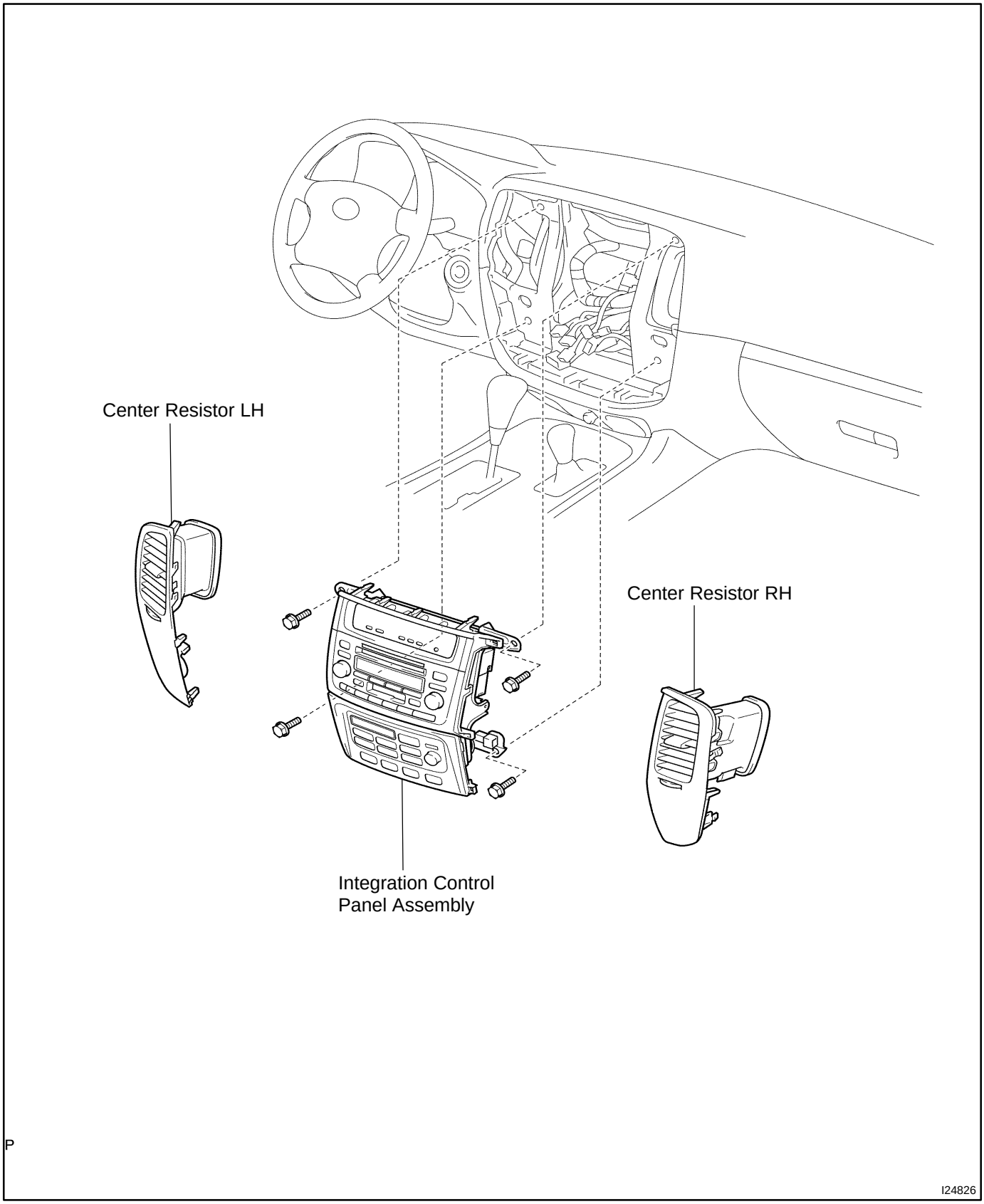
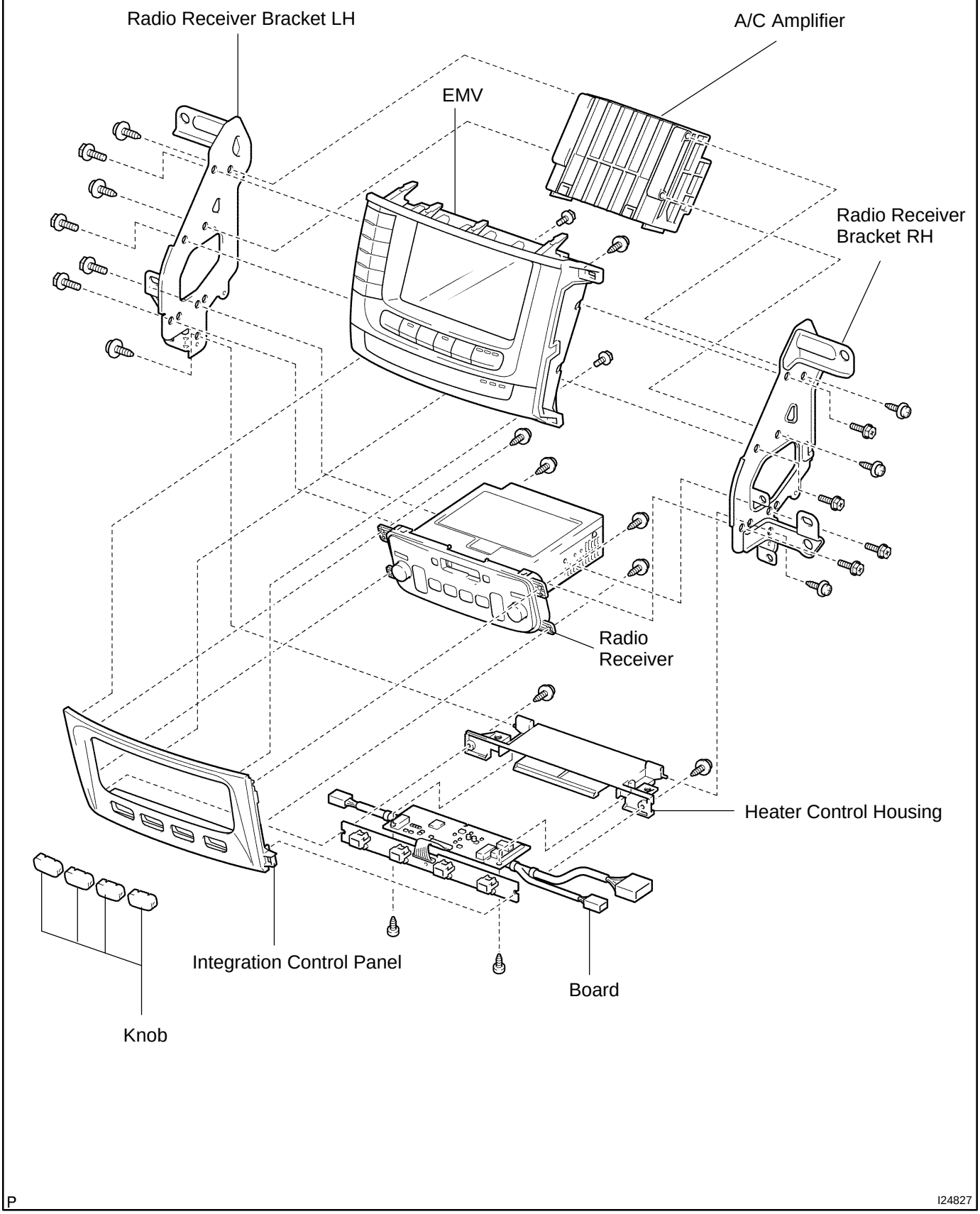
AIR CONDITIONING CONTROL ASSEMBLY

COMPONENTS

AC3P2-01



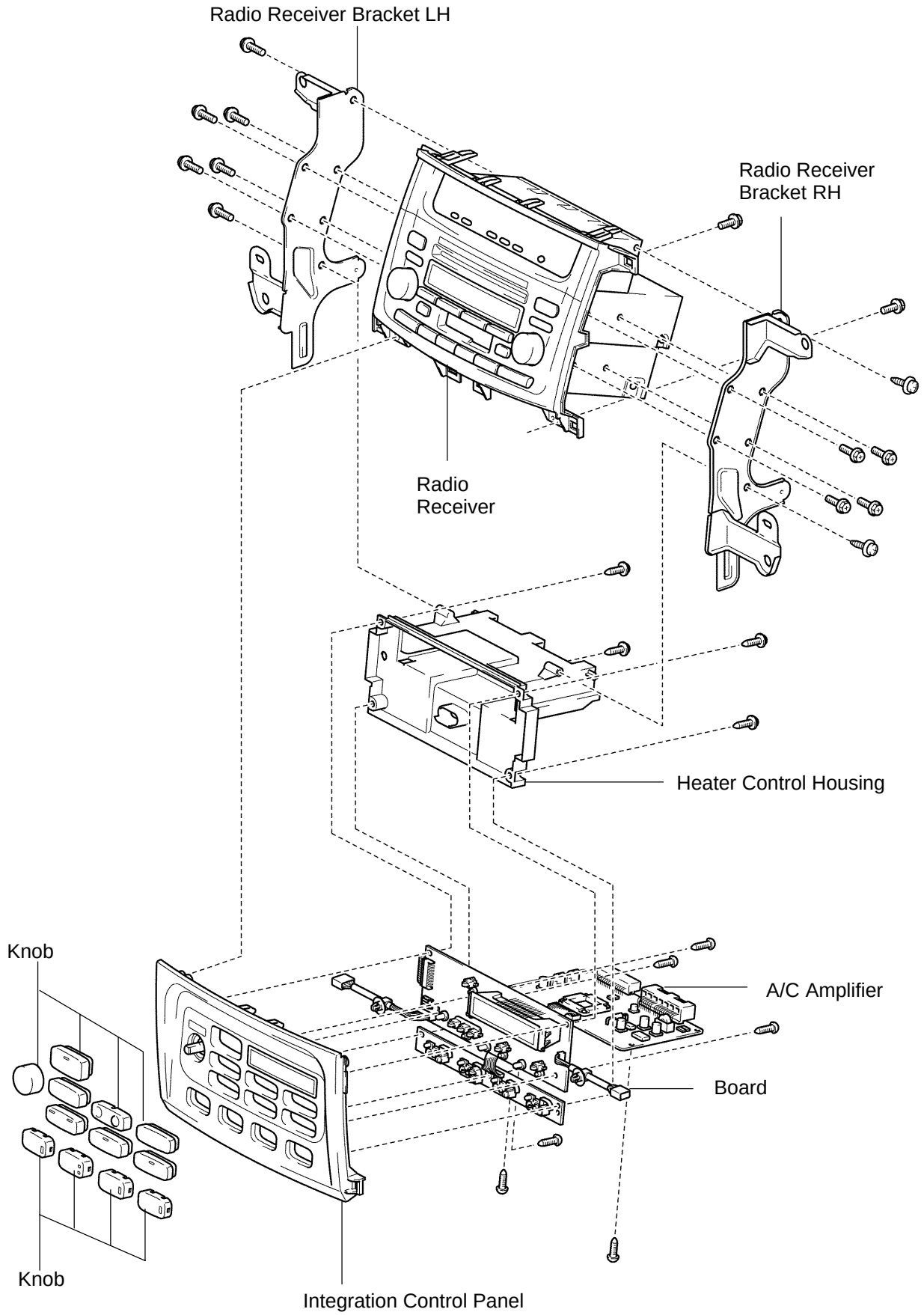
w/ Navigation System:



P

I24827

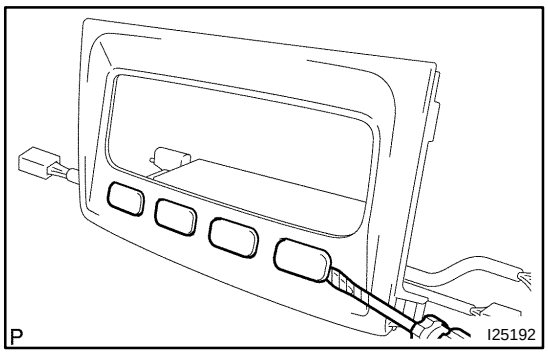
w/o Navigation System:



P I25152

AC3P0-01

DISASSEMBLY

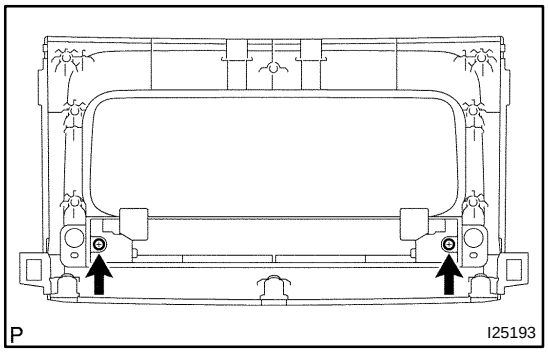


1. w/ navigation system:
REMOVE KNOB

Using a screwdriver, pull out the knobs.

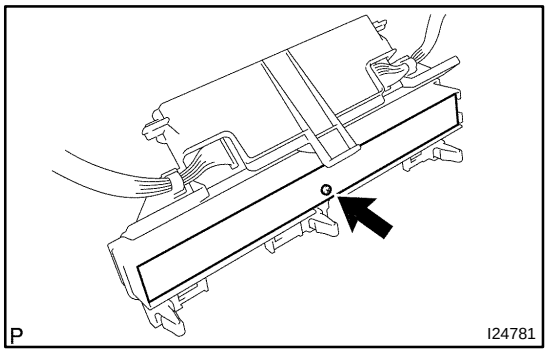
HINT:

Tape up the screwdriver tip before use.

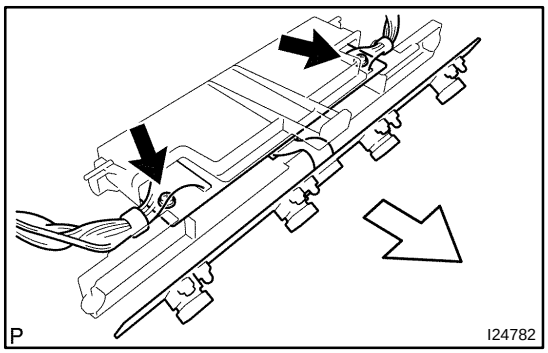


2. w/ navigation system:
REMOVE INTEGRATION CONTROL PANEL

(a) Remove the 2 screws.



(b) Remove the screw and the board.



3. w/ navigation system:
REMOVE HEATER CONTROL HOUSING

(a) Disconnect the connector clamps.

(b) Remove the 2 screws and pull out the board from the heater control housing.

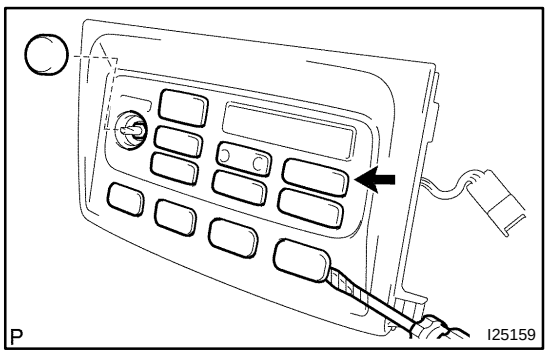
4. REMOVE KNOB

(a) Using a screwdriver, pull out the knobs.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the nut.

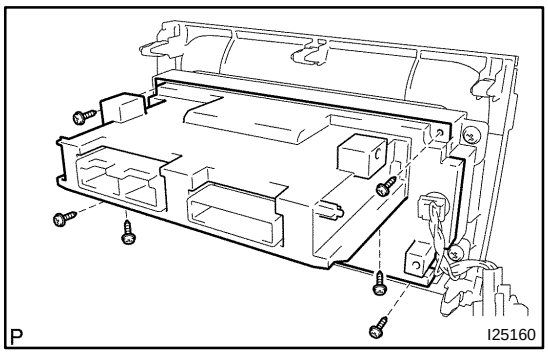


5. w/o LEXUS navigation system:
REMOVE KNOB

Using a screwdriver, pull out the knobs.

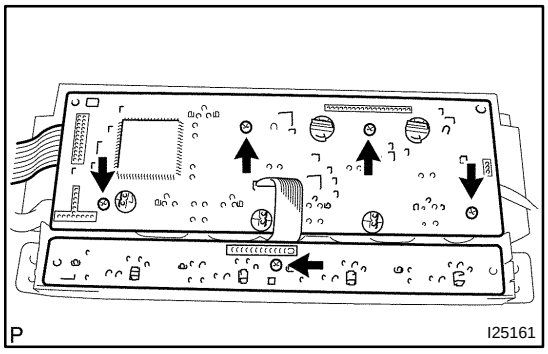
HINT:

Tape up the screwdriver tip before use.



6. w/o navigation system:
REMOVE INTEGRATION CONTROL PANEL

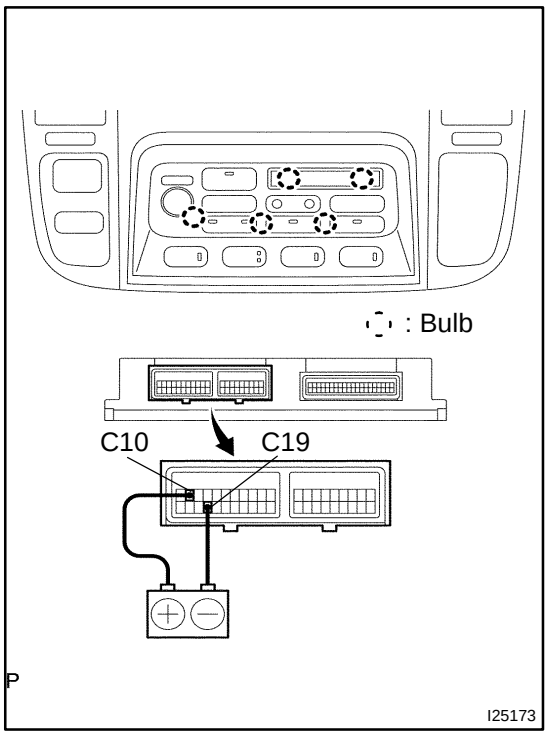
(a) Remove the 6 screws and pull out the A/C amplifier.



(b) Remove the 5 screws and the board.

AC3P1-01

INSPECTION

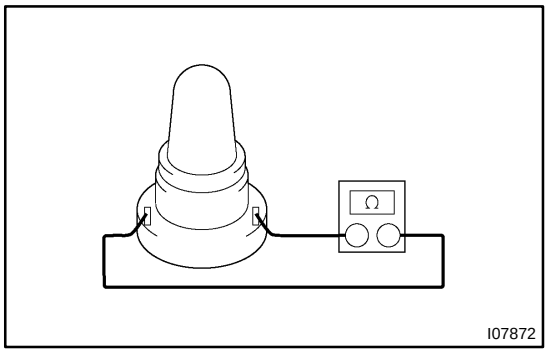


1. w/o Navigation system:
INSPECT ILLUMINATION OPERATION

(a) Connect the positive (+) lead from the battery to terminal C10 and negative (-) lead to terminal C19, then check that the indicators illuminate.

If operation is not as specified, check the faulty bulb.

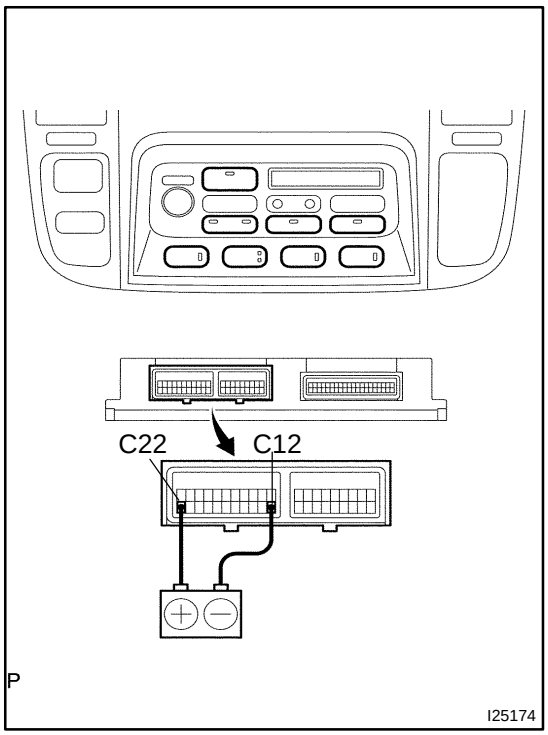
(b) Remove the bulb.



(c) Using the tester as shown in the illustration, test the continuity.

If continuity exists, replace the heater control.

If no continuity exists, replace the bulb.



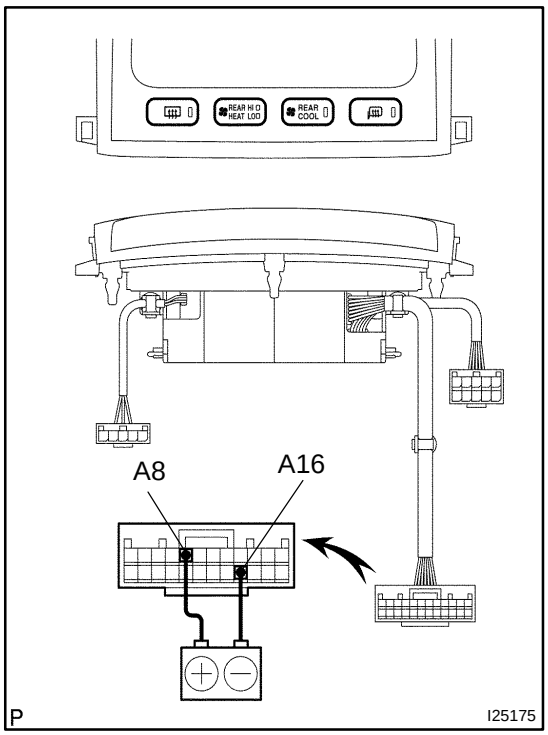
2. w/o Navigation system:
INSPECT INDICATORS OPERATION

(a) Connect the positive (+) lead from the battery to terminal C22 and negative (-) lead to terminal C12.

(b) Check that the indicators come on while operate the switches.

If operation is not as specified, replace the heater control.

3. INSPECT A/C CONTROL ASSEMBLY CIRCUIT
(See page DI-1309)



4. w/ Navigation system:
INSPECT ILLUMINATION OPERATION

(a) Connect the positive (+) lead from the battery to terminal A8 and negative (-) lead to terminal A16.

(b) Check that the indicators come on while operating the switches.

If operation is not as specified, replace the heater control.

5. INSPECT A/C CONTROL ASSEMBLY CIRCUIT
(See page DI-1309)

AC1JL-02

INSTALLATION

Installation is in the reverse of removal (See page AC-100).

HINT:

w/ Navigation System:

When removing/installing or replacing EMV, or when disconnecting/connecting the battery terminal, turn the IG ON and OFF twice for initial display setting.

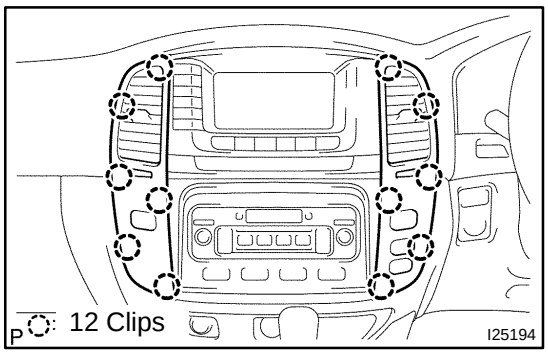
AC1JK-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-102).

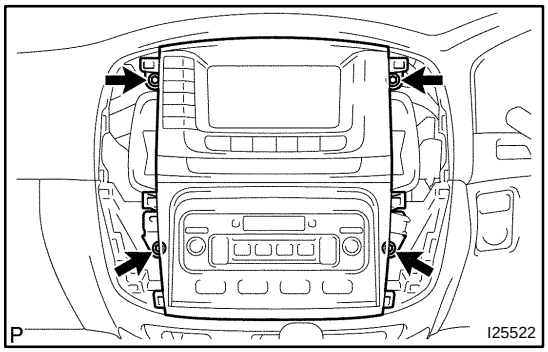
AC3OZ-01

REMOVAL



1. REMOVE CENTER RESISTORS

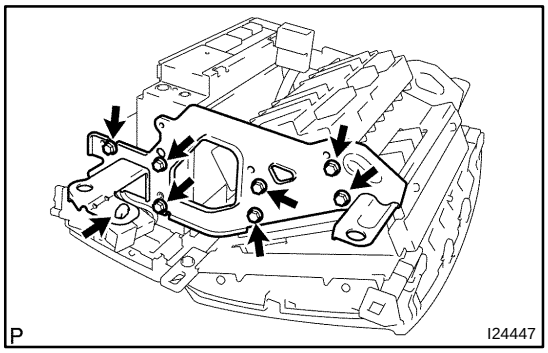
Disengage the 12 clips and remove the center resistors, then disconnect the connectors.



2. REMOVE INTEGRATION CONTROL PANEL ASSEMBLY

(a) Remove the 4 bolts.

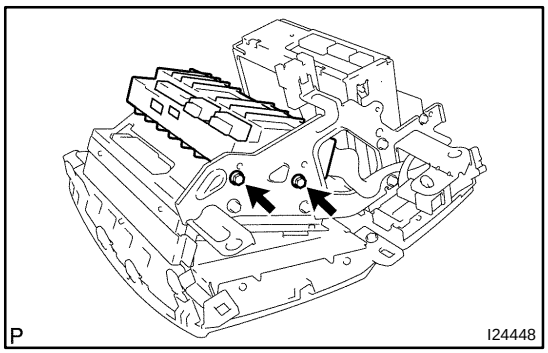
(b) Remove the integration control panel assembly, then disconnect the connectors.



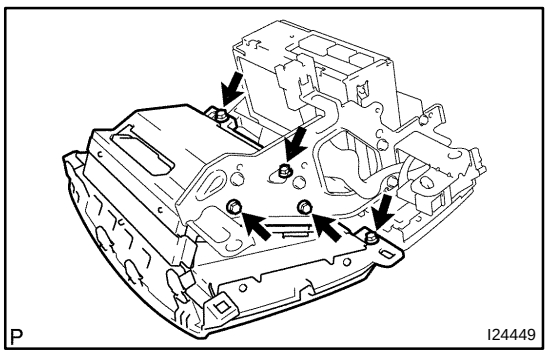
3. w/ navigation system:
REMOVE A/C AMPLIFIER

(a) Disconnect the connector clamp.

(b) Remove the 3 screws, the 4 bolts and the radio receiver bracket LH.

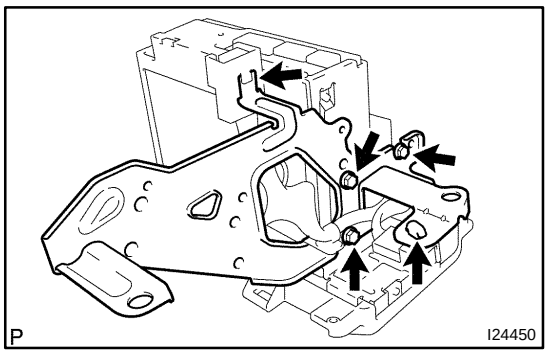


(c) Remove the 2 screws and the A/C amplifier.



4. w/ LEXUS navigation system:
REMOVE EMV

Remove the 3 screws, the 2 bolts and the EMV.

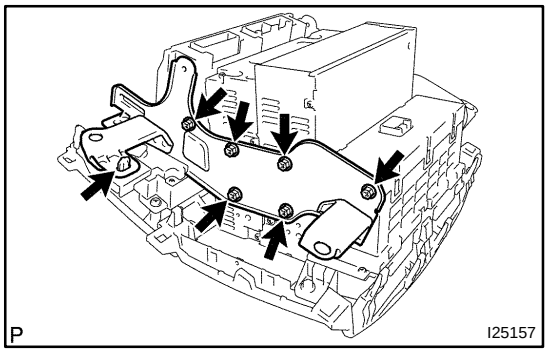


5. w/ navigation system:
REMOVE INTEGRATION CONTROL PANEL

6. Disconnect the connector clamps.

(a) Remove the screw, the 2 bolts and the radio receiver bracket RH.

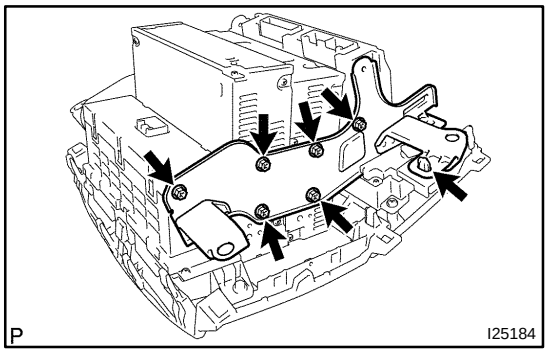
(b) Remove the integration control panel from the radio receiver.



7. w/o navigation system:
REMOVE INTEGRATION CONTROL PANEL

(a) Disconnect the connector clamp.

(b) Remove the 2 screws, 4 bolts and the radio receiver bracket LH.



(c) Disconnect the connector clamp.

(d) Remove the 2 screws, 4 bolts and the radio receiver bracket RH.

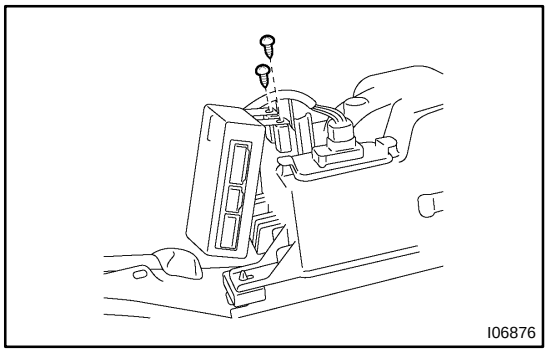
(e) Remove the integration control panel.

AIR CONDITIONING AMPLIFIER (for Rear A/C)

AC22D-03

INSPECTION

1. REMOVE REAR DOOR SCUFF PLATE RH
2. REMOVE REAR FLOOR MAT SUPPORT PLATE
3. REMOVE QUARTER TRIM PANEL RH



4. REMOVE A/C AMPLIFIER

(a) Disconnect the connectors.

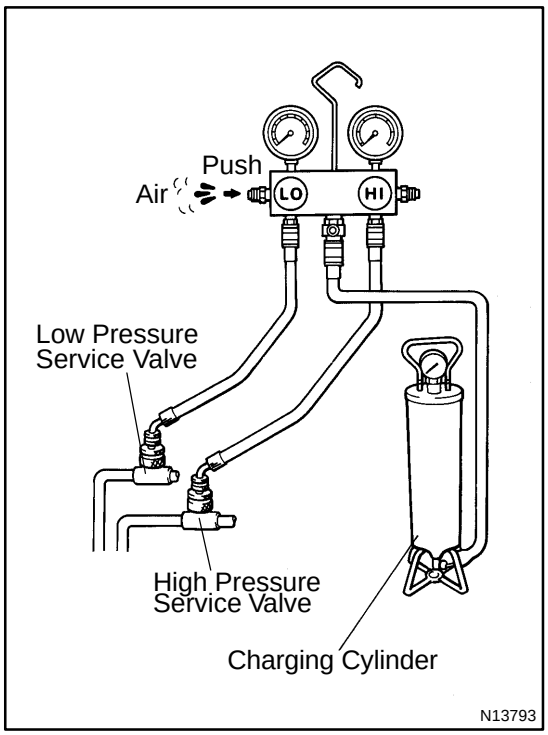
(b) Remove the 2 screws and the A/C amplifier.

5. INSPECT REAR A/C AMPLIFIER CIRCUIT

(See page DI-1309)

AC1HN-04

CHARGING



1. INSTALL CHARGING CYLINDER

HINT:

When handling the charging cylinder, always follow the directions given in the instruction manual.

(a) Charge the proper amount of refrigerant into the charging cylinder.

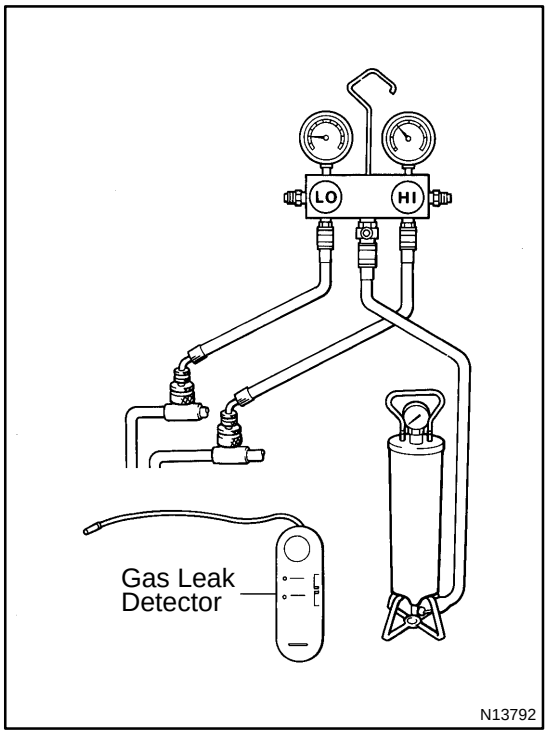
(b) Connect the center hose to the charging cylinder.

CAUTION:

Do not open both high and low hand valves of manifold gauge set.

(c) Open the valve of the charging cylinder.

(d) Press the valve core on the side of manifold gauge and expel the air inside the center hose.



2. INSPECT REFRIGERATION SYSTEM FOR LEAKS

(a) Open the high pressure hand valve and the charge refrigerant.

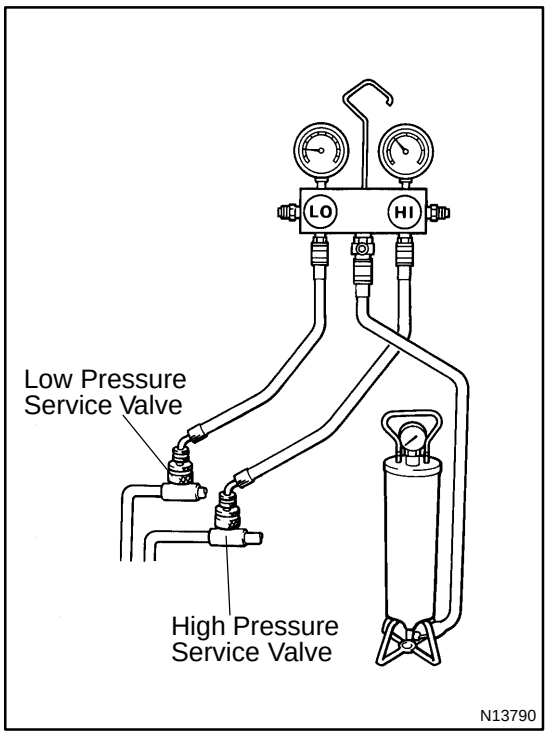
(b) When the low pressure gauge indicates 98 kPa (1 kgf/cm^2, 14 psi), close the high pressure hand valve.

(c) Using a gas leak detector, check the system for any leakage.

If leaks are found, repair the faulty component or connection.

CAUTION:

Use the refrigerant recovery/ recycling machine to recover the refrigerant whenever replacing parts.



3. CHARGE REFRIGERANT INTO REFRIGERATION SYSTEM

If there is no leak after refrigerant leak check, charge the proper amount of refrigerant into the refrigeration system.

CAUTION:

- **Do not run the engine when charging the system through the high pressure side.**
- **Do not open the low pressure hand valve when the system is being charged with liquid refrigerant.**

(a) Open the high pressure hand valve fully.

(b) Charge specified amount of refrigerant, then close the high pressure hand valve.

HINT:

No bubbles in the sight glass indicates that the system is fully charged.

(c) Partially charge the refrigeration system with refrigerant.

(1) Start engine and race engine at 1,500 rpm.

(2) Set fan speed selector to ”HI”.

(3) Set temperature control to ”MAX. COOL”.

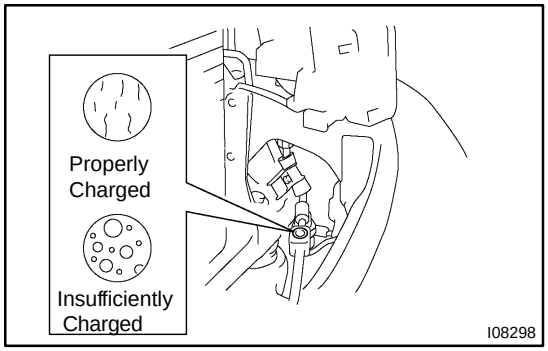
(4) Set air inlet control to ”RECIRC”.

(5) Fully open doors (Sliding roof: closed).

(6) Open the low pressure hand valve.

CAUTION:

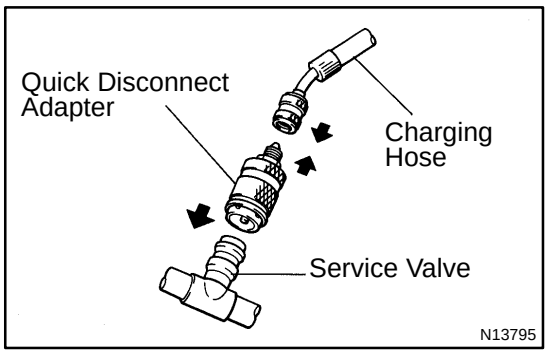
Do not open the high pressure hand valve.



(d) Charge refrigerant until bubbles disappear and check the pressure on the gauge through the sight glass.

AC1HM-04

EVACUATING



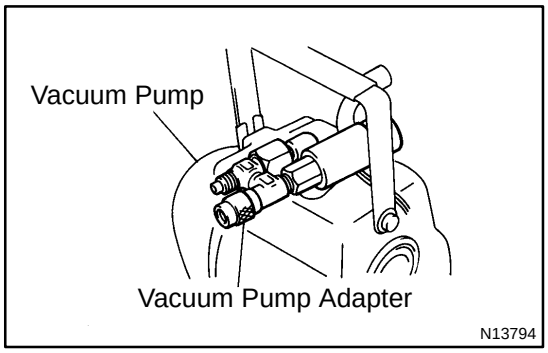
1. CONNECT QUICK DISCONNECT ADAPTER TO CHARGING HOSES

2. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES

3. SET ON MANIFOLD GAUGE SET

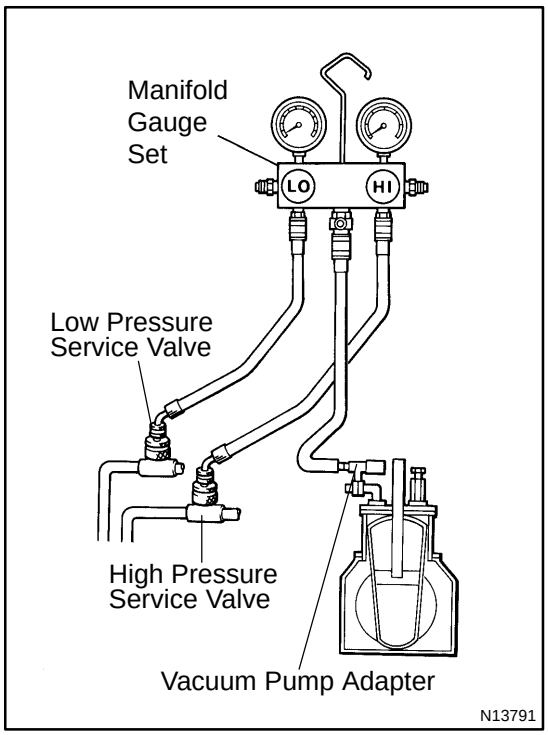
(a) Close both the hand valves of the manifold gauge set.

(b) Connect the quick disconnect adapters to the service valves.



4. EVACUATE AIR FROM REFRIGERATION SYSTEM

(a) Connect the vacuum pump adapter to the vacuum pump.



(b) Connect the center hose of the manifold gauge set to the vacuum pump adapter.

(c) Open both the high and low hand valves and run the vacuum pump.

(d) After 10 minutes or later, check that the low pressure gauge indicates 750 mmHg (30 in. Hg) minimum.

HINT:

If the reading is 750 mmHg (30 in. Hg) close both hand valves of the manifold gauge set and stop the vacuum pump.

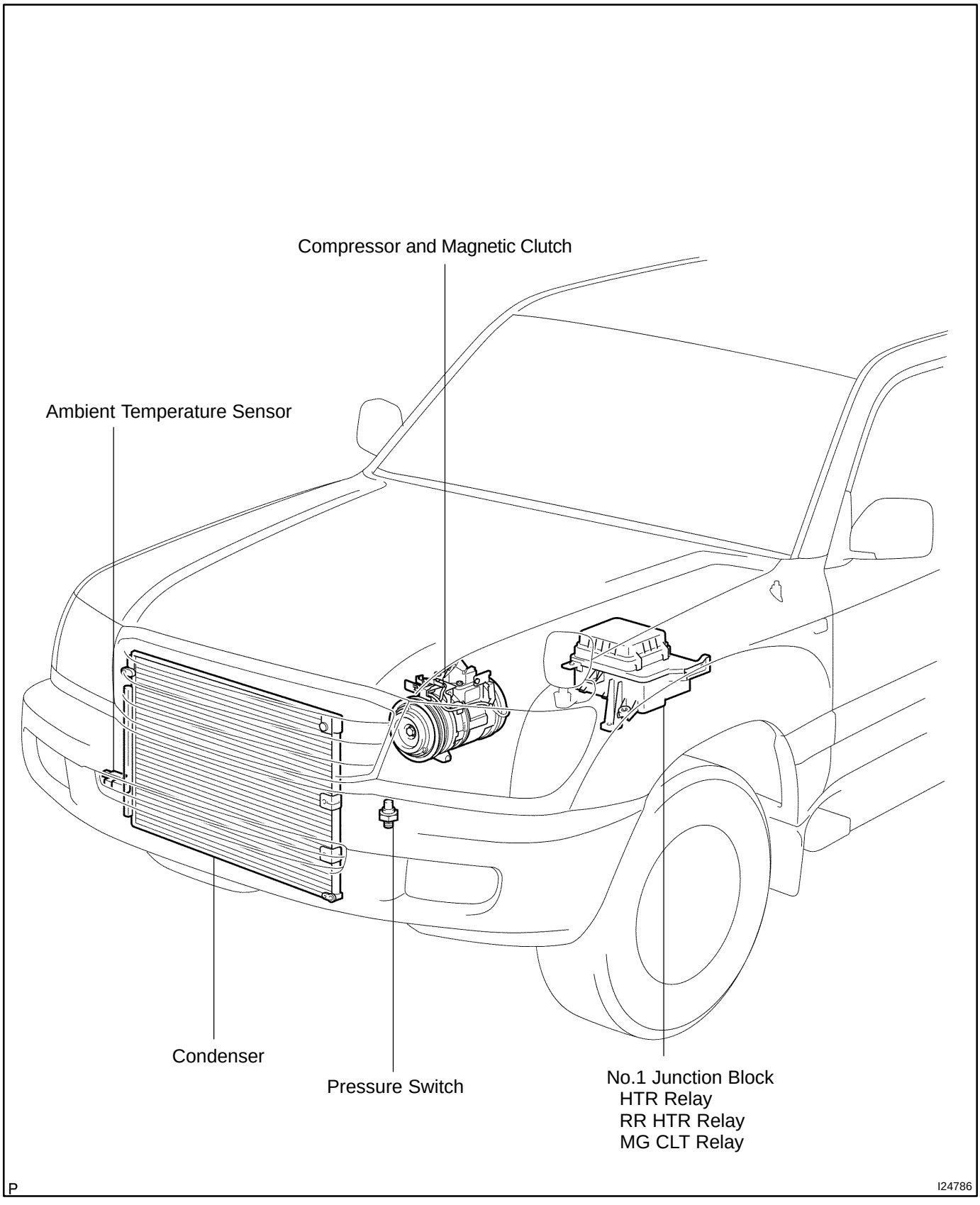
Check the system for leaks and repair if necessary.

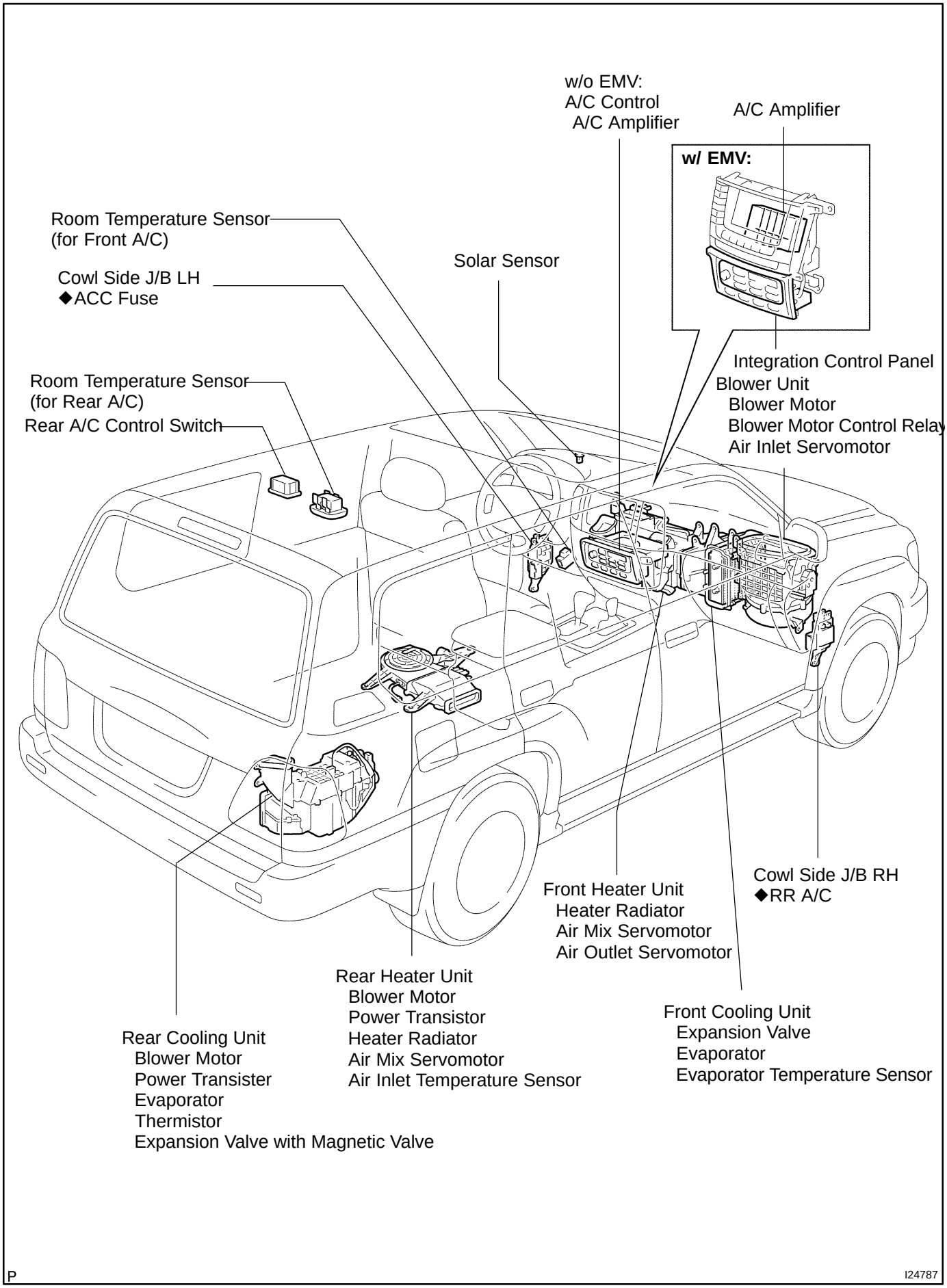
(e) Close both the high and low hand valves and stop the vacuum pump.

(f) Leave the system in this condition for at least 5 minutes and check that there is no gauge indicator.

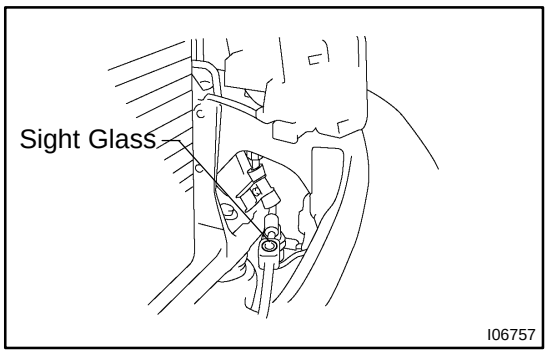
AC1HO-05

LOCATION




w/o EMV:
A/C Control
A/C Amplifier
A/C Amplifier
w/ EMV:
Room Temperature Sensor
(for Front A/C)
Cowl Side J/B LH
◆ACC Fuse
Solar Sensor
Integration Control Panel
Blower Unit
Blower Motor
Blower Motor Control Relay
Air Inlet Servomotor
Room Temperature Sensor
(for Rear A/C)
Rear A/C Control Switch
Cowl Side J/B RH
◆RR A/C
Front Heater Unit
Heater Radiator
Air Mix Servomotor
Air Outlet Servomotor
Rear Heater Unit
Blower Motor
Power Transistor
Heater Radiator
Air Mix Servomotor
Air Inlet Temperature Sensor
Front Cooling Unit
Expansion Valve
Evaporator
Evaporator Temperature Sensor
Rear Cooling Unit
Blower Motor
Power Transister
Evaporator
Thermistor
Expansion Valve with Magnetic Valve
P
I24787

AC1HL-05



ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

Observe the sight glass on the liquid tube.

Test conditions:

- Engine speed at 1,500 rpm
- Fan speed selector at ”HI” position
- A/C switch ON
- Temperature control dial at ”COOL” position
- Doors fully opened

Item	Symptom	Amount of refrigerant	Remedy
1	Bubbles appear in sight glass	Insufficient*	(1) Check for gas leakage with gas leak detector and repair, if necessary (2) Add refrigerant until bubbles disappear
2	No bubbles appear in sight glass	None, sufficient or too much	Refer to item 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	Temperature between compressor inlet and outlet is noticeably different	Correct or too much	Refer to items 5 and 6
5	Immediately after air conditioning system is turned off, refrigerant in sight glass stays clear	Too much	(1) Discharge refrigerant (2) Evacuate air and charge proper amount of purified refrigerant
6	When air conditioning system is turned off, refrigerant foams and then stays clear	Correct	-

*: Bubbles in the sight glass with ambient temperatures higher than usual can be considered normal if cooling is sufficient.

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

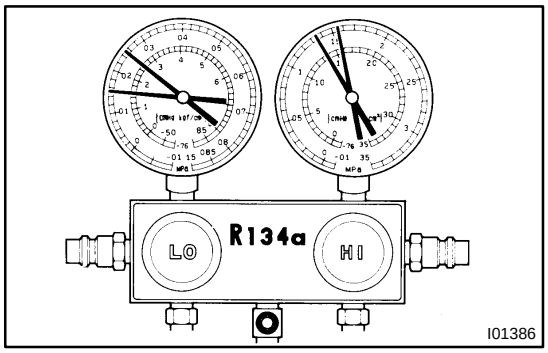
Check the trouble area using a set of manifold gauge set. Read the manifold gauge pressure when following conditions are detected.

Test conditions:

- Temperature at the air inlet with the switch set at RECIRC is 30 - 35 °C (86 - 95 °F)
- Engine running at 2,000 rpm
- Fan speed selector at "HI" position
- Temperature control dial on "COOL" position

HINT:

It should be noted that the gauge indications may vary depending on ambient temperature conditions.



(1) Normally functioning refrigeration system.

Gauge reading:

Low pressure side:

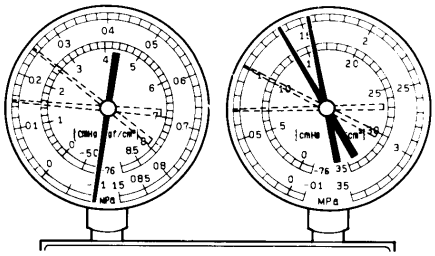
0.15 - 0.25 MPa (1.5 - 2.5 kgf/cm^2)

High pressure side:

1.37 - 1.57 MPa (14 - 15 kgf/cm$^{2)}$

(2) Moisture present in refrigeration system.

Condition: Periodically cools and then fails to cool

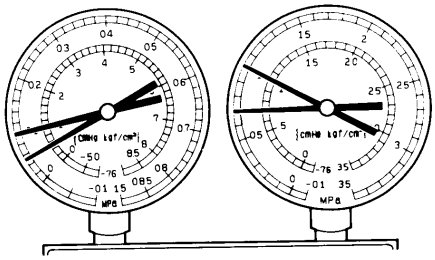


I01387

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
During operation, pressure on low pressure side sometimes become a vacuum and sometime normal	Moisture entered in refrigeration system freezes at expansion valve orifice and temporarily stops cycle, but normal state is restored after a time when the ice melts	◆Drier in over-saturated state ◆Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant	(1) Replace condenser (2) Remove moisture in cycle through repeatedly evacuating air (3) Charge proper amount of new refrigerant

(3) Insufficient cooling.

Condition: Insufficient cooling

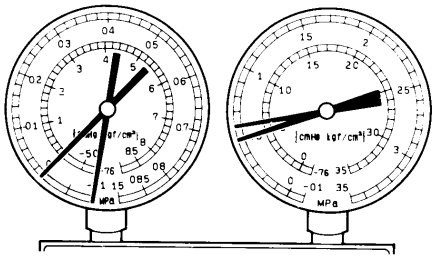


I01388

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure low on both low and high pressure sides ◆Bubbles seen in sight glass continuously ◆Insufficient cooling performance	Gas leakage at some place in refrigeration system	◆Insufficient refrigerant in system ◆Refrigerant leaking	(1) Check for gas leakage with gas leak detector and repair if necessary (2) Charge proper amount of refrigerant (3) If indicated pressure value is near 0 when connected to gauge, create the vacuum after inspecting and repairing the location of the leak

(4) Poor circulation of refrigerant.

Condition: Insufficient cooling

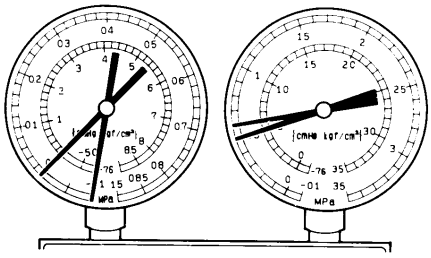


I01389

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure low in both low and high pressure sides ◆Frost on tube from condenser to unit	Refrigerant flow obstructed by dirt in condenser	condenser clogged	Replace condenser

(5) Refrigerant does not circulate.

Condition: Does not cool (Cools from time to time in some cases)

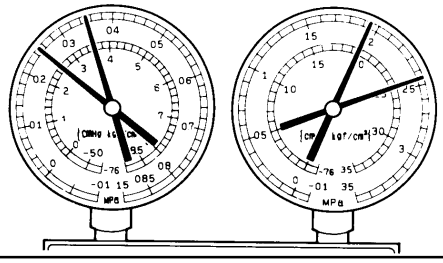


I01449

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Vacuum indicated on low pressure side, very low pressure indicated on high pressure side ◆Frost or dew seen on piping before and after condenser/ drier 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 out dirt in expansion valve by blowing with air (3) Replace condenser (4) Evacuate air and charge new refrigerant to proper amount (5) For gas leakage from expansion valve, replace expansion valve

(6) Refrigerant overcharged or insufficient cooling of condenser.

Condition: Insufficient cooling

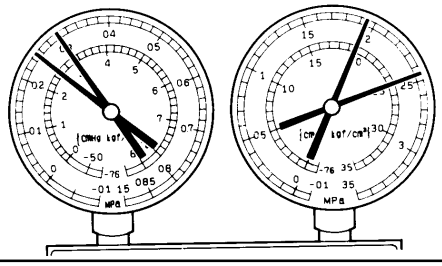


I01390

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure too high on both low and high pressure sides ◆No air bubbles seen through the sight glass even when the engine rpm is lowered	◆Unable to develop sufficient performance due to excessive refrigeration system ◆Insufficient cooling of condenser	◆Excessive refrigerant in cycle → refrigerant over charged ◆Condenser cooling → condenser fins clogged or cooling fan faulty	(1) Clean condenser (2) Check cooling fan with fluid coupling operation (3) If (1) and (2) are in normal state, check amount of refrigerant, and charge proper amount of refrigerant

(7) Air present in refrigeration system.

Condition: Insufficient cooling



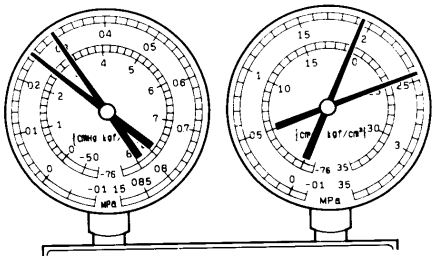
NOTE : These gauge indications are shown when the refrigeration system has been opened and the refrigerant charged without vacuum purging.

I01392

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure too high on both low and high pressure sides ◆The low pressure piping hot to touch ◆Bubbles seen in sight glass	Air entered in refrigeration system	◆Air present in refrigeration system ◆Insufficient vacuum purging	(1) Check compressor oil to see if it is dirty or insufficient (2) Evacuate air and charge new refrigerant

(8) Expansion valve improperly.

Condition: Insufficient cooling

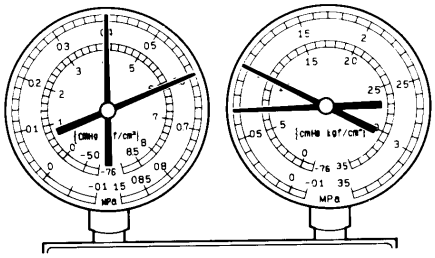


I01450

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure too high on both low and high pressure sides ◆Frost or large amount of dew on piping on low pressure side	Trouble in expansion valve	◆Excessive refrigerant in low pressure piping ◆Expansion valve opened too wide	Check expansion valve, and replace if defective

(9) Defective compression compressor.

Condition : Does not cool



I01393

Symptom seen in refrigeration system	Probable cause	Diagnosis	Remedy
◆Pressure too high on low and high pressure sides ◆Pressure too low on high pressure side	Internal leak in compressor	◆Compression defective ◆Valve leaking or broken sliding parts	Repair or replace compressor

3. INSPECT IDLE-UP SPEED

(a) Warm up engine

(b) Inspect idle-up speed when following conditions are established.

Test conditions:

- Fan speed selector at "HI" position
- Temperature control dial at "COOL" position
- A/C switch ON
- Put gear shift in neutral

Magnetic clutch condition	Idle-up speed
Magnetic clutch not engaged	700 ± 50 rpm
Magnetic clutch engaged	780 ± 50 rpm

If idle speed is not as specified, check the idle control system.

4. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Stop engine.

(b) Secure good ventilation (The gas leak detector may not react to volatile gases which are not refrigerant, such as evaporated gasoline and exhaust gas)

(c) Repeat the test 2 or 3 times

(d) Make sure that there is some refrigerant remaining in the refrigeration system.

When compressor is OFF: approx. 392 - 588 kPa (4 - 6 kgf·cm^2, 57 - 85 psi)

(e) Bring the gas leak detector close to the drain hose before performing the test.

HINT:

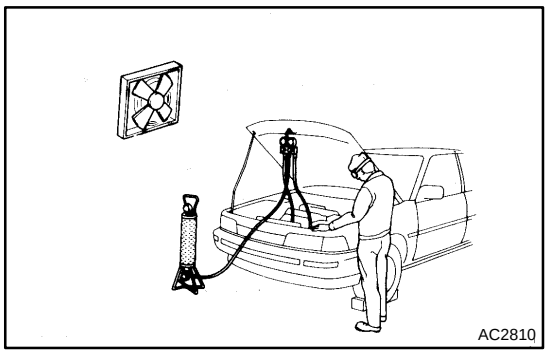
- After the blower motor stops, leave the cooling for more than 15 minutes.
- Expose the gas leak detector sensor under the drain hose.
- When bring the gas leak detector close to the drain hose, make sure that the gas leak detector does not react to the volatile gases.

If gas leaks are detected, lift up the vehicle.

(f) If gas leaks are not detected on the drain hose, remove the blower resistor from the cooling unit. Then insert the gas leak detector sensor into the unit to perform the test.

(g) Disconnect the connector and leave the pressure switch for approx. 20 minutes. Then bring the gas leak detector close to the pressure switch to perform the test.

(h) Bring the gas leak detector close to the refrigerant lines.


AC2810

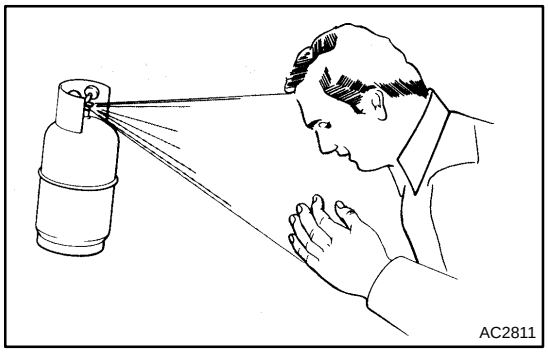
AIR CONDITIONING SYSTEM

AC1HK-04

PRECAUTION

1. DO NOT HANDLE REFRIGERANT IN AN ENCLOSED AREA OR NEAR AN OPEN FLAME

2. ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION


AC2811

3. AVOID YOUR EYES AND SKIN TO CONTACT WITH LIQUID REFRIGERANT

If you get the liquid refrigerant in your eyes or on your skin:

(a) Wash out the area with lots of cold water.

CAUTION:

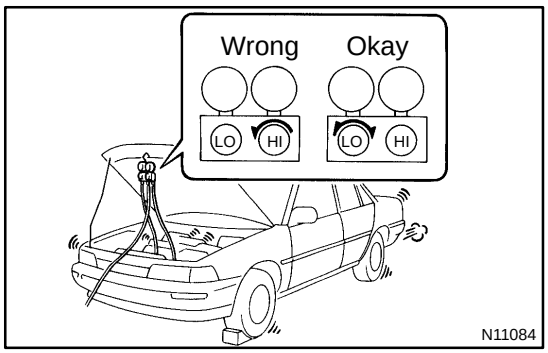
Do not rub your eyes or skin.

(b) Apply clean petroleum jelly to the skin.

(c) Go immediately to a physician or hospital for professional treatment.

4. NEVER HEAT CONTAINER OR EXPOSE IT TO NAKED FLAME

5. DO NOT DROP CONTAINER NOR APPLY PHYSICAL SHOCKS TO IT.



N11084

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 compressor burnout may occur. To avoid this, always keep enough refrigerant in the refrigerant system.

7. DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING

If the high pressure valves opened, refrigerant flows in the reverse direction and could cause the charging cylinder to rupture, so open and close the only low pressure valve.

8. DO NOT OVERCHARGE REFRIGERANT SYSTEM WITH REFRIGERANT

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating etc.

9. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

The LAND CRUISER is equipped with SRS (Supplemental Restraint System) such as the driver airbag and the front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

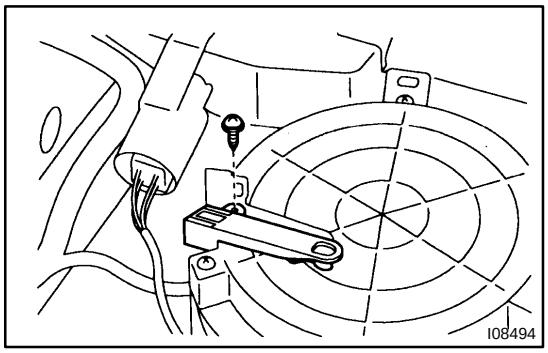
AIR INLET TEMPERATURE SENSOR

AC1LQ-04

INSPECTION

1. **REMOVE FRONT SEATS**
2. **REMOVE REAR CONSOLE BOX**
3. **REMOVE FRONT CONSOLE BOX COVER**
4. **REMOVE LOWER CENTER CLUSTER FINISH PANEL**
5. **REMOVE FRONT DOOR SCUFF PLATES**
6. **REMOVE COWL SIDE TRIMS**
7. **REMOVE REAR DOOR SCUFF PATES**
8. **REMOVE CENTER PILLAR GARNISHES**
9. **REMOVE AIR INLET TEMPERATURE SENSOR**

(a) Slide the floor carpet backward.

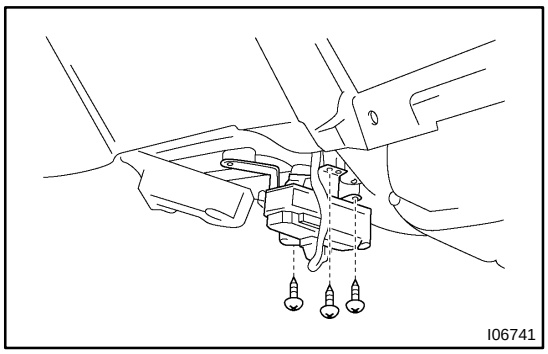


(b) Disconnect the connector.
(c) Remove the screw and the air inlet temperature sensor.

10. **INSPECT AIR INLET TEMPERATURE SENSOR CIRCUIT (See page DI-1342)**
11. **INSTALL AIR INLET TEMPERATURE SENSOR**

(a) Install the air inlet temperature sensor with the screw.
(b) Connect the connector.
(c) Install the floor carpet.

12. **INSTALL CENTER PILLAR GARNISHES**
13. **INSTALL REAR DOOR SCUFF PLATES**
14. **INSTALL COWL SIDE TRIMS**
15. **INSTALL FRONT DOOR SCUFF PLATES**
16. **INSTALL REAR CONSOLE BOX**
17. **INSTALL FRONT SEATS**



AIR MIX SERVOMOTOR (for Front A/C)

AC1LK-06

INSPECTION

1. REMOVE AIR MIX SERVOMOTOR

(a) Disconnect the connector.

(b) Remove the 2 screws and the air mix servomotor.

2. INSPECT AIR MIX SERVOMOTOR OPERATION
(See page DI-1354)

3. INSPECT AIR MIX DAMPER POSITION SENSOR
(See page DI-1345)

4. INSTALL SERVOMOTOR

(a) Install the servomotor with the 3 screws.

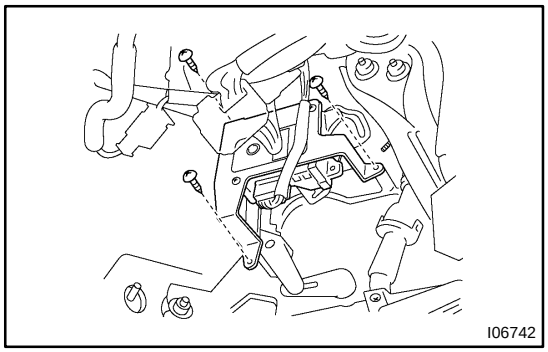
(b) Connect the connector.

AIR OUTLET SERVOMOTOR

AC1LL-06

INSPECTION

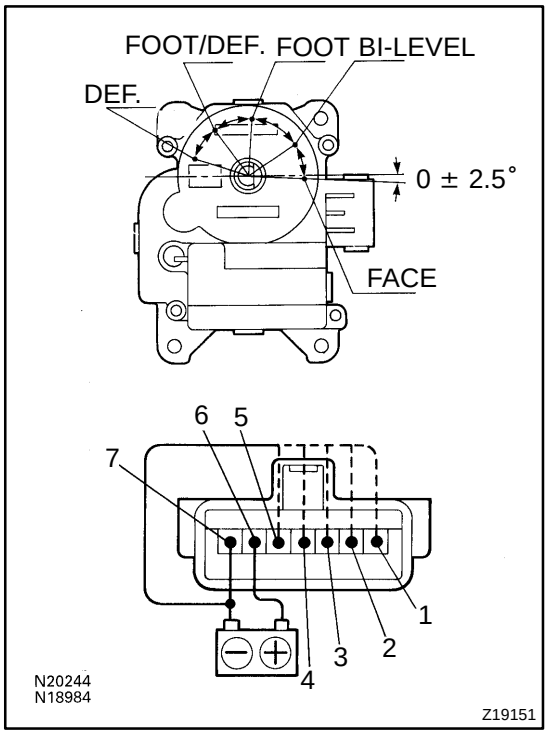
1. REMOVE LOWER NO. 1 PANEL (See page BO-84)



2. REMOVE AIR OUTLET SERVOMOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and the air outlet servomotor.



3. INSPECT AIR OUTLET SERVOMOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 7.

(b) Connect the negative (-) lead from the battery to each terminal and check that the shaft rotates at each position, as shown in the illustration.

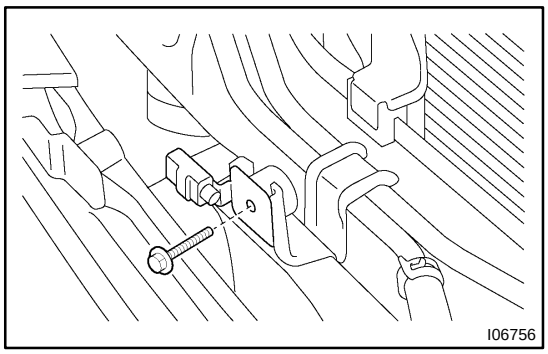
Connected terminal	Position
5	DEF.
4	FOOT/DEF.
3	FOOT
2	B/L
1	FACE

If operation is not as specified, replace the servomotor.

4. INSTALL AIR OUTLET SERVOMOTOR

(a) Install the air outlet servomotor with the 3 screws.

(b) Connect the connector.



AMBIENT TEMPERATURE SENSOR

AC1LP-05

INSPECTION

1. REMOVE AMBIENT TEMPERATURE SENSOR

(a) Disconnect the connector.

(b) Remove the bolt and the ambient temperature sensor.

2. INSPECT AMBIENT TEMPERATURE SENSOR CIRCUIT (See page DI-1319)

3. INSTALL AMBIENT TEMPERATURE SENSOR

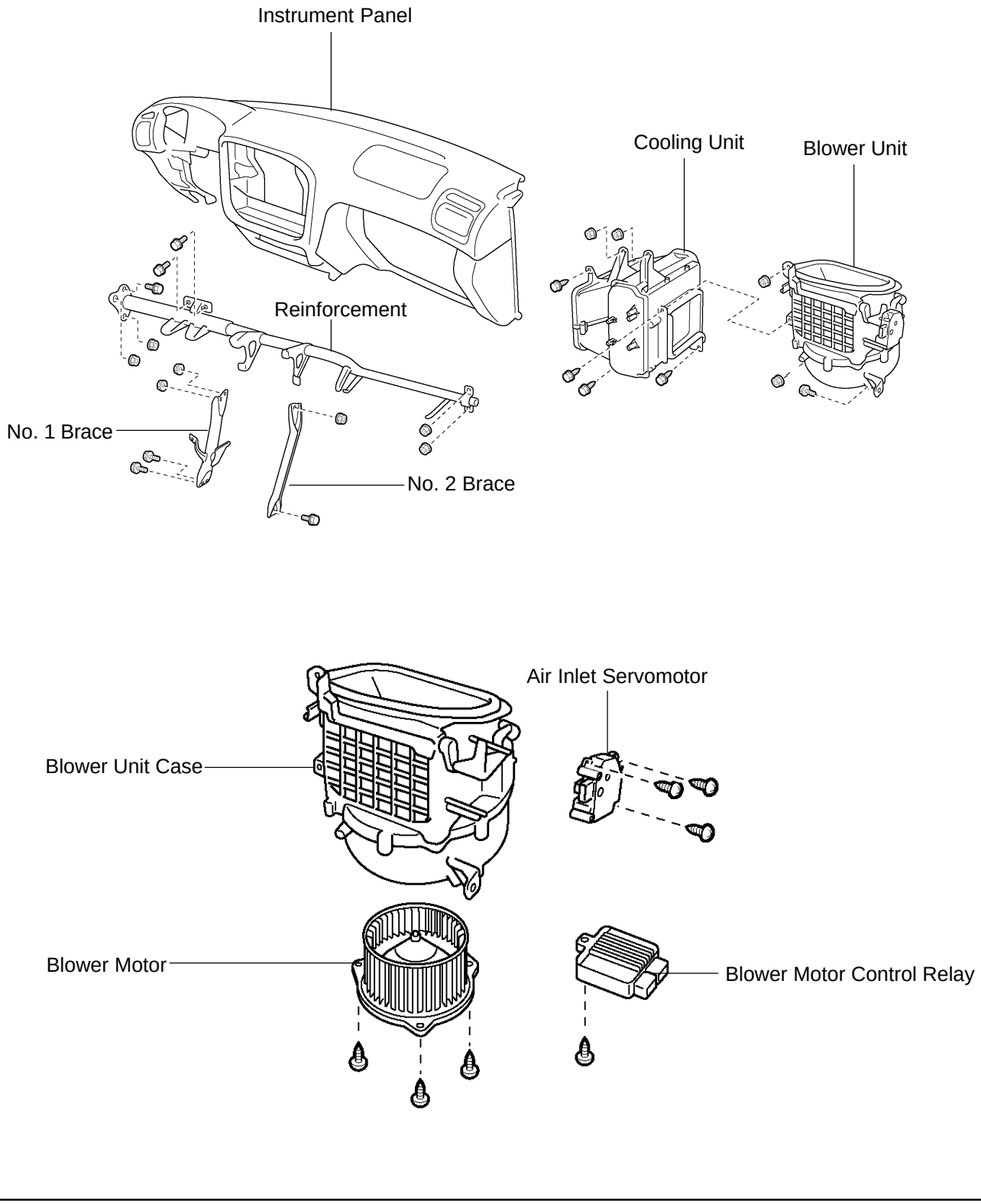
(a) Install the ambient temperature sensor to the condenser upper bracket.

(b) Connect the connector.

BLOWER UNIT

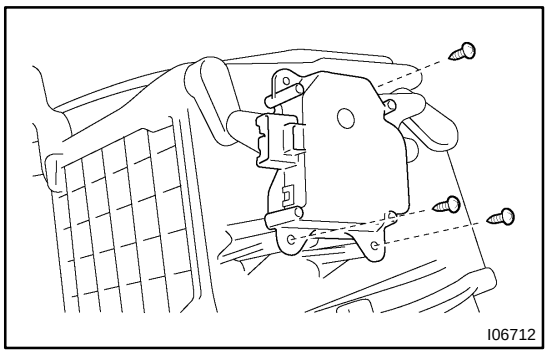
COMPONENTS

AC1KT-03



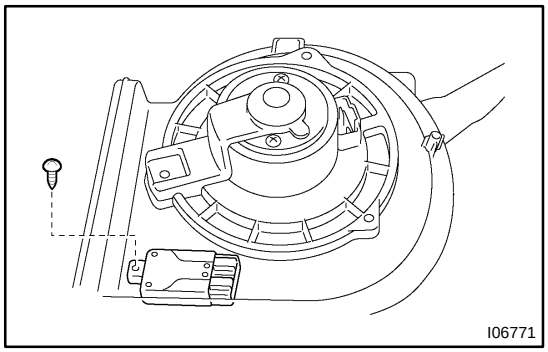
AC1KV-03

DISASSEMBLY



1. REMOVE AIR INLET SERVOMOTOR

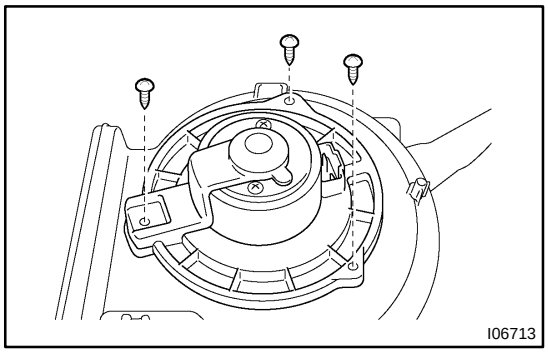
Remove the 3 screws and the air inlet servomotor.



2. REMOVE BLOWER MOTOR CONTROL RELAY

(a) Disconnect the connector.

(b) Remove the screw and the blower motor control relay.



3. REMOVE BLOWER MOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and the blower motor.

4. REMOVE WIRE HARNESS

Remove the screw and the wire harness.

AC1KW-05

INSPECTION

1. INSPECT AIR INLET SERVOMOTOR OPERATION (See page DI-1357)
2. INSPECT AIR INLET DAMPER POSITION SENSOR CIRCUIT (See page DI-1348)

AC1KY-02

INSTALLATION

Installation is in the reverse of removal (See page AC-55).

AC1KX-02

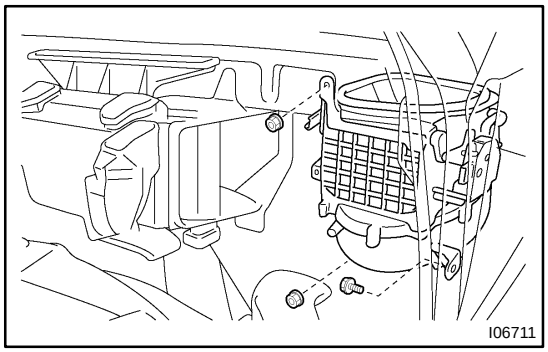
REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-56).

AC1KU-04

REMOVAL

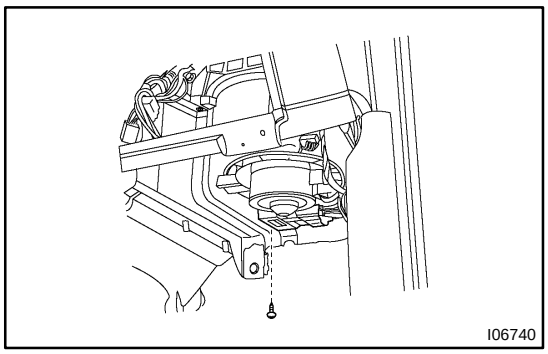
1. REMOVE FRONT COOLING UNIT (See page AC-24)



2. REMOVE BLOWER UNIT

(a) Disconnect the connectors.

(b) Remove the bolt, 2 nuts and the blower unit.



BLOWER MOTOR CONTROL RELAY

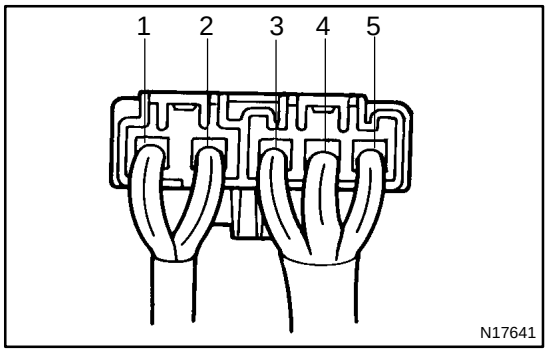
AC1LH-03

INSPECTION

1. REMOVE BLOWER MOTOR CONTROL RELAY

(a) Disconnect the connectors.

(b) Remove the screw and the blower motor control relay.



2. INSPECT BLOWER MOTOR CONTROL RELAY

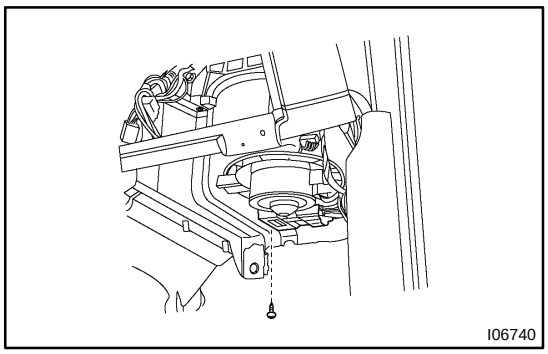
Connect the connector to the blower motor control relay and inspect the wire harness side connector from the back side as shown in the illustration.

Test condition:

- Turn ignition switch to ON

Tester connection	Condition	Specified condition
1 - Ground	Constant	Continuity
2 - Ground	Blower speed control switch at ”LO” position	Approx. 3.5 V
	Blower speed control switch at ”M1” position	Approx. 2.2 V
3 - Ground	Operate blower motor	Battery positive voltage
	Blower speed control switch at ”OFF” position	No voltage
4 - 5	Blower speed control switch at ”LO” position	Approx. 3.6 V
	Blower speed control switch at ”M2” position	Approx. 8.3 V
	Blower speed control switch at ”HI” position	Approx. 13.0 V

If circuit is not as specified, replace the relay.



BLOWER MOTOR CONTROL RELAY

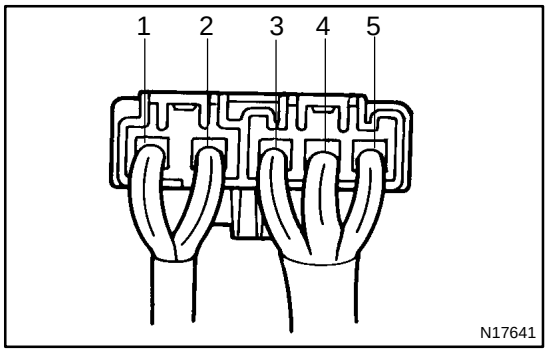
AC1LH-03

INSPECTION

1. REMOVE BLOWER MOTOR CONTROL RELAY

(a) Disconnect the connectors.

(b) Remove the screw and the blower motor control relay.



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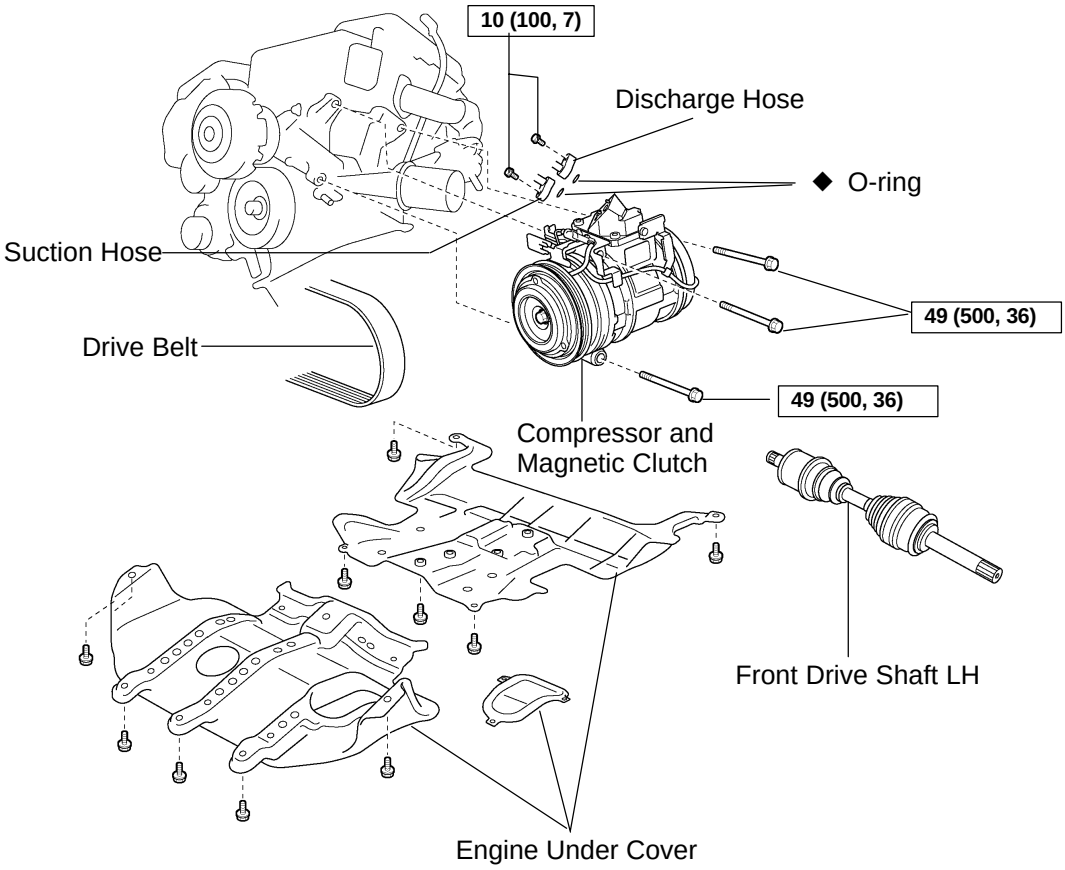
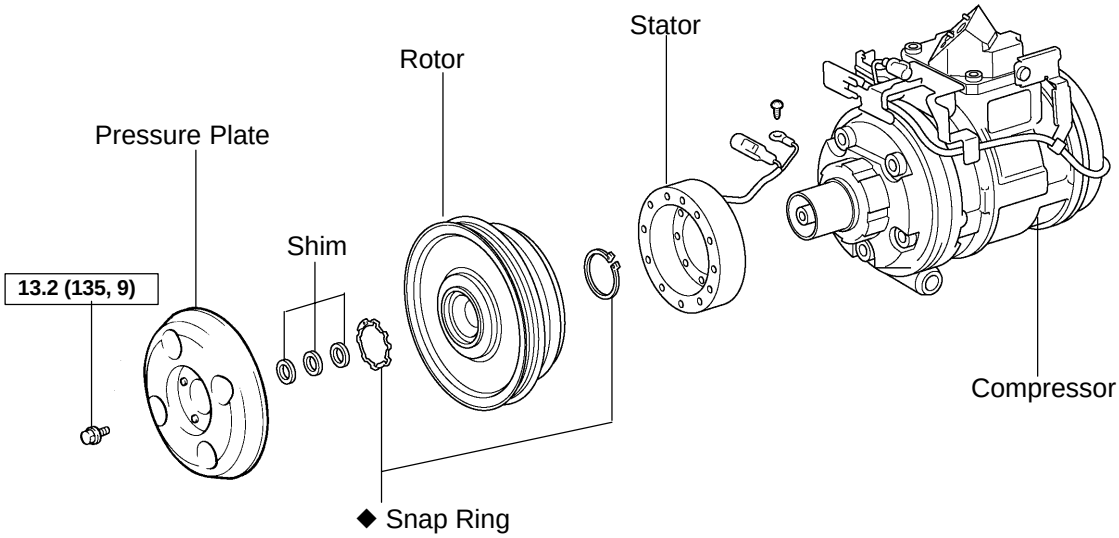
4 - 5	Blower speed control switch at ”LO” position	Approx. 3.6 V
	Blower speed control switch at ”M2” position	Approx. 8.3 V
	Blower speed control switch at ”HI” position	Approx. 13.0 V

If circuit is not as specified, replace the relay.

AC1IL-03

COMPONENTS





I06761
I06762

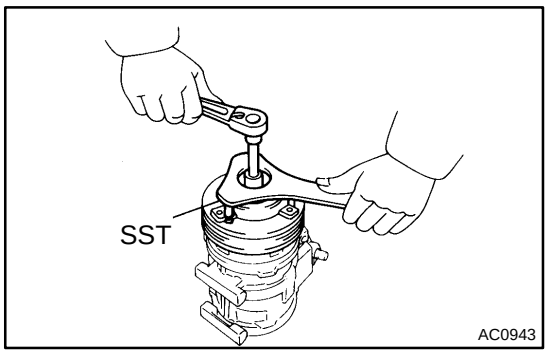
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non reusable part

I08106

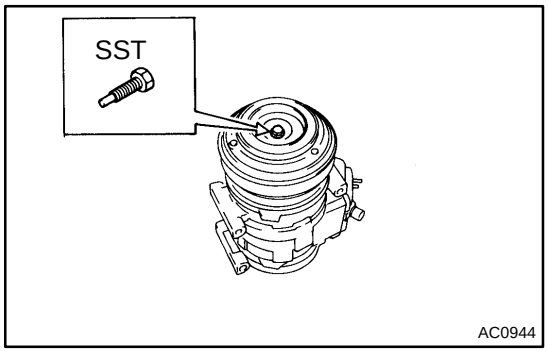
AC1IN-04

DISASSEMBLY

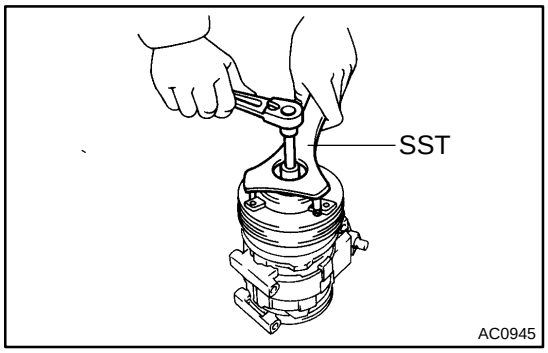


1. REMOVE PRESSURE PLATE

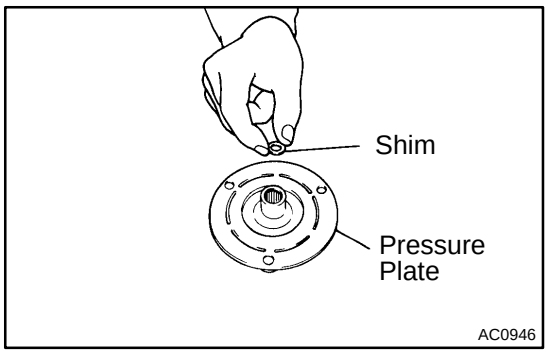
(a) Using SST and a socket wrench, remove the shaft bolt.
Torque: 13.2 N·m (135 kgf·cm, 9 ft·lbf)
SST 07112-76060



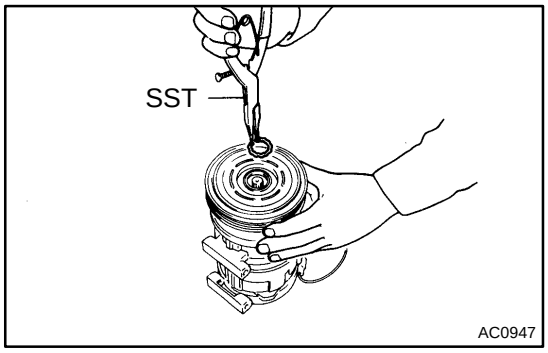
(b) Install SST on the pressure plate.
SST 07112-66040



(c) Using SST and socket wrench, remove the pressure plate.
SST 07112-66040, 07112-76060

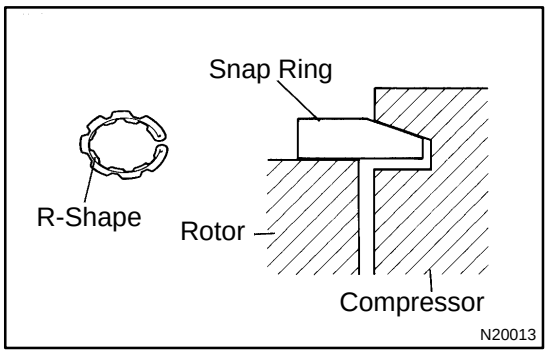


(d) Remove the shims from the pressure plate.

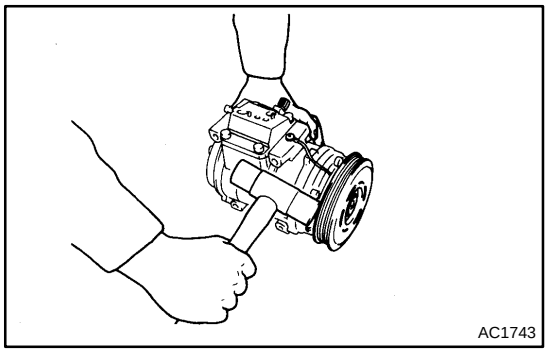


2. REMOVE ROTOR

(a) Using SST, remove the snap ring.
SST 95994-10020

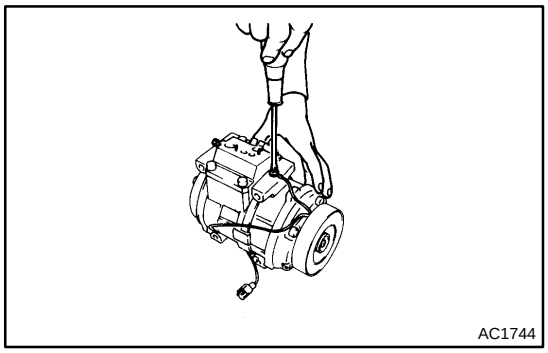


NOTICE:
At the time of reassembly, the snap ring should be installed so that beveled side facing up.



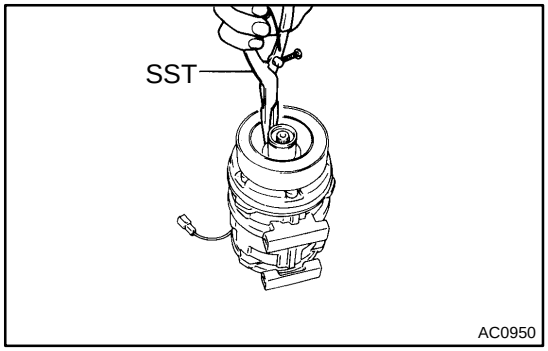
(b) Using a plastic hammer, tap the rotor off the shaft.

NOTICE:
Be careful not to damage the pulley when tapping on the rotor.

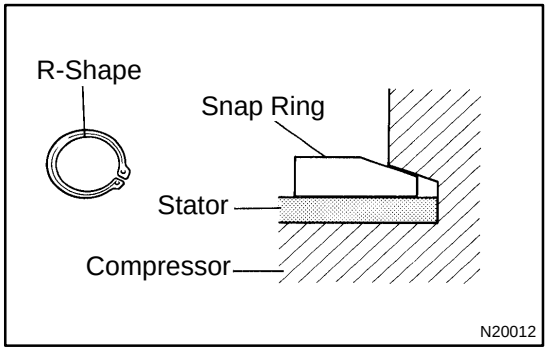


3. REMOVE STATOR

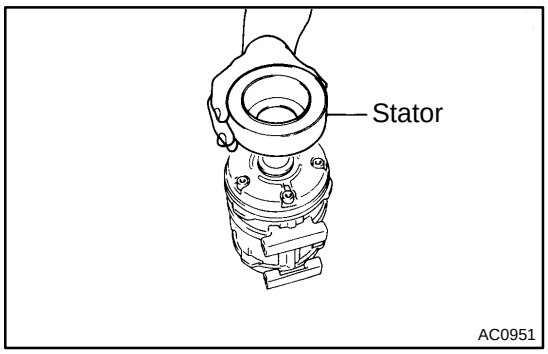
(a) Disconnect the stator lead wire from the compressor housing.



(b) Using SST, remove the snap ring.
SST 95994-10020



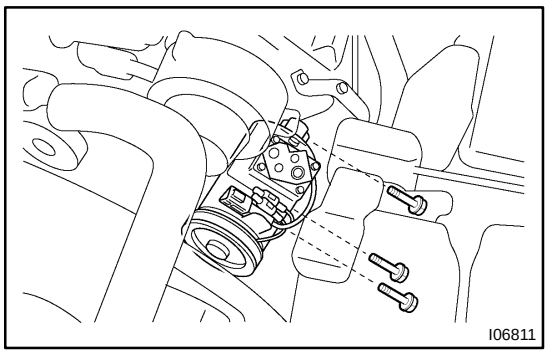
NOTICE:
At the time of reassembly, the snap ring should be installed so that its beveled side facing up.



(c) Remove the stator.

AC1IP-04

INSTALLATION

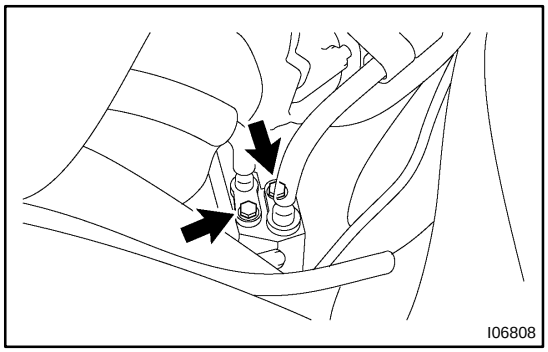


1. INSTALL COMPRESSOR

(a) Install the compressor with 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Connect the connector.

2. INSTALL FRONT DRIVE SHAFT LH
(See page SA-33)



3. CONNECT DISCHARGE AND SUCTION HOSES

(a) Lubricate 2 new O-rings with compressor oil and install them to the hoses.

(b) Connect the both hoses with 2 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:
Hose should be connected immediately after the caps have been removed.

4. INSTALL AND CHECK DRIVE BELT
(See page AC-17 and AC-15)

5. CONNECT NEGATIVE (-) TERMINAL CABLE TO BATTERY

6. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT
Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)

7. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leaks of the refrigerant.
If there is a leakage, check the tightening torque at the joints.

8. INSPECT A/C OPERATION

COMPRESSOR AND MAGNETIC CLUTCH

AC1IK-03

ON-VEHICLE INSPECTION

1. INSPECT COMPRESSOR FOR METALLIC SOUND

Check there is abnormal metallic sound from the compressor when the A/C switch is ON.

If abnormal metallic sound is heard, replace the compressor assembly.

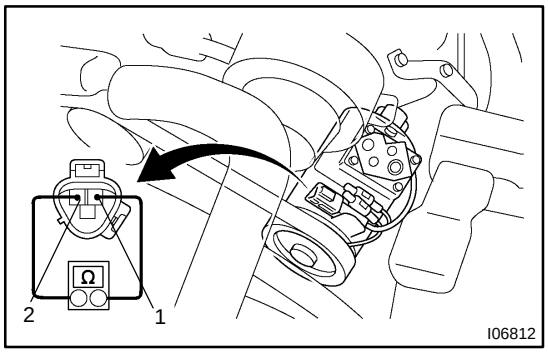
2. INSPECT REFRIGERANT PRESSURE

(See page AC-3)

3. INSPECT VISUALLY FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leakage of refrigerant.

If there is any leakage, replace the compressor assembly.



4. INSPECT COMPRESSOR LOCK SENSOR RESISTANCE

(a) Disconnect the connector.

(b) Measure resistance between terminal 1 and 2.

Standard resistance:

570 - 1,050 Ω at 20˚C (68 ˚F)

If resistance is not as specified, replace the compressor.

5. CHECK FOR LEAKAGE OF GREASE FROM CLUTCH BEARING

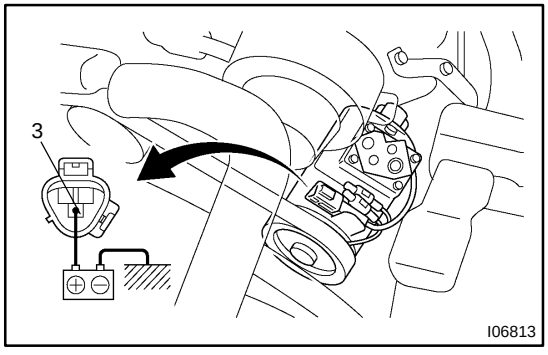
6. CHECK FOR SIGNS OF OIL ON PRESSURE PLATE OR ROTOR

7. INSPECT MAGNETIC CLUTCH BEARING FOR NOISE

(a) Start engine.

(b) Check for abnormal noise from the compressor when the A/C switch is OFF.

If abnormal noise is being emitted, replace the rotor of magnetic clutch.



8. INSPECT MAGNETIC CLUTCH OPERATION

(a) Disconnect the connector.

(b) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to the body ground.

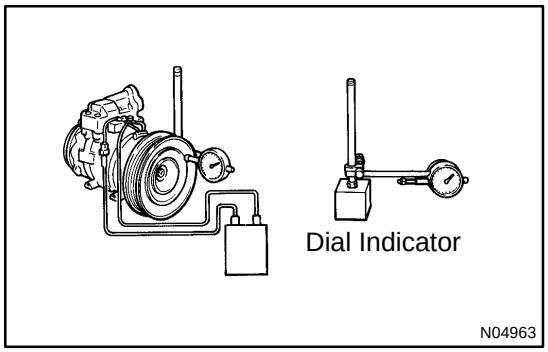
(c) Check that the magnetic clutch is energized.

If operation is not as specified, replace the magnetic clutch.

AC1IO-03

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-63).



AFTER REASSEMBLY, CHECK MAGNETIC CLUTCH CLEARANCE

(a) Set the dial indicator to the pressure plate of the magnetic clutch.

(b) Connect the magnetic clutch lead wire to the battery positive (+) terminal.

(c) Check the clearance between the pressure plate and rotor when connecting the negative (-) terminal to the battery.

Standard clearance:
0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

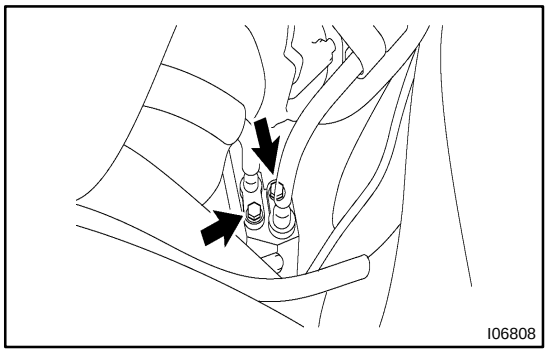
If the clearance is not within the standard clearance, adjust the clearance using shims to obtain the standard clearance.

Shim thickness:
0.1 mm (0.004 in.)
0.3 mm (0.012 in.)
0.5 mm (0.020in.)

AC1IM-03

REMOVAL

1. **RUN ENGINE AT IDLE SPEED WITH A/C ON FOR APPROX. 10 MINUTES**
2. **STOP ENGINE**
3. **DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY**
4. **DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM**
5. **REMOVE ENGINE UNDER COVER**
6. **REMOVE DRIVE BELT (See page AC-16)**



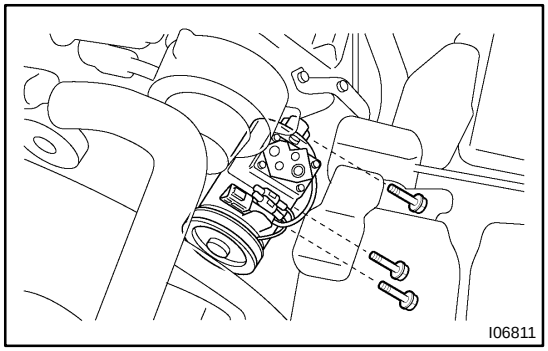
7. **DISCONNECT DISCHARGE AND SUCTION HOSES**

Remove the 2 bolts and disconnect the both hoses.

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

8. **REMOVE FRONT DRIVE SHAFT LH (See page SA-26)**



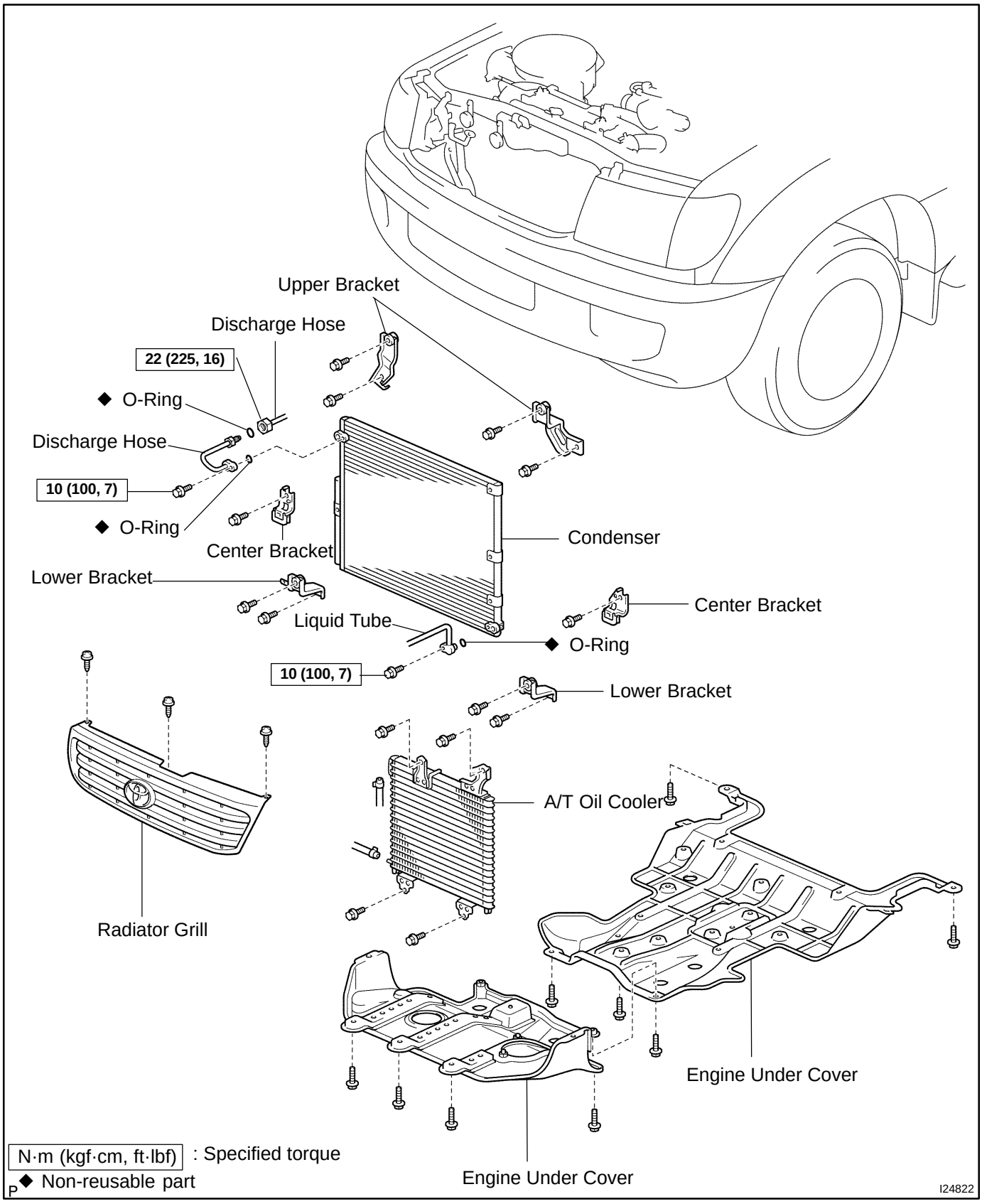
9. **REMOVE COMPRESSOR**

(a) Disconnect the connector.

(b) Remove the 3 bolts and the compressor.

AC1IR-04

COMPONENTS



AC1IT-02

INSTALLATION

Installation is in the reverse of removal (See page AC-70).

CONDENSER

AC1IQ-02

ON-VEHICLE INSPECTION

1. INSPECT CONDENSER FINS FOR BLOCKAGE OR DAMAGE

If the fins are clogged, wash them with water and dry with compressed air.

NOTICE:

Be careful not to damage the fins.

If the fins are bent, straighten them with a screwdriver or pliers.

2. INSPECT CONDENSER AND FITTINGS FOR LEAKAGE

Using a gas leak detector, check for leaks of refrigerant.

If there is a leakage, check the tightening torque at the joints.

AC1IS-04

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, refer to the following items evacuate air from the refrigeration system and charge system with the refrigerant and inspect for leaks of the refrigerant.

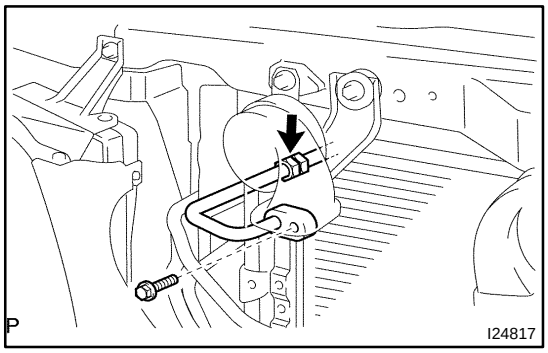
Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)

2. REMOVE RADIATOR GRILL

3. REMOVE A/T AIR COOLED OIL COOLER

(See page AT-17)

4. REMOVE ENGINE UNDER COVER



5. REMOVE DISCHARGE TUBE

(a) Remove the bolt and disconnect the tube from the condenser.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(b) Loosen the nut and remove the tube.

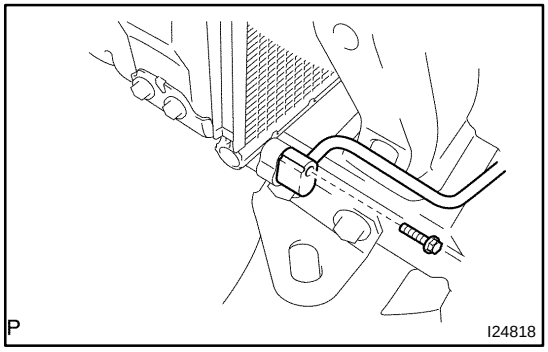
Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, lubricate 2 new O-rings with compressor oil and install them on the tube.



6. DISCONNECT LIQUID TUBE

Remove the bolt and disconnect the tube.

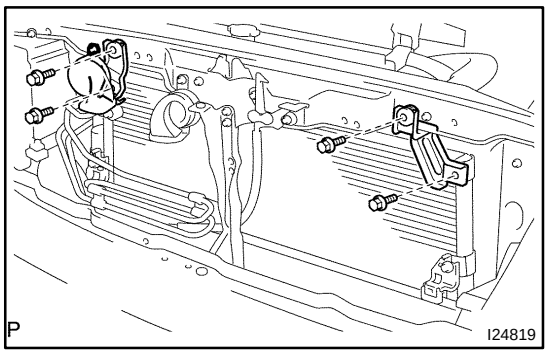
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

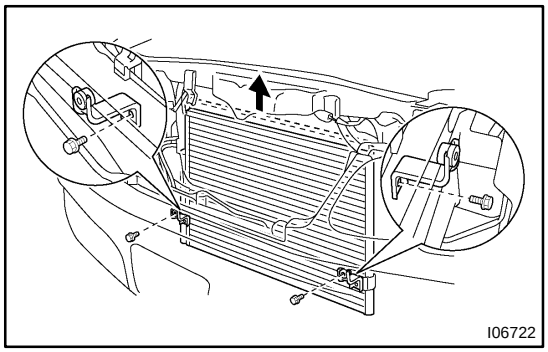
HINT:

At the time of installation, lubricate a new O-ring with compressor oil and install them on the tube.

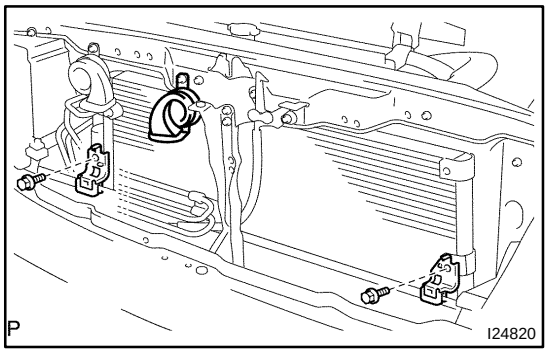


7. REMOVE CONDENSER

(a) Remove the 4 bolts and the 2 upper bracket.



(b) Lift up condenser, then remove the 4 bolts and the 2 center bracket.



(c) Remove the 2 bolts and the 2 center bracket.

(d) Remove the condenser.

HINT:

At the time of installation, please refer to the following item.

If condenser is replaced, add compressor oil to condenser.

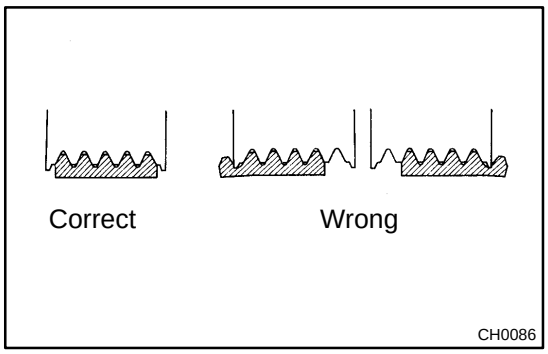
Add: 40 - 50 cc (1.4 - 1.7 fl.oz.)

Compressor oil: ND-OIL 8 or equivalent

AC1HR-03

INSTALLATION

Installation is in the reverse of removal (See page AC-16).



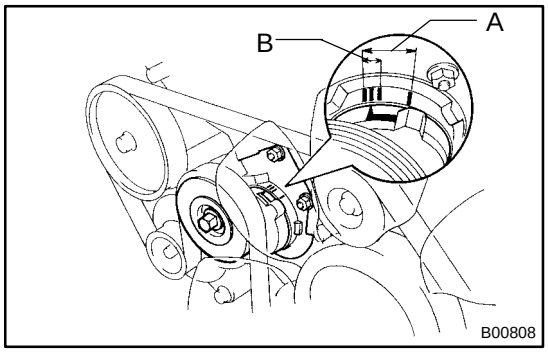
DRIVE BELT

AC1HP-03

ON-VEHICLE INSPECTION

1. INSPECT DRIVE BELT'S INSTALLATION CONDITION

Check that drive belt fits properly in the ribbed grooves.



2. INSPECT DRIVE BELT TENSION

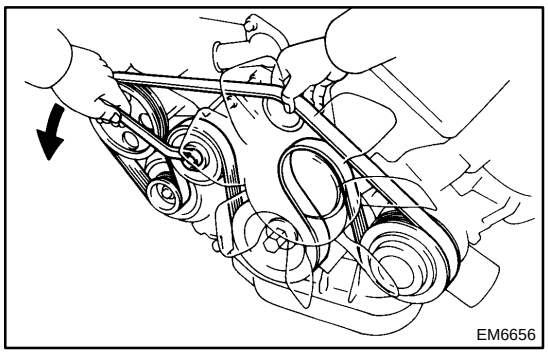
Check that the tension is within A range on the auto tensioner scale.

If the tension is not within the A range on the scale, replace the belt with a new one.

HINT:

When replacing the drive belt with a new one, the belt's tension should be within the B range on the belt tensioner scale.

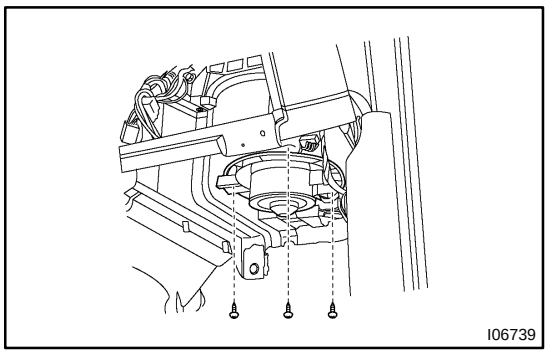
AC1HQ-03



REMOVAL

REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.



FRONT A/C BLOWER MOTOR

AC1LG-03

INSPECTION

1. REMOVE BLOWER MOTOR

(a) Disconnect the connector.

(b) Remove the 3 screws and the blower motor.

2. INSPECT BLOWER MOTOR CIRCUIT

(See page DI-1369)

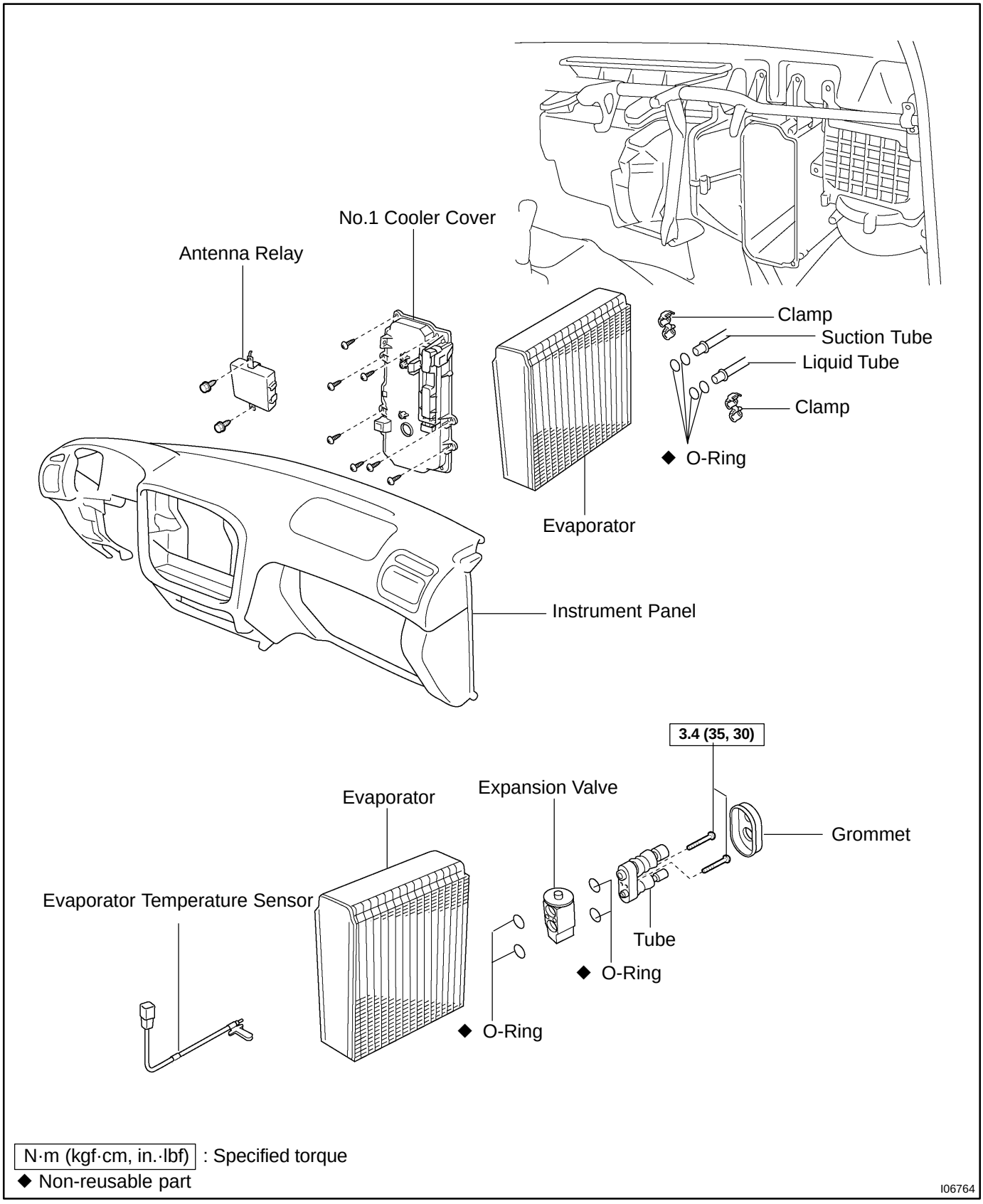
3. INSTALL BLOWER MOTOR

(a) Install the blower motor with 3 screws.

(b) Connect the connector.

AC1LA-03

COMPONENTS



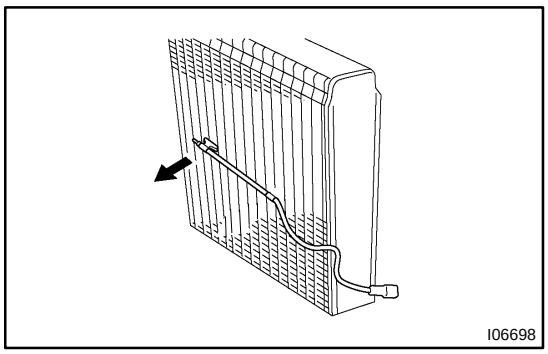
N·m (kgf·cm, in.·lbf) : Specified torque

◆ Non-reusable part

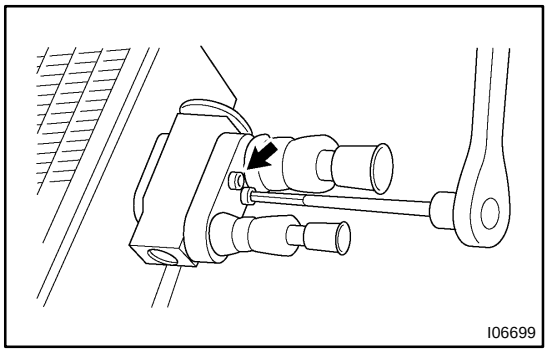
I06764

AC1LC-02

DISASSEMBLY



1. PULL OUT EVAPORATOR TEMPERATURE SENSOR



2. REMOVE EXPANSION VALVE

Using a hexagon wrench (5.0mm, 0.20 in.), remove the 2 bolts and separate the expansion valve and the evaporator.

Torque: 3.4 N·m (35 kgf·cm, 30 in.·lbf)

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of reassembly, lubricate 4 new O-rings with compressor oil and install them to the valve. If evaporator is replaced, add compressor oil to the evaporator.

Add: 40 cc (1.4 fl.oz.)

Compressor oil: ND-OIL8 or equivalent

AC1LD-04

INSPECTION

1. CHECK EVAPORATOR FINS FOR BLOCKAGE

If the fins are clogged, remove them with compressed air.

NOTICE:

Never use water to clean the evaporator.

2. CHECK FITTINGS FOR CRACKS OR SCRATCHES

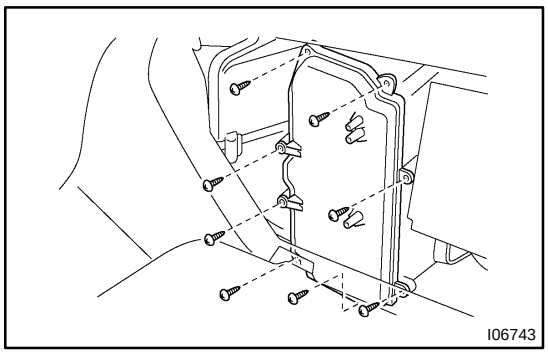
If necessary, repair or replace.

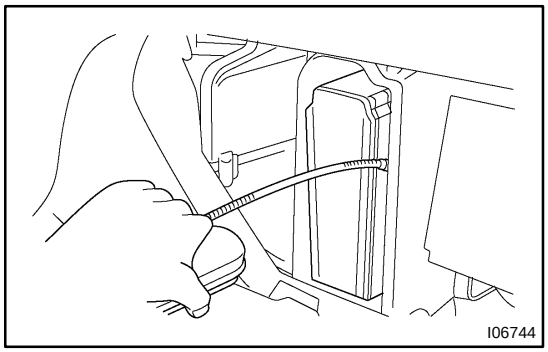
3. INSPECT EVAPORATOR TEMPERATURE CIRCUIT (See page DI-1322)

AC1LF-02

INSTALLATION

Installation is in the reverse of removal (See page AC-75).





FRONT A/C EVAPORATOR

AC1L9-05

ON-VEHICLE INSPECTION

1. INSPECT FOR LEAKAGE OF REFRIGERANT

(a) Remove the glove compartment door.

(b) Remove the lower No. 2 finish panel (See page BO-84).

(c) Remove the No. 1 cooler cover.

(1) Disconnect the connector clamp.

(2) Remove the 8 screws and No. 1 cooler cover.

(d) Using a gas leak detector, check for leaks of refrigerant.

If there is a leakage of refrigerant, check the tightening torque at the joints or check the evaporator.

(e) Install the No. 1 cooler cover.

2. INSPECT EXPANSION VALVE

(a) Check amount of gas during refrigeration cycle.

(b) Set on manifold gauge set.

(c) Operate A/C system at ”MAX. COOL” for approx. 5 minutes.

(d) Check expansion valve.

Check the low pressure reading drops to 0 kPa (0 kgf/cm^2, 0 psi).

If the low pressure reading is not as specified, replace the expansion valve with the tubes.

AC1LE-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-76).

AC1LB-04

REMOVAL

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

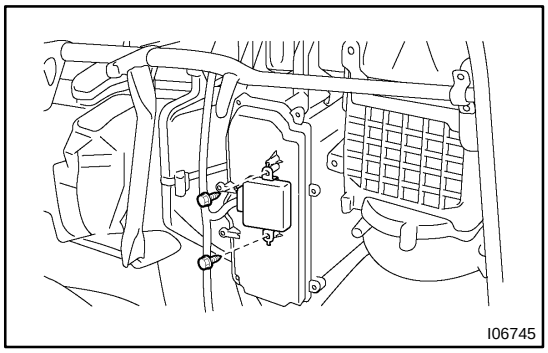
HINT:

At the time of installation, evacuate air from refrigeration system and charge the system with the refrigerant and inspect for leaks of the refrigerant.

Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)

2. DISCONNECT LIQUID AND SUCTION TUBES FROM FRONT COOLING UNIT (See page AC-24)

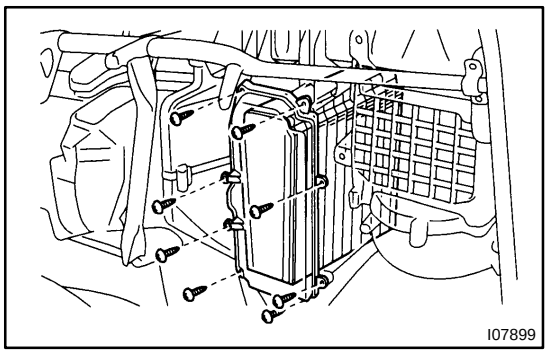
3. REMOVE INSTRUMENT PANEL (See page BO-84)



4. REMOVE ANTENNA RELAY

(a) Disconnect the connector.

(b) Remove the 2 screws and the antenna relay.



5. REMOVE EVAPORATOR

(a) Disconnect the connector.

(b) Disconnect the connector clamp.

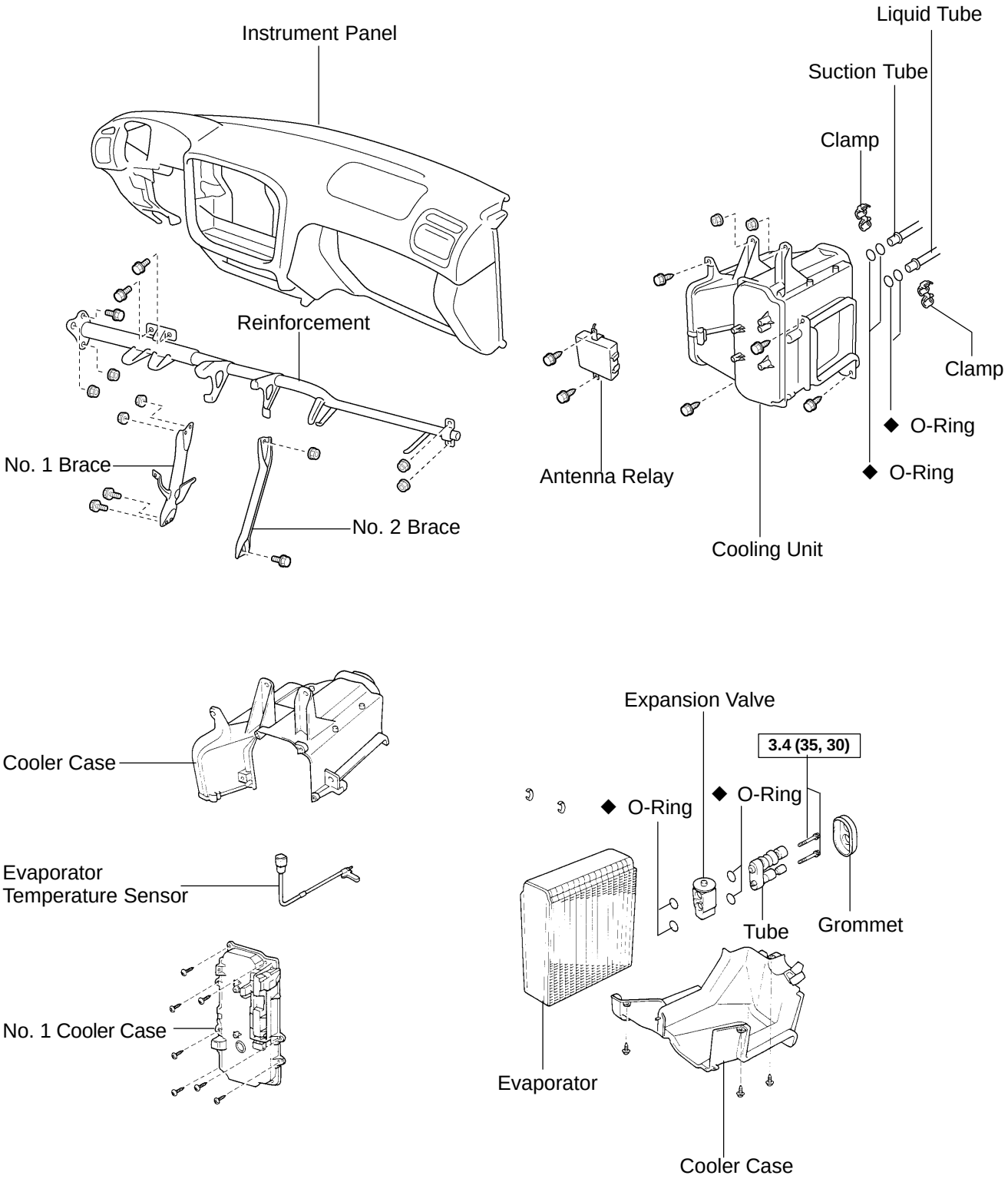
(c) Remove the 8 screws and the No .1 cooler cover.

(d) Pull out the evaporator.

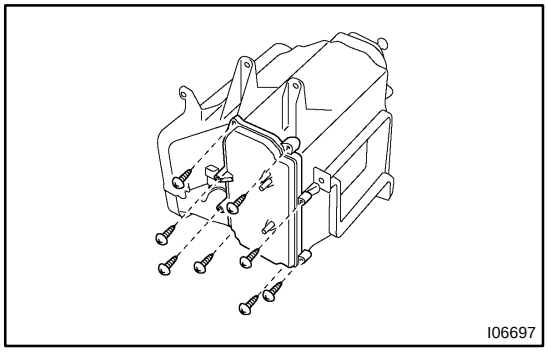
FRONT COOLING UNIT

AC1K5-06

COMPONENTS



AC1K7-06


I06697

DISASSEMBLY

1. REMOVE EVAPORATOR

(a) Disconnect the connector clamp.

(b) Remove the 8 screws and No. 1 cooler cover.

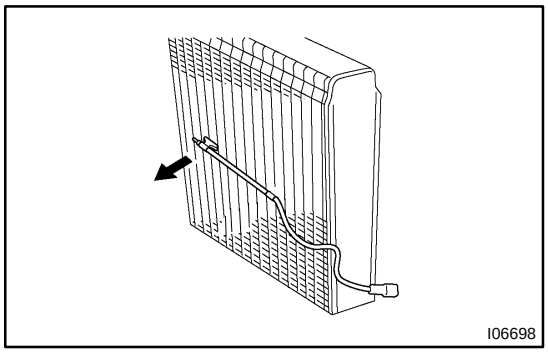
(c) Pull out the evaporator

HINT:

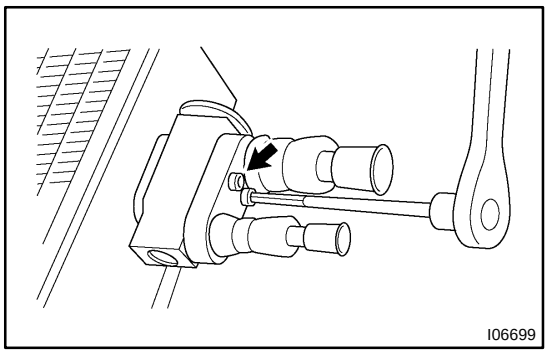
At the time of reassembly, if evaporator is replaced, add compressor oil to the evaporator.

Add: 40 cc (1.4 fl.oz.)

Compressor oil: ND-OIL 8 or equivalent


I06698

2. PULL OUT EVAPORATOR TEMPERATURE SENSOR FROM EVAPORATOR


I06699

3. REMOVE EXPANSION VALVE

(a) Remove the grommet.

(b) Pry out the packing.

HINT:

At the time of reassembly, do not reuse the packing.

(c) Using a hexagon wrench (5.0 mm, 0.20 in.), remove the 2 bolts and separate the expansion valve, tube and evaporator.

Torque: 3.4 N·m (35 kgf·cm, 30 in.·lbf)

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of reassembly, lubricate 4 new O-rings with compressor oil and install them in the tube.

4. REMOVE DRAIN HOSE

AC1K9-02

INSTALLATION

Installation is in the reverse of removal (See page AC-24).

AC1K8-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-26).

AC1K6-04

REMOVAL

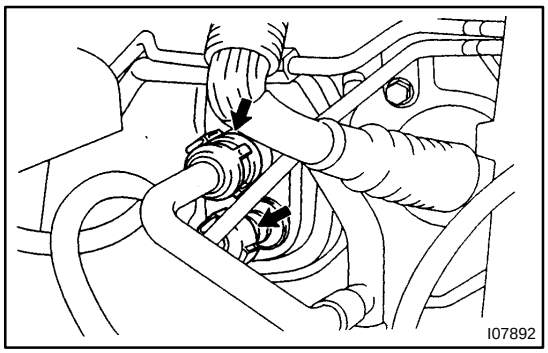
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, first evacuate air from refrigeration system.

Then, charge the system with the refrigerant and inspect for leaks of the refrigerant.

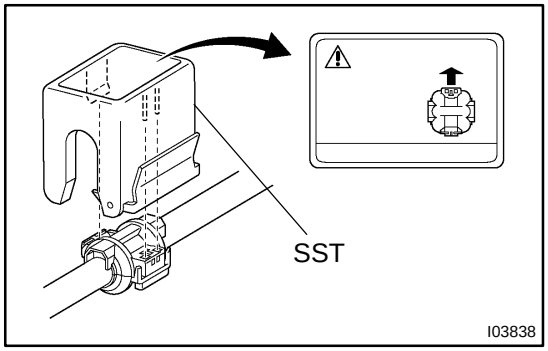
Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBES

(a) Using SST, remove the 2 piping clamps.

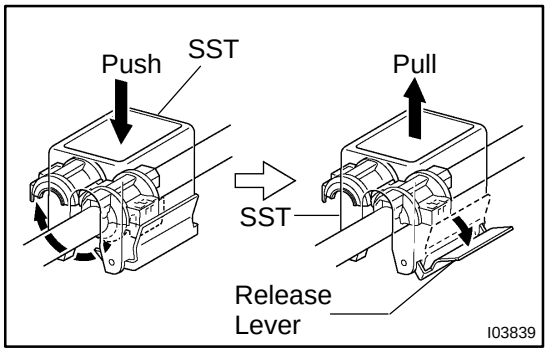
SST 09870-00025 (Liquid tube)
09870-00015 (Suction tube)



(1) Insert SST to piping clamp.

HINT:

Confirm the direction of the piping clamp claw and SST referring to the illustration on the caution label.



(2) Push down SST and release the clamp lock.

NOTICE:

Be careful not to deform the tubes when pushing SST.

(3) Pull SST slightly and push the release lever, then remove the piping clamp with SST.

(4) Remove the piping clamp from SST.

(b) Disconnect the both tubes.

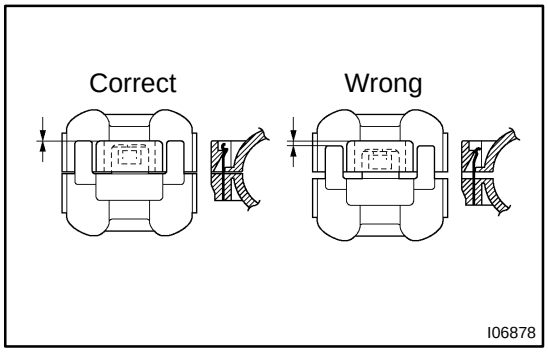
NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

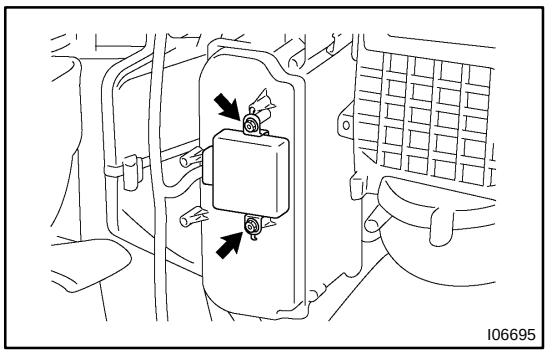
HINT:

At the time of installation:

- Lubricate 4 new O-rings with compressor oil and install them to the tubes.
- After connection, check the fitting for claw of the piping clamp.



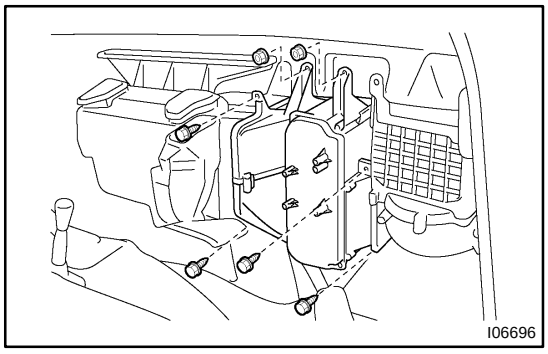
3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT (See page BO-84)



4. REMOVE ANTENNA RELAY

(a) Disconnect the connector.

(b) Remove the 2 screws and antenna relay.



5. REMOVE COOLING UNIT

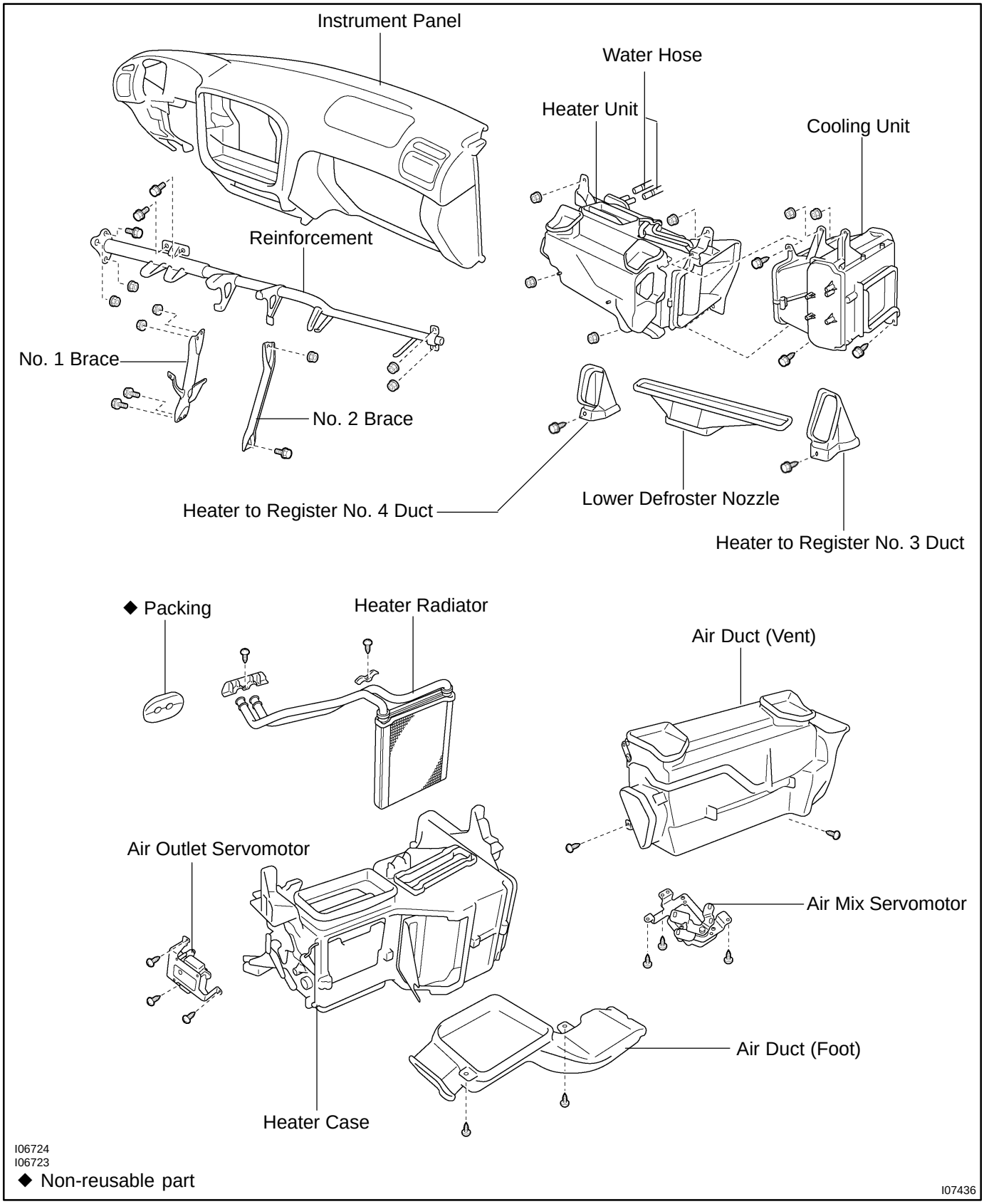
(a) Disconnect the connector.

(b) Remove the 4 screws, 2 nuts and cooling unit.

FRONT HEATER UNIT

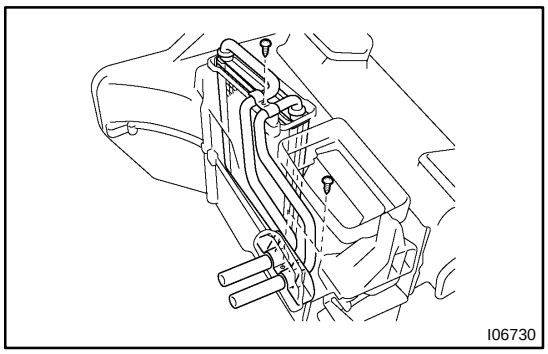
COMPONENTS

AC1KH-03



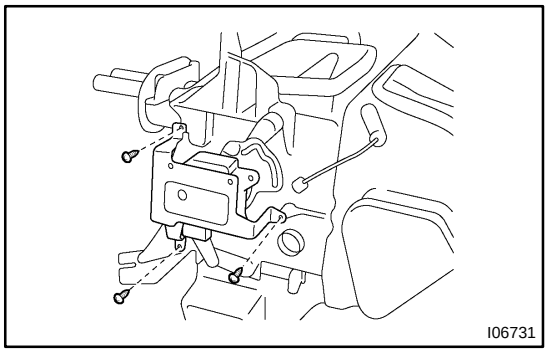
AC1KJ-03

DISASSEMBLY



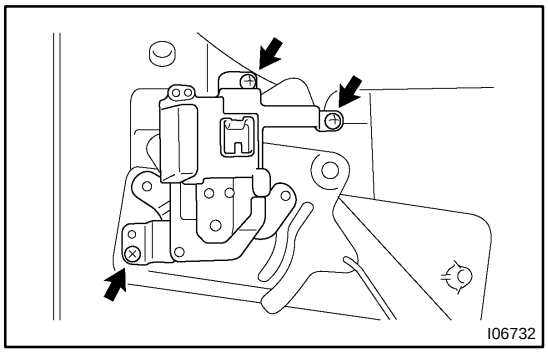
1. REMOVE HEATER RADIATOR

(a) Pry out the packing.
(b) Remove the screw and the bracket.
(c) Remove the screw and the clamp.
(d) Pull out the heater radiator.



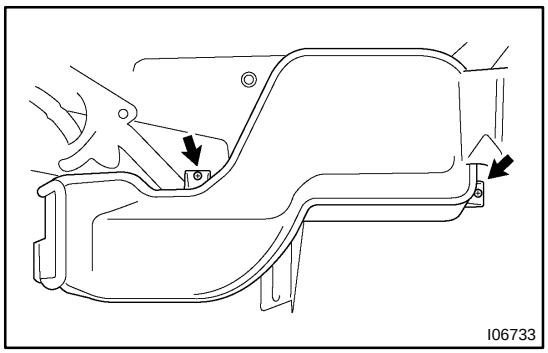
2. REMOVE AIR OUTLET SERVOMOTOR

Remove the 3 screws and the air outlet servomotor.



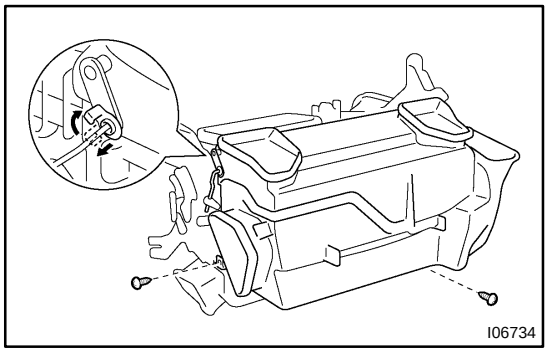
3. REMOVE AIR MIX SERVOMOTOR

(a) Disconnect the connector.
(b) Remove the 3 screws and the air mix servomotor.
(c) Release the claw and remove the wire harness.



4. REMOVE AIR DUCT (Foot Duct)

Remove the 2 screws and air duct.



5. REMOVE AIR DUCT (Vent Duct)

(a) Disconnect the mode damper control link.
(b) Remove the 2 screws and the air duct.

AC1KK-03

INSPECTION

1. CHECK HEATER RADIATOR FINS FOR BLOCKAGE

If the fins are clogged, remove them with compressed air.

2. CHECK FITTING FRO CRACKS OR SCRATCHES

If necessary repair or replace.

AC1KM-02

INSTALLATION

Installation is in the reverse of removal (See page AC-40).

AC1KL-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-41).

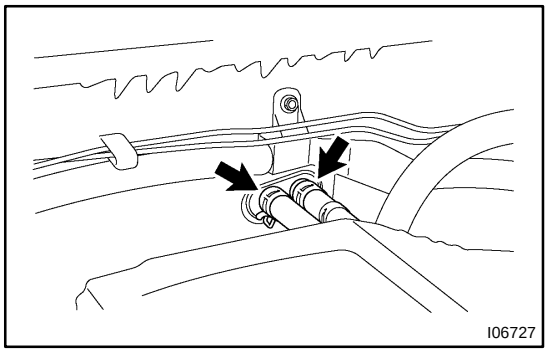
AC1KI-04

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

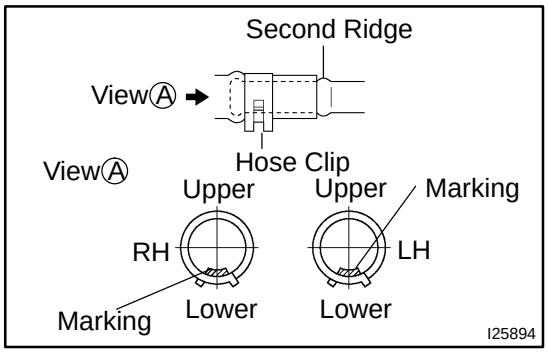
It is not necessary to drain out all coolant.



2. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

(a) Using pliers, grip the claws of the hose clip and slide the clip along the hose.

(b) Disconnect the water hoses from the heater radiator pipes.



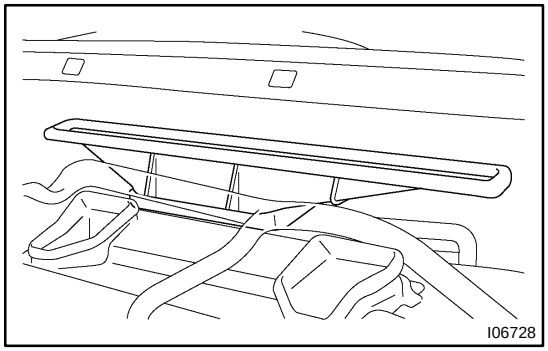
HINT:

At the time of installation , please refer to the following items.

- Push the water hose onto the heater radiator pipe to the second ridge on the pipe.
- Install a hose clip in the position as shown in the illustration.

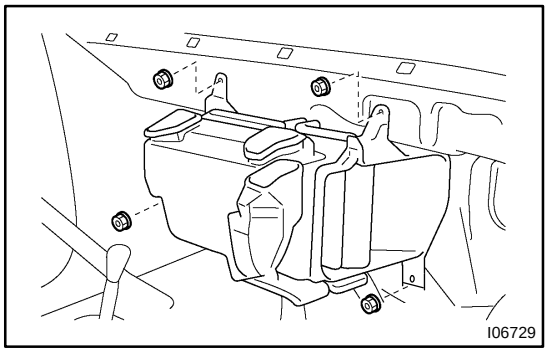
3. REMOVE INSTRUMENT PANEL AND REINFORCEMENT (See page BO-84)

4. REMOVE FRONT COOLING UNIT (See page AC-24)



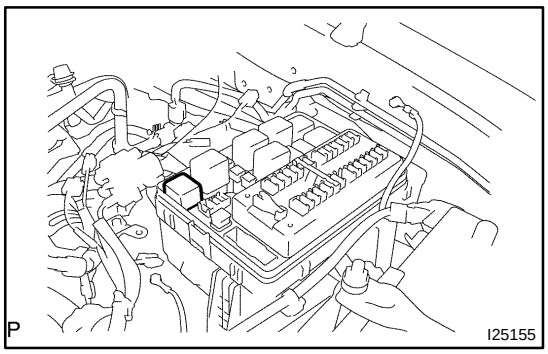
5. REMOVE HEATER UNIT

(a) Remove the lower defroster nozzle.



(b) Disconnect the connector.

(c) Remove the 4 nuts and heater unit.



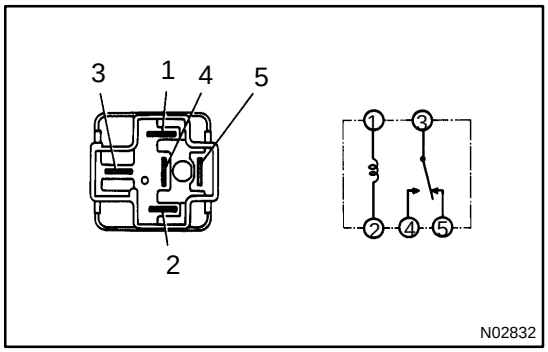
HEATER MAIN RELAY

AC3OX-01

INSPECTION

1. REMOVE HEATER MAIN RELAY

Remove the heater main relay.

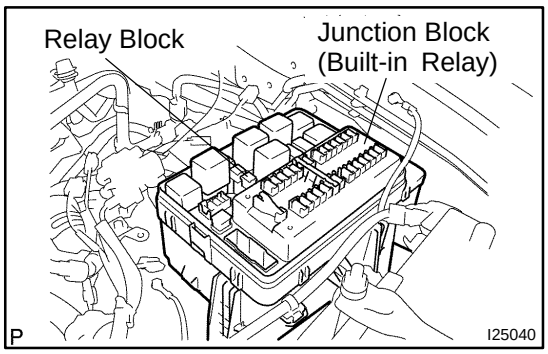


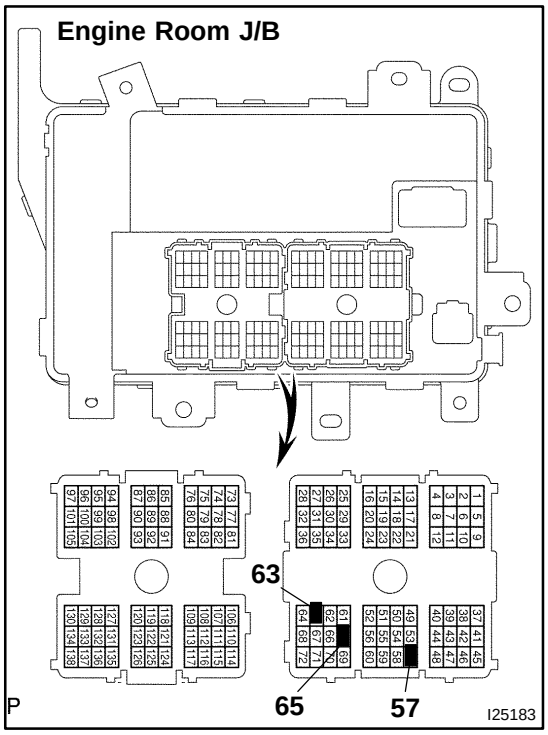
2. INSPECT HEATER MAIN RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2 3 - 4	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

If continuity is not as specified, replace the relay.

3. INSTALL HEATER MAIN RELAY





MAGNETIC CLUTCH RELAY

AC1LY-03

INSPECTION

HINT:

The magnetic clutch relay is built in the engine room junction block. Since the relay is constructed with a relay block that is in the junction block as a unit, it is impossible to disconnect the wire harness connecting with the relay block.

If the relay has a malfunction, replace it with the junction block assembly wire harness together.

1. REMOVE ENGINE ROOM J/B

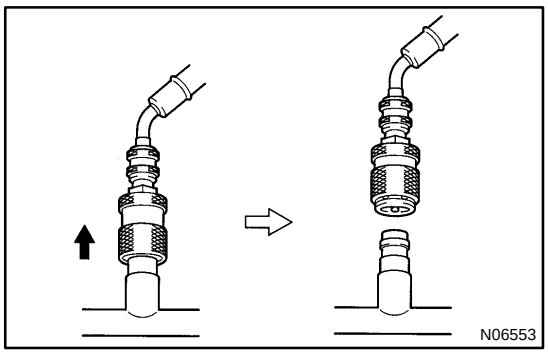
2. INSPECT MAGNETIC CLUTCH RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	57 - 65	Continuity
Apply B+ between terminals 57 and 65.	63 - 65	Continuity

If continuity is not as specified, replace the engine room J/B.

3. INSTALL ENGINE ROOM J/B

AC1HT-04



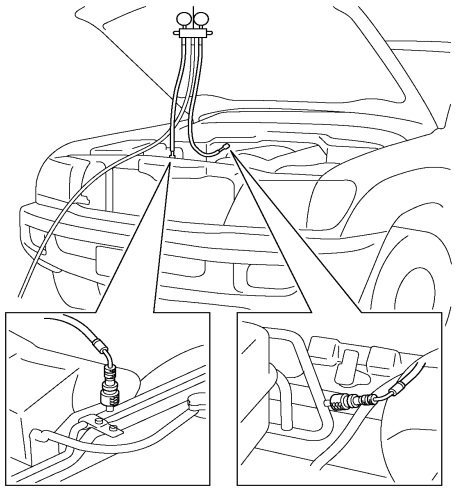
SET OFF

1. **CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET**
2. **DISCONNECT QUICK DISCONNECT ADAPTERS FROM SERVICE VALVES ON REFRIGERANT LINE**

HINT:

Slide the sleeve of the quick disconnect adapter upward to unlock the adapter and remove it from the service valve.

3. **INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINE**



MANIFOLD GAUGE SET

AC1HS-05

SET ON

1. CONNECT CHARGING HOSE TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

CAUTION:

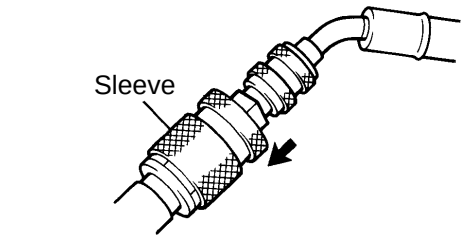
Do not connect the wrong hoses.

2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

3. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES

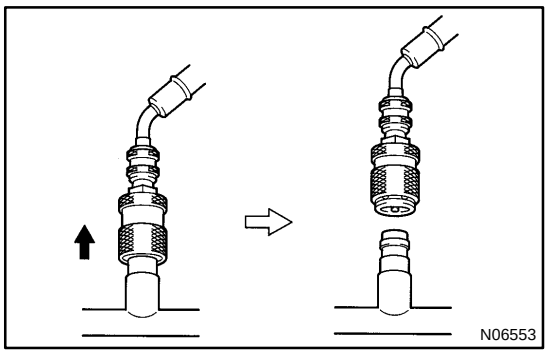


5. CONNECT QUICK DISCONNECT ADAPTERS TO SERVICE VALVES

HINT:

Push the quick disconnect adapter onto the service valve, then the sleeve of the quick disconnect adapter downward to lock it.

AC1HT-04



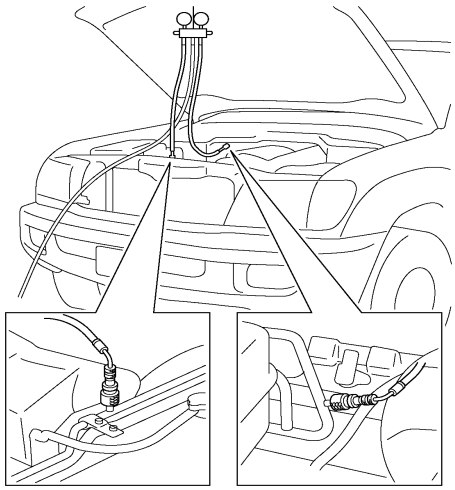
SET OFF

1. **CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET**
2. **DISCONNECT QUICK DISCONNECT ADAPTERS FROM SERVICE VALVES ON REFRIGERANT LINE**

HINT:

Slide the sleeve of the quick disconnect adapter upward to unlock the adapter and remove it from the service valve.

3. **INSTALL CAPS TO SERVICE VALVES ON REFRIGERANT LINE**



MANIFOLD GAUGE SET

AC1HS-05

SET ON

1. CONNECT CHARGING HOSE TO MANIFOLD GAUGE SET

Tighten the nuts by hand.

CAUTION:

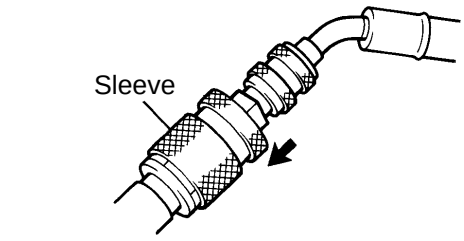
Do not connect the wrong hoses.

2. CONNECT QUICK DISCONNECT ADAPTERS TO CHARGING HOSES

Tighten the nuts by hand.

3. CLOSE BOTH HAND VALVES OF MANIFOLD GAUGE SET

4. REMOVE CAPS FROM SERVICE VALVES ON REFRIGERANT LINES



5. CONNECT QUICK DISCONNECT ADAPTERS TO SERVICE VALVES

HINT:

Push the quick disconnect adapter onto the service valve, then the sleeve of the quick disconnect adapter downward to lock it.

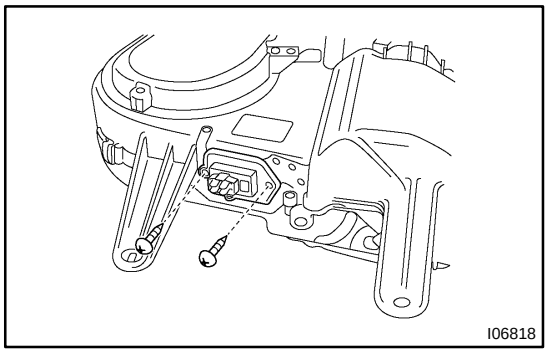
POWER TRANSISTOR (for Rear Heater)

AC1LJ-04

INSPECTION

1. **REMOVE FRONT SEATS**
2. **REMOVE REAR CONSOLE BOX**
3. **REMOVE FRONT CONSOLE BOX COVER**
4. **REMOVE LOWER CENTER CLUSTER FINISH PANEL**
5. **REMOVE FRONT DOOR SCUFF PLATES**
6. **REMOVE COWL SIDE TRIMS**
7. **REMOVE REAR DOOR SCUFF PATES**
8. **REMOVE CENTER PILLAR GARNISHES**
9. **REMOVE POWER TRANSISTOR**

(a) Slide the floor carpet backward.



(b) Disconnect the connector.

(c) Remove the 2 screws and power transistor.

10. **INSPECT POWER TRANSISTOR**

Check the power transistor in the same way as for ”POWER TRANSISTOR (For Rear Cooler)” on page AC-82 .

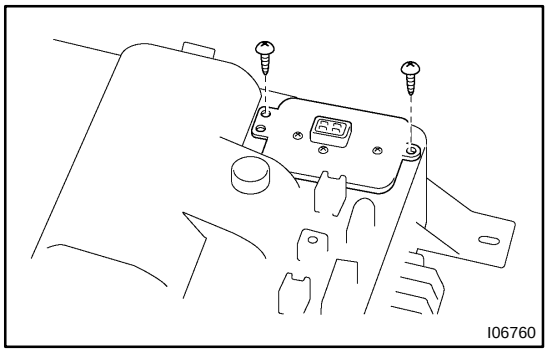
11. **INSTALL POWER TRANSISTOR**
12. **INSTALL CENTER PILLAR GARNISHES**
13. **INSTALL REAR DOOR SCUFF PATES**
14. **INSTALL COWL SIDE TRIMS**
15. **INSTALL FRONT DOOR SCUFF PLATES**
16. **INSTALL LOWER CENTER CLUSTER FINISH PANEL**
17. **INSTALL FRONT CONSOLE BOX COVER**
18. **INSTALL REAR CONSOLE BOX**
19. **INSTALL FRONT SEATS**

POWER TRANSISTOR (for Rear Cooler)

AC1LI-04

INSPECTION

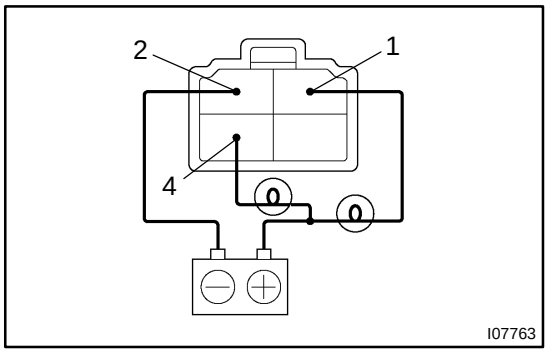
1. REMOVE REAR DOOR SCUFF PLATE RH
2. REMOVE REAR FLOOR MAT SUPPORT PLATE
3. REMOVE QUARTER TRIM PANEL RH



4. REMOVE POWER TRANSISTOR

(a) Disconnect the connector.

(b) Remove the 2 screws and the power transistor.

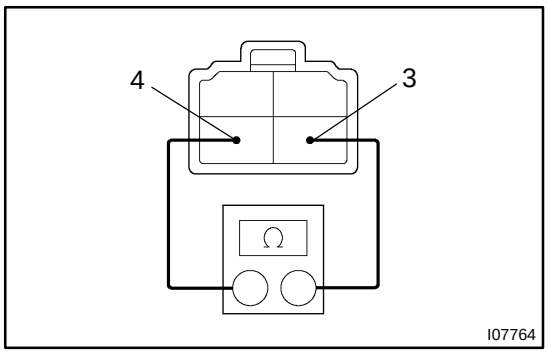


5. INSPECT POWER TRANSISTOR OPERATION

(a) Connect the positive (+) lead to terminal 1 through a 12 V - 3.4 W test bulb and negative (-) lead to terminal 2.

(b) Check the test bulb comes on when another positive (+) lead is connected to terminal 4 through a 12 V - 3.4 W test bulb.

If operation is not as specified, replace the power transistor.



6. INSPECT POWER TRANSISTOR RESISTANCE

Measure resistance between terminals 3 and 4.

Standard resistance: 2.0 - 2.4 kΩ

If resistance is not as specified, replace the power transistor.

7. INSTALL POWER TRANSISTOR

(a) Install the power transistor with 2 screws.

(b) Connect the connector.

8. INSTALL QUARTER TRIM PANEL RH
9. INSTALL REAR FLOOR MAT SUPPORT PLATE
10. INSTALL REAR DOOR SCUFF PLATE RH

AC1LU-02

INSTALLATION

Installation is in the reverse of removal (See page AC-92).

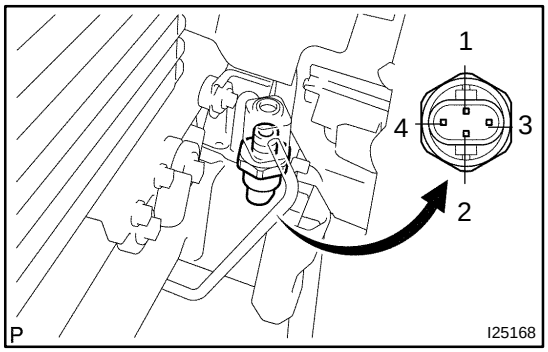
PRESSURE SWITCH

AC3OW-01

ON-VEHICLE INSPECTION

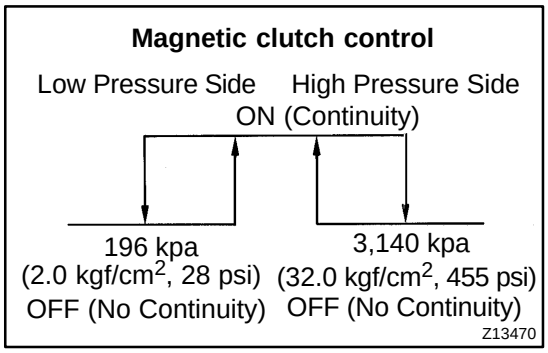
1. SET VEHICLE IN THESE CONDITION

(a) Engine speed at 1,500 rpm
(b) Blower speed control switch at ”HI” position
(c) Temperature control dial at ”MAX. COOL” position
(d) Manifold gauge set setting



2. INSPECT PRESSURE SWITCH OPERATION

(a) Disconnect the connector.



(b) Inspect pressure switch continuity (Magnetic Clutch Control)
  (1) Connect the positive (+) lead from the ohmmeter to terminal 1 and the negative (-) lead to terminal 2.
  (2) Check continuity between terminals when the refrigerant pressure is changed, as shown in the illustration.

If continuity is not as specified, replace the pressure switch.

AC1JE-04

REMOVAL

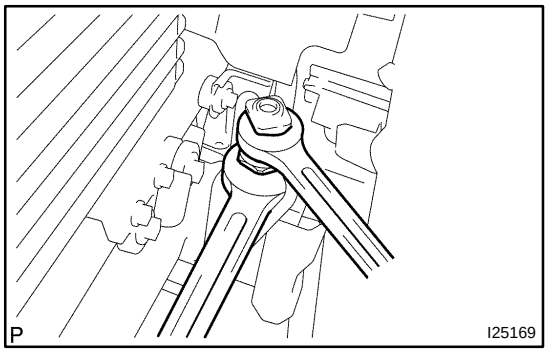
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, evacuate air from refrigeration system and charge system with refrigerant and inspect for leakage of refrigerant.

Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)

2. REMOVE RADIATOR GRILL



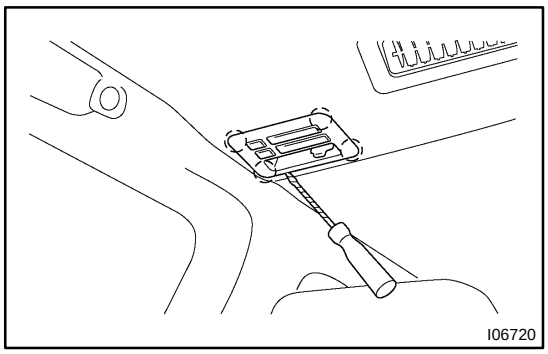
3. REMOVE PRESSURE SWITCH FROM LIQUID TUBE

Disconnect the connector and remove the pressure switch.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

HINT:

- Lock the switch mount on the tube with an open-end wrench, be careful not to deform the tube, and remove the switch.
- At the time of installation, lubricate a new O-ring with compressor oil and install the switch.



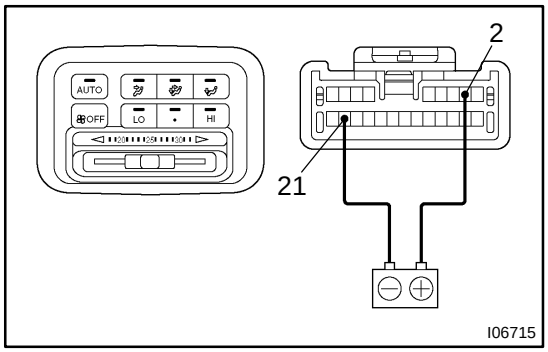
REAR A/C CONTROL ASSEMBLY

AC1MC-04

INSPECTION

1. REMOVE REAR HEATER CONTROL ASSEMBLY

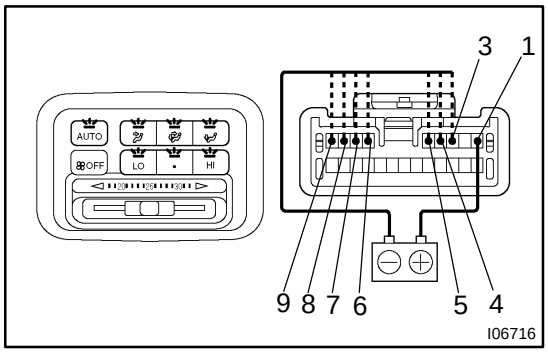
Using a screwdriver, release the 4 claws and pull out the rear heater control assembly, then disconnect the connector.



2. INSPECT ILLUMINATION OPERATION

Connect battery positive (+) lead to terminal 2 and battery negative (-) lead to terminal 21 then check that the indicators come on.

If operation is not as specified, replace the rear A/C control assembly.

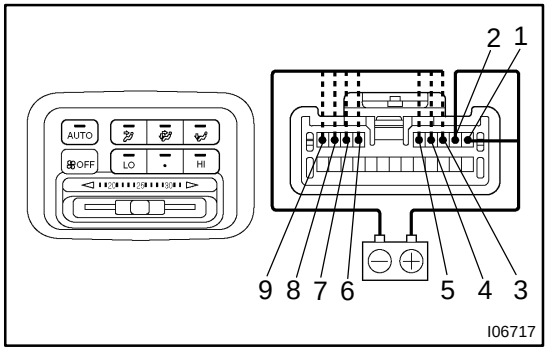


3. INSPECT INDICATOR OPERATION

(a) Connect battery positive (+) lead to terminal 1 and battery negative (-) lead to all the other terminals, then check that the indicator come on, as shown in the chart.

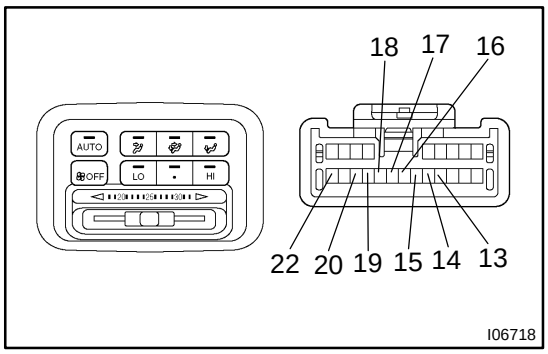
Switch	Tester connection
Auto	3
LO	4
ME	5
HI	6
FACE	7
Bi-Level	8
FOOT	9

If operation is not as specified, replace the rear A/C control assembly.



(b) Connect the positive (+) lead from the battery to terminal 2, then check where the indicators dim.

If operation is not as specified, replace the rear A/C control assembly.

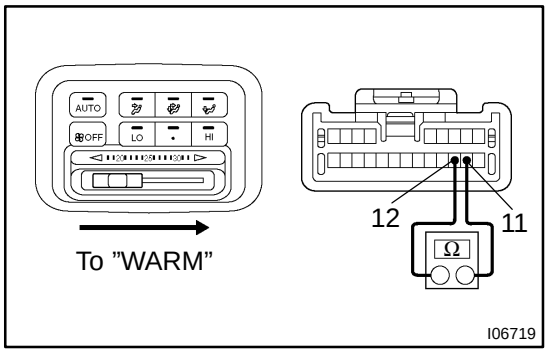


4. INSPECT SWITCH CONTINUITY

Check the continuity between terminals while switch is pressed, as shown in the chart.

Switch	Tester connection	Specified condition
Auto	13 - 22	Continuity
OFF	14 - 22	Continuity
LO	15 - 22	Continuity
ME	16 - 22	Continuity
HI	17 - 22	Continuity
FACE	18 - 22	Continuity
Bi-Level	19 - 22	Continuity
FOOT	20 - 22	Continuity

If continuity is not as specified, replace the rear A/C control assembly.



5. INSPECT VARIABLE RESISTOR OPERATION

(a) Measure resistance between terminal 10 and 12.
Standard resistance: 3.0 kΩ

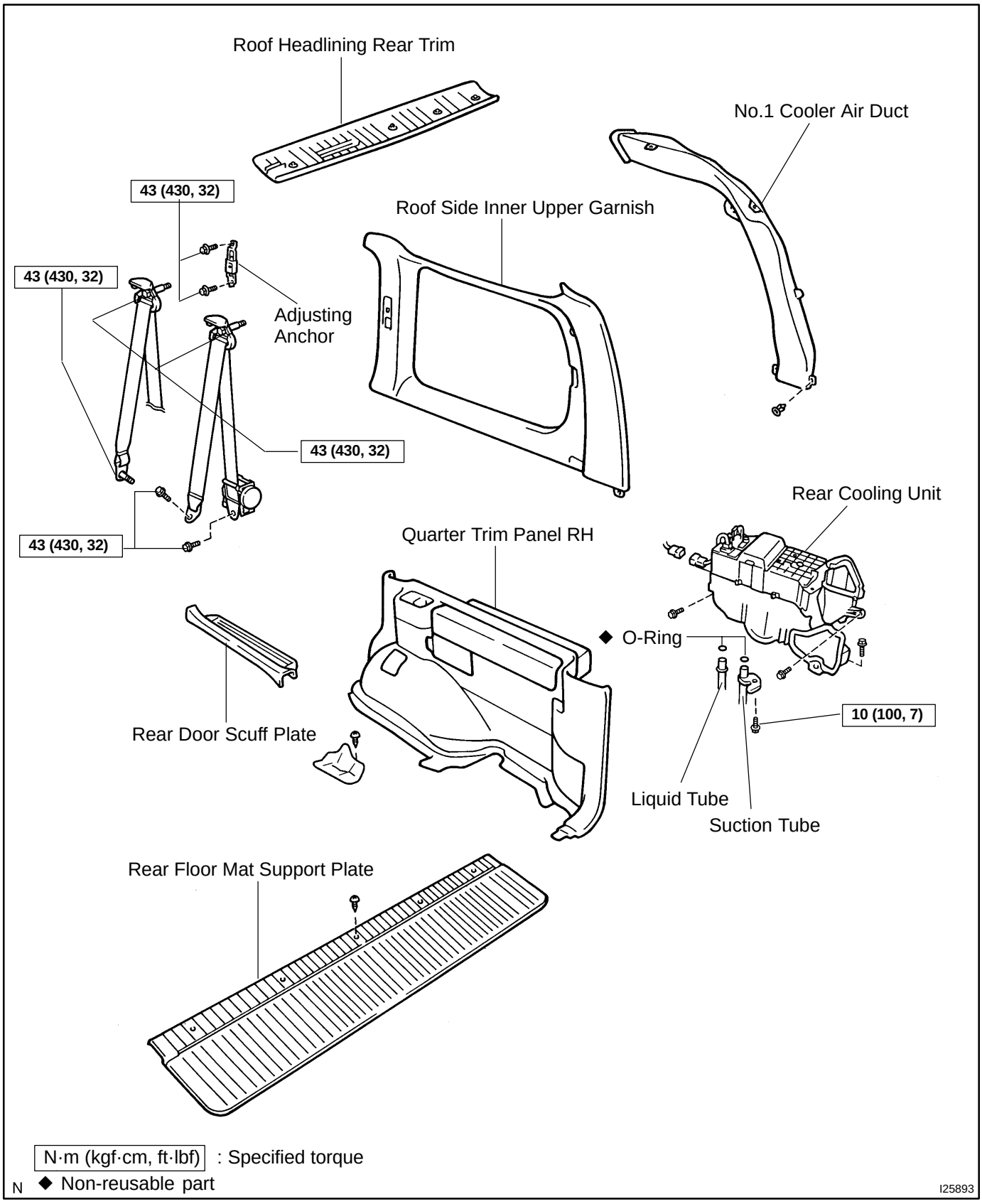
(b) Gradually move the temperature control lever from "COOL" side to "WARM" side, then check that the resistance between terminal 11 and 12 increase to 3.0 kΩ.

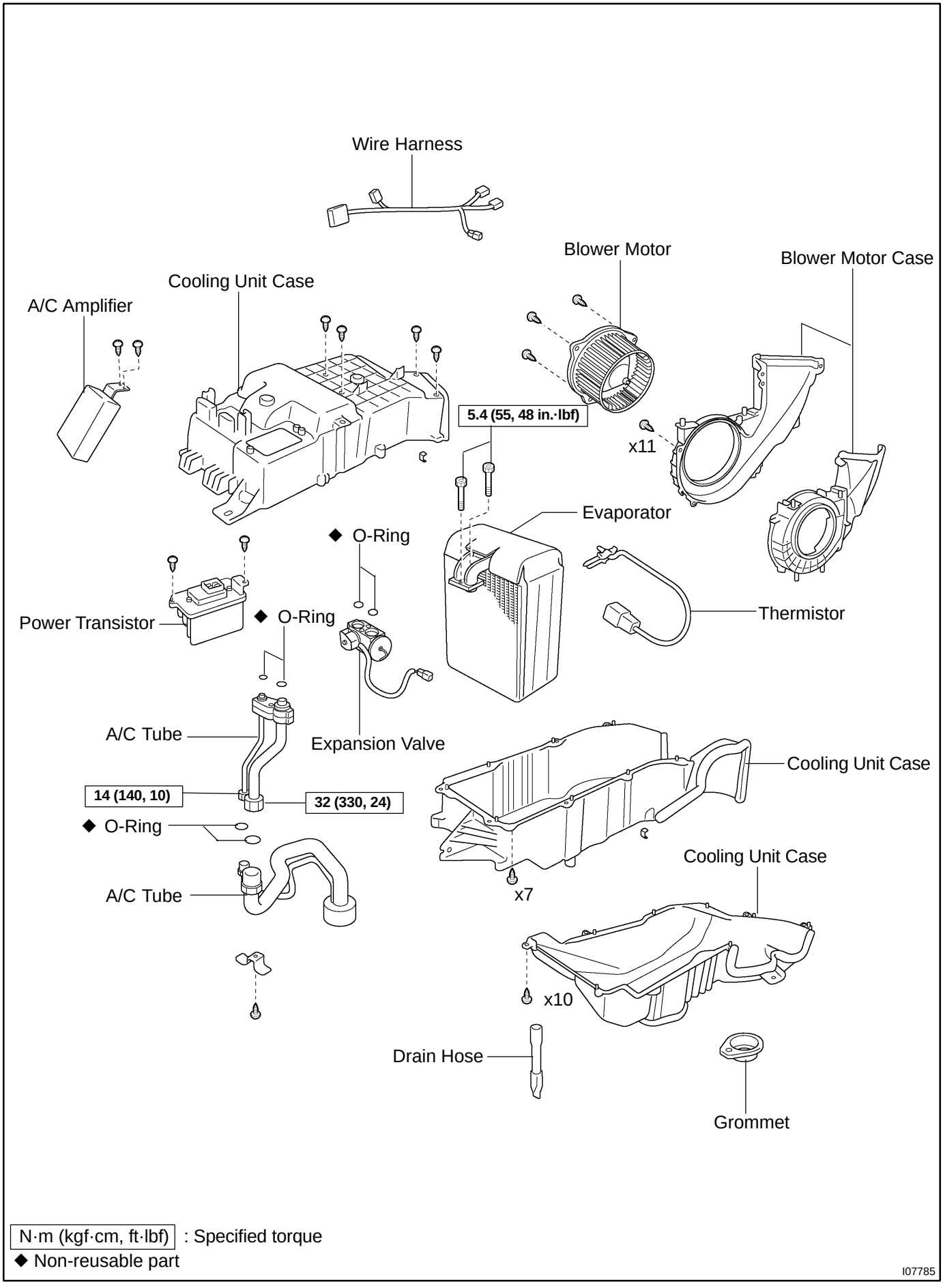
If operation is not as specified, replace the rear A/C control assembly.

6. INSTALL HEATER CONTROL ASSEMBLY

AC1KB-05

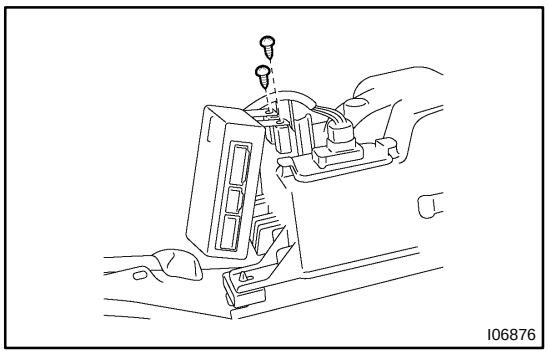
COMPONENTS




Wire Harness
Blower Motor
Blower Motor Case
Cooling Unit Case
A/C Amplifier
5.4 (55, 48 in.·lbf)
x11
Evaporator
◆ O-Ring
Power Transistor
◆ O-Ring
Thermistor
A/C Tube
Expansion Valve
Cooling Unit Case
14 (140, 10)
32 (330, 24)
◆ O-Ring
x7
Cooling Unit Case
A/C Tube
x10
Drain Hose
Grommet
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
I07785

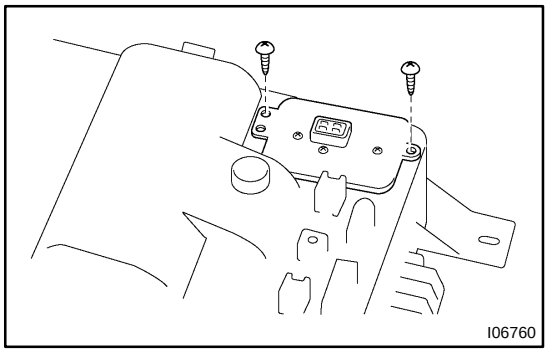
AC1KD-05

DISASSEMBLY



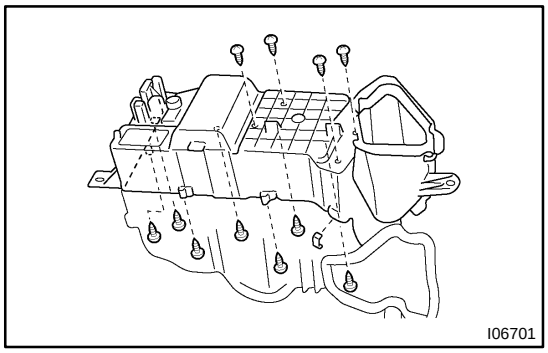
1. REMOVE A/C AMPLIFIER

Remove the 2 screws and the A/C amplifier.



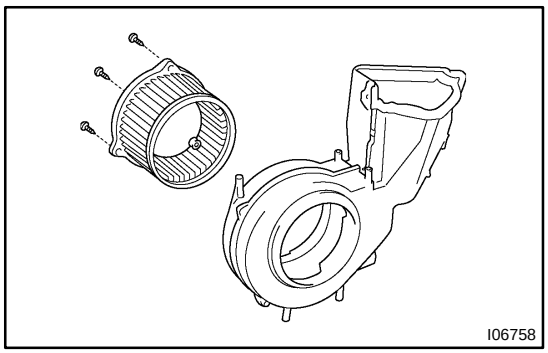
2. REMOVE POWER TRANSISTOR

(a) Disconnect the connector.
(b) Remove the 2 screws and the power transistor.



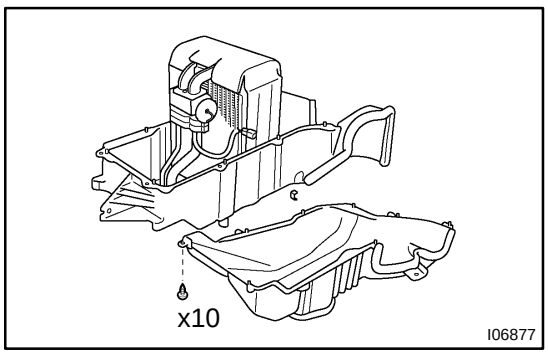
3. REMOVE BLOWER CASE

(a) Remove the wire harness.
(b) Remove the 11 screws, 3 holding springs and separate the cooling unit cases.
(c) Disconnect the connector.
(d) Remove the blower case.



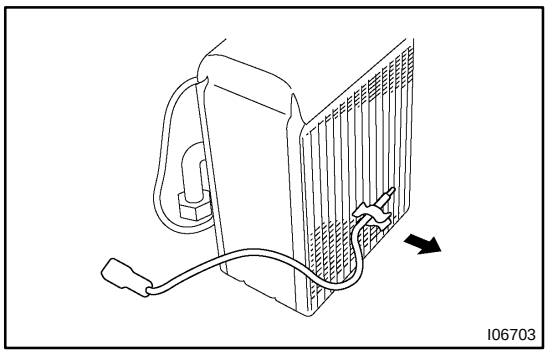
4. REMOVE BLOWER MOTOR

Remove the 3 screws and the blower motor.

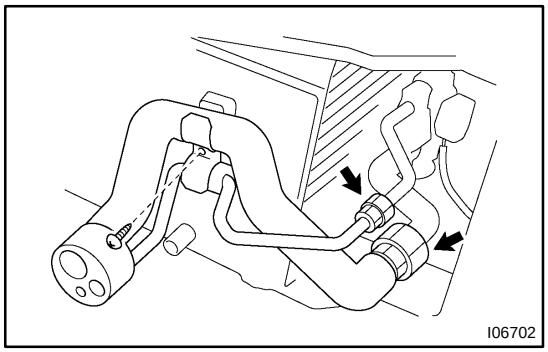


5. REMOVE EVAPORATOR

(a) Disconnect the 2 connector clamps.
(b) Remove the 10 screws and the 2 holding springs, and separate the cooling unit cases.



(c) Pull out the thermistor from the evaporator.

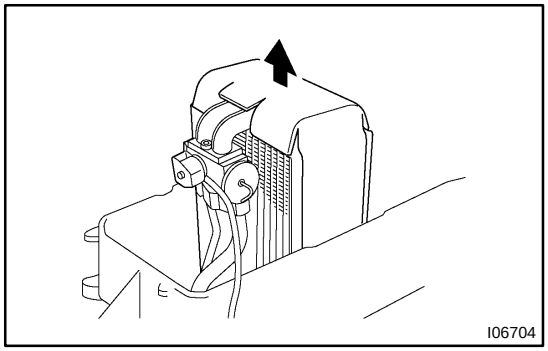


(d) Remove the screw and the piping clamp.
(e) Loosen the 2 nuts and remove the tube and accessory.

Torque:
Liquid line: 14 N·m (140 kgf·cm, 10 ft·lbf)
Suction line: 32 N·m (330 kgf·cm, 24 ft·lbf)

NOTICE:
Cap the open fittings immediately to keep moisture or dirt out of the system.

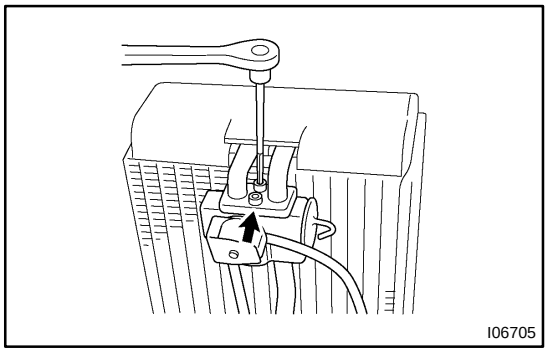
HINT:
At the time of reassembly, lubricate 2 new O-rings with compressor oil and install them in the tubes.



(f) Remove the evaporator.

HINT:
At the time of reassembly, if evaporator was replaced, add compressor oil to the new evaporator.

Add 40 cc: (1.4 fl.oz.)
Compressor oil: ND-OIL 8 or equivalent



6. REMOVE EXPANSION VALVE

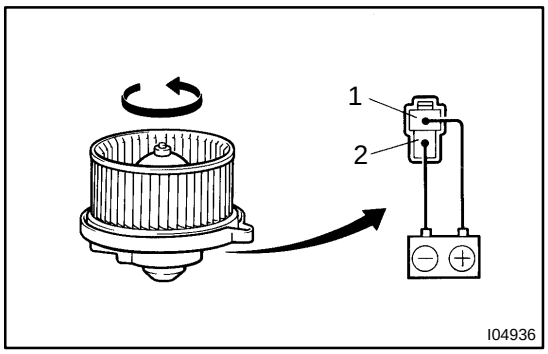
Using a hexagon wrench (5.0 mm, 0.20 in.), remove the 2 bolts and separate the expansion valve and evaporator.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

HINT:
At the time of reassembly, lubricate 4 new O-rings with compressor oil and install them in the tubes.

AC1KE-05

INSPECTION

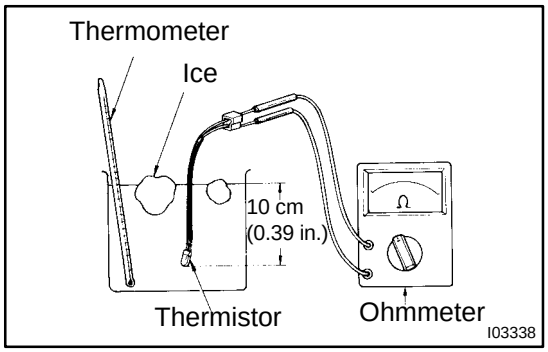


1. INSPECT BLOWER MOTOR OPERATION

Connect the battery positive (+) lead to terminal 1 and battery negative (-) lead to terminal 2, then check that the motor rotates smoothly.

If the motor rotates smoothly, check the wire harness.

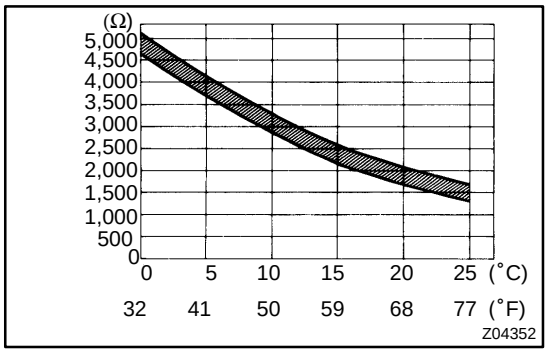
Otherwise, replace the blower motor.



2. INSPECT THERMISTOR RESISTANCE

(a) Place the thermistor in cold water.

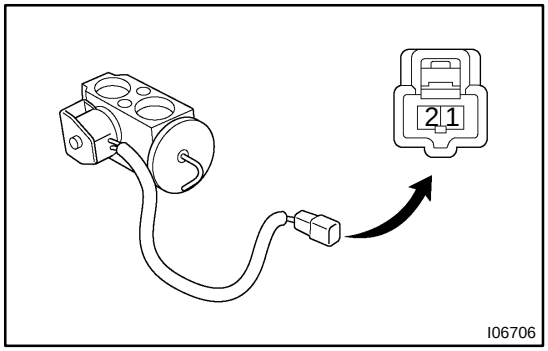
(b) Measure resistance of the thermistor as the water temperature increases.



(c) Compare the readings with the chart.

If the values meet the specifications, check the wire harness.

Otherwise, replace the thermistor.



3. INSPECT MAGNETIC VALVE OPERATION

Check the air passage through the valve, with and without the battery positive voltage applied, between terminals as shown in the chart.

Condition	Air passage
Apply B+ between terminals	Free passage
Not apply B+ between terminals	No passage

Otherwise replace the magnetic valve with the expansion valve.

If operation is as specified, check the wire harness.

4. INSPECT EVAPORATOR

(a) Check the evaporator fins for blockage.

If the fins are clogged, remove them with compressed air.

NOTICE:

Never use water to clean the evaporator.

(b) Check the fitting for cracks or scratches.

If necessary, repair or replace.

AC1KG-02

INSTALLATION

Installation is in the reverse of removal (See page AC-32).

REAR COOLING UNIT

AC1KA-04

ON-VEHICLE INSPECTION

1. INSPECT EXPANSION VALVE

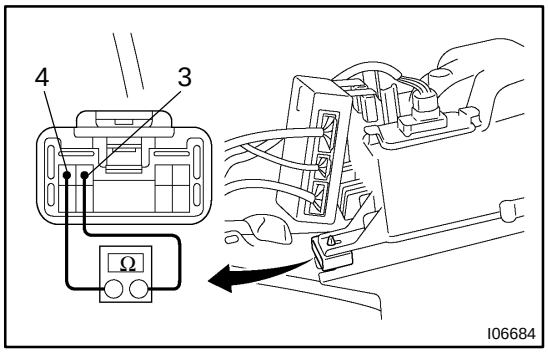
(a) Check amount of gas during refrigeration cycle.
(b) Set on manifold gauge set.
(c) Start the engine.
(d) Operate the A/C system.
(e) Inspect the expansion valve.
  (1) Run the engine at 1,500 rpm for at least 5 minutes.
  (2) Check the high pressure reading is 1.37 - 1.57 MPa (14 - 16 kgf/cm^2, 199 - 288 psi).
  (3) Check the low pressure reading.

If the low pressure reading is 0 kPa (0 kgf/cm^2, 0psi), replace the expansion valve.

2. REMOVE REAR DOOR SCUFF PLATE RH

3. REMOVE REAR FLOOR MAT SUPPORT PLATE

4. REMOVE QUARTER TRIM PANEL RH

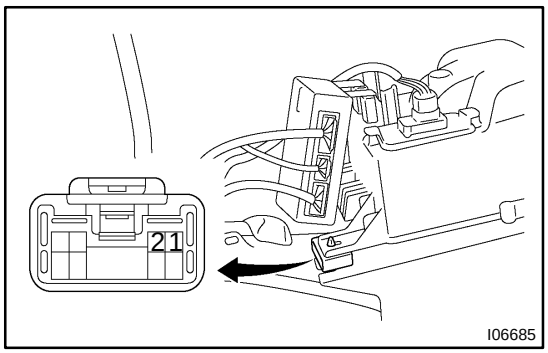


5. INSPECT THERMISTOR RESISTANCE

(a) Disconnect the connector.
(b) Measure resistance between terminal 3 and 4.

Standard resistance: Approx. 1.5 kΩ at 25 ˚C (77 ˚F)

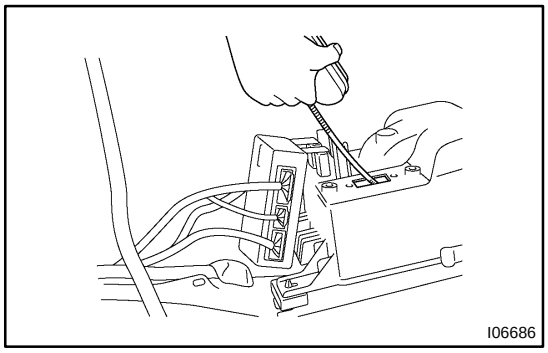
If resistance is not as specified, proceed ”INSPECTION” on page AC-36 .



6. INSPECT MAGNETIC VALVE CONTINUITY

(a) Disconnect the connector.
(b) Check the continuity exists between terminal 1 and 2.

If resistance is not as specified, proceed ”INSPECTION” on page AC-36 .



7. CHECK FOR LEAKAGE OF REFRIGERANT

(a) Remove the power transistor.
(b) Using a gas leak detector, check for leaks of refrigerant.

If there is a leakage, check the evaporator or tightening torque at the joints.

AC1KF-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-34).

AC1KC-05

REMOVAL

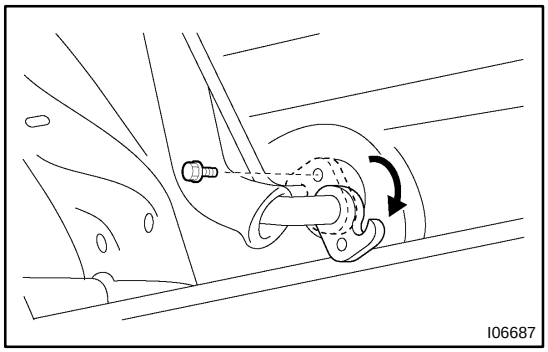
1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

HINT:

At the time of installation, first evacuate air from refrigeration system.

Then, charge the system with the refrigerant and inspect for leaks of the refrigerant.

Specified amount: 1,050 ± 50 g (37.04 ± 1.76 oz.)



2. DISCONNECT LIQUID AND SUCTION TUBES

Remove the bolt and slide the plate, then disconnect both tubes.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

HINT:

At the time of installation, lubricate 2 new O-rings with compressor oil and install them to the tubes.

3. REMOVE REAR DOOR SCUFF PLATE RH

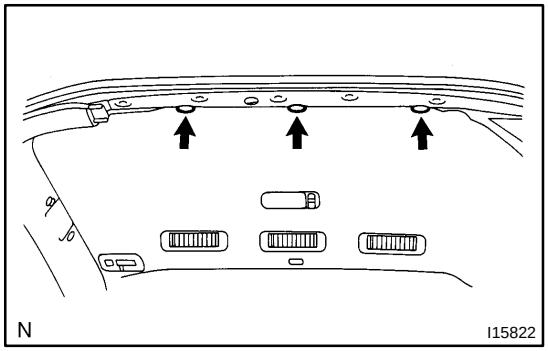
4. REMOVE REAR FLOOR MAT SUPPORT PLATE

5. REMOVE ROOF HEADLINING REAR TRIM

6. REMOVE QUARTER TRIM PANEL RH

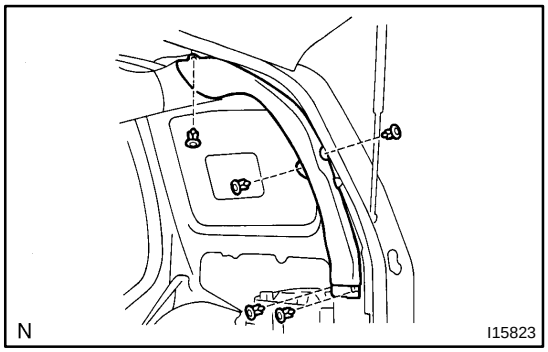
7. REMOVE ROOF SIDE INNER UPPER GARNISH

(See page BO-97)

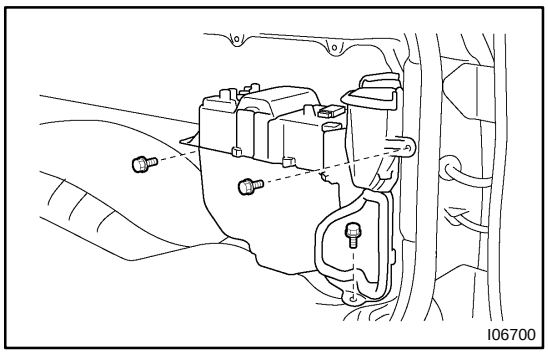


8. REMOVE NO. 1 COOLER AIR DUCT

(a) Remove the 3 roof headlining set clips.



(b) Remove the 5 clips and the No. 1 cooler air duct.



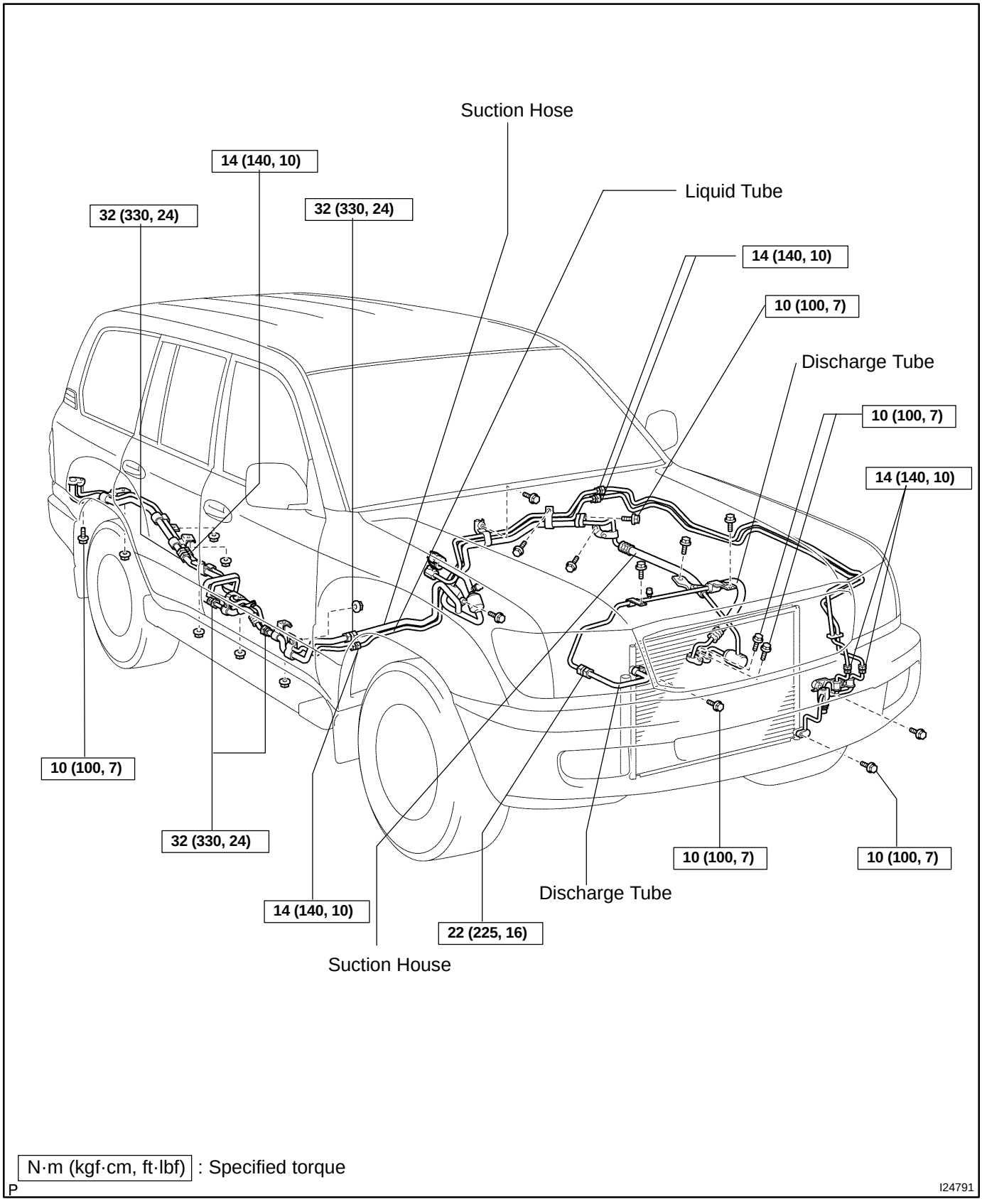
9. REMOVE REAR COOLING UNIT

(a) Disconnect the connectors.

(b) Remove the 3 bolts and the rear cooling unit.

AC3OV-01

COMPONENTS



REFRIGERANT LINE

AC1HU-01

ON-VEHICLE INSPECTION

1. INSPECTION HOSE AND TUBE CONNECTIONS FOR LOOSENESS

2. INSPECT HOSES AND TUBES FOR LEAKAGE

Using a gas leak detector, check for leakage of refrigerant.

AC1HW-04

REPLACEMENT

1. DISCHARGE REFRIGERANT FROM REFRIGERATION SYSTEM

2. REPLACE FAULTY TUBE OR HOSE

NOTICE:

Cap the open fittings immediately to keep moisture or dirt out of the system.

3. TIGHTEN JOINT OF BOLT OR NUT TO SPECIFIED TORQUE

NOTICE:

Do not tighten the connections more than specified.

Part tightened		N·m	kgf·cm	ft·lbf
Compressor x Discharge hose		10	100	7
Compressor x Suction hose		10	100	7
Condenser x Discharge tube		5.4	55	48 in.·lbf
Condenser x Liquid tube		10	100	7
Liquid line	Nut	14	140	10
	Bolt	10	100	7
Discharge line	Nut	22	225	16
Suction line	Nut (5/8")	32	330	24
	Nut (3/4")	42	425	31
	Bolt	10	100	7

4. EVACUATE AIR FROM REFRIGERATION SYSTEM AND CHARGE SYSTEM WITH REFRIGERANT

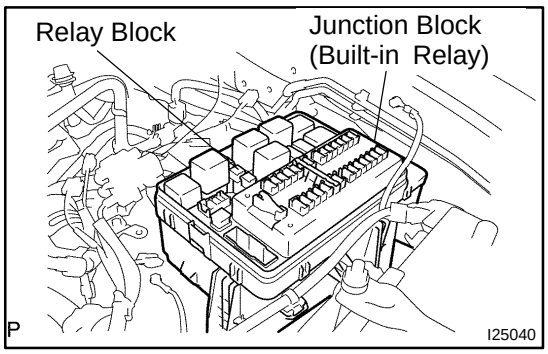
Specified amount: 1,050 ± 50 g (37.03 ± 1.76 oz.)

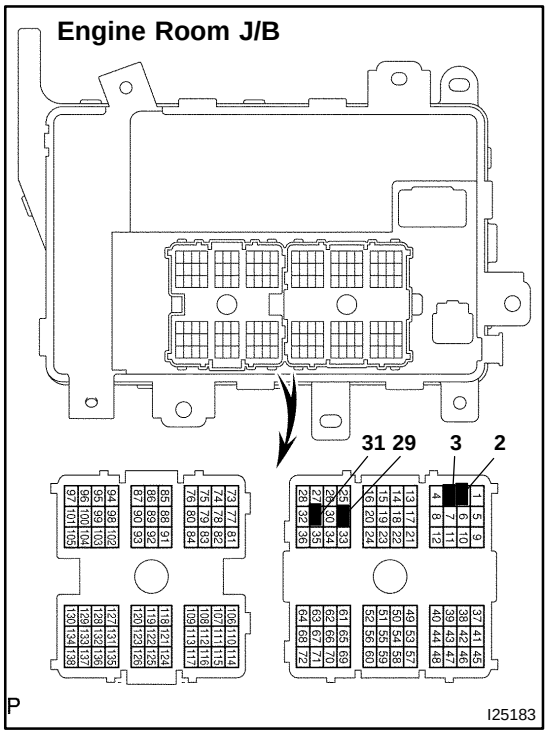
5. INSPECT FOR LEAKAGE OF REFRIGERANT

Using a gas leak detector, check for leaks of refrigerant

If there is leakage, check the tightening torque at the joints.

6. INSPECT AIR CONDITIONING OPERATION





REAR HEATER RELAY

INSPECTION

AC3OY-01

HINT:

The rear heater relay is built in the engine room junction block. Since the relay is constructed with a relay block that is in the junction block as a unit, it is impossible to disconnect the wire harness connecting with the relay block.

If the relay has a malfunction, replace it with the junction block assembly wire harness together.

1. REMOVE ENGINE ROOM J/B

2. INSPECT REAR HEATER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	29 - 31	Continuity
Apply B+ between terminals 29 and 31.	2 - 3	Continuity

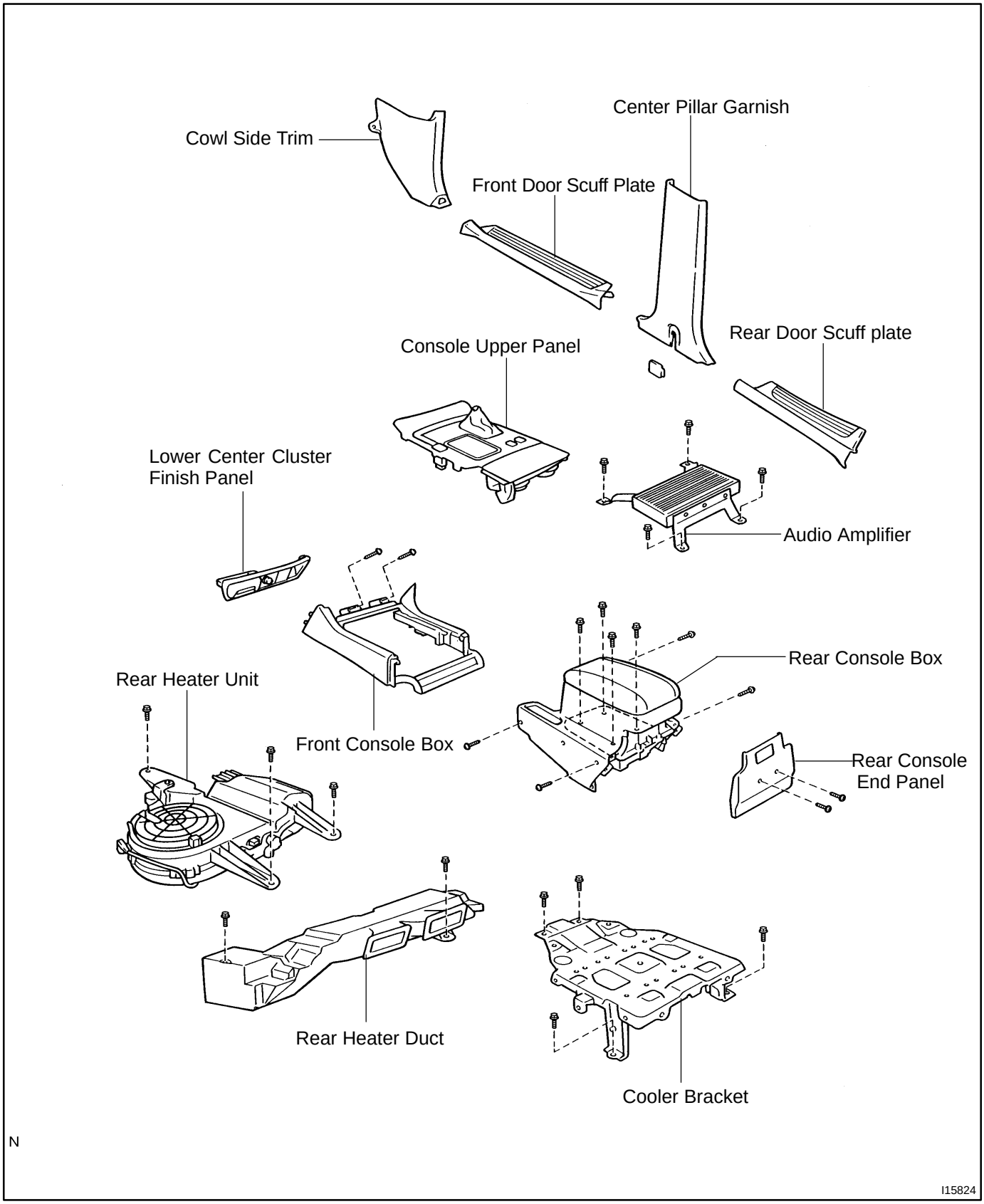
If continuity is not as specified, replace the engine room J/B.

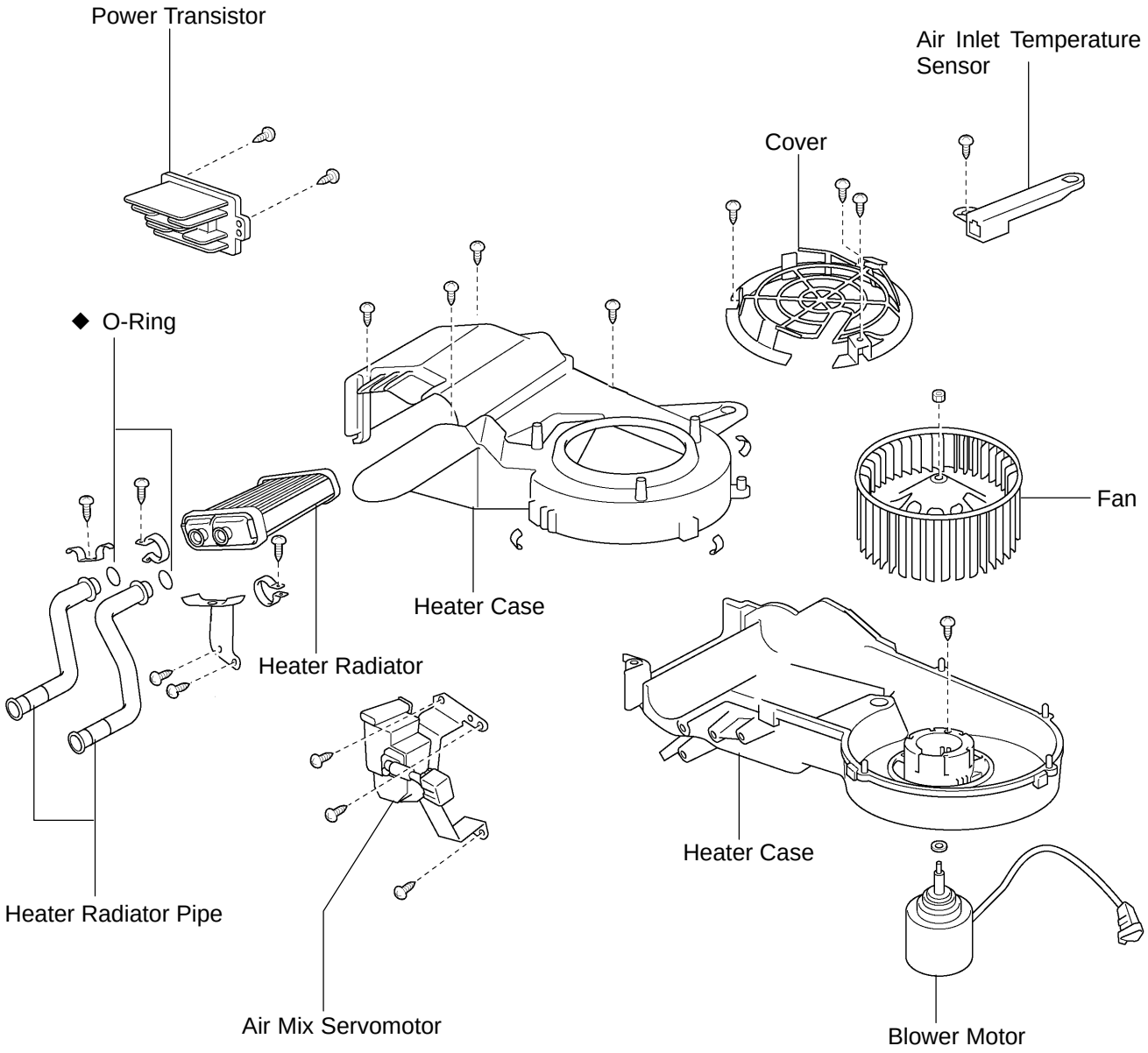
3. INSTALL ENGINE ROOM J/B

REAR HEATER UNIT

COMPONENTS

AC1KN-05



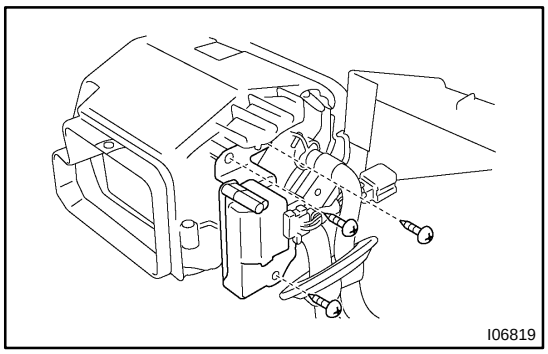


◆ Non - reusable part

I08487

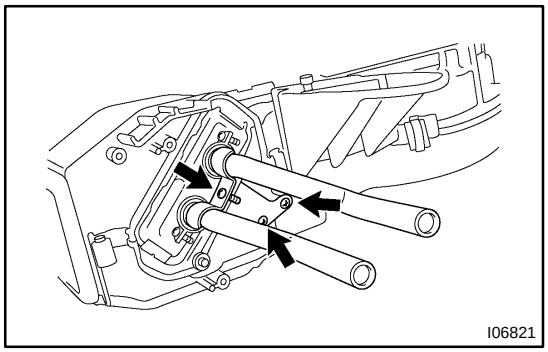
AC1KP-03

DISASSEMBLY



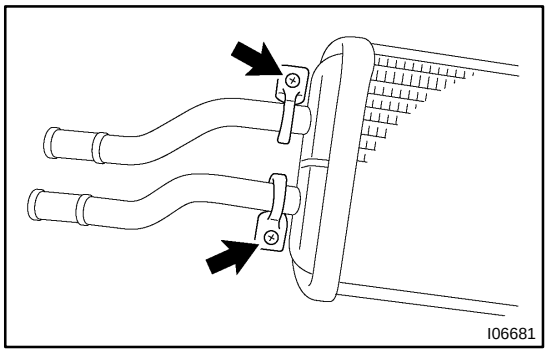
1. REMOVE AIR MIX SERVOMOTOR

Remove the 3 screws and the air mix servomotor.



2. REMOVE HEATER RADIATOR

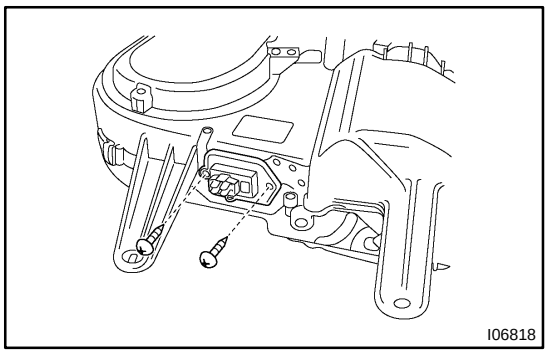
(a) Remove the 3 screws and 2 clamps
(b) Pull out the heater radiator.



(c) Remove the 2 screws, 2 clamps and the heater radiator pipes.
(d) Remove the 2 O-rings.

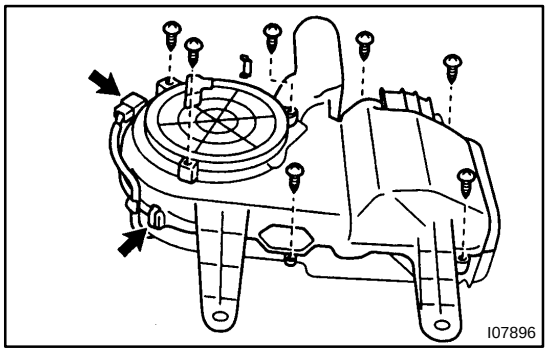
HINT:

At the time of reassembly, do not reuse the O-rings



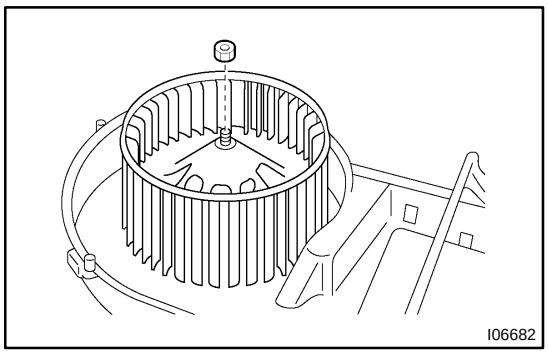
3. REMOVE POWER TRANSISTOR

Remove the 2 screws and the power transistor.

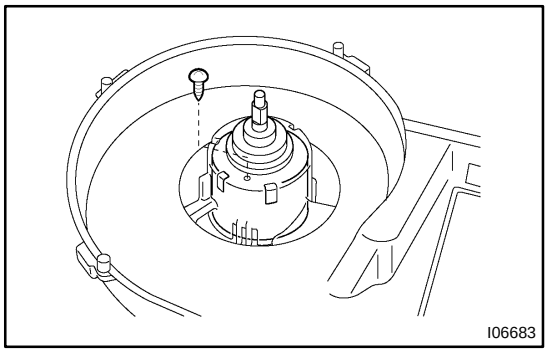


4. REMOVE BLOWER MOTOR

(a) Remove the 3 screws and the cover.
(b) Remove the 4 screws, the 3 holding springs and separate the heater cases.



(c) Remove the nut and the fan.



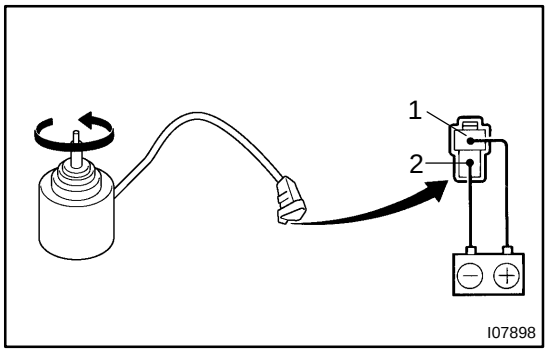
(d) Remove the screws and the blower motor.

AC1KQ-05

INSPECTION

1. INSPECT HEATER RADIATOR

If the fins are clogged, clean them with compressed air.



2. INSPECT BLOWER MOTOR OPERATION

Connect battery positive (+) lead to terminal 1 and battery negative (-) lead to terminal 2, then check that the motor rotates smoothly.

If operation is not as specified, replace the blower motor.

3. INSPECT AIR MIX SERVOMOTOR (See page DI-1354)

4. INSPECT AIR MIX DAMPER POSITION SENSOR (See page DI-1345)

AC1KS-02

INSTALLATION

Installation is in the reverse of removal (See page AC-47).

AC1KR-02

REASSEMBLY

Reassembly is in the reverse of disassembly (See page AC-49).

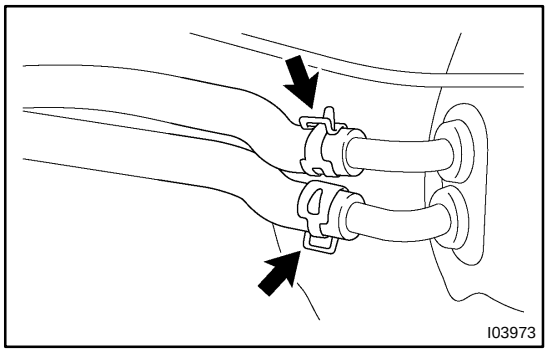
AC1KO-04

REMOVAL

1. DRAIN ENGINE COOLANT FROM RADIATOR

HINT:

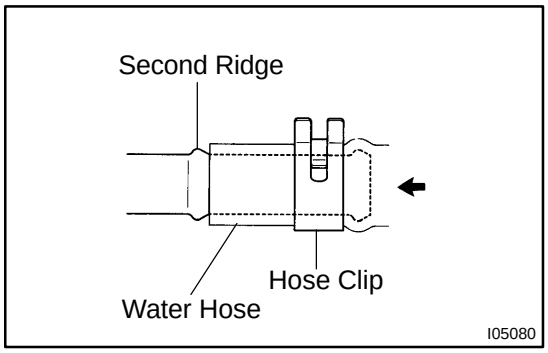
It is not necessary to drain out all the coolant.



2. DISCONNECT WATER HOSES FROM HEATER RADIATOR PIPES

(a) Using pliers, grip the claws of the clip and slide the clip along the hose

(b) Disconnect the water hoses



HINT:

At the time of installation, push the water hose on to the heater radiator pipe to the second ridge on the pipe.

3. REMOVE FRONT SEATS

4. REMOVE REAR CONSOLE BOX

5. REMOVE FRONT CONSOLE BOX COVER

6. REMOVE LOWER CENTER CLUSTER FINISH PANEL

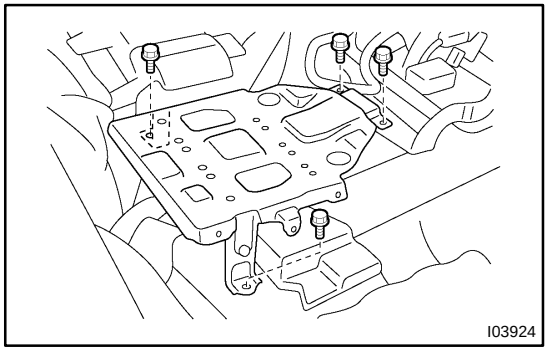
7. REMOVE FRONT DOOR SCUFF PLATE

8. REMOVE COWL SIDE TRIMS

9. REMOVE REAR DOOR SCUFF PLATES

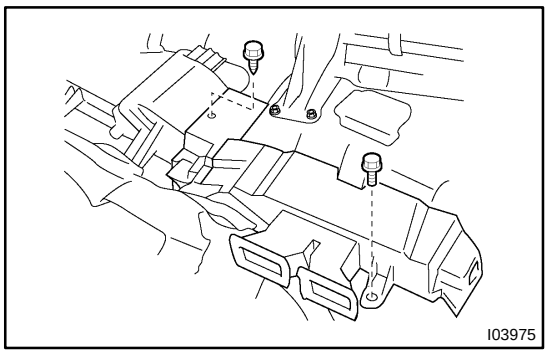
10. REMOVE CENTER PILLAR GARNISHES

11. SLIDE FLOOR CARPET BACKWARD



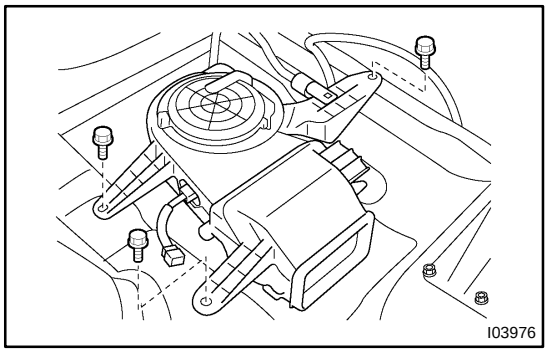
12. REMOVE COOLER BRACKET

Remove the 4 bolts and the cooler bracket.



13. REMOVE REAR HEATER DUCT

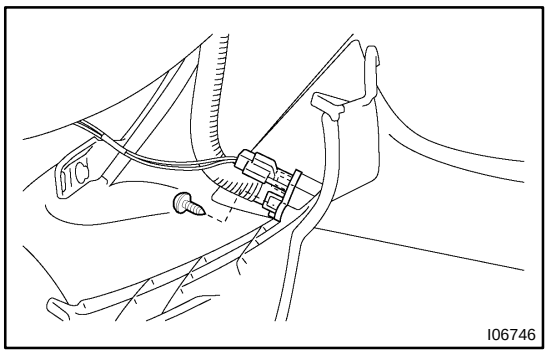
Remove the bolt, the screw and the rear heater duct.



14. REMOVE REAR HEATER UNIT

(a) Disconnect the connector.

(b) Remove the 3 bolts and the rear heater unit.



ROOM TEMPERATURE SENSOR (for Front A/C)

AC1LN-04

INSPECTION

1. REMOVE ROOM TEMPERATURE SENSOR

(a) Remove the lower No. 1 panel set screw.

(b) Release the lower No. 1 panel set claws.

(c) Disconnect the connector and the aspirator hose.

(d) Remove the screw and the room temperature sensor.

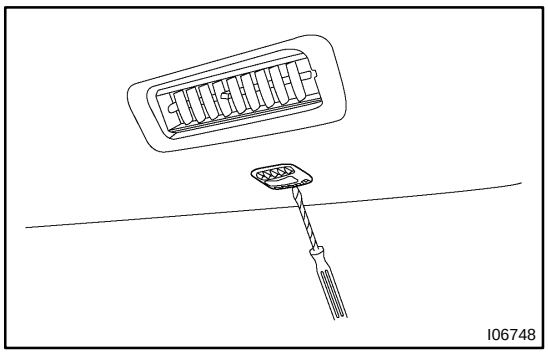
2. INSPECT ROOM TEMPERATURE SENSOR CIRCUIT (See page DI-1316)

3. INSTALL ROOM TEMPERATURE SENSOR

(a) Install the room temperature sensor to the lower No. 1 panel with the screw.

(b) Connect the aspirator hose and the connector.

(c) Install the lower No. 1 panel with the screw.



ROOM TEMPERATURE SENSOR (for Rear A/C)

AC1LO-05

INSPECTION

1. REMOVE ROOM TEMPERATURE SENSOR

Using a scrwedriver, pull out the room temperature sensor, then disconnect the connector.

HINT:

Tape the screwdriver tip before use.

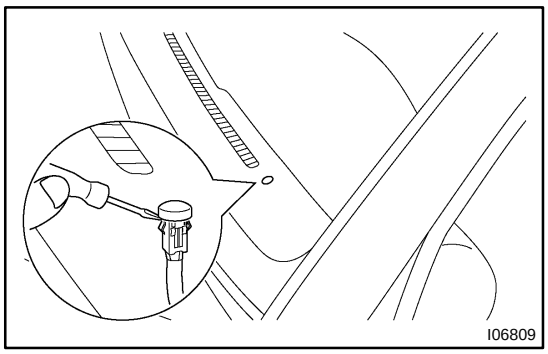
2. INSPECT ROOM TEMPERATURE SENSOR

(See page DI-1330)

3. INSTALL ROOM TEMPERATURE SENSOR

(a) Connect the connector.

(b) Insert the room temperature sensor to the roof headlining.



SOLAR SENSOR

AC1LM-05

INSPECTION

1. REMOVE SOLAR SENSOR

Using a screwdriver, pull out the solar sensor, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

2. INSPECT SOLAR SENSOR CIRCUIT

(See page DI-1333)

3. INSTALL SOLAR SENSOR

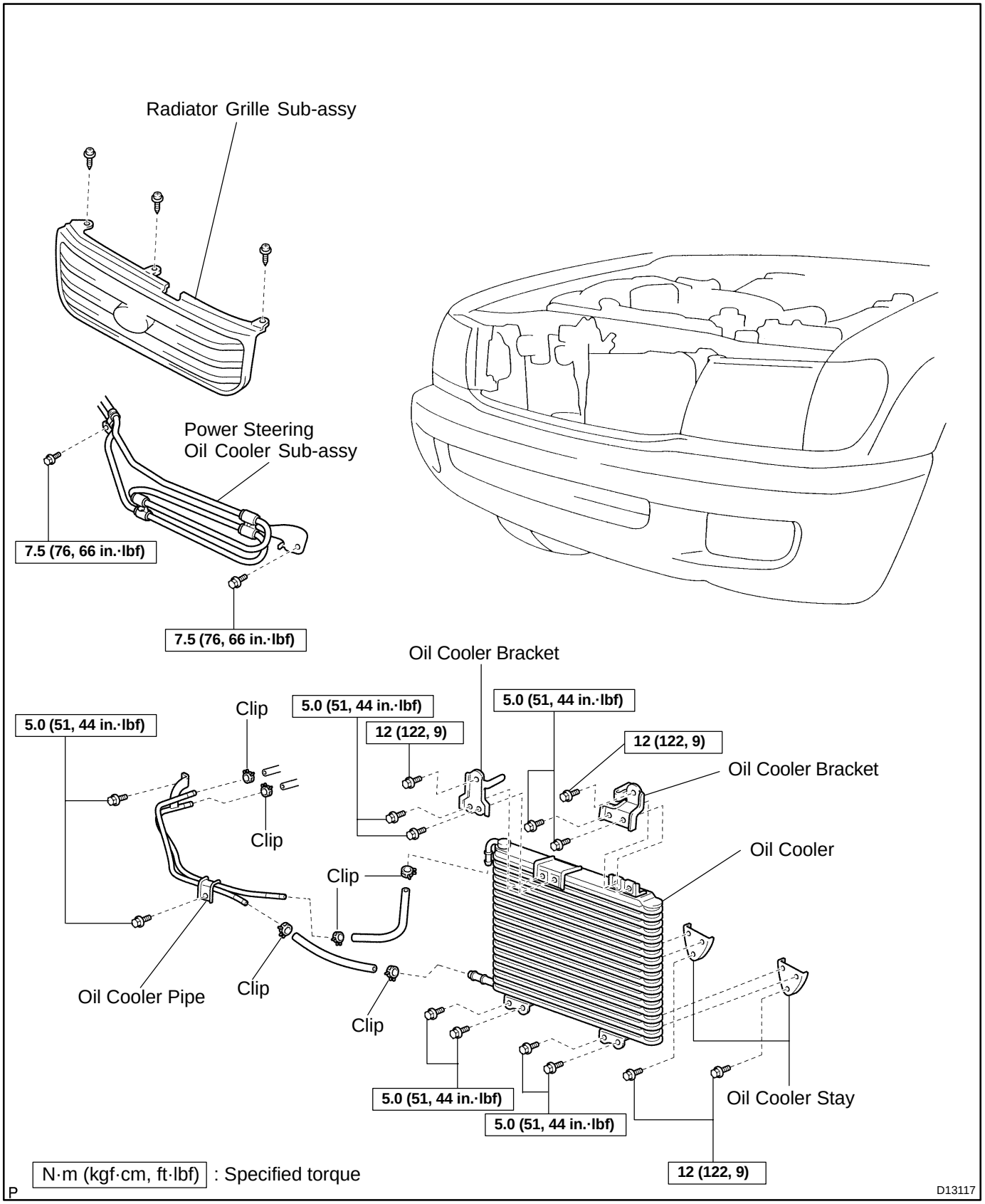
(a) Connect the connector.

(b) Insert the solar sensor to the instrument panel.

AIR COOLED OIL COOLER

COMPONENTS

AT07I-05



AT07K-05

INSTALLATION

Installation is in the reverse order of removal (See page AT-17).

HINT:

After installtion, check fluid level (See page AT-3-1).

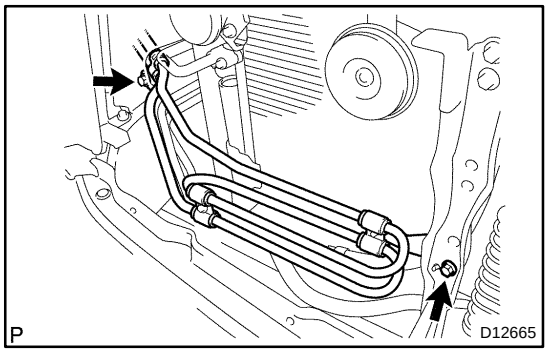
AT113-01

REMOVAL

1. REMOVE RADIATOR GRILLE SUB-ASSY

(a) Remove the 3 screws.

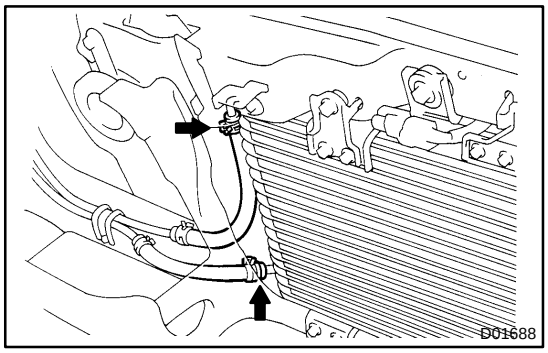
(b) Release the 2 clips and remove the radiator grille sub-assy.



2. SEPARATE POWER STEERING OIL COOLER SUB-ASSY

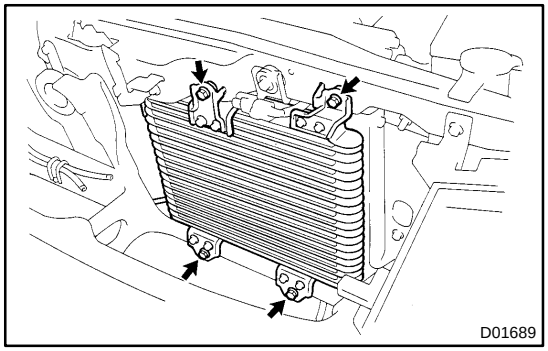
Remove the 2 bolts and separate the power steering oil cooler sub-assy .

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)



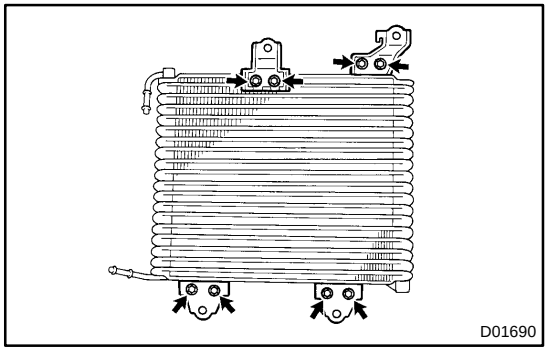
3. REMOVE OIL COOLER

(a) Loosen the 2 clips and disconnect the 2 hoses.



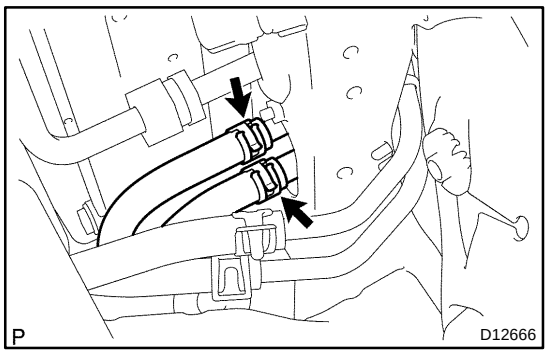
(b) Remove the 4 bolts and oil cooler.

Torque: 12 N·m (117 kgf·cm, 8 ft·lbf)



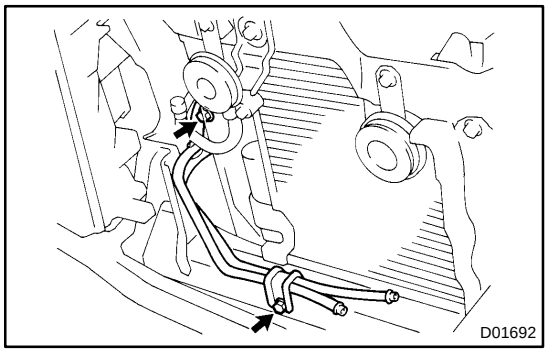
(c) Remove the 8 bolts, the 2 oil cooler brackets and the 2 stays.

Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)



4. REMOVE OIL COOLER PIPE BRACKET

(a) Loosen the 2 clips and disconnect the 2 hoses.



(b) Remove the 2 bolts and the oil cooler pipe bracket.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

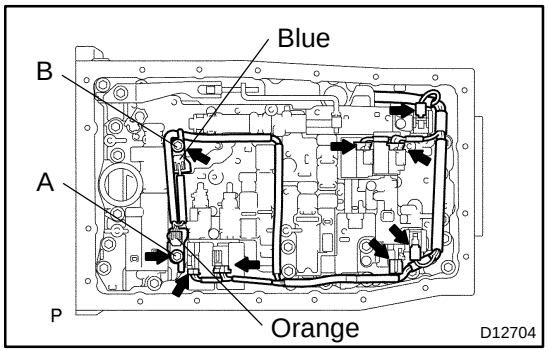
(c) Loosen the 2 clips and disconnect the 2 hoses.

ATF TEMPERATURE SENSOR

AT10Z-02

ON-VEHICLE REPAIR

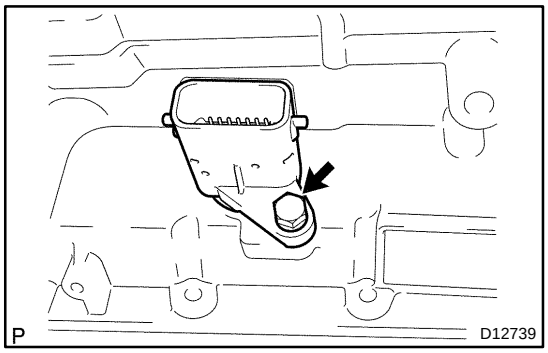
1. **REMOVE ENGINE NO.2 UNDER COVER**
2. **DRAIN ATF**
3. **REMOVE OIL PAN (See page AT-11)**
4. **REMOVE OIL STRAINER (See page AT-11)**



5. **REMOVE ATF TEMPERATURE SENSOR**

(a) Disconnect the 7 solenoid valve connectors.

(b) Remove the 2 bolts and disconnect the 2 ATF temperature sensors.



(c) Disconnect the solenoid connector.

(d) Remove the bolt and the transmission wire harness.

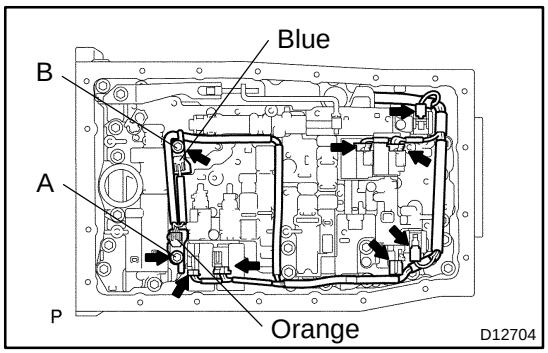
6. **INSTALL ATF TEMPERATURE SENSOR**

(a) Install the transmission wire harness.

(b) Install the bolt.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(c) Connect the solenoid connector.



(d) Connect the 7 solenoid valve connectors.

(e) Connect the 2 ATF temperature sensors with the 2 bolts.

Torque:
A: 11 N·m (112 kgf·cm, 8 ft·lbf)
B: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 36 mm (1.42 in.)
Bolt B: 12 mm (0.47 in.)

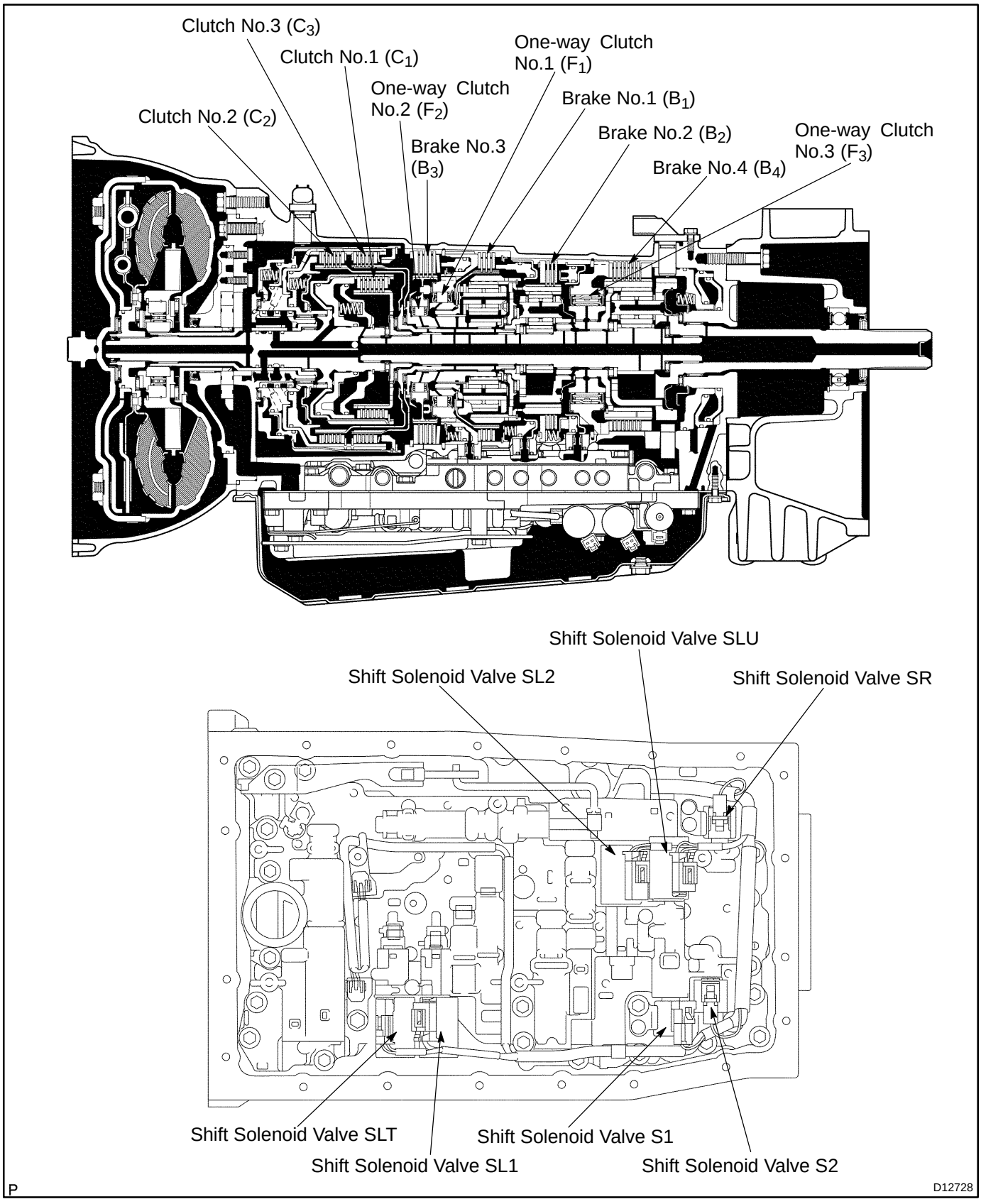
Sensor wire harness:

Wire harness	Color
for linear control	Orange
for oil temp warning lamp	Blue

7. **INSTALL OIL STRAINER (See page AT-8)**
8. **INSTALL OIL PAN (See page AT-8)**
9. **FILL ATF AND CHECK ATF LEVEL (See page AT-3-1)**
10. **INSTALL ENGINE NO.2 UNDER COVER**

AT07M-02

OPERATION



Shift Lever Position	Gear Position	S1	S2	SR	SL1	SL2	SLU	C_1	C_2	C_3	B_1	B_2	B_3	B_4	F_1	F_2	F_3
P	Park	○	x	x	x	○	x	x	x	x	x	x	x	x	x	x	x
R	Reverse	○	x	x	x	○	x	x	x	○	○	x	x	○	○	x	x
N	Neutral	○	x	x	x	○	x	x	x	x	x	x	x	x	x	x	x
D	1st	○	x	x	x	○	x	○	x	x	x	x	x	x	x	x	○
	2nd	○	○	x	x	○	x	○	x	x	x	x	○	x	○	○	x
	3rd	x	○	x	x	○	x	○	x	○	x	x	○	x	○	x	x
	4th	x	x	x	x	○	○	○	○	○	x	x	○	x	x	x	x
	5th	x	x	○	○	x	○	x	○	○	○	x	○	x	x	x	x
4	1st	○	x	x	x	○	x	○	x	x	x	x	x	x	x	x	○
	2nd	○	○	x	x	○	x	○	x	x	x	x	○	x	○	○	x
	3rd	x	○	x	x	○	x	○	x	○	x	x	○	x	○	x	x
	4th	x	x	x	x	○	○	○	○	○	x	x	○	x	x	x	x
3	1st	○	x	x	x	○	x	○	x	x	x	x	x	x	x	x	○
	2nd	○	○	x	x	○	x	○	x	x	x	x	○	x	○	○	x
	3rd	x	○	x	x	x	x	○	x	○	○	x	○	x	○	x	x
2	1st	○	x	x	x	○	x	○	x	x	x	x	x	x	x	x	○
	2nd	○	○	○	x	x	x	○	x	x	x	○	○	x	○	○	x
L	1st	○	x	x	x	x	x	○	x	x	x	x	x	○	x	x	○

○ : Operating

F1, F2, F3 : Operate only when driving

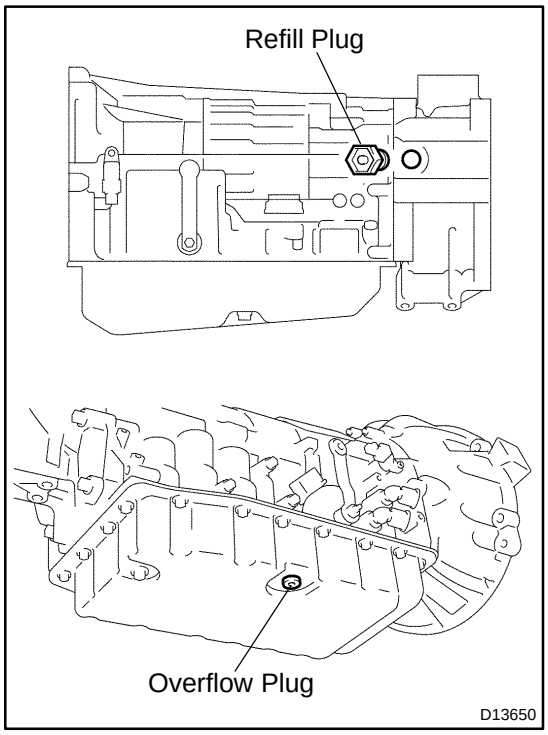
AUTOMATIC TRANSMISSION FLUID

AT147-03

OPERATION

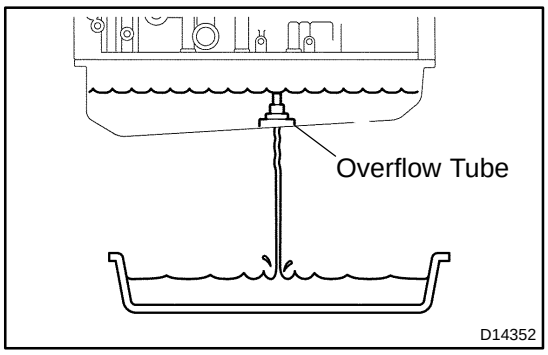
1. BEFORE TRANSMISSION FILL

- This transmission requires Toyota Genuine ATF WS.
- It is necessary to refill the transmission with the correct amount of fluid.
- The vehicle must remain level while adjusting the transmission fluid level.
- On vehicles equipped with active suspension, turn the suspension control switch OFF if it is necessary to jack up the vehicle with the engine running.



2. TRANSMISSION PAN FILL

(a) Remove the refill plug and overflow plug.



(b) Fill the transmission through the refill hole until fluid begins to trickle out of the overflow tube.

(c) Reinstall the overflow plug.

3. TRANSMISSION FILL

(a) Fill the transmission with the correct amount of fluid as listed in the table below.

(b) Reinstall the refill plug to avoid fluid splash.

Repair	Fill Amount
Transmission pan and drain plug removal	1.3 liters (1.37 US qts, 1.14 Imp. qts)
Transmission valve body removal	3.9 liters (4.12 US qts, 3.43 Imp. qts)
Torque converter removal	5.3 liters (5.60 US qts, 4.66 Imp. qts)
Entire transmission assembly	5.3 liters (5.60 US qts, 4.66 Imp. qts)

HINT:

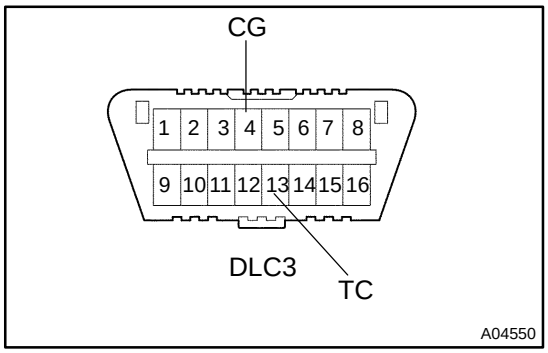
If you cannot add the listed amount of fluid, do the following:

(1) Install the refill plug.
(2) Allow the engine to idle with air conditioning OFF.
(3) Move the shift lever through entire gear range to circulate fluid.
(4) Wait for 30 seconds with the engine idling.
(5) Stop the engine.
(6) Remove the refill plug and add fluid.
(7) Reinstall the refill plug.

4. FLUID CIRCULATION

(a) Allow the engine to idle with the air conditioning OFF.

(b) Move the shift lever through entire gear range to circulate fluid.



5. FLUID TEMPERATURE CHECK

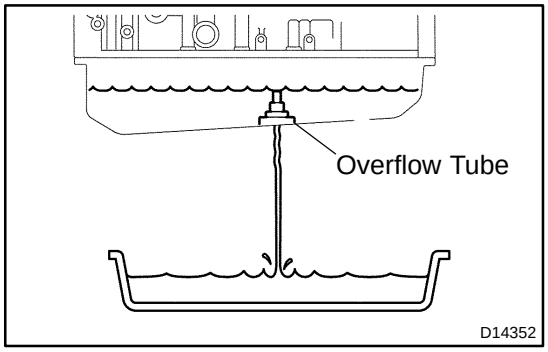
NOTICE:

The fluid temperature should be less than 30°C (86°F) before beginning the fluid temperature check.

(a) With hand-held tester

(1) Connect the hand-held tester to the DLC3.
(2) Select the tester menus: OBD/MOBD, ENGINE, DATA LIST and A/T.
(3) Check A/T OIL TEMP.
(4) Allow the engine to idle until the fluid temperature reaches 46°C (115°F).

(b) Without hand-held tester (Using A/T OIL TEMP indicator)
(1) Connect terminals between CG (4) and TC (13) of the DLC3 using SST (09843-18040).
(2) Move the shift lever back and forth between N and D at 1.5 seconds interval for six seconds.
(3) The D shift indicator on the combination meter comes on for two seconds. This indicates that the fluid temperature check mode has been started.
(4) The D shift indicator comes on again when the fluid temperature reaches 46°C (115°F) and blinks when it exceeds 56°C (130°F).
(5) Allow the engine to idle until the fluid temperature reaches 46°C (115°F).



6. FLUID LEVEL CHECK

NOTICE:

The fluid temperature must be between 46°C (115°F) and 56°C (130°F) to check the fluid level.

(a) Remove the overflow plug with the engine idling.
(b) Check that the fluid comes out of the overflow tube.
- If fluid does not come out, proceed to step 7.
- If fluid comes out, wait until the overflow slows to a trickle and proceed to step 8.

7. TRANSMISSION REFILL

(a) Install the overflow plug.
(b) Stop the engine.
(c) Remove the refill plug.
(d) Add 0.4 liters (0.42 US qts, 0.35 lmp. qts) of fluid.
(e) Allow the engine to idle and wait for 10 seconds.
(f) Proceed to step 6.

8. COMPLETE

(a) Install the overflow plug with a new gasket.
(b) Stop the engine.
(c) Install the refill plug with a new gasket.

Torque:

20 N·m (205 kgf·cm, 15 ft·lbf) for overflow plug
39 N·m (400 kgf·cm, 29 ft·lbf) for refill plug

AUTOMATIC TRANSMISSION SYSTEM

AT07L-02

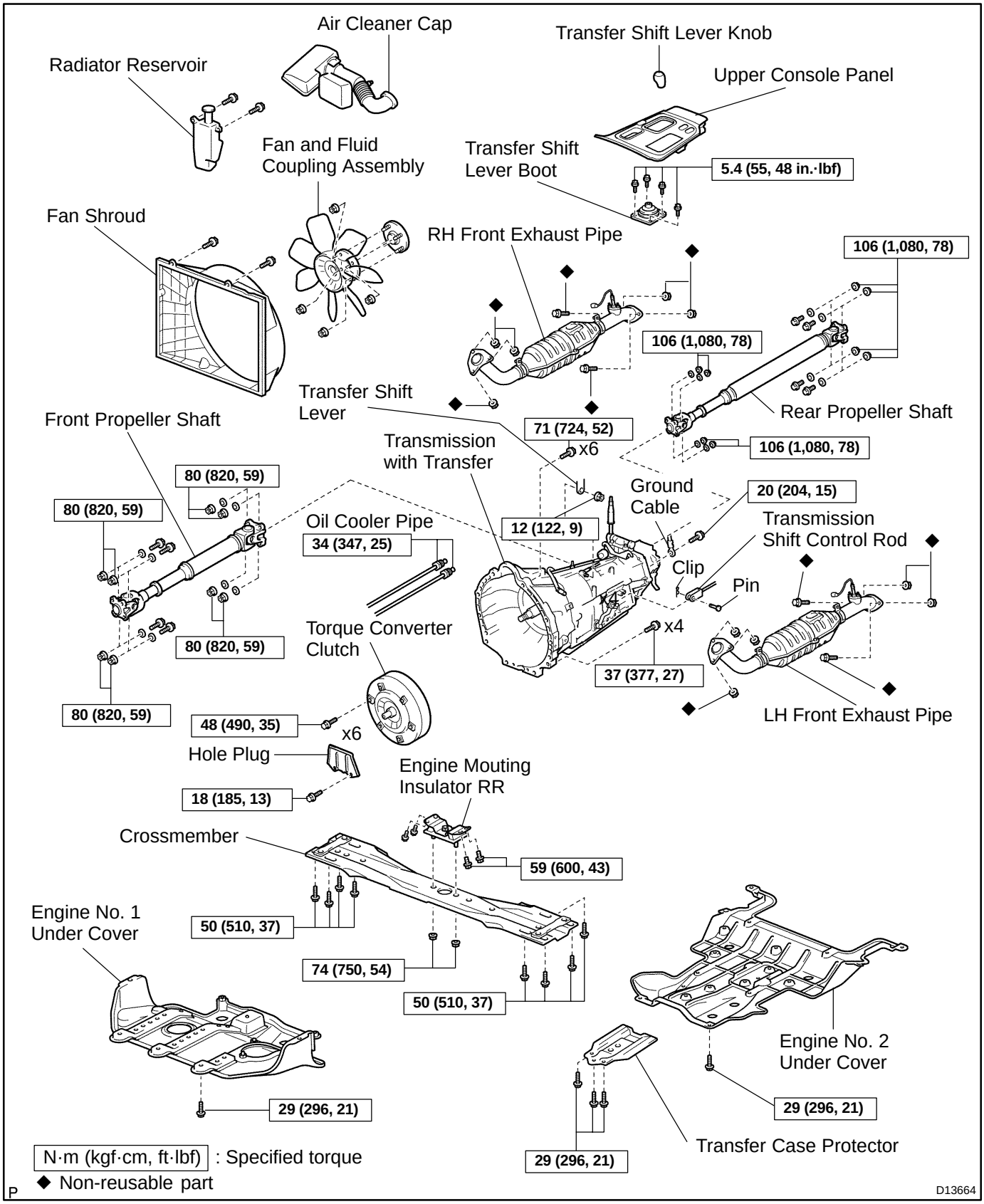
PRECAUTION

If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.

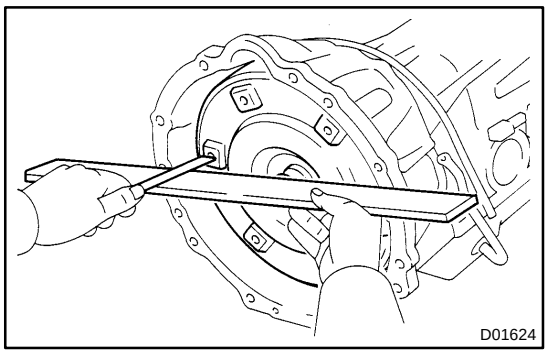
AUTOMATIC TRANSMISSION UNIT

AT080-04

COMPONENTS



AT082-06



INSTALLATION

1. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

Using calipers and a straight edge, measure the distance from the installed surface of the transmission housing to the installed surface of the torque converter clutch.

Correct distance: More than 17.1 mm (0.673 in.)

2. TRANSMISSION INSTALLATION

Installation is in the reverse order of removal (See page AT-33).

HINT:

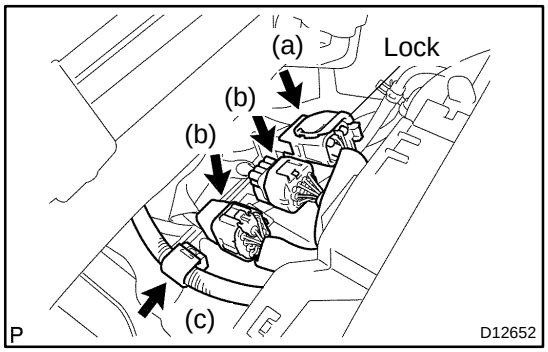
- Transmission control rod and the park/neutral position switch (See page DI-361)
- ATF level (See page AT-3-1)
- Conduct the road test of the vehicle (See page DI-361)

AT12V-01

REMOVAL

1. REMOVE BATTERY

2. REMOVE AIR CLEANER CAP DRIVE BELT, FAN AND FLUID COUPLING ASSEMBLY, FAN SHROUD AND RADIATOR RESERVOIR
(See page CO-17)



3. DISCONNECT CONNECTORS

(a) Release the lock and disconnect the transmission wire connector.

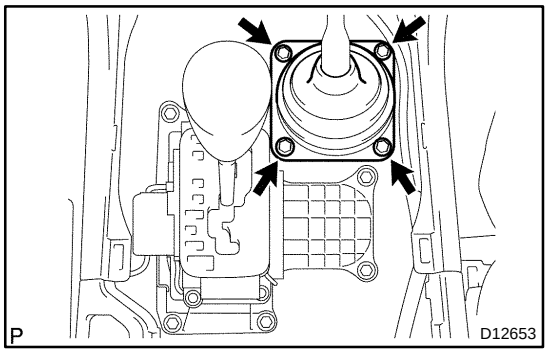
(b) Disconnect the 2 transmission wire connectors.

(c) Separate the connector clamp.

4. REMOVE TRANSFER SHIFT LEVER BOOT

(a) Remove the transfer shift lever knob.

(b) Remove upper console panel (See page BO-84).

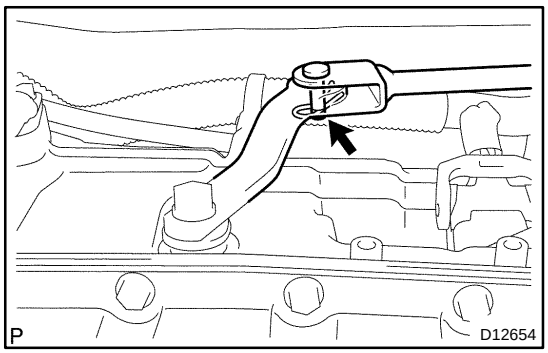


(c) Remove the 4 bolts and the transfer shift lever boot.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

5. REMOVE ENGINE NO. 1 AND NO. 2 UNDER COVERS

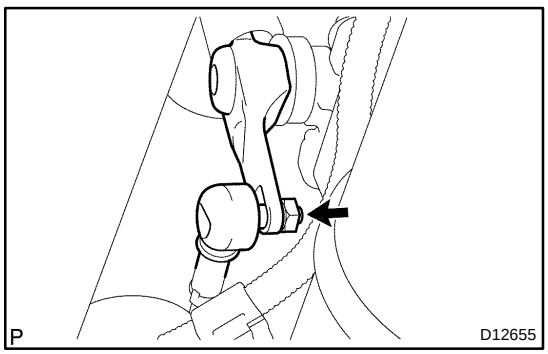
6. REMOVE LH AND RH FRONT EXHAUST PIPES
(See page EM-1 15)

7. REMOVE FRONT AND REAR PROPELLER SHAFTS
(See page PR-4)



8. SEPARATE TRANSMISSION SHIFT CONTROL ROD

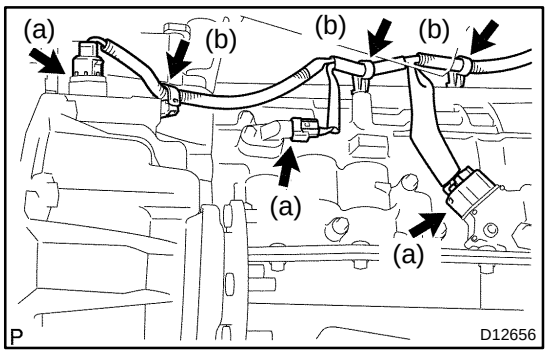
Remove the clip and pin and separate the shift control rod.



9. SEPARATE TRANSFER SHIFT LEVER

Remove the nut and separate the transfer shift lever rod assembly.

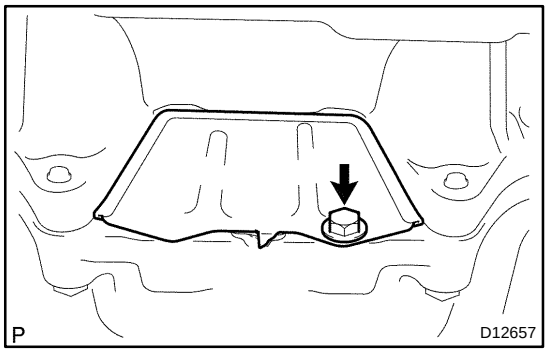
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)



10. SEPARATE WIRE HARNESS

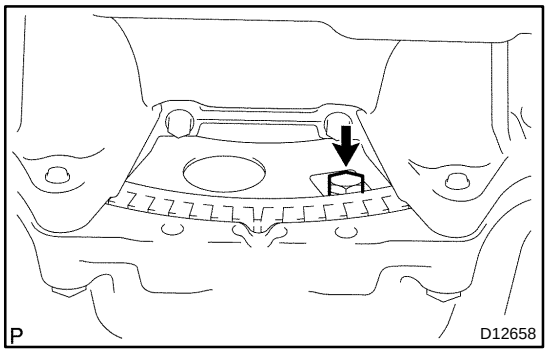
(a) Disconnect 3 connectors.

(b) Remove the 3 clamps from the transmission unit and separate the transmission wire.



11. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLT

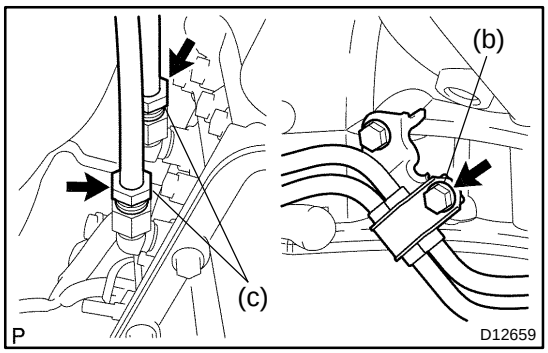
(a) Remove the bolt and the hole plug.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



(b) Turn the crankshaft to gain access to each bolt.

(c) Hold the crankshaft pulley nut with a wrench, and remove the 6 bolts.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
At the time of installation, first install the green colored bolt. And then install the other 5 bolts.

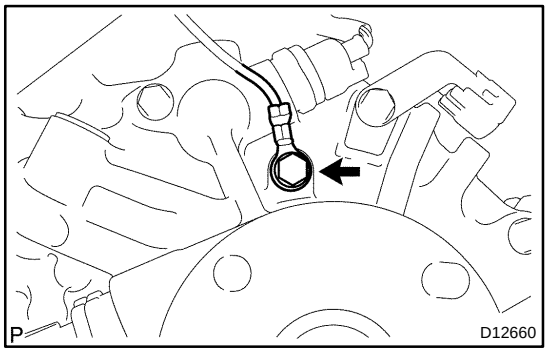


12. DISCONNECT OIL COOLER PIPES

(a) Loosen the 2 union nuts.

(b) Remove the bolt and the clamp.
Torque: 12 N·m (122 kgf·cm, 9 ft·lbf)

(c) Remove the 2 union nuts and disconnect the 2 oil cooler pipes.
Torque: 34 N·m (347 kgf·cm, 25 ft·lbf)

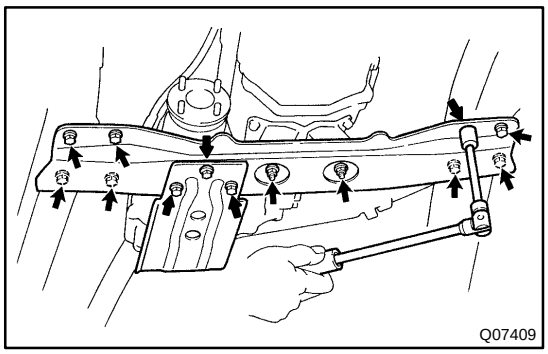


13. SEPARATE GROUND CABLE

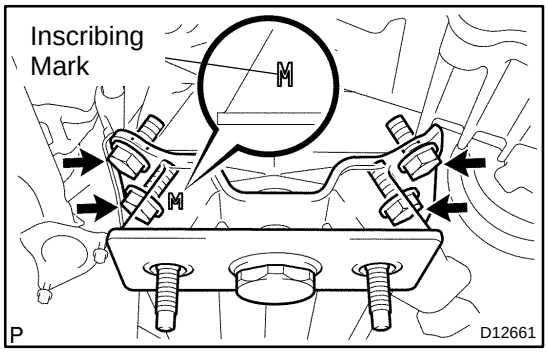
Remove the bolt and separate the ground cable.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

14. REMOVE CROSSMEMBER AND TRANSTER CASE PROTECTOR

(a) Support the transmission with a jack.

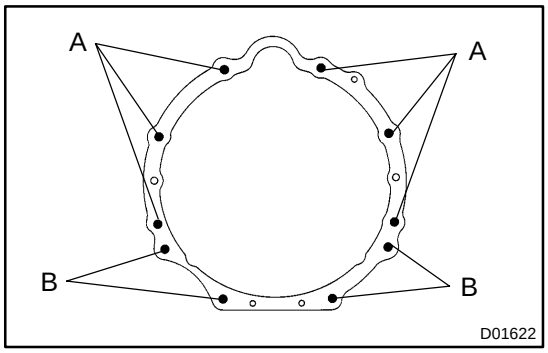


(b) Remove the 3 bolts and the transter case protector.
Torque: 29 N·m (296 kgf·cm, 21 ft·lbf)
(c) Remove the 8 bolts, the 2 nuts and the crossmember.
Torque:
Bolt: 50 N·m (510 kgf·cm, 37 ft·lbf)
Nut: 74 N·m (750 kgf·cm, 54 ft·lbf)

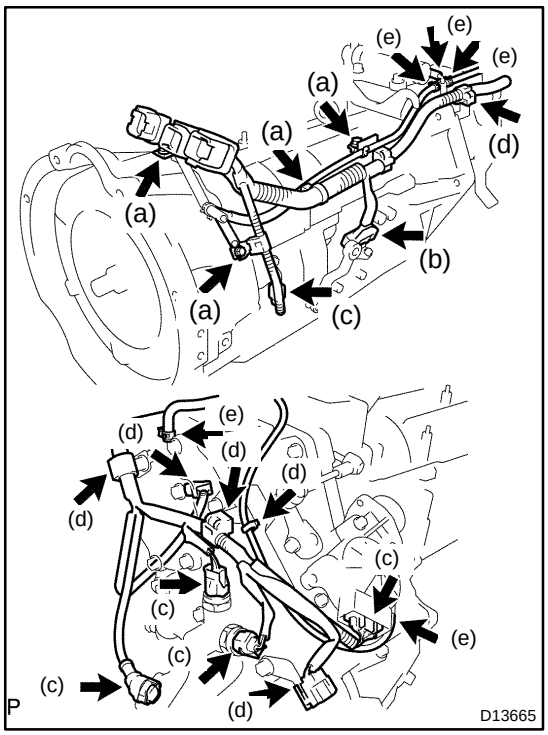


15. REMOVE ENGINE MOUNTING INSULATOR RR
Remove the 4 bolts and the engine mounting insulator RR.
Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)
HINT:
At the time of installation, install the insulator rear with the inscribing mark facing backward.

16. REMOVE TRANSMISSION
(a) Lower the rear end of the transmission unit.
(b) Remove the transmission wire clamp bolt.



(c) Remove the 10 bolts and the transmission unit.
Torque:
Bolt A: 71 N·m (724 kgf·cm, 52 ft·lbf)
Bolt B: 37 N·m (377 kgf·cm, 27 ft·lbf)

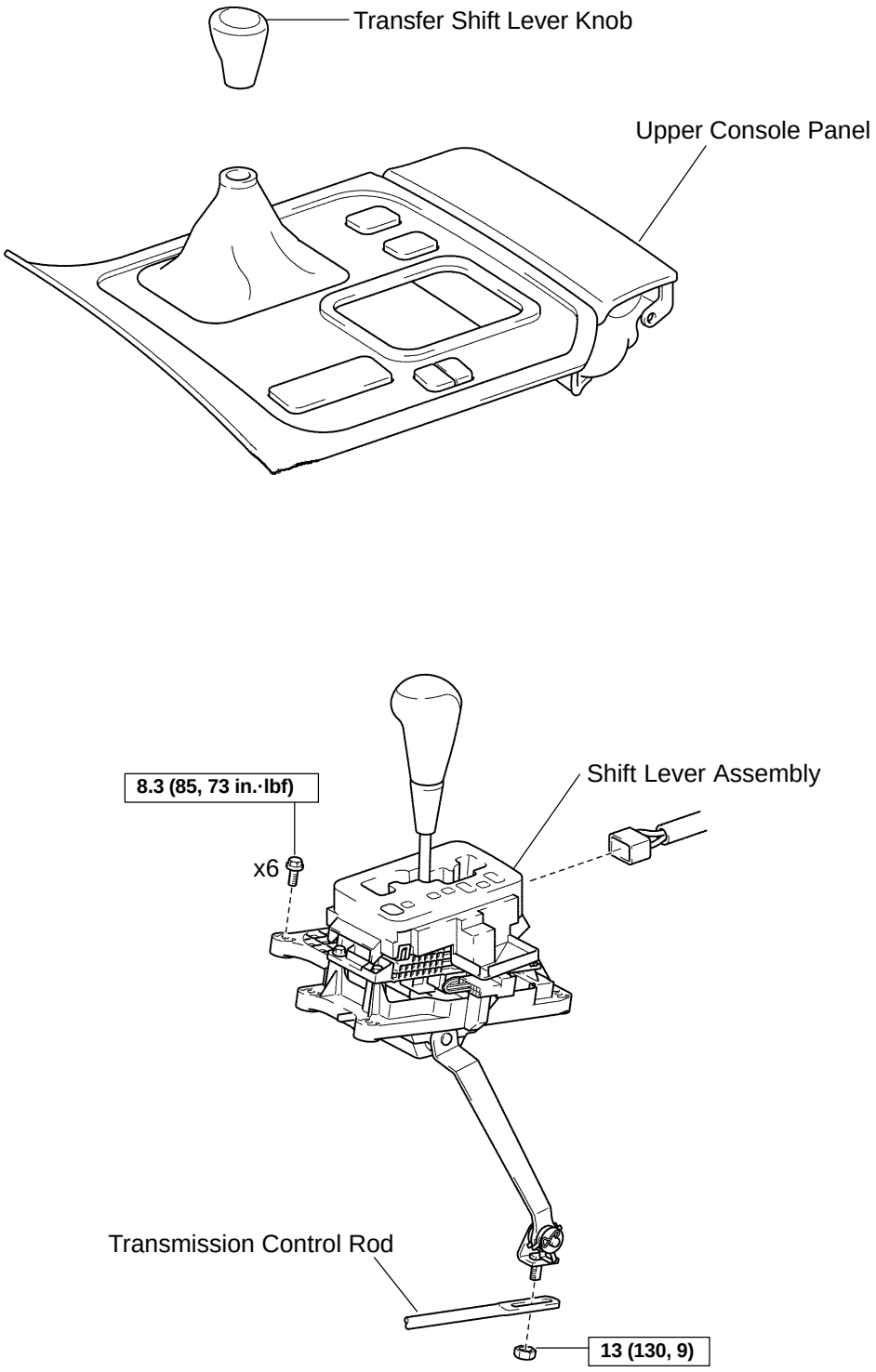


17. REMOVE WIRE HARNESS AND HOSE
(a) Remove the 4 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)
(b) Release the lock and disconnect the connector.
(c) Disconnect the 5 connectors.
(d) Separate the 6 connector clamps.
(e) Disconnect the 5 hoses and remove the wire harness and the hose.

FLOOR SHIFT ASSEMBLY

AT07S-04

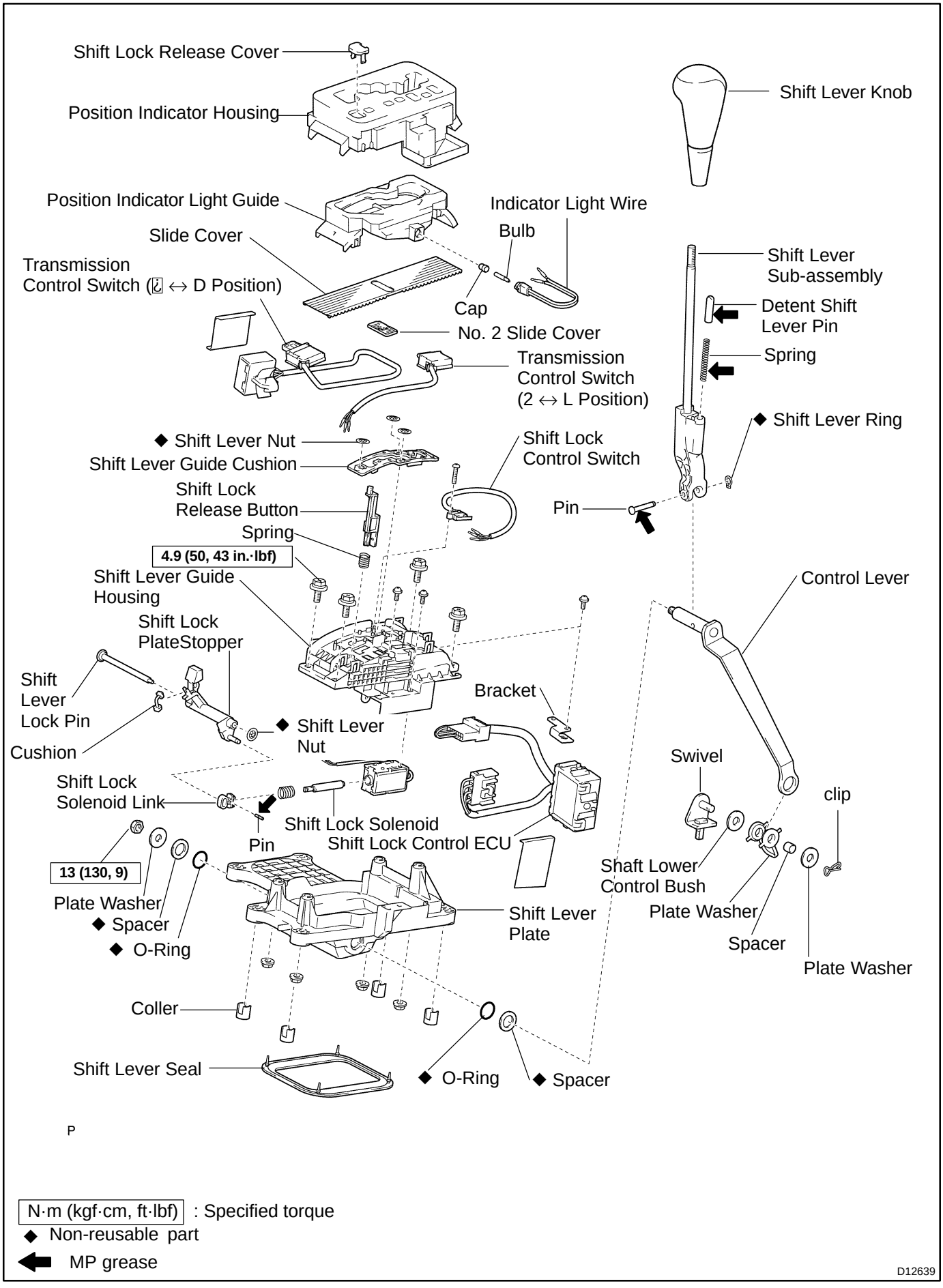
COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

P

D12638


Shift Lock Release Cover
Position Indicator Housing
Shift Lever Knob
Position Indicator Light Guide
Indicator Light Wire
Bulb
Slide Cover
Transmission Control Switch (P ↔ D Position)
Cap
No. 2 Slide Cover
Shift Lever Sub-assembly
Detent Shift Lever Pin
Spring
Transmission Control Switch (2 ↔ L Position)
◆ Shift Lever Ring
◆ Shift Lever Nut
Shift Lever Guide Cushion
Shift Lock Control Switch
Shift Lock Release Button
Pin
Spring
4.9 (50, 43 in.·lbf)
Shift Lever Guide Housing
Control Lever
Shift Lock PlateStopper
Shift Lever Lock Pin
Bracket
◆ Shift Lever Nut
Cushion
Swivel
clip
Shift Lock Solenoid Link
Shift Lock Solenoid
Shift Lock Control ECU
Pin
13 (130, 9)
Shaft Lower Control Bush
Plate Washer
◆ Spacer
Shift Lever Plate
Plate Washer
◆ O-Ring
Spacer
Plate Washer
Coller
Shift Lever Seal
◆ O-Ring
◆ Spacer
P
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
MP grease
D12639

AT114-01

DISASSEMBLY

1. REMOVE SHIFT LEVER KNOB

2. REMOVE POSITION INDICATOR HOUSING

(a) Using a small screwdriver, remove the shift lock release cover from the position indicator housing.

(b) Remove the position indicator housing assembly.

3. REMOVE POSITION INDICATOR LIGHT GUIDE

(a) Disconnect the indicator lamp wire from the position indicator light guide.

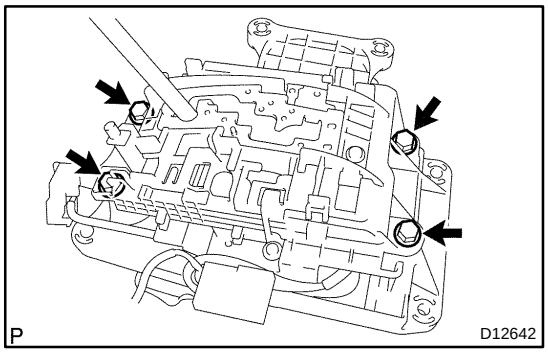
(b) Remove the position indicator light guide.

4. REMOVE SLIDE COVER AND NO. 2 SLIDE COVER

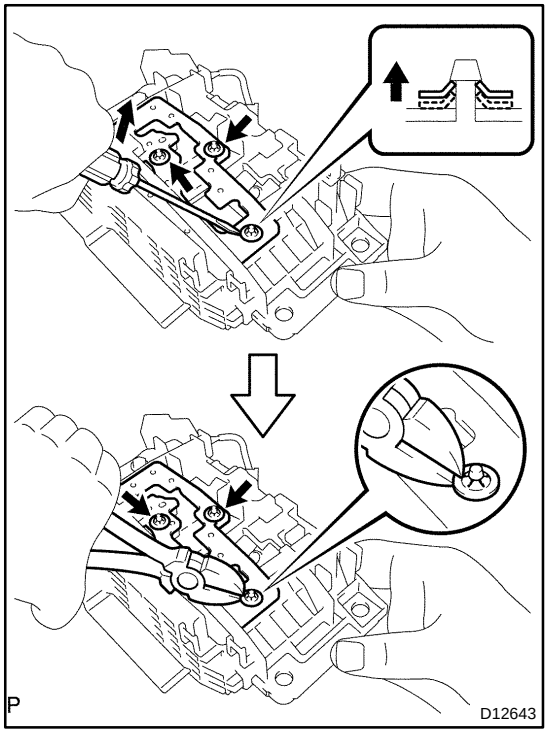
5. REMOVE SHIFT LEVER GUIDE HOUSING

(a) Disconnect the shift lock control ECU connector from the shift lever plate.

(b) Disconnect the 2 transmission control switches and the shift lock control switch from the shift lever guide housing.



(c) Remove the 4 bolts, nuts and the shift lever guide housing assembly.



6. DISASSEMBLE SHIFT LEVER GUIDE HOUSING

(a) Using a screwdriver, pry up the 3 shift lever nuts.

(b) Using nippers, cut the 3 shift lever nuts off then.

HINT:

Remove the shift lever lock pin of the shift lever nut in the same way.

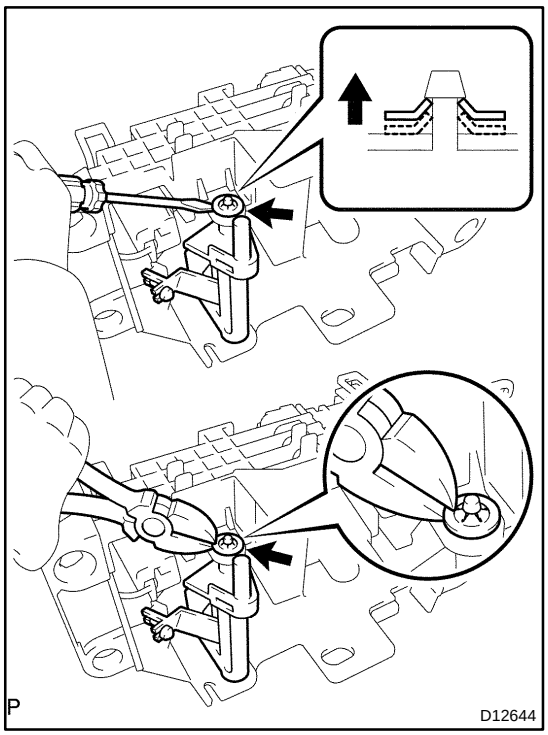
(c) Remove the shift lever guide cushion.

(d) Remove the 3 screws, the shift lock control ECU and the shift lock solenoid.

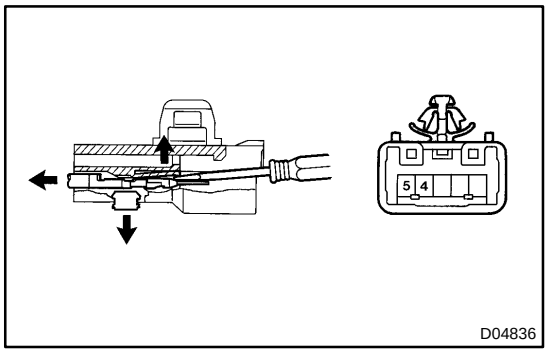
(e) Remove the shift lock control ECU bracket from the shift lock control ECU.

(f) Disconnect the transmission control switch connector from the shift lever guide housing.

(g) Remove the shift lock release button and the spring.



(h) Using a screwdriver, pry up the shift lever nut.
(i) Using nipper, cut the shift lever nut off then.
(j) Remove the shift lever lock pin, the shift lock plate stopper and the cushion.

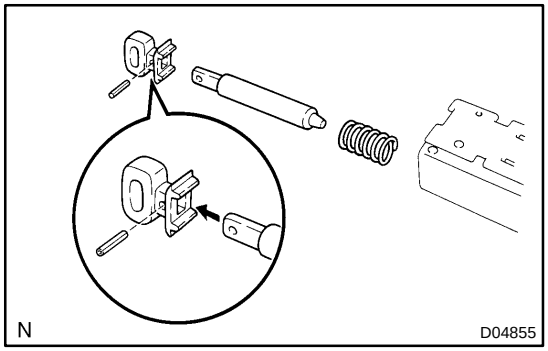


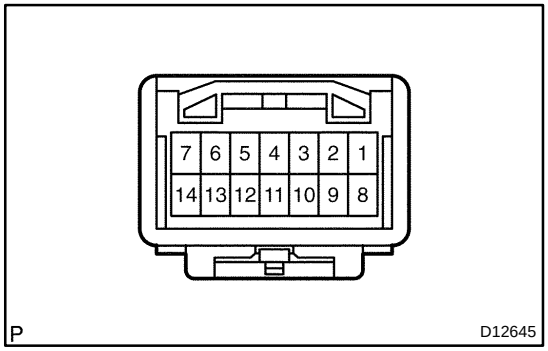
7. DISCONNECT SHIFT LOCK CONTROL ECU, SHIFT LOCK SOLENOID, SHIFT LOCK CONTROL SWITCH AND TRANSMISSION CONTROL SWITCH

(a) Disengage the secondary locking device of the shift lock solenoid.
(b) Release the locking lug of the terminal 4 and 5, and pull the terminals out from the rear.

HINT:
Remove the transmission control switch in the same way.

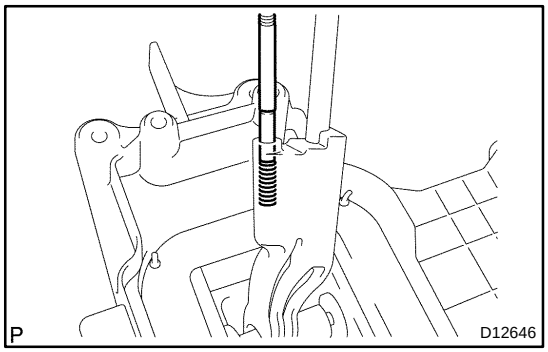
(c) Remove the shift lock solenoid.
(d) Using 2 mm dia. steel wire, remove the pin and the shift lock solenoid link from the shift lock solenoid plunger.





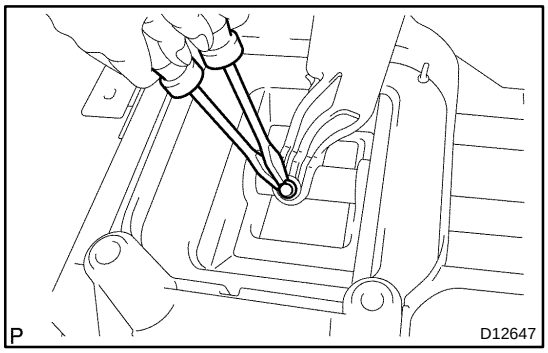
(e) Disengage the secondary locking device of the shift lock control ECU.
(f) Release the locking lag of the terminal 1, 2 and 8 pull the terminals out from the rear.
(g) Remove the transmission control switch. (D↔ 4)
(h) Release the locking lag of the terminal 5, 6 and 12 and pull the terminals out from the rear.
(i) Remove the transmission control switch. (2↔L)
(j) Release the locking lag of the terminal 7 and 14 and pull the terminals out from the rear.

(k) Remove the indicator lamp wire.

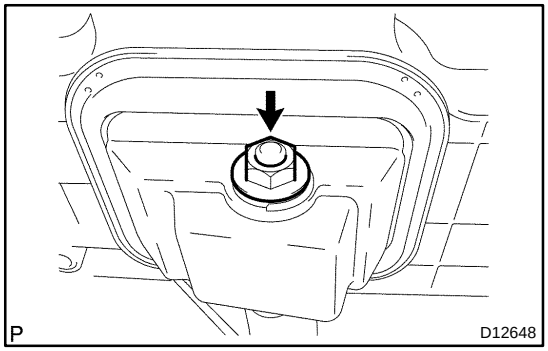


8. REMOVE SHIFT LEVER SUB-ASSEMBLY

(a) Using a magnetic finger, remove the detent shift lever pin and the spring.

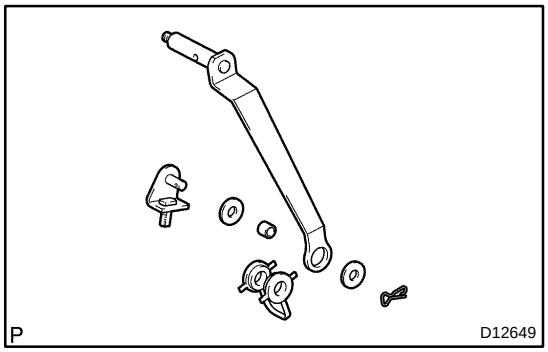


(b) Using 2 screwdrivers, remove the shift lever ring.
(c) Remove the pin and shift lever sub-assembly.



9. DISASSEMBLE SHIFT LEVER PLATE

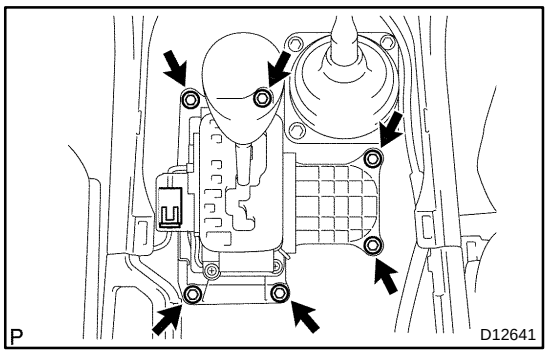
(a) Remove the nut, the control lever, the plate washer, the 2 spacers and the 2 O-rings.



(b) Using pliers, remove the clip.
(c) Remove the swivel, the 2 plate washers, the shaft lower control bush and the spacer.
(d) Remove the shift lever seal.
(e) Remove the 4 collars.
(f) Remove the 2 spring nuts.

AT116-01

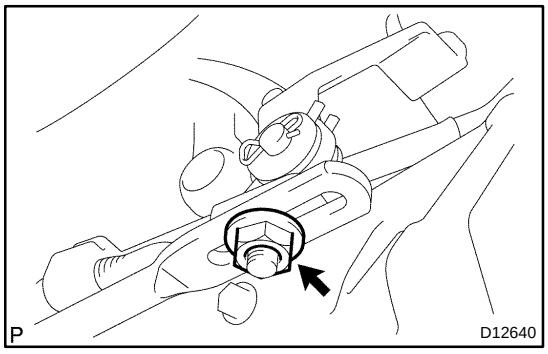
INSTALLATION



1. INSTALL FLOOR SHIFT LEVER ASSEMBLY

(a) Install the floor shift lever assembly with the 6 bolts.
Torque: 8.3 N·m (85 kgf·cm, 73 in.·lbf)

(b) Connect the connector to the floor shift lever assembly.



2. INSTALL No.1 FLOOR SHIFT GEAR SHIFTING ROD

(a) Shift into the N position.

(b) Connect the No.1 floor shift gear shifting rod and the connecting rod swivel with the nut.
Torque: 13 N·m (130 kgf·cm, 9 ft.·lbf)

3. INSTALL UPPER CONSOL PANNEL
(See Page BO-84)

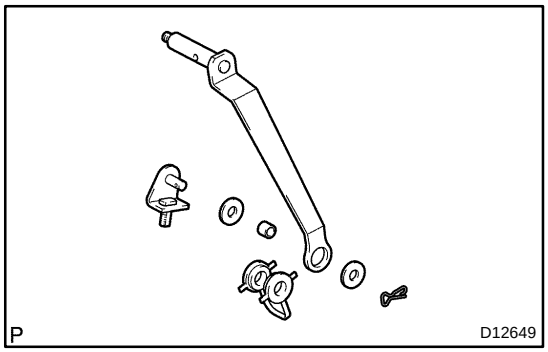
4. INSTALL TRANSFER SHIFT LEVER KNOB

AT115-01

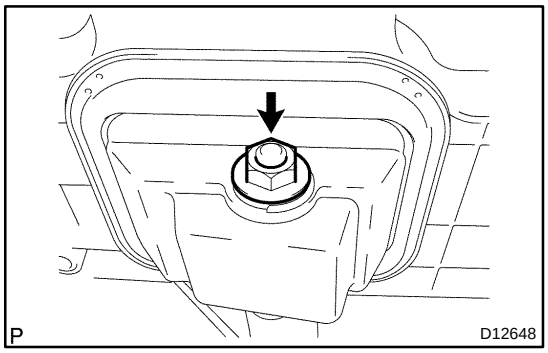
REASSEMBLY

1. REASSEMBLE SHIFT LEVER PLATE

(a) Install the 2 spring nuts.
(b) Install the 4 collars.
(c) Install the shift lever seal.



(d) Install the shaft lower control bush, the spacer, the 2 plate washers and the swivel.
(e) Using pliers, install the clip.

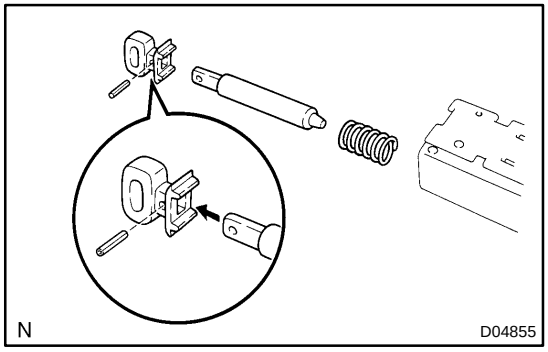


(f) Apply MP grease to 2 new O-rings.
(g) Install the 2 O-rings, 2 new spacers, the plate washer, the control lever and the nut.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

2. INSTALL SHIFT LEVER SUB-ASSEMBLY

(a) Apply MP grease to the pin.
(b) Install the shift lever sub-assembly and pin.
(c) Install the shift lever ring.
(d) Apply MP grease to the detent shift lever pin and the spring.
(e) Install the detent shift lever pin and spring.



3. REASSEMBLE SHIFT LOCK SOLENOID

(a) Apply MP grease to the shift lock solenoid link.
(b) Install the shift lock solenoid link and the pin to the shift lock solenoid plunger.
(c) Install the shift lock solenoid link with shift lock solenoid plunger and the spring to the shift lock solenoid.

4. CONNECT SHIFT LOCK CONTROL ECU, SHIFT LOCK SOLENOID, SHIFT LOCK CONTROL SWITCH, INDICATOR LAMP WIRE AND 2 TRANSMISSION CONTROL SWITCH

5. REASSEMBLE SHIFT LEVER GUIDE HOUSING

(a) Apply MP grease to the shift lever lock pin.

(b) Install the shift lever lock pin, the shift lock plate stopper and the cushion to the shift lever guide housing.

(c) Install a new shift lever nut to the shift lever lock pin by knocking them lightly via the 10 mm seated nut.

HINT:

Install the shift lever guide cushion of the shift lever nut in the same way.

(d) Apply MP grease to the shift lock release button.

(e) Install the spring and the shift lock release button.

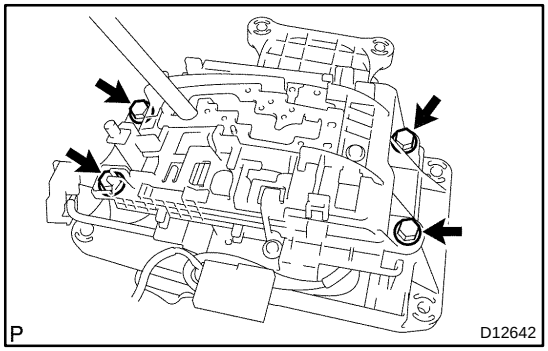
(f) Connect the transmission control switch connector to the shift lever guide housing.

(g) Install the shift lock control ECU bracket to the shift lock control ECU.

(h) Install the shift lock control ECU and the shift lock solenoid with the 3 screws to the shift lever guide housing.

(i) Install the shift lever guide cushion with 3 new shift lever nuts.

6. INSTALL SHIFT LEVER GUIDE HOUSING



(a) Install the shift lever guide housing assembly with the 4 bolts and nuts to the shift lever plate.

Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

(b) Install the 2 transmission control switches and the shift lock control switch to the shift lever guide housing.

(c) Connect the shift lock control ECU connector to the shift lever plate.

7. INSTALL SLIDE COVER AND NO. 2 SLIDE COVER

8. INSTALL POSITION INDICATOR LIGHT GUIDE

(a) Install the position indicator light guide.

(b) Connect the indicator lamp wire to the position indicator light guide.

9. INSTALL POSITION INDICATOR HOUSING

(a) Install the position indicator housing.

(b) Install the shift lock release cover to the position indicator housing.

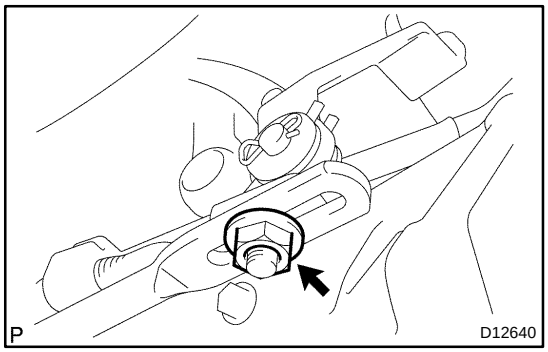
10. INSTALL SHIFT LEVER KNOB

AT07T-04

REMOVAL

1. REMOVE TRANSFER SHIFT LEVER KNOB

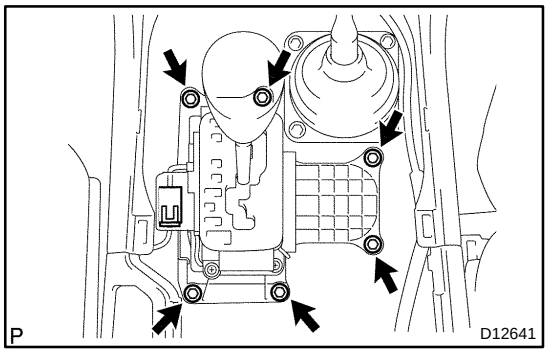
2. REMOVE UPPER CONSOLE PANEL
(See page BO-84)



3. SEPARATE NO. 1 FLOOR SHIFT GEAR SHIFTING ROD

(a) Shift into the N position.

(b) Remove the nut and separate the No. 1 floor shift gear shifting rod from the connecting rod swivel.



4. REMOVE FLOOR SHIFT LEVER ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 6 bolts.
Torque: 8.3 N·m (85 kgf·cm, 73 in.·lbf)

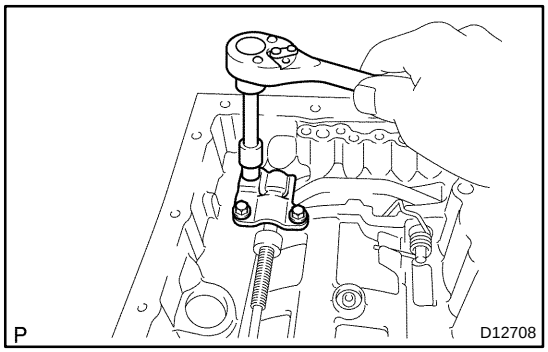
(c) Remove the floor shift lever assembly.

PARKING LOCK PAWL

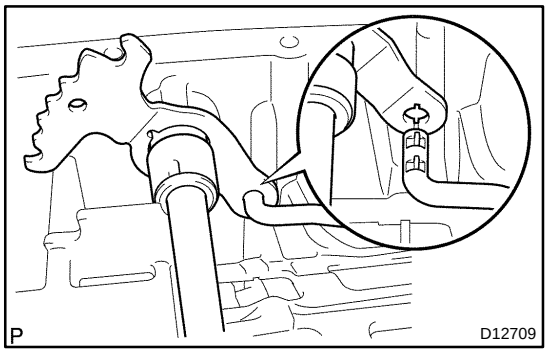
AT112-01

ON-VEHICLE REPAIR

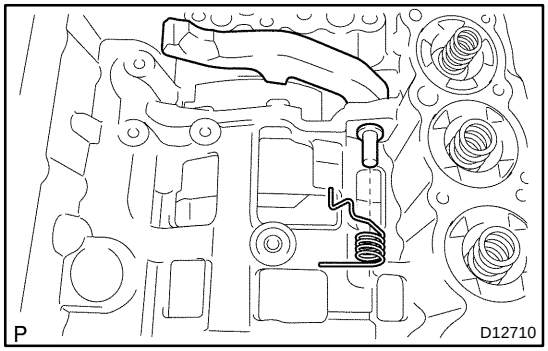
1. **REMOVE VALVE BODY (See page AT-8)**



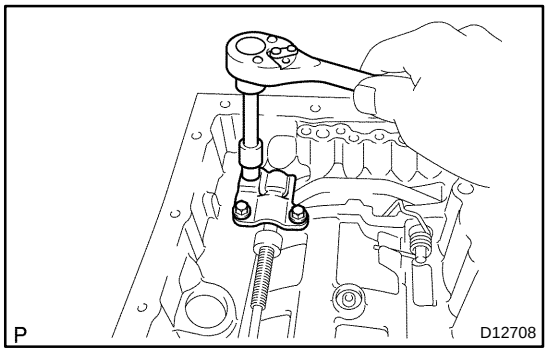
2. **REMOVE PARKING LOCK PAWL BRACKET**



3. **REMOVE PARKING LOCK ROD**



4. **REMOVE SPRING FROM PARKING LOCK PAWL SHAFT**
5. **REMOVE PARKING LOCK PAWL AND SHAFT**
6. **INSTALL PARKING LOCK PAWL AND SHAFT**
7. **INSTALL SPRING TO PARKING LOCK PAWL SHAFT**



8. **INSTALL PARKING LOCK PAWL BRACKET**

HINT:

- Push the lock rod fully forward.
- Check that the parking lock pawl operates smoothly.

Torque: 7.4 N·m (75 kgf·cm, 65 in.·lbf)

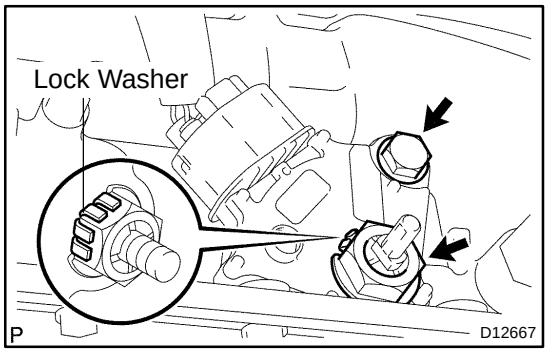
9. **INSTALL VALVE BODY (See page AT-8)**

PARK/NEUTRAL POSITION (PNP) SWITCH

AT110-01

ON-VEHICLE REPAIR

1. **REMOVE ENGINE NO. 2 UNDER COVER**
2. **DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR**



3. **REMOVE PARK/NEUTRAL POSITION SWITCH**

(a) Pry off the lock washer and remove the nut.

(b) Remove the bolt and park/neutral position switch.

4. **INSTALL PARK/NEUTRAL POSITION SWITCH**

(a) Install the park/neutral position switch with the bolt.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

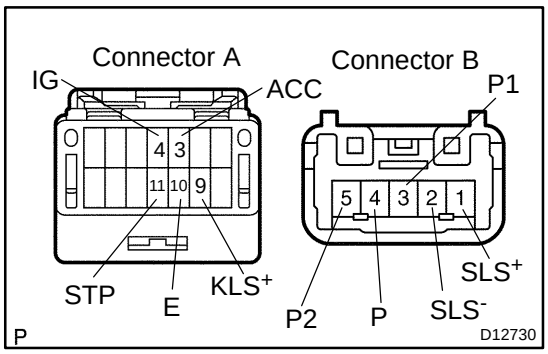
(b) Install a new lock washer and the nut.
Torque: 6.9 N·m (70 kgf·cm, 62 in.·lbf)

(c) Bent the claws on the lock washer to stake the nut.

(d) Adjust the park/neutral position switch
(See page DI-361).

5. **CONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR**
6. **INSTALL ENGINE NO. 2 UNDER COVER**

AT07R-03



INSPECTION

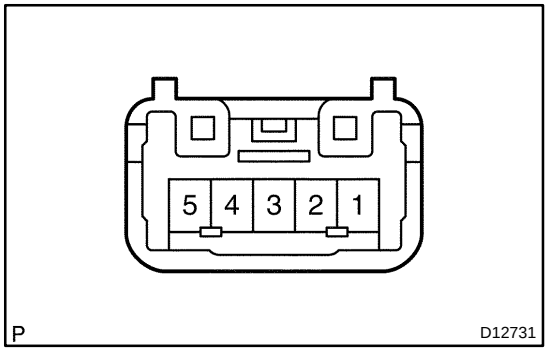
1. INSPECT SHIFT LOCK CONTROL ECU

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the ECU connector.

Terminal	Measuring Condition	Voltage (V)
Connector A		
3 - 10 (ACC - E)	Ignition switch ACC	10 - 14
4 - 10 (IG - E)	Ignition switch ON	10 - 14
10 - 11 (E - STP)	Depress brake pedal	10 - 14
9 - 10 (KLS^+ - E)	(1) Ignition switch ACC and P position (2) Ignition switch ACC and except P position (3) (After approx. 1 second)	0 7.5 - 10.5 6 - 9
Connector B		
1 - 2 (SLS^+ - SLS^-)	(1) Ignition switch ON and P position (2) Depress brake pedal (3) Shift except P position under conditions above	0 8.5 - 13.5 0
3 - 4 (P1 - P)	(1) Ignition switch ON, P position and depress brake pedal (2) Shift except P position under condition above	0 9 - 13.5
4 - 5 (P - P2)	(1) Ignition switch ACC and P position (2) Shift except P position under condition above	9 - 13.5 0



2. INSPECT SHIFT LOCK SOLENOID

(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure the resistance between terminal 1 and 2.

Standard resistance: 21 - 27 Ω

If the resistance value is not as specified, replace the solenoid.

(c) Apply the battery positive voltage between terminals. Check that the operation noise can be heard from the solenoid.

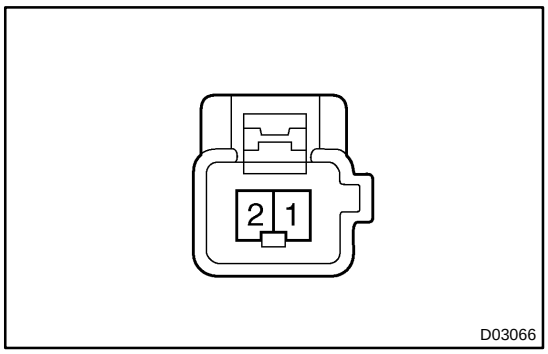
If the solenoid does not operate, replace the solenoid.

3. INSPECT SHIFT LOCK CONTROL SWITCH

Inspect that continuity exists between each terminal.

Shift position	Tester connection	Specified value
P position (Release button is not pushed)	3 - 4 (P - P1)	Continuity
P position (Release button is pushed)	3 - 4 (P - P1) 4 - 5 (P - P2)	Continuity
R, N, D, 2, L position	4 - 5 (P - P2)	Continuity

If continuity is not as specified, replace the switch.



4. INSPECT KEY INTERLOCK SOLENOID

(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure the resistance between terminal 1 and 2.

Standard resistance: 12 - 17 Ω

If resistance value is not as specified, replace the solenoid.

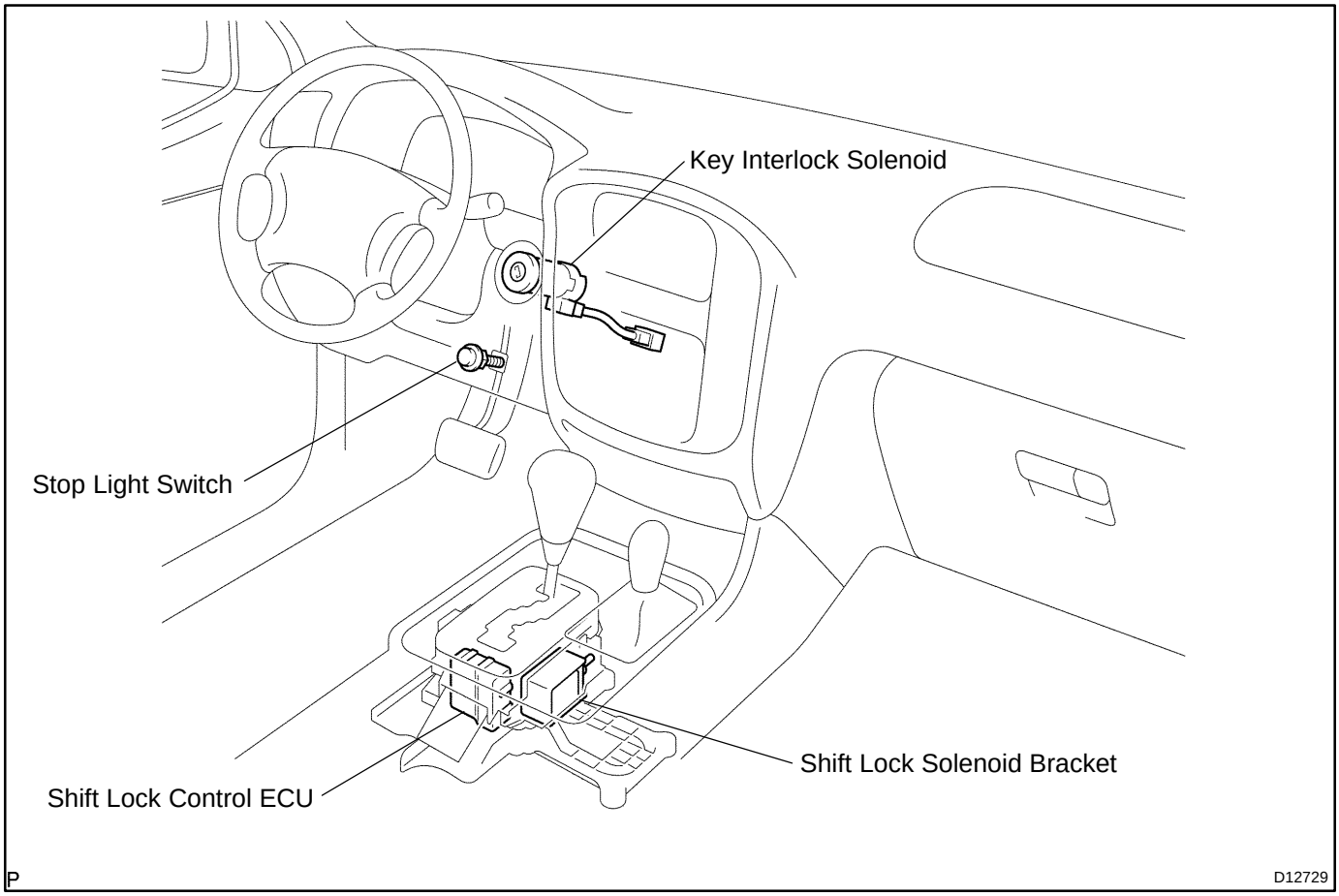
(c) Apply the battery positive voltage between terminals 1 and 2. Check that an operation noise can be heard from the solenoid.

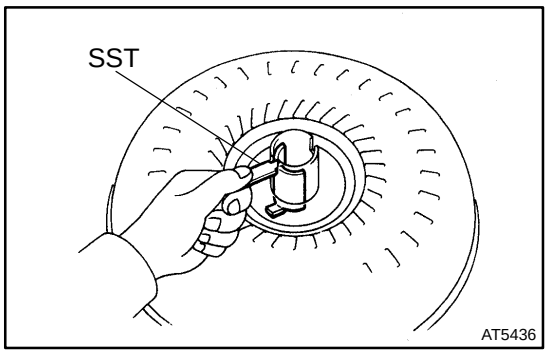
If the solenoid does not operate, replace the solenoid.

SHIFT LOCK SYSTEM

AT07Q-03

LOCATION





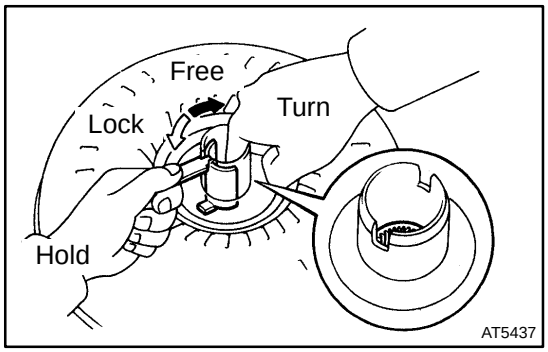
TORQUE CONVERTER CLUTCH AND DRIVE PLATE

AT07X-03

INSPECTION

1. INSPECT ONE-WAY CLUTCH

(a) Install SST so that it fits in the notch of the converter hub and outer race of the one-way clutch.
SST 09350-30020 (09351-32020)

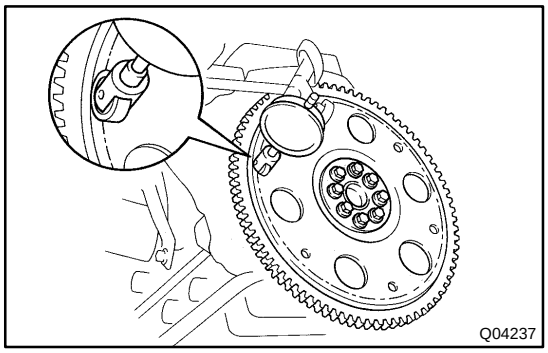


(b) Press on the serrations of stator with a finger and rotate it.

(c) Check if it rotates smoothly when turned clockwise and locks up when turned counterclockwise.

If necessary, clean the converter clutch and retest the one-way clutch.

Replace the converter clutch if the clutch still fails in the test.



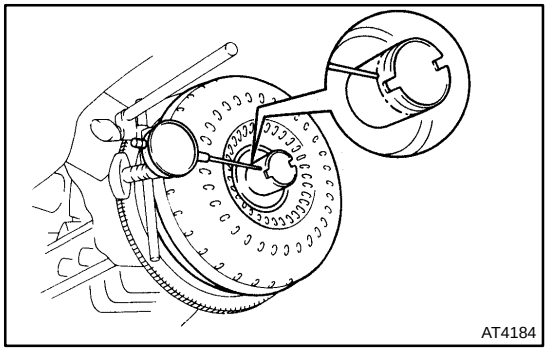
2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

Set up a dial indicator and measure the drive plate runout.

Maximum runout: 0.20 mm (0.0079 in.)

If runout is not within the specification 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:
1st: 49 N·m (500 kgf·cm, 36 ft·lbf)
2nd: Turn extra 90°



3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

(a) Temporarily mount the torque converter clutch to the drive plate.

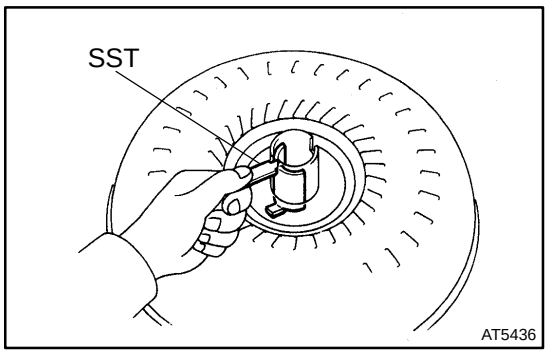
Set up a dial indicator and measure the torque converter clutch sleeve runout.

Maximum runout: 0.30 mm (0.0118 in.)

If runout is not within the specification, correct it by reorienting the installation of the torque converter clutch.

If excessive runout cannot be corrected, replace the torque converter clutch.

(b) Remove the torque converter clutch.



TORQUE CONVERTER CLUTCH AND DRIVE PLATE

AT07X-03

INSPECTION

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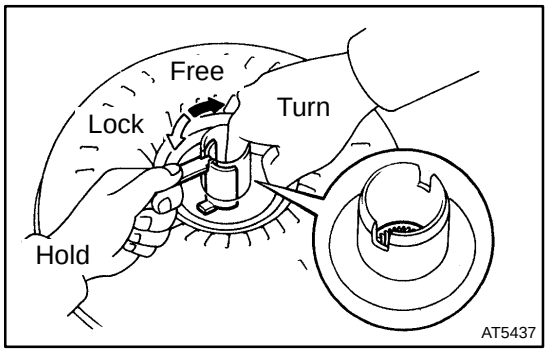
SST 09350-30020 (09351-32020)

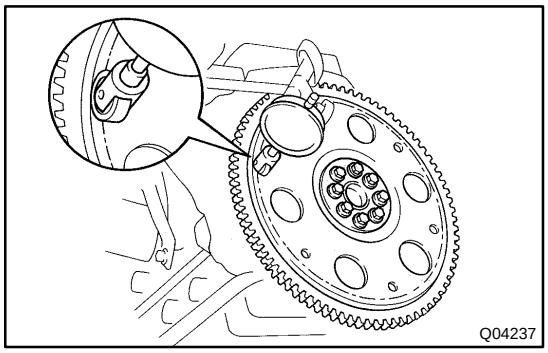


(b) Press on the serrations of stator with a finger and rotate it.

(c) Check if it rotates smoothly when turned clockwise and locks up when turned counterclockwise.

If necessary, clean the converter clutch and retest the one-way clutch.

Replace the converter clutch if the clutch still fails in the test.



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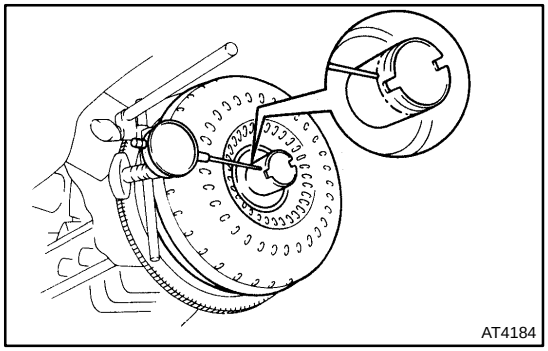
Set up a dial indicator and measure the drive plate runout.

Maximum runout: 0.20 mm (0.0079 in.)

If runout is not within the specification 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:
1st: 49 N·m (500 kgf·cm, 36 ft·lbf)
2nd: Turn extra 90°



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(a) Temporarily mount the torque converter clutch to the drive plate.

Set up a dial indicator and measure the torque converter clutch sleeve runout.

Maximum runout: 0.30 mm (0.0118 in.)

If runout is not within the specification, correct it by reorienting the installation of the torque converter clutch.

If excessive runout cannot be corrected, replace the torque converter clutch.

(b) Remove the torque converter clutch.

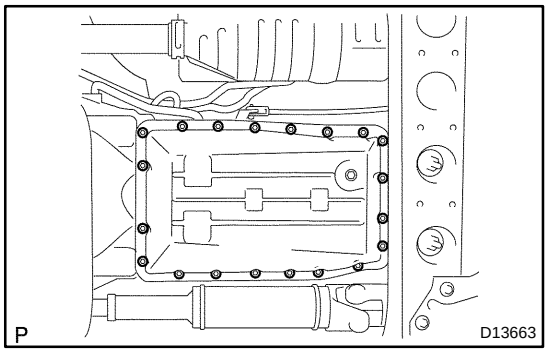
VALVE BODY ASSEMBLY

AT111-02

ON-VEHICLE REPAIR

1. REMOVE ENGINE NO.2 UNDER COVER

2. DRAIN ATF



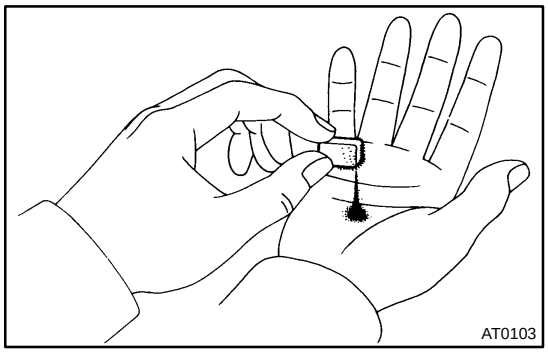
3. REMOVE OIL PAN

NOTICE:

Some fluid will remain in the oil pan.

(a) Remove the 20 bolts.

(b) Remove the oil pan gasket.

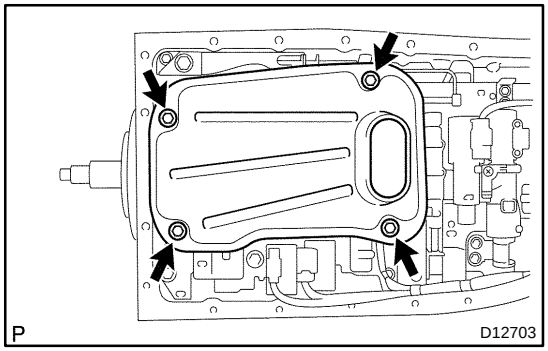


4. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect steel particles. Carefully look at the foreign matter and particles in the pan and on the magnets to anticipate the type of wear you will find in the transmission.

Steel (magnetic)...bearing, gear and clutch plate wear

Brass (non-magnetic)...bushing wear

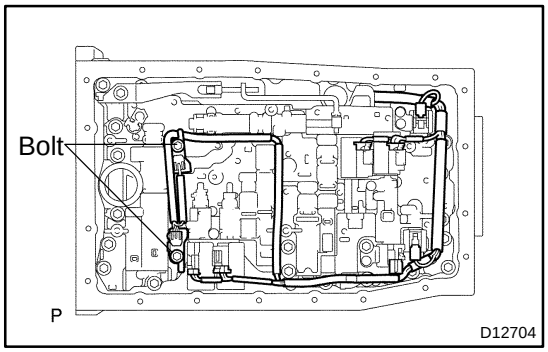


5. REMOVE OIL STRAINER

Remove the 4 bolts, the oil strainer and the O-ring.

NOTICE:

Be careful as some fluid will come out with the oil strainer.



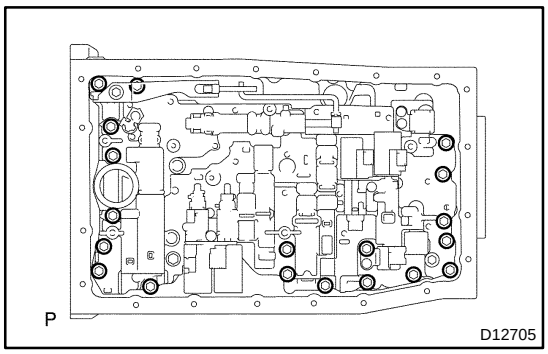
6. DISCONNECT TEMPERATURE SENSOR

(a) Disconnect the 7 solenoid connectors.

(b) Remove 2 bolts and the 2 temperature sensors clamp from the valve body.

(c) Disconnect the 2 temperature sensor from the valve body.

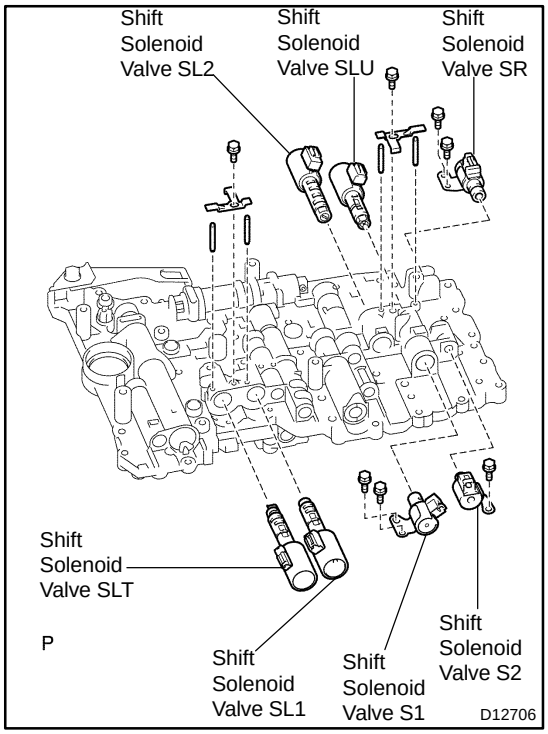
7. DISCONNECT 7 CONNECTORS FROM SHIFT SOLENOID VALVES



8. REMOVE VALVE BODY

(a) Remove the 19 bolts and the valve body.

(b) Remove the 3 drum seal gaskets.



9. REMOVE SOLENOID VALVE

(a) Remove the 2 bolts and the shift solenoid valve SR.

(b) Remove the 3 bolts and the shift solenoid valve S1 and S2.

(c) Remove the 2 bolts, 2 solenoid lock plates and the 4 straight pins.

(d) Remove the shift solenoid SL2 and the shift solenoid valve SLU.

(e) Remove the shift solenoid SL1 and the shift solenoid valve SLT.

(f) Remove the O-ring from the solenoid valve S2.

10. INSTALL SOLENOID VALVE

(a) Install a new O-ring to shift solenoid valve S2.

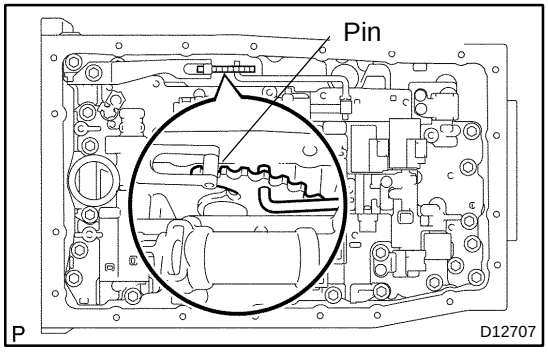
(b) Install the shift solenoid SL1 and the shift solenoid valve SLT.

(c) Install the shift solenoid SL2 and the shift solenoid valve SLU.

(d) Install the 4 straight pins and the 2 solenoid lock plates with the 2 bolts.
Torque:6.4 N·m (65 kgf·cm,57 in·lbf)

(e) Install the shift solenoid valve S1and S2 with the 2 bolts.
Torque:10 N·m (102 kgf·cm,7 ft·lbf)

(f) Install the shift solenoid valve SR with the 2 bolts.
Torque:6.4 N·m (65 kgf·cm,5.7 ft·lbf)

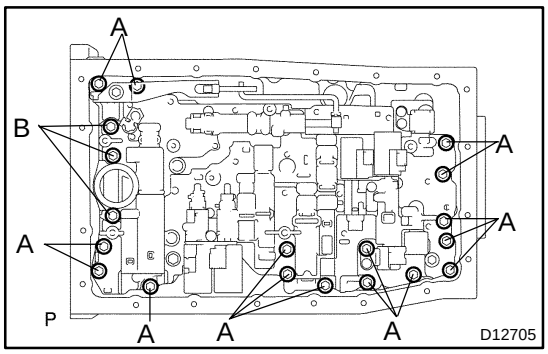


11. INSTALL VALVE BODY

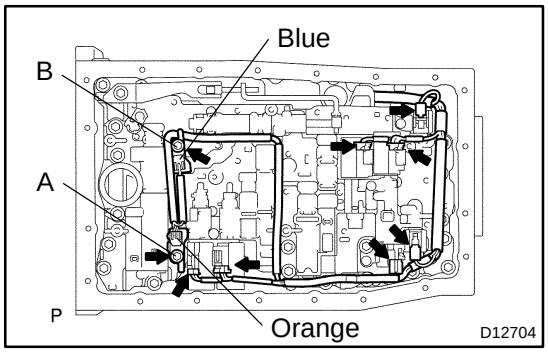
HINT:

Align the groove of the manual valve with the pin of the lever.

(a) Install the 3 new drum seal gaskets to the transmission case.



(b) Install the 19 bolts and the valve body.
Torque:
BoltA.B: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt length:
Bolt A: 25 mm (0.98 in.)
Bolt B: 36 mm (1.42 in.)



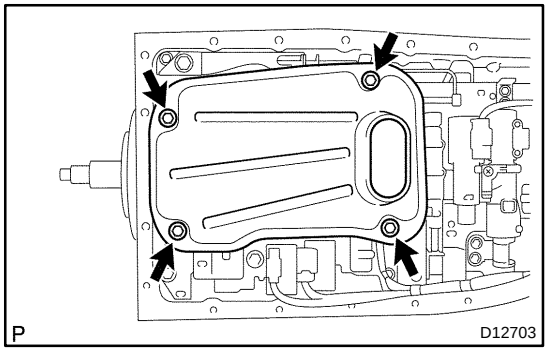
12. CONNECT TEMPERATURE SENSOR

(a) Connect the 2 temperature sensors to the valve body, and install the 2 temperature sensors clamp with the 2 bolts.
Torque:
A: 11 N·m (112 kgf·cm, 8 ft·lbf)
B: 10 N·m (100 kgf·cm, 7 ft·lbf)
Bolt length:
Bolt A: 36 mm (1.42 in.)
Bolt B: 12 mm (0.47 in.)

Sensor wire harness:

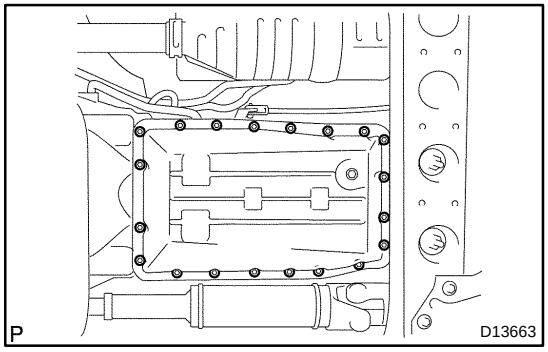
Wire harness	Color
for linear control	Orange
for oil temp warning lamp	Blue

13. CONNECT 7 CONNECTORS TO SHIFT SOLENOID VALVES



14. INSTALL OIL STRAINER

(a) Install a new O-ring.
(b) Install the oil strainer with the 4 bolts.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)



15. INSTALL OIL PAN

HINT:
Remove any packing material, and be careful not to spill oil on the contacting surfaces of the transmission case and the oil pan.

(a) Install a new gasket and oil pan.
(b) Install the 20 bolts and oil pan.
Torque: 4.4 N·m (45 kgf·cm, 39 in·lbf)

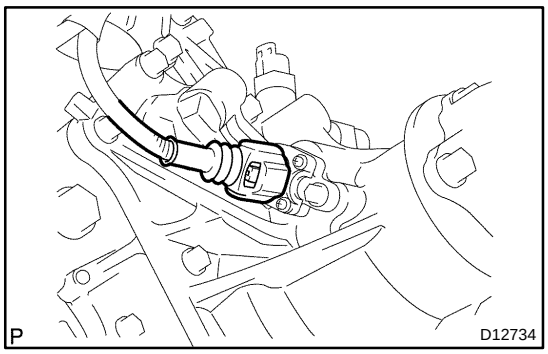
16. FILL ATF AND CHECK ATF LEVEL

(a) Install a new gasket and a drain plug.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(b) Remove the refill plug.

(c) Fill new fluid through the refill hole (See page AT-3-1).

17. INSTALL ENGINE NO.2 UNDER COVER

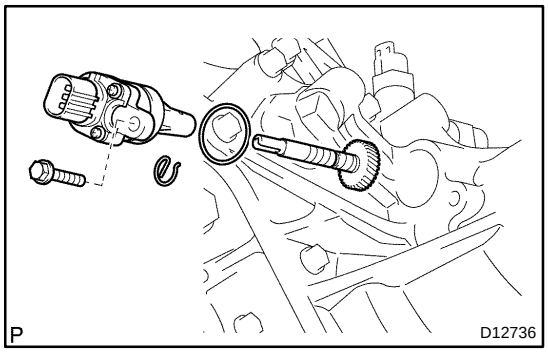


VEHICLE SPEED SENSOR

AT07Y-02

ON-VEHICLE REPAIR

1. DISCONNECT NO. 1 VEHICLE SPEED SENSOR CONNECTOR



2. REMOVE NO. 1 VEHICLE SPEED SENSOR

Remove the bolt and the No. 1 vehicle speed sensor.

3. DISASSEMBLE NO. 1 VEHICLE SPEED SENSOR

(a) Remove the O-ring from the speedometer driven gear assembly.

(b) Remove the clip and the speedometer driven gear from the speedometer driven gear sleeve.

4. ASSEMBLE NO. 1 VEHICLE SPEED SENSOR

(a) Install the speedometer driven gear and the clip to the speedometer driven gear sleeve.

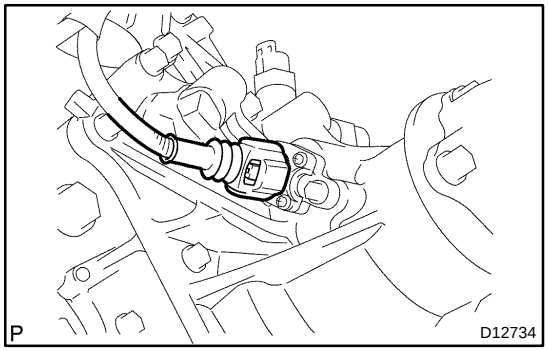
(b) Coat a new O-ring with ATF.

(c) Install the O-ring to the speedometer driven gear assembly.

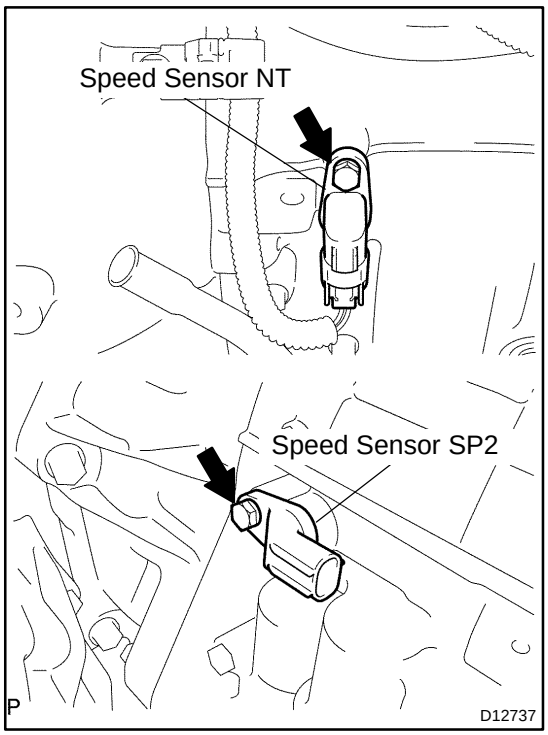
5. INSTALL NO. 1 VEHICLE SPEED SENSOR

Install the No. 1 vehicle speed sensor with the bolt.

Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



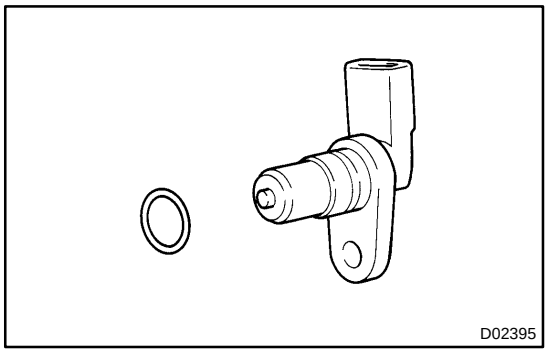
6. CONNECT NO. 1 VEHICLE SPEED SENSOR CONNECTOR



7. DISCONNECT SPEED SENSOR NT AND SP2 CONNECTORS

8. REMOVE SPEED SENSOR NT AND SP2

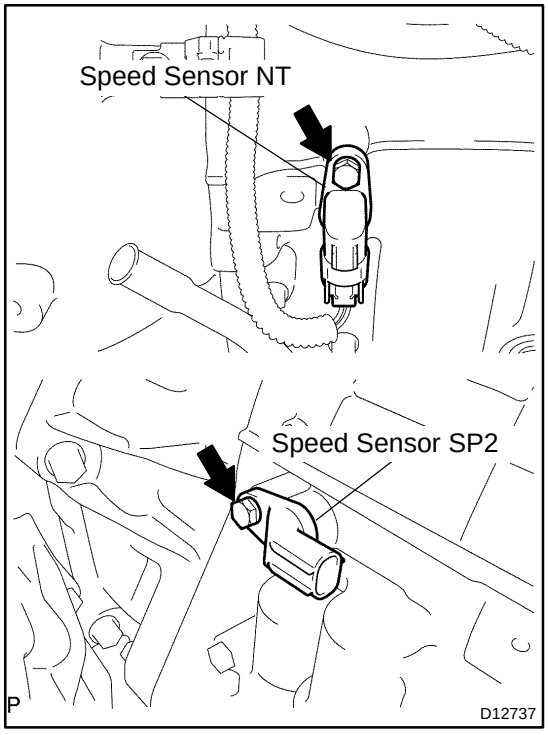
(a) Remove the 2 bolts, speed sensor NT and SP2.



(b) Remove 2 O-rings from the speed sensor NT and SP2.

9. INSTALL SPEED SENSOR NT AND SP2

(a) Coat 2 new O-rings with ATF and install them to the speed sensor NT and SP2.



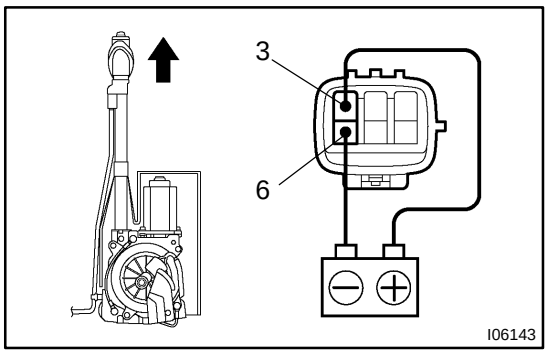
(b) Install the speed sensor NT and SP2 with 2 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

10. CONNECT SPEED SENSOR NT AND SP2 CONNECTORS

BE0SD-04

INSPECTION

1. Auto Antenna Models:
INSPECT ANTENNA MOTOR

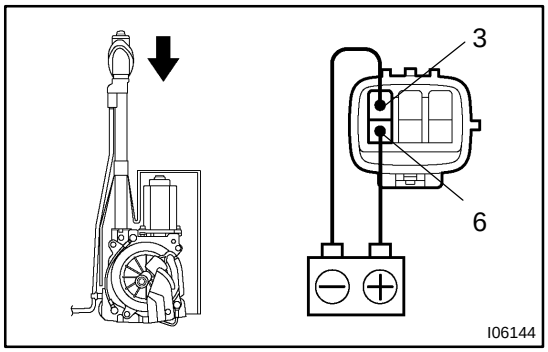


(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 6.

(b) Check that the motor turns (moves upward).

NOTICE:

These tests must be done quickly (within 3 - 5 seconds) to prevent the coil from burning out.

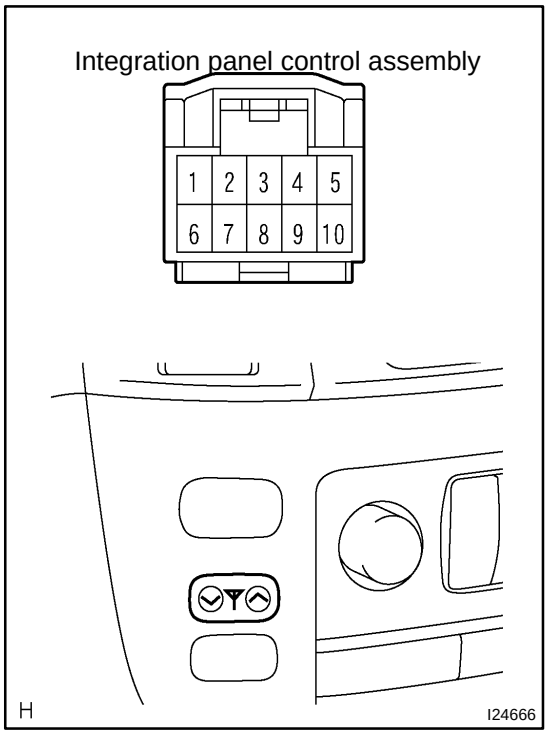


(c) Then, reverse the polarity, check that the motor turns the opposite way (moves downward).

NOTICE:

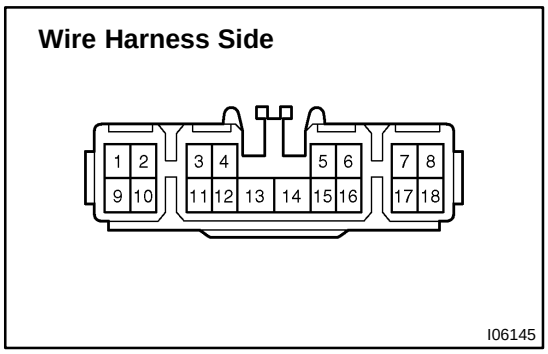
These tests must be done quickly (within 3 - 5 seconds) to prevent the coil from burning out.

2. INSPECT ANTENNA SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
UP button FREE	4 - 5	No continuity
UP button Pushed in	4 - 5	Continuity
DOWN button FREE	9 - 5	No continuity
DOWN button Pushed in	9 - 5	Continuity

If continuity is not as specified, replace the switch.



3. Auto Antenna Models:
INSPECT ANTENNA MOTOR CONTROL RELAY CIRCUIT

Disconnect the connector from the relay and inspect the connector on wire harness side, as shown in the chart on the next page.

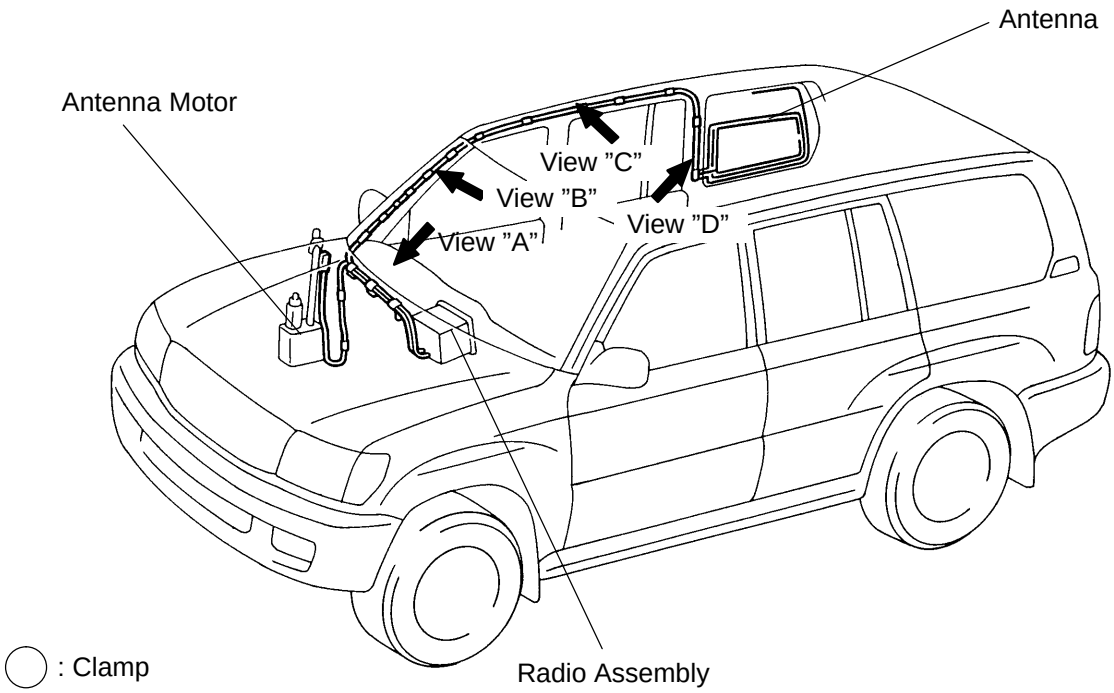
Tester connection	Condition	Specified condition
1 - Ground	Antenna ”UP” switch OFF	No continuity
1 - Ground	Antenna ”UP” switch ON	Continuity
5 - Ground	Constant	Continuity
9 - Ground	Antenna ”DOWN” switch OFF	No continuity
9 - Ground	Antenna ”DOWN” switch ON	Continuity
4 - Ground	Constant	Battery positive voltage
7 - Ground	Ignition switch ACC or LOCK	No voltage
7 - Ground	Ignition switch ON	Battery positive voltage
17 - Ground	Ignition switch LOCK	No voltage
17 - Ground	Ignition switch ACC or ON	Battery positive voltage

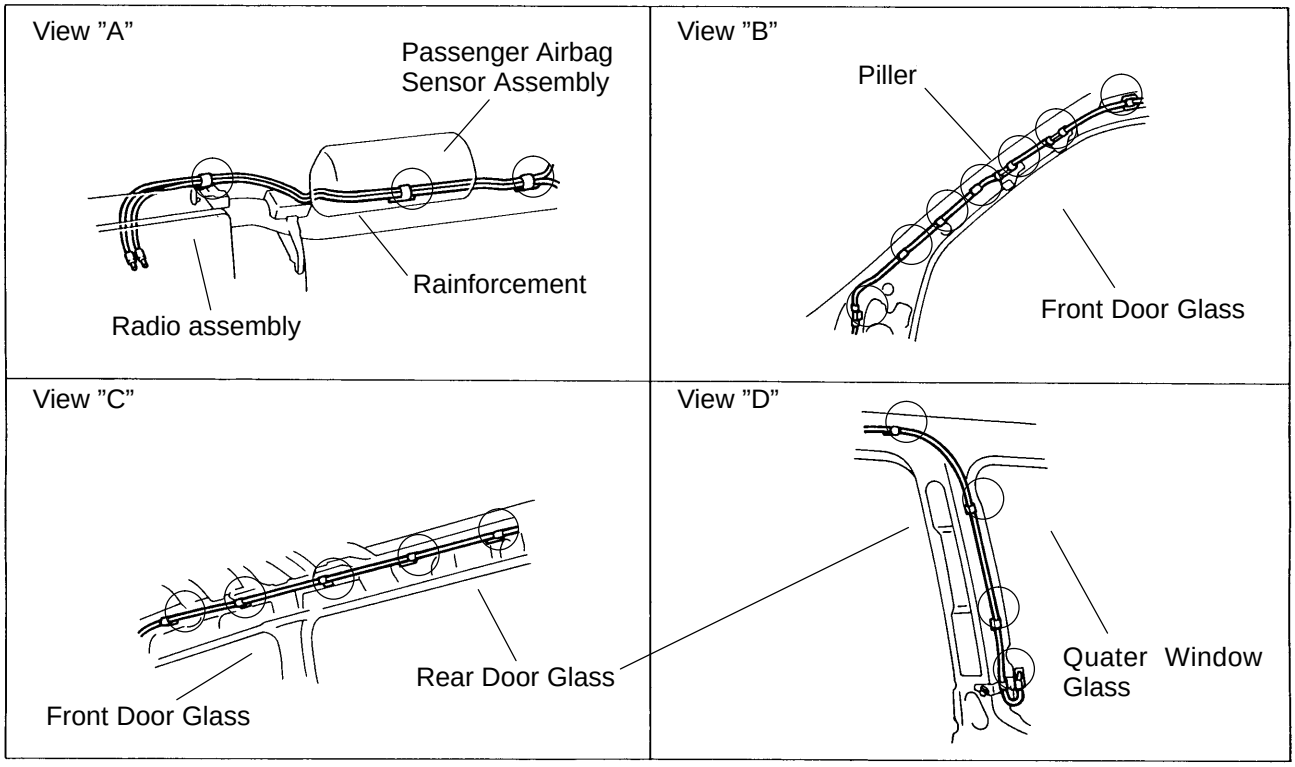
If circuit is as specified, replace the relay.

ANTENNA

LOCATION

BE0G9-04





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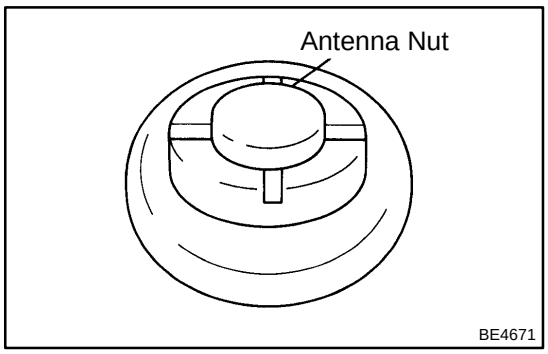
REPLACEMENT



1. Auto antenna models:
REMOVE ANTENNA ROD

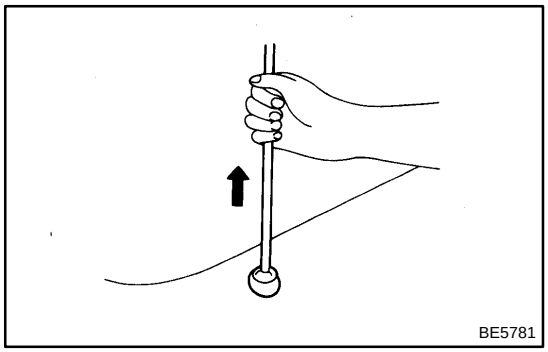
HINT:

Do this operation with the battery negative (-) cable connected to the battery terminal.

(a) Remove the antenna nut.

(b) Turn the radio switch ”ON” position.

(c) Turn the antenna switch to ”UP”.



(d) Catch the antenna rod by hand and turn the radio switch ”OFF”.

(e) Try again to turn the radio switch ”ON” and antenna switch ”UP”.

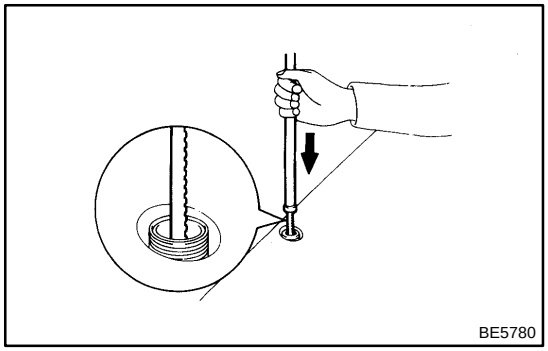
(f) Remove antenna rod.

HINT:

The rod will extend fully and be released form the motor antenna.

NOTICE:

To prevent body damage when the antenna rod is released, hold the rod while it comes out.



2. Auto antenna models:
INSTALL ANTENNA ROD

(a) Insert the cable of the rod until it reaches the bottom.

HINT:

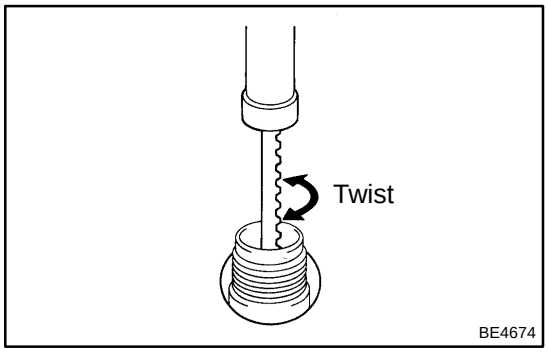
- When inserting the cable, the teeth on the cable must face toward the rear of the vehicle.
- Insert the antenna approx. 350 mm.

(b) Turn the radio switch to ”OFF”.

HINT:

- In case the cable is not wound, twist it, as shown in the illustration.
- Even if the rod has not retracted fully, install the antenna nut and inspect the antenna rod operation. It will finally retract fully.

(c) Inspect the antenna rod operation by pushing the radio wave band select buttons.



AUDIO SYSTEM

BE2E8-01

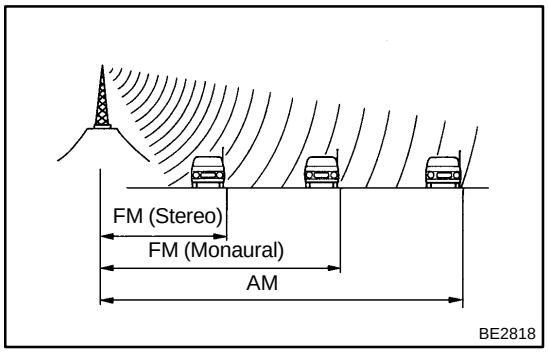
DESCRIPTION

1. RADIO WAVE BAND

The radio wave bands used in radio broadcasting are as follows:

Frequency	30 kHz	300 kHz	3 MHz	30 MHz	300 MHz
Designation	LF	MF	HF	VHF	
Radio wave		AM ⟷		FM ⟷	
Modulation	Amplitude modulation			Frequency modulation	

LF: Low Frequency
MF: Medium Frequency
HF: High Frequency
VHF: Very High Frequency

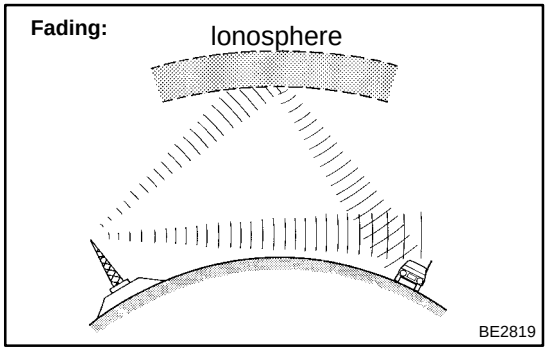


2. SERVICE AREA

There are great differences in the size of the service area for AM and FM monaural. Sometimes FM stereo broadcasts cannot be received even through AM can be received in very clearly.
Not only does FM stereo have the smallest service area, but it also picks up static and other types of interference (”noise”) easily.

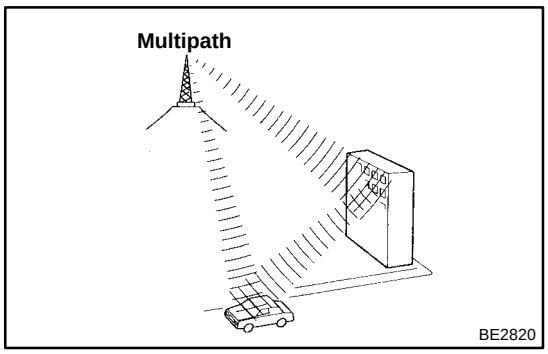
3. RECEPTION PROBLEMS

Besides the problem of static, there are also the problems called ”fading”, ”multipath” and ”fade out”. These problems are caused not by electrical noise but by the nature of the radio waves themselves.

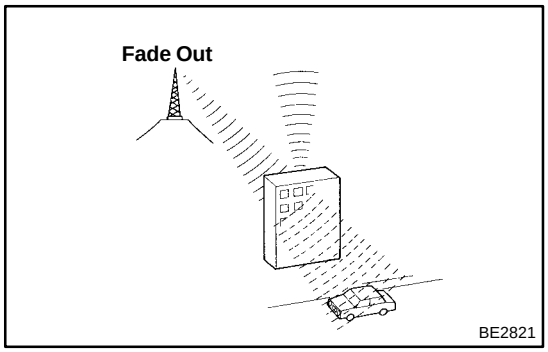


(1) Fading

Besides electrical interference, AM broadcasts are also susceptible to other types of interference, especially at night. This is because AM radio waves bounce off the ionosphere at night. These radio waves then interfere with the signals from the same transmitter that reach the vehicle’s antenna directly. This type of interference is called ”fading”.



(2) Multipath
One type of interference caused by the bounce of radio waves off of obstructions is called ”multipath”. Multipath occurs when a signal from the broadcast transmitter antenna bounces off buildings and mountains and interferes with the signal that is received directly.



(3) Fade Out
Because FM radio waves are of higher frequencies than AM radio waves, they bounce off buildings, mountains, and other obstructions. For this reason, FM signals often seem to gradually disappear or fade away as the vehicle goes behind a building or other obstruction. This is called ”fade out”.

4. NOISE PROBLEMS

(a) Questionnaire for nose:
It is very important for noise trouble shooting to have good understanding of the claims from the customers. Refer to the following questionnaire to diagnose the problem accurately.

AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	There is a possibility that the same program is broadcasted from different local stations, and that might be listening a program from other station.
	Noise occurs only at night.	Strong possibility of the beat from a distant broadcasting.
FM	Noise occurs while driving on a particular area..	Strong possibility of multipath noise and fading noise caused by the changes of FM waves.

HINT:
In the condition of noise occurrence does not meet any of the above questionnaire, check the problems to ”Reception Problem” on the previous page.

(b) Matters that require attention when checking:
- Noise coming into the radio usually has no harm for daily use as the noise protection is taken, and it is very rate for an extremely loud noise to come in. When extremely loud noise comes into the radio, check if the grounding is normal where the antenna is installed.
- Check if all the regular noise prevention parts are properly installed, and if there is any installation of non-authorized parts and non-authorized wiring.
- If you leave the radio under out of tune (not turning), it is easy to diagnose the phenomenon as noise occurs frequently.

(c) Antenna and noise:
Electronic signal received by the antenna will reach to the radio transmitting through the core wire of the coaxial cable. Any noise wave other than radio wave is mixed into this core wire, that naturally causes noise in the radio and poor sound quality. In order to prevent the noise from coming into radio, the core wire inside the coaxial cable is covered with a mesh wire called shield wire which transmits the noise to the ground.

5. COMPACT DISC PLAYER

Compact Disc Players use a laser beam pick-up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc.

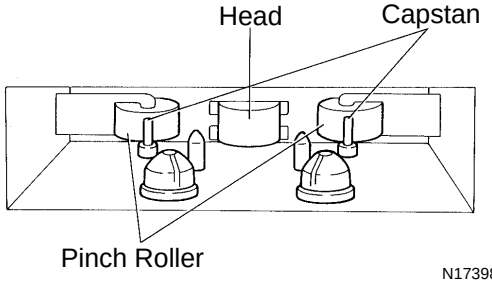
HINT:

Never attempt to disassemble or oil any part of the player unit. Do not insert any object other than a disc into the magazine.

NOTICE:

CD players use an invisible laser beam which could cause hazardous radiation exposure. Be sure to operate the player correctly as instructed.

Example:

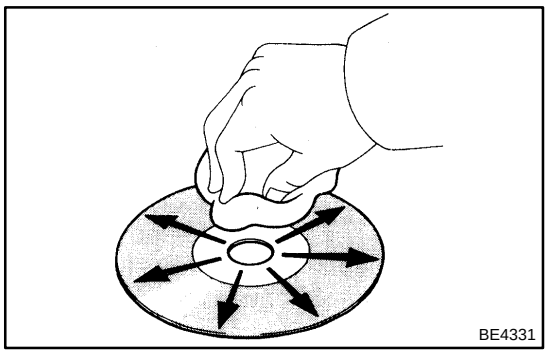


6. Tape player/head cleaning:

MAINTENANCE

(a) Raise the cassette door with your finger.
Next, using a pencil or similar object, push in the guide.

(b) Using a cleaning pen or cotton applicator soaked in cleaner, clean the head surface, pinch rollers and capstans.



7. CD player/disc cleaning:
MAINTENANCE

If the disc gets dirty, clean the disc by wiping the surface from the center to outside in the radial directions with a soft cloth.

NOTICE:

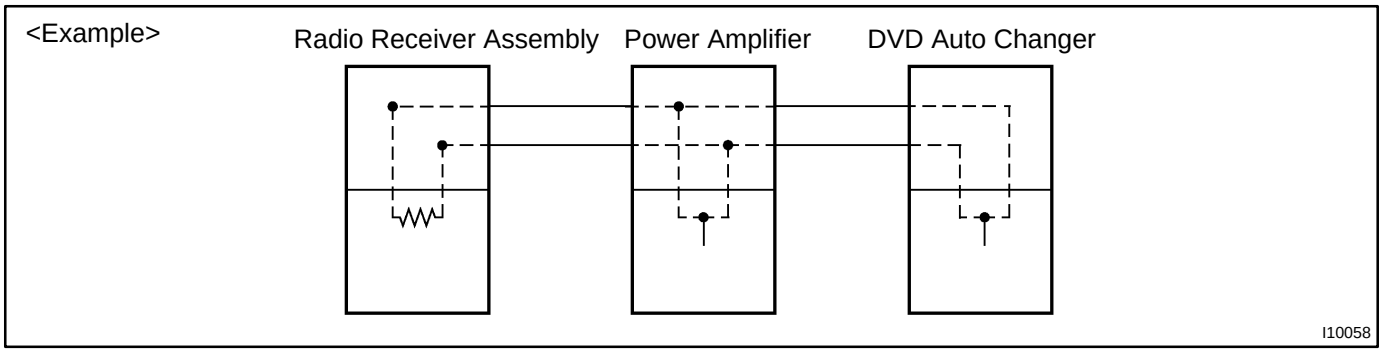
Do not use a conventional record cleaner or anti-static preservative.

8. OUTLINE OF AVC-LAN

(a) What is AVC-LAN?

AVC-LAN is the abbreviation, which stands for Audio Visual Communication-Local Area Network. This is a unified standard co-developed by 6 audio manufactures associated with Toyota Motor Corporation.

The Unified standard covers signals, such as audio signal, visual signal, signal for switch indication and communication signal. Radio receiver assembly and RSA (Rear Seat Audio) panel have a resistance (60 - 80 Ω) required for communication.



(b) Objectives

Recently the car audio system has been rapidly developed and functions have been changed drastically. The conventional system has been switched to the multi-media type such as a navigation system. At the same time the level of customers needs to audio system has been upgraded. This lies behind this standardization.

The concrete objectives are explained below.

(1) When products by different manufactures were combined together, there used to be a case that malfunction occurred such as sound did not come out. This problem has been resolved by standardization of signals.

(2) Various types of after market products have been able to add or replace freely.

(3) Because of the above (2), each manufacture has become able to concentrate on developing products in their strongest field. This has enabled many types of products provided inexpensively.

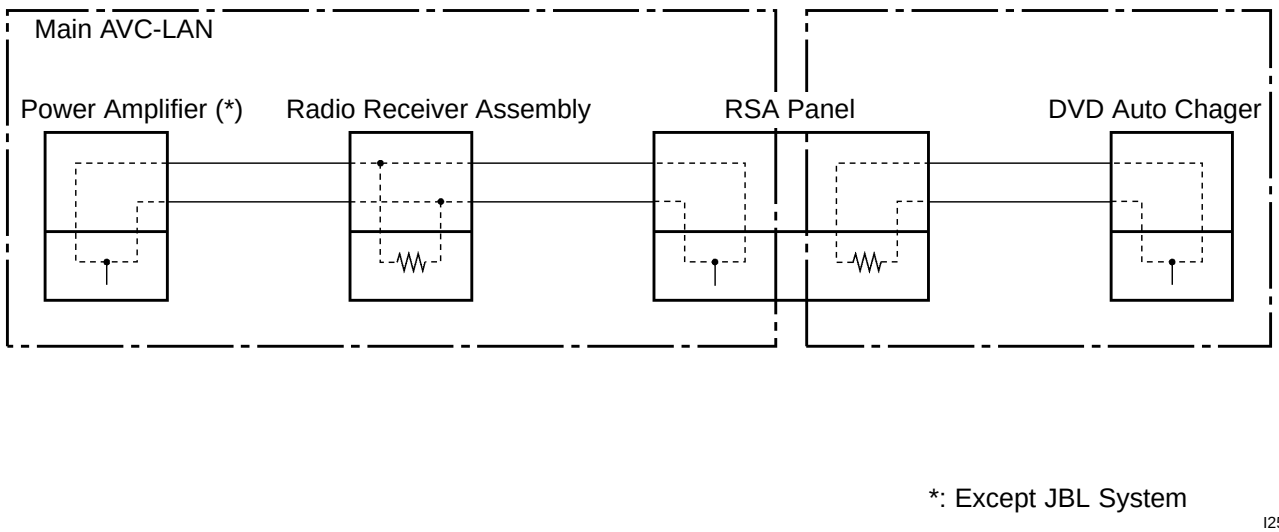
(4) In general, a new product developed by one particular manufacture could not be used due to a lack of compatibility with other manufactures products. Because of this new standard, users can enjoy many compatible products from different manufacture anytime they went.

(c) The above descriptions are the objectives to introduce AVC-LAN. By this standardization, development of new products will no longer cause systematic errors.

HINT:

- When +B short or GND short is detected in AVC-LAN circuit, communication stops. And audio system does not function normally.
- When audio system is not equipped with a navigation system, audio head unit is the master unit. When audio system is equipped with a navigation system, multi-display is the master unit.
- This system has 2 kinds of AVC-LAN, Main AVC-LAN and Sub AVC-LAN.
- RSA panel works as a master unit in the Sub AVC-LAN, but not in the Main AVC-LAN.
- The car audio system using AVC-LAN circuit has a diagnosis function.
  (w/ Navigation system (see page DI-1263)
- Each product has its own specified numbers called physical address. Numbers are also allotted to each function in one product, which are called logical address.

AVC-LAN:



*: Except JBL System

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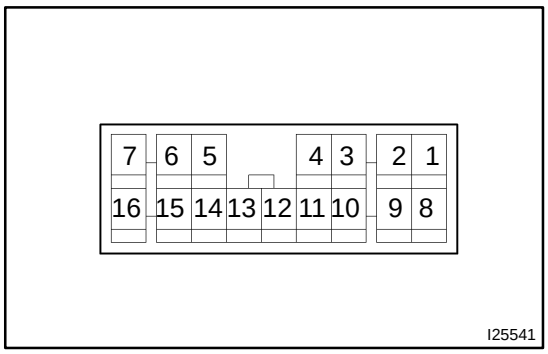


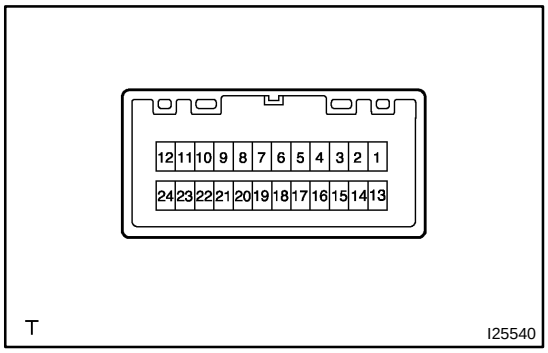
INSPECTION

1. INSPECT POWER AMPLIFIER CIRCUIT

Disconnect the connector from power amplifier and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
12 - Ground	Constant	Continuity
13 - Ground	Constant	Continuity
7 - Ground	Constant	Battery voltage
16 - Ground	Constant	Battery voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

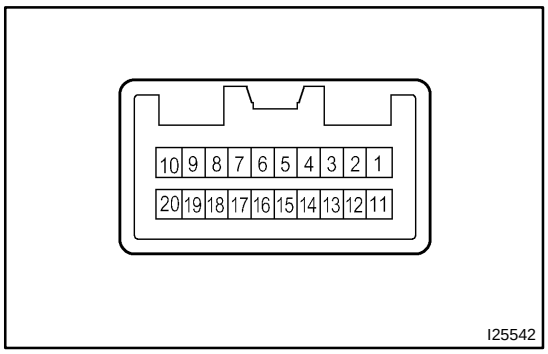


2. INSPECT REAR SEAT AUDIO CIRCUIT

Disconnect the connector from RSA controller and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
17 - Ground	Constant	Continuity
24 - Ground	Ignition switch LOCK and radio switch ON	No voltage
24 - Ground	Ignition switch ACC or ON and radio switch ON	Battery voltage
12 - Ground	Constant	Battery voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

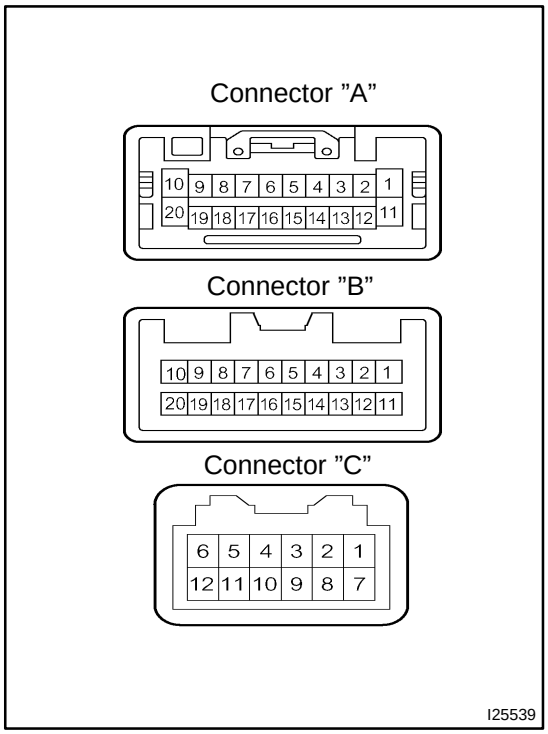


3. INSPECT DVD CHANGER CIRCUIT

Disconnect the connector from DVD changer and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
20 - Ground	Constant	Continuity
1 - Ground	Ignition switch LOCK	No voltage
1 - Ground	Ignition switch ACC or ON	Battery voltage
10 - Ground	Constant	Battery voltage

If the circuit is not as specified, inspect the circuits connected to other parts.



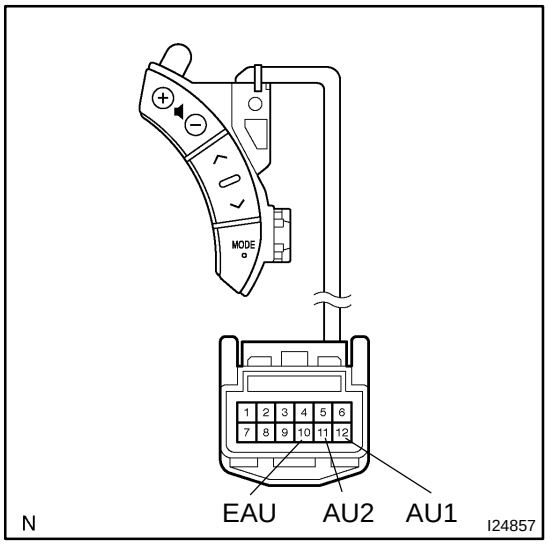
4. INSPECT RADIO RECEIVER ASSEMBLY CIRCUIT

Disconnect the connectors from the radio receiver assembly, and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
A20 - Ground	Constant	Continuity
A1 - Ground	Constant	Battery voltage
A11 - Ground	Ignition switch LOCK	No voltage
A11 - Ground	Ignition switch ACC or ON	Battery voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

HINT:
Check the wire harness between radio receiver assembly and the CD auto changer, between radio receiver assembly and power amplifier.



5. INSPECT STEERING PAD SWITCH CIRCUIT

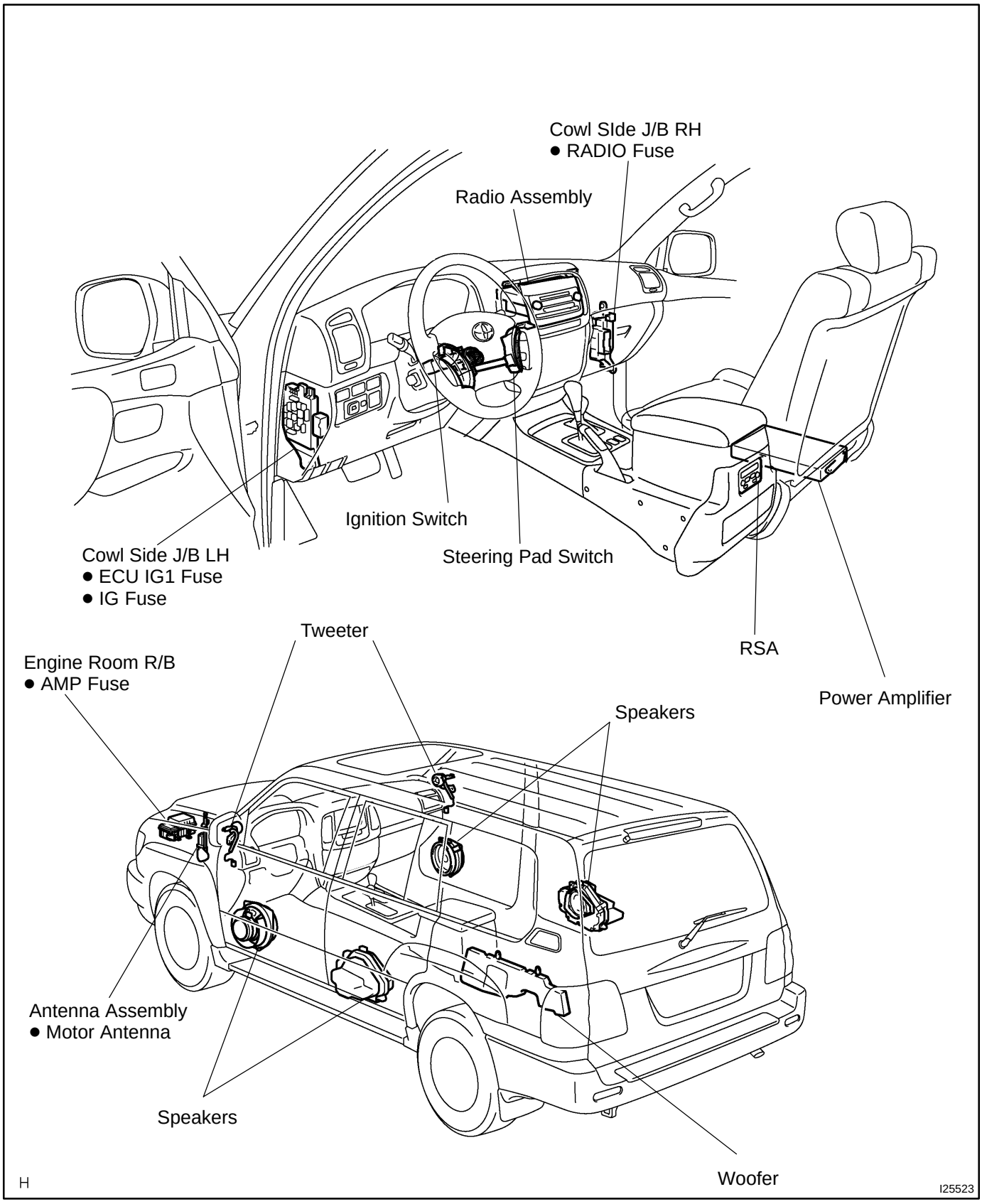
Disconnect the connectors from the steering pad switch, and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
AU1 - EAU	Do not switch position	Approx. 100 kΩ
AU1 - EAU	SEEK+ switch: push	0 Ω
AU1 - EAU	SEEK- switch: push	Approx. 0.3 Ω
AU1 - EAU	VOL+ switch: push	Approx. 1k Ω
AU1 - EAU	VOL- switch: push	Approx. 3.2 kΩ
AU2 - EAU	Do not switch position	Approx. 100 kΩ
AU2 - EAU	MODE switch: push	0 Ω

If the circuit is not as specified, inspect the circuits connected to other parts.

BE0GD-23

LOCATION



BE2E9-01

TROUBLESHOOTING

1. DIAGNOSIS FUNCTION (Main AVC-LAN)

(a) Diagnosis start-up

For shifting to diagnosis mode, turn the ignition switch ON and push the ”DISC” switch 3 times while pressing ”ch1” and ”ch6” switches.

HINT:

To exit the diagnosis mode, push the ”DISC” switch for 1.7 sec. or turn the ignition switch to ACC or OFF.

(b) Element check mode

After the diagnosis start-up, the system enters the element check mode. Check that the all elements light up.

HINT:

By pressing the ”TUNE UP” switch, the system enters the ”Service Check Mode”.

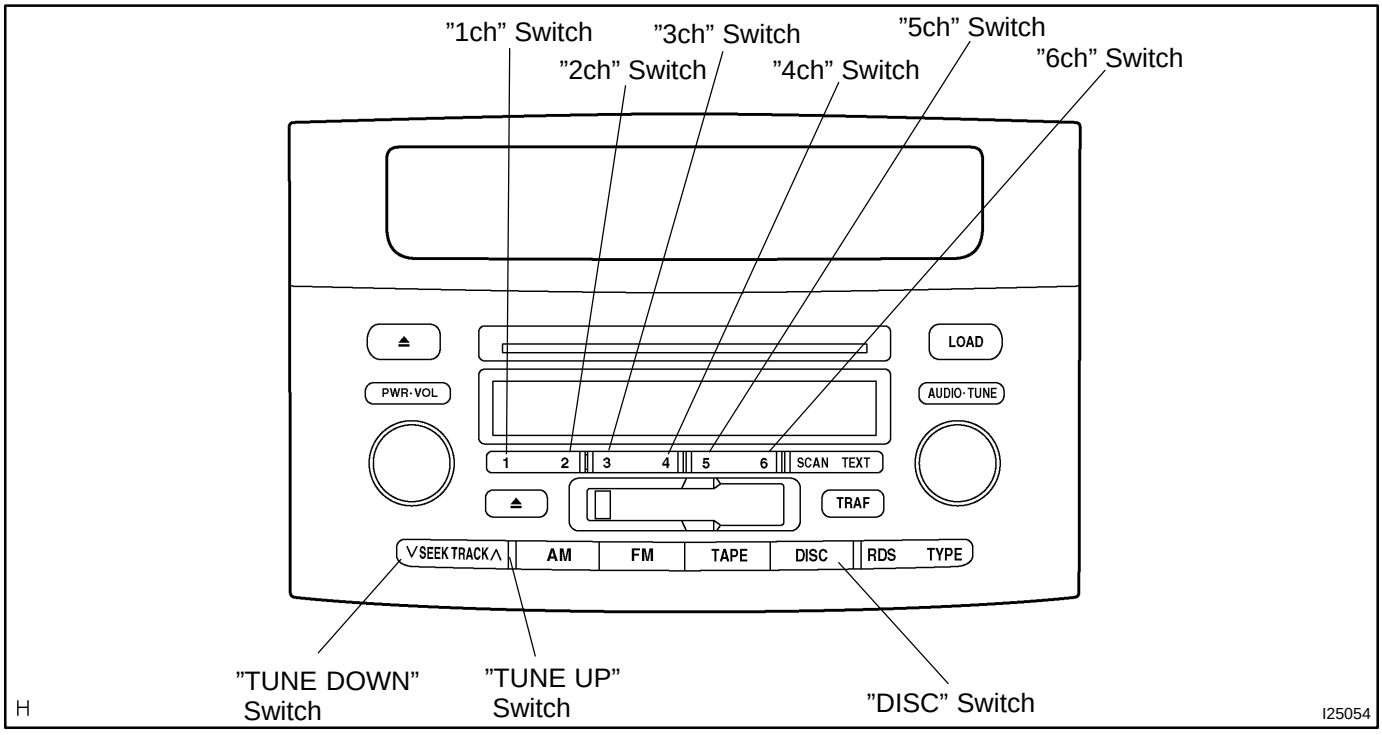
(c) Switch check mode

(1) Element check mode is started at the same time with the switch check mode.

(2) Check that there is a beep sound when any switch is pressed.

HINT:

By pressing ”TUNE UP” switch, the system enters the ”Service Check Mode”.



(d) Service check mode

(1) After the element check and switch check is completed, the system enters service check mode when ”TUNE UP” switch is pressed.

(2) Error codes over the tuner and connected equipments are displayed on the screen of the tuner. Results for each check are displayed as follows:

good:

No DTC is detected for both ”System Check Confirmation” and ”Diagnosis Memory Response”.

nCon:

The component does not respond to the ”Diagnosis On Instruction” command.

Applicable to only the system where connected components are limited to be used.

ECHn:

Application of new version has been confirmed by the ”Diagnosis On Check”, and there is one or more DTC which indicates ”Replacement” in the ”System Check Result Response” or ”Diagnosis Memory Response”.

CHEC:

Application of new version has been confirmed by the ”Diagnosis On Check”, and there is no DTC which indicates ”Replacement” in the ”System Check Result Response” or ”Diagnosis Memory Response”, but one or more DTC which indicates ”Check” is identified.

Old:

Application of old version is confirmed by the ”Diagnosis On Check”, and DTC is identified in the ”System Check Result Response” or ”Diagnosis Memory Response”.

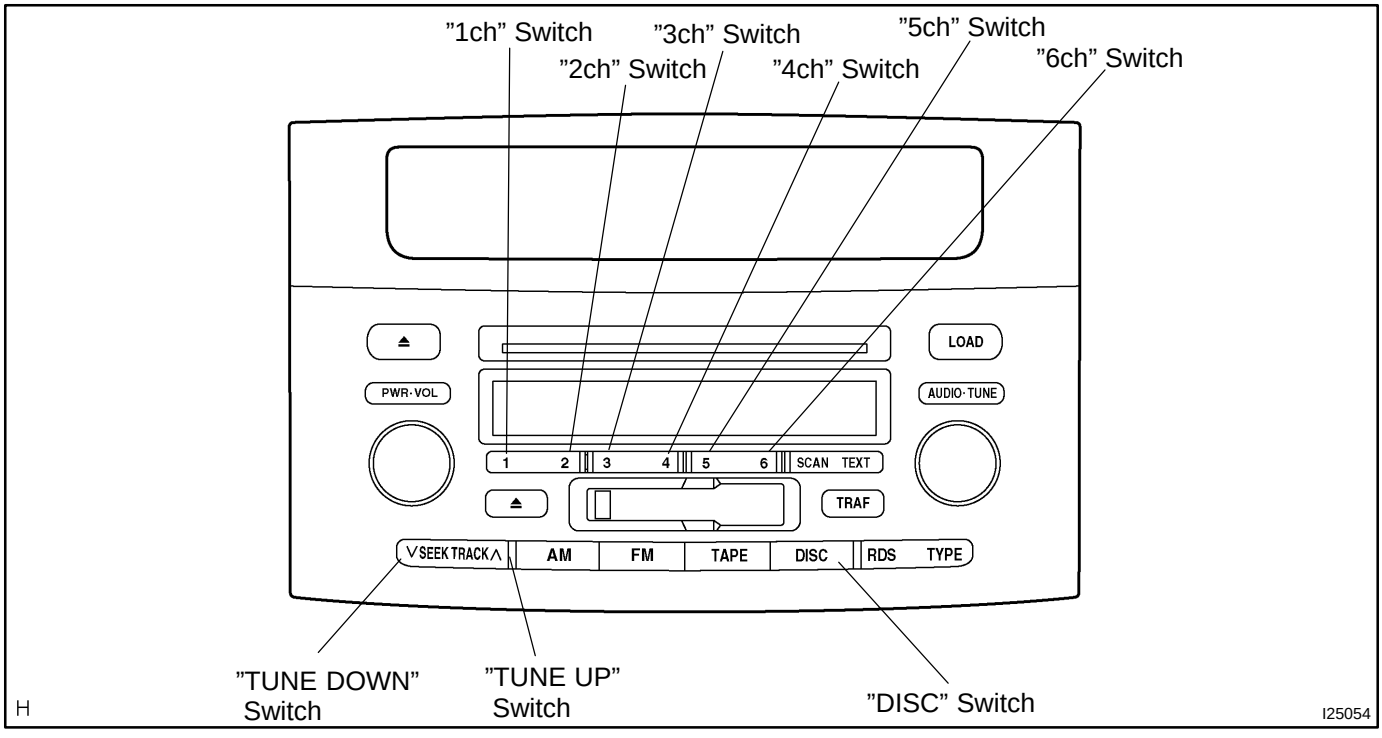
nrES:

No response is identified to the ”System Check Start Instruction” and ”Request for System Check Result” commands.

HINT:

Check the present and past condition of components by performing the System Check and collecting stored DTC memories.

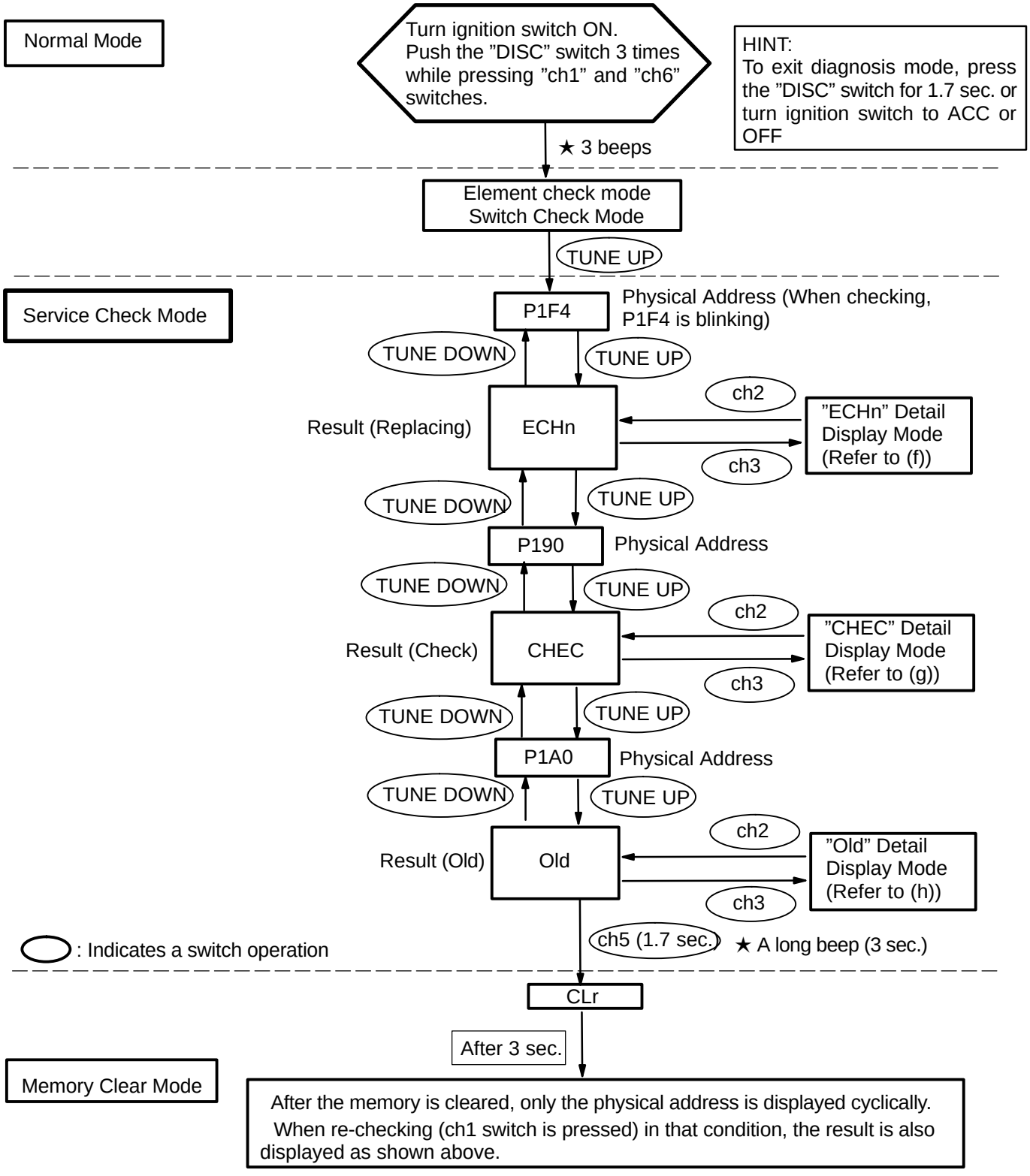
Check results are displayed as one of the following six indications: ”good”, ”ECHn”, ”CHEC”,”nCon”, ”Old” or ”nrES”.



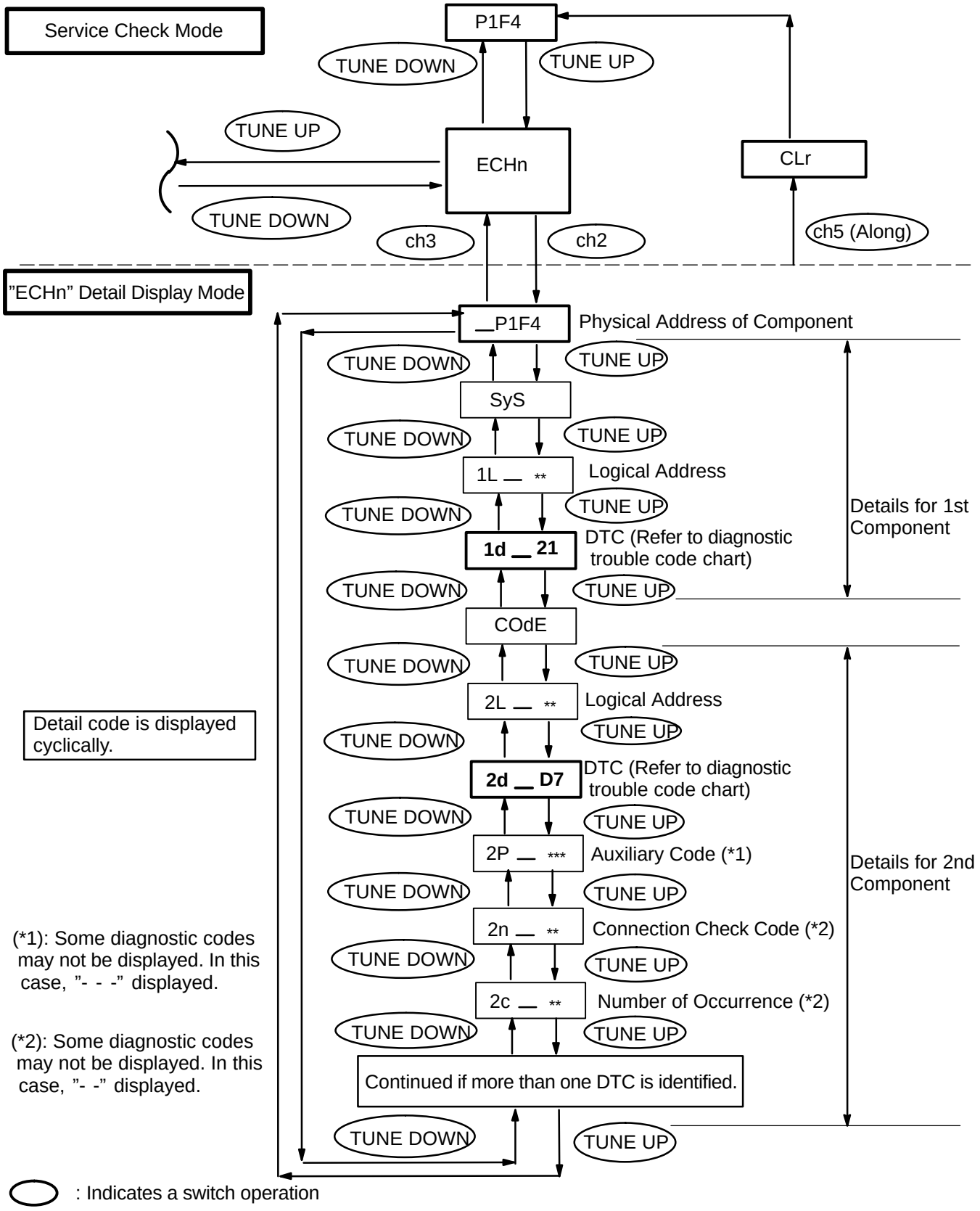
(e) Display Screen for Service Check.

Example:

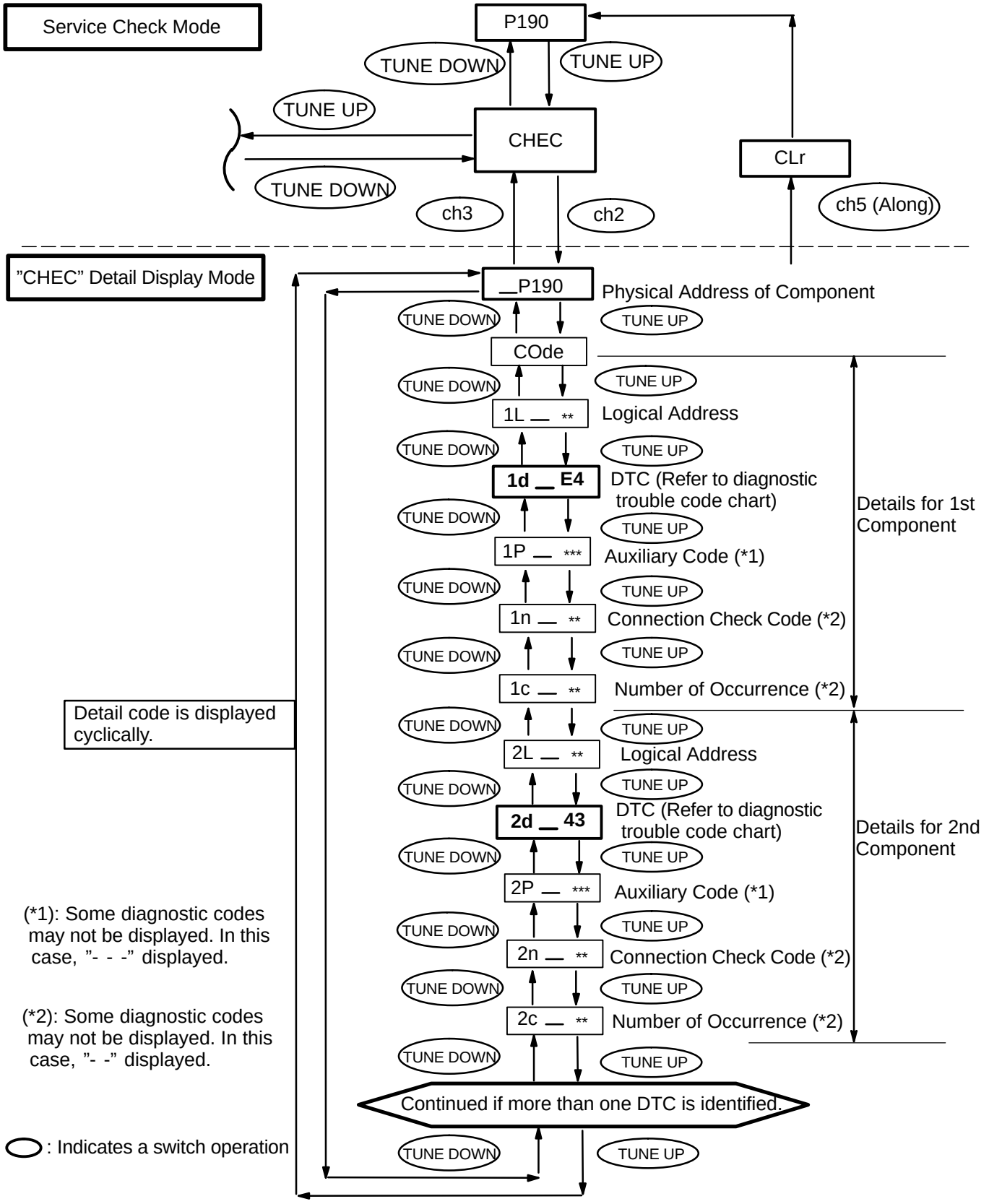
Connection parts (physical address): Radio receiver (P190), RSA ECU (P1F4), DVD player (P1A0)



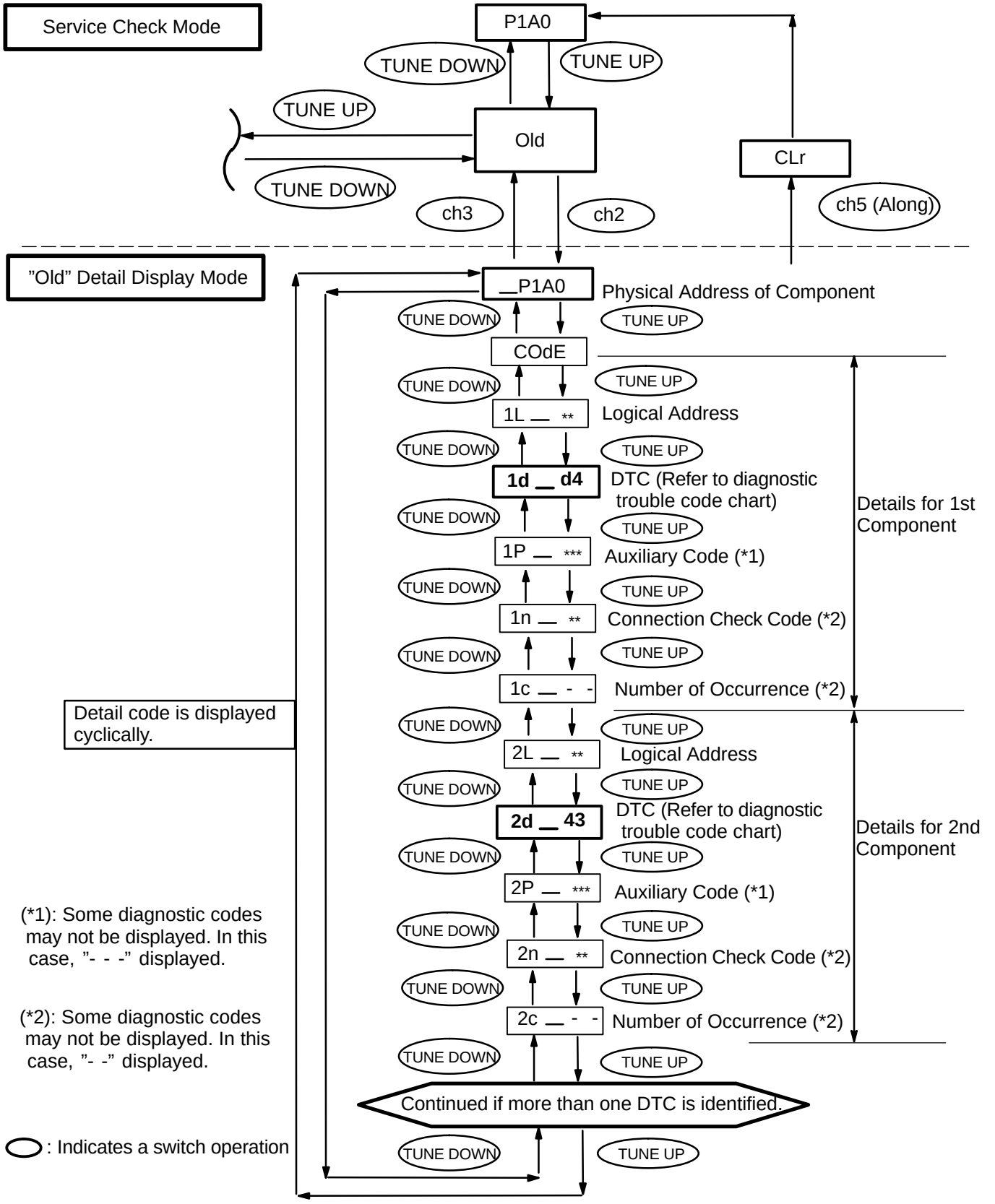
(f) ”ECHn” Detail Display Mode Screen



(g) ”CHEC” Detail Display Mode Screen



(h) ”Old” Detail Display Mode Screen



2. DIAGNOSIS FUNCTION (Sub AVC-LAN)

HINT:

As starting Main AVC-LAN to operate the diagnosis mode, Sub AVC-LAN is automatically to the mode. Perform the diagnosis mode operation on the RSA panel.

(a) Element check mode

After the diagnosis start-up, the system enters the element check mode. Check that the all elements light up.

HINT:

By pressing the ”TUNE UP” switch, the system enters the ”Service Check Mode”.

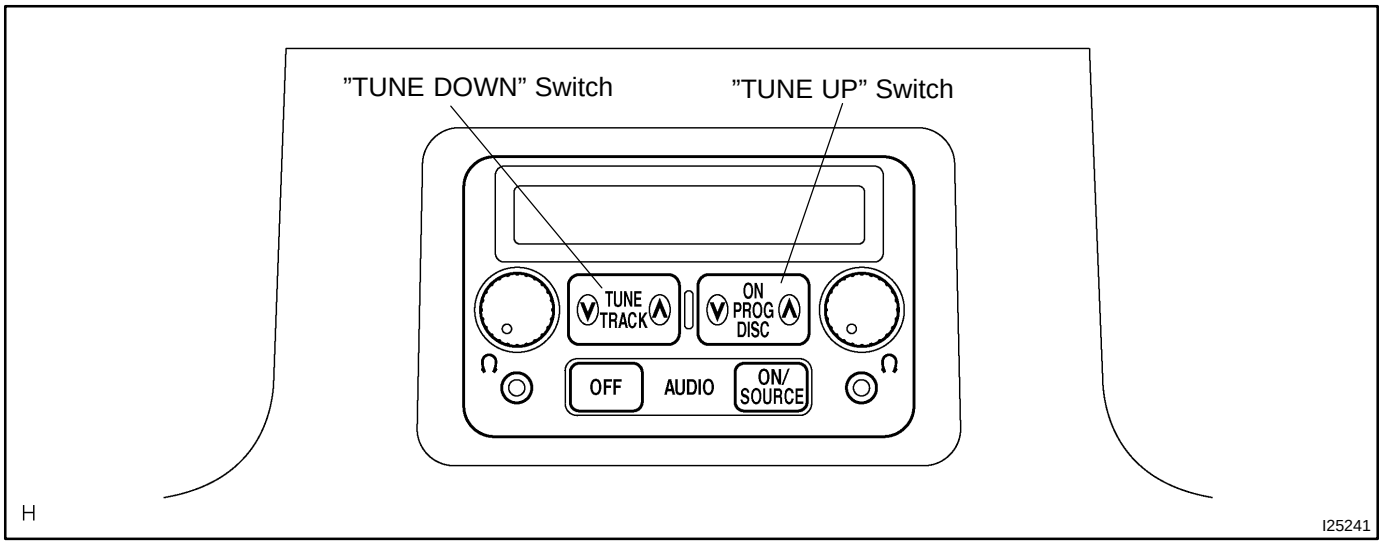
(b) Switch check mode

(1) Element check mode is started at the same time with the switch check mode.

(2) Check that there is a beep sound when any switch is pressed.

HINT:

By pressing ”TUNE UP” switch, the system enters the ”Service Check Mode”.



(c) Service check mode

(1) After the element check and switch check is completed, the system enters service check mode when ”TUNE UP” switch is pressed.

(2) Error codes over the tuner and connected equipments are displayed on the screen of the tuner. Results for each check are displayed as follows:

good:

No DTC is detected for both ”System Check Confirmation” and ”Diagnosis Memory Response”.

nCon:

The component does not respond to the ”Diagnosis On Instruction” command.

Applicable to only the system where connected components are limited to be used.

ECHn:

Application of new version has been confirmed by the ”Diagnosis On Check”, and there is one or more DTC which indicates ”Replacement” in the ”System Check Result Response” or ”Diagnosis Memory Response”.

CHEC:

Application of new version has been confirmed by the ”Diagnosis On Check”, and there is no DTC which indicates ”Replacement” in the ”System Check Result Response” or ”Diagnosis Memory Response”, but one or more DTC which indicates ”Check” is identified.

Old:

Application of old version is confirmed by the ”Diagnosis On Check”, and DTC is identified in the ”System Check Result Response” or ”Diagnosis Memory Response”.

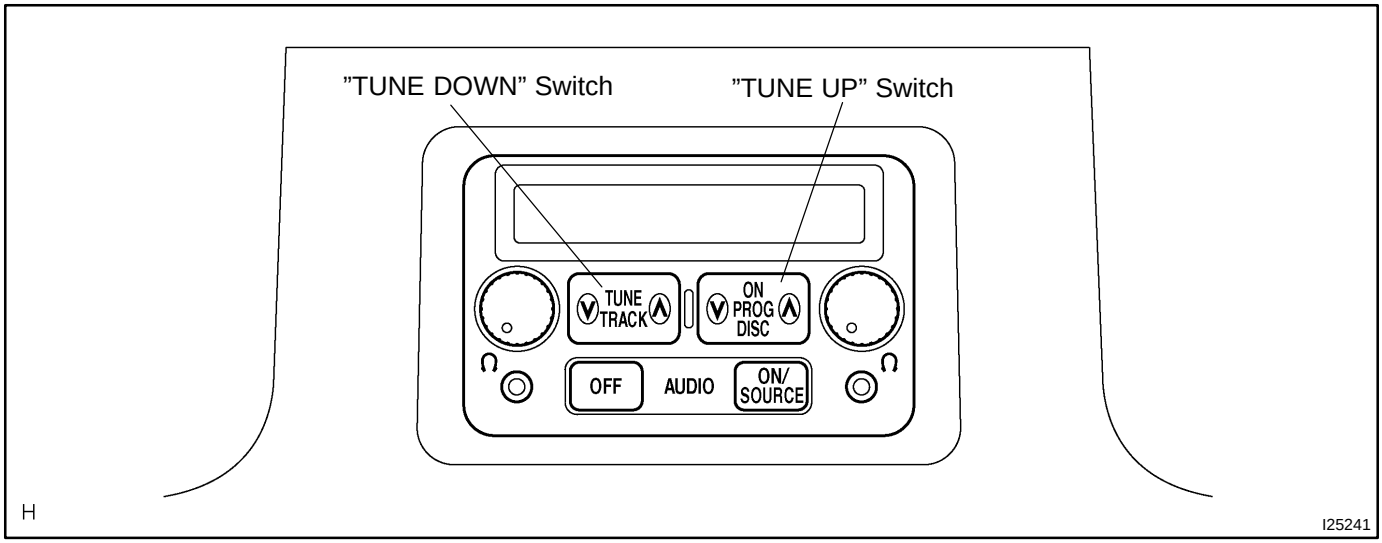
nrES:

No response is identified to the ”System Check Start Instruction” and ”Request for System Check Result” commands.

HINT:

Check the present and past condition of components by performing the System Check and collecting stored DTC memories.

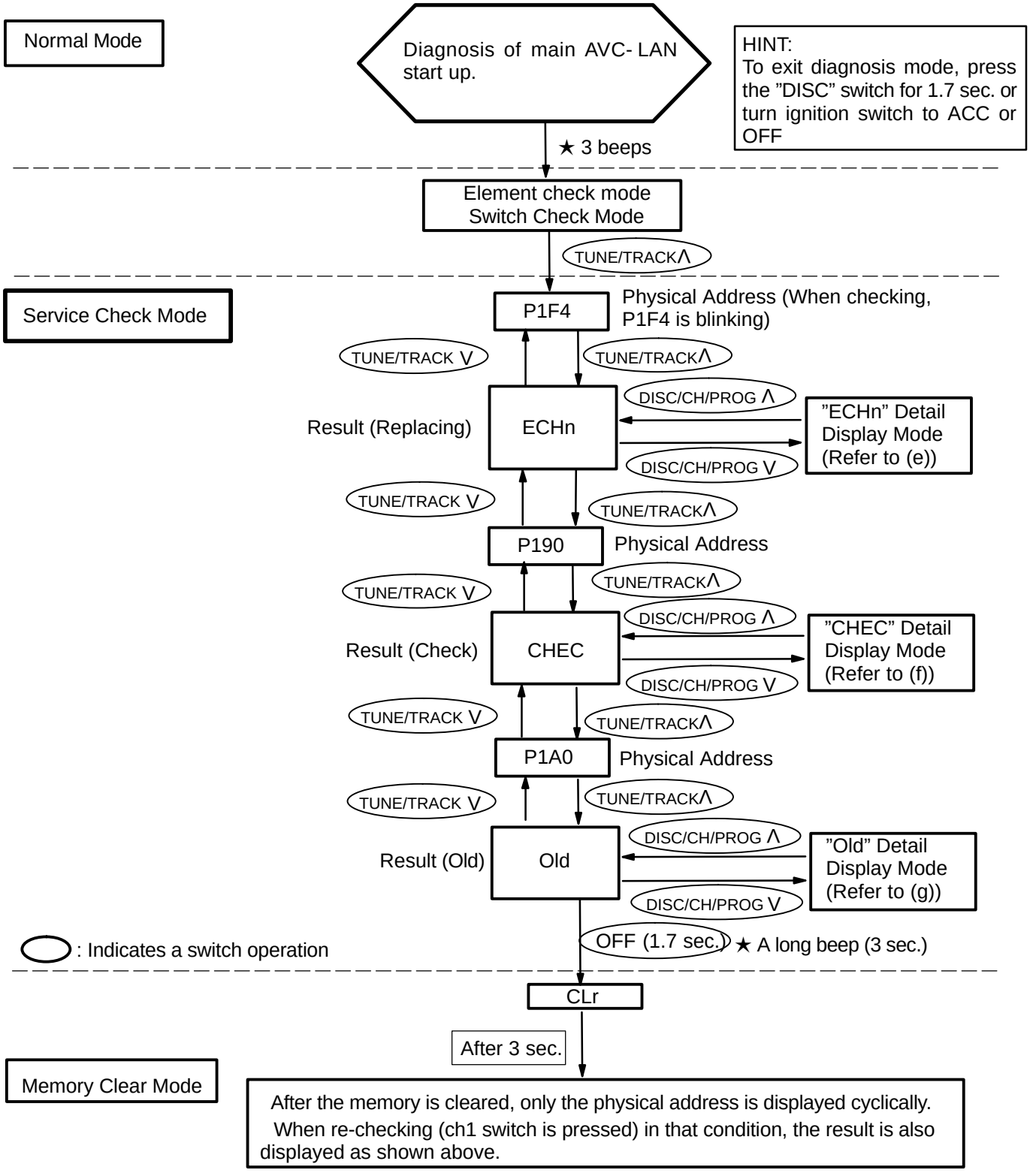
Check results are displayed as one of the following six indications: ”good”, ”ECHn”, ”CHEC”,”nCon”, ”Old” or ”nrES”.



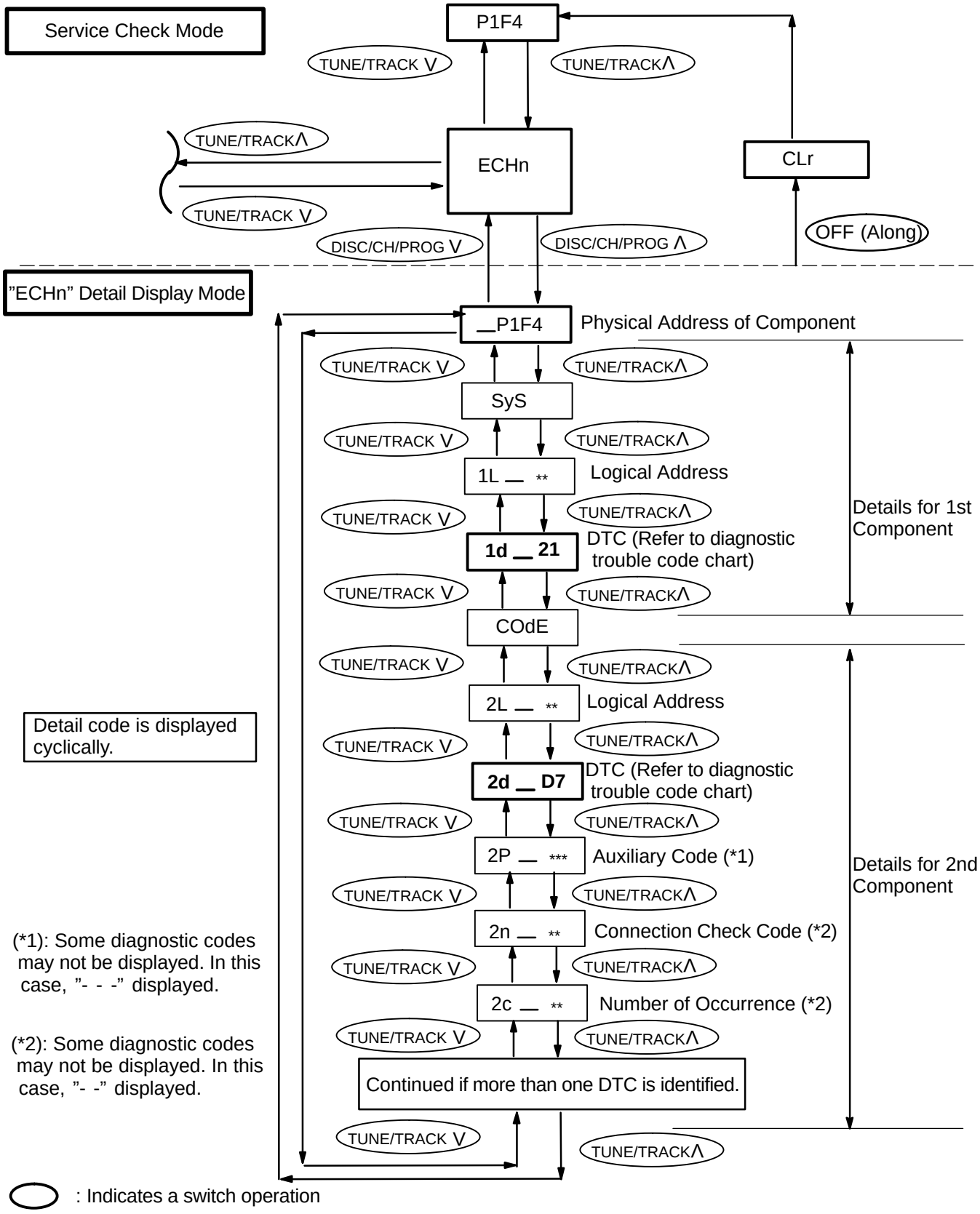
(d) Display Screen for Service Check.

Example:

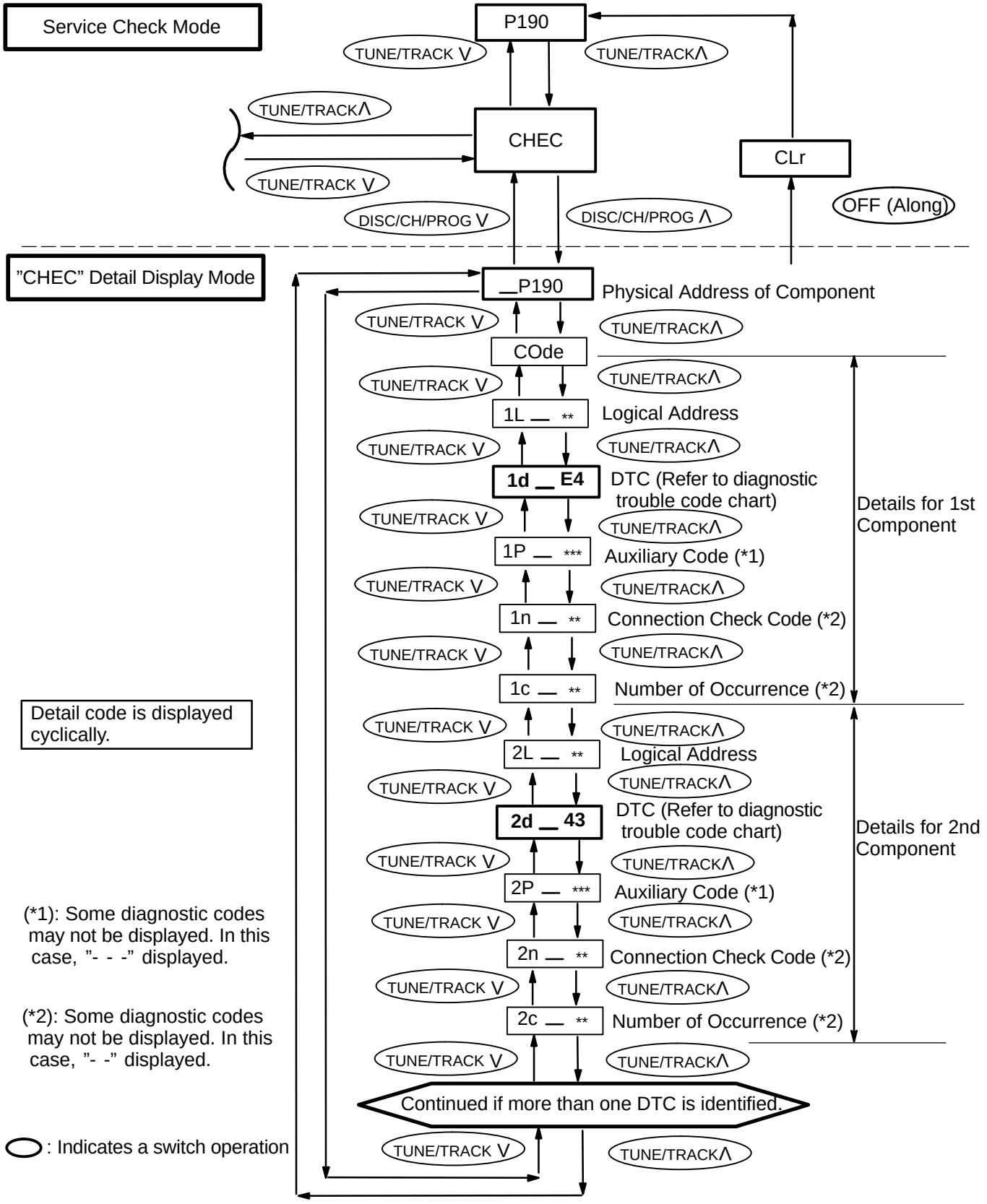
Connection parts (physical address): Radio receiver (P190), RSA ECU (P1F4), DVD player (P1A0)



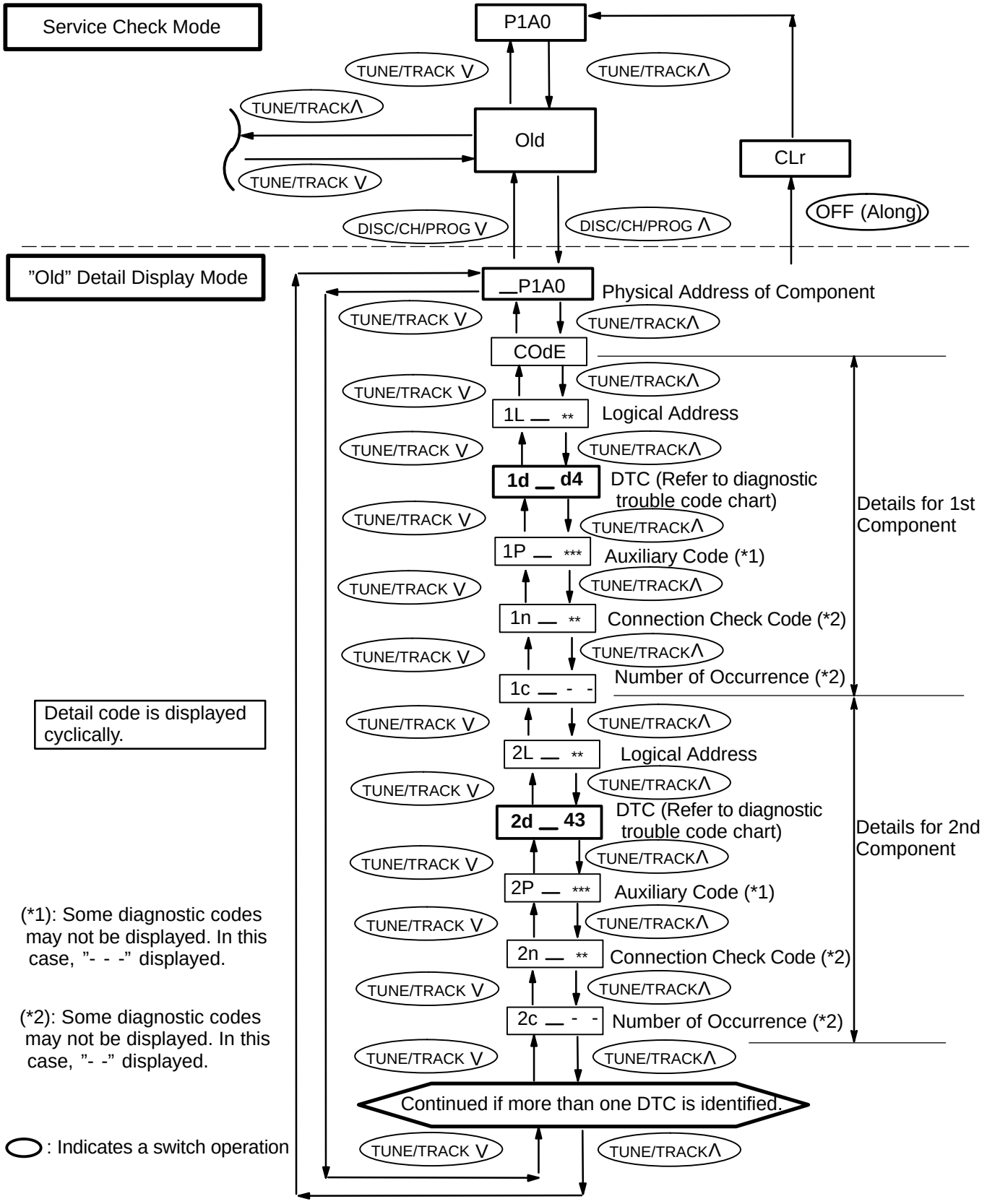
(e) ”ECHn” Detail Display Mode Screen



(f) ”CHEC” Detail Display Mode Screen



(g) ”Old” Detail Display Mode Screen



3. DIAGNOSIS CODE LIST

w/ Navigation system (See page)

Physical address: 190 Radio receiver assembly

HINT:

*1: Even if no failure is detected, it may be stored depending on the battery condition or voltage for starting an engine.
*2: It may be stored when the engine key is turned 1 min. angain after engine start.
*3: It may be stored when the engine key is turned again after engine start.
*4: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts
01 (Communication Control)	21	ROM Error	Error is detected in internal ROM.	Replace radio receiver assembly.
01 (Communication Control)	22	RAM Error	Error is detected in internal RAM.	Replace radio receiver assembly.
01 *2 (Communication Control)	D6	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply system of radio receiver assembly. ● Check harness for communication system of radio receiver assembly.
01 *3 (Communication Control)	D8	No Response to Connection Check	Component shown by auxiliary code is or had been disconnected from system after engine start. D9	● Check harness for power supply system of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *2 (Communication Control)	D9	Last Mode Error	Component operated (sounds and/or images were provided) before engine stop is or has been disconnected with ignition switch in ACC or ON.	● Check harness for power supply system of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 (Communication Control)	DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code. ● If error occurs again, replace component shown by auxiliary code.
01 *2 (Communication Control)	DB	Mode Status Error	Dual alarm is detected.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.

01 *4 (Communication Control)	DC	Transmission Error	Transmission to component shown by auxiliary code has been failed. (Detecting this DTC does not necessary mean actual failure.)	● If same auxiliary code is recorded in other component, check harness for power supply and communication system of components shown sub code.
01 *3 (Communication Control)	DD	Master Reset (Momentary Interruption)	After engine is started, radio receiver assembly assembly was disconnected from system.	● If this error occurs frequently, replace radio receiver assembly.
01 *3 (Communication Control)	DE	Slave Reset (Momentary Interruption)	After engine is started, slave component was disconnected from system.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *4 (Communication Control)	DF	Master Error	Due to defective condition of radio receiver assembly, master function is switched to audio equipment. Error occurs in communication between sub-master (audio) and radio receiver assembly.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly . ● Check harness for communication system between radio receiver assembly and sub-master component.
01 (Communication Control)	E0	Registration Completion Instruction Error	”Registration Completion Instruction” command from radio receiver assembly cannot be received.	● Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.
01 *2 (Communication Control)	E1	Audio processor ON error	While source equipment is operating, AMP output is stopped.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly.
01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error occurs in ON/OFF controlling command from radio receiver assembly assembly.	● Replace radio receiver assembly .
01 (Communication Control)	E3	Registration Request Transmission	Registration Request command is output from slave component. Receiving Connection Check Instruction, Registration Request command is output from sub-master component.	● Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.
01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	● Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.
60 (Radio receiver assembly)	43	AM Tuner Error	Abnormal condition is detected in AM tuner. Inspect radio receiver assembly.	Replace radio receiver assembly.
60 (Radio receiver assembly)	44	FM Tuner Error	Abnormal condition is detected in FM tuner.	Replace radio receiver assembly.

61 (Cassette switch)	40	Mechanical or Media Error	Malfunction due to mechanical failure is identified. Or, cassette tape is cut or entangled.	Inspect cassette tape.
61 (Cassette switch)	41	EJECT Malfunction	Malfunction due to mechanical failure.	Replace radio receiver assembly.
63 (In-dash CD auto changer)	42	No Disc Readout	Disc cannot be read.	Inspect CD.
63 (In-dash CD auto changer)	44	CD Error	Error is detected in CD auto changer.	Replace radio receiver assembly.
63 (In-dash CD auto Changer)	45	EJECT Error	CD cannot be ejected.	Replace radio receiver assembly.
63 (In-dash CD auto Changer)	47	CD High Temp.	High temperature is detected in CD auto changer.	Replace radio receiver assembly.
63 (In-dash CD auto Changer)	48	CD Excess Current	Excess current is applied to CD auto changer.	Replace radio receiver assembly.

Physical address: 440 Strereo component amplifier

HINT:
*1: Even if no failure is detected, it may be stored depending on the battery condition or voltage for starting an engine.
*2: It may be stored when the engine key is turned 1 min. angain after engine start.
*3: It may be stored when the engine key is turned again after engine start.
*4: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspeced parts
01 (Communication Control)	21	ROM Error	Abnormal condition of ROM is detected.	Replace stereo component amplifier.
01 (Communication Control)	22	RAM Error	Abnormal condition of RAM is detected.	Replace stereo component amplifier.
01 (Communication Control)	D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of stereo component amplifier. ● Check harness for communication system of stereo component amplifier.

01*6 (Communication Control)	D7	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of stereo component amplifier. ● Check harness for communication system of stereo component amplifier.
01 (Communication Control)	DC *2	Transmission Error	Transmission to component shown by auxiliary code has bee failed. (This code does not necessarily mean actual failure.)	If same auxiliary code is recorded in other component(s), check harness for power supply and communication system of components shown sub code.
01 (Communication Control)	DD *3	Master Reset (Momentary Interruption)	After engine is started, radio receiver assembly assembly was disconnected from system.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● If error occurs frequently, replace radio receiver assembly.
01 (Communication Control)	DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment . Error occurs in communication between sub-master (audio) and master component.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for communication system between radio receiver assembly and sub-master component.
01 (Communication Control)	E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command fromradio receiver assembly cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
01 (Communication Control)	E1 *1	Audio processor ON error	While source equipment is operating, AMP output is stopped.	● Check harness for power supply of radio receiver assembly ● Check harness for communication system of radio receiver assembly.
01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error is detected in ON/OFF control command from radio receiver assembly.	Replace radio receiver assembly.
01 (Communication Control)	E3	Registration Request Transmission	● Registration Request command is output from slave component. ● By reception of connection check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

Physical address: 1F4 RSA Panel (Main AVC-LAN)

HINT:
*1: Even if no failure is detected, it may be stored depending on the battery condition or voltage for starting an engine.
*2: It may be stored when the engine key is turned 1 min. angain after engine start.
*3: It may be stored when the engine key is turned again after engine start.
*4: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspeced parts
01 (Communication Control)	D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of RSA panel. ● Check harness for communication system of RSA panel.
01*6 (Communication Control)	D7	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of RSA panel. ● Check harness for communication system of RSA panel.
01 (Communication Control)	DC *2	Transmission Error	Transmission to component shown by auxiliary code has bee failed. (This code does not necessarily mean actual failure.)	If same auxiliary code is recorded in other component(s), check harness for power supply and communication system of components shown sub code.
01 (Communication Control)	DD *3	Master Reset (Momentary Interruption)	After engine is started, radio receiver assembly was disconnected from system.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● If error occurs frequently, replace radio receiver assembly.
01 (Communication Control)	DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment . Error occurs in communication between sub-master (audio) and master component.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for communication system between radio receiver assembly and sub-master component.
01 (Communication Control)	E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command fromradio receiver assembly cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
01 (Communication Control)	E3	Registration Request Transmission	● Registration Request command is output from slave component. ● By reception of connection check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.

01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

Physical address: 16A, 16C RSA Panel (Sub AVC-LAN)
HINT:
*1: Even if no failure is detected, it may be stored depending on the battery condition or voltage for starting an engine.
*2: It may be stored when the engine key is turned 1 min. angain after engine start.
*3: It may be stored when the engine key is turned again after engine start.
*4: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspeced parts
01 *3 (Communication Control)	D8	No Response to Connection Check	Component shown by auxiliary code is or had been disconnected from system after engine start. D9	● Check harness for power supply system of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *2 (Communication Control)	D9	Last Mode Error	Component operated (sounds and/or images were provided) before engine stop is or has been disconnected with ignition switch in ACC or ON.	● Check harness for power supply system of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 (Communication Control)	DA	No Response to ON/OFF Instruction	No response is identified when changing mode (audio and visual mode change). Detected when sound and picture does not change by button operation.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code. ● If error occurs again, replace component shown by auxiliary code.
01 *2 (Communication Control)	DB	Mode Status Error	Dual alarm is detected.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 *4 (Communication Control)	DC	Transmission Error	Transmission to component shown by auxiliary code has been failed. (Detecting this DTC does not necessary mean actual failure.)	● If same auxiliary code is recorded in other component, check harness for power supply and communication system of components shown sub code.
01 *3 (Communication Control)	DE	Slave Reset (Momentary Interruption)	After engine is started, slave component was disconnected from system.	● Check harness for power supply of component shown by auxiliary code. ● Check harness for communication system of component shown by auxiliary code.
01 (Communication Control)	E4	Plural Frame Abort	Plural frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

Physical address: 1A0 DVD Auto Player

HINT:
*1: Even if no failure is detected, this code may be stored depending on the battery condition or voltage for starting an engine.
*2: This code may be stored when the engine key is turned again 1 min. after engine start.
*3: This code may be stored when the engine key is turned again after engine start.
*4: When 210 sec. has passed after pulling out the power supply connector of the master component with the ignition switch in ACC or ON, this code is stored.

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspeced parts
01 (Communication Control)	D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, RSA Panel was disconnected.	● Check harness for power supply of RSA Panel. ● Check harness for communication system of RSA Panel. ● Check harness for power supply of DVD player. ● Check harness for communication system of DVD player.
01 (Communication Control)	D7	Communication Check Error	Component in which this code is recorded is was disconnected from system after engine start. Or, when recorded this code, RSA Panel was disconnected.	● Check harness for power supply of RSA Panel. ● Check harness for communication system of RSA Panel. ● Check harness for power supply of DVD player. ● Check harness for communication system of DVD player.
01 *4 (Communication Control)	DC	Transmission Error	Transmission to component shown by sub-code has been failed. (Detecting this DTC does not necessary mean actual failure.)	● If same sub-code is recorded in other component, check harness for power supply and communication system of components shown sub code.
01 (Communication Control)	DD *3	Master Reset (Momentary Interruption)	After engine is started, radio receiver assembly assembly was disconnected from system.	● Check harness for power supply of RSA Panel. ● Check harness for communication system of RSA Panel. ● Check harness for power supply of DVD player. ● Check harness for communication system of DVD player.
01 (Communication Control)	DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment . Error occurs in communication between sub-master (audio) and master component.	● Check harness for power supply of RSA Panel. ● Check harness for communication system of RSA Panel. ● Check harness for communication system between RSA Panel.
01 (Communication Control)	E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command from master cannot be received.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.

01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error is detected in ON/OFF control command from DVD player.	Replace DVD player.
01 (Communication Control)	E3	Registration Request Transmission	● Registration Request command is output from slave component. ● Registration connection check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
01 (Communication Control)	E4	Multiple Frame Abort	Multiple frame transmission is aborted.	Since this DTC is provided for engineering purpose, it may be detected when no actual failure exists.
01 (Communication Control)	22	RAM Error	Abnormal condition of RAM is detected.	Replace DVD player.

Physical address: 250 (DVD Auto Changer) (Sub AVC-LAN)

Logical address	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspeced parts
01 (Communication Control)	D6 *1	Absence of Master	Component in which this code is recorded has been disconnected from system with ignition in ACC or ON. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of DVD auto changer. ● Check harness for communication system of DVD auto changer.
01*6 (Communication Control)	D7	Connection Check Error	Component in which this code is recorded has been disconnected from system after engine start. Or, when this code was recorded, radio receiver assembly was disconnected.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for power supply of DVD auto changer. ● Check harness for communication system of DVD auto changer.
01 (Communication Control)	DC *2	Transmission Error	Transmission to component shown by auxiliary code has bee failed. (This code does not necessarily mean actual failure.)	If same auxiliary code is recorded in other component(s), check harness for power supply and communication system of components shown sub code.
01 (Communication Control)	DD *3	Master Reset (Momentary Interruption)	After engine is started, radio receiver assembly assembly was disconnected from system.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● If error occurs frequently, replace radio receiver assembly.

01 (Communication Control)	DF *4	Master Error	Due to defective condition of component with a display, master function is switched to audio equipment . Error occurs in communication between sub-master (audio) and master component.	● Check harness for power supply of radio receiver assembly. ● Check harness for communication system of radio receiver assembly. ● Check harness for communication system between radio receiver assembly and sub-master component.
01 (Communication Control)	E0 *1	Registration Completion Instruction Error	”Registration Completion Instruction” command fromradio receiver assembly cannot be received.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
01 (Communication Control)	E2	ON/OFF Instruction Parameter Error	Error is detected in ON/OFF control command from radio receiver assembly.	Replace radio receiver assembly.
01 (Communication Control)	E3	Registration Request Transmission	● Registration Request command is output from slave component. ● By reception of connection check Instruction, Registration Request command is output from sub-master component.	Since this DTC is provided for engineering, it may be detected when no actual failure exists.
45 (DVD)	42	No Disk Readout	Disk cannot be read.	Inspect disk.
45 (DVD)	44	DVD error	Error is detected in DVD player.	Replace radio and player.
45 (DVD)	45	EJECT error	Disk cannot be ejected.	Check whether foreign matters enter inspection.
45 (DVD)	46	Disk Crack	A crack and dirt are in a disk.	Inspect disk.
45 (DVD)	52	Player Error	Clamp unusually generating.	DVD player.
45 (DVD)	47	DVD High Temp	High temperature is detected in DVD auto changer.	Do not stop the operation for a period of time.
45 (DVD)	48	DVD Excess Current	Excess current is applied to DVD auto changer.	Replace DVD auto changer.
45 (DVD)	50	A Malfunction in insertion/ejection	Operation malfunction in insertion/ ejection.	Replace DVD auto changer.
45 (DVD)	51	A Malfunction in switching disk	Operation malfunction in switching disk.	Replace DVD auto changer.

4. PROBLEM SYSMPTOMS TABLE

NOTICE:

When replacing the internal mechanism (computer part) of the audio system, be careful that no part of your body or clothing comes in contact with the terminals of the leads from the IC, etc. of the replacement part (spare part).

HINT:

This inspection procedure is a simple troubleshooting which should be carried out on the vehicle during system operation and was prepared on the assumption of system component troubles (except for the wires and connectors, etc.).

Always inspect the trouble taking the following items into consideration.

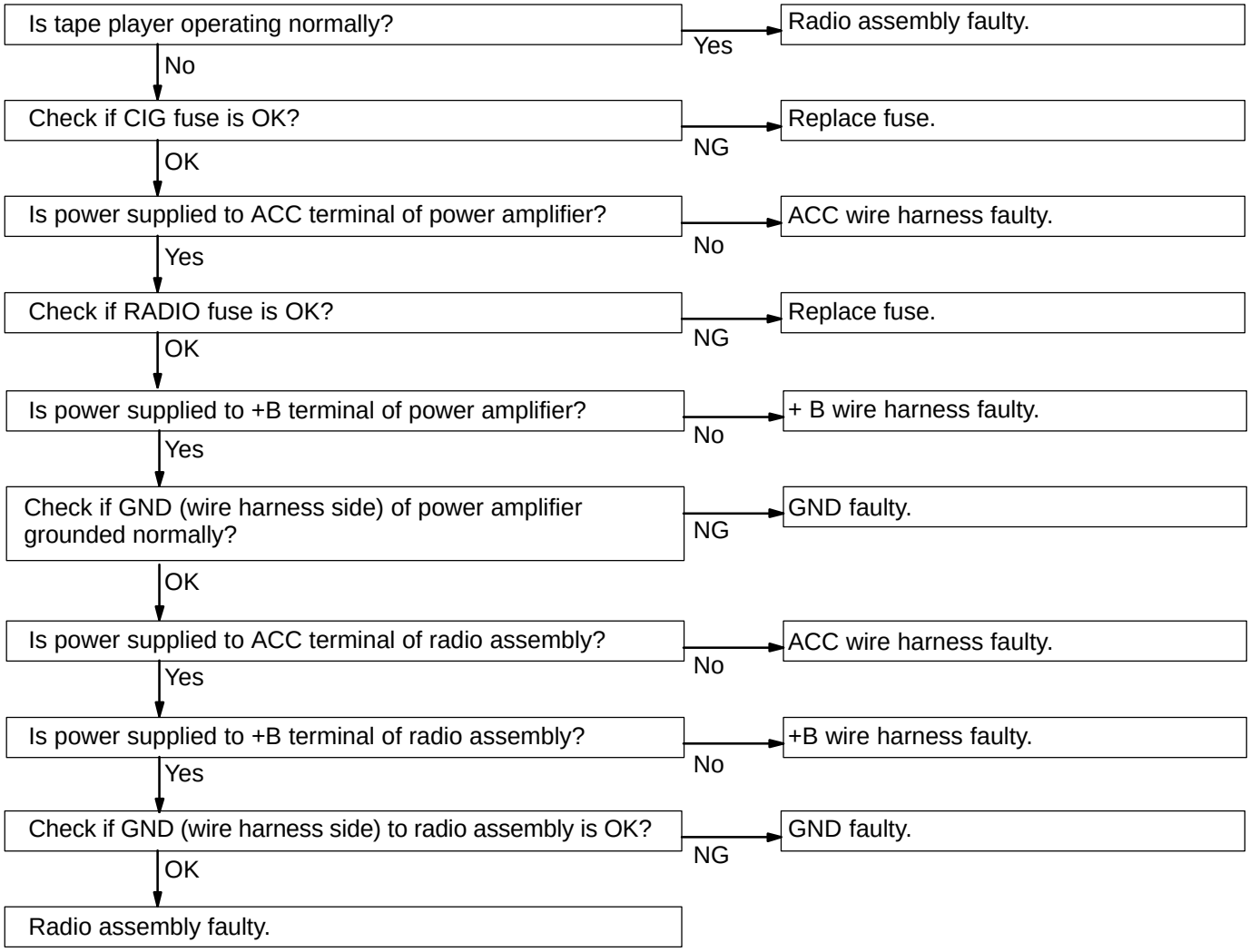
Open or short circuit of the wire harness

Connector or terminal connection fault

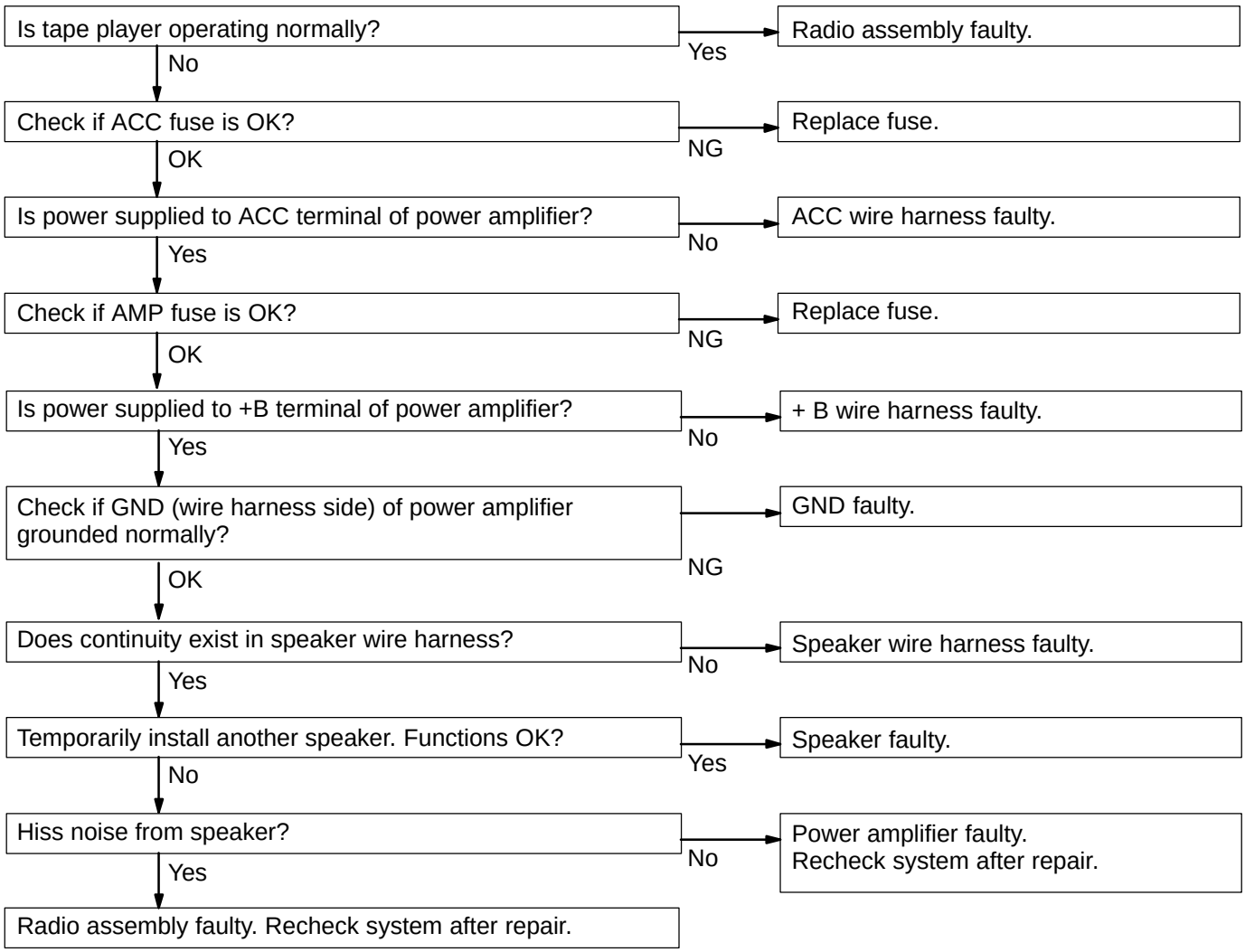
	Problem	Flow chart No.
Radio	Radio not operating when power switch turned to 'ON'.	1
	Display indicates when power switch turned to 'ON', but no sound (including 'noise') is produced.	2
	Noise present, but AM - FM not operating.	3
	Any speaker does not work.	4
	Any AM or FM does not work.	5
	Few preset turning bands.	5
	Reception poor.	6
	Sound quality poor.	7
	Preset memory disappears.	8
Tape Player	Cassette tape cannot be inserted.	9
	Cassette tape inserted, but no power.	10
	Power coming in, but tape player not operating.	11
	Any speaker does not work.	12
	Sound quality poor.	13
	Tape jammed, malfunction with tape speed or auto-reverse.	14
	Cassette tape will not eject.	15
CD Player	CD cannot be inserted.	16
	CD inserted but no power/	17
	Power coming in, but CD player not operating.	18
	Sound jumps.	19
	Sound quality poor (Volume faint)	20
	Any speaker does not work.	21
	CD will not be ejected.	22
Power Amplifier	No power coming in.	23
	Power coming in, but power amplifier not operating.	24
	Any speaker does not work.	25
Noise	Noise occurs	26
	Noise produced by vibration or shock while driving.	27
	Noise produced when engine starts.	28
Steering Pad Switch	A audio system cannot be operated with steering pad switch.	29
Rear Seat Audio	Quality of sound from headphone connected to headphone terminal is poor or no sound can be heard.	30

The term ”AM” includes LW,MW and SW, and the term ”FW” includes UKW.

1	Radio	RADIO NOT OPERATING WHEN POWER SWITCH TURNED TO ”ON”



2	Radio	DISPLAY INDICATES WHEN POWER SWITCH TURNED TO ”ON”, BUT NO SOUND (INCLUDING ”NOISE”) IS PRODUCED



3	**Radio**	**NOISE PRESENT, BUT AM-FM NOT OPERATING**

Go to No.25

If radio side faulty. → Radio faulty.

4	**Radio**	**ANY SPEAKER DOSE NOT WORK**

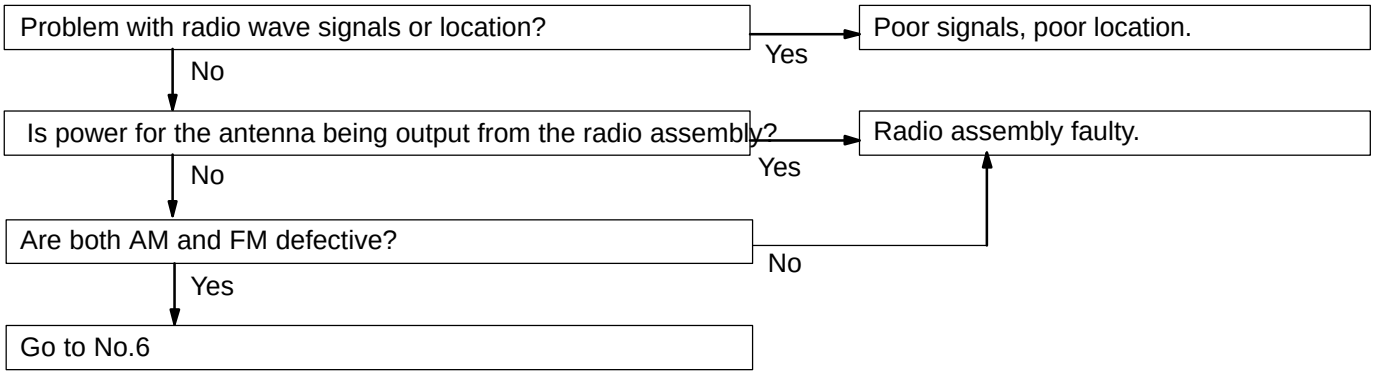
Is hiss noise produced by non-functioning speaker?
- Yes → Radio assembly faulty. Recheck system after repair.
- No ↓

Does continuity exist in speaker wire harness?
- No → Speaker wire harness faulty.
- Yes ↓

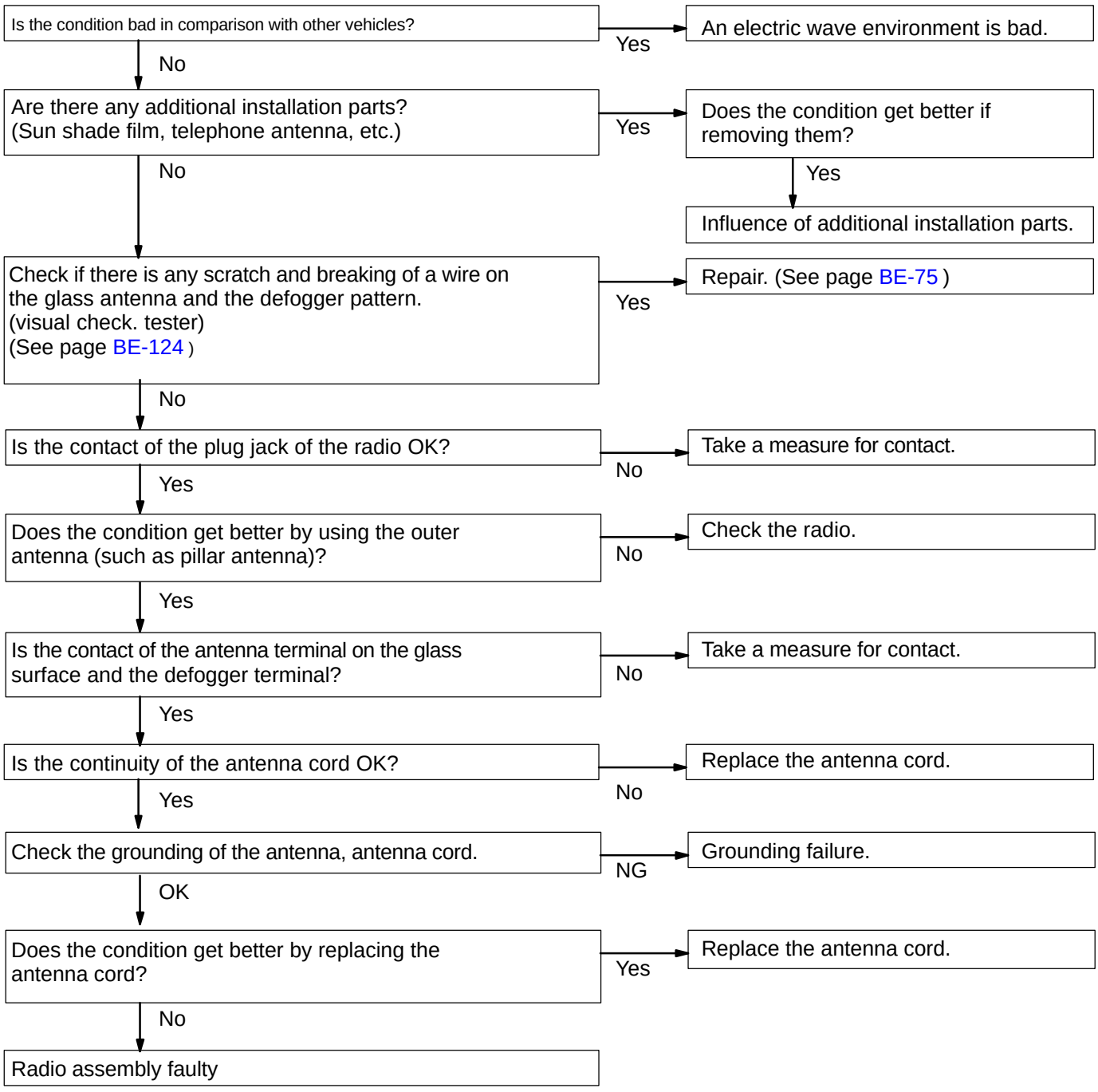
Temporarily install another speaker? Functions OK?
- Yes → Speaker faulty.
- No ↓

Power amplifier faulty. Recheck system after repair.

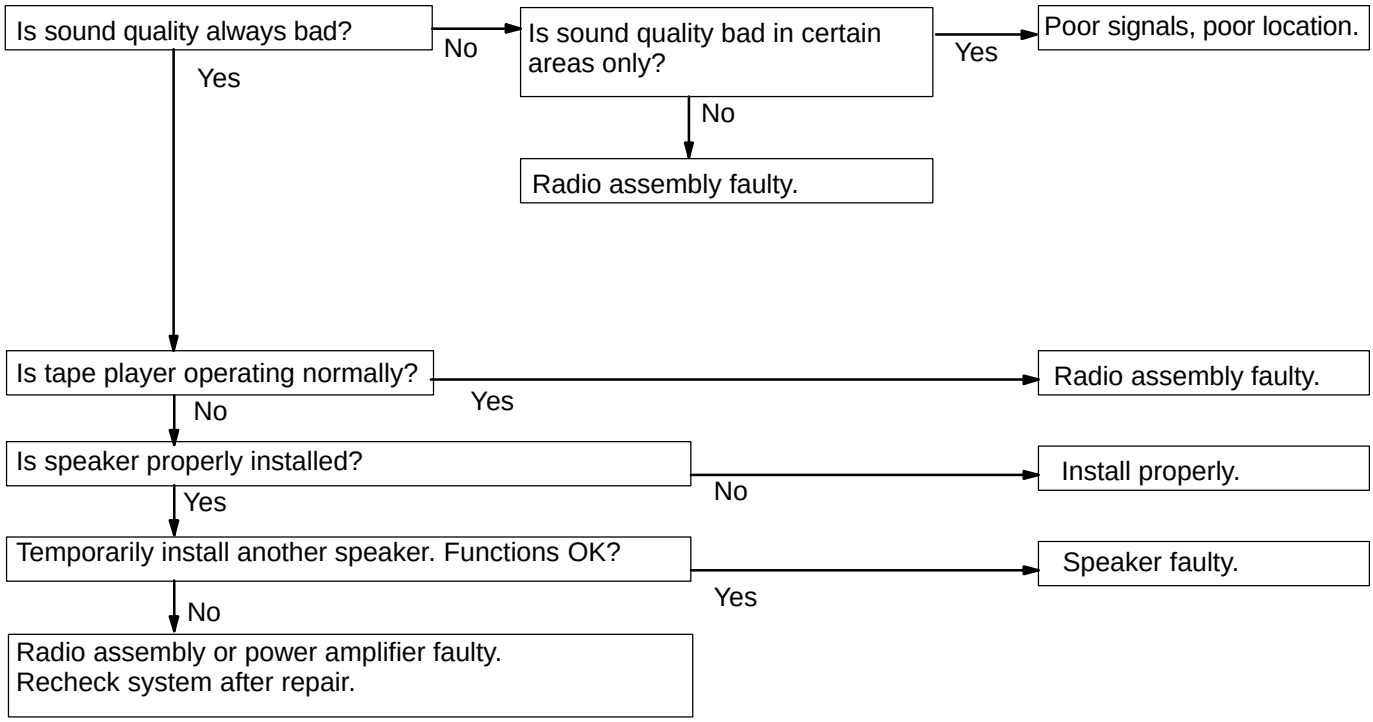
5	**Radio**	**ANY AM OR FM DOES NOR WORK FEW PRESET TUNING BANDS**



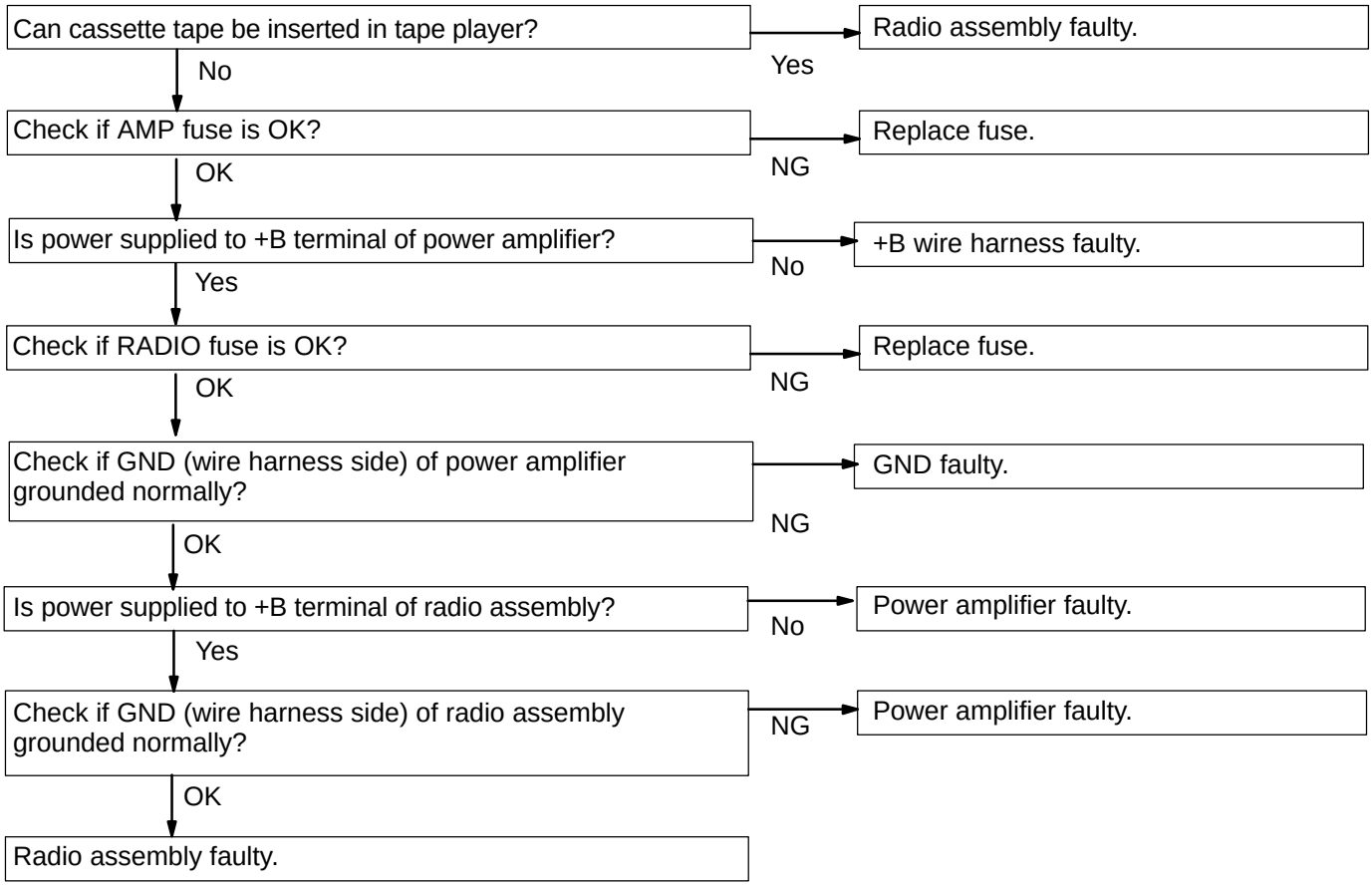
6	Radio	POOR RECEPTION



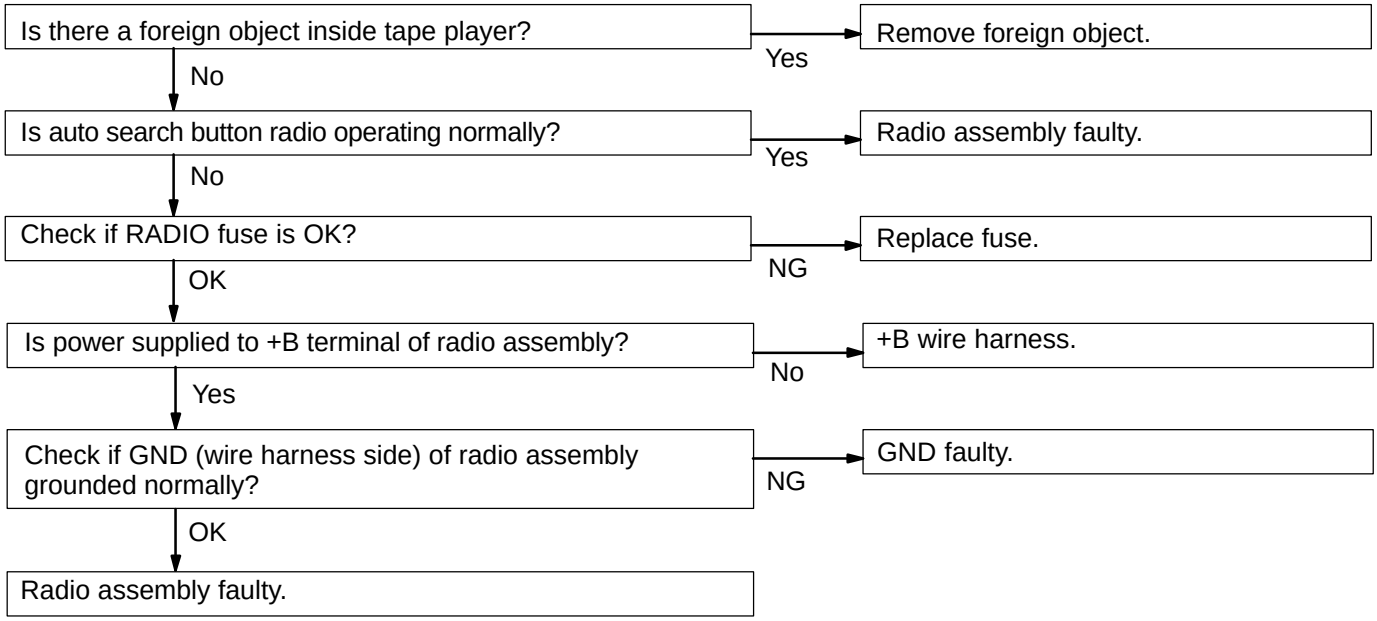
7	Radio	SOUND QUALITY POOR



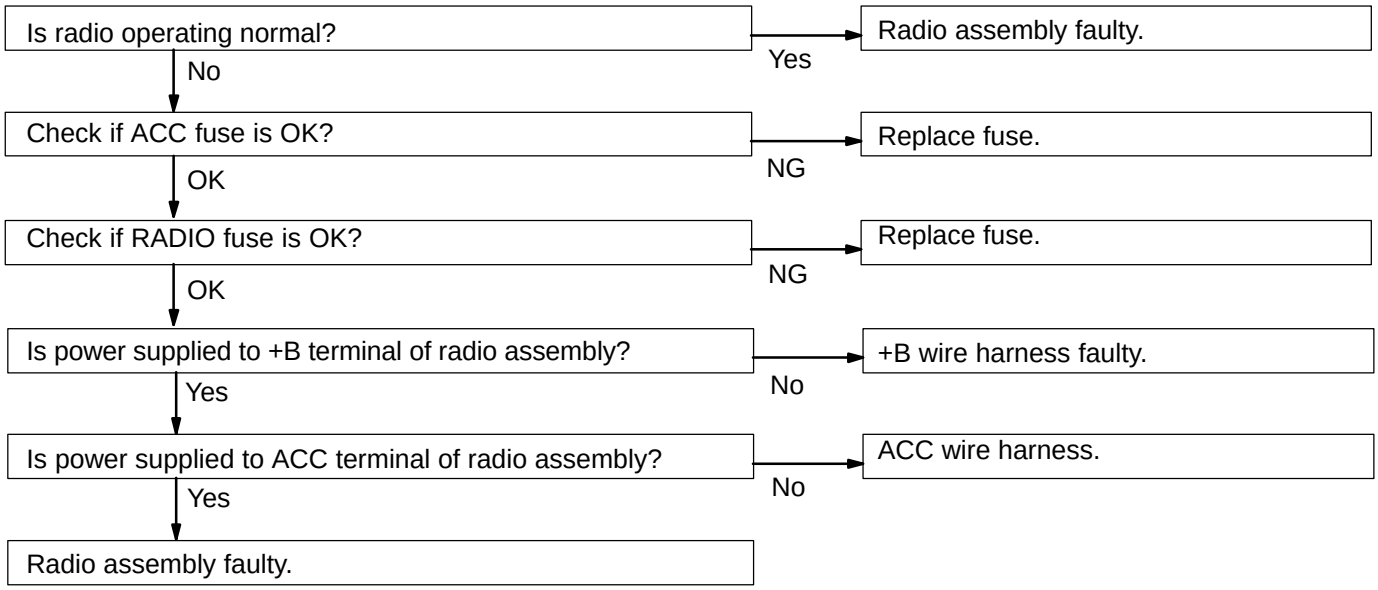
8	Radio	PRESET MEMORY DISAPPEARS



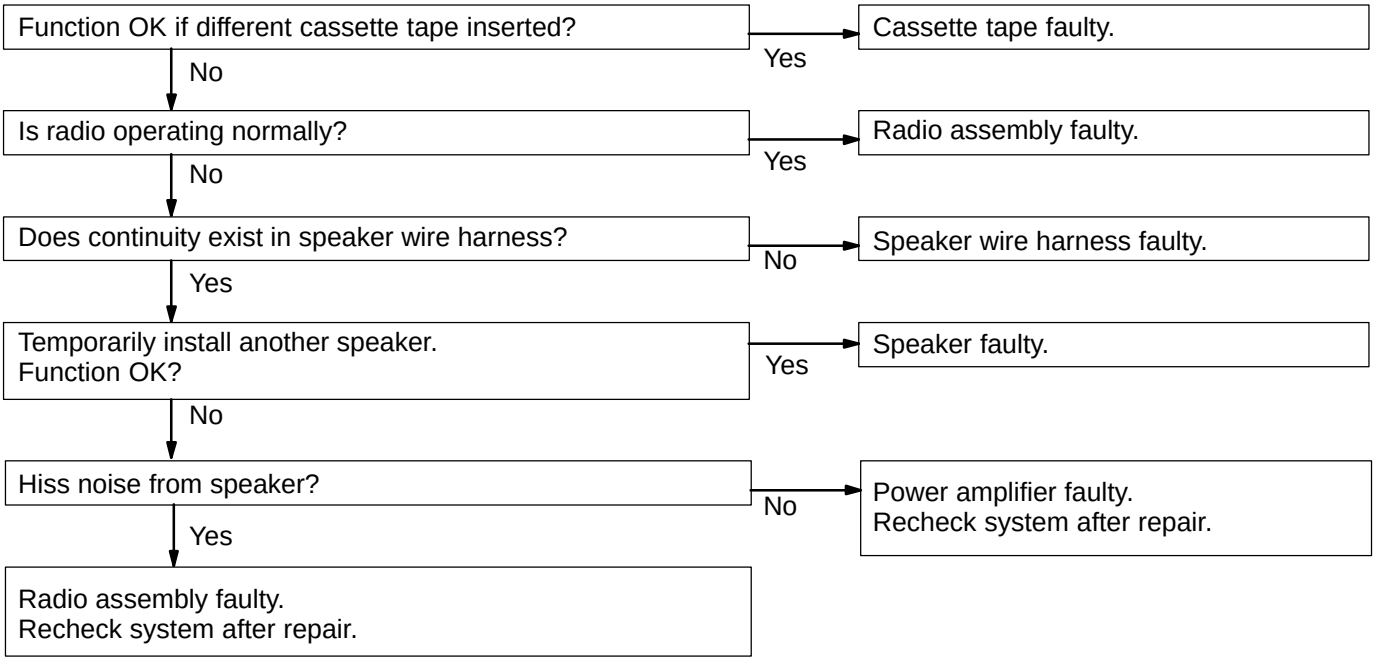
9	Tape Player	CASSETTE TAPE CANNOT BE INSERTED



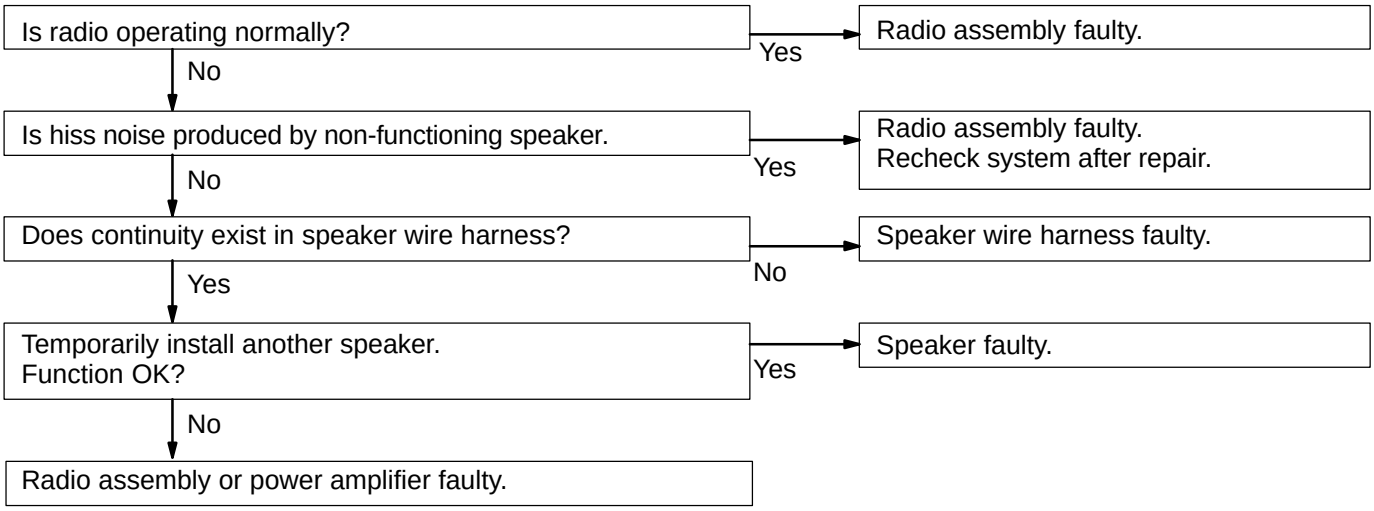
10	Tape Player	CASSETTE TAPE INSERTED, BUT NO POWER



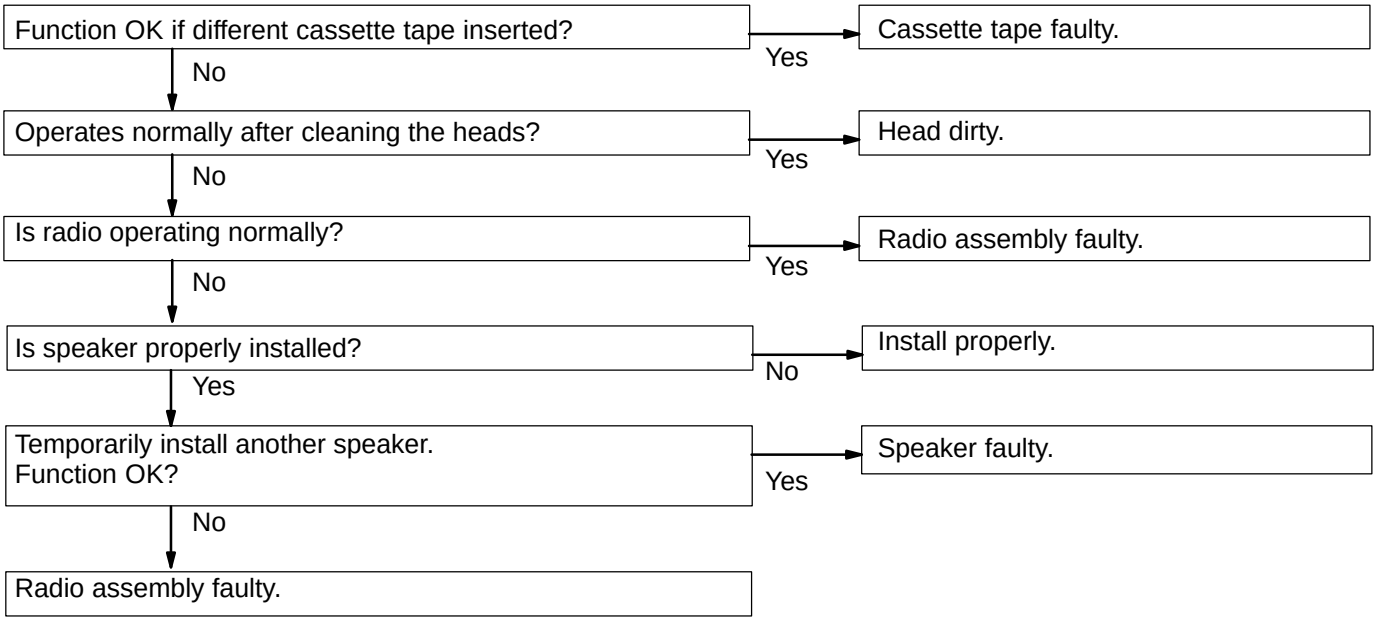
11	Tape Player	POWER COMING IN, BUT TAPE PLAYER NOT OPERATING



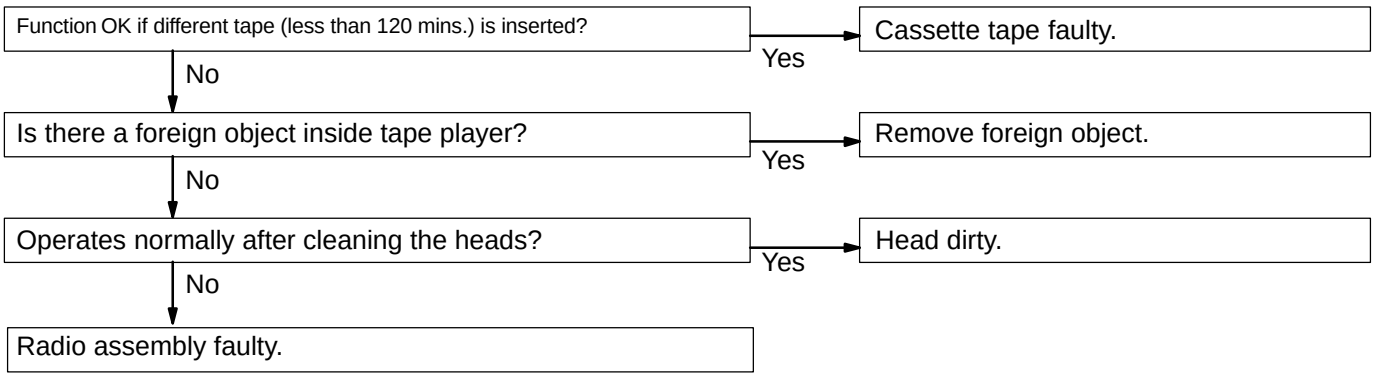
12	Tape Player	ANY SPEAKER DOES NOT WORK



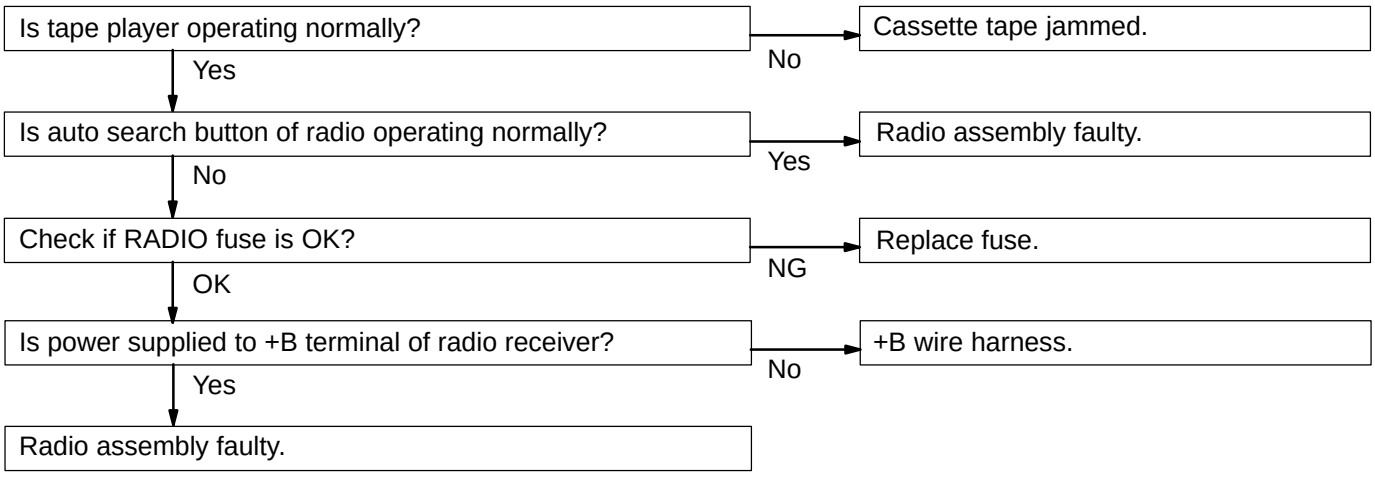
13	Tape Player	SOUND QUALITY POOR (VOLUME FAINT)



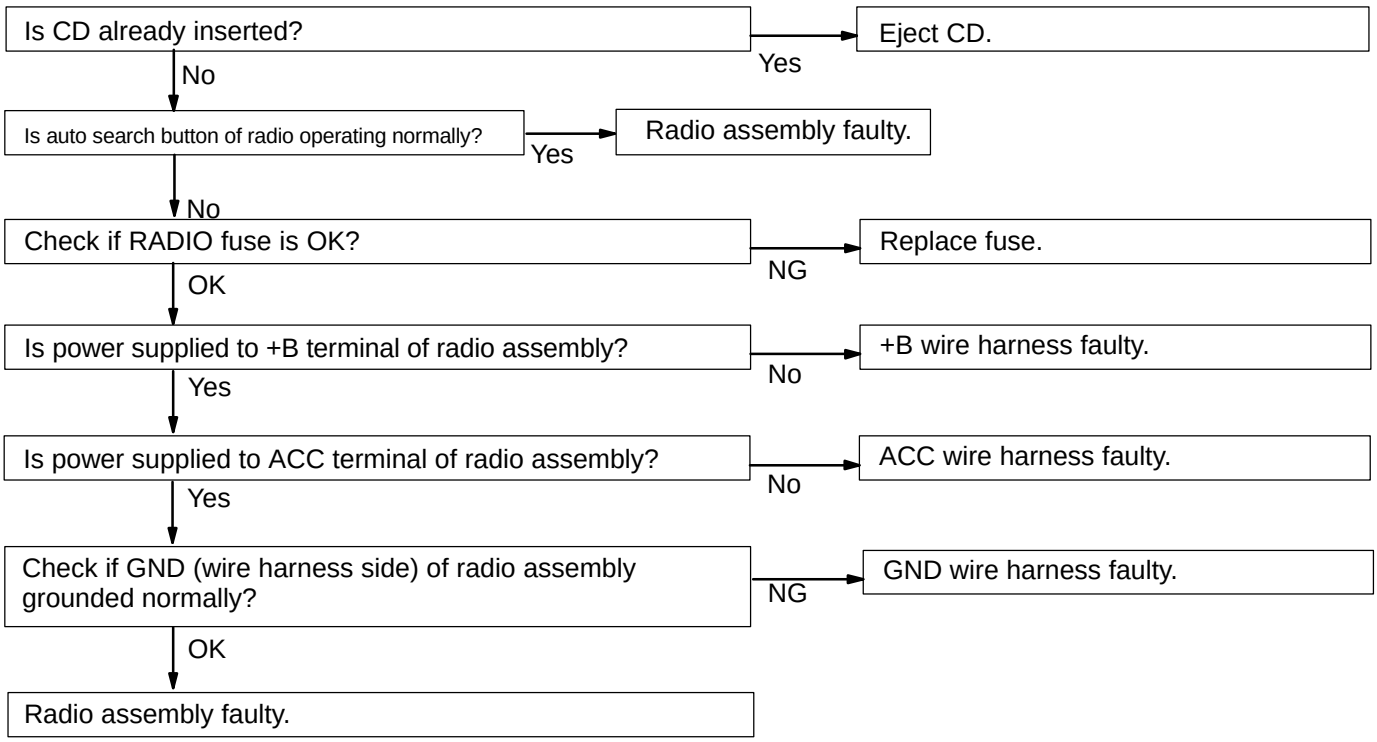
14	Tape Player	TAPE JAMMED MALFUNCTION WITH TAPE SPEED OR AUTO-REVERSE



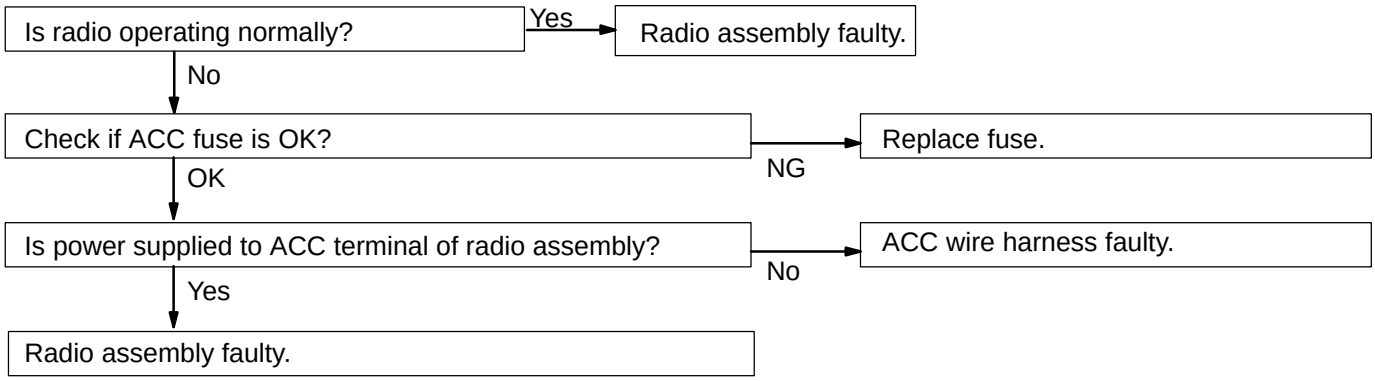
15	Tape Player	CASSETTE TAPE WILL NOT BE EJECTED



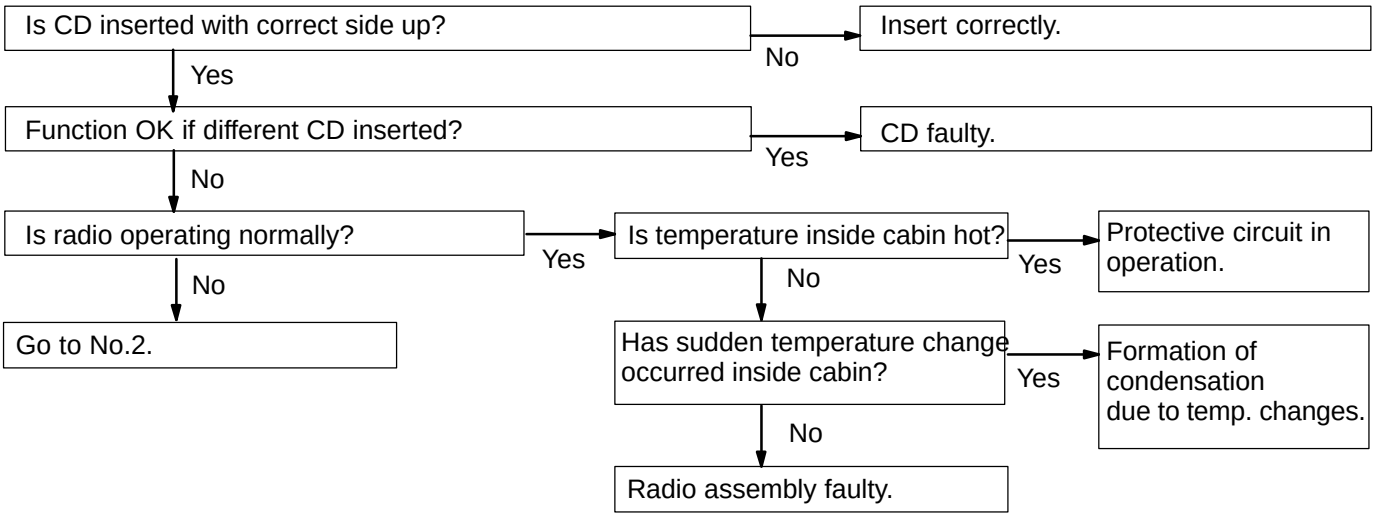
16	CD Player	CD CANNOT BE INSERTED



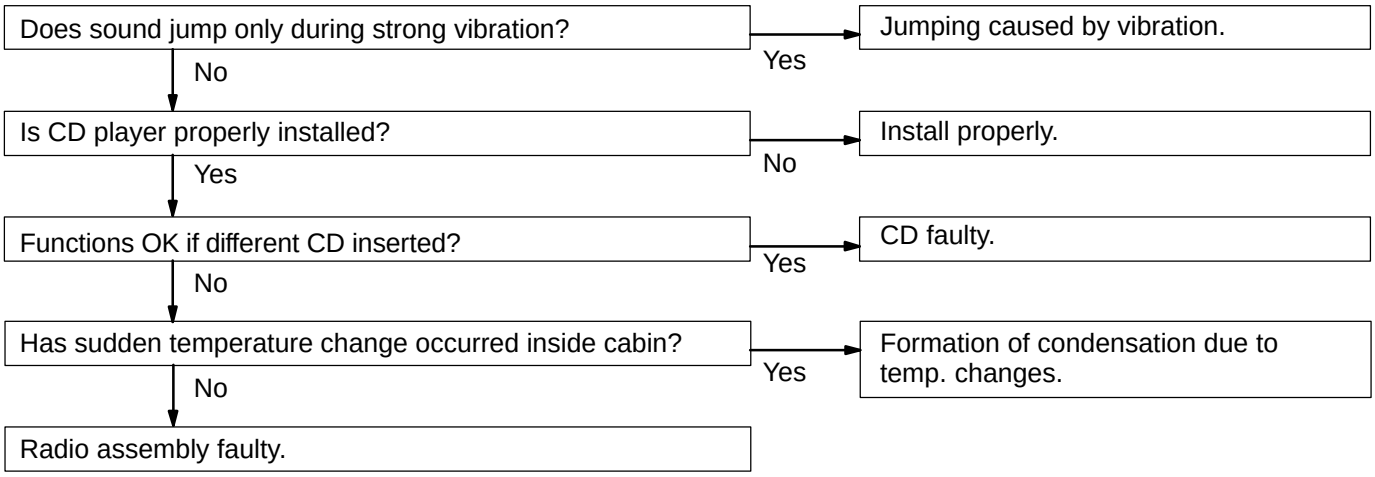
17	CD Player	CD INSERTED, BUT NO POWER



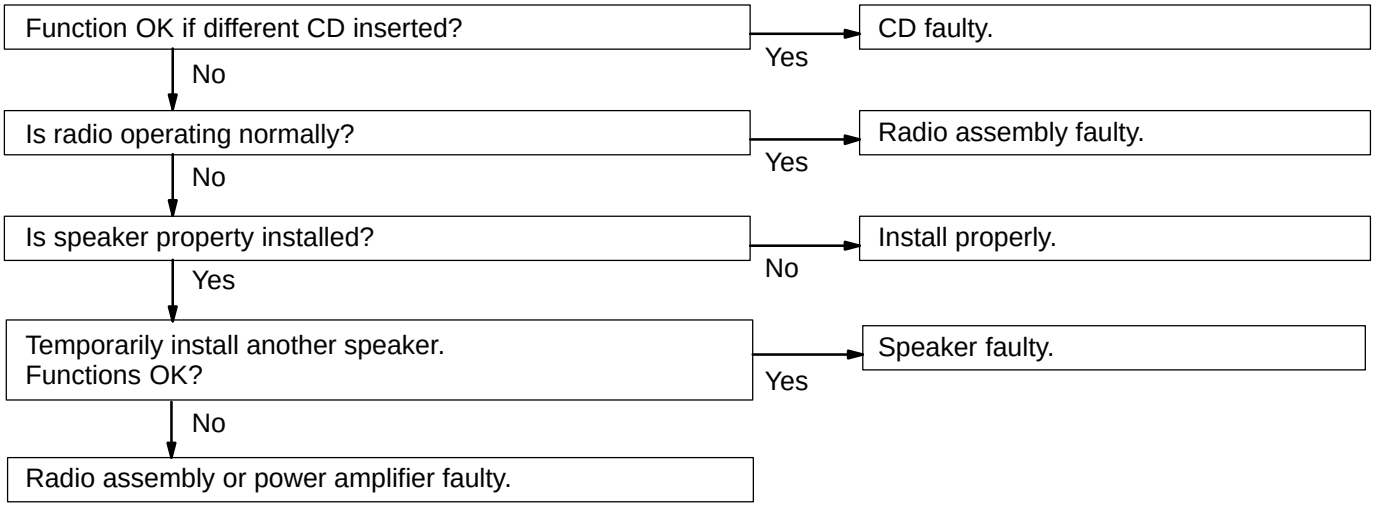
18	CD Player	POWER COMING IN, BUT CD PLAYER NOT OPERATING



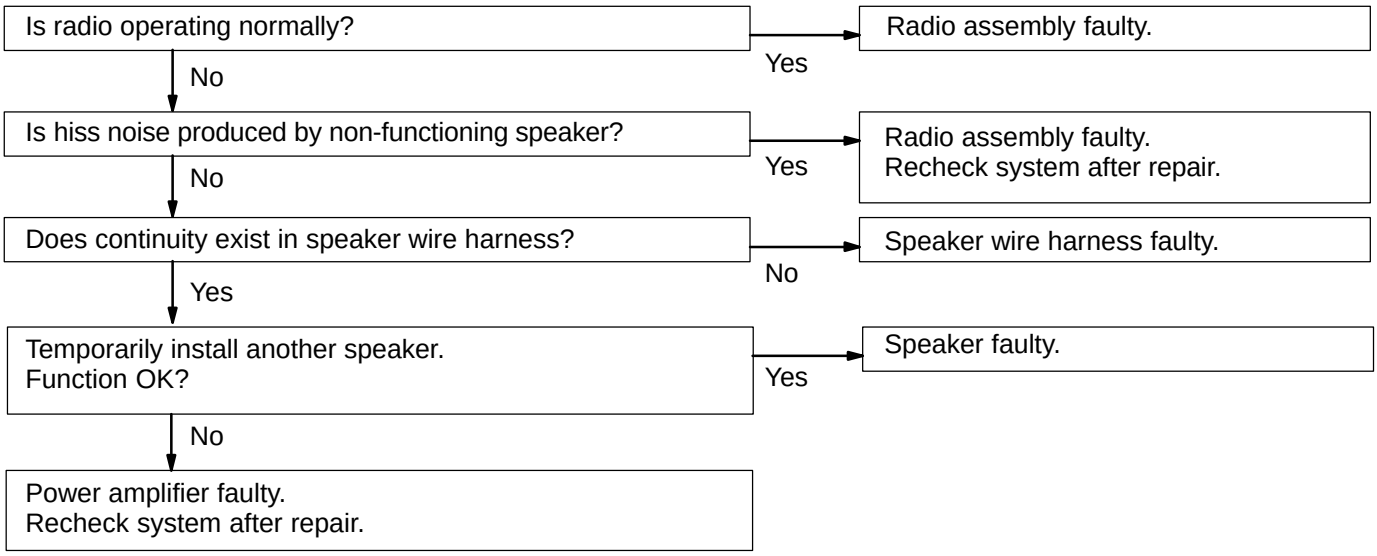
19	CD Player	SOUND JUMPS



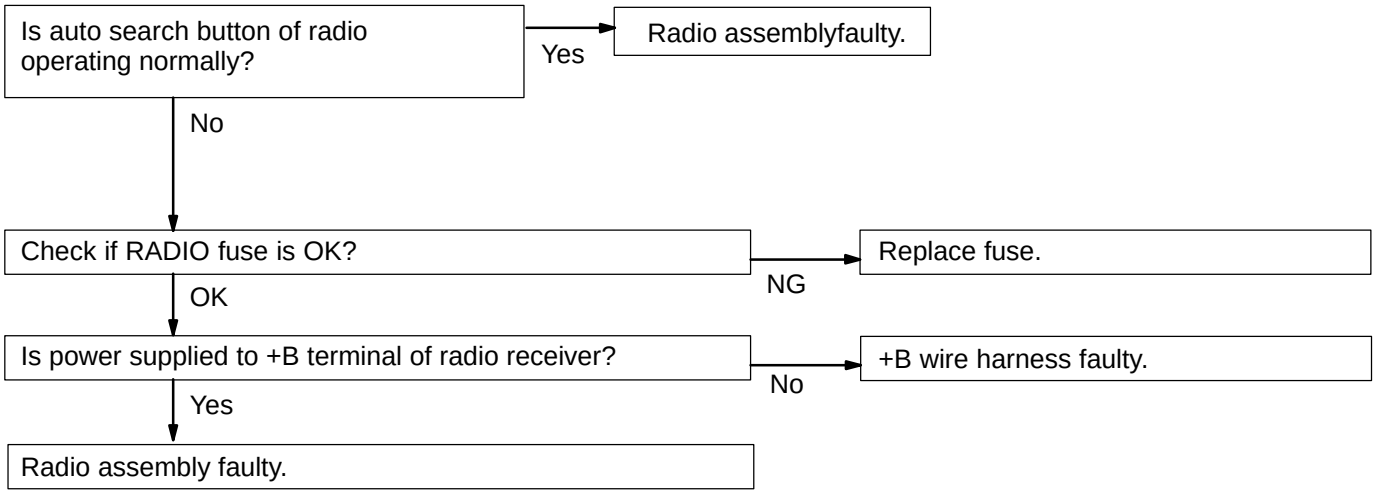
20	CD Player	SOUND QUALITY POOR (VOLUME FAINT)



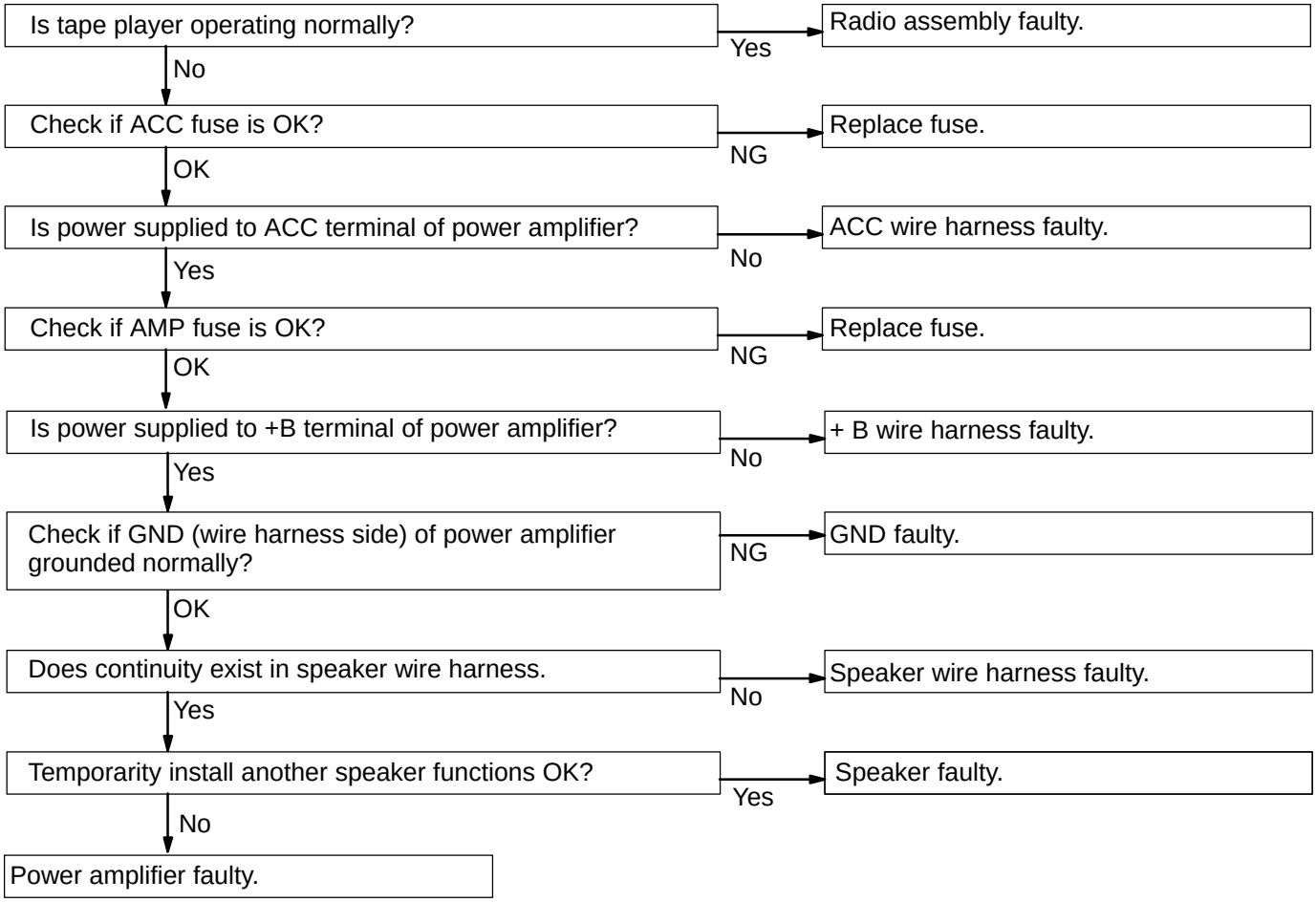
21	CD Player	ANY SPEAKER DOES NOT WORK



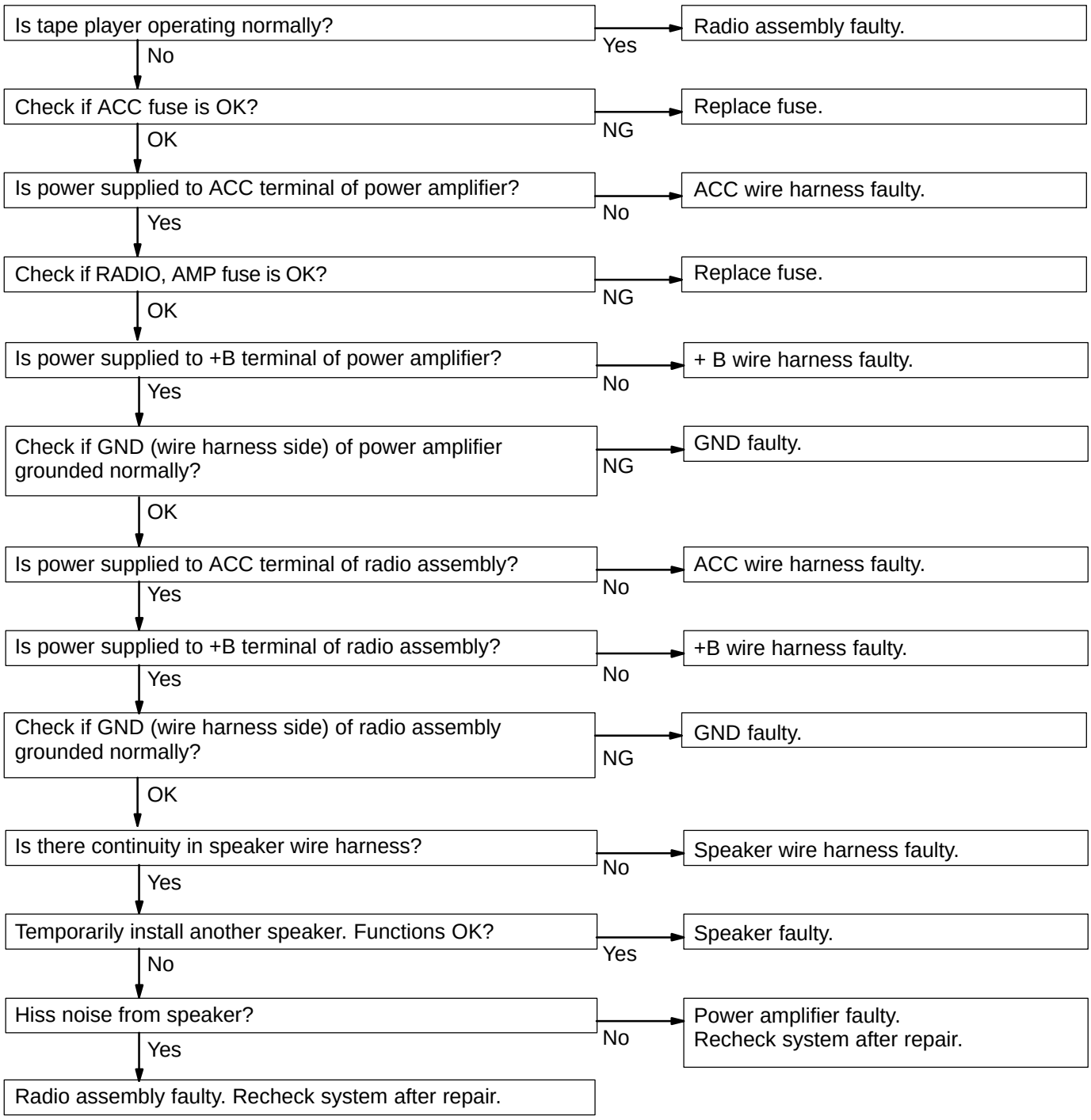
22	CD Player	CD WILL NOT BE EJECTED



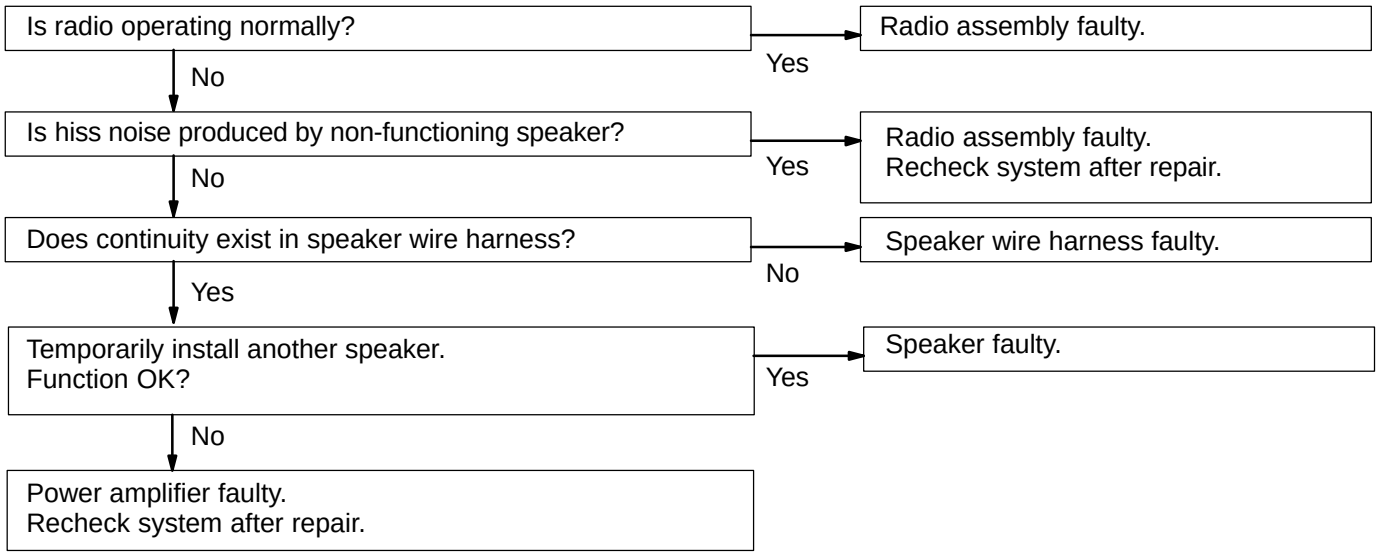
23	Power Amplifier	NO POWER COMING IN



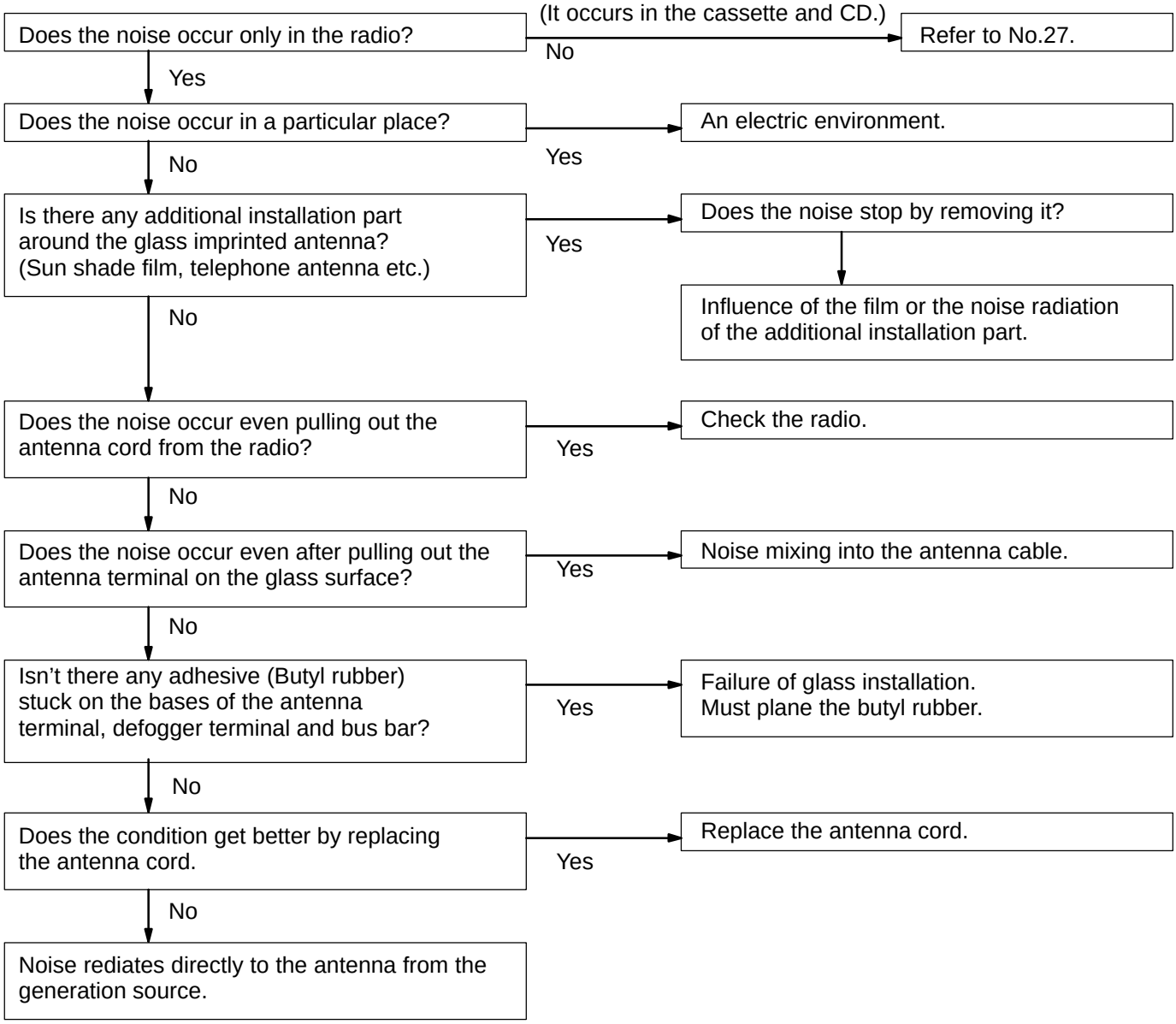
24	Power Amplifier	POWER COMIMG IN, BUT WOOFER (POWER) AMPLIFIER NOT OPERATING



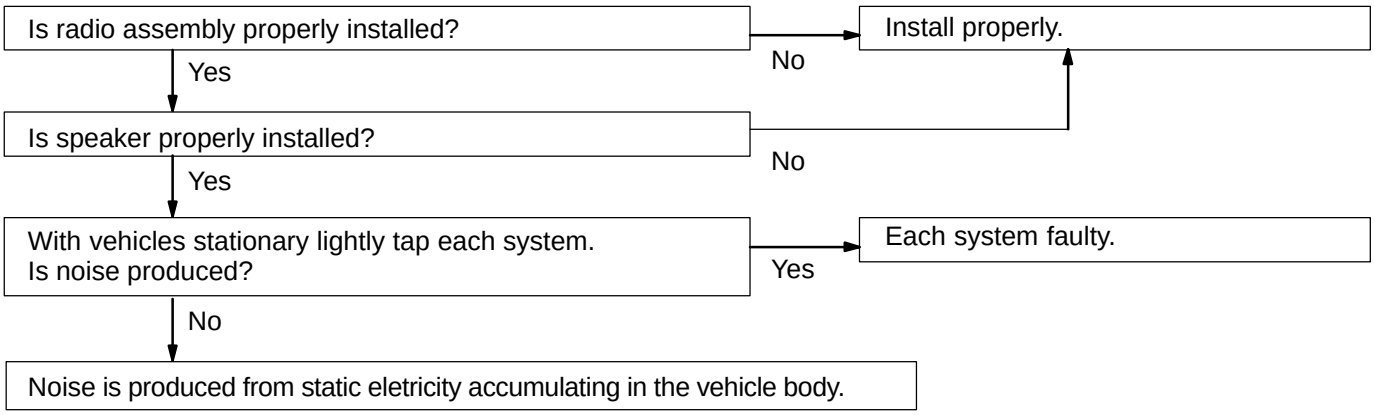
25	Power Amplifier	ANY SPEAKER DOES NOT WORK



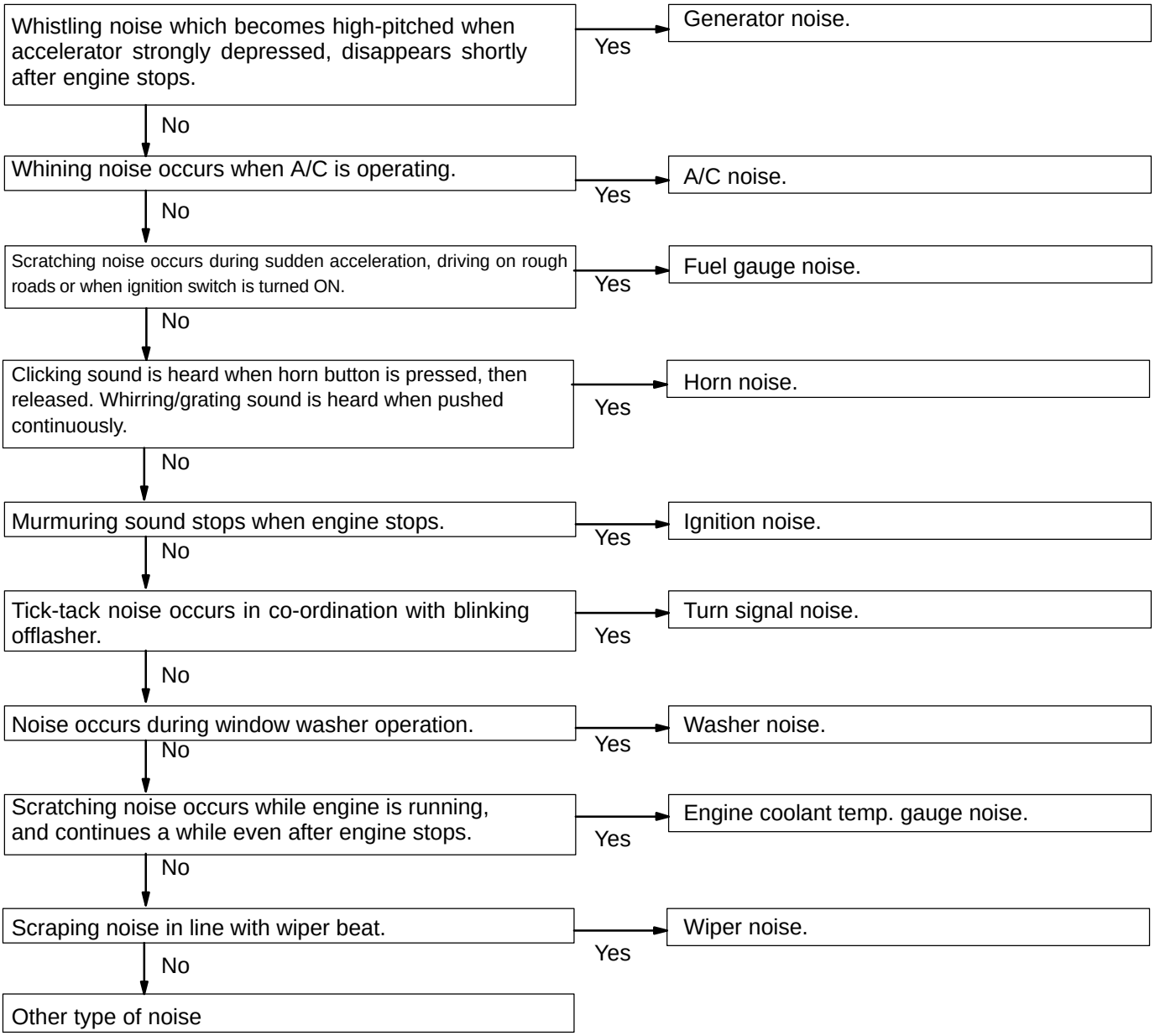
26	Noise	NOISE OCCURS



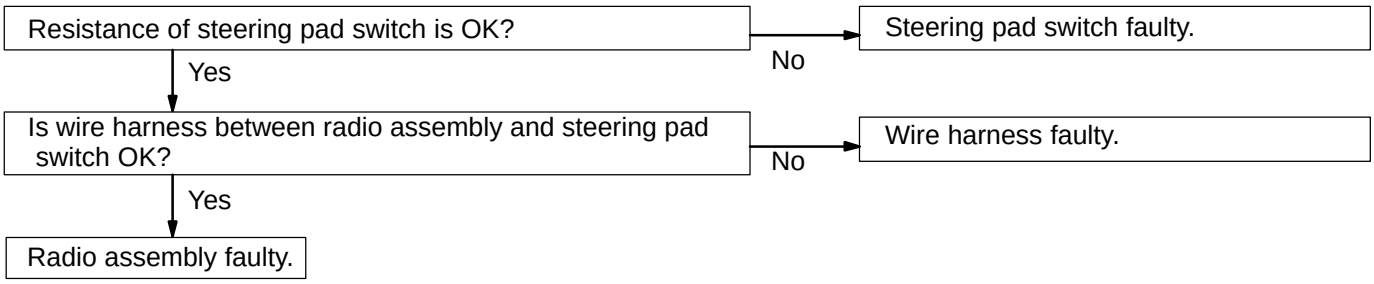
27	Noise	NOISE PRODUCED BY VIBRATION OR SHOCK WHILE DRIVING



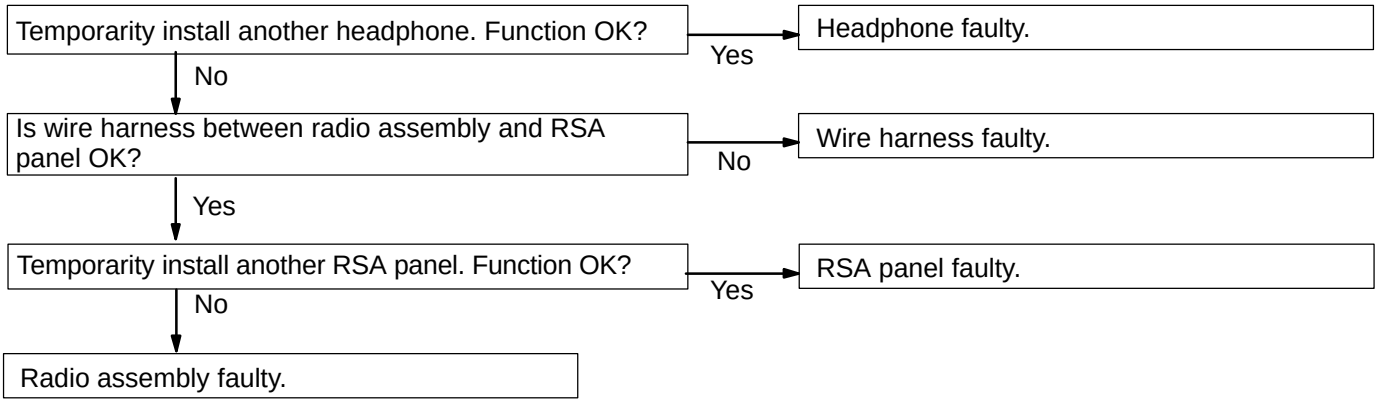
28	Noise	NOISE PRODUCED WHEN ENGINE STARTS



29	Steering Pad Switch	A AUDIO SYSTEM CANNOT BE OPERATED WITH STEERING PAD SWITCH



30	Rear Seat Audio	QUALITY OF SOUND FROM HEADPHONE TERMINAL IS POOR OR NO SOUND CAN BE HEARD



BODY ELECTRICAL SYSTEM

BE01I-05

PRECAUTION

HINT:
Take care to observe the following precautions when performing inspections or removal and replacement of body electrical related parts.

1. HEADLIGHT SYSTEM

Halogen bulbs have pressurized gas inside and require special handling. They can burst if scratched or dropped. Hold a bulb only by its plastic or metal case. Don't touch the glass part of a bulb with bare hands.

2. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

The LAND CRUISER is equipped with an SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

3. AUDIO SYSTEM

- If the negative (-) terminal cable is disconnected from the battery, the preset AM, FM 1 and FM 2 stations stored in memory are erased, so be sure to note the stations and reset them after the negative (-) terminal cable is reconnected to the battery.
- If the negative (-) terminal cable is disconnected from the battery, the "ANTI-THEFT SYSTEM" will operate when the cable is reconnected, but the radio, tape player and CD player will not operate. Be sure to input the correct ID number so that the radio, tape player and CD player can be operated again.

4. MOBILE COMMUNICATION SYSTEM

If the vehicle is equipped with a mobile communication system, refer to precautions in the IN section.

BE0GX-11

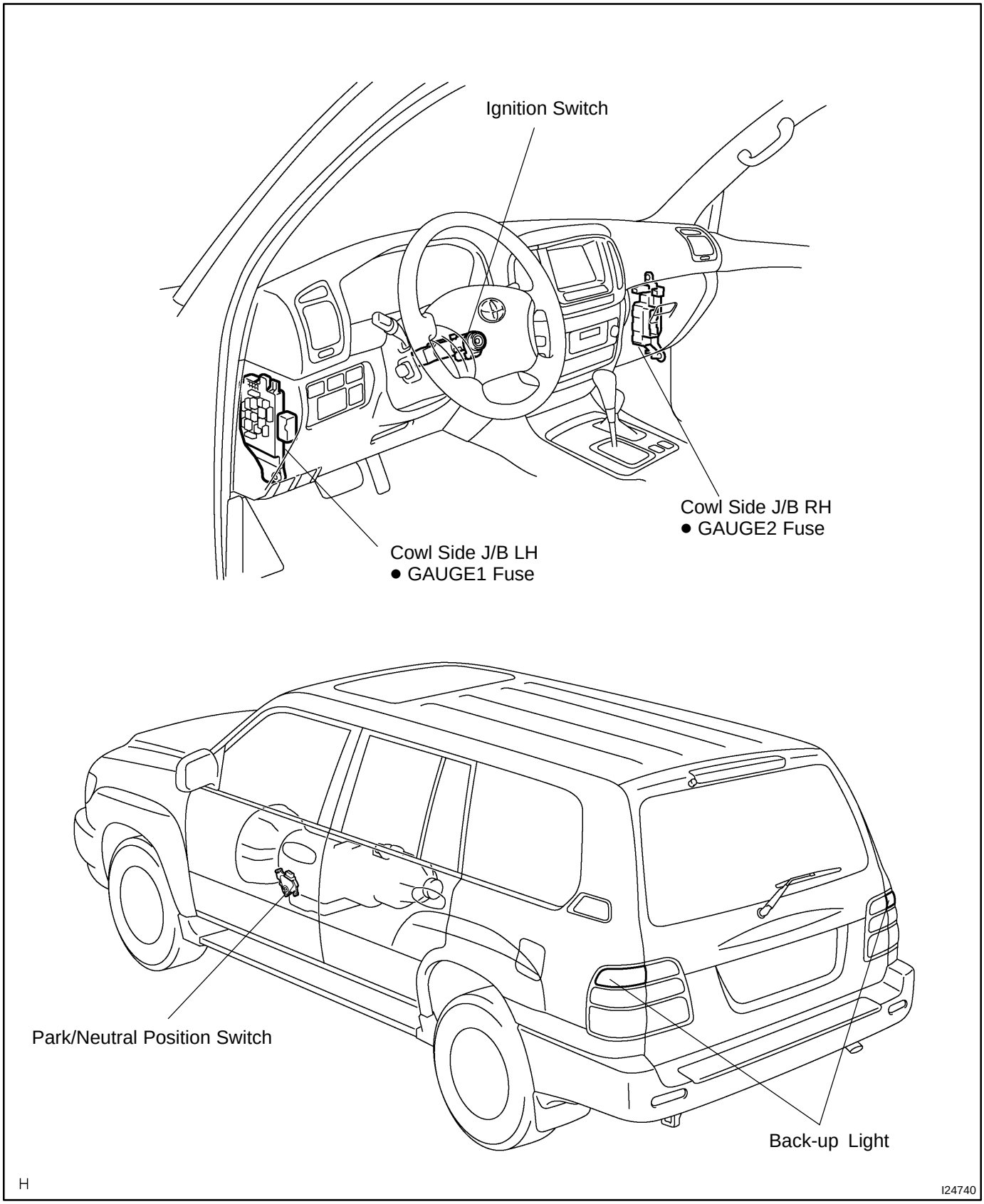
INSPECTION

INSPECT PARK/ NEUTRAL POSITION SWITCH CONTINUITY (See page DI-402)

BACK-UP LIGHT SYSTEM

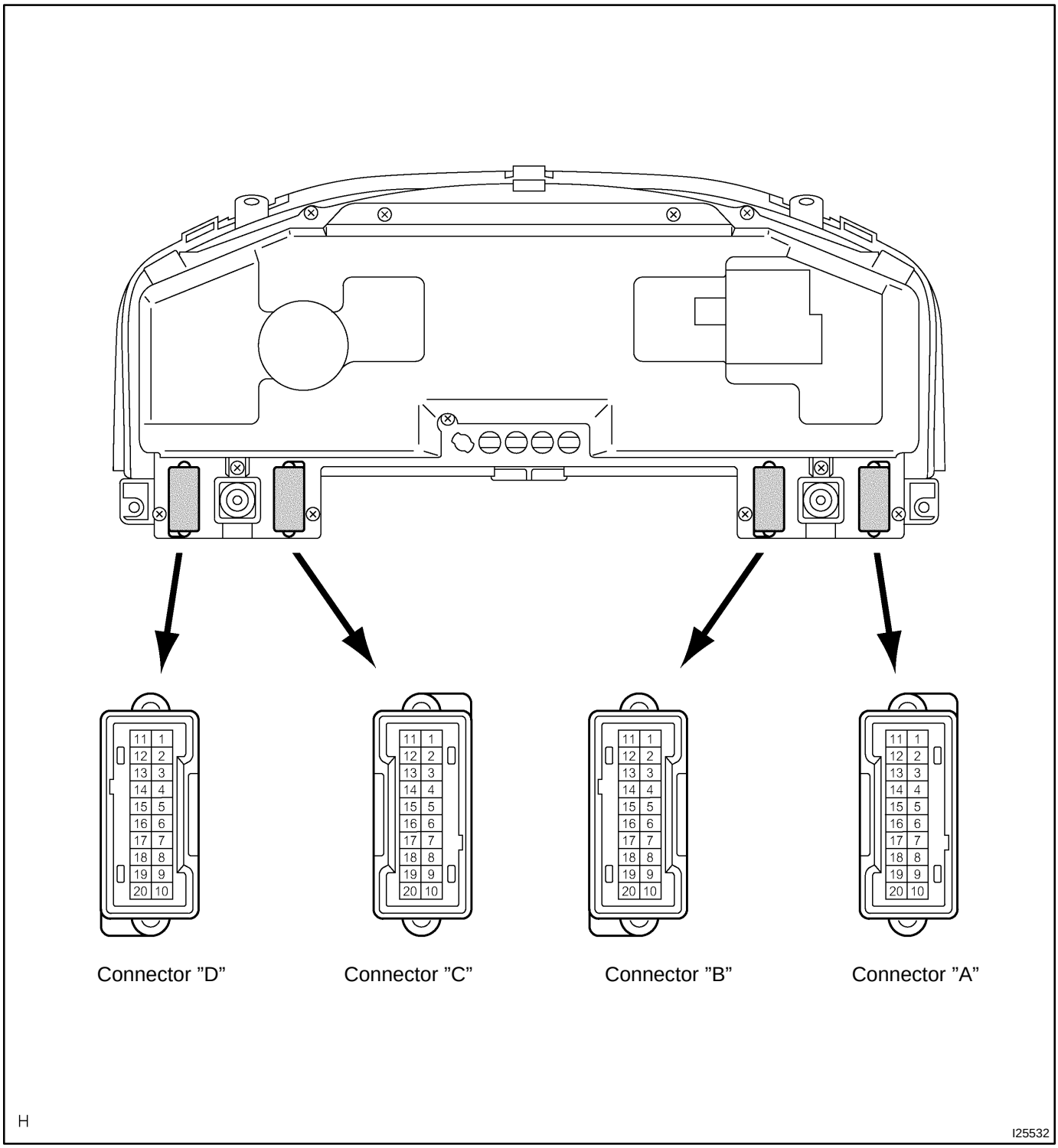
LOCATION

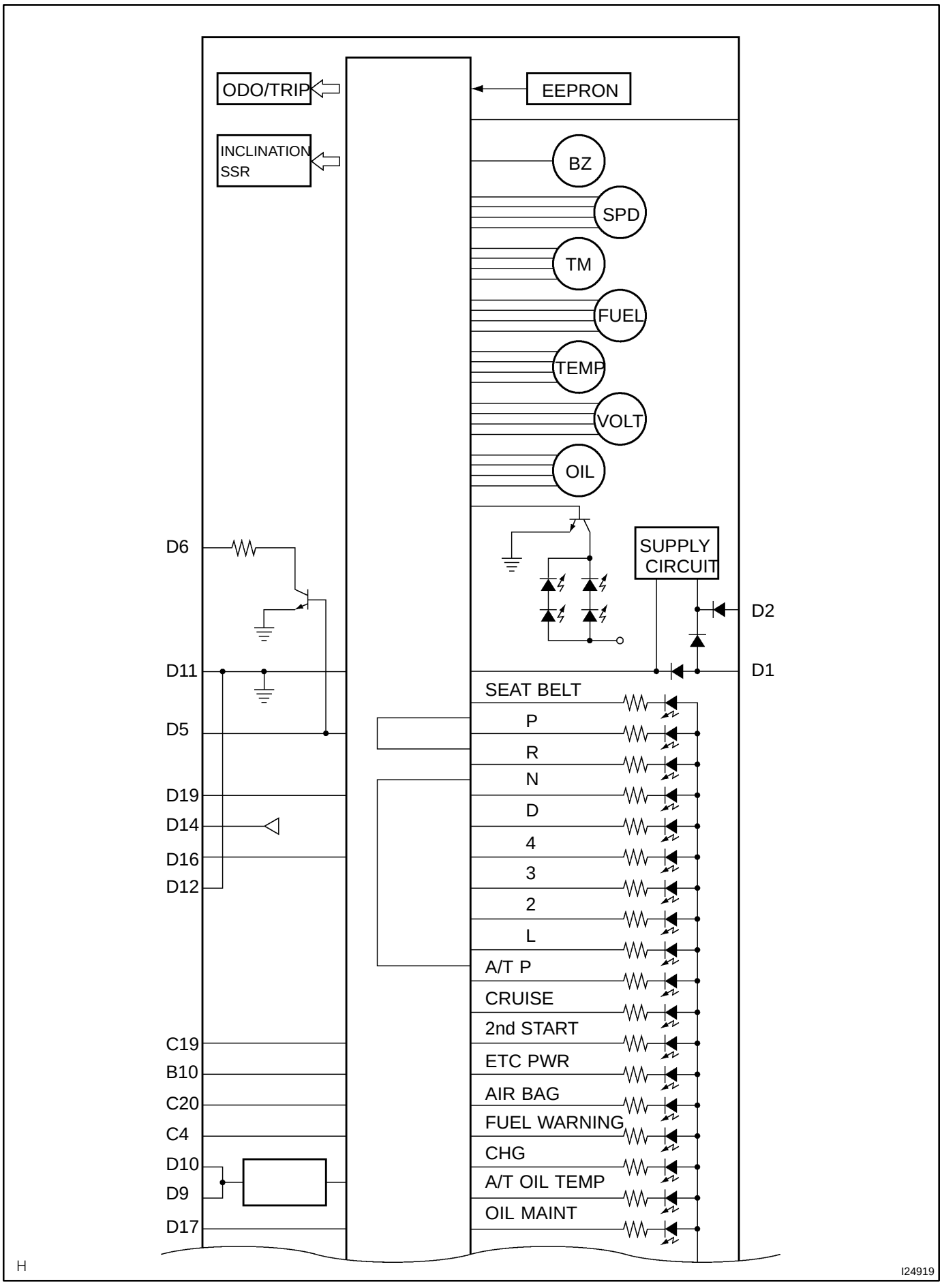
BE0GW-12

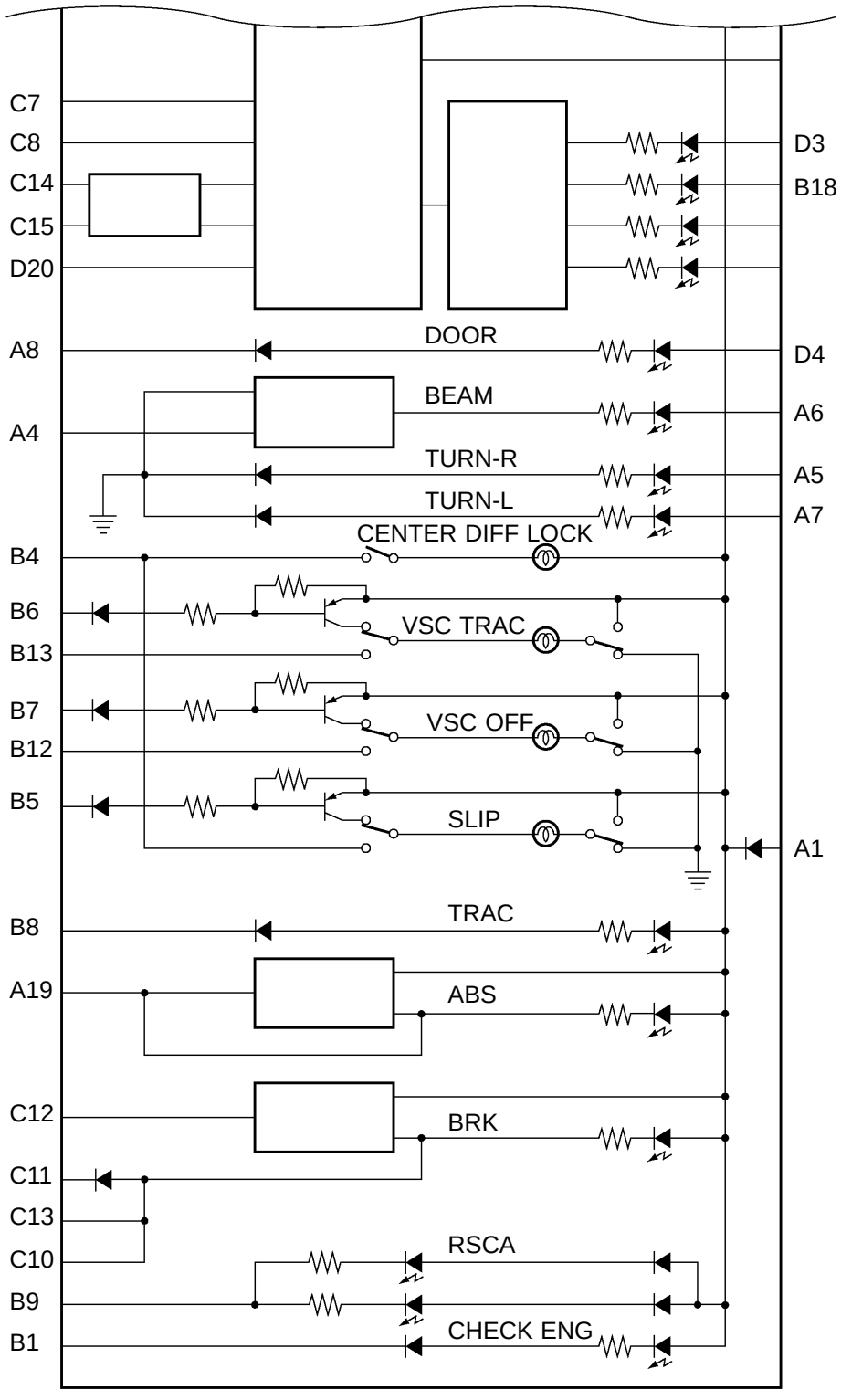


BE0S0-04

CIRCUIT




ODO/TRIP
INCLINATION SSR
EEPRON
BZ
SPD
TM
FUEL
TEMP
VOLT
OIL
SUPPLY CIRCUIT
D6
D11
D5
D19
D14
D16
D12
C19
B10
C20
C4
D10
D9
D17
D2
D1
SEAT BELT
P
R
N
D
4
3
2
L
A/T P
CRUISE
2nd START
ETC PWR
AIR BAG
FUEL WARNING
CHG
A/T OIL TEMP
OIL MAINT
H
I24919


C7
C8
C14
C15
D20
D3
B18
A8
DOOR
D4
A4
BEAM
A6
TURN-R
A5
TURN-L
A7
CENTER DIFF LOCK
B4
B6
VSC TRAC
B13
B7
VSC OFF
B12
B5
SLIP
A1
B8
TRAC
A19
ABS
C12
BRK
C11
C13
C10
RSCA
B9
B1
CHECK ENG

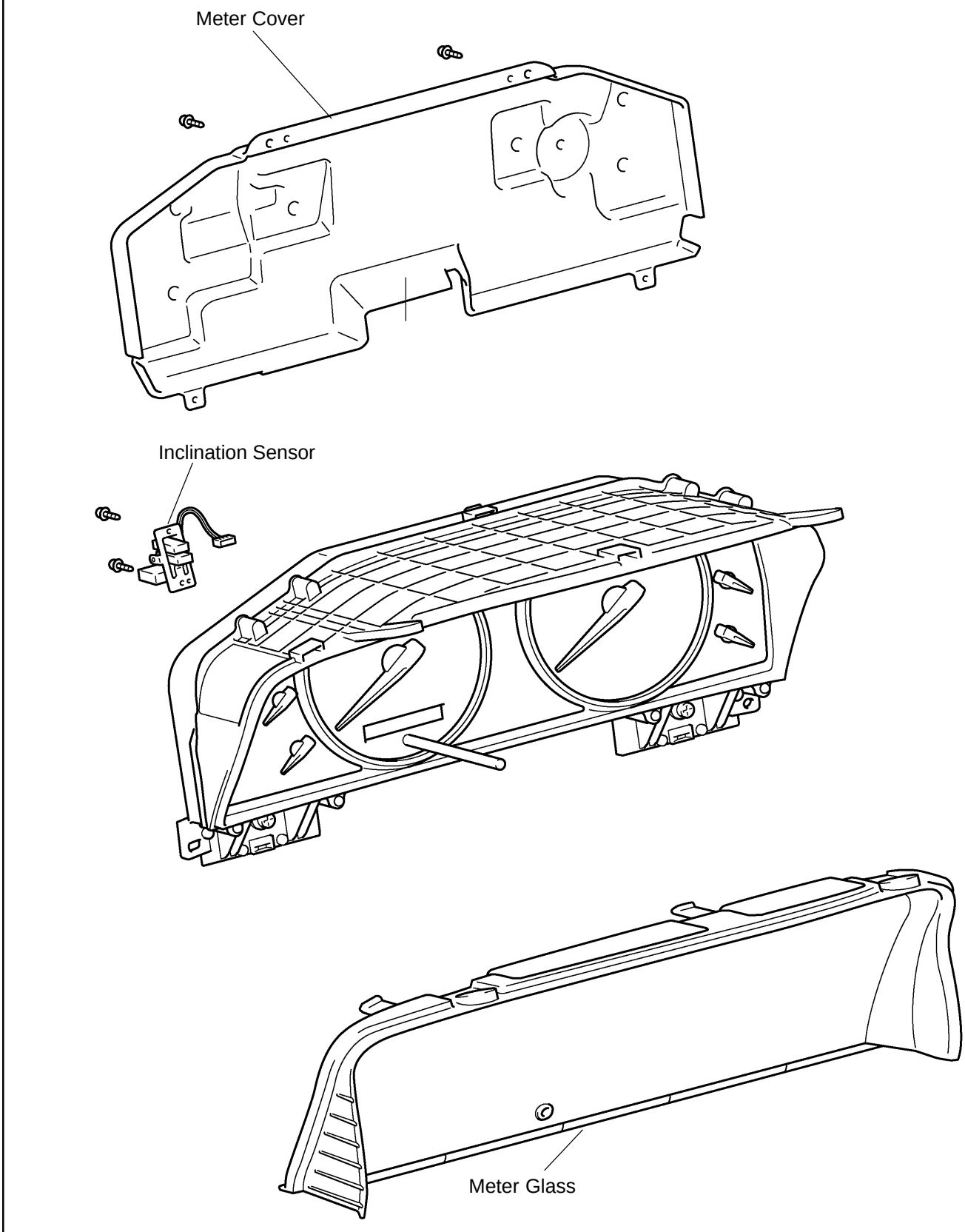
H

I24920

No.		Wiring connector side
C12	3	Body ECU
	4	Flasher Relay
	5	H/L R-HI Fuse
	6	Flasher Relay
	7	Light Control Switch
	10	MET Fuse
	12	ABS, TRC, VSC ECU
C13	8	PANEL Fuse
	9	Body Ground
	11	ECM
	14	CTR DIFF Switch
	15	ABS, TRC, VSC ECU
	16	ABS, TRC, VSC ECU
	17	ABS, TRC, VSC ECU
	18	ABS, TRC, VSC ECU
	19	Airbag ECU
C14	1	Body ECU
	4	Airbag ECU
	7	Oil Pressure Sender Gauge
	10	ECM
	11	Driver Seat Belt Buckle Switch
	16	Drive Monitor
	17	Drive Monitor
	18	ABS, TRC, VSC ECU
	19	ABS, TRC, VSC ECU
	20	ABS & BA & TRAC & VSC Actuator
C15	1	Engine Ground
	2	Main Fuel Sender Gauge
	4	Main Fuel Sender Gauge
	6	Main Fuel Sender Gauge
	7	Light Control Rheostat
	9	Key Unlock Warning Switch
	10	Body (Door Courtesy Switch Signal)
	11	GAUGE1 Fuse
	12	ECU-B2 Fuse
	13	ACC Fuse
	14	DOME Fuse
	15	Speed Sensor
	16	Speed Control Unit
	19	Gateway ECU
	20	ECM

BE0HJ-11

COMPONENTS



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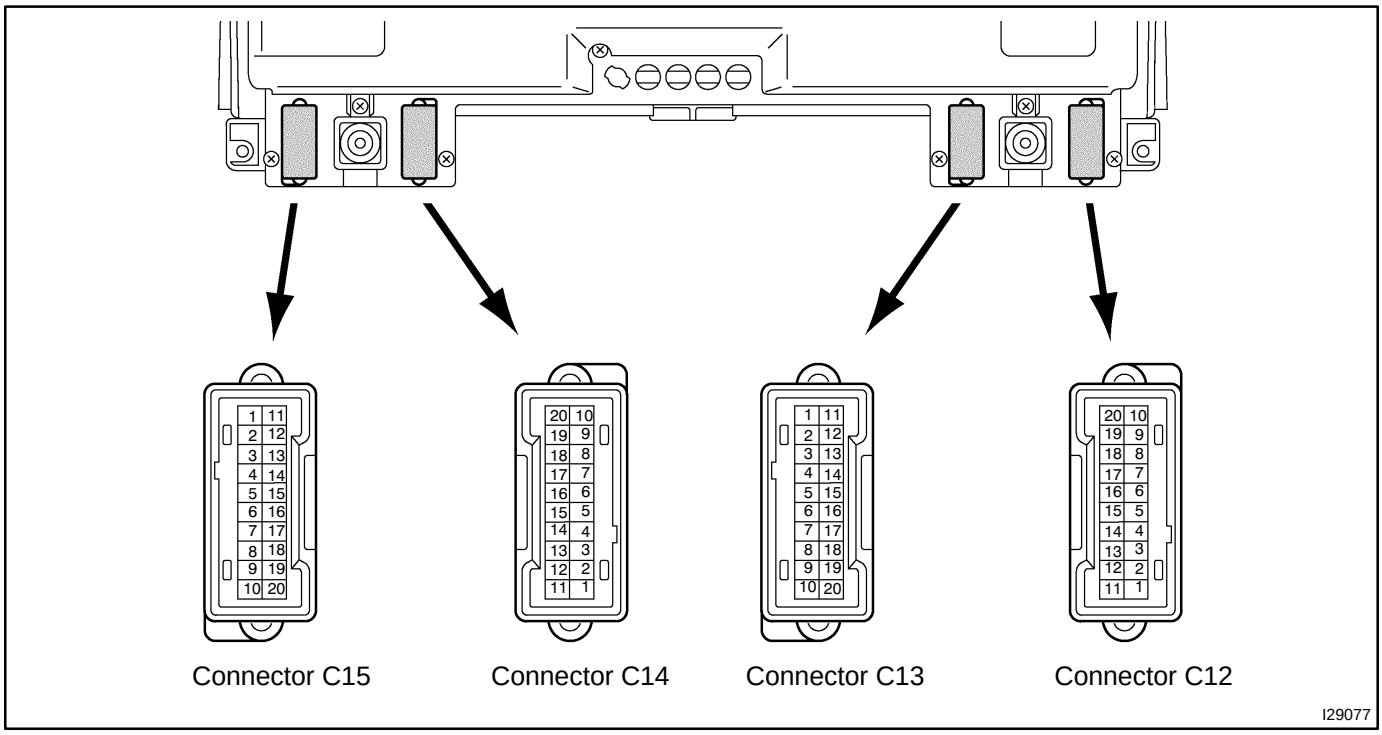
I24912

BE2EF-01

INSPECTION

1. INSPECT COMBINATION METER CIRCUIT

Connect the connector C12, C13, C14 and C15 to the combination meter and inspect the wire harness side connectors from the back side as shown in the table.



Tester connection	Condition	Specified condition
C12-3 (DOOR-) - Ground	Either door is opened	Below 1 V
	Either door is closed	10 - 14 V
C12-4 (TURN-L) - Ground	Ignition switch ON and turn signal switch OFF or RIGHT	Below 1 V
	Ignition switch ON and turn signal switch LEFT	Pulse signal is output 10 - 14 V ↔ Below 1 V
C12-5 (BEAM+) - Ground	IG switch ON, light control switch OFF	Below 1 V
	IG switch ON, light control switch ON	10 - 14 V
C12-6 (TURN-R) - Ground	Ignition switch ON and turn signal switch OFF or LEFT	Below 1 V
	Ignition switch ON and turn signal switch RIGHT	Pulse signal is output 10 - 14 V ↔ Below 1 V
C12-7 (BEAM-) - Ground	IG switch ON, light control switch ON	Below 1 V
C12-10 (CHG+) - Ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	10 - 14 V
C12-12 (ABS) - Ground	Ignition switch ON and ABS warning light lights up	Below 1 V
	Ignition switch ON and ABS warning light does not light up	10 - 14 V
C13-8 (ILL+) - Ground	IG switch OFF	Below 1 V
	IG switch ON	10 - 14 V

C13-11 (CHECK E/G) - Ground	Ignition switch ON and engine is stopped	Below 1 V
	Ignition switch ON and engine is running	10 - 14 V
C13-14 (CTR DIFF/4WD) - Ground	Ignition switch ON and center diff. lock switch OFF	Below 1 V
C13-14 (CTR DIFF/4WD) - Ground	Ignition switch ON and center diff. lock switch ON	10 - 14 V
C13-15 (SLIP) - Ground	IG switch ON, SLIP warning light ON	Below 1.5 V
	IG switch ON, SLIP warning light OFF	10 - 14 V
C13-16 (VSC TRC) - Ground	IG switch ON, VSC TRC indicator light ON	Below 1.5 V
	IG switch ON, VSC TRC indicator light OFF	10 - 14 V
C13-17 (VSC OFF) - Ground	IG switch ON, VSC OFF indicator light ON	Below 1.5 V
	IG switch ON, VSC OFF indicator light OFF	10 - 14 V
C13-18 (ACTIVE TRC) - Ground	IG switch ON, TRC OFF indicator light ON	Below 1.5 V
	IG switch ON, TRC OFF indicator light OFF	10 - 14 V
C13-19 (RSCA OFF) - Ground	IG switch ON, RSCA warning light ON	Below 2.0 V
	IG switch ON, RSCA warning light OFF	10 - 14 V
C14-4 (AIR BAG-) - Ground	Ignition switch ON and SRS indicator light lights up	Below 1 V
C14-4 (AIR BAG-) - Ground	Ignition switch ON and SRS indicator does not light up	10 - 14 V
C14-7 (OIL PRS SDR) - Ground	Ignition switch ON and indicator ON	Below 1 V
	Ignition switch ON and indicator OFF	10 - 14 V
C14-10 (T/M PULSE) - Ground	Engine is Running	Pulse generation
C14-11 (D-BKL SW) - Ground	Ignition switch ON and seat belt is unfastened	10 - 14 V
	Ignition switch ON and seat belt is fastened	Below 1 V
C14-18 (PKB SW) - Ground	Ignition switch ON and parking brake lever is pulled	Below 1 V
	Ignition switch ON and parking brake lever is released	10 - 14 V
C14-20 (BRAKE) - Ground	Ignition switch ON and brake system indicator ON	Below 1 V
	Ignition switch ON and brake system indicator OFF	10 - 14 V
C15-1 (E/G EARTH) - Ground	Constant	Continuity
C15-2 (MAIN FE) - Ground	Constant	Continuity
C15-4 (MAIN FV) - Ground	Ignition switch ON	4.5 - 5.5 V
C15-6 (MAIN FR) - Ground	Ignition switch ON and fuel sender gauge float UP	Approx. 0.5 V
	Ignition switch ON and fuel sender gauge float DOWN	Approx. 5.5 V
C15-7 (ILL-) - Ground	Ignition switch ON and light control rheostat volume minimum	Below 1 V
	Ignition switch ON and light control rheostat volume maximum	10 - 14 V
C15-9 (KEY SW) - Ground	Key unlock warning switch ON (Key is inserted)	Below 1 V
	Key unlock warning switch OFF (Key is removed)	10 - 14 V

C15-10 (D-CTY SW) - Ground	Ignition switch ON and driver door is opened	Below 1 V
	Ignition switch ON and driver door is closed	10 - 14 V
C15-11 (IGN+) - Ground	Ignition switch OFF	Below 1 V
	Ignition switch ON	10 - 14 V
C15-12 (ECU-B2) - Ground	Constant	10 - 14 V
C15-13 (ACC+) - Ground	Ignition switch OFF	Below 1 V
	Ignition switch ACC or ON	10 - 14 V
C15-14 (DOOR+) - Ground	Constant	10 - 14 V
C15-15 (SP IN) - Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ battery positive voltage
C15-16 (4P OUT) - Ground	Ignition switch ON and slowly move the wheel	Pulse signal is output below 1.5 V ↔ approx. 5 V or below 1.5 V ↔ battery positive voltage

If a circuit is not as specified, inspect the applicable circuit.

2. INSPECT SPEEDOMETER/ ON-VEHICLE

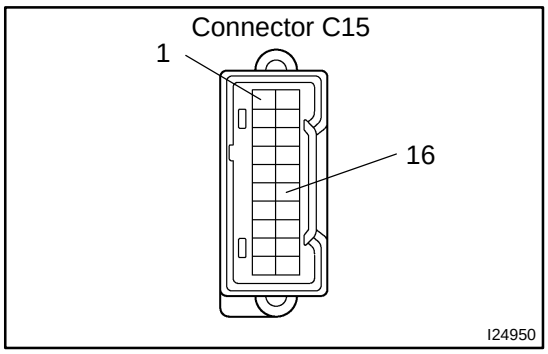
Using a speedometer tester, inspect the speedometer for allowable indication error and check the operation of the odometer.

HINT:

Tire wear and tire over or under inflation will increase the indication error.

USA (mph)		CANADA (km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	18 - 24	20	17 - 24
40	38 - 44	40	38 - 46
60	56 - 66	60	57.5 - 67
80	78 - 88	80	77 - 88
100	98 - 110	100	96 - 109
120	118 - 132	120	115 - 130
		140	134 - 151.5
		160	153 - 173

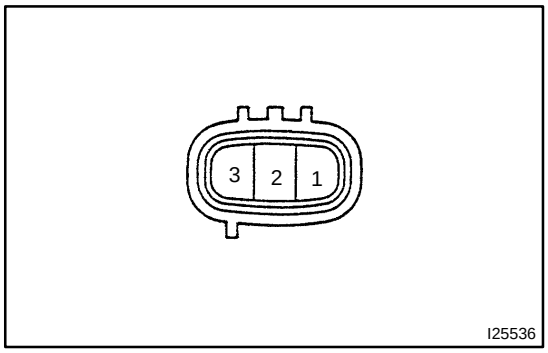
If error is excessive, replace the combination meter.



3. INSPECT SPEEDOMETER VOLTAGE

(a) While driving the vehicle at the speed of 10 km/h, check the voltage between the terminals 16 and 1 of the combination meter assy.

STANDARD: Fluctuation between 10 to 14 V or less is repeated 7 times within 1 sec.



4. INSPECT VEHICLE SPEED SENSOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2.

(b) Connect the positive (+) lead from the tester to terminal 3 and the negative (-) lead to terminal 2.

(c) Rotate the shaft.

(d) Check that there is voltage change from approx. 0V to 11 V or more between terminals 2 and 3.

HINT:

The voltage change should be performed 4 times for every revolution is not as specified, replace the sensor.

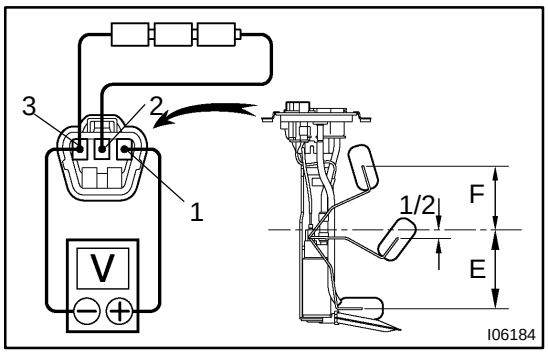
5. INSPECT TACHOMETER / ON-VEHICLE

(a) Connect a tune-up test tachometer, and start the engine.

(b) Compare the tester and tachometer indications.

DC 13.5 V 25 ˚C at (77˚F):

Standard indication (rpm)	Allowable range (rpm) ( ): estimated reference values
700	630 - 770
1,000	900 - 1,100
2,000	1,850 - 2,150
3,000	2,800 - 3,200
4,000	3,800 - 4,200
5,000	4,800 - 5,200
6,000	5,750 - 6,250
7,000	6,700 - 7,300



6. INSPECT FUEL SENDER GAUGE VOLTAGE

(a) Apply voltage (4.5 V - 5.0 V) between terminals 2 and 3.

(b) Measure voltage between terminals 1 and 2 for each float position.

Float position mm (in.)	Voltage (V)
F: Approx. 85.3 (3.36)	Approx. 4.60 ± 0.1
1/2: Approx. 1.7 (0.67)	Approx. 2.45 ± 0.1
E: Approx. 91.9 (3.62)	Approx. 0.30 ± 0.1

If voltage value is not as specified, replace main sender gauge.

7. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the low oil pressure switch.

(b) Turn the ignition switch ON.

(c) Connect the terminal of wire harness side connector and ground, then check the warning light.

8. INSPECT PARKING BRAKE WARNING LIGHT

(a) Disconnect the connector from the parking brake switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON and check that the warning light lights up.

9. INSPECT BRAKE WARNING LIGHT

(a) Disconnect the connector from the brake fluid level warning switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON and check that the warning light lights up.

10. INSPECT BRAKE FLUID LEVEL WARNING SWITCH

(a) Remove the reservoir tank cap and retainer.

(b) Disconnect the connector.

(c) Check that the continuity exists between the terminal.

(d) Use syphon, etc., to take fluid out of the reservoir tank.

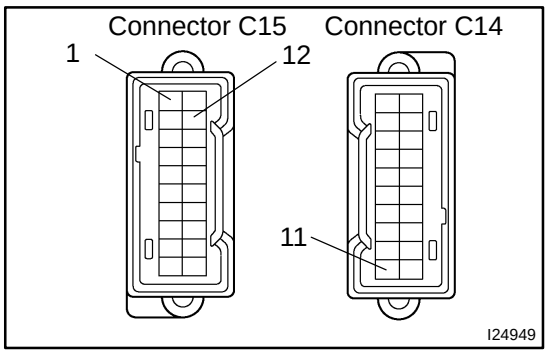
(e) Check that the continuity exists between terminals.

(f) Pour the fluid back in the reservoir tank.

11. INSPECT OPEN DOOR WARNING LIGHT

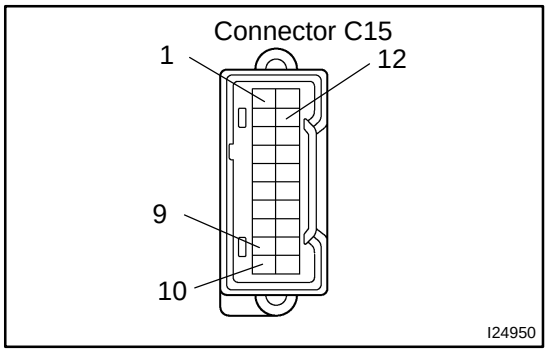
(a) DIsconnect the connector from the driver door courtesy switch and ground terminal on the wire harness side connector.

(b) Turn the ignition switch ON and check that the warning light lights up.



12. INSPECT SEAT BELT WARNING BUZZER

(a) Disconnect the connector from the combination meter.
(b) Connect the positive (+) lead from the battery terminal 12 and negative (-) lead terminal 1.
(c) Check that the buzzer stop after 4 to 8 seconds.
(d) Check that the buzzer stops when connecting the terminal 11 to the GND.

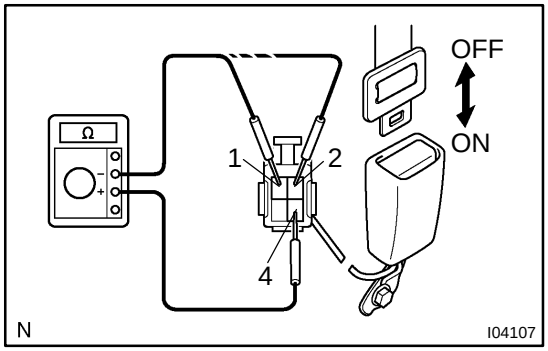


13. INSPECT KEY UNLOCK WARNING BUZZER

(a) Disconnect the connector from the combination meter.
(b) Connect the positive (+) lead from the battery terminal 12 and negative (-) lead terminal 1.
(c) Connect the negative (-) lead from battery terminal 9 and 10, check that the buzzer sound.

14. INSPECT SEAT BELT WARNING LIGHT

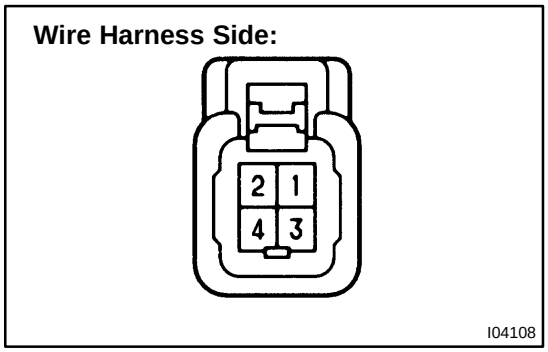
(a) DIsconnect the connector from the seat belt buckle switch and ground terminal on the wire harness side connector.
(b) Turn the ignition switch ON and check that the warning light lights up.



15. INSPECT SEAT BELT BUCKLE SWITCH CONTINUITY

	Tester connection	Belt fastened (Belt unfastened)
Seat belt buckle SW (D)	1 - 4	ON (OFF)
Seat belt buckle SW (P)	2 - 4	OFF (ON)

If operation is not as specified, replace the switch.

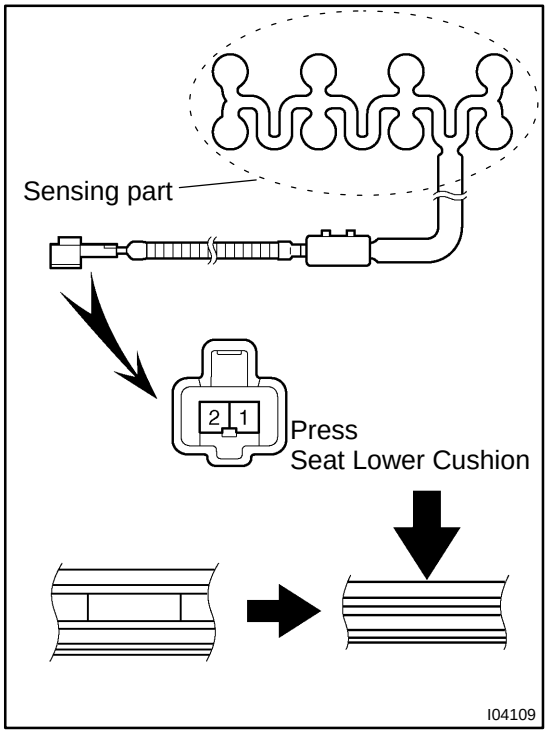


16. INSPECT SEAT BELT BUCKLE SWITCH CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side, as shown.

Tester connection	Condition	Specified condition
4 - Ground	Constant	Continuity

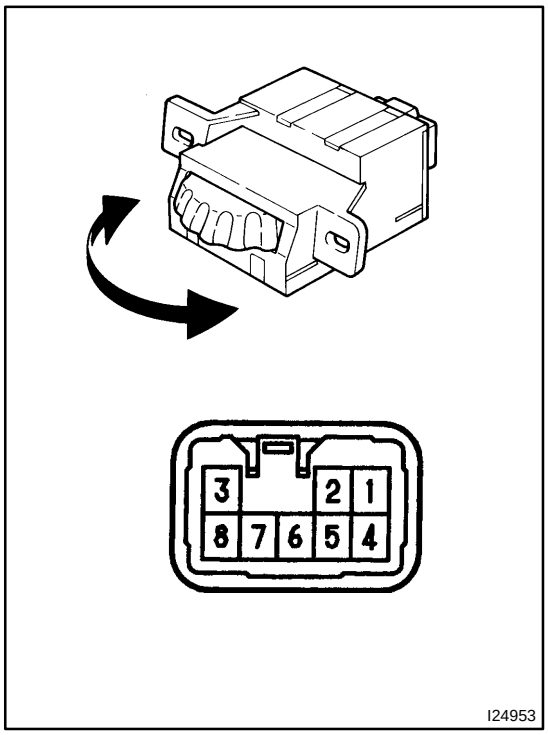
If continuity is not as specified, inspect the ground circuit.



17. Passenger seat only:
INSPECT SEAT BELT WARNING OCCUPANT DETECTION SENSOR CONTINUITY

Check that continuity exists between the terminals 1 and 2 when pressing the sensing part of the lower seat cushion.

If operation is not as specified, replace the sensor.



18. INSPECT LIGHT CONTROL RHEOSTAT

(a) Turn the rheostat knob OFF, and check that there is no continuity between terminal 5 and 4 (Rheostat knob turned to fully counterclockwise).

(b) Gradually, turn the rheostat knob from the dark side to bright side, and check that there is continuity between terminal 5 and 4 (Rheostat knob turned to clockwise).

If operation is not as specified, replace the rheostat.

19. INSPECT INCLINATION SENSOR

(a) The inclination sensor is installed in the combination meter. Inspect the inclination sensor by connecting a battery positive (+) lead to terminal 11 (IGN+) of the meter connector, and a battery negative (-) lead to terminal 1 (E/G EARTH).

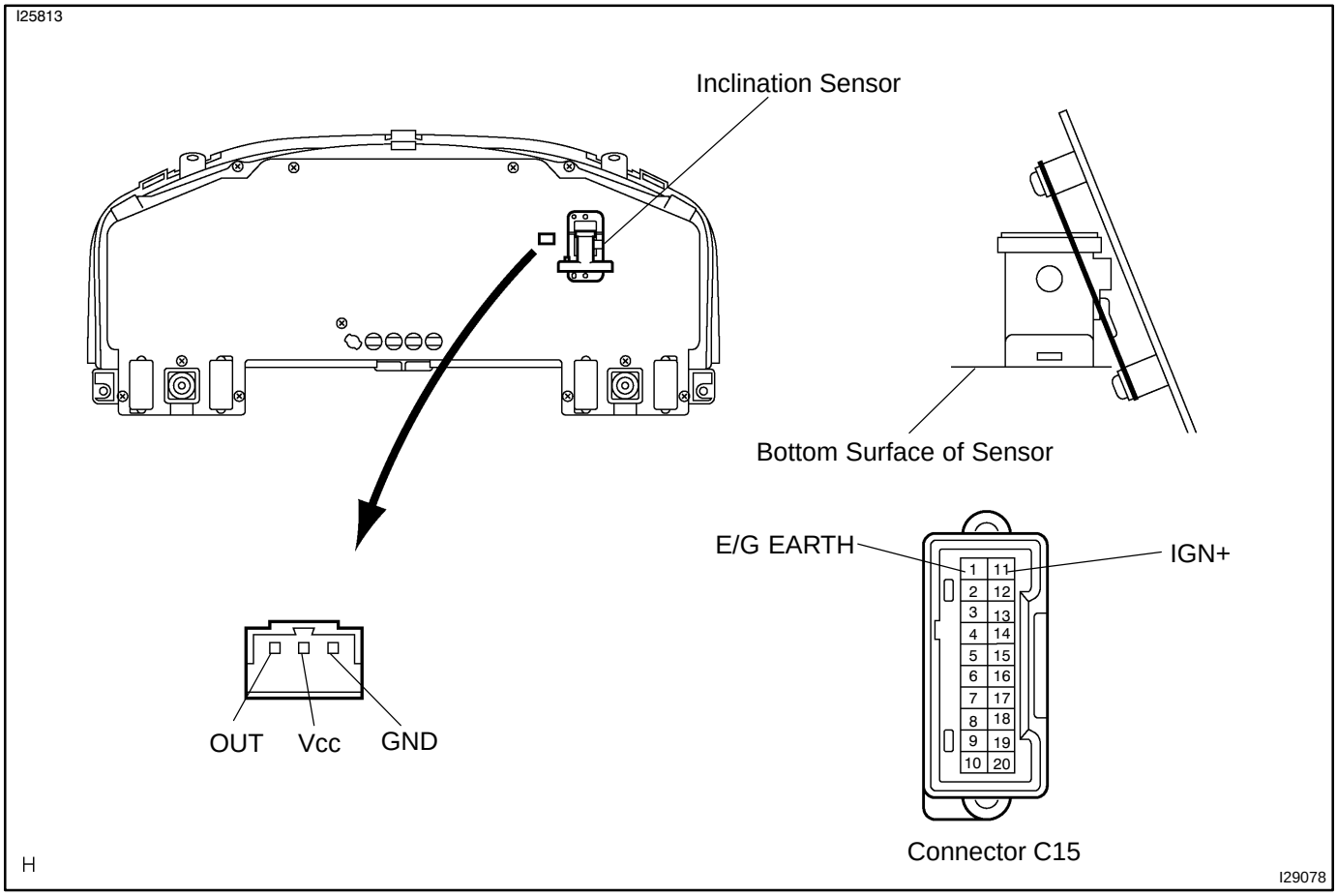
(b) Check if the voltage between terminal Vcc and GND of the inclination sensor connector is 5 V.

(c) Check the voltage between terminal OUT and GND when the bottom surface of the inclination sensor is in a level position. Also check the voltage when it is inclined backward or forward.

Standard Value:

Bottom surface of sensor is set in a level position:
about 4.5 V

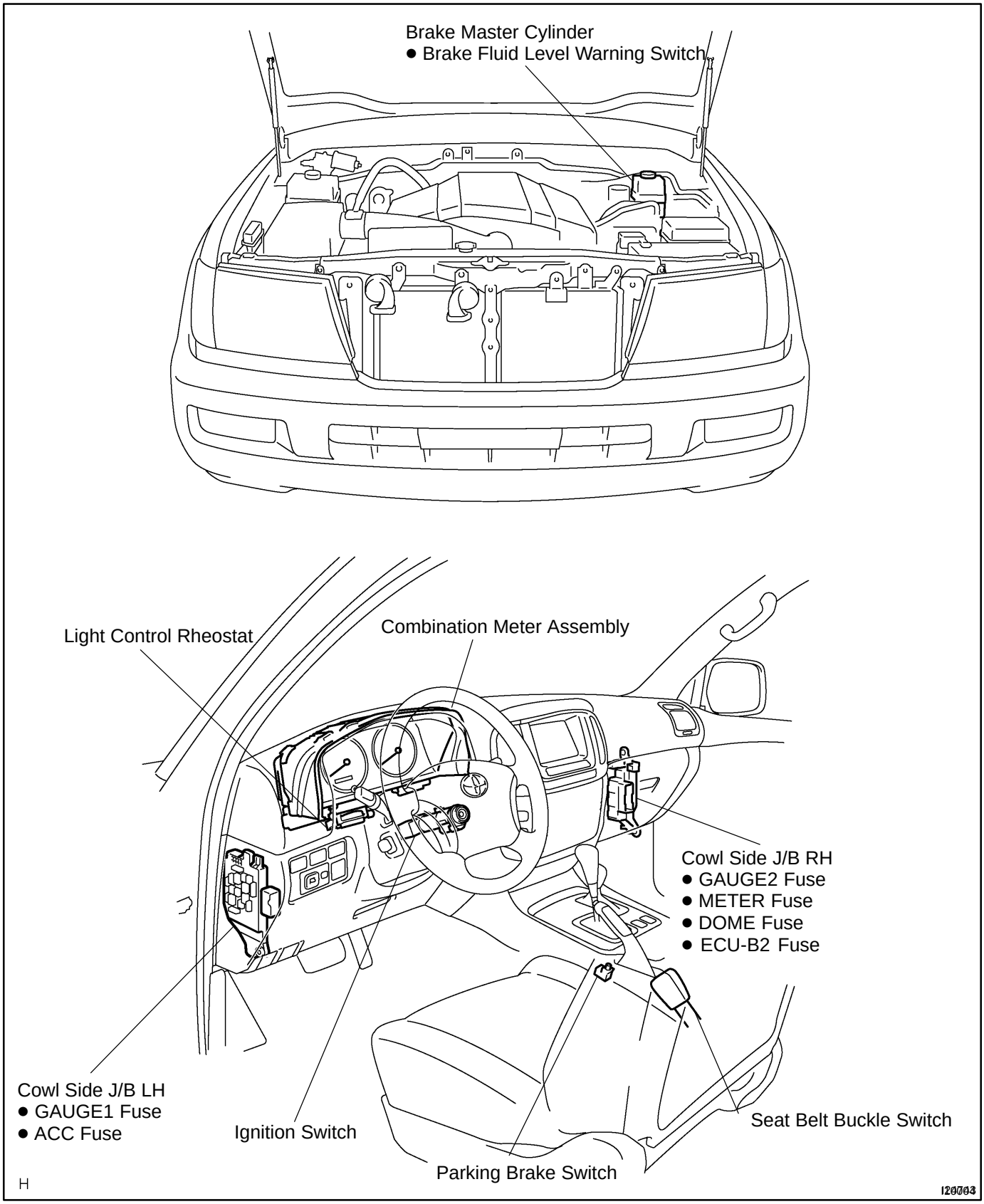
Bottom surface of sensor is inclined:
about 0.5 V

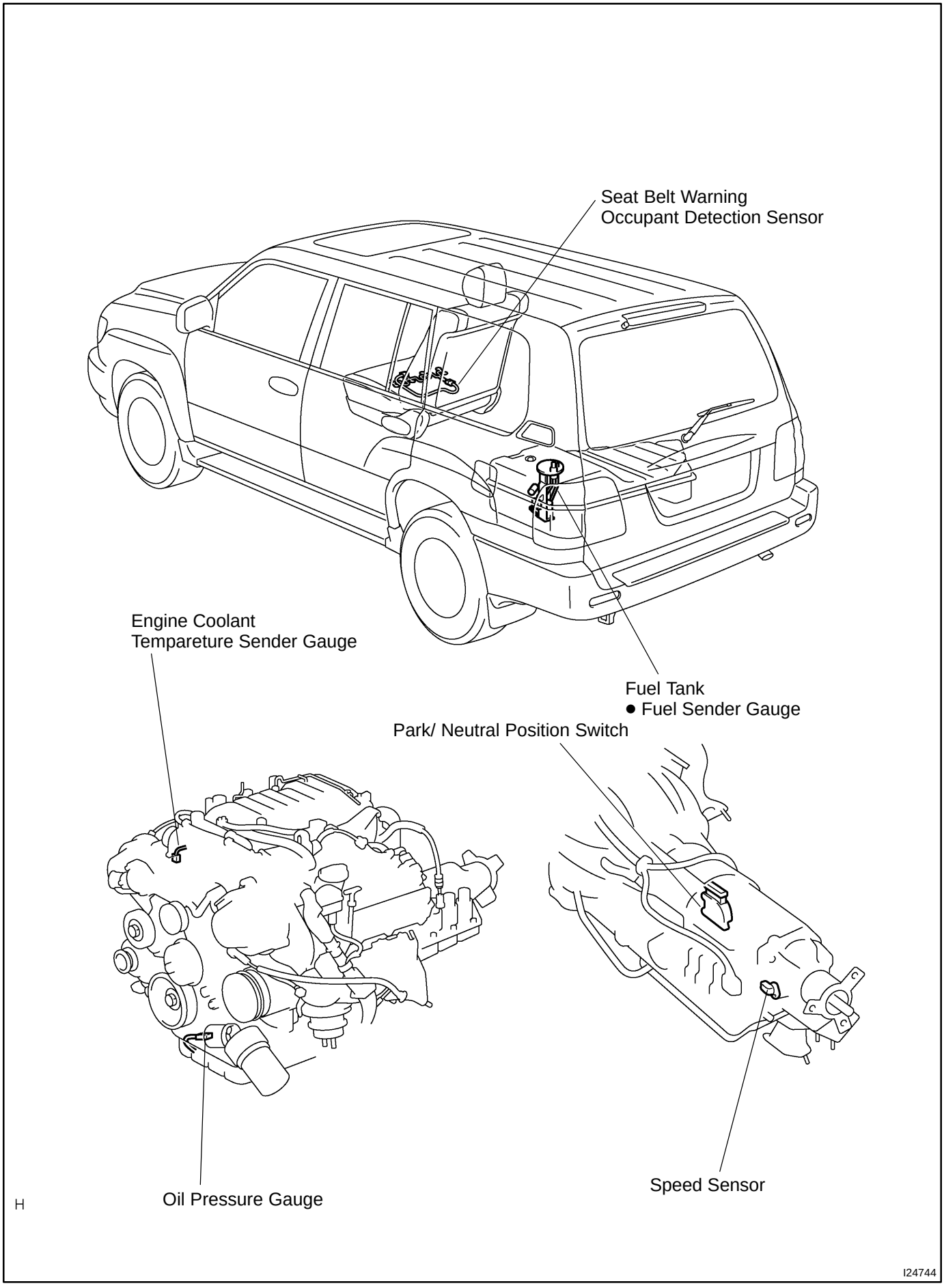


COMBINATION METER

LOCATION

BE0HH-12




Seat Belt Warning
Occupant Detection Sensor
Engine Coolant
Tempareture Sender Gauge
Fuel Tank
● Fuel Sender Gauge
Park/ Neutral Position Switch
Oil Pressure Gauge
Speed Sensor
H
I24744

COMPASS

BE1Z9-01

PRE-CHECK

1. SELECTING COMPASS DISPLAY MODE

The mode select switch allows you to select a Display or Non-display mode of the compass.
The mode select is operated by the automatic glare-proof / non-glare proof switch on the inner mirror.

2. SETTING ZONE

Deviation between the magnetic north and ”actual north” differs depending on the terrestrial location, therefore, an adjustment in magnetism is required. Since the magnetic condition differs according to the area where the vehicle will be used, it is necessary for each user to set the zone. (Refer to ”Compass Zone Map”).
The zone setting can be changed using the mode select switch of the inner mirror.

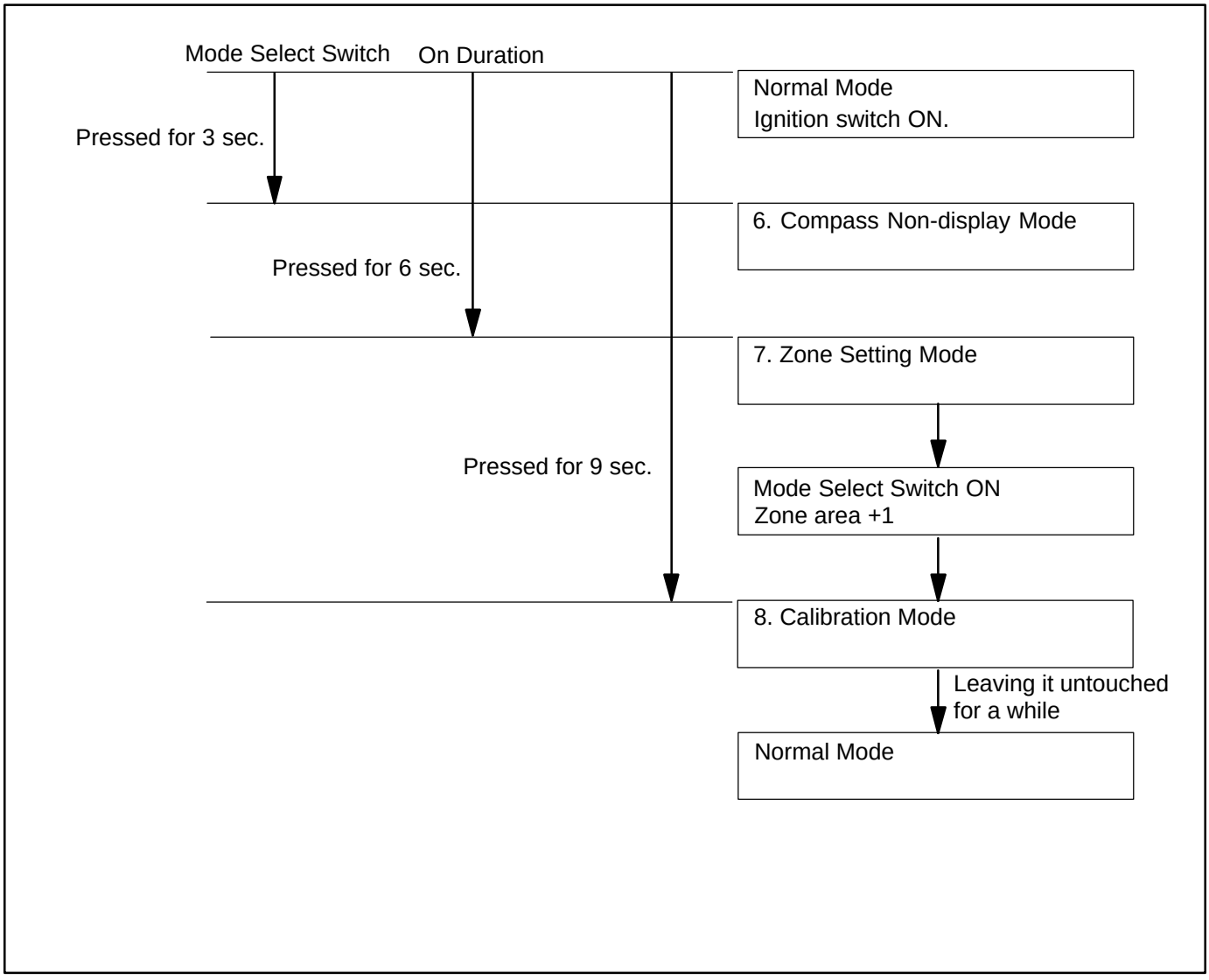
3. PERFORMING CALIBRATION

Because each vehicle has its own magnetic field, calibration should be performed for each vehicle. This compass function is used when storing the record of the vehicle’s magnetic field.

4. WHEN COMPASS MAGNETIZED:

A compass could be magnetized during shipping by vessels or freight cars. Before delivery, therefore, make sure to perform calibration and ensure that calibration can be done. If it cannot be done (cannot complete in spite of driving round several times), it may be caused by magnetization. Demagnetize the vehicle using a demagnetizer and perform calibration again.

5. SETTING COMPASS



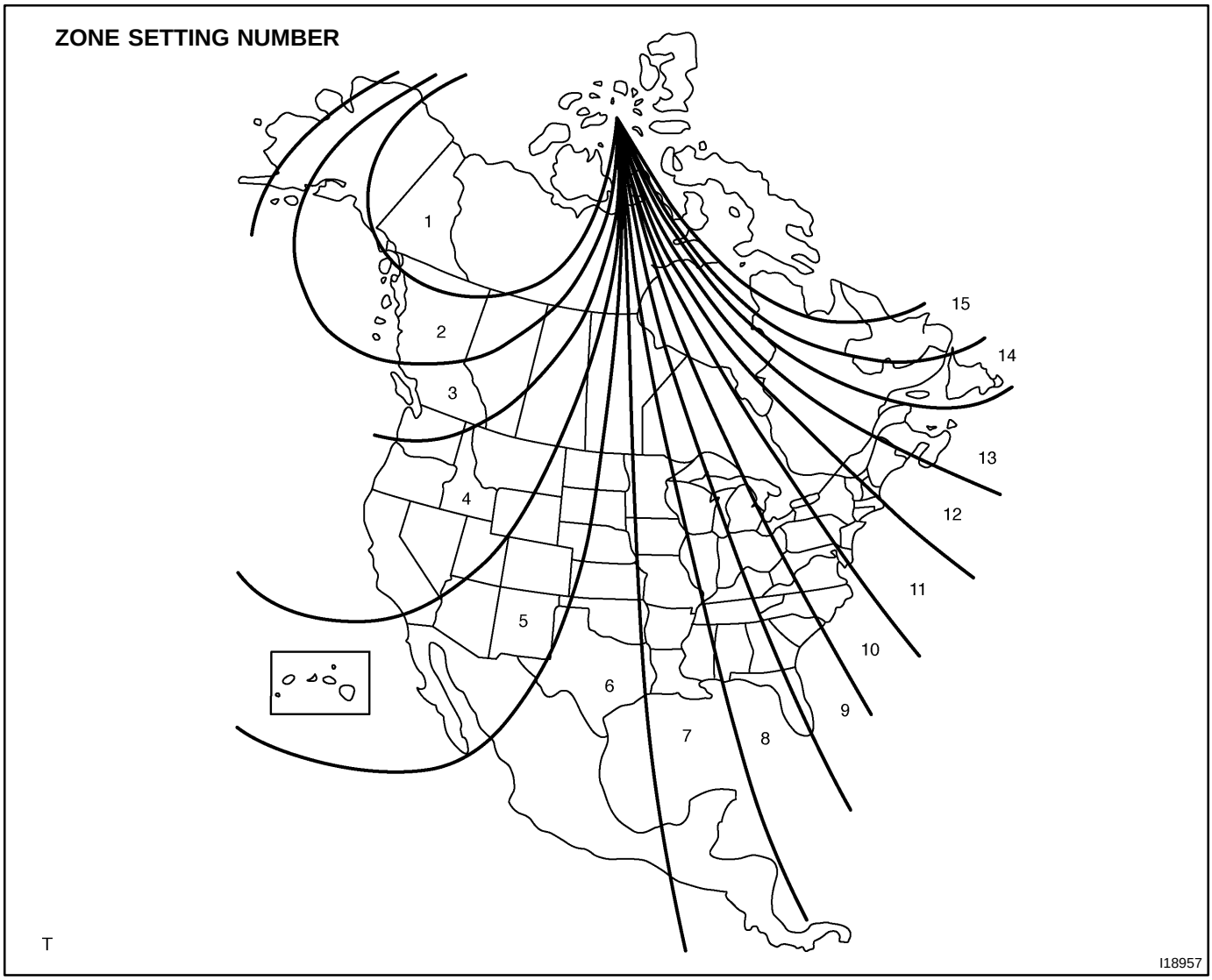
6. SELECTING DISPLAY MODE

(a) Turn the ignition switch ON.
(b) Check that the LED on the inner mirror is lit (green).
(c) Check that the compass display indicates an azimuthal direction (N, NE, E, SE, S, SW, W, or NW) or "C".
(d) Pressing the mode select switch on the inner mirror for 3 sec. or more erases the above mentioned display and activates the Non-display mode.

HINT:

- Immediately after pressing the mode select switch, the LED goes off activating the Non-glare-proof mode. However, when the switch remains pressed, the LED is lit again after 3 sec. and the system enters the automatic glare-proof mode.
- Keep pressing the mode select switch for 3 sec. after selection of the compass display mode will activate the zone setting mode, showing a number (1-15) on the compass display.

7. ZONE SETTING MODE



Pressing the mode select switch for 6 sec. from the normal mode will activate the zone setting mode, showing a numbar (1-15) on the compass display.

HINT:

In the initial status, ”8” is displayed.

(1) The displayed number increases +1 every time the mode select switch is pressed. Referring to the map, check the number for the area where the vehicle will be used and set the zone number.

(2) Leave it untouched for several seconds after setting and check that the compass display shows an azimuthal direction (N, NE, E, SE, S, SW, W, or NW) or ”C”.

8. CALIBRATION SETTING MODE

(a) After the set zone is displayed, if the switch remains pressed another 3 sec. will activate the calibration setting mode.

(b) Pressing the switch for 9 sec. from the normal mode will also activate this mode.

(c) Drive the vehicle at a slow speed of 8 km/h (5MPH) or less in the circular direction.

(d) Driving round the circle 1 to 3 times will display the azimuthal direction on the display, completing the calibration.

HINT:

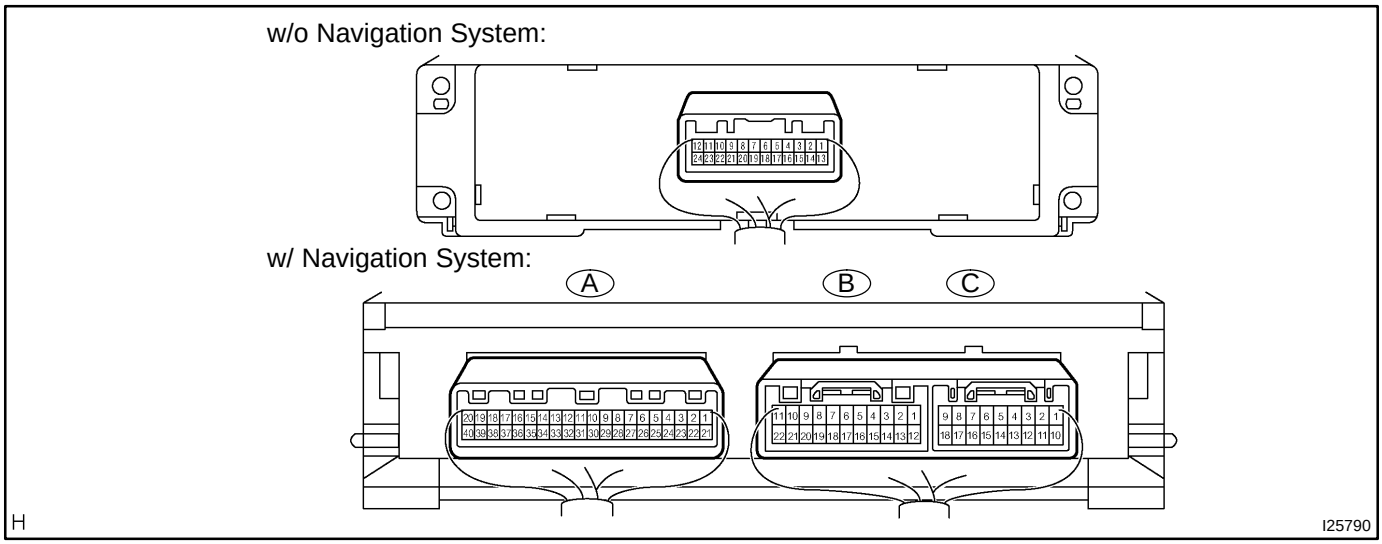
Once calibration is completed, it is not necessary to perform the above procedures unless the magnetic field strength is drastically changed. If this happens, the azimuthal display will be changed to ”C”.

BE2EE-01

INSPECTION

1. INSPECT DEFOGGER SWITCH CIRCUIT

Disconnect the connector from the panel switch and inspect the connector on wire harness side, as shown in the chart.



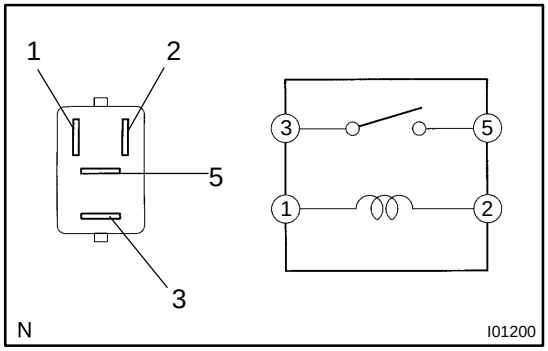
w/ Navigation:

Tester connection	Condition	Specified condition
B12 (GND) - Ground	Constant	Continuity
B11 (+B) - Ground	Constant	Battery positive voltage
B22 (IG) - Ground	Ignition switch LOCK or ACC	No voltage
B22 (IG) - Ground	Ignition switch ON	Battery positive voltage
A10 (RDFGR) - Ground	Constant	Battery positive voltage

w/o Navigation:

Tester connection	Condition	Specified condition
16 (GND) - Ground	Constant	Continuity
8 (IG) - Ground	Ignition switch LOCK or ACC	No voltage
8 (IG) - Ground	Ignition switch ON	Battery positive voltage
2 (DEFC) - Ground	Constant	Battery positive voltage

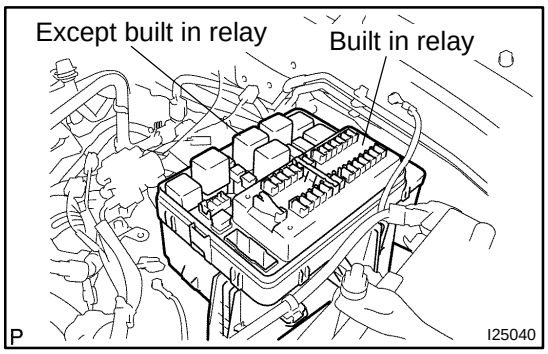
If the circuit is not as specified, replace the switch.



2. INSPECT DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

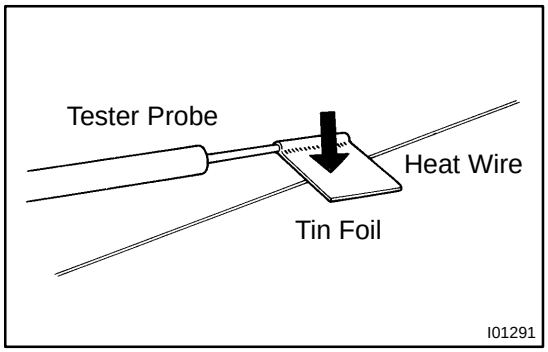
If continuity is not as specified, replace the relay.



3. INSPECT ENGINE ROOM R/B RELAY CIRCUIT (See Pase BE-15)

HINT:

The mirror heater relay is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.



4. INSPECT DEFOGGER WIRE

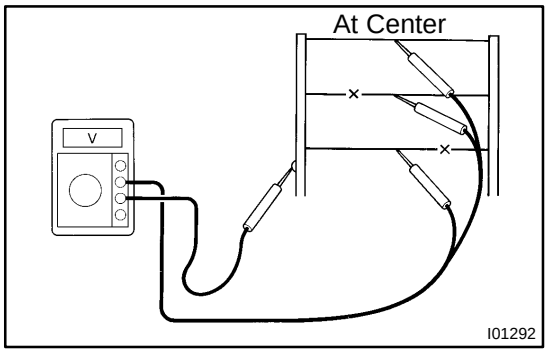
NOTICE:

- **When cleaning the glass, use a soft, dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires.**
- **Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown.**

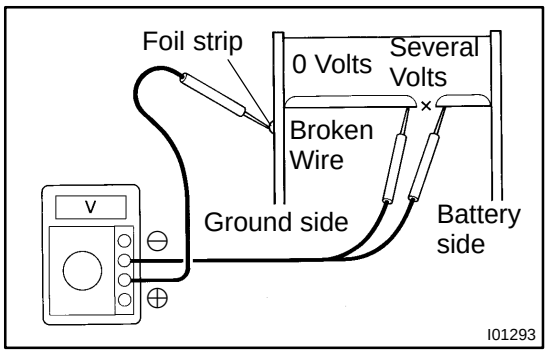
(a) Turn the ignition switch ON.

(b) Turn the defogger switch ON.

(c) Inspect the voltage at the center of each heat wire, as shown.



Voltage	Criteria
Approx. 5V	Okay (No break in wire)
Approx. 10V or 0V	Broken wire



HINT:

If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

(d) Place the voltmeter positive (+) lead against the defogger wire on the battery side.

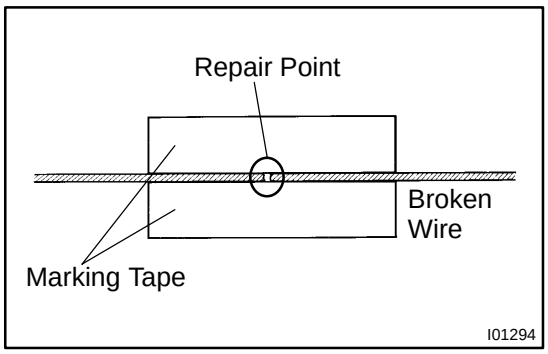
(e) Place the voltmeter negative (-) lead with the foil strip against the wire on the ground side.

(f) Slide the positive (+) lead from battery to ground side.

(g) The point where the voltmeter deflects from several V to zero V is the place where the defogger wire is broken.

HINT:

If the heat wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the heat wire but voltage gradually increases to about 12 V as the meter probe moves to the other end.

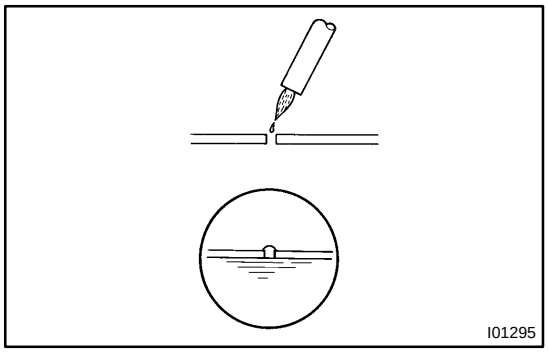


5. IF NECESSARY, REPAIR DEFOGGER WIRE

(a) Clean the broken wire tips with grease, wax and silicone remover.

(b) Place the masking tape along both sides of the wire for repair.

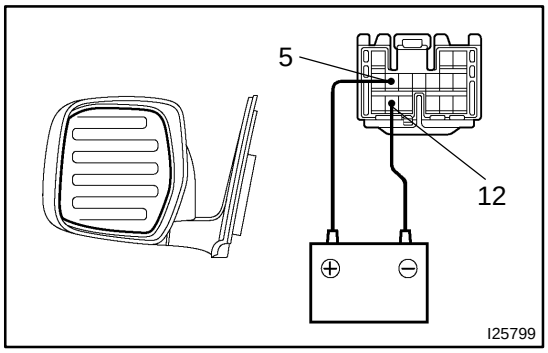
(c) Thoroughly mix the repair agent (Dupont paste No. 4817).



(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.

(f) Do not repair the defogger wire for at least 24 hours.



6. w/ Mirror heater:
INSPECT MIRROR HEATER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 12.

(b) Check that the mirror becomes warm.

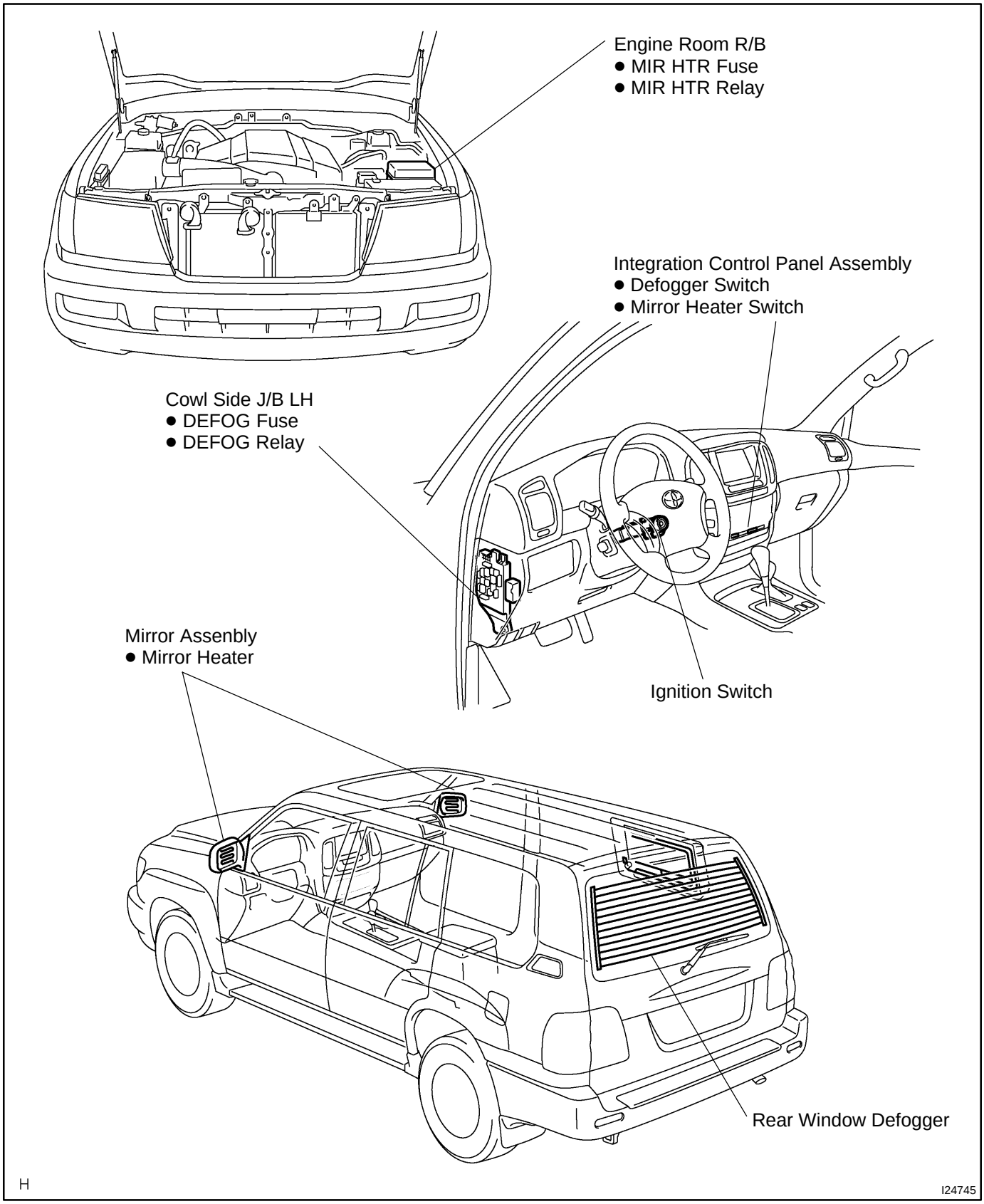
HINT:

It will take a short time for the mirror to become warm.

DEFOGGER SYSTEM

BE0GS-19

LOCATION

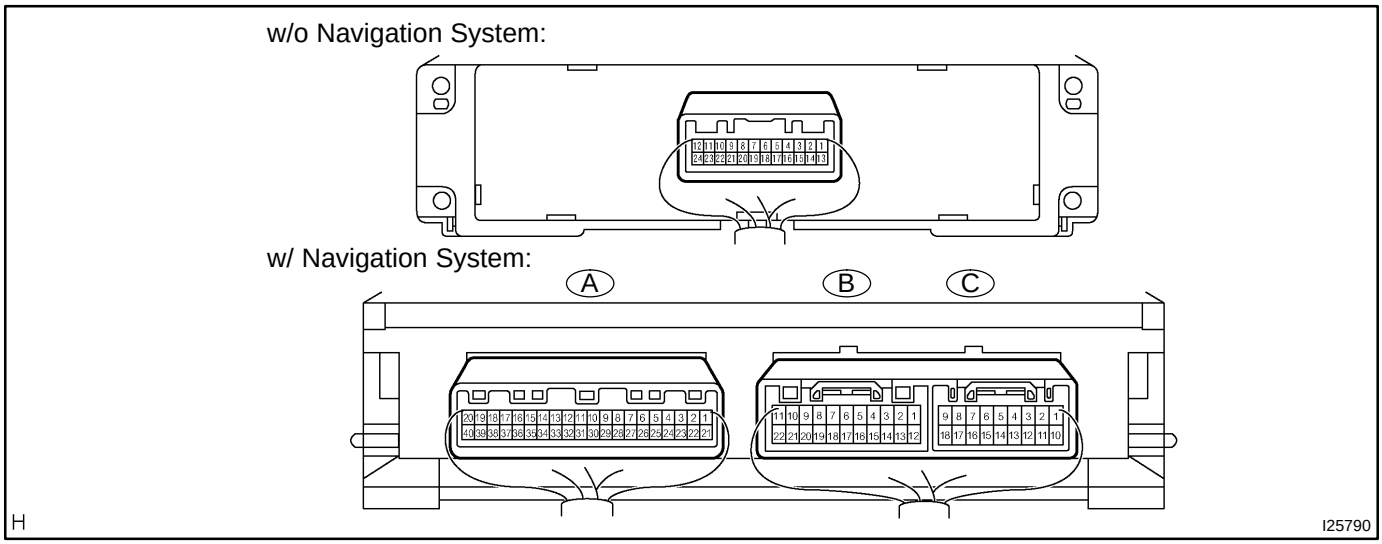


BE2EE-01

INSPECTION

1. INSPECT DEFOGGER SWITCH CIRCUIT

Disconnect the connector from the panel switch and inspect the connector on wire harness side, as shown in the chart.



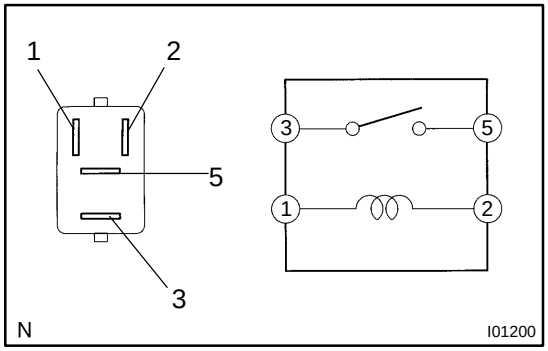
w/ Navigation:

Tester connection	Condition	Specified condition
B12 (GND) - Ground	Constant	Continuity
B11 (+B) - Ground	Constant	Battery positive voltage
B22 (IG) - Ground	Ignition switch LOCK or ACC	No voltage
B22 (IG) - Ground	Ignition switch ON	Battery positive voltage
A10 (RDFGR) - Ground	Constant	Battery positive voltage

w/o Navigation:

Tester connection	Condition	Specified condition
16 (GND) - Ground	Constant	Continuity
8 (IG) - Ground	Ignition switch LOCK or ACC	No voltage
8 (IG) - Ground	Ignition switch ON	Battery positive voltage
2 (DEFC) - Ground	Constant	Battery positive voltage

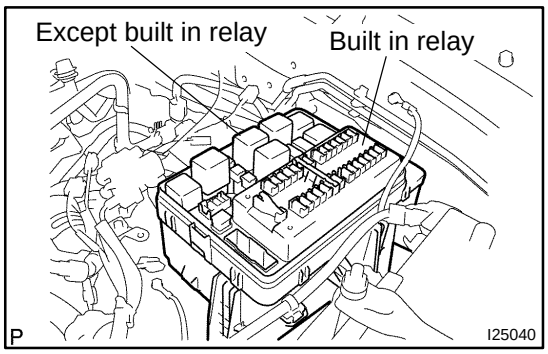
If the circuit is not as specified, replace the switch.



2. INSPECT DEFOGGER RELAY CONTINUITY

Condition	Tester connection	Specified condition
Constant	1 - 2	Continuity
Apply B+ between terminals 1 and 2.	3 - 5	Continuity

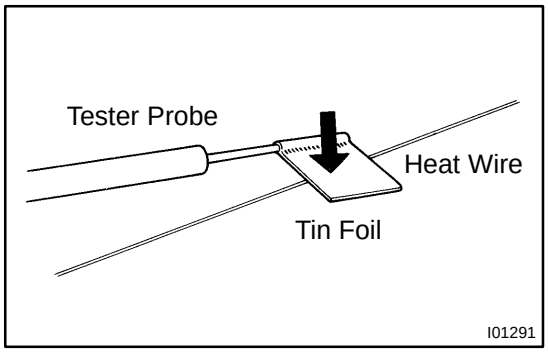
If continuity is not as specified, replace the relay.



3. INSPECT ENGINE ROOM R/B RELAY CIRCUIT (See Pase BE-15)

HINT:

The mirror heater relay is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.



4. INSPECT DEFOGGER WIRE

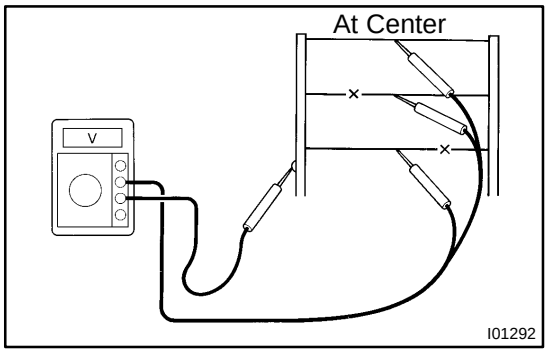
NOTICE:

- **When cleaning the glass, use a soft, dry cloth, and wipe the glass in the direction of the wire. Take care not to damage the wires.**
- **Do not use detergents or glass cleaners with abrasive ingredients.**
- **When measuring voltage, wrap a piece of tin foil around the tip of the negative probe and press the foil against the wire with your finger, as shown.**

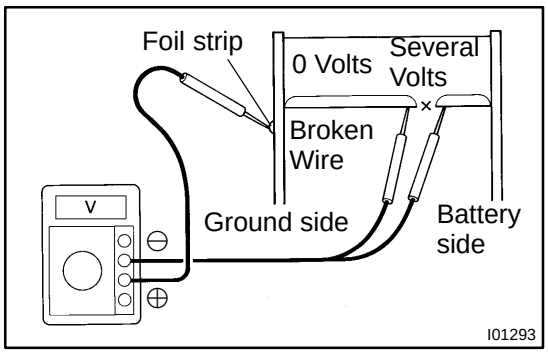
(a) Turn the ignition switch ON.

(b) Turn the defogger switch ON.

(c) Inspect the voltage at the center of each heat wire, as shown.



Voltage	Criteria
Approx. 5V	Okay (No break in wire)
Approx. 10V or 0V	Broken wire



HINT:

If there is approximately 10 V, the wire is broken between the center of the wire and the positive (+) end. If there is no voltage, the wire is broken between the center of the wire and ground.

(d) Place the voltmeter positive (+) lead against the defogger wire on the battery side.

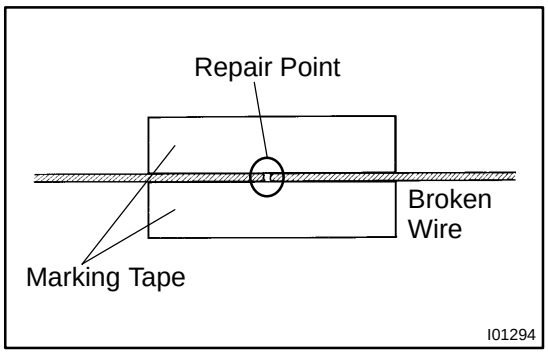
(e) Place the voltmeter negative (-) lead with the foil strip against the wire on the ground side.

(f) Slide the positive (+) lead from battery to ground side.

(g) The point where the voltmeter deflects from several V to zero V is the place where the defogger wire is broken.

HINT:

If the heat wire is not broken, the voltmeter indicates 0 V at the positive (+) end of the heat wire but voltage gradually increases to about 12 V as the meter probe moves to the other end.

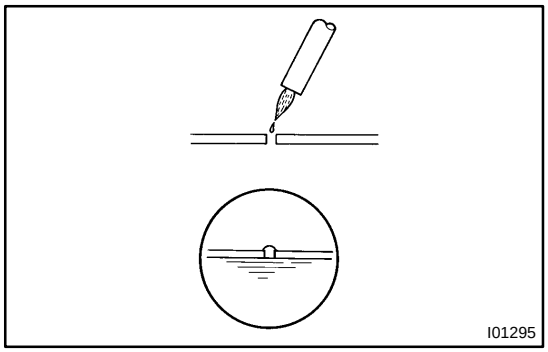


5. IF NECESSARY, REPAIR DEFOGGER WIRE

(a) Clean the broken wire tips with grease, wax and silicone remover.

(b) Place the masking tape along both sides of the wire for repair.

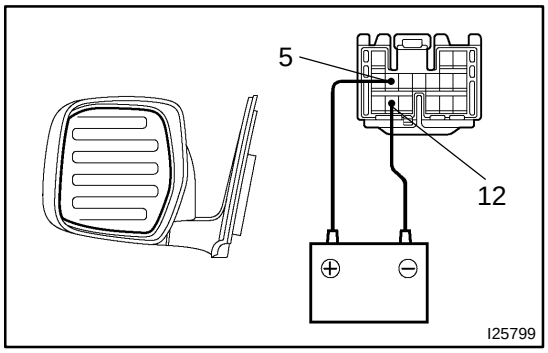
(c) Thoroughly mix the repair agent (Dupont paste No. 4817).



(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.

(f) Do not repair the defogger wire for at least 24 hours.



6. w/ Mirror heater:
INSPECT MIRROR HEATER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 12.

(b) Check that the mirror becomes warm.

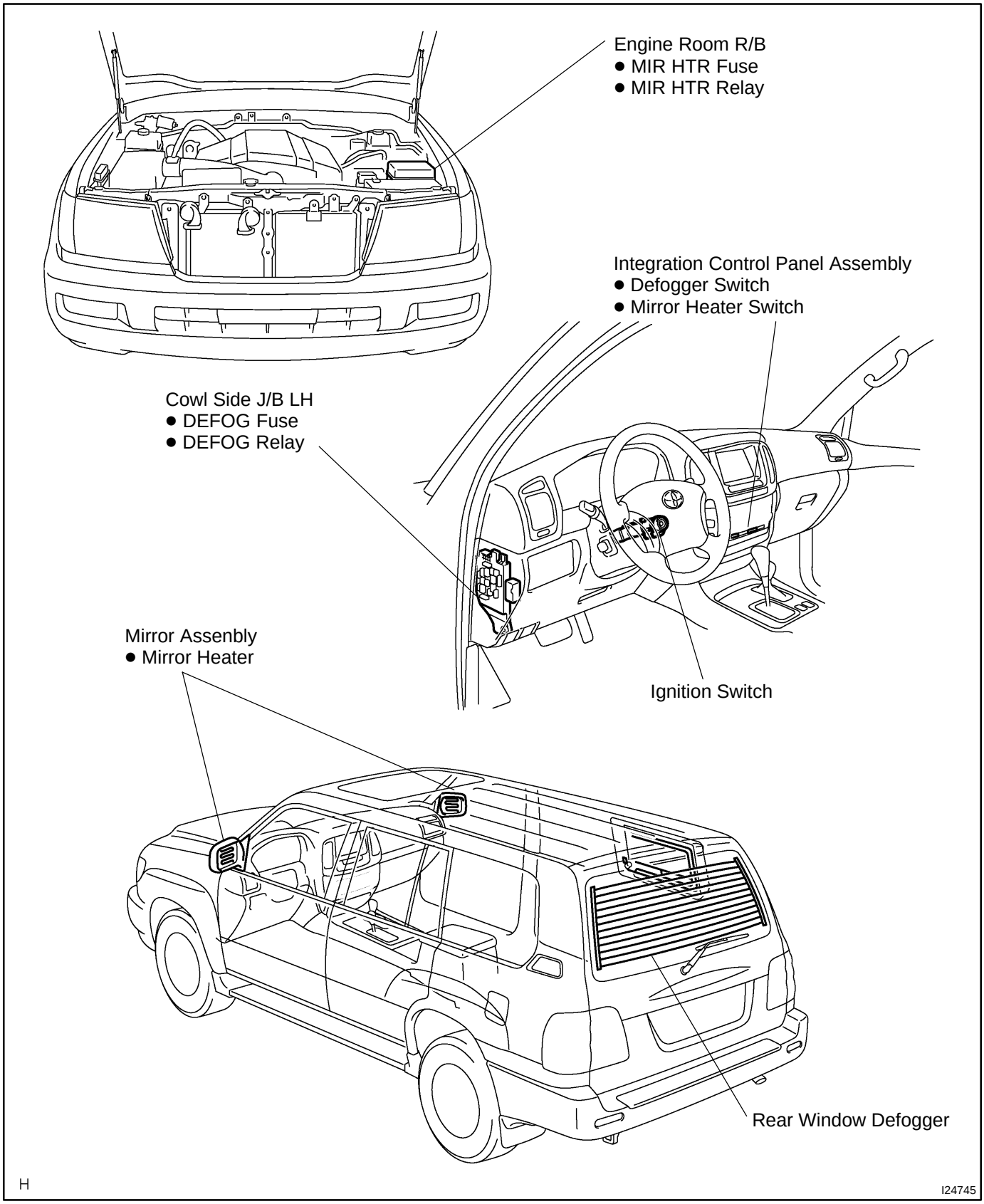
HINT:

It will take a short time for the mirror to become warm.

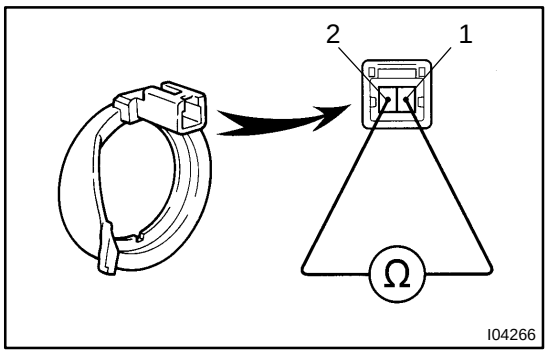
DEFOGGER SYSTEM

BE0GS-19

LOCATION



BE0G8-06



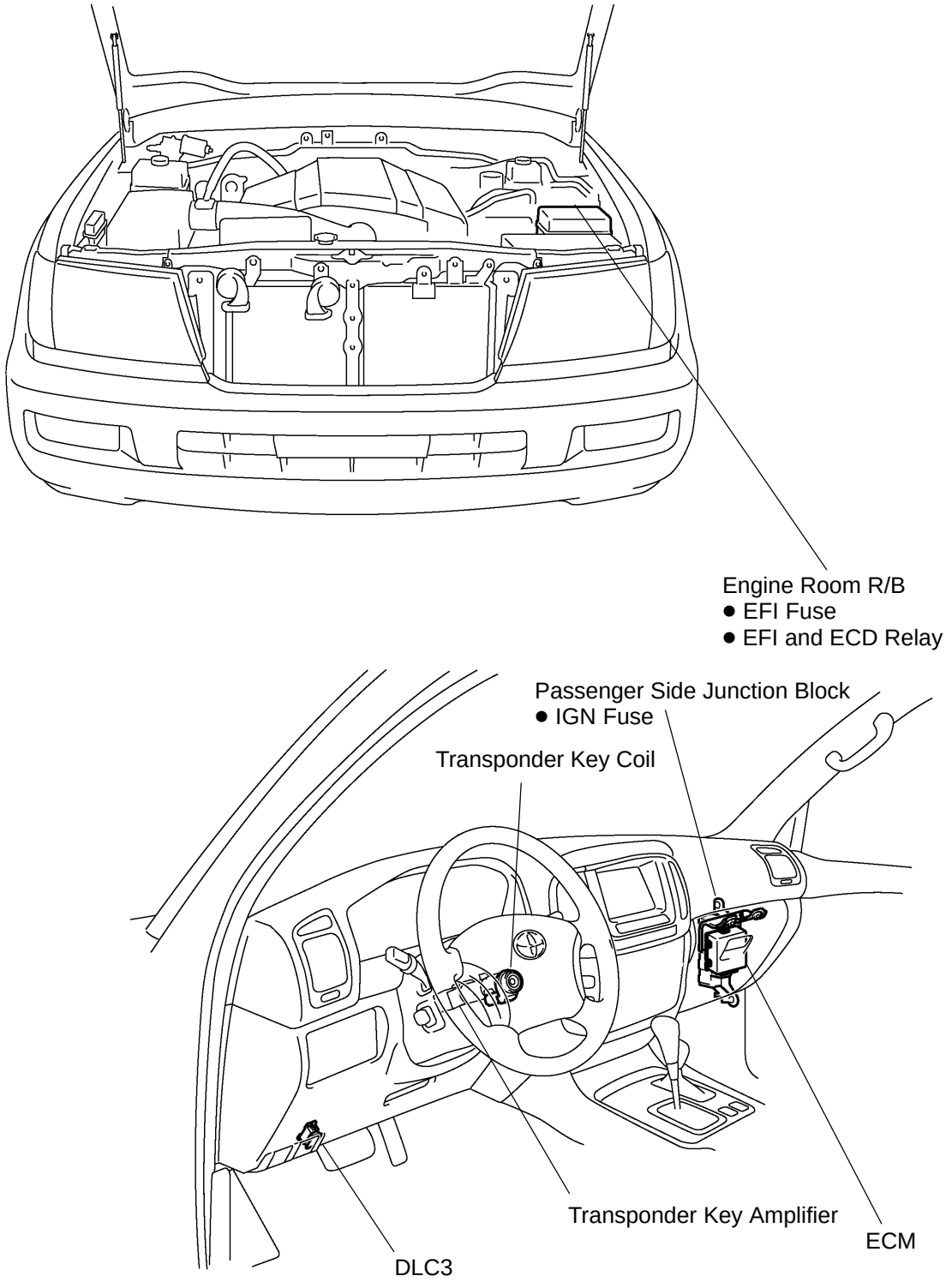
INSPECTION

INSPECTION TRANSPONDER KEY COIL CONTINUITY

Check that continuity exists between terminals 1 and 2.
If continuity is not as specified, replace the coil.

BE02Q-23

LOCATION



H

ENGINE IMMOBILISER SYSTEM

BE1Z6-03

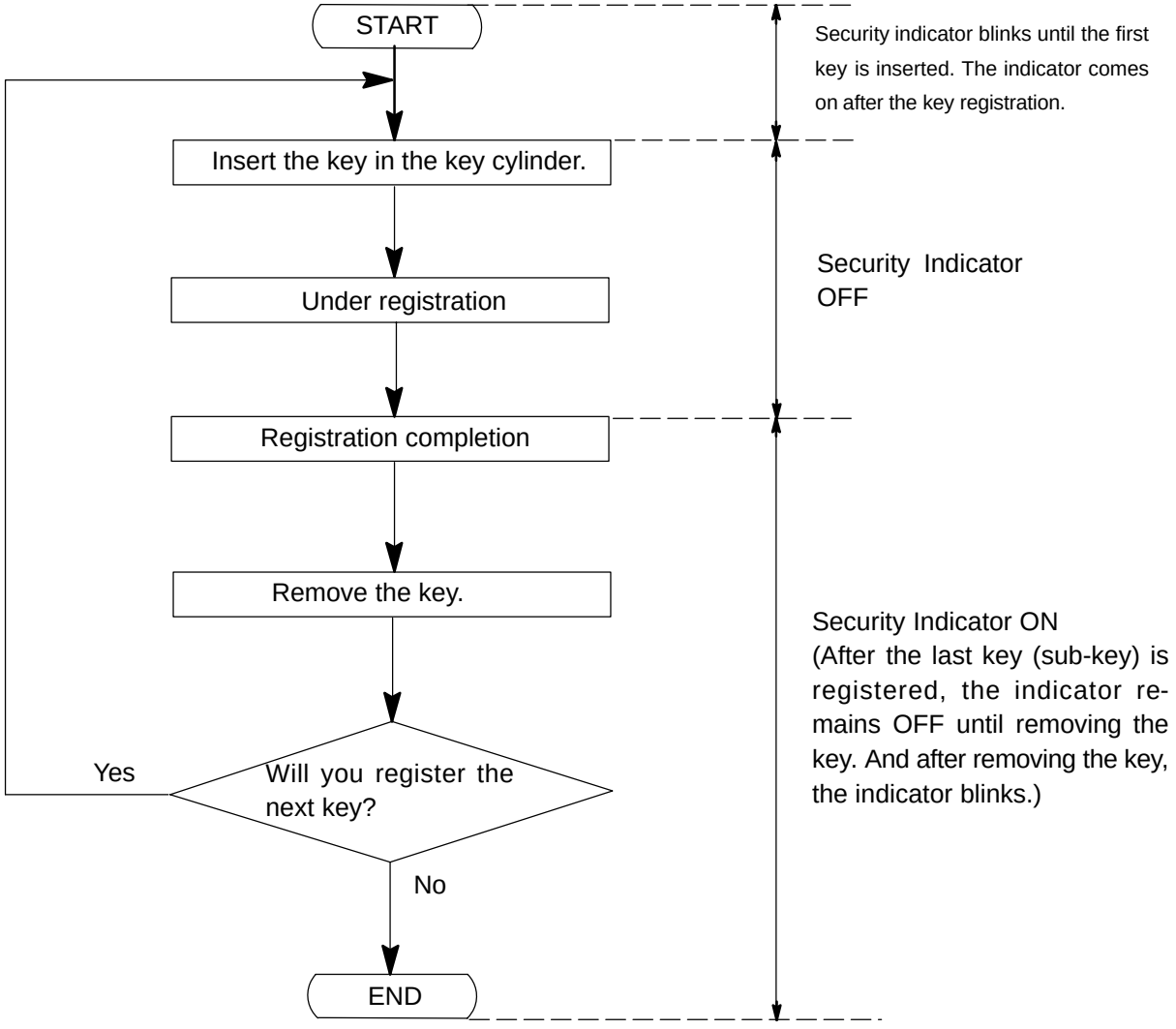
REGISTRATION PROCEDURE

1. KEY REGISTRATION IN AUTOMATIC REGISTRATION MODE

(a) Registration of a new transponder key.

HINT:

- This must be done when you install a new Transponder key ECU.
- The new Transponder key ECU is on the automatic key code registration mode. The already fixed of key codes for this Transponder key ECU can be registered.
  On this type of vehicle, up to 4 key codes can be registered.
- A master and sub key are registered automatically.



HINT:

- When a key is not inserted in the key cylinder on the automatic registration mode, the security indicator always comes.
- When the immobiliser system operates normally and the key is pulled out, the security indicator blinks.

(b) Automatic registration mode completion

If completing the mode forcibly when registering more than 1 key code on the automatic registration mode, perform the following procedures.

After registering 1 more key code with master key, perform step (1) or (2) without pulling the key out or inserting the already registered key.

(1) Turn the ignition switch LOCK → ON 5 times within 10 sec.

(2) With the hand-held tester, require automatic registration mode completion.

2. REGISTRATION OF ADDITIONAL MASTER KEY AND SUB KEY

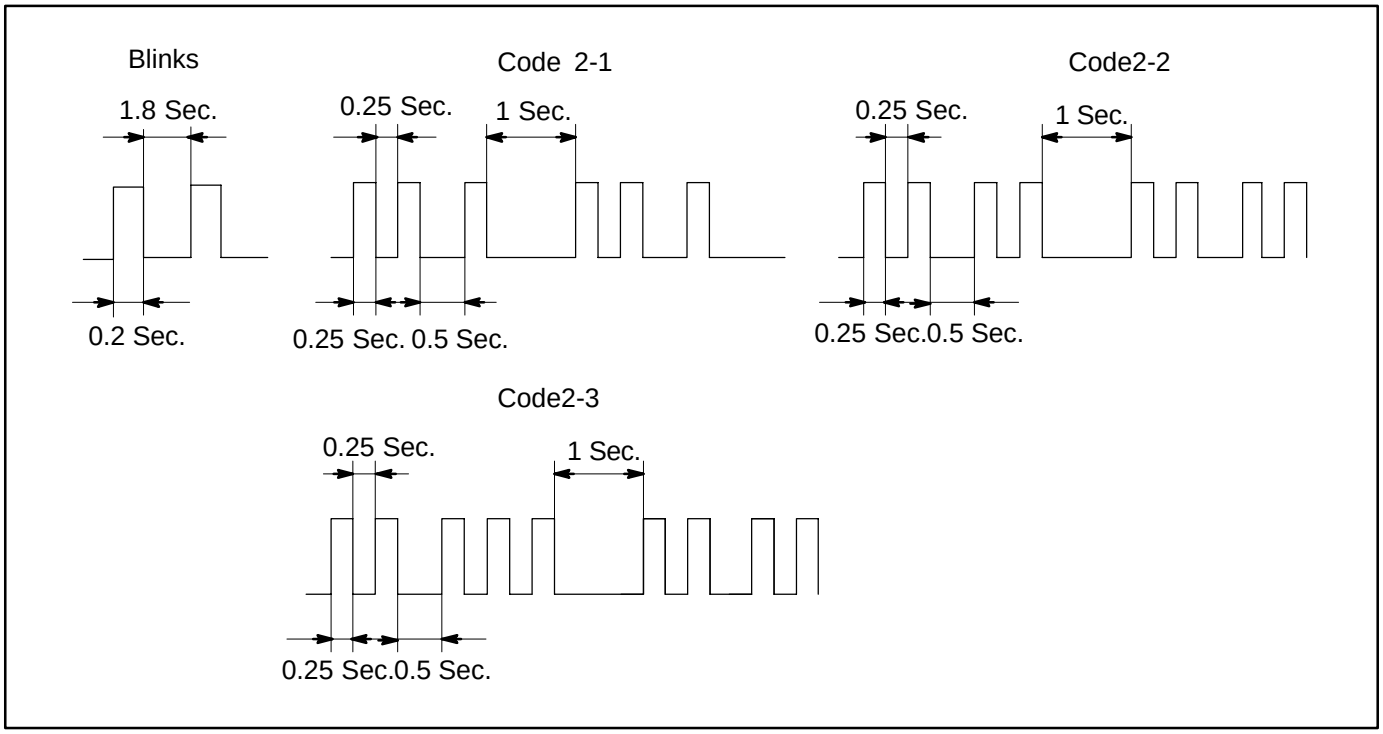
It is possible to carry out additional registration of the supply key.

HINT:

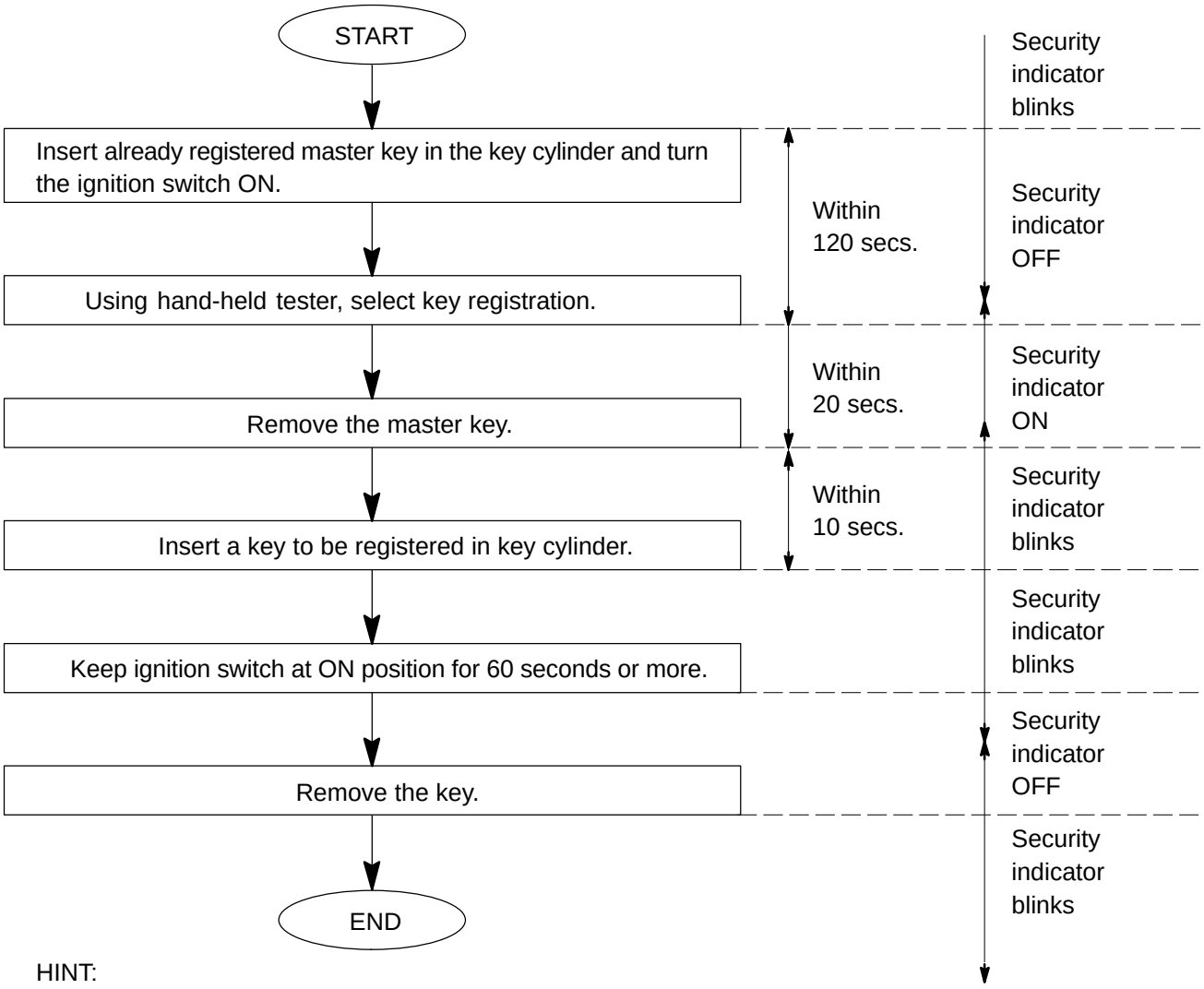
- It is possible to register up to 5 master key codes including the already registered key code.
- It is possible to register up to 3 sub key codes including the already registered key code.
- When any operation period described below is over, registration mode cannot be completed.
- When the next procedure is performed while the previous timer is working, the timer stops counting time, and then the next timer starts.
- When replacing "Ignition Cylinder Key Set" or "Lock Cylinder Set", perform registration following the procedure using the original master key. However, after the registration of the additional master key, as the original master key and the original sub-key is not necessary any more, erase registration of those key codes.
- For the registration order, it is not necessary to distinguish between Main and Sub. (Main key and Sub key are automatically identified)

When a registration error in the transponder key ECU is detected, the security indicator indicates the following codes.

2 - 1	Communication error between the key to be registered and the transponder key ECU
2 - 2	When trying to register the key that is already registered
2 - 3	When exceeding the number of keys which can be registered (Master key: 5, Sub key: 3)



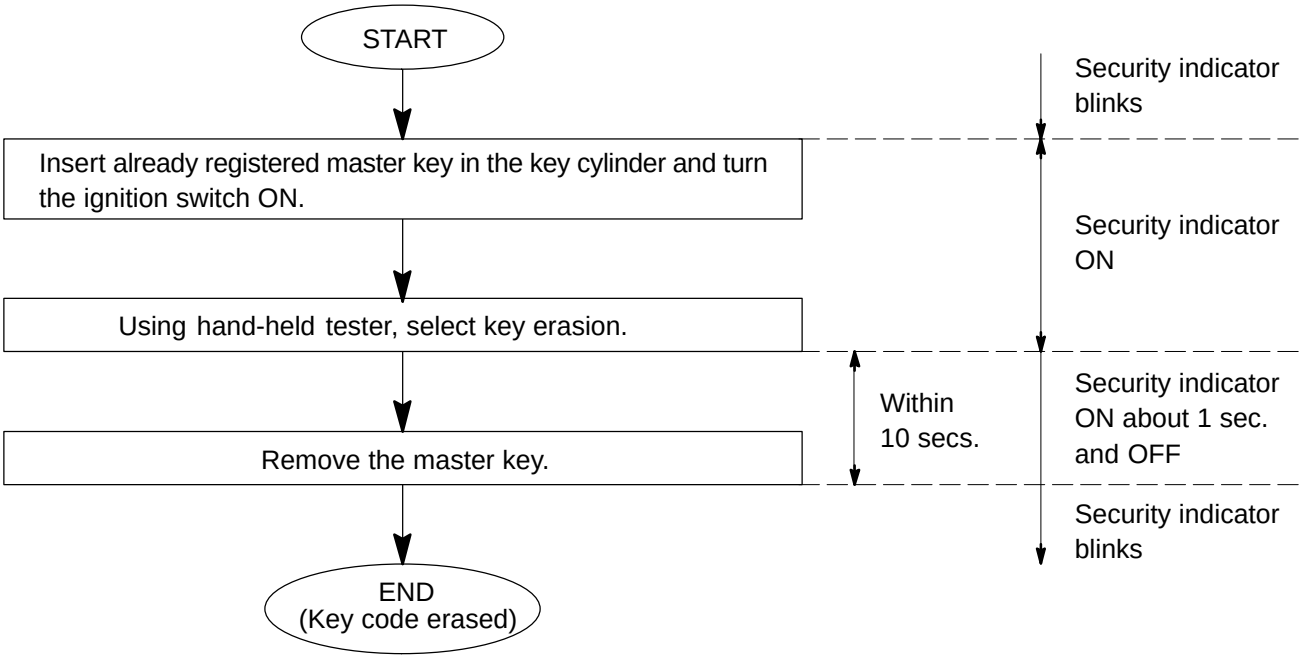
Using hand-held tester:



HINT:
Follow the screen of the hand-held tester for detailed procedure.

3. ERASURE OF TRANSPONDER KEY CODE

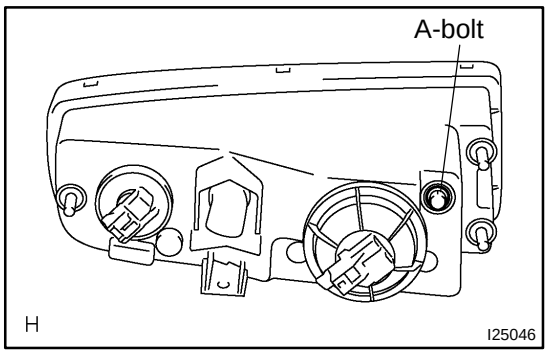
Using hand-held tester:



HINT:

- Follow the screen of the hand-held tester for more detailed procedure.

BE0RU-04



ADJUSTMENT

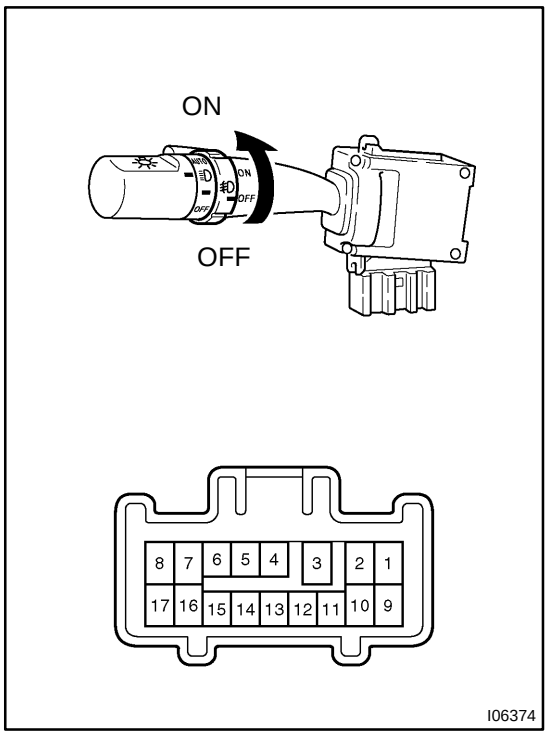
ADJUST FOGLIGHT AIM

A-bolt : Vertical Direction

BE0RT-04

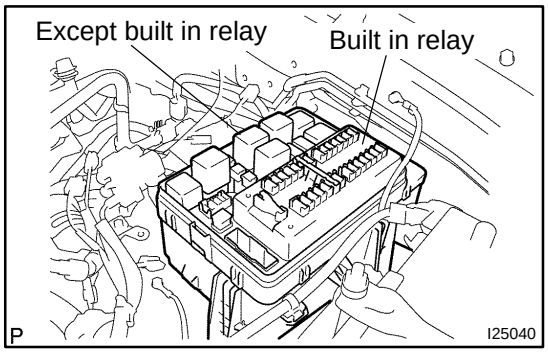
INSPECTION

1. INSPECT FOG LIGHT SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	10 - 11	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT ENGINE ROOM R/B RELAY CIRCUIT(See Pase BE-15)

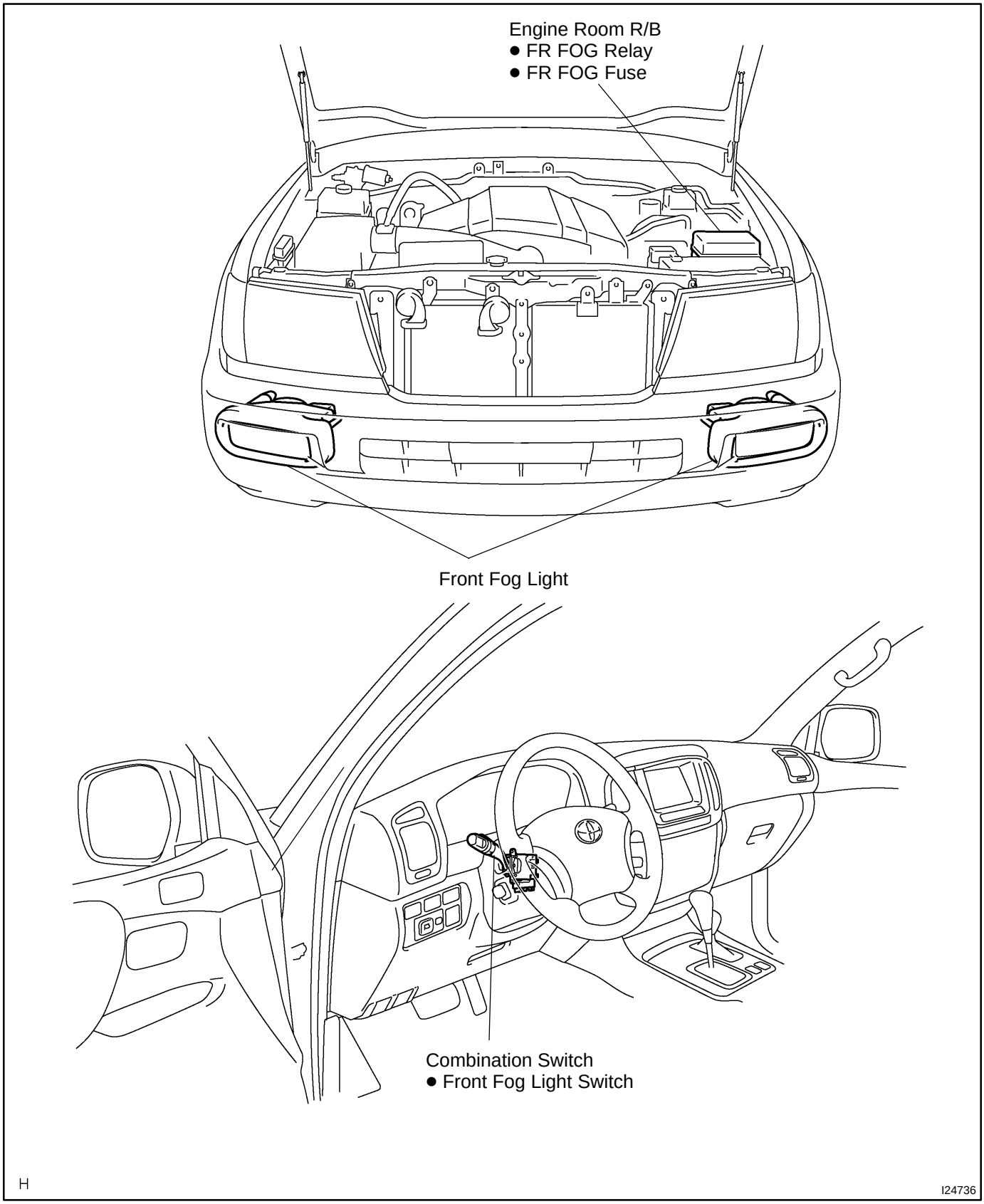
HINT:

The foglight relay is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.

FOG LIGHT SYSTEM

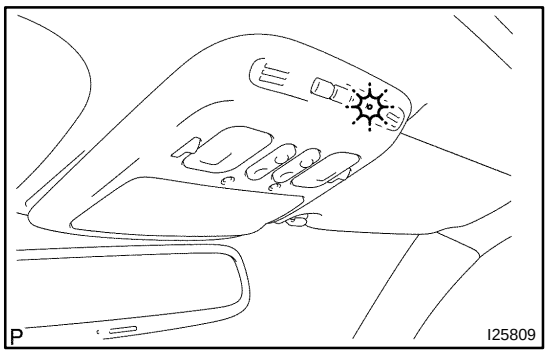
LOCATION

BE0H2-16



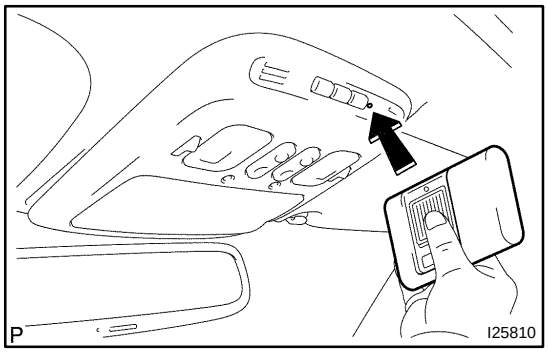
BE2F0-01

INSPECTION



1. INSPECT GARAGE DOOR OPENER SWITCH

Press the switch and check that each LED (red) lights up.
Even if only one switch is found not to light up, replace it.

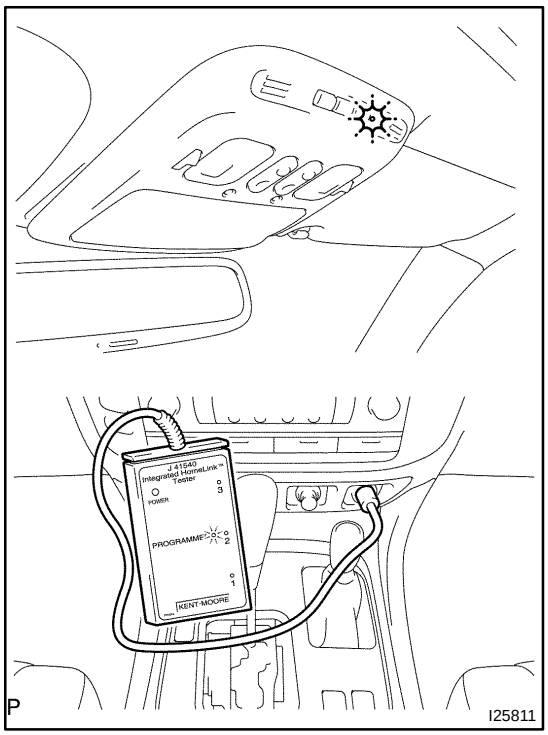


2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTING

HINT:
Use the home link tester made by KENT MORE for this test.
As it is necessary to record the code of the hand held transmitter, customer's code will be erased. When the inspection completes, please register the customer's again.

(a) Check that the code of hand held transmitter for inspection can be recorded (See page BE-186).

If the code can not be registered, replace garage door opener.

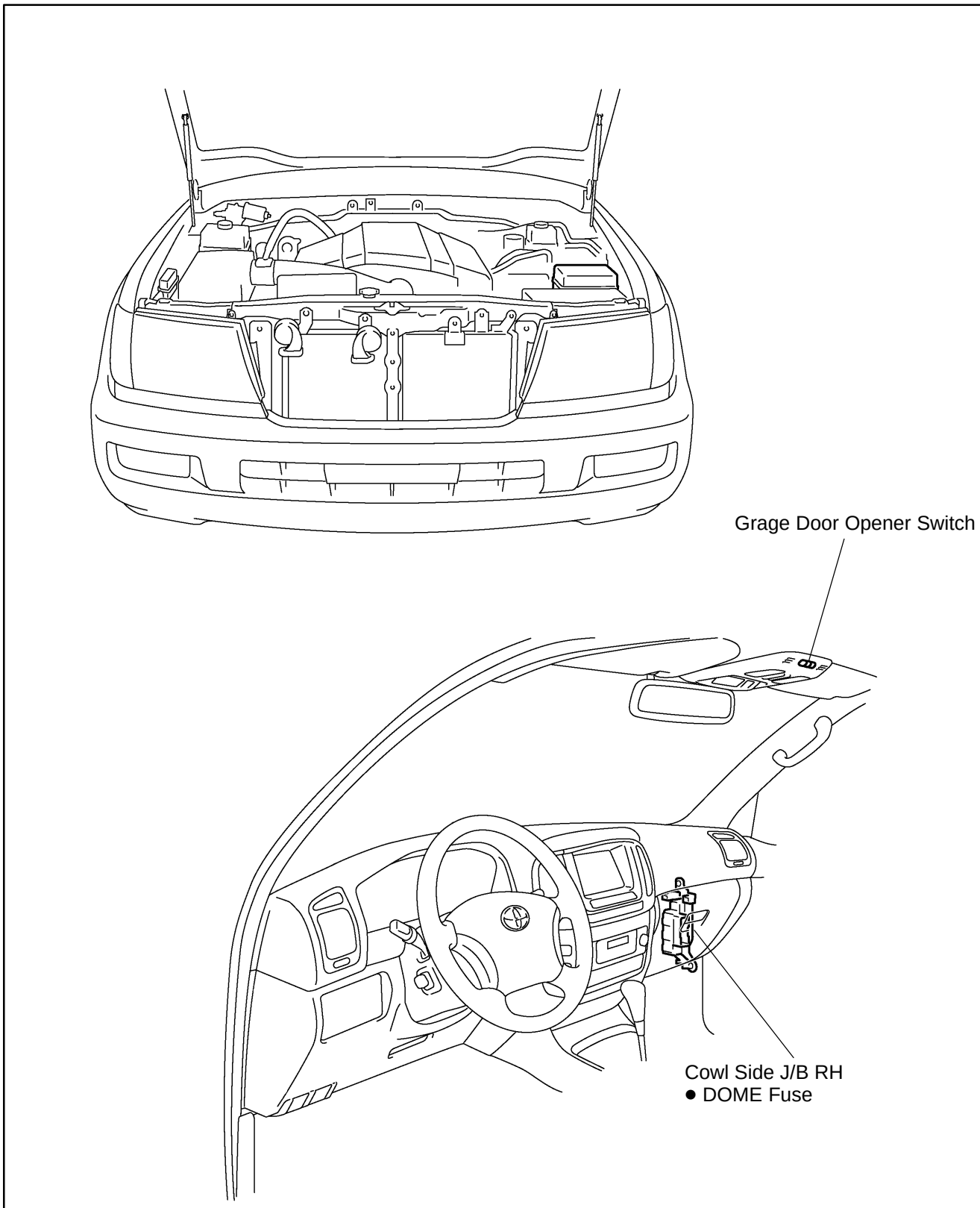


(b) Press the switch which an inspection code has been registered for and check that LED (green) of the home link tester lights up.

If the LED (green) does not light up, replace the garage door opener.

BE0TZ-06

LOCATION



GARAGE DOOR OPENER SYSTEM

BE0TY-04

REGISTRATION PROCEDURE

1. NEW CODE REGISTRATION

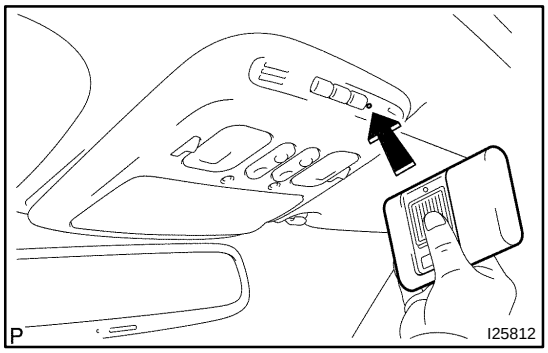
NOTICE:

- **If pressing the switch of the original transmitter to register the code, the system might operate.**
- **When registering the transmitter codes such as for garage or gate, check that there is nobody around those places then register.**

(a) Press the switch for the item to be registered for 20 seconds

HINT:

When transferring to registration mode, LED (red) blinks in 1 Hz cycle.

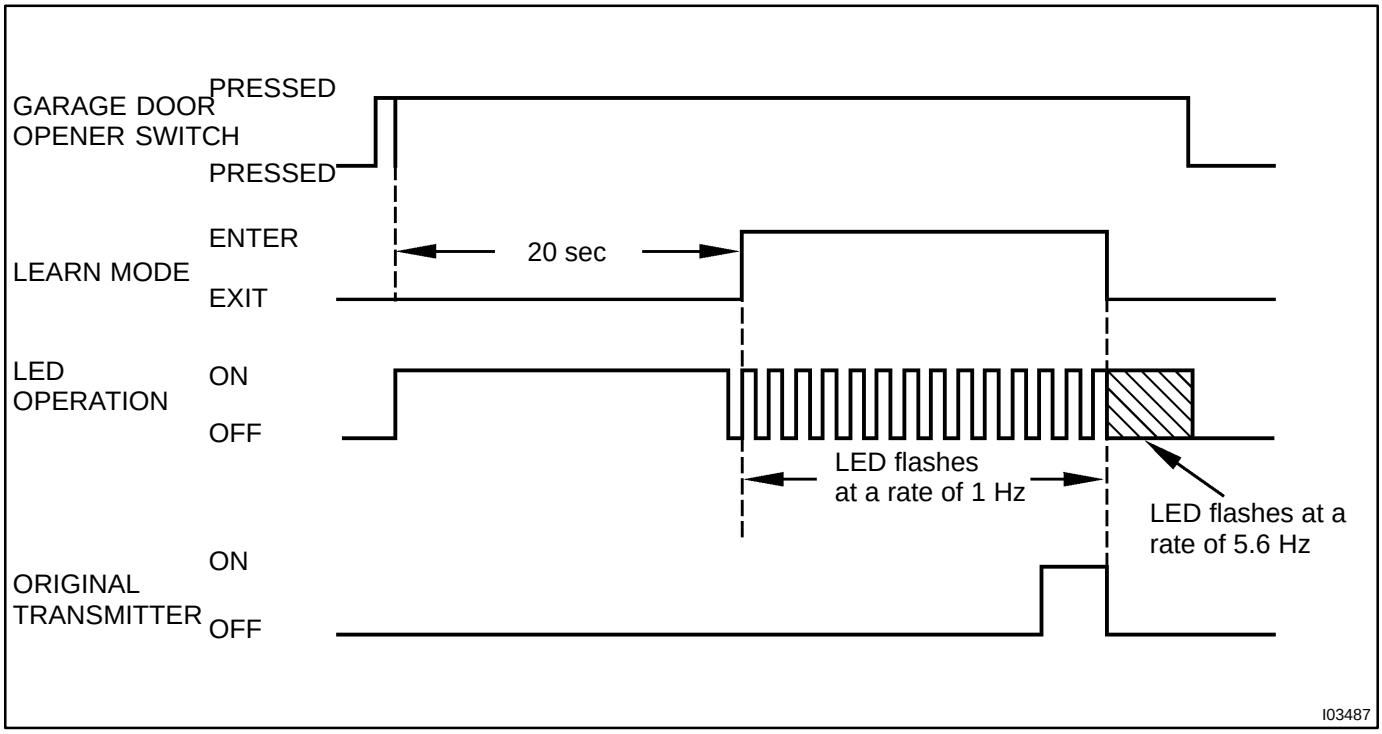


(b) In the condition of (a), bring the original transmitter to within 1-inch area around the garage door opener and press the switch. (code transmitting).

HINT:

When code registration completes correctly, LED (red) blinks in 5.6 Hz cycle.

New code registration timing chart



If a code can not be registered, observe the following conditions.

HINT:

- If the battery of original transmitter is consumed.
- Press the switch of the transmitter repeatedly in registration mode, as some transmitters stop transmitting for 1 to 2 seconds.
- This system is not applicable to the garage door opener which had been made before 1982.

2. CODE DELETION

(a) Press the switches at both ends of garage door opener simultaneously for 20 seconds.

HINT:

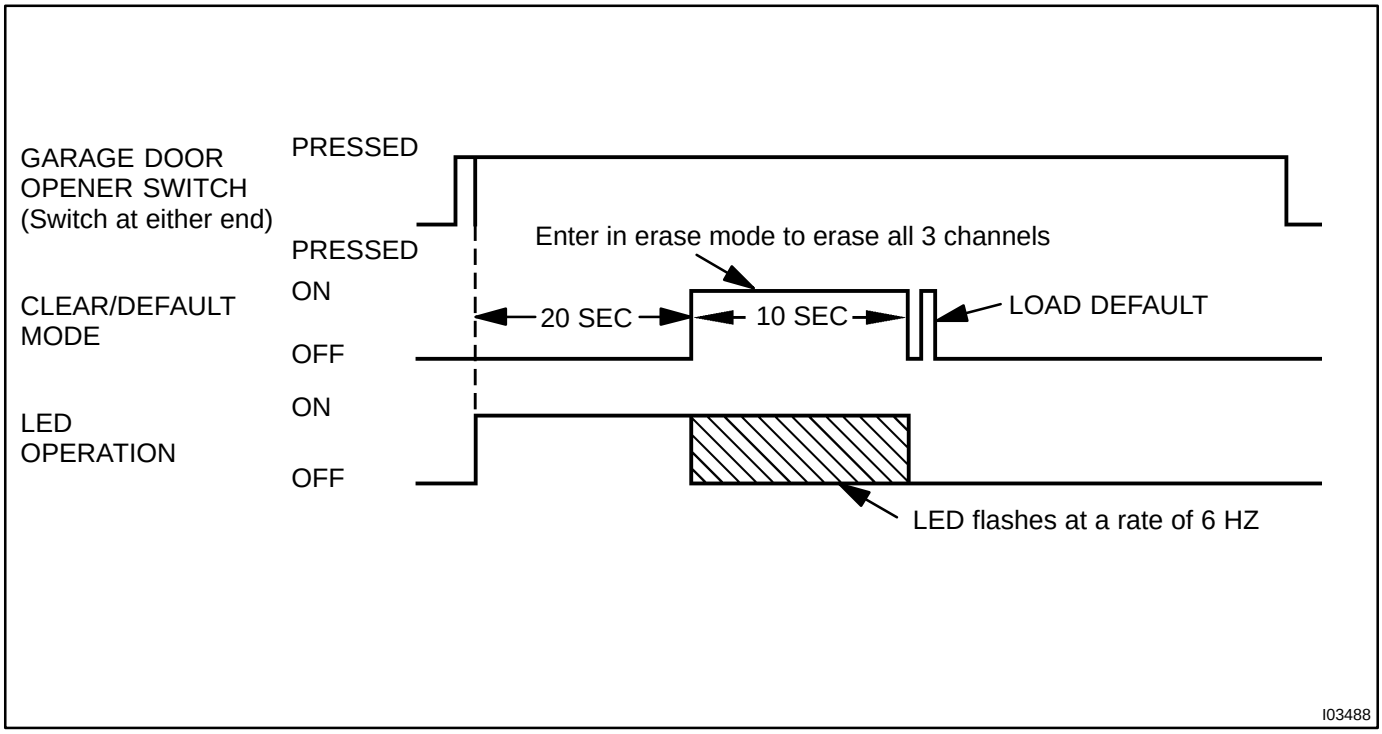
When transferring to deletion mode, LED (red) blinks in 6 Hz cycle.

(b) When releasing the switch within 10 seconds after transferring to deletion mode, all the registered codes will be erased.

HINT:

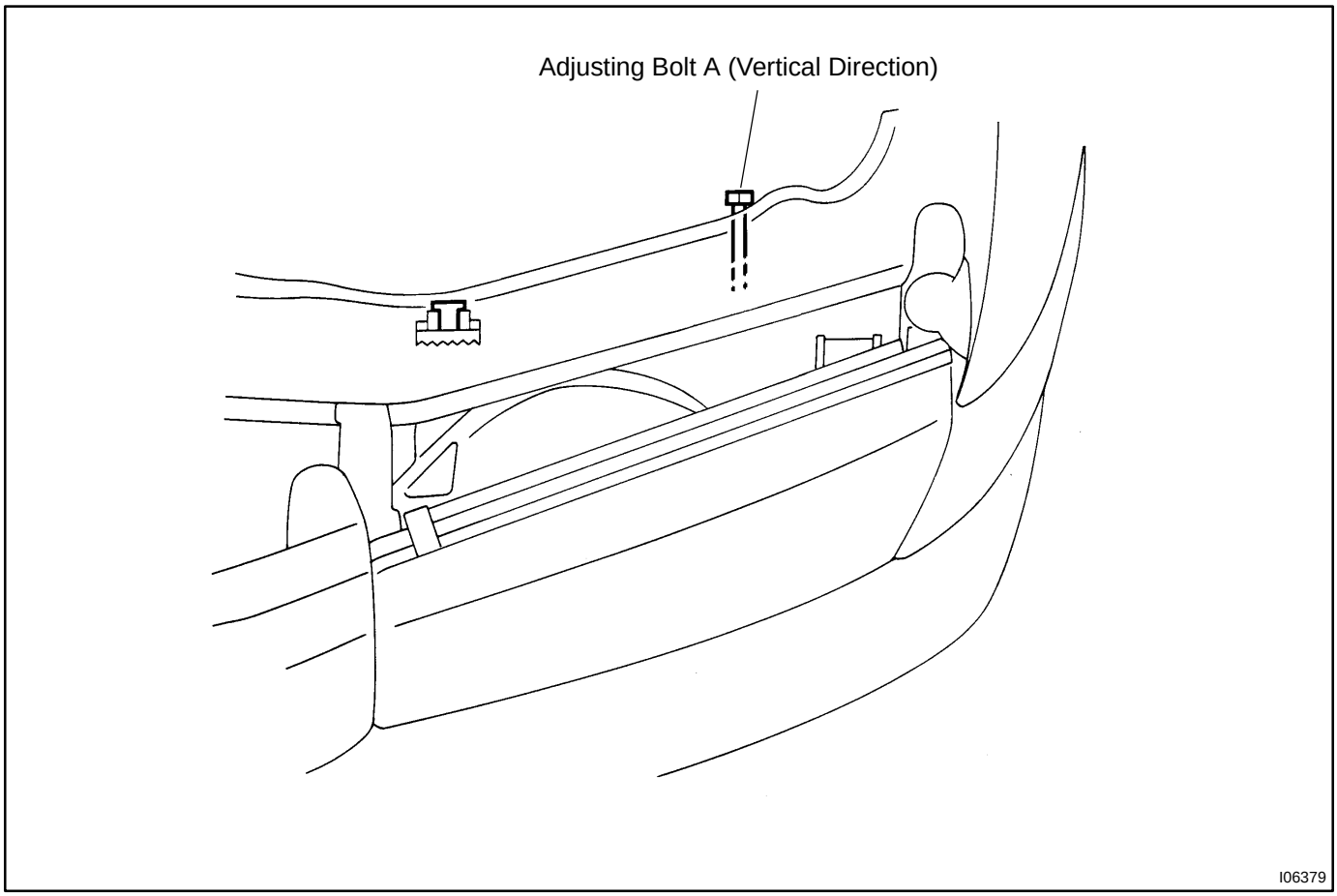
Press the switch until blinking in 6 Hz cycle stops, so that the default code for check is set.

Code deletion timing chart



BE0RS-03

ADJUSTMENT



ADJUST HEADLIGHT AIM ONLY

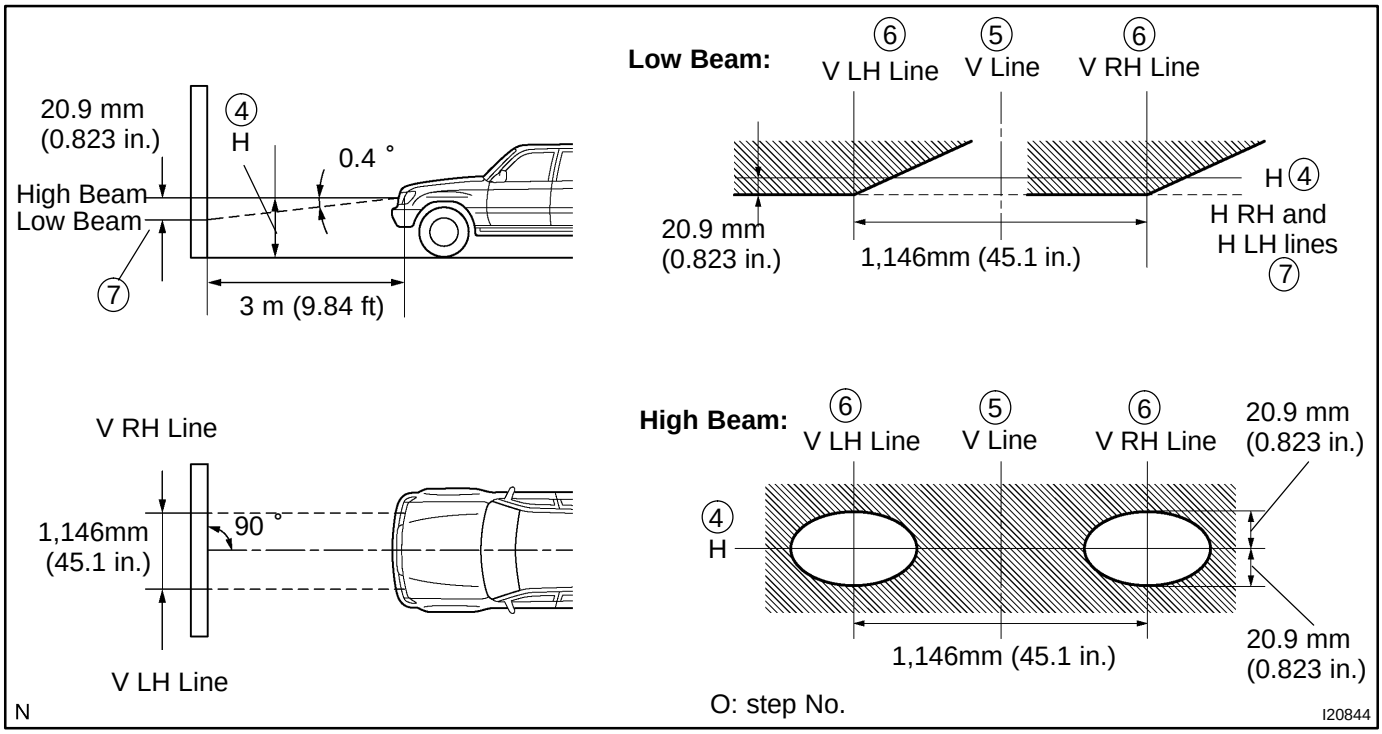
(a) Place the vehicle in the following conditions.
- The area around the headlight is not deformed.
- The vehicle is parked on a level surface.
- Tire inflation pressure is the specified value.
- A driver is in the driver's seat and the vehicle is in a state ready for driving (with a tank full).
- The vehicle has been bounced several times.

(b) Check the headlight aiming.
(1) Prepare a thick white paper.
(2) Stand the paper perpendicular to the ground at the position 9.84 ft away from the headlights.
(3) Ensure that the center line of the vehicle and the paper face forms a 90-degree angle as shown in the illustration.
(4) Draw a horizontal line (H line) on the paper, showing where the headlights should strike.
(5) Draw a vertical line (V line) to where the center line of the vehicle is to be.
(6) Draw 2 vertical lines (by connecting the low and high beam center marks) to where the both headlights should strike (V RH and V LH lines).
(7) Draw a horizontal line (by connecting the both low beam center marks) to where the headlights should strike (H RH and H LH lines).

HINT:

The H RH and H LH line is 0.4° below the horizontal line (H line) of the light axis.

(8) Start the engine.
(9) Turn the headlights ON.
(10) Check that the headlights properly strike the position shown in the illustration.
(11) If not, adjust the lights in the vertical direction.



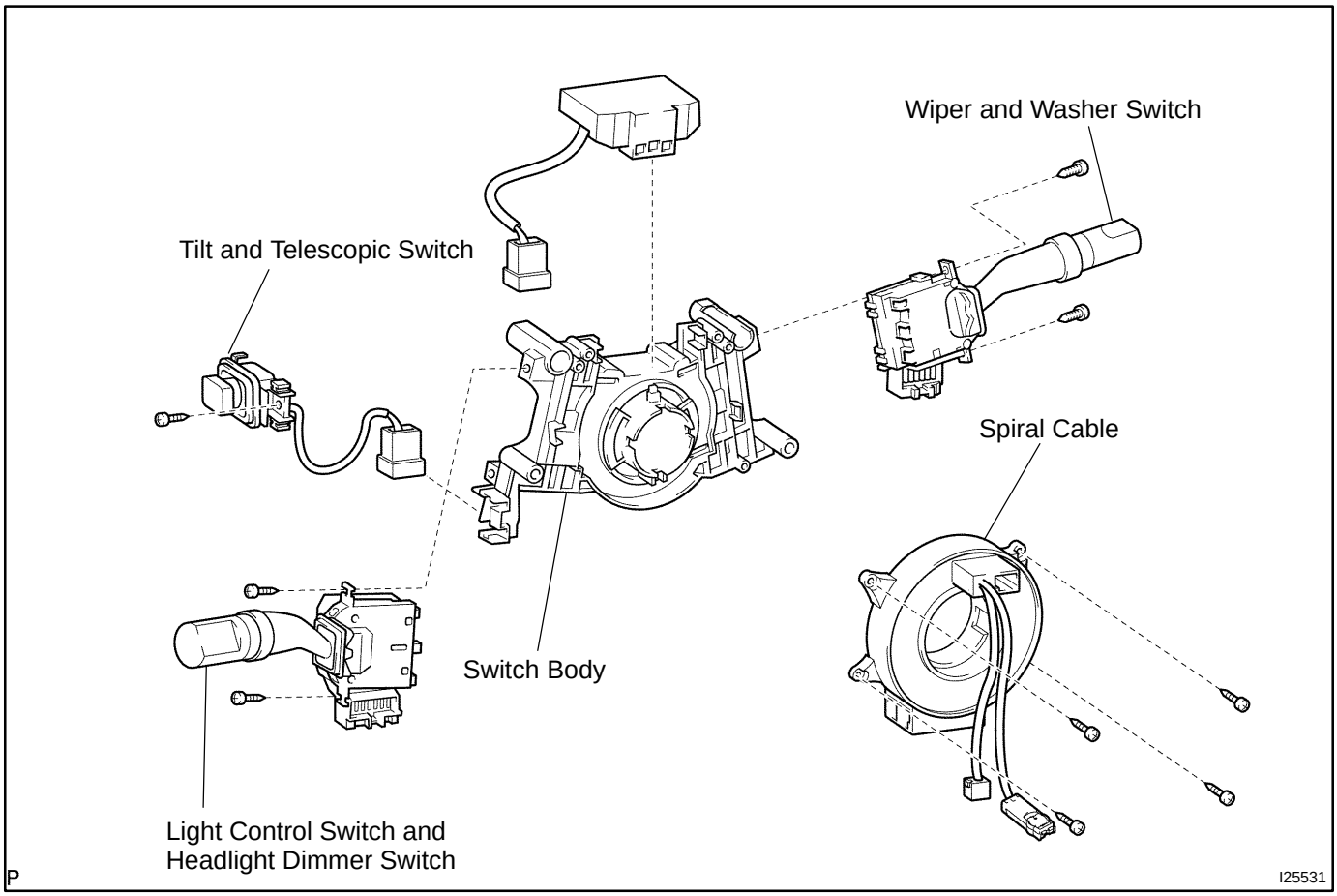
HINT:

As shown in the illustration, adjust each aim of the RH and LH lights.

(c) When adjusting it in the vertical direction:
Using adjusting bolt A, adjust the headlight aim to within the specified range.

BE0H9-08

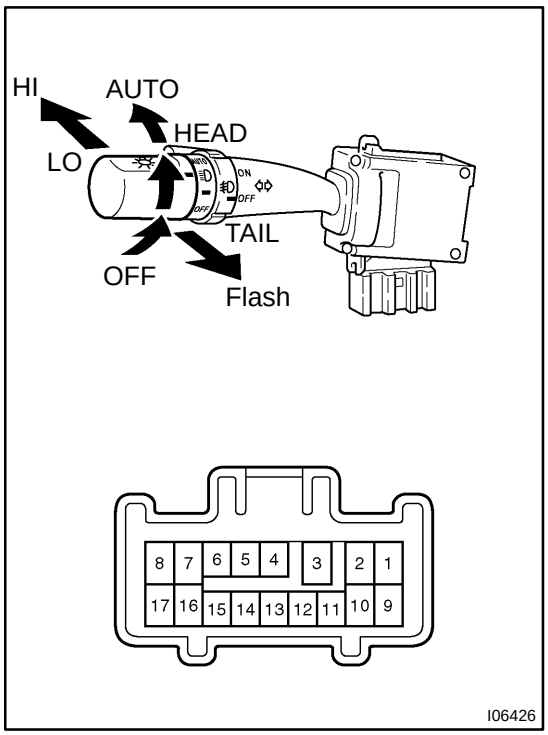
COMPONENTS



BE2EH-01

INSPECTION

1. INSPECT LIGHT CONTROL SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	-	No continuity
TAIL	14 - 16	Continuity
HEAD	13 - 14 - 16	Continuity
AUTO	12 - 16	Continuity

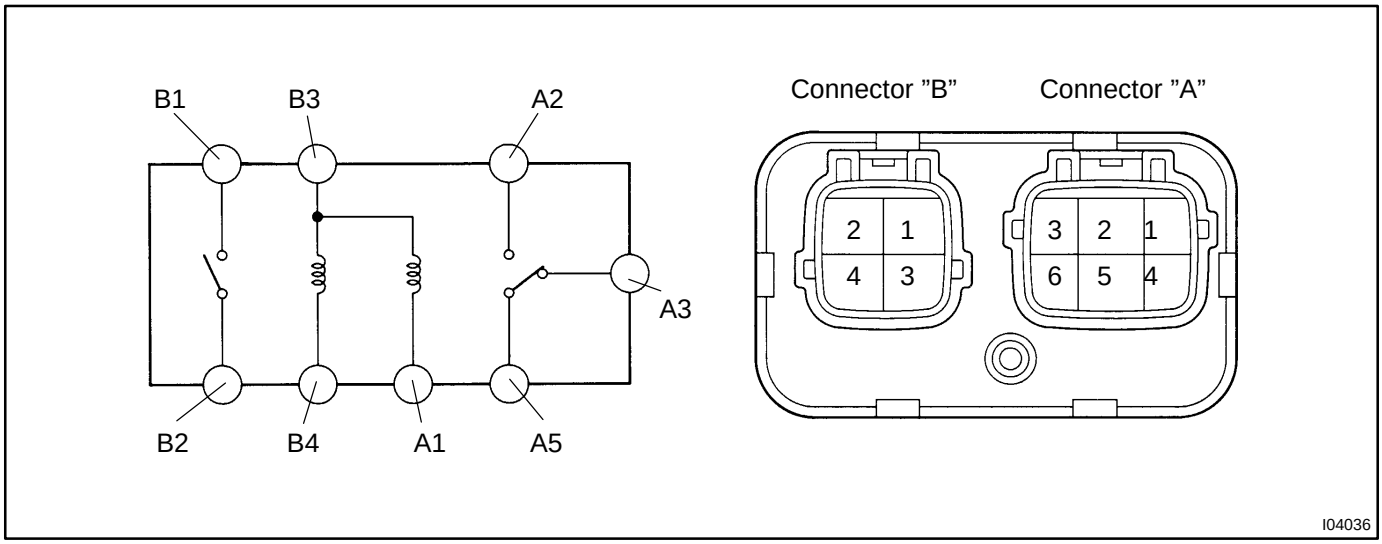
If continuity is not as specified, replace the switch.

2. INSPECT HEADLIGHT DIMMER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Low beam	16 - 17	Continuity
High beam	7 - 16	Continuity
Flash	7 - 8 - 16	Continuity

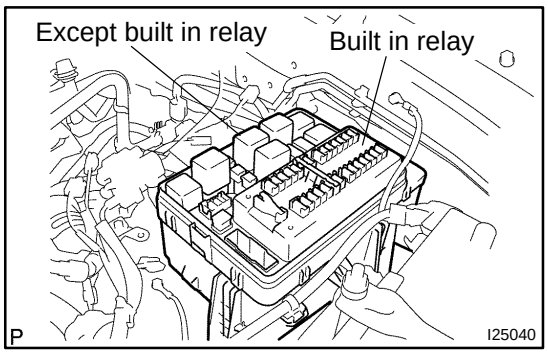
If continuity is not as specified, replace the switch.

3. INSPECT DAYTIME RUNNING LIGHT NO.3 AND NO.4 RELAY CONTINUITY



Tester connection	Condition	Specified condition
A1 - B3	Constant	Continuity
A3 - A5	Constant	Continuity
B3 - B4	Constant	Continuity
A2 - A5	Apply battery positive voltage between terminals A1 and B3.	Continuity
B1 - B2	Apply battery positive voltage between terminals B3 and B4.	Continuity

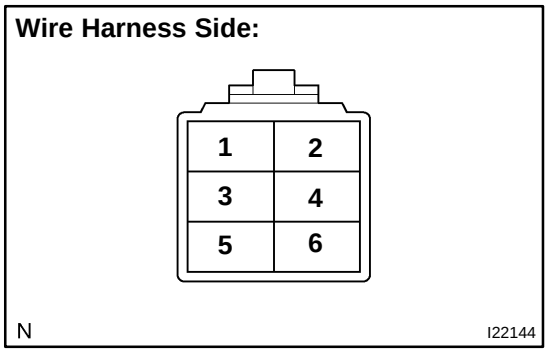
If continuity is not as specified, replace the relay.



4. INSPECT ENGINE ROOM R/B RELAY CIRCUIT (See Pase BE-15)

HINT:

The (Headlight, DIM, Tail relay) is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.



5. Connector disconnected: INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side, as shown in the chart.

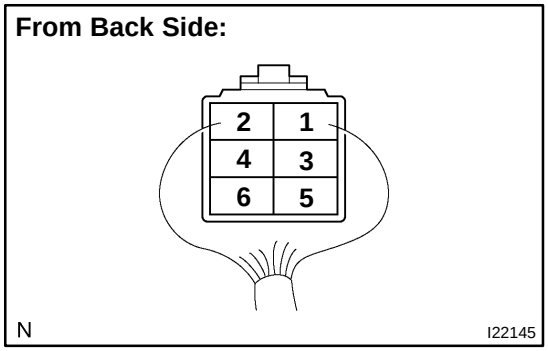
HINT:

- Ignition switch is ON.
- Light control switch is in AUTO.
- Vehicle's surroundings are bright.

Tester connection	Condition	Specified condition
6 - Ground	Constant	Continuity
3 - Ground	Close the driver's door again while the ignition switch OFF	No voltage
3 - Ground	Ignition switch position ON	5.2 - 9.0V

If circuit is as specified, perform the inspection on the following page.

If the circuits is not as specified, inspect the circuit connected to other parts.



6. Connector disconnected: INSPECT AUTOMATIC LIGHT CONTROL SENSOR CIRCUIT

Connect the wire harness side connector to the sensor and inspect wire harness side connector from the back side, as shown.

HINT:

- Ignition switch is ON.
- Light control switch is in AUTO.
- Vehicle's surroundings are bright.

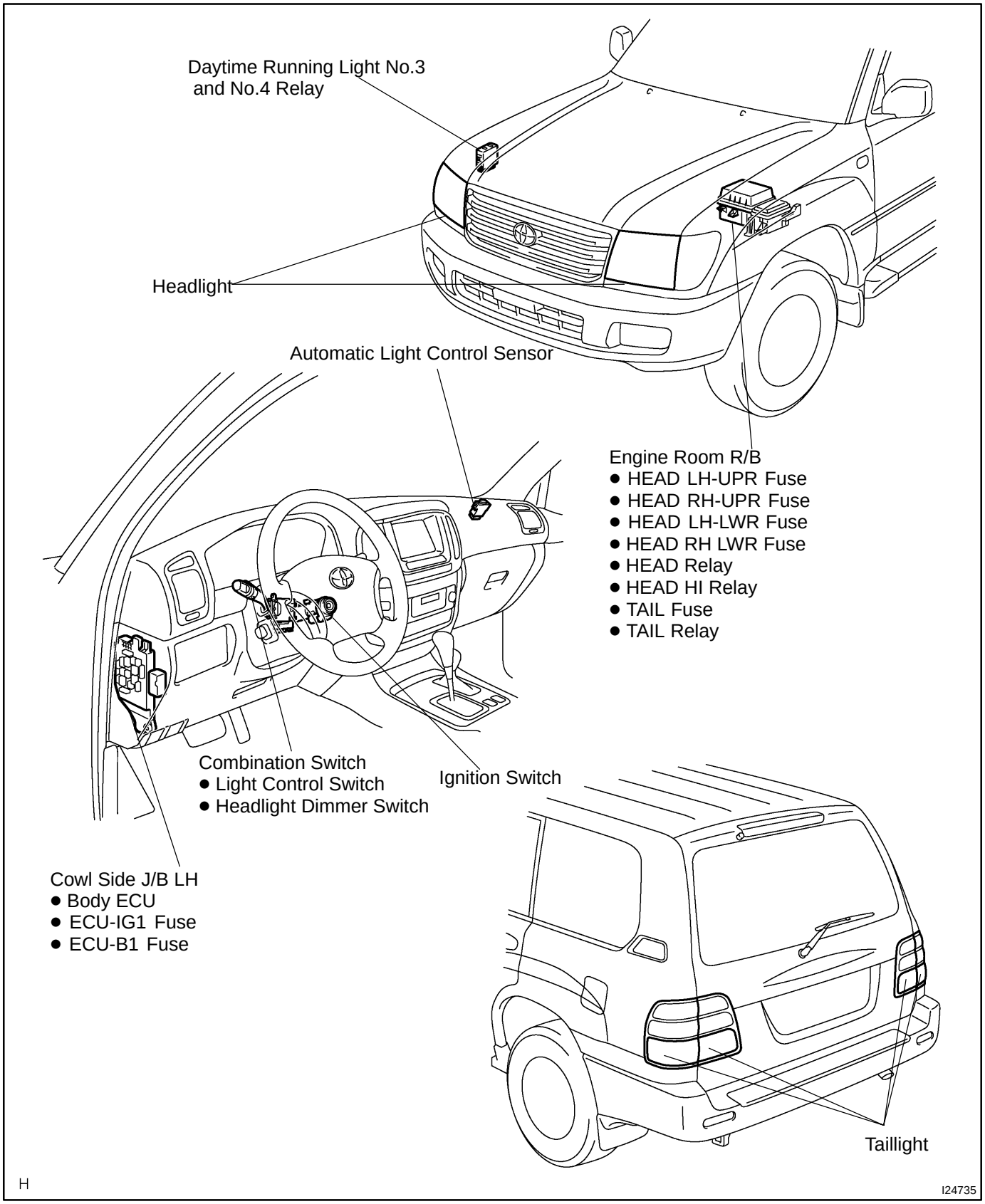
Tester connection	Condition	Specified condition
4 - Ground (CLTS - Body ground)	Constant	Pulse generation
3 - Ground (CLTB - Body ground)	Ignition switch ON	10 - 14V

If the circuits is not as specified, try replacing the sensor with a new one.

HEADLIGHT AND TAILLIGHT SYSTEM

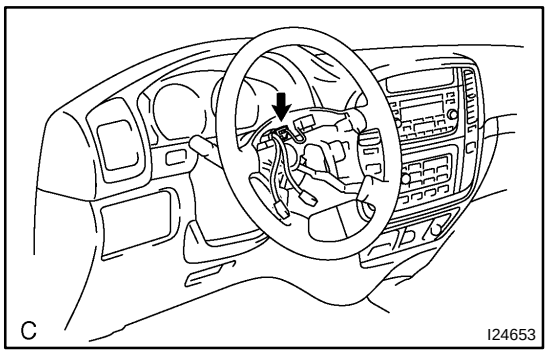
BE0H8-11

LOCATION



BE0FZ-19

INSPECTION

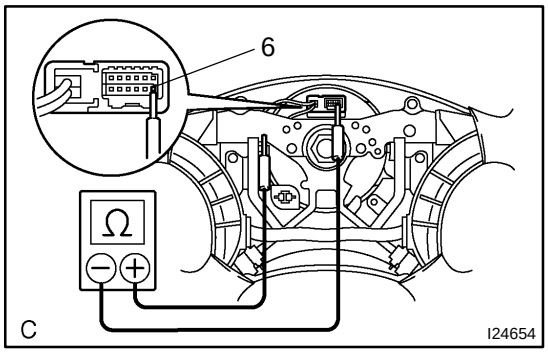


1. INSPECT HORN SWITCH

(a) Disconnect the negative (-) terminal from the battery.
(b) Remove the left and right covers from the steering wheel.
(c) Using a torx socket wrench, loosen the 2 bolts.
(d) Pull up the horn pad and place it on the steering column, as shown.

HINT:
Do not disconnect the connector from the horn pad.

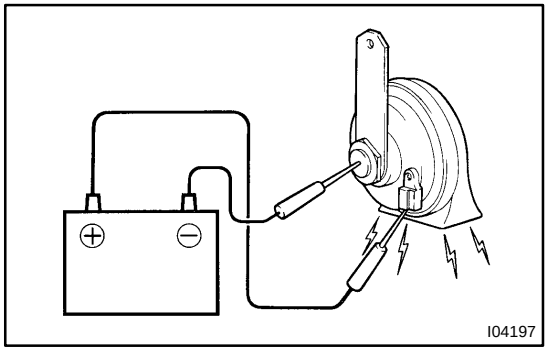
(e) Disconnect the connector from the slip ring.



(f) Check that no continuity exists between terminal 6 of the connector and body ground.
(g) Check that continuity exists between terminal 6 of the connector and body ground when the horn contact plate is pressed against the steering spoke assembly.

If continuity is not as specified, repair or replace the steering wheel or wire harness as necessary.

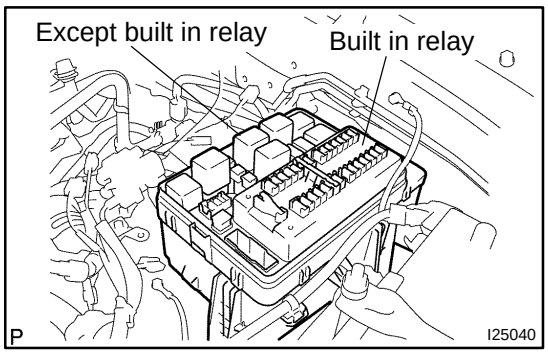
(h) Install the horn pad in place and using a torx socket wrench, torque the 2 bolts.
Torque: 7.1 N·m (72 kgf·cm, 62 in.·lbf)
(i) Install the left and right covers.
(j) Connect the negative (-) terminal to the battery.



2. INSPECT HORN OPERATION

Connect the positive (+) lead from the battery to the terminal and negative (-) lead to the horn body and check that the horn blows.

If operation is not as specified, replace the horn.



3. INSPECT ENGINE ROOM R/B RELAY CIRCUIT (See Pase BE-15)

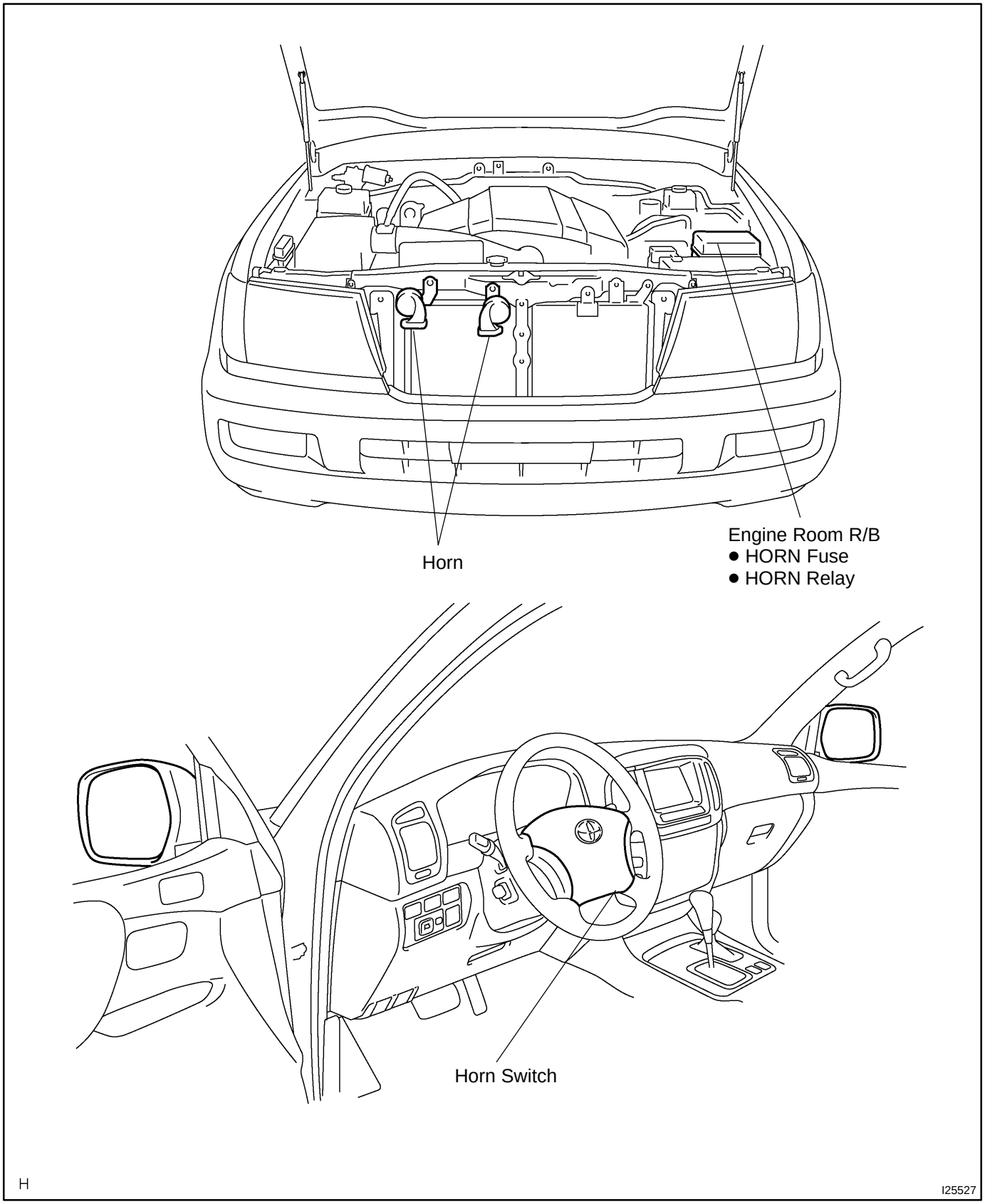
HINT:

The horn relay is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.

HORN SYSTEM

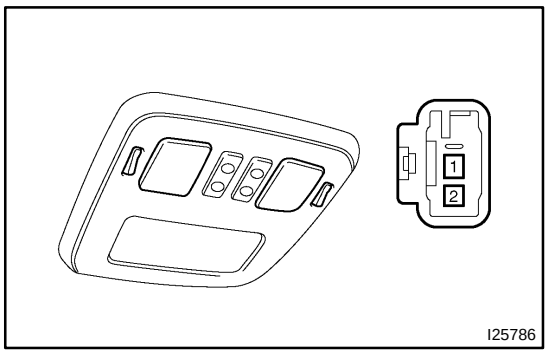
LOCATION

BE0FY-27



BE2EG-01

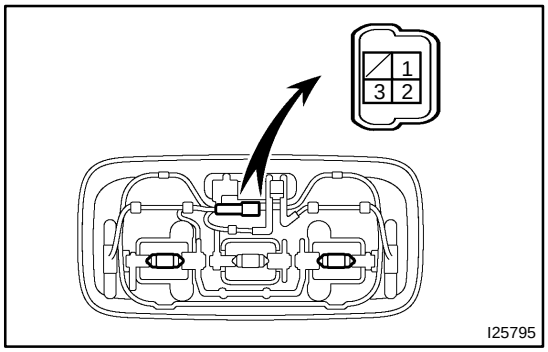
INSPECTION



1. INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 2	Continuity

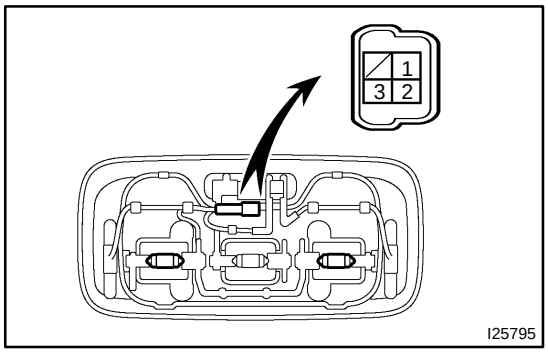
If continuity is not as specified, replace the light assembly or bulb.



2. INSPECT REAR PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 3	Continuity

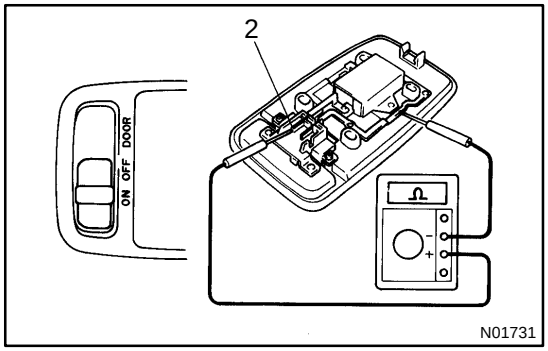
If continuity is not as specified, replace the light assembly or bulb.



3. INSPECT ROOM LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Room Light Switch OFF	-	No continuity
Room Light Switch DOOR	2 - 3	Continuity
Room Light Switch ON	1 - 3	Continuity

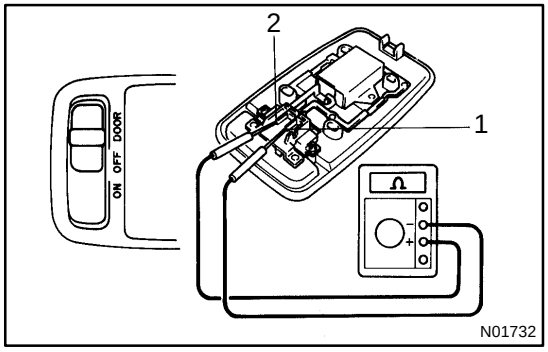
If continuity is not as specified, replace the light assembly or bulb.



4. INSPECT REAR ROOM LIGHT SWITCH CONTINUITY

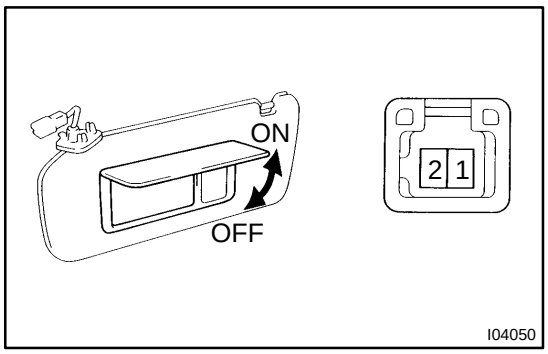
(a) Disconnect the connector from room light assembly.

(b) Turn the room light switch ON, check that continuity exists between terminal 2 and body ground.



(c) Turn the room light switch DOOR, check that continuity exists between terminal 1 and 2.

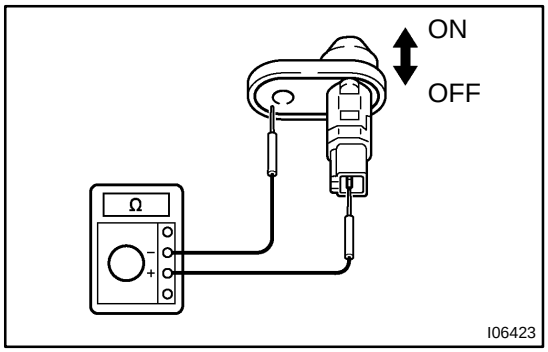
If operation is not as specified, replace the light assembly or bulb.



5. INSPECT VANITY LIGHT CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the vanity light assembly or bulb.

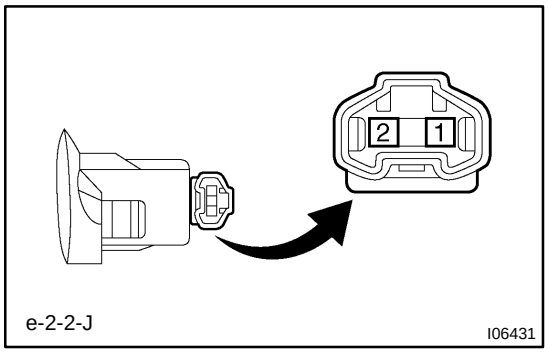


6. INSPECT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminal and switch body with the switch ON (switch pin released).

(b) Check that no continuity exists between terminal and switch body with the switch OFF (switch pin pushed).

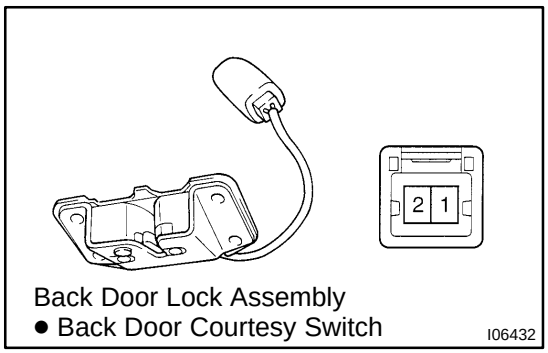
If continuity is not as specified, replace the switch.



7. INSPECT DOOR COURTESY LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

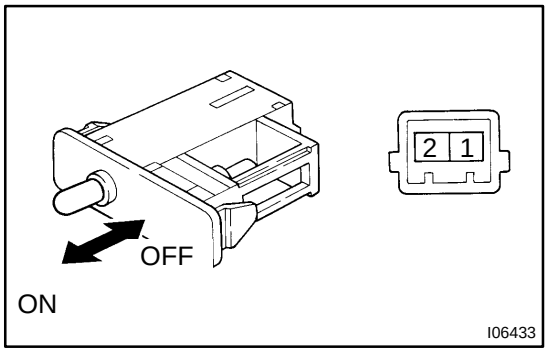
If continuity is not as specified, replace the light assembly or bulb.



8. INSPECT BACK DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

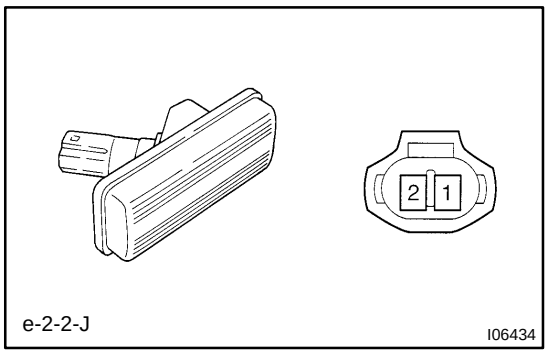
If continuity is not as specified, replace the back door lock assembly.



9. INSPECT GLOVE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the switch.



10. INSPECT LICENCE PLATE LIGHT CONTINUITY

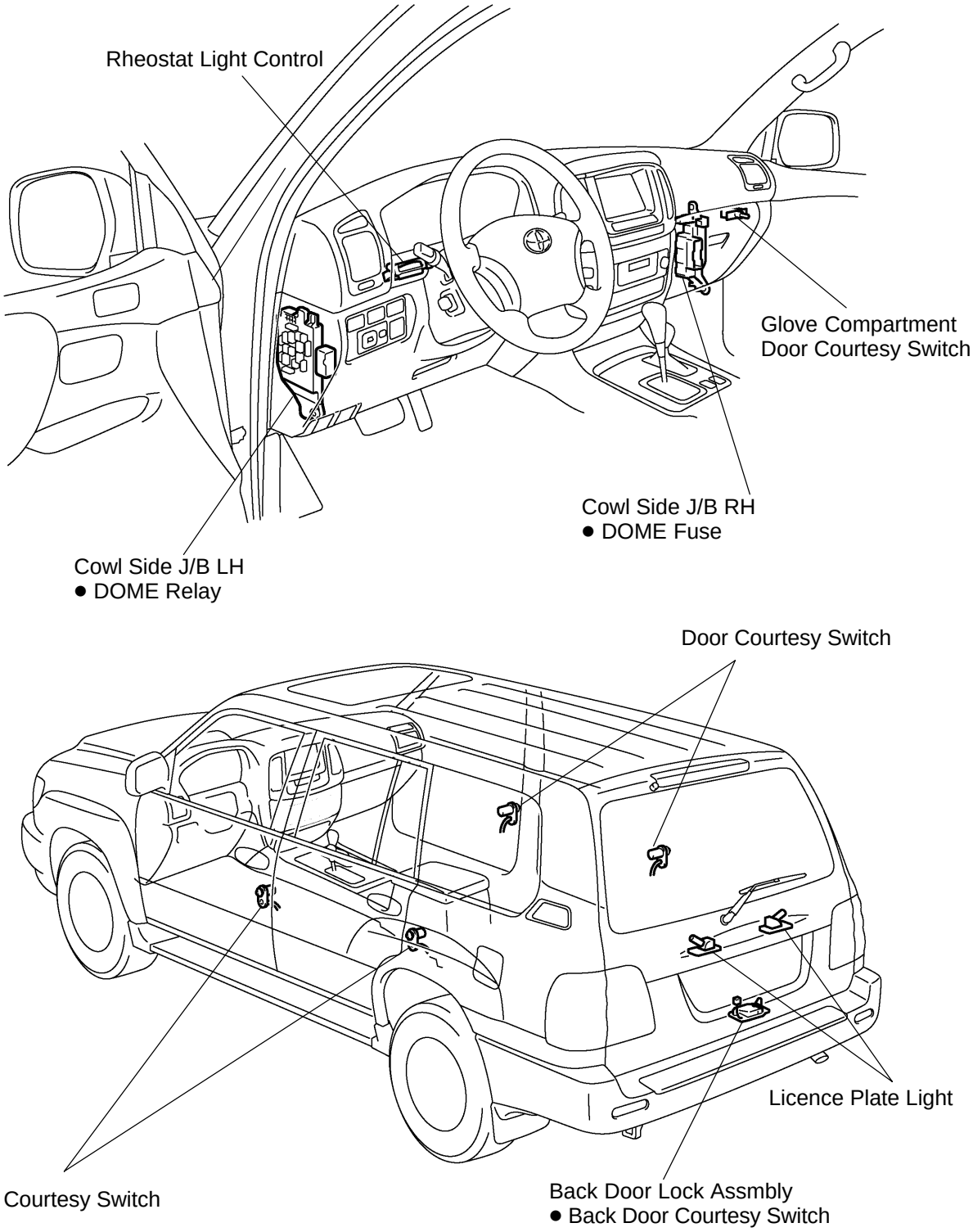
Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.

INTERIOR LIGHT SYSTEM

LOCATION

BE0RW-03



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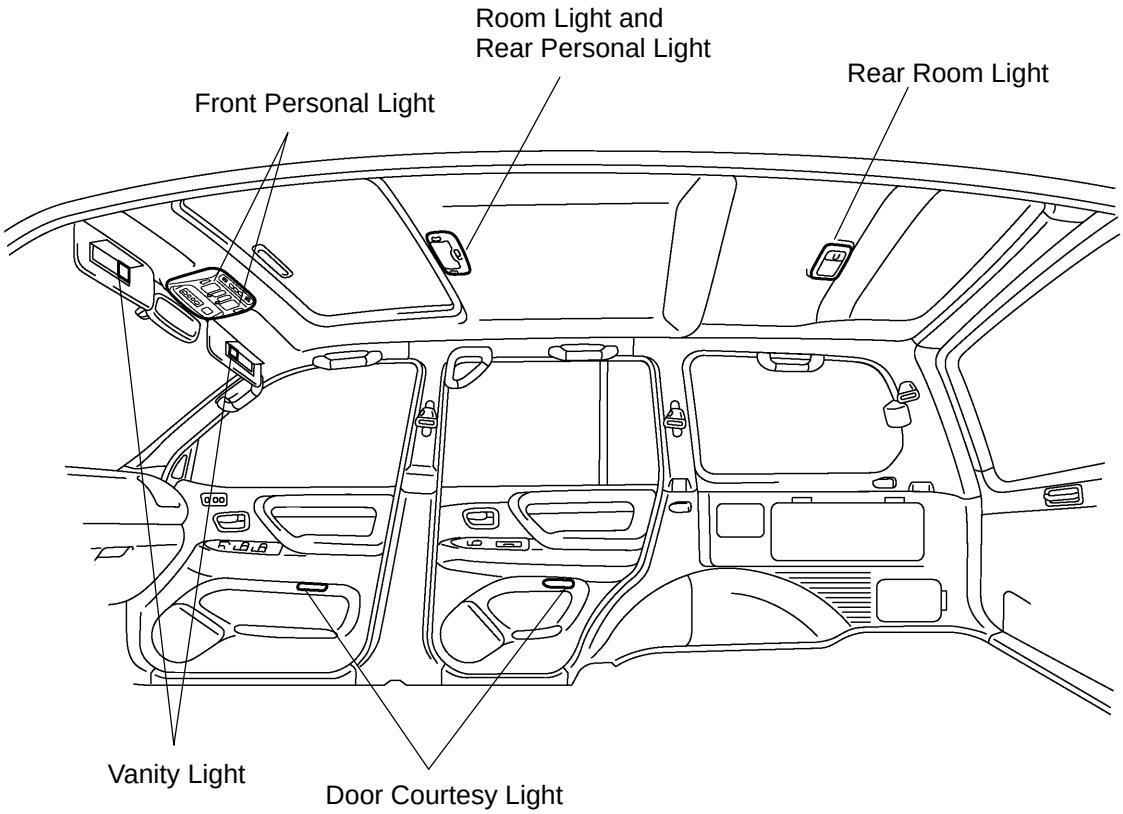
Room Light and
Rear Personal Light
Rear Room Light
Front Personal Light
Vanity Light
Door Courtesy Light
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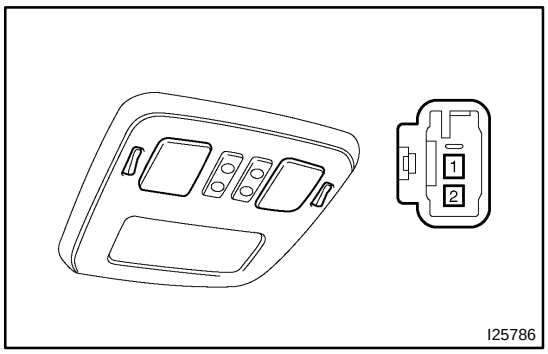
BE2EG-01

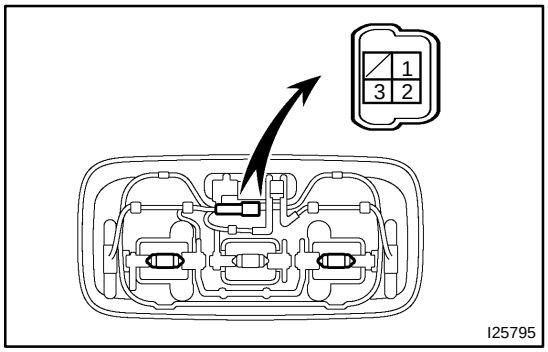
INSPECTION



1. INSPECT FRONT PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 2	Continuity

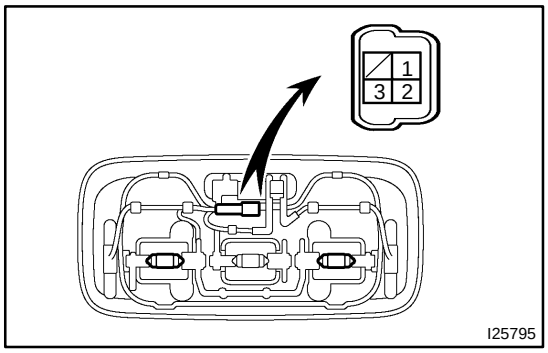
If continuity is not as specified, replace the light assembly or bulb.



2. INSPECT REAR PERSONAL LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
ON	1 - 3	Continuity

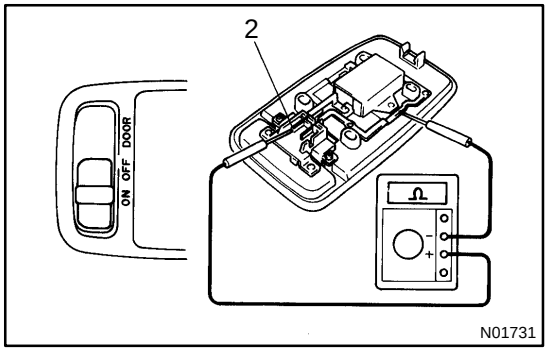
If continuity is not as specified, replace the light assembly or bulb.



3. INSPECT ROOM LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Room Light Switch OFF	-	No continuity
Room Light Switch DOOR	2 - 3	Continuity
Room Light Switch ON	1 - 3	Continuity

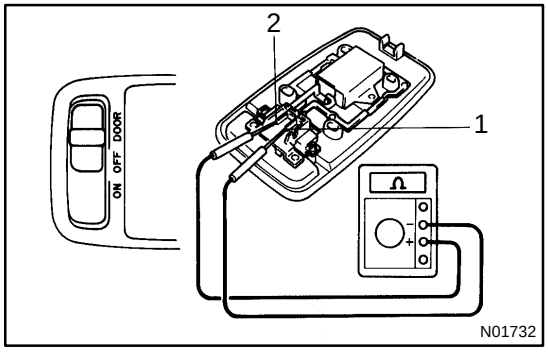
If continuity is not as specified, replace the light assembly or bulb.



4. INSPECT REAR ROOM LIGHT SWITCH CONTINUITY

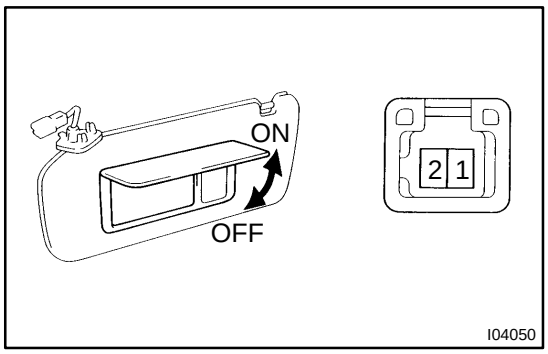
(a) Disconnect the connector from room light assembly.

(b) Turn the room light switch ON, check that continuity exists between terminal 2 and body ground.



(c) Turn the room light switch DOOR, check that continuity exists between terminal 1 and 2.

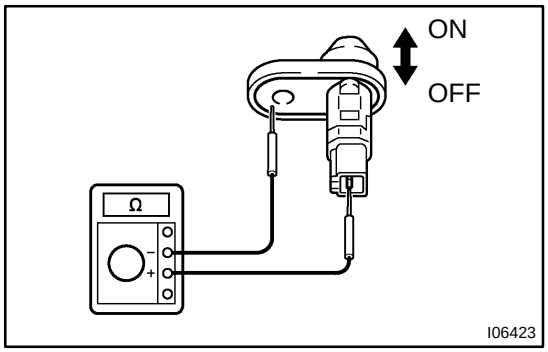
If operation is not as specified, replace the light assembly or bulb.



5. INSPECT VANITY LIGHT CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the vanity light assembly or bulb.

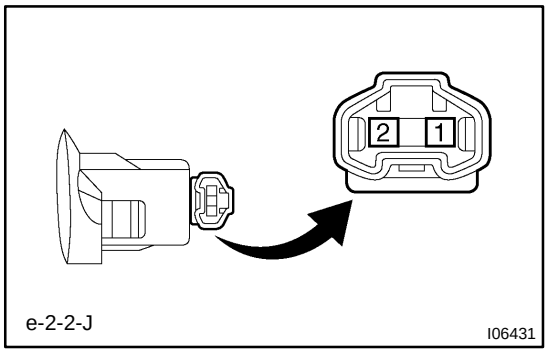


6. INSPECT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminal and switch body with the switch ON (switch pin released).

(b) Check that no continuity exists between terminal and switch body with the switch OFF (switch pin pushed).

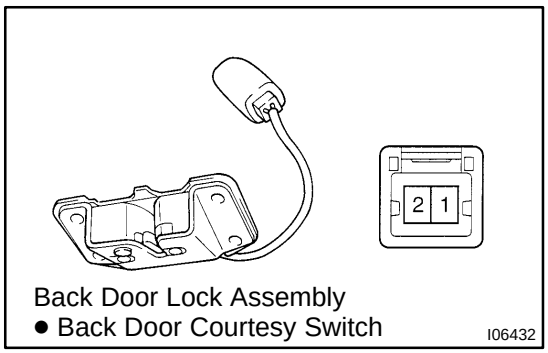
If continuity is not as specified, replace the switch.



7. INSPECT DOOR COURTESY LIGHT CONTINUITY

Using an ohmmeter, check that continuity exists between terminals.

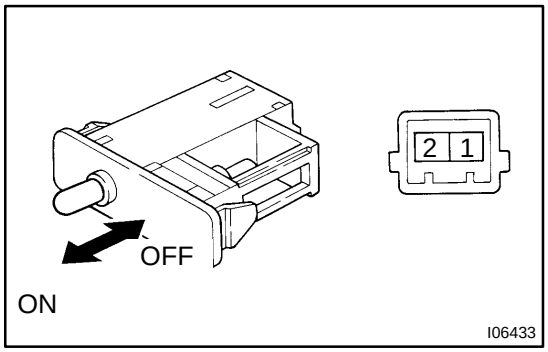
If continuity is not as specified, replace the light assembly or bulb.



8. INSPECT BACK DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

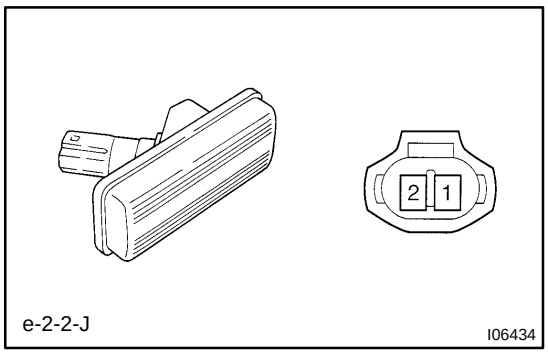
If continuity is not as specified, replace the back door lock assembly.



9. INSPECT GLOVE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (closed)	-	No continuity
ON (opened)	1 - 2	Continuity

If continuity is not as specified, replace the switch.



10. INSPECT LICENCE PLATE LIGHT CONTINUITY

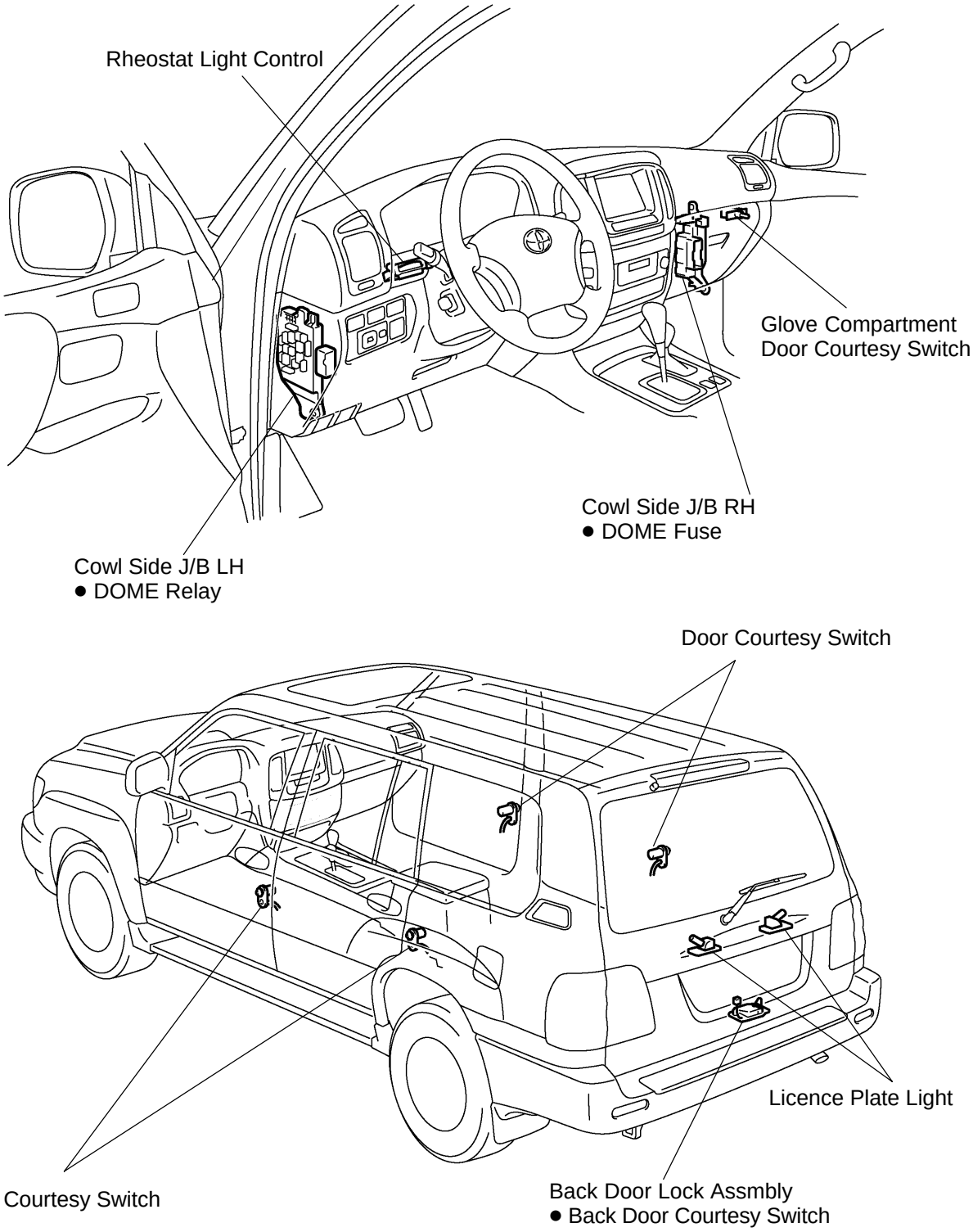
Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly or bulb.

INTERIOR LIGHT SYSTEM

LOCATION

BE0RW-03



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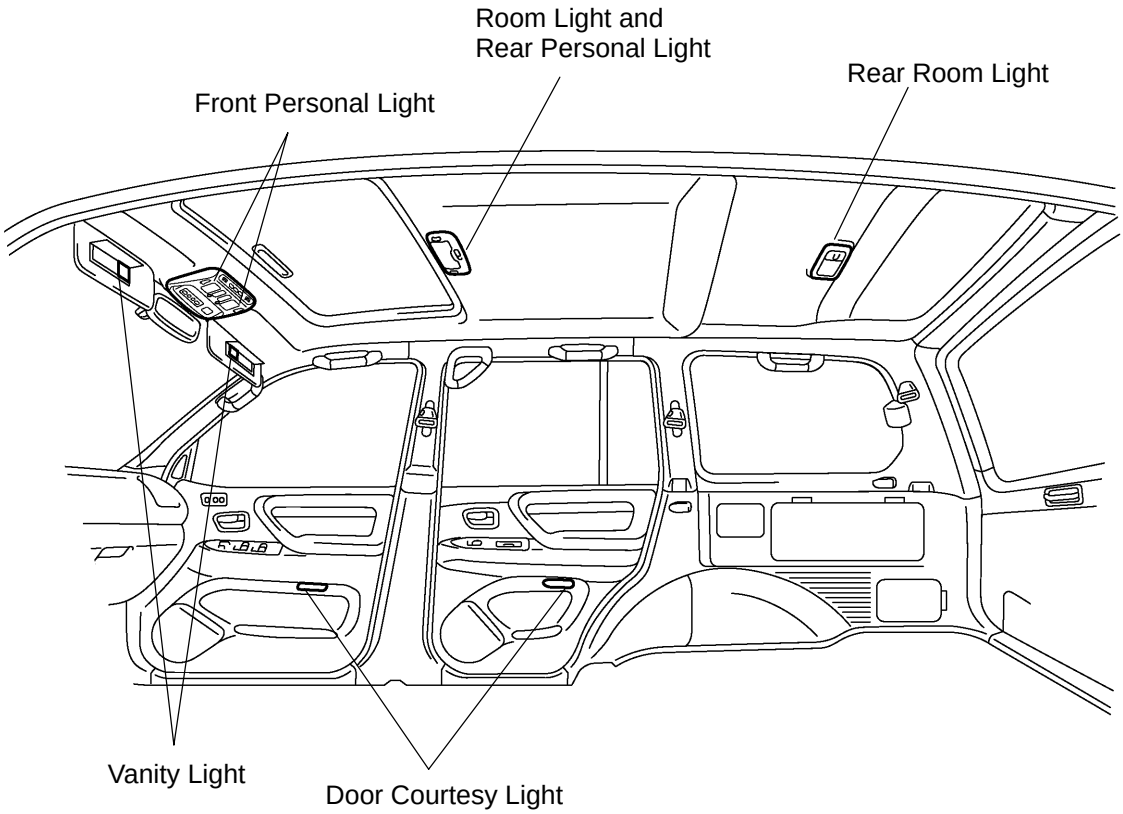
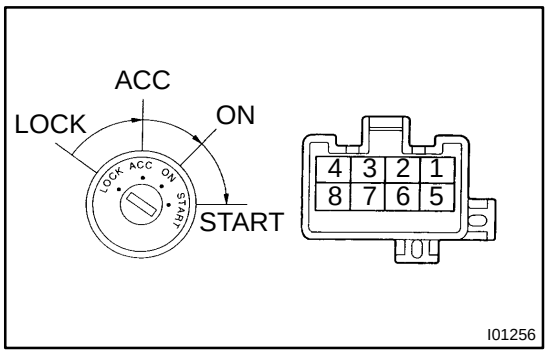

Room Light and
Rear Personal Light
Rear Room Light
Front Personal Light
Vanity Light
Door Courtesy Light
H
I24739

BE0RO-03

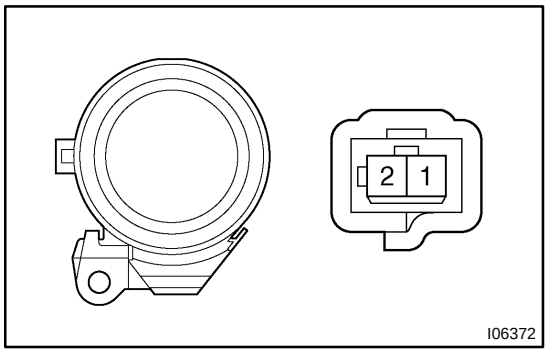


INSPECTION

1. INSPECT IGNITION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	-	No continuity
ACC	2 - 3	Continuity
ON	2 - 3 - 4 6 - 7	Continuity
START	1 - 2 - 4 6 - 7 - 8	Continuity

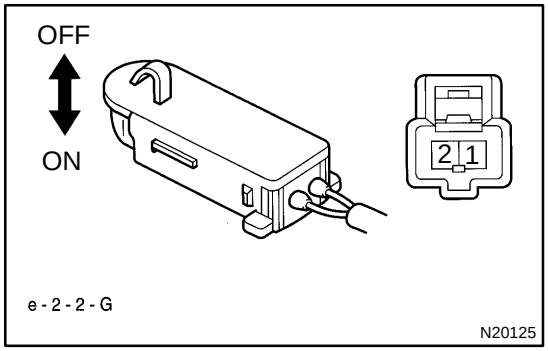
If continuity is not as specified, replace the switch.



2. INSPECT IGNITION KEY ILLUMINATION OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the indicator light lights up.

If operation is not as specified, replace the switch.



3. INSPECT KEY UNLOCK WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Key removed)	-	No continuity
ON (Key set)	1 - 2	Continuity

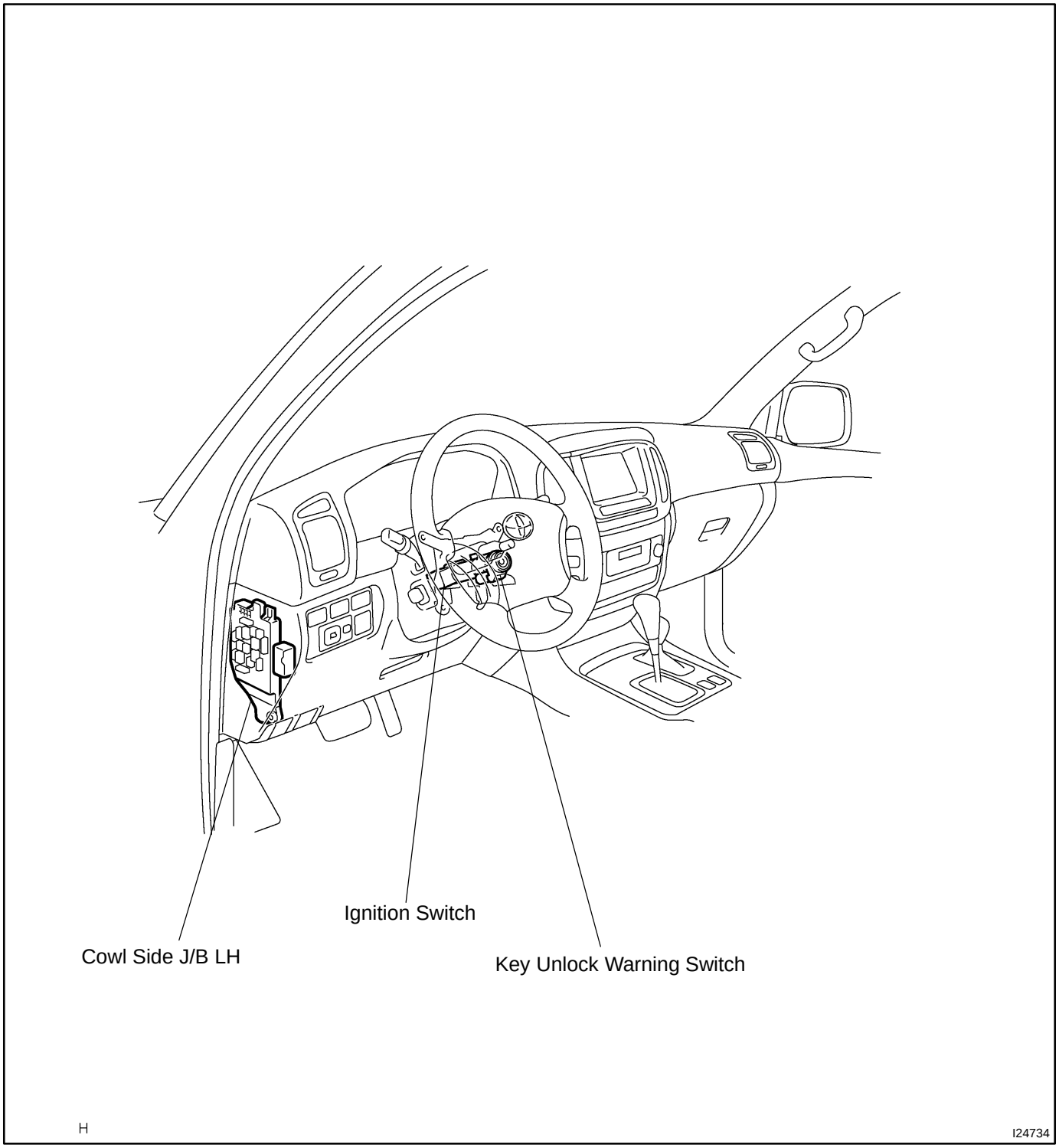
If continuity is not as specified, replace the switch.

Connect the switch connector and inspect the connector on wire harness side from the back side, as shown.

IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

BE01L-17

LOCATION



MULTI DISPLAY

TROUBLESHOOTING

BE2E1-01

HINT:

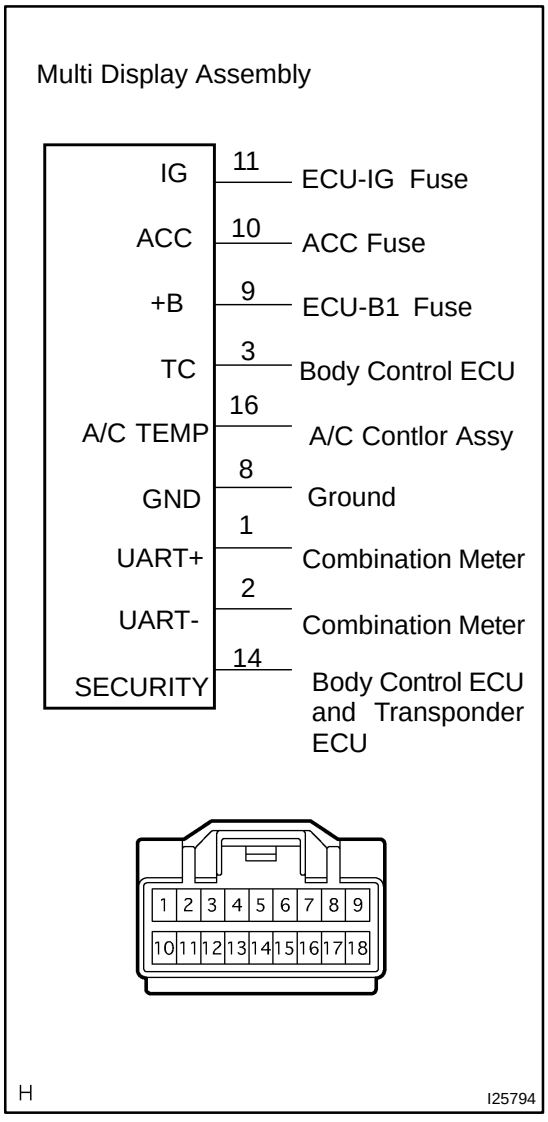
- Troubleshoot the Multi Display according to the table below.
- w/ Navigation System (See PageDI-1 151)

Troubleshooting	No.
Multi disolay does not operate.	1
Clock loses or gains time.	2
Drive monitor function malfunction.	3
Outer temperature display malfunction.	4
Security indicator does not light up.	(See page DI-953)

± 1.5 seconds / day

1. TROUBLESHOOTING NO.1

1	**MULTI DISPLAY DOES NOT OPERATE**



(a) Check that the battery positive voltage is 10 - 16 V.

If voltage is not as specified, replace the battery.

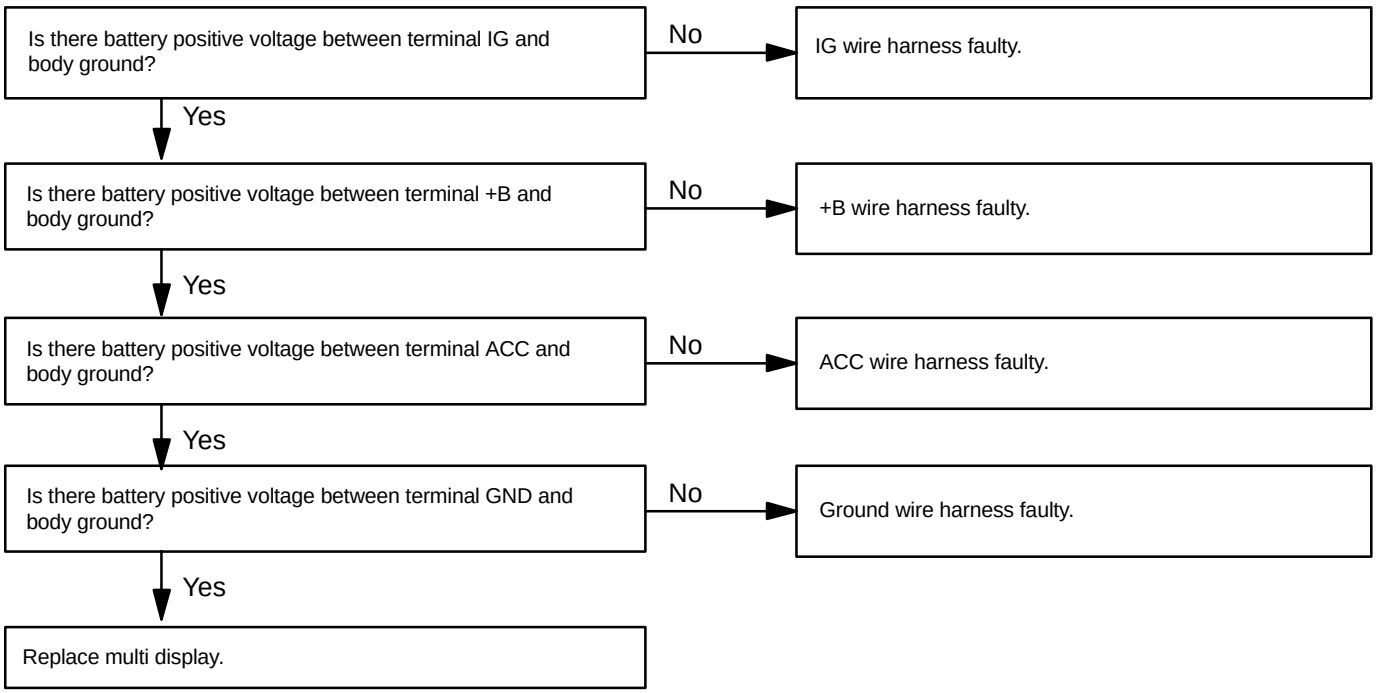
(b) Check that the ECU-IG, ECU-B and ACC fuses are not blown.

If the fuse is blown, replace the fuse and check for short.

(c) Troubleshoot the multi display as follows.

HINT:

Inspect the connector on the wire harness side.



2. TROUBLESHOOTING NO.2

2	**CLOCK LOSES OR GAINS TIME**

(a) Check that the battery positive voltage is 10 - 16 V.

If voltage is not as specified, replace the battery.

(b) Inspect the error of the clock.

Allowable error (per day): ± 1.5 seconds

If the error exceeds the allowable error, replace the multi display.

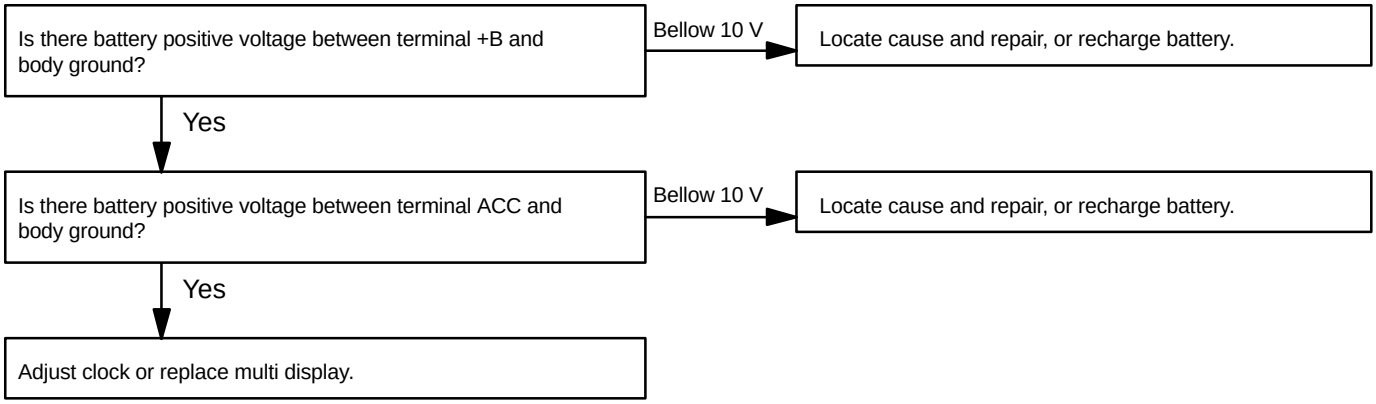
(c) Check that the clock adjusting button is sticking in position and has failed to return.

If the error exceeds the allowable error, replace the multi display.

(d) Troubleshoot the clock as follows.

HINT:

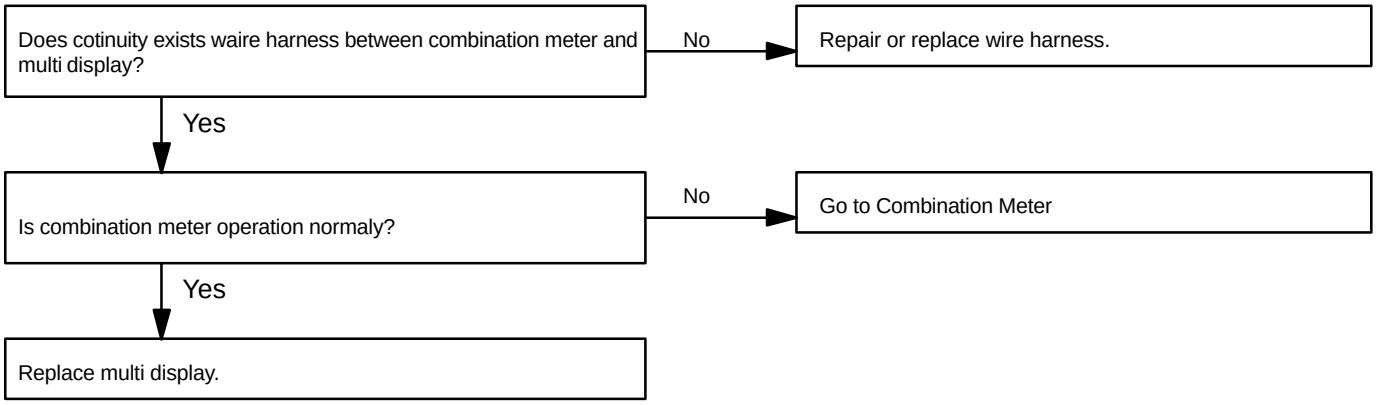
Inspect the connector on the wire harness side.



3. TROUBLESHOOTING NO.3

3	DRIVE MONITOR FUNCTION MALFUNCTION

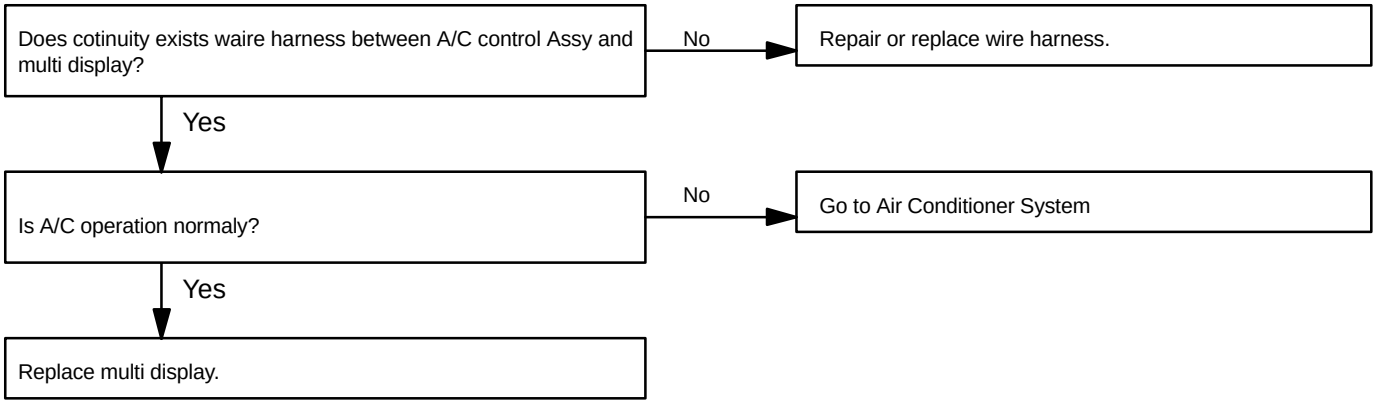
(a) Check that the battery positive voltage is 10 - 16 V.
If voltage is not as specified, replace the battery.
(b) Troubleshoot the drive monitor function as follows.
HINT:
Inspect the connector on the wire harness side.



4. TROUBLESHOOTING NO.4

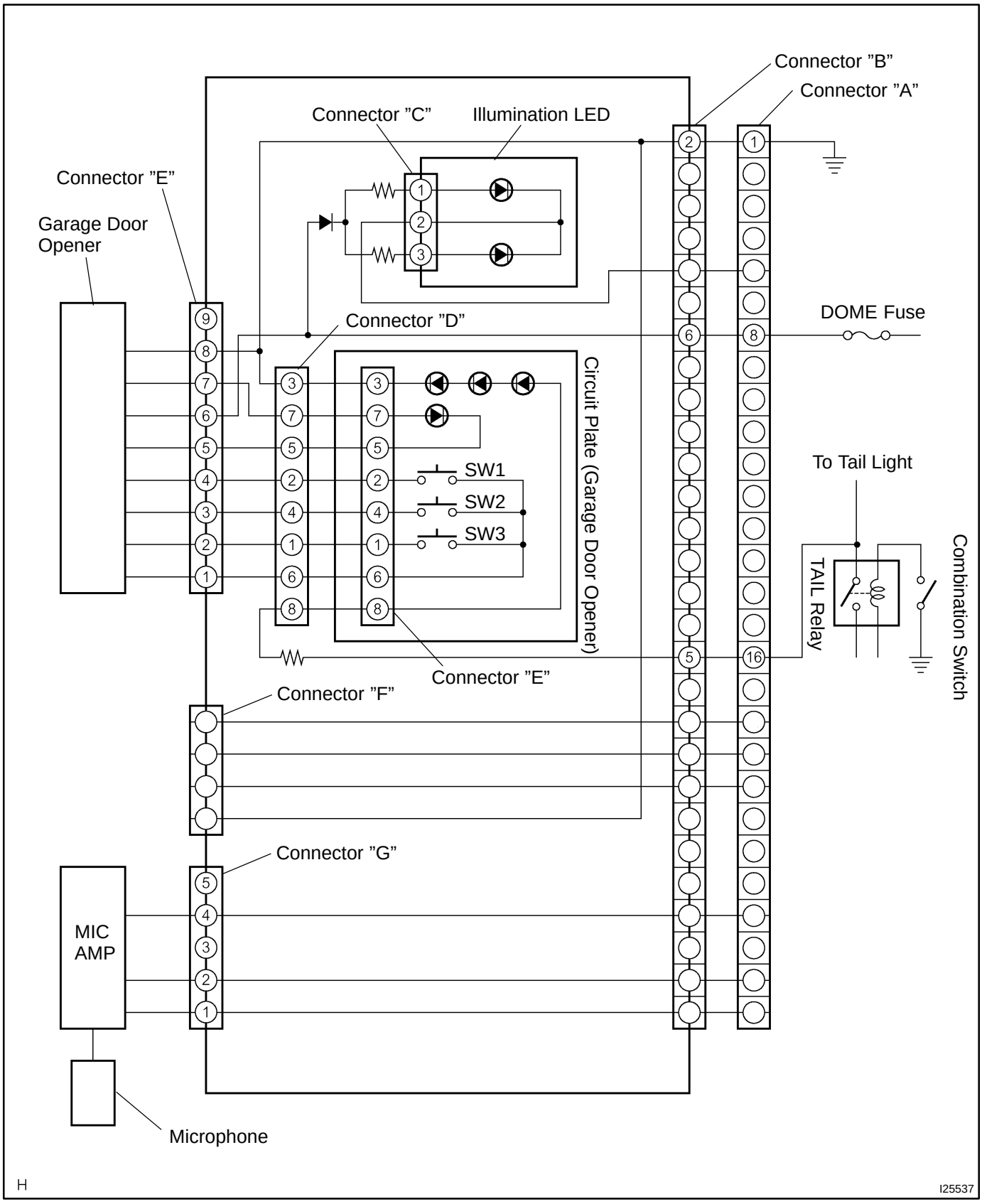
4	OUTER TEMPERATURE DISPLAY MALFUNCTION

(a) Check that the battery positive voltage is 10 - 16 V.
If voltage is not as specified, replace the battery.
(b) Troubleshoot the outer temperature display as follows.
HINT:
Inspect the connector on the wire harness side.



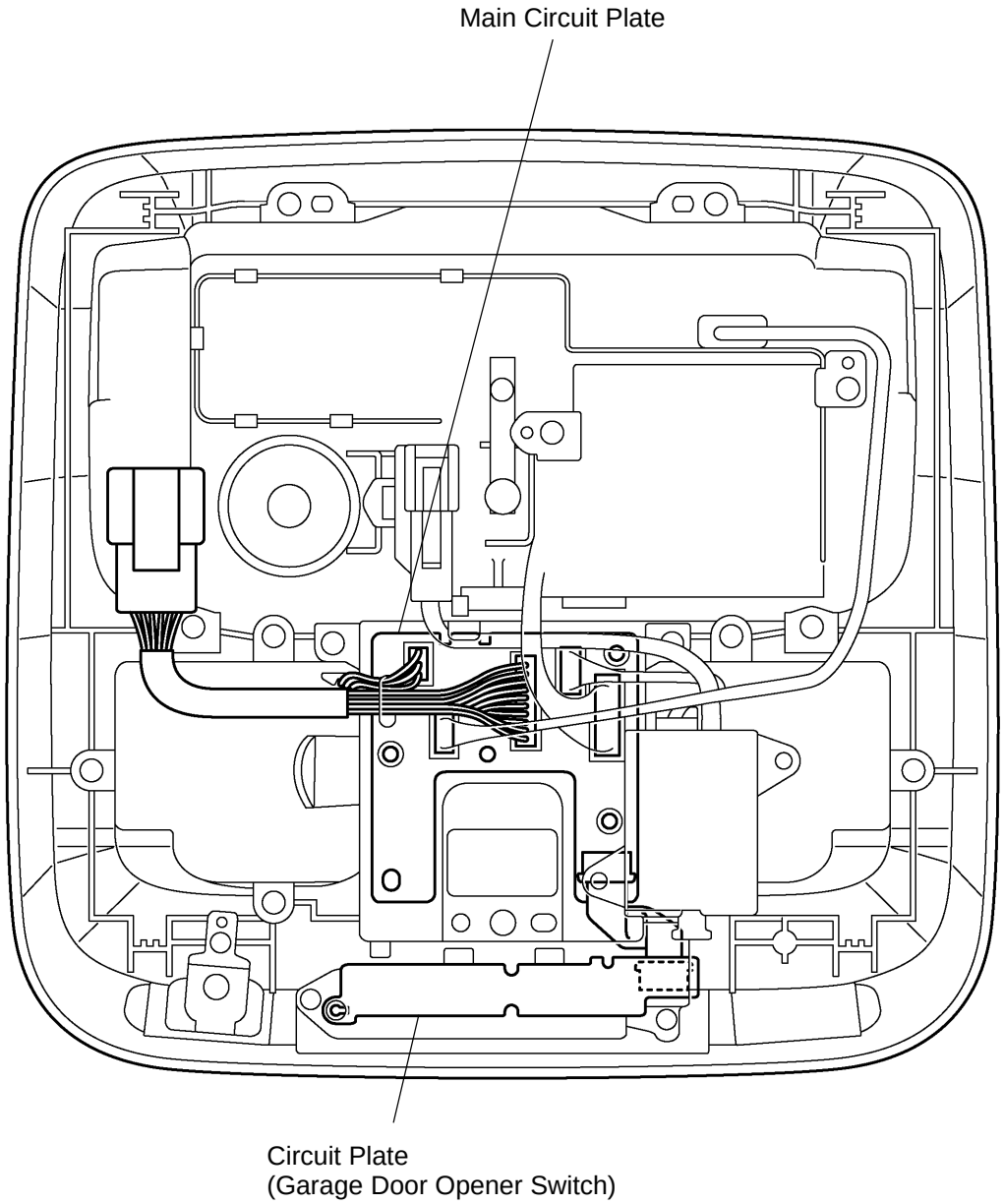
BE2E5-01

CIRCUIT



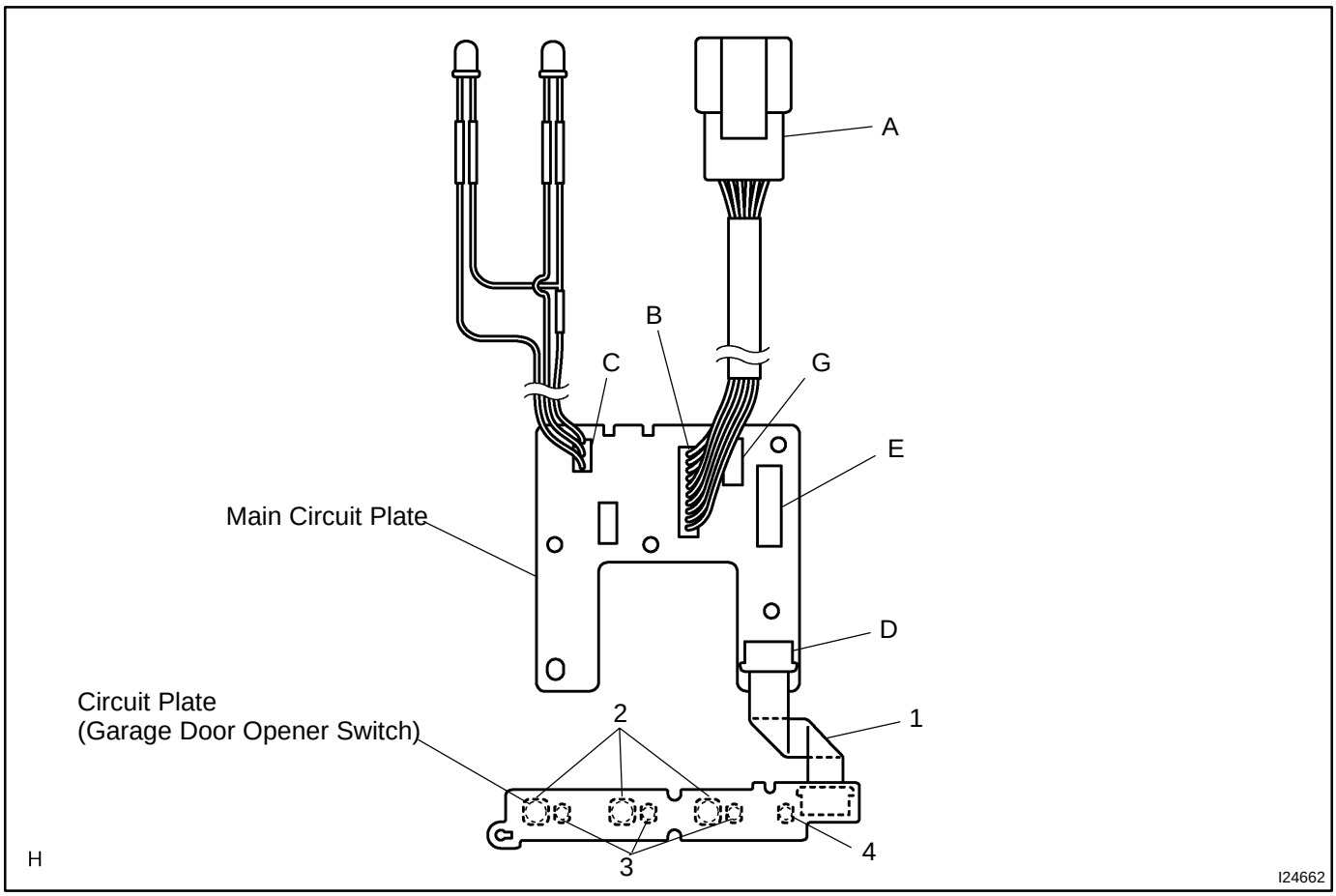
BE2E6-01

COMPONENTS



H

I24661



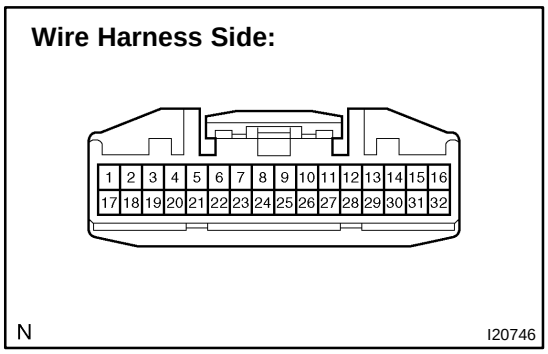
Parts No.	Connector name	Related to systems
A, B	Vehicle wire harness connector	-
C	Overhead console illumination connector (Unbar)	Overhead junction block illumination
D	Garage door opener ECU connector	Garage door opener system
E	Garage door opener ECU connector	Garage door opener system
G	Voice recognition connector	Navigation system
1	Garage door opener substrate flat harness connector	Garage door opener system
2	Garage door opener switch	Garage door opener system
3	Garage door opener LED (Green)	Garage door opener system
4	Garage door opener operate indicator LED (Red)	Garage door opener system

BE2E7-01

INSPECTION

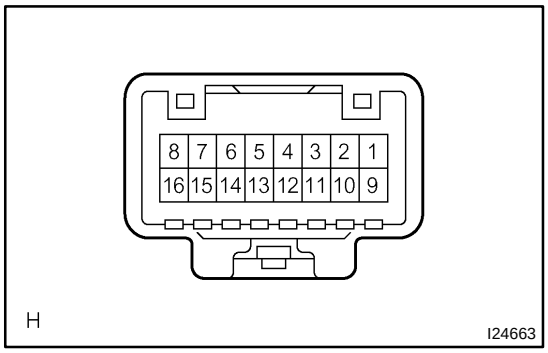
1. INSPECT OVERHEAD JUNCTION BLOCK ASSEMBLY

Disconnect the connector from the overhead J/B and inspect the connector on the wire harness side, as shown.



Tester connection	Condition	Specified condition
1 - Ground	Constant	Continuity
8 - Ground	Constant	Battery positive voltage
11 - Ground	Ignition switch OFF or ACC	No voltage
	Ignition switch ON	Battery positive voltage

If continuity is not as specified, repair or replace the wire harness.



2. Overhead J/B side:
INSPECT OVERHEAD JUNCTION BLOCK ASSEMBLY

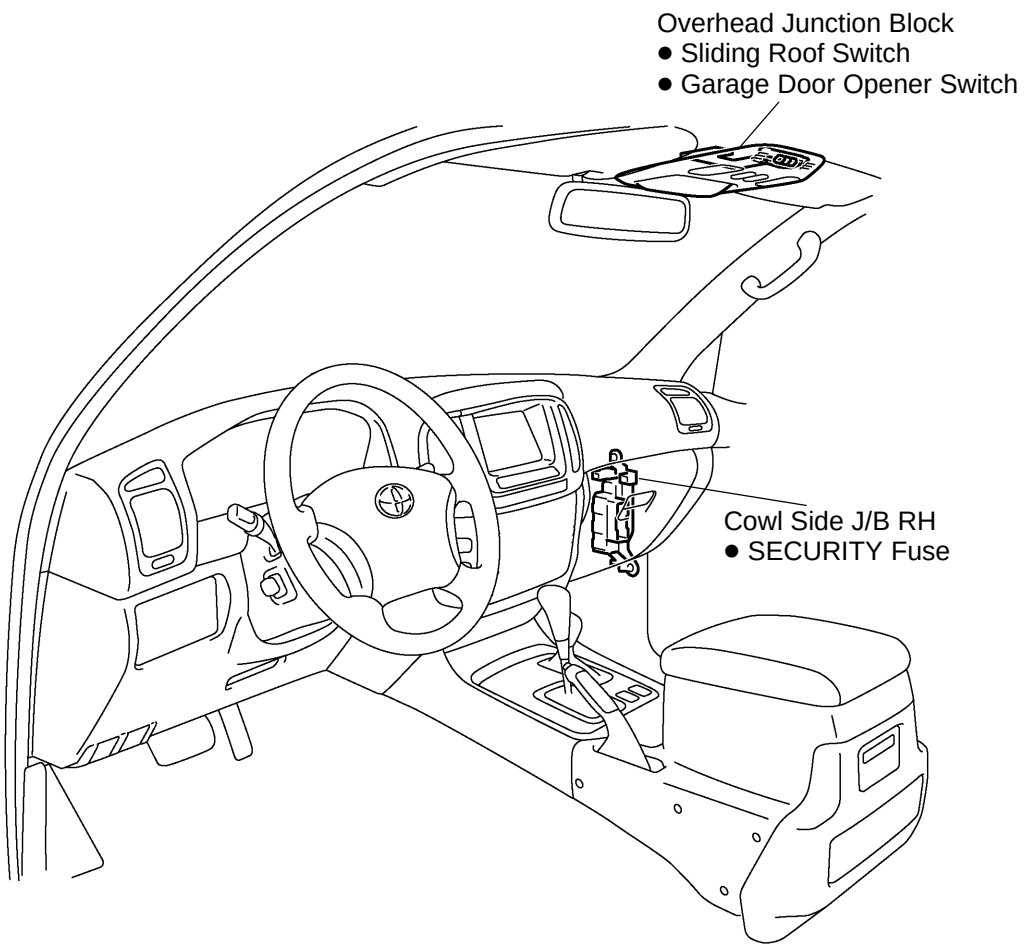
Circuit name	Tester connection	Specified condition
Power source circuit	A8 - B6 - E6	Continuity
Ground circuit	A1 - B2 - E8 - D3	Continuity
Microphone circuit	B10 - G4	Continuity
Microphone circuit	B9 - G2	Continuity

If continuity is not as specified, replace the overhead J/B assembly.

OVERHEAD JUNCTION BLOCK

BE2E4-01

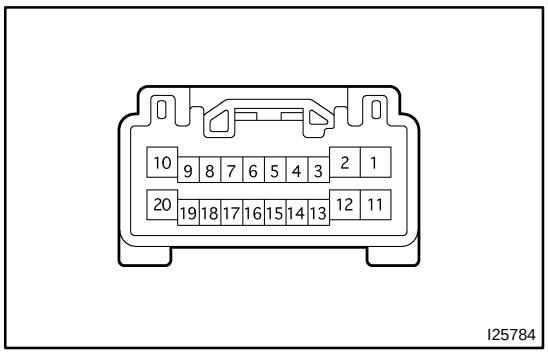
LOCATION



I25538

BE2EK-01

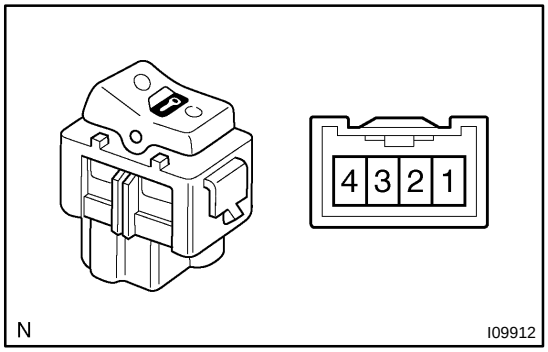
INSPECTION



1. Master switch:
INSPECT DRIVER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	3 - 4	Continuity
OFF	-	No continuity
UNLOCK	3 - 14	Continuity

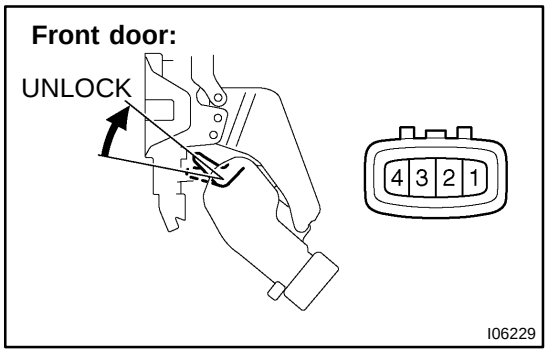
If continuity is not as specified, replace the switch.



2. INSPECT PASSENGER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	3 - 2	Continuity
OFF	-	No continuity
UNLOCK	1 - 2	Continuity

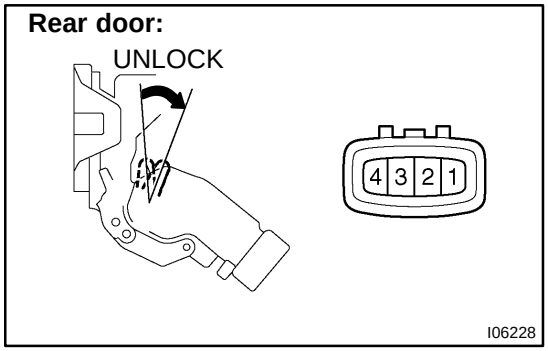
If continuity is not as specified, replace the switch.



3. Front door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	1 - 4	Continuity

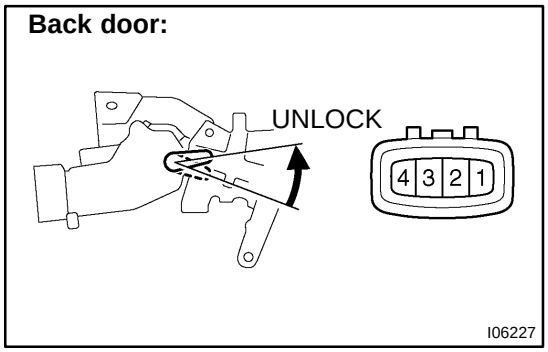
If continuity is not as specified, replace the switch.



4. Rear door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	1 - 4	Continuity

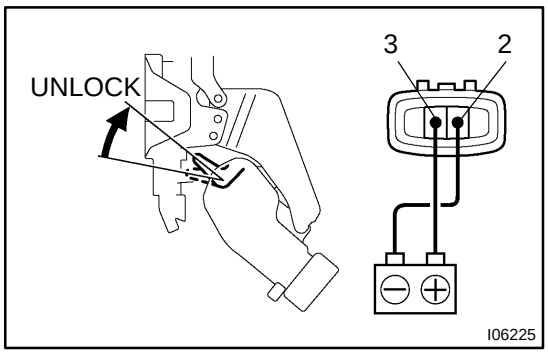
If continuity is not as specified, replace the switch.



5. Back door:
INSPECT DOOR UNLOCK DETECTION SWITCH CONTINUITY

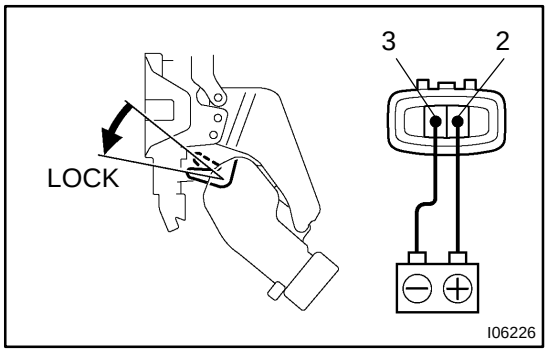
Switch position	Tester connection	Specified condition
OFF (Door Lock set to LOCK)	-	No continuity
ON (Door Lock set to UNLOCK)	1 - 4	Continuity

If continuity is not as specified, replace the switch.



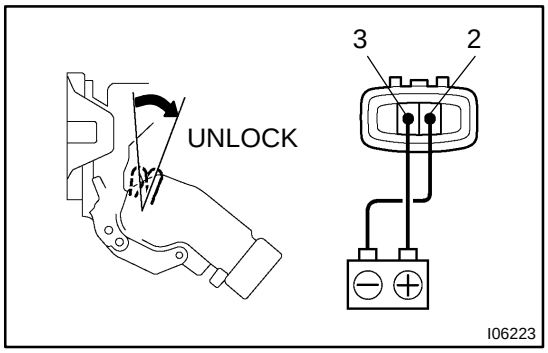
6. Front door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2, and check that the door lock link moves to UNLOCK position.



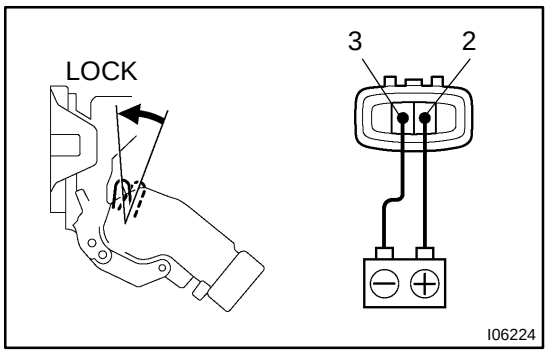
(b) Reverse the polarity and check that the door lock link moves to LOCK position.

If operation is not as specified, replace the door lock assembly.



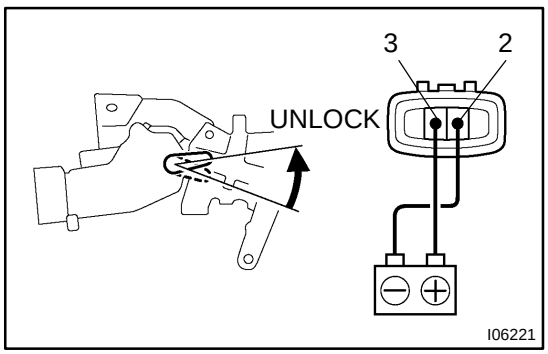
7. Rear door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2, and check that the door lock link moves to UNLOCK position.



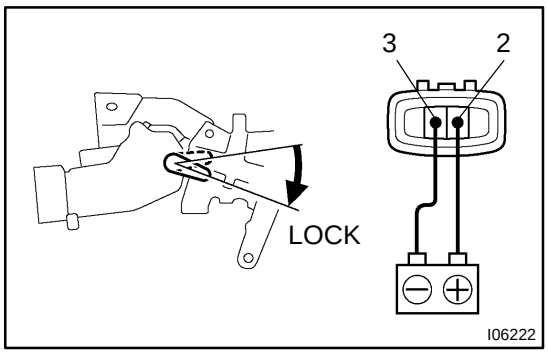
(b) Reverse the polarity and check that the door lock link moves to LOCK position.

If operation is not as specified, replace the door lock assembly.



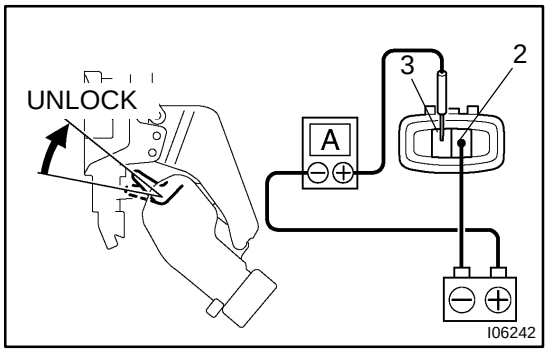
8. Back door:
INSPECT DOOR LOCK MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2, and check that the door lock link moves to UNLOCK position.



(b) Reverse the polarity and check that the door lock link moves to LOCK position.

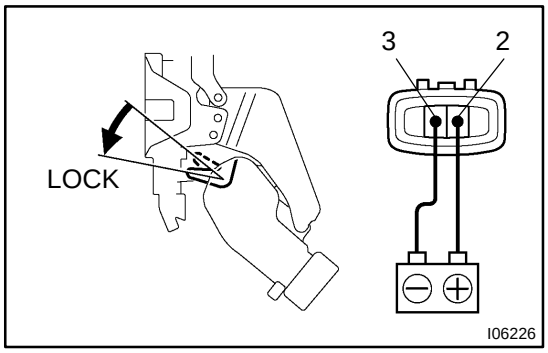
If operation is not as specified, replace the door lock assembly.



9. Front door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (-) lead from the battery to terminal 2.

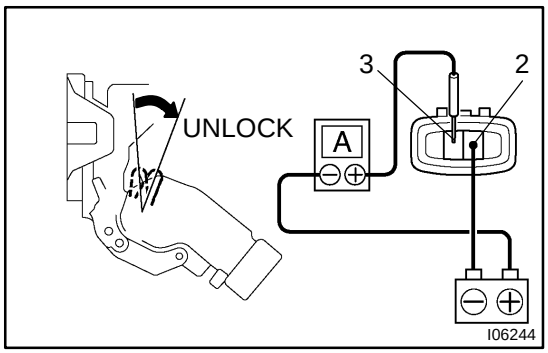
(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (-) lead to battery negative (-) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3, and check that the door lock moves to the LOCK position.

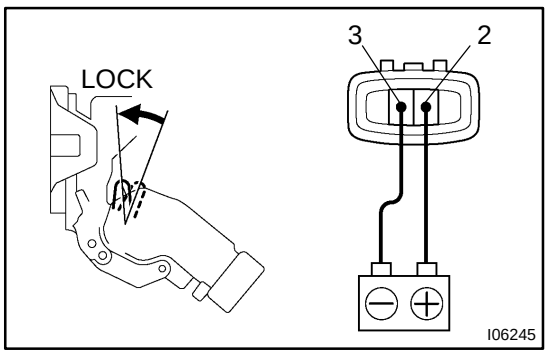
If operation is not as specified, replace the door lock assembly.



10. Rear door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (-) lead from the battery to terminal 2.

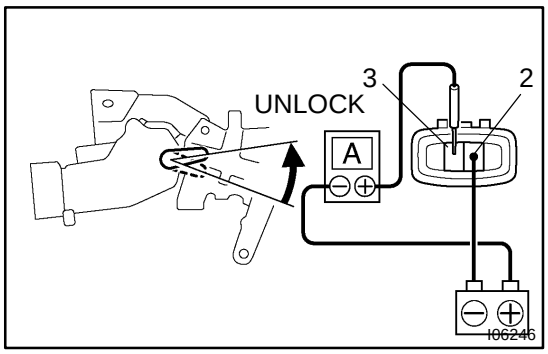
(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (-) lead to battery negative (-) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3, and check that the door lock moves to the LOCK position.

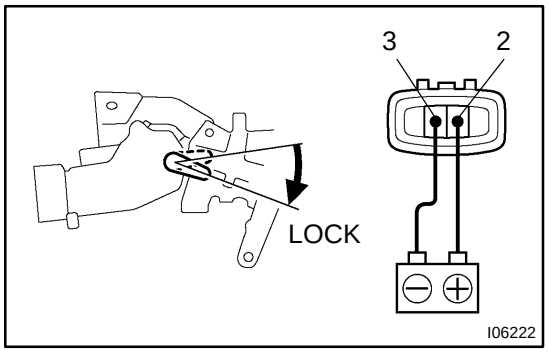
If operation is not as specified, replace the door lock assembly.



11. Back door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the negative (-) lead from the battery to terminal 2.

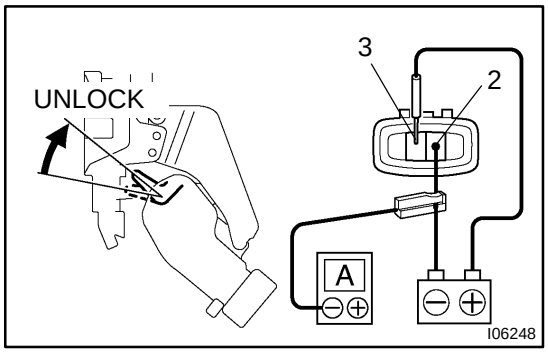
(b) Connect the positive (+) lead from the ammeter to terminal 3 and the negative (-) lead to battery negative (-) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 3, and check that the door lock moves to the LOCK position.

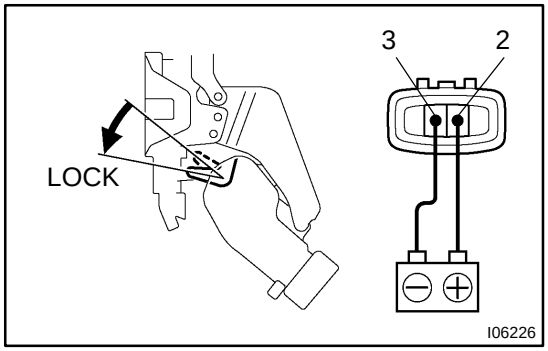
If operation is not as specified, replace the door lock assembly.



12. Front door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current-measuring probe)

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2.

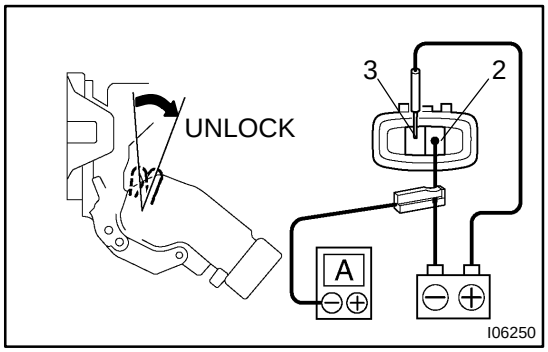
(b) Attach a current-measuring probe to either the positive (+) lead or the negative (-) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(c) Disconnect the leads from terminals.

(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

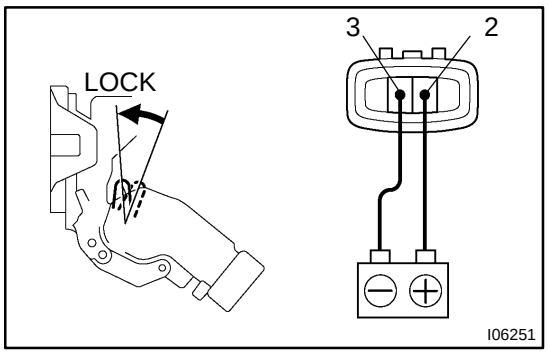
If operation is not as specified, replace the door lock assembly.



13. Rear door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current-measuring probe)

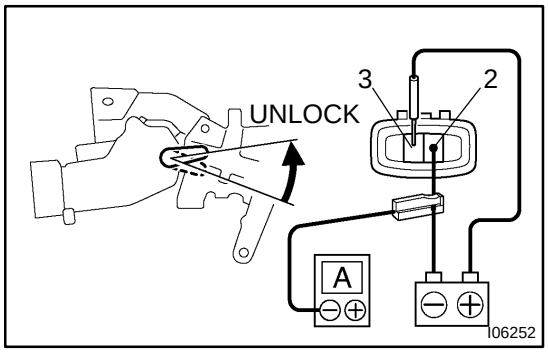
(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2.

(b) Attach a current-measuring probe to either the positive (+) lead or the negative (-) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



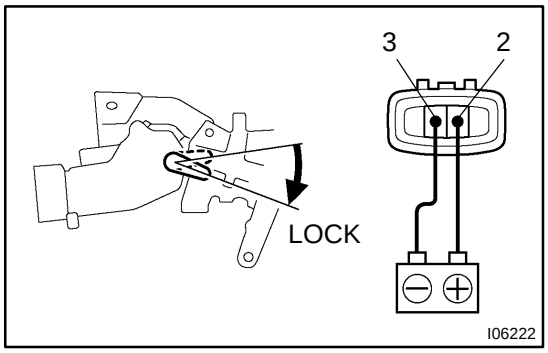
(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.



14. Back door:
INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current-measuring probe)

(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (-) lead to terminal 2.
(b) Attach a current-measuring probe to either the positive (+) lead or the negative (-) lead, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



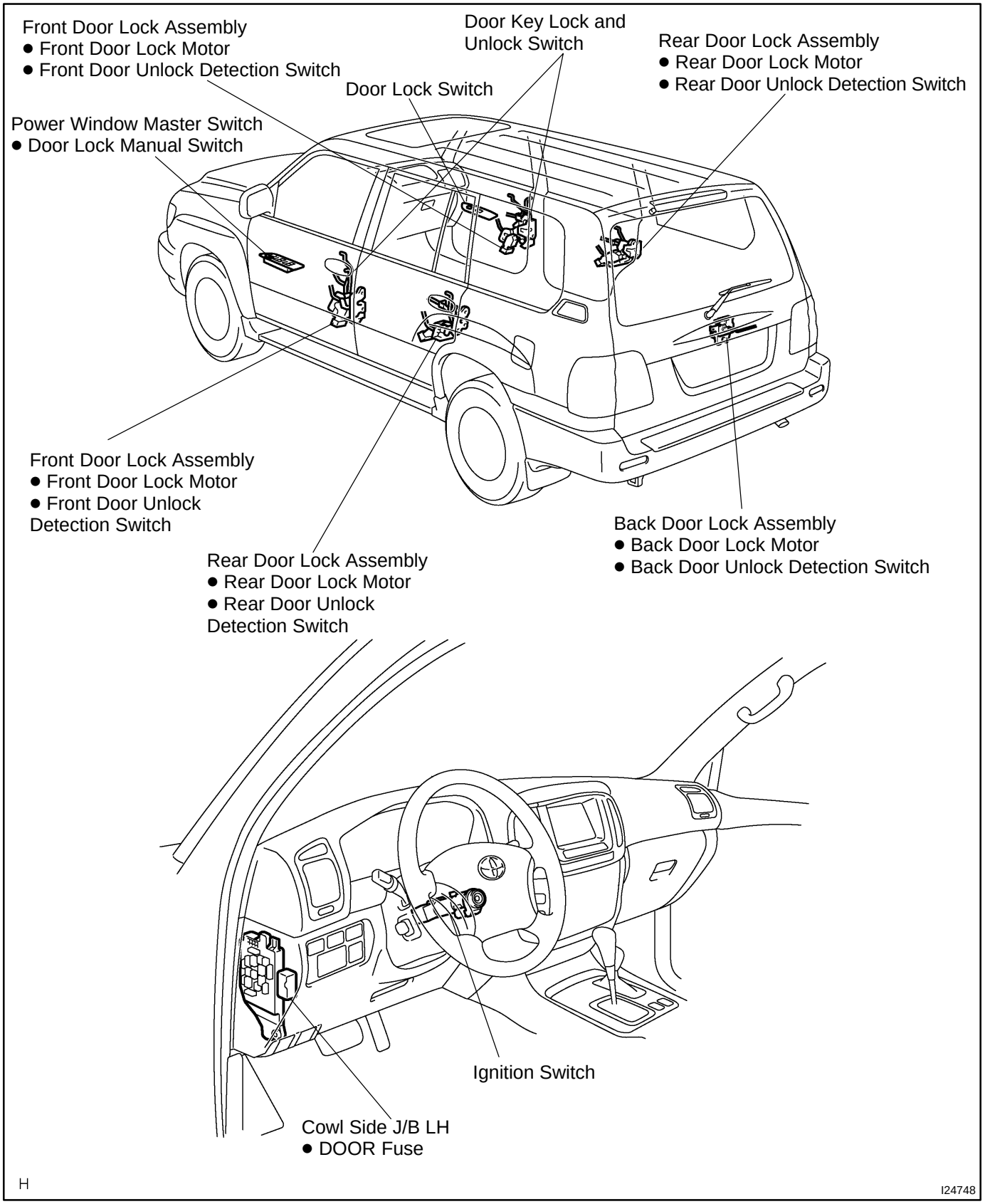
(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, reverse the polarity, and check that the door lock moves to the LOCK position.

If operation is not as specified, replace the door lock assembly.

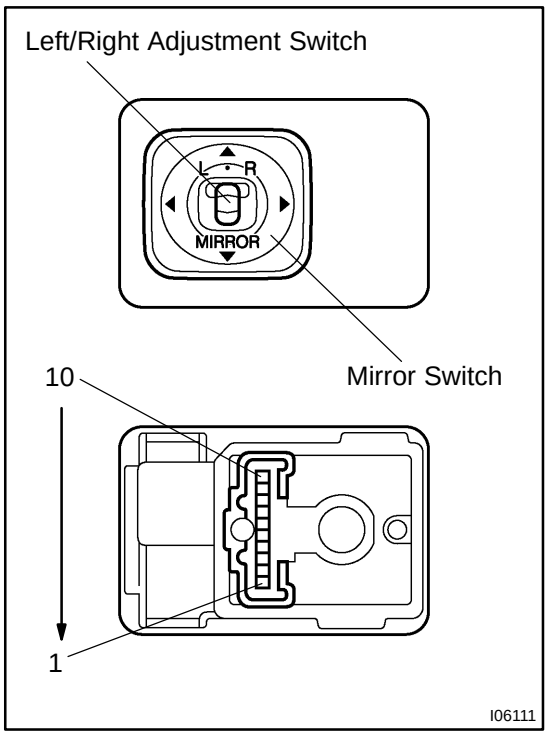
POWER DOOR LOCK CONTROL SYSTEM

LOCATION

BE0HQ-19



BE2EC-01



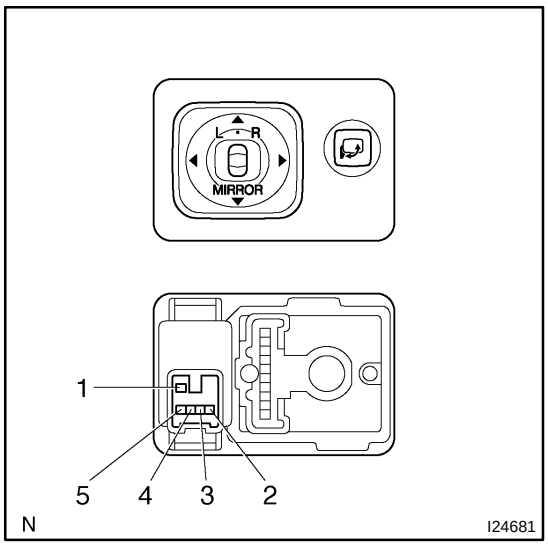
INSPECTION

1. INSPECT LEFT SIDE MIRROR SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	3 - 4 7 - 8	Continuity
DOWN	3 - 8 4 - 7	Continuity
LEFT	4 - 9 7 - 8	Continuity
RIGHT	4 - 7 8 - 9	Continuity

2. INSPECT RIGHT SIDE MIRROR SWITCH CONTINUITY

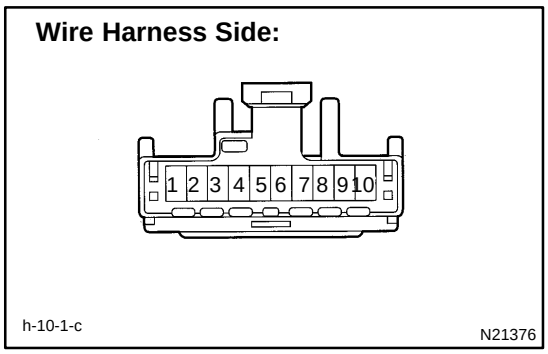
Switch position	Tester connection	Specified condition
OFF	-	No continuity
UP	2 - 4 1 - 7 - 8	Continuity
DOWN	4 - 7 1 - 2 - 8	Continuity
LEFT	4 - 10 1 - 7 - 8	Continuity
RIGHT	4 - 7 1 - 8 - 10	Continuity



3. INSPECT RETRACT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
RETURN	1 - 5 2 - 4	Continuity
RETRACT	1 - 2 4 - 5	Continuity

If continuity is not as specified, replace the switch.

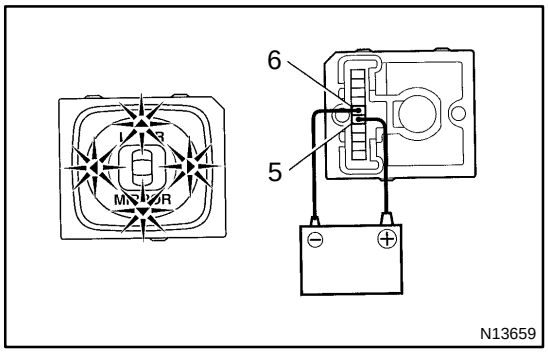


4. INSPECT MIRROR SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

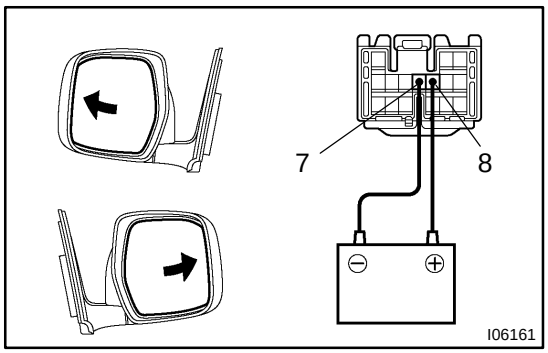
Tester connection	Condition	Specified condition
8 - Ground	Constant	Continuity
4 - Ground	Ignition switch position LOCK	No voltage
4 - Ground	Ignition switch position ACC or ON	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.



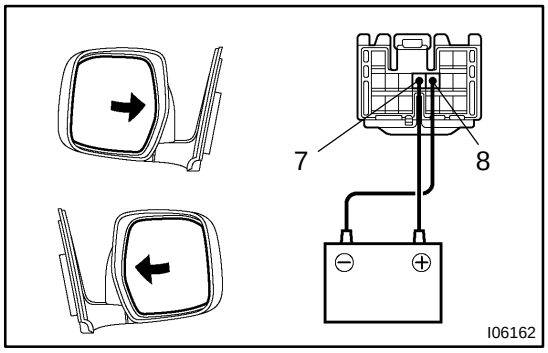
5. INSPECT INDICATOR LIGHT OPERATION

Connect the positive (+) lead from the battery to terminal 5 and the negative (-) lead to terminal 6, and check that the indicator light does not light up, replace the switch.

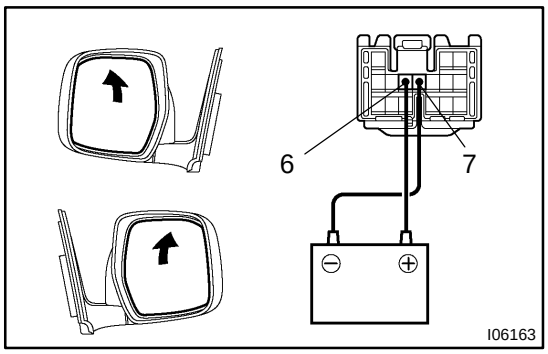


6. INSPECT MIRROR MOTOR OPERATION

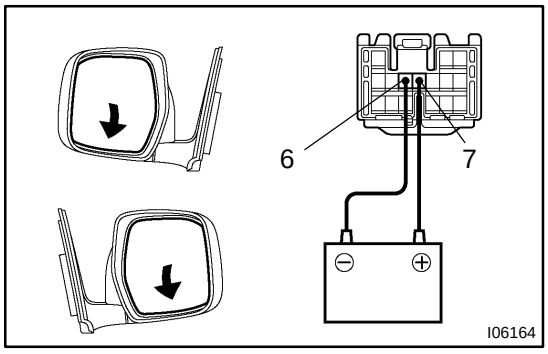
(a) Connect the positive (+) lead from the battery to terminal 8 and the negative (-) lead to terminal 7, and check that the mirror turns to the left side.



(b) Reverse the polarity, and check that the mirror turns to the right side.



(c) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 7, and check that the mirror turns upward.



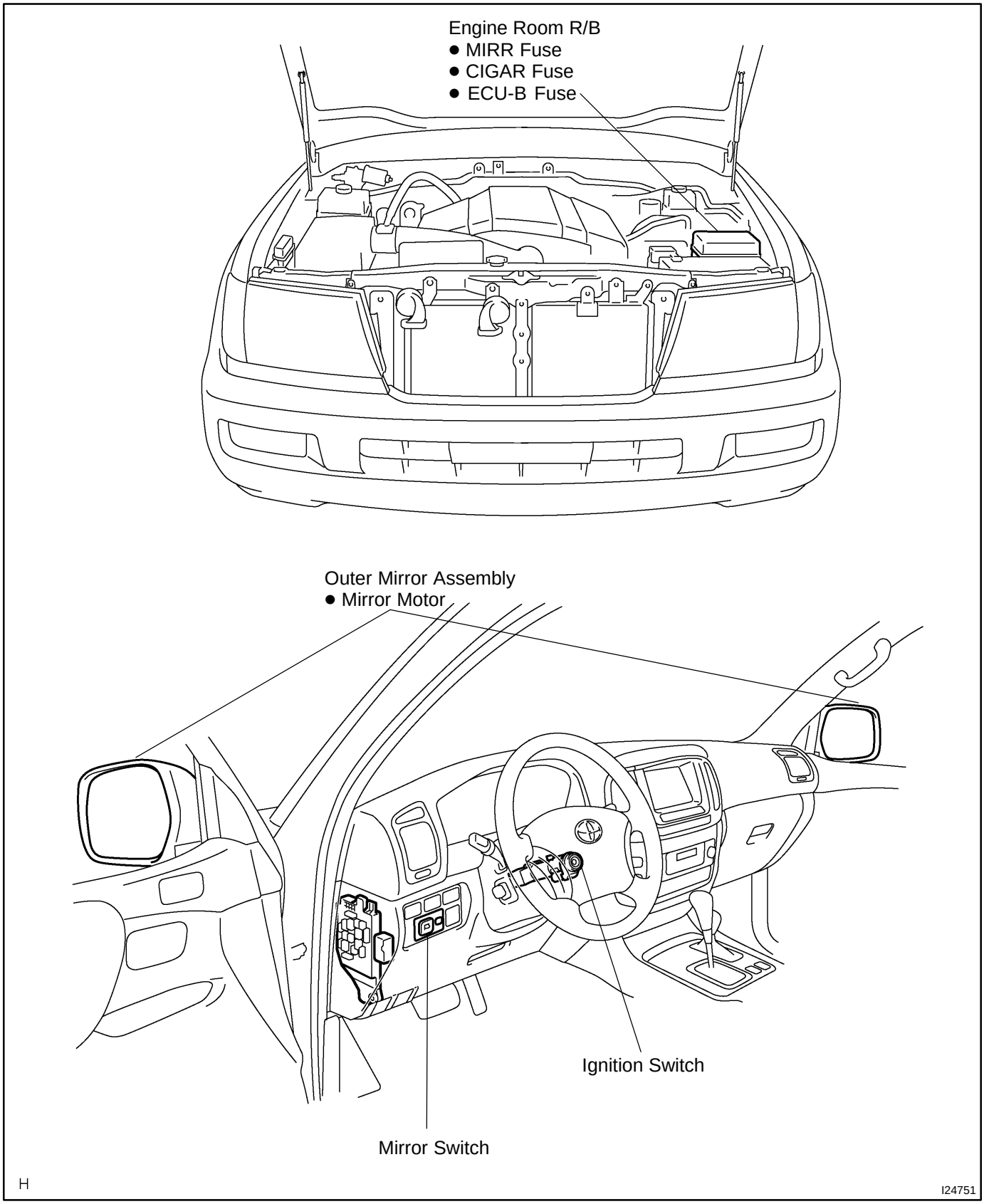
(d) Reverse the polarity, and check that the mirror turns downward.

If operation is not as specified, replace the mirror assembly.

POWER MIRROR CONTROL SYSTEM

BE02J-16

LOCATION

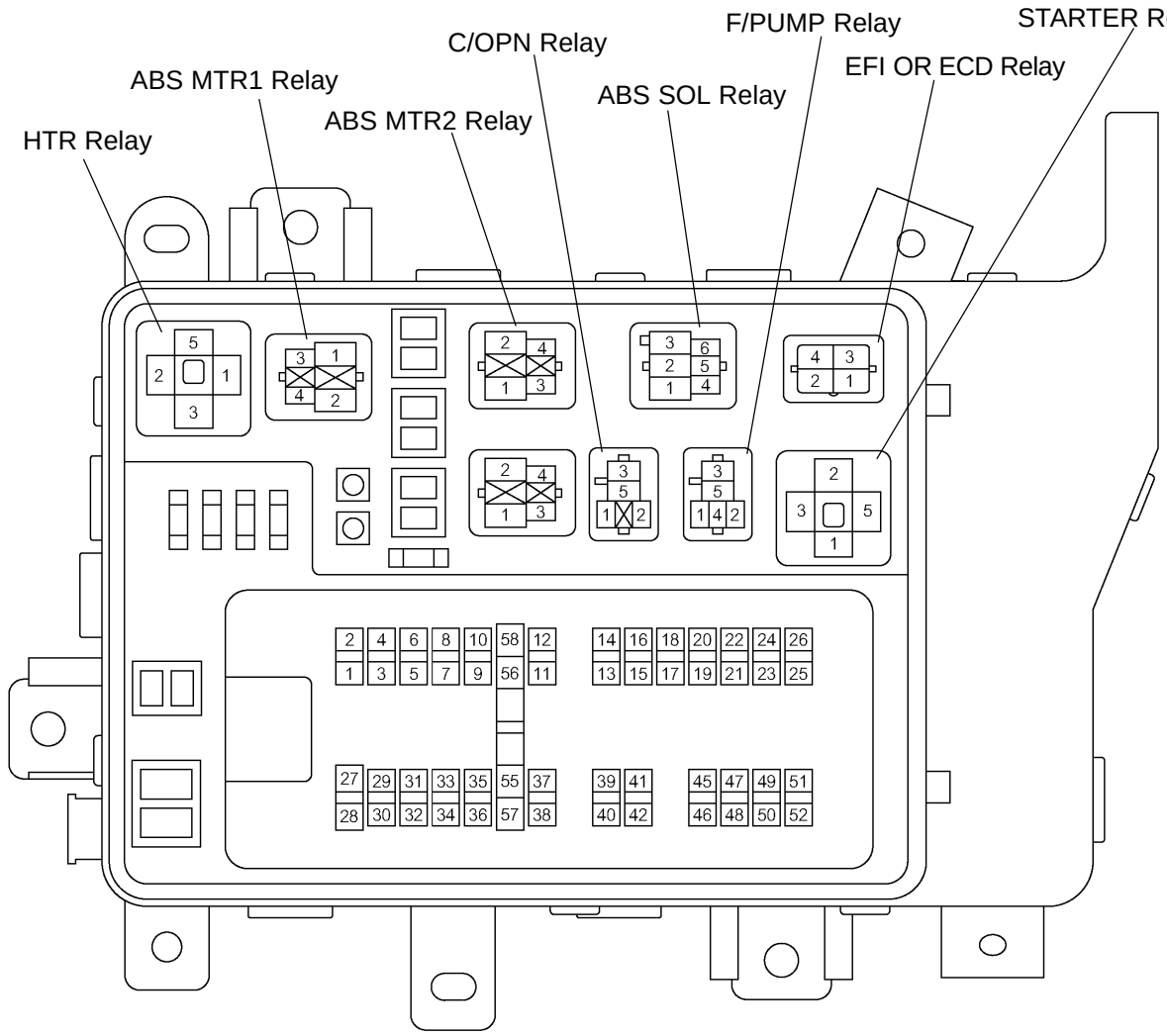


BE2EJ-01

INSPECTION

1. INSPECT ENGINE ROOM R/B CIRCUIT

Engine Room R/B:



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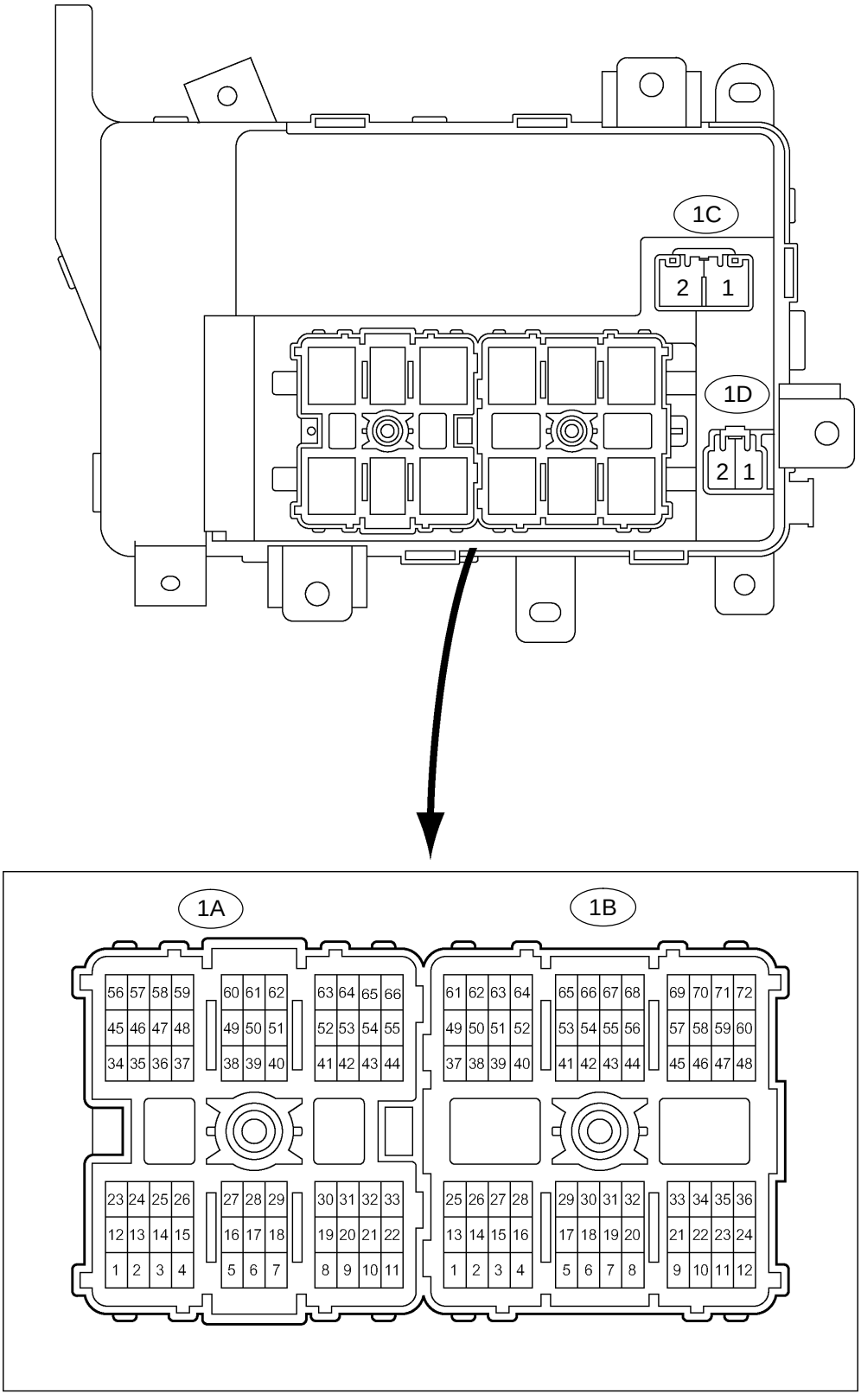
I25272

Engine Room R/B (Back Side):



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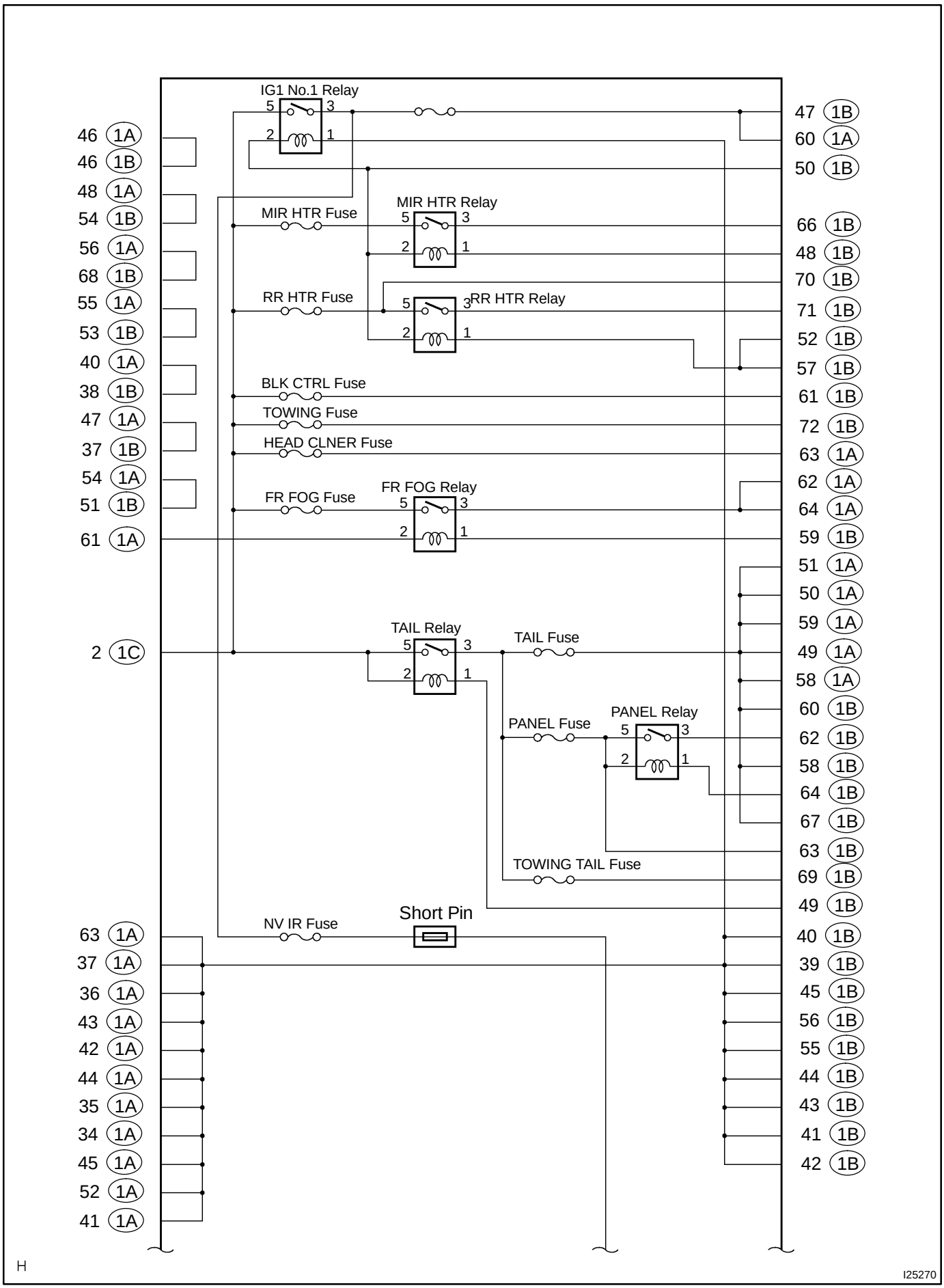
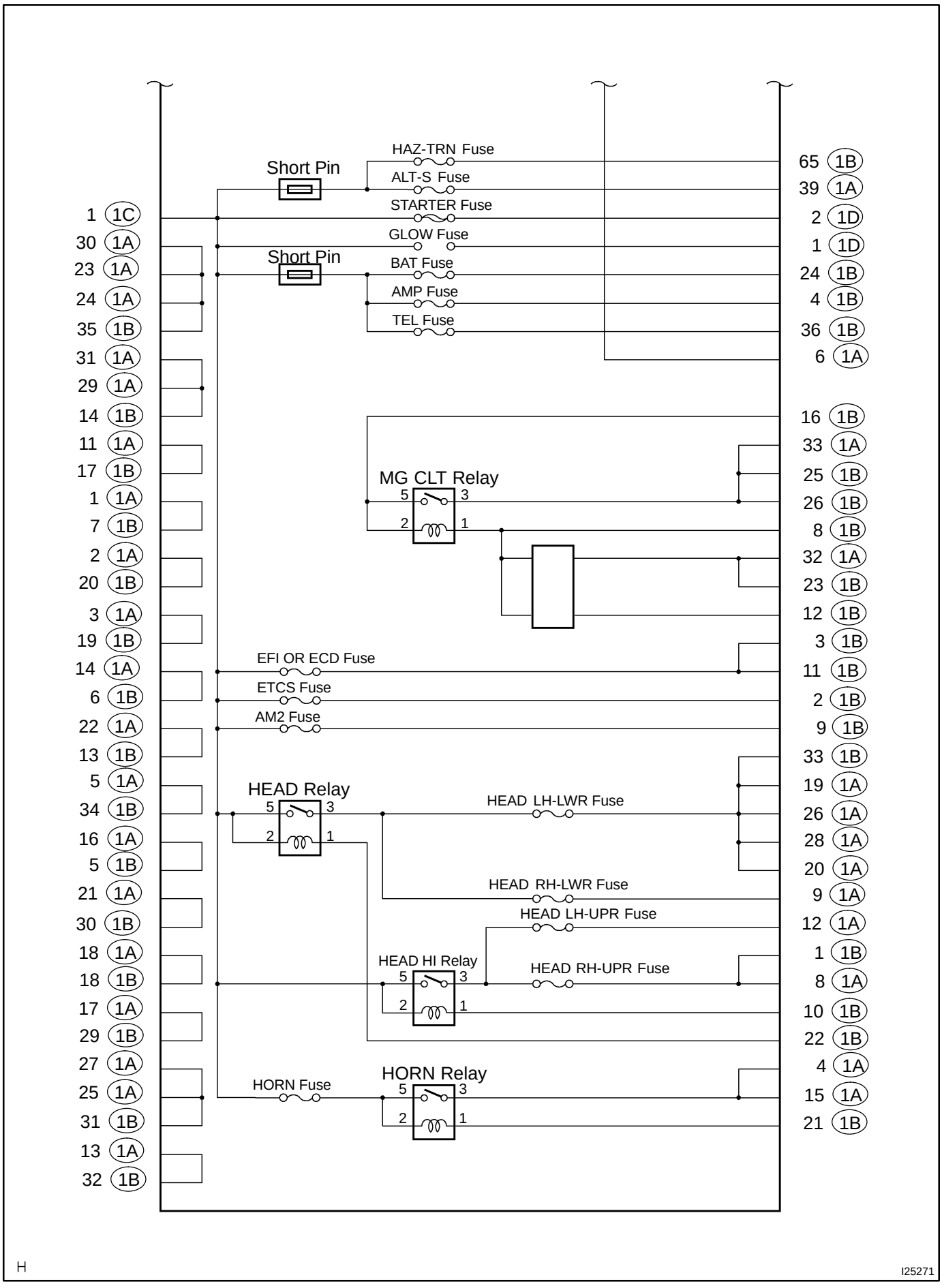
I25261


IG1 No.1 Relay
MIR HTR Relay
MIR HTR Fuse
RR HTR Relay
RR HTR Fuse
BLK CTRL Fuse
TOWING Fuse
HEAD CLNER Fuse
FR FOG Relay
FR FOG Fuse
TAIL Relay
TAIL Fuse
PANEL Relay
PANEL Fuse
TOWING TAIL Fuse
Short Pin
NV IR Fuse
46 1A
46 1B
48 1A
54 1B
56 1A
68 1B
55 1A
53 1B
40 1A
38 1B
47 1A
37 1B
54 1A
51 1B
61 1A
2 1C
63 1A
37 1A
36 1A
43 1A
42 1A
44 1A
35 1A
34 1A
45 1A
52 1A
41 1A
47 1B
60 1A
50 1B
66 1B
48 1B
70 1B
71 1B
52 1B
57 1B
61 1B
72 1B
63 1A
62 1A
64 1A
59 1B
51 1A
50 1A
59 1A
49 1A
58 1A
60 1B
62 1B
58 1B
64 1B
67 1B
63 1B
69 1B
49 1B
40 1B
39 1B
45 1B
56 1B
55 1B
44 1B
43 1B
41 1B
42 1B
H
I25270


Short Pin
Short Pin
HAZ-TRN Fuse
ALT-S Fuse
STARTER Fuse
GLOW Fuse
BAT Fuse
AMP Fuse
TEL Fuse
MG CLT Relay
EFI OR ECD Fuse
ETCS Fuse
AM2 Fuse
HEAD Relay
HEAD LH-LWR Fuse
HEAD RH-LWR Fuse
HEAD LH-UPR Fuse
HEAD HI Relay
HEAD RH-UPR Fuse
HORN Relay
HORN Fuse
1 1C
30 1A
23 1A
24 1A
35 1B
31 1A
29 1A
14 1B
11 1A
17 1B
1 1A
7 1B
2 1A
20 1B
3 1A
19 1B
14 1A
6 1B
22 1A
13 1B
5 1A
34 1B
16 1A
5 1B
21 1A
30 1B
18 1A
18 1B
17 1A
29 1B
27 1A
25 1A
31 1B
13 1A
32 1B
65 1B
39 1A
2 1D
1 1D
24 1B
4 1B
36 1B
6 1A
16 1B
33 1A
25 1B
26 1B
8 1B
32 1A
23 1B
12 1B
3 1B
11 1B
2 1B
9 1B
33 1B
19 1A
26 1A
28 1A
20 1A
9 1A
12 1A
1 1B
8 1A
10 1B
22 1B
4 1A
15 1A
21 1B
H
I25271

(a) Remove the fuse from the junction block and inspect the connector on junction block side.

Fuse	Tester connection	Condition	Specified condition
TOWING	1 - Ground	Constant	Battery positive voltage
MIR HTR	3 - Ground	Constant	Battery positive voltage
RR HTR	5 - Ground	Constant	Battery positive voltage
HAZ-TRN	7 - Ground	Constant	Battery positive voltage
ALT-S	9 - Ground	Constant	Battery positive voltage
NV-IR	13 - Ground	Constant	Battery positive voltage
FR FOG	13 - Ground	Constant	Battery positive voltage
BRK CTRL	15 - Ground	Constant	Battery positive voltage
HEAD CLNER	17 - Ground	Ignition switch ON	Battery positive voltage
FR-IG	19 - Ground	Ignition switch ON	Battery positive voltage
PANEL	21 - Ground	Light control switch HEAD or TAIL	Battery positive voltage
TOWING TAIL	23 - Ground	Light control switch HEAD or TAIL	Battery positive voltage
TAIL	25 - Ground	Light control switch HEAD or TAIL	Battery positive voltage
BAT	29 - Ground	Constant	Battery positive voltage
TEL	31 - Ground	Constant	Battery positive voltage
AMP	33 - Ground	Constant	Battery positive voltage
EFI or ECD NO.1	35 - Ground	Constant	Battery positive voltage
AM2	37 - Ground	Constant	Battery positive voltage
ETCS	39 - Ground	Constant	Battery positive voltage
HORN	41 - Ground	Constant	Battery positive voltage
HEAD LH-UPR	51 - Ground	Light control switch HI or Flash	Battery positive voltage
HEAD RH-UPR	49 - Ground	Light control switch HI or Flash	Battery positive voltage
HEAD LH-LWR	47 - Ground	Light control switch HEAD	Battery positive voltage
HEAD RH-LWR	45 - Ground	Light control switch HEAD	Battery positive voltage
ST1	1 - Ground	Constant	Battery positive voltage
AHC	1 - Ground	Constant	Battery positive voltage
ABS NO.1	1 - Ground	Constant	Battery positive voltage
ABS NO.2	1 - Ground	Constant	Battery positive voltage
STARTER	1 - Ground	Constant	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

(b) Remove the relay from the junction block and inspect the connector on junction block side.

Relay	Tester connection	Condition	Specified condition
AHC	1 - Ground	Ignition switch ON	Battery positive voltage
ABS SOL	1 - Ground	Ignition switch ON	Battery positive voltage
ABS MTR1	1 - Ground	Constant	Battery positive voltage
ABS MTR2	1 - Ground	Ignition switch ON	Battery positive voltage
STARTER	5 - Ground	Constant	Continuity
STARTER	2 - Ground	Ignition switch ON	Battery positive voltage
EFI or ECD	3 - Ground	Constant	Battery positive voltage
C/OPN SPIL VLV	5 - Ground	Constant	Battery positive voltage
C/OPN SPIL VLV	2 - Ground	Ignition switch ON	Continuity

F/P PUMP ST CUT VISC MG 2 - Ground	Ignition switch ON	Battery positive voltage
F/P PUMP ST CUT VISC MG 3 - Ground	Ignition switch ON	Continuity
HTR 5 - Ground	Constant	Battery positive voltage
HTR 1 - Ground	Ignition switch ON	Continuity

If the circuit is not as specified, inspect the circuits connected to other parts.

(c) Inspect Engine Room Junction Block Inner Cercuit:
Inspect the connector on junction block side.

HINT:

Remove the junction block from the vehicle.

Relay	Tester connection	Condition	Specified condition
IG1 NO.1	50 (1B) - 40 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 39 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 45 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 56 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 55 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 44 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 43 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 41 (1B)	Constant	Continuity
IG1 NO.1	50 (1B) - 42 (1B)	Constant	Continuity
IG1 NO.1	2 (1C) - 47 (1B)	Apply B+ between terminals 50 (1B) and 40 (1B).	Continuity
IG1 NO.1	2 (1C) - 60 (1A)	Apply B+ between terminals 50 (1B) and 40 (1B).	Continuity
MIR HTR	50 (1B) - 48 (1B)	Constant	Continuity
MIR HTR	2 (1C) - 66 (1B)	Apply B+ between terminals 50 (1B) and 48 (1B).	Continuity
RR HTR	50 (1B) - 52 (1B)	Constant	Continuity
RR HTR	50 (1B) - 57 (1B)	Constant	Continuity
RR HTR	2 (1C) - 71 (1B)	Apply B+ between terminals 50 (1B) and 52 (1B).	Continuity
RR HTR	70 (1B) - 71 (1B)	Apply B+ between terminals 50 (1B) and 52 (1B).	Continuity
FR FOG	61 (1A) - 59 (1B)	Constant	Continuity
FR FOG	2 (1C) - 62 (1A)	Apply B+ between terminals 61 (1A) and 59 (1B).	Continuity
FR FOG	2 (1C) - 64 (1A)	Apply B+ between terminals 61 (1A) and 59 (1B).	Continuity
TAIL	2 (1C) - 49 (1B)	Constant	Continuity
TAIL	2 (1C) - 51 (1A)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 50 (1A)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 59 (1A)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 49 (1A)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 58 (1A)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 60 (1B)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 58 (1B)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 67 (1B)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
TAIL	2 (1C) - 69 (1B)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity
PANEL	2 (1C) - 64 (1B)	Apply B+ between terminals 2 (1C) and 49 (1B).	Continuity

HEAD	1 (1C) - 22 (1B)	Constant	Continuity
HEAD	1 (1C) - 33 (1B)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD	1 (1C) - 19 (1A)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD	1 (1C) - 26 (1A)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD	1 (1C) - 28 (1A)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD	1 (1C) - 20 (1A)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD	1 (1C) - 9 (1A)	Apply B+ between terminals 1 (1C) and 22 (1B).	Continuity
HEAD HI	1 (1C) - 10 (1B)	Constant	Continuity
HEAD HI	1 (1C) - 12 (1A)	Apply B+ between terminals 1 (1C) and 10 (1B).	Continuity
HEAD HI	1 (1C) - 1 (1B)	Apply B+ between terminals 1 (1C) and 10 (1B).	Continuity
HEAD HI	1 (1C) - 8 (1A)	Apply B+ between terminals 1 (1C) and 10 (1B).	Continuity
HORN	1 (1C) - 21 (1B)	Constant	Continuity
HORN	1 (1C) - 4 (1A)	Apply B+ between terminals 1 (1C) and 21 (1B).	Continuity
HORN	1 (1C) - 15 (1A)	Apply B+ between terminals 1 (1C) and 21 (1B).	Continuity

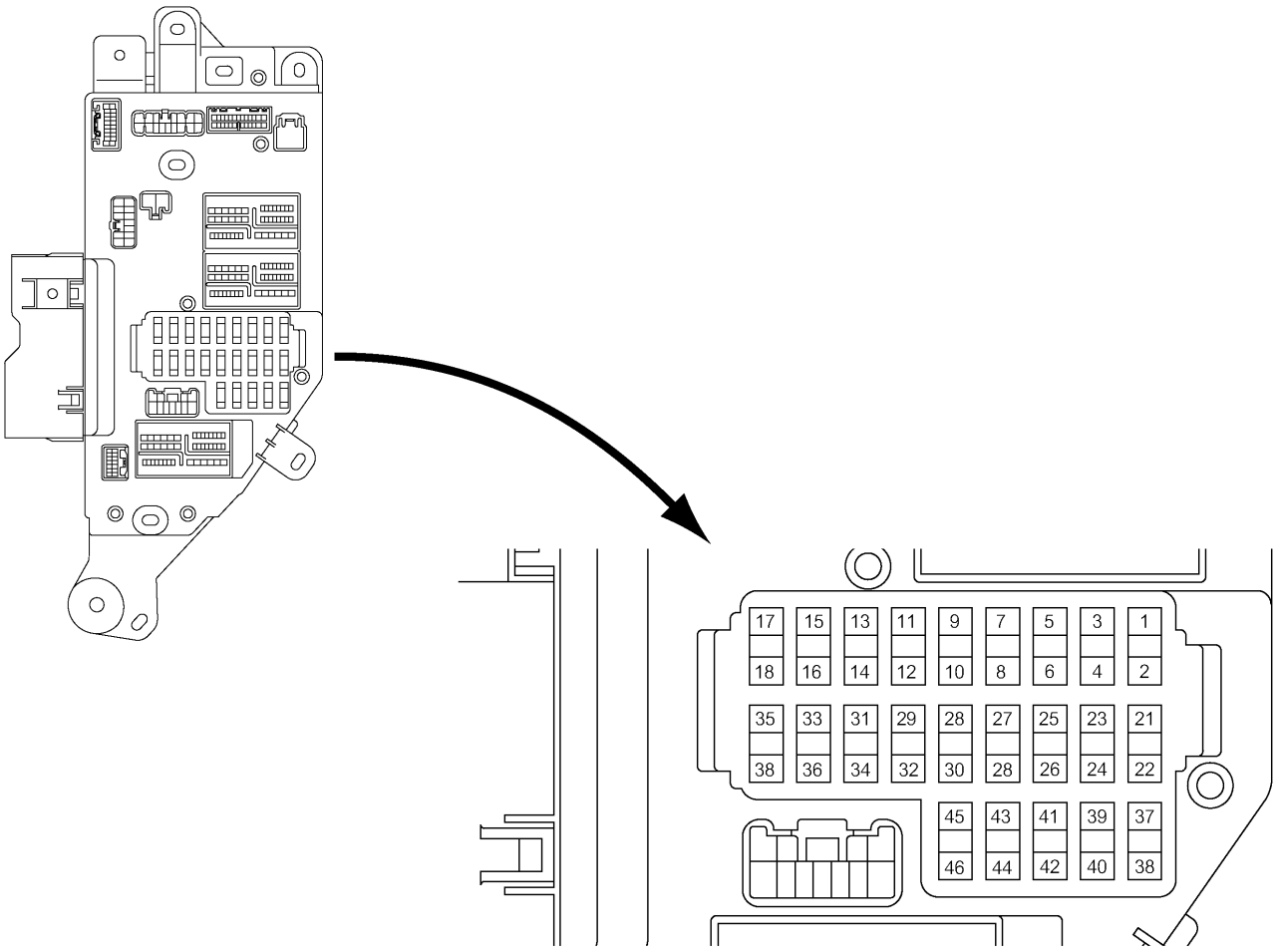
If the circuit is not as specified, replace it with junction block assembly.

HINT:

The relay is built in engine room junction block. Also the relay is constructed with a relay block that is in the junction block as a unit. To disconnect the wire harness connecting with relay block is impossible. If the relay has a malfunction, replace it with junction block assembly wire harness together.

2. INSPECT COWL SIDE J/B LH CIRCUIT

Cowl Side J/B LH:



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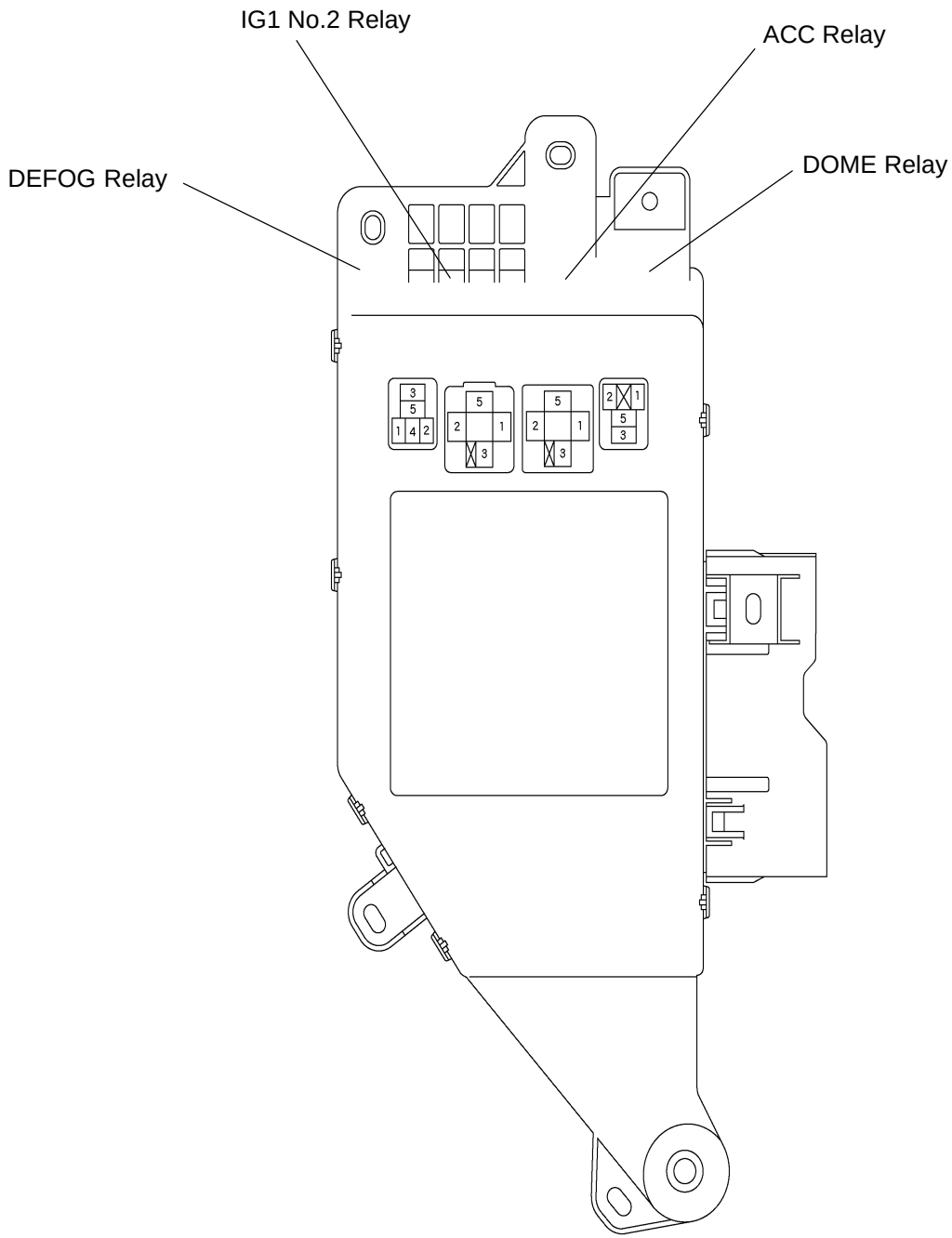
I25273

Cowl Side J/B LH (Back Side):



(a) Remove the fuse from the junction block and inspect the connector on junction block side.

Fuse	Tester connection	Condition	Specified condition
AHC-IG	2 - Ground	Ignition switch ON	Battery positive voltage
POWER HTR	4 - Ground	Ignition switch ON	Battery positive voltage
FUEL HTR	6 - Ground	Ignition switch ON	Battery positive voltage
AHC-B	8 - Ground	Constant	Battery positive voltage
DEFOG	10 - Ground	Constant	Battery positive voltage
AM1	12 - Ground	Constant	Battery positive voltage

ACC	13 - Ground	Ignition switch ACC	Battery positive voltage
CIG	15 - Ground	Ignition switch ACC	Battery positive voltage
PWR OUTLET	17 - Ground	Ignition switch ACC	Battery positive voltage
OBD-2	20 - Ground	Constant	Battery positive voltage
STOP	22 - Ground	Constant	Battery positive voltage
A/C	24 - Ground	Ignition switch ON	Battery positive voltage
BATT CHARGE	26 - Ground	Constant	Battery positive voltage
DBL LOCK	39 - Ground	Constant	Battery positive voltage
ECU-B1	29 - Ground	Constant	Battery positive voltage
ECU-IG1	32 - Ground	Ignition switch ON	Battery positive voltage
GAUGE1	34 - Ground	Ignition switch ON	Battery positive voltage
EFI or ECD NO.2	35 - Ground	Constant	Battery positive voltage
RR WIPER	37 - Ground	Ignition switch ON	Battery positive voltage
SUN ROOF	39 - Ground	Constant	Battery positive voltage
DOOR	41 - Ground	Constant	Battery positive voltage
LH SEAT	43 - Ground	Constant	Battery positive voltage
IDLE UP	46 - Ground	Rear deffoger system ON	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

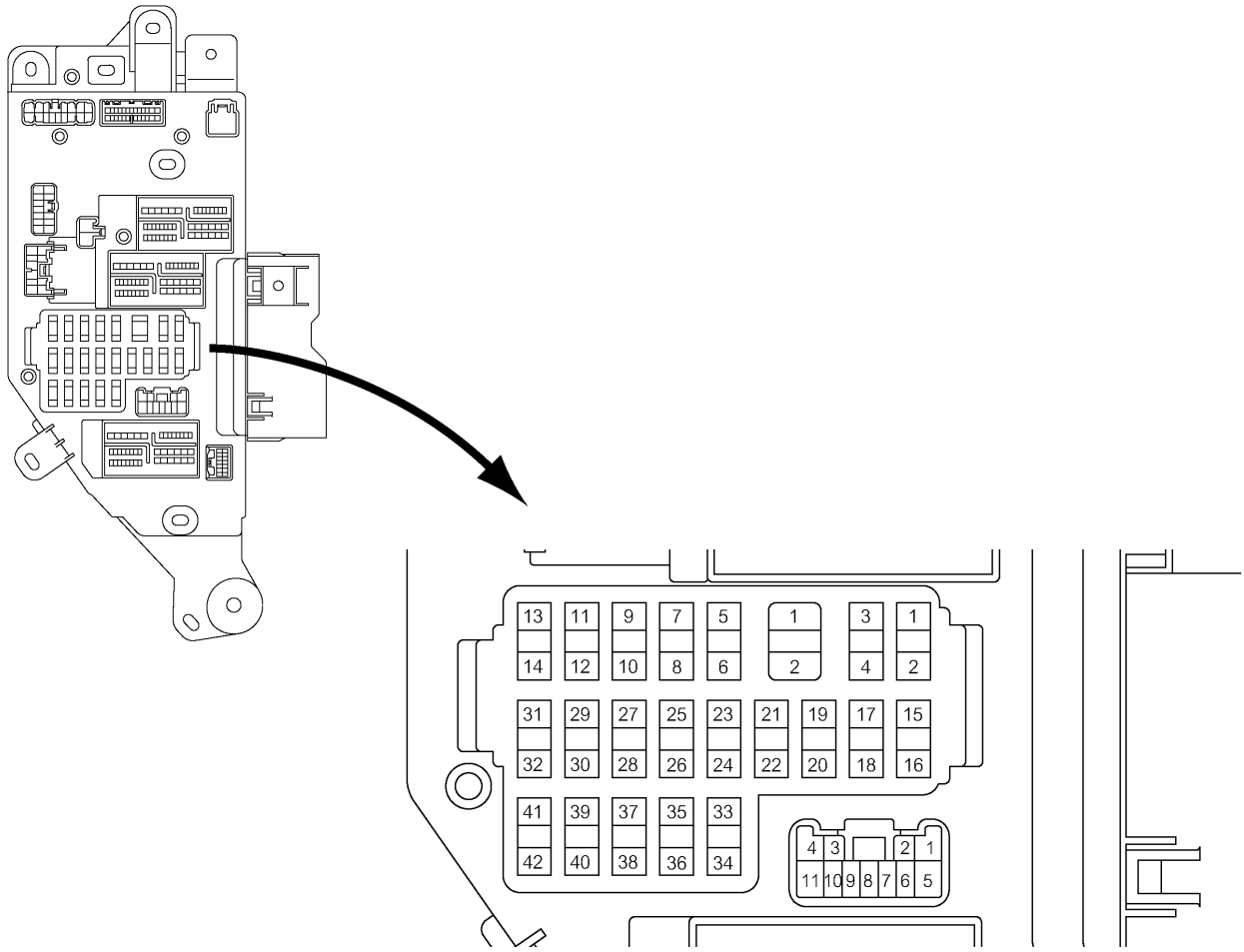
(b) Remove the relay from the junction block and inspect the connector on junction block side.

Relay	Tester connection	Condition	Specified condition
DOME	1 - Ground	Constant	Battery positive voltage
DOME	5 - Ground	Constant	Battery positive voltage
ACC	5 - Ground	Constant	Battery positive voltage
ACC	2 - Ground	Ignition switch ON	Battery positive voltage
IG1 NO.2	5 - Ground	Constant	Battery positive voltage
IG1 NO.2	2 - Ground	Ignition switch ON	Battery positive voltage
DEFOG	5 - Ground	Constant	Battery positive voltage
DEFOG	1 - Ground	Ignition switch ON	Battery positive voltage

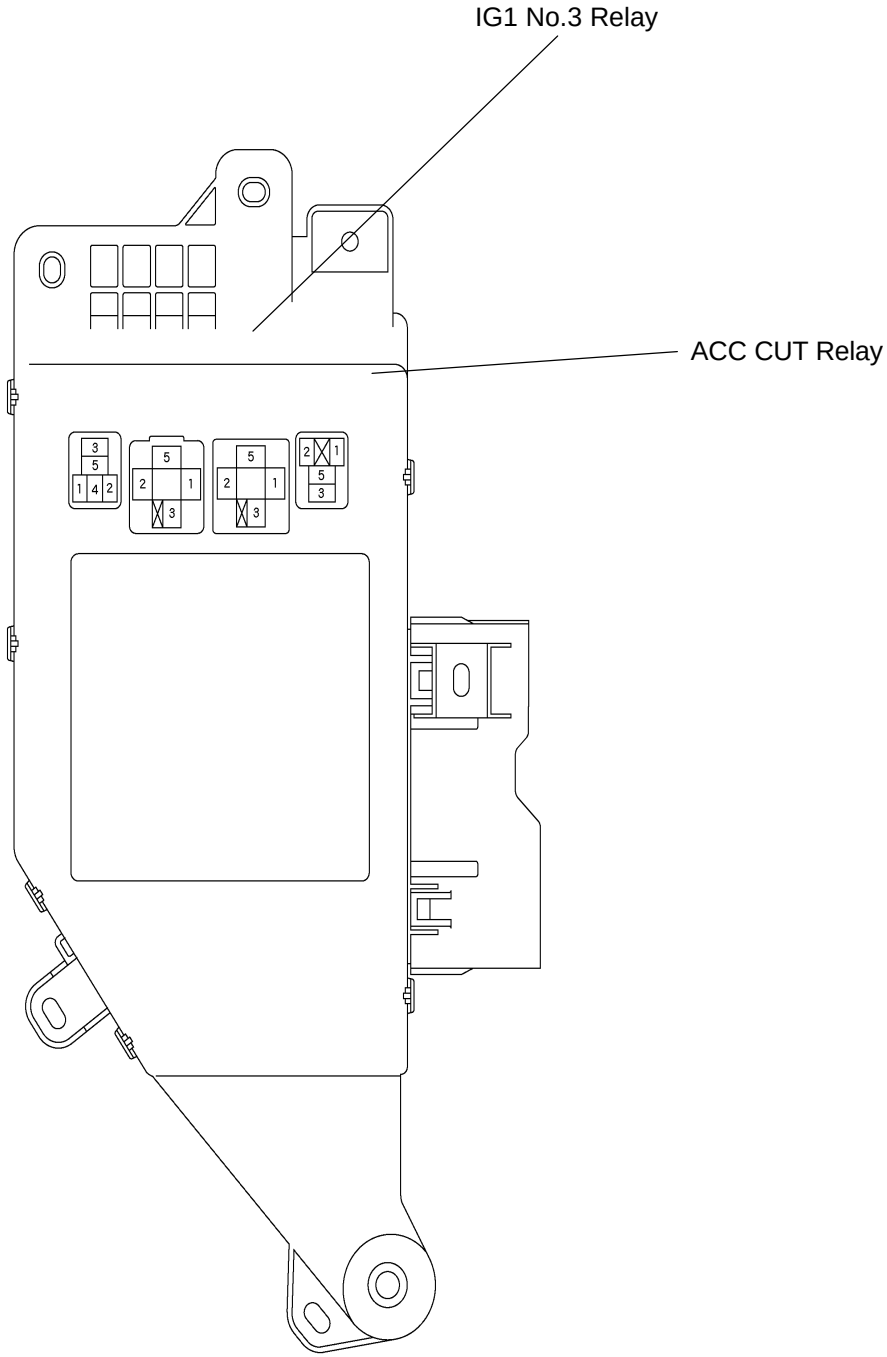
If the circuit is not as specified, inspect the circuits connected to other parts.

3. INSPECT COWL SIDE J/B RH CIRCUIT

Cowl Side J/B RH:



Cowl Side J/B RH (Back Side):



(a) Remove the fuse from the junction block and inspect the connector on junction block side.

Fuse	Tester connection	Condition	Specified condition
P/W (RL)	2 - Ground	Constant	Battery positive voltage
P/W (FL)	4 - Ground	Constant	Battery positive voltage
VGRS	2 - Ground	Constant	Battery positive voltage
DOME	5 - Ground	Constant	Battery positive voltage
RADIO	7 - Ground	Constant	Battery positive voltage
WASHER	10 - Ground	Ignition switch ON	Battery positive voltage

DIFF	12 - Ground	Ignition switch ON	Battery positive voltage
ECU-B2	13 - Ground	Constant	Battery positive voltage
P/W (FR)	15 - Ground	Constant	Battery positive voltage
P/W (RR)	17 - Ground	Constant	Battery positive voltage
SECURITY	20 - Ground	Constant	Battery positive voltage
IGN	21 - Ground	Ignition switch ON	Battery positive voltage
MET	23 - Ground	Ignition switch ON	Battery positive voltage
GAUGE2	25 - Ground	Ignition switch ON	Battery positive voltage
SEAT HTR	27 - Ground	Ignition switch ON	Battery positive voltage
ECU-IG2	29 - Ground	Ignition switch ON	Battery positive voltage
WIPER	31 - Ground	Ignition switch ON	Battery positive voltage
RH SEAT	33 - Ground	Constant	Battery positive voltage
RR A/C	35 - Ground	Constant	Battery positive voltage
TIL & TEL	37 - Ground	Constant	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

Remove the relay from the junction block and inspect the connector on junction block side.

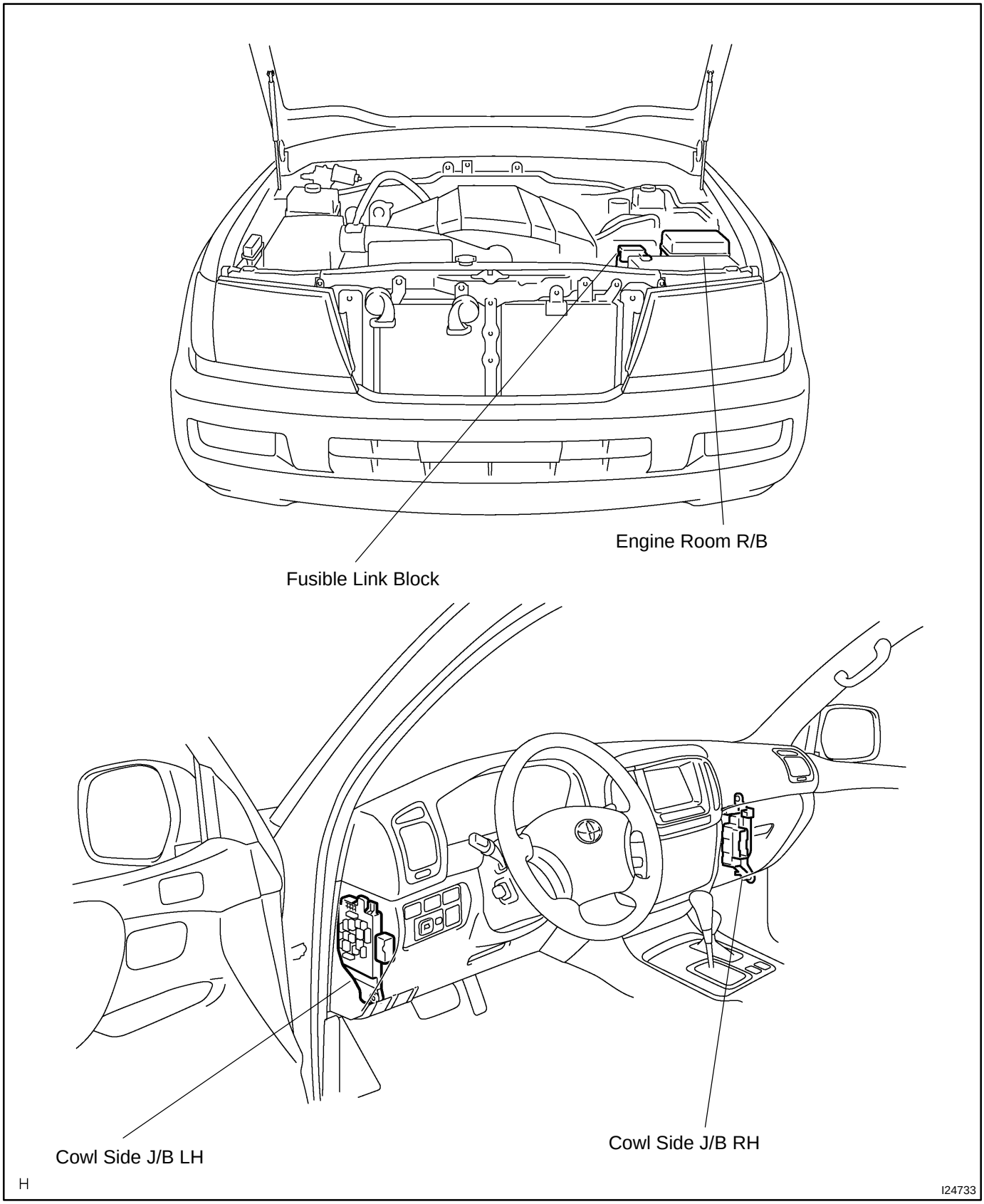
Relay	Tester connection	Condition	Specified condition
ACC CUT	2 - Ground	Constant	Battery positive voltage
ACC CUT	4 - Ground	Ignition Switch ACC	Battery positive voltage
IG1 NO.3	5 - Ground	Constant	Battery positive voltage
IG1 NO.3	2 - Ground	Ignition Switch ON	Battery positive voltage

If the circuit is not as specified, inspect the circuits connected to other parts.

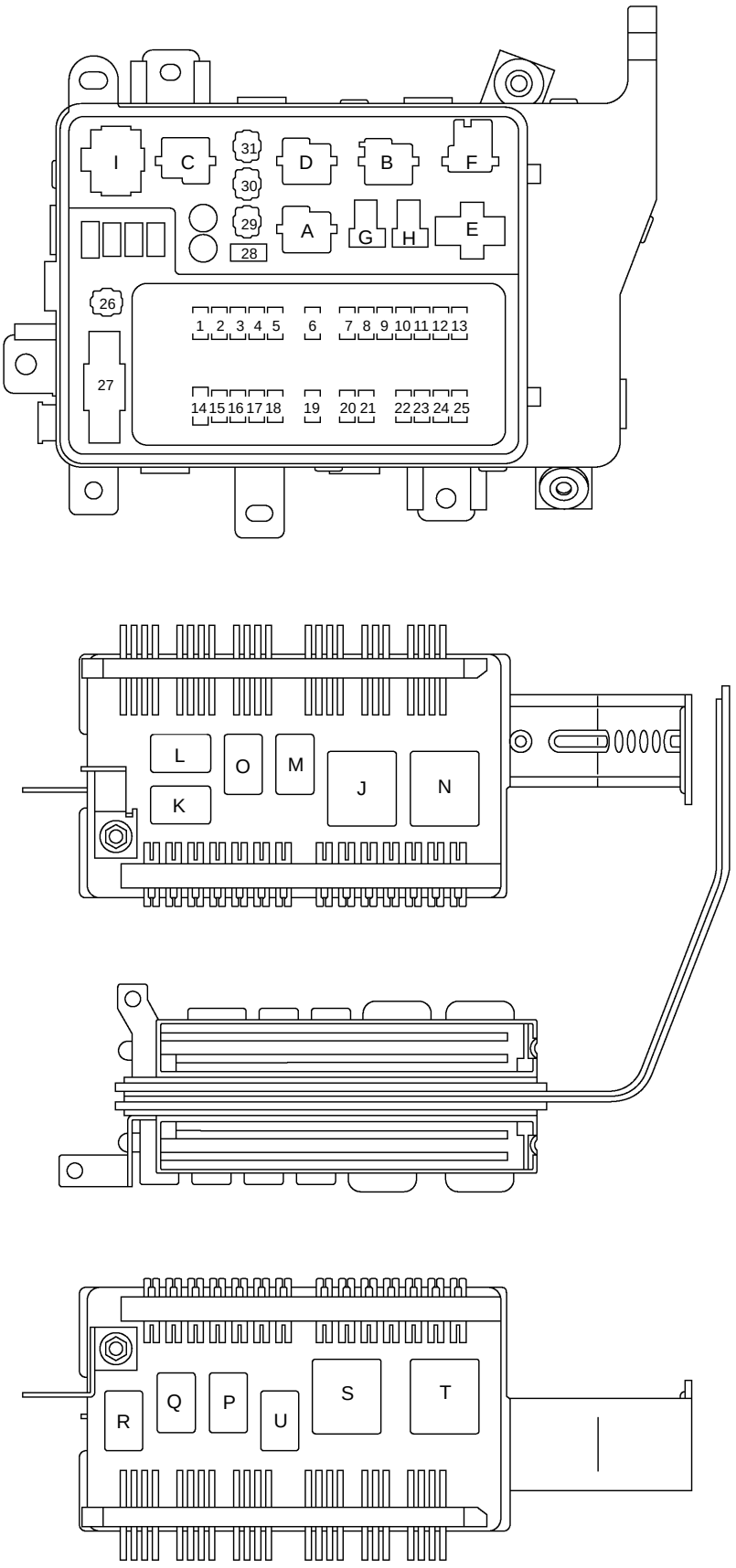
POWER SOURCE

LOCATION

BE2EI-01



Engine Room R/B



Fuses:

1. TOWING
2. MIR HTR
3. RR HTR
4. HAZ-TEN
5. ALT-S
6. NV-IR
7. FR FOG
8. TOWING BRK
9. HEAD CLNER
10. FR-IG
11. PANEL
12. TOWING TAIL
13. TAIL
14. -
15. BAT
16. TEL
17. AMP
18. EFI or ECD NO.1
19. AM2
20. ETCS
21. HORN
22. HEAD RH-LWR
23. HEAD LH-LWR
24. HEAD RH-UPR
25. HEAD LH-UPR
26.STARTER
27. GLOW
28. ST1
29. AHC
30. ABS NO.1
31. ABS NO.2

Relays:

A. AHC
B. ABS SOL
C. ABS MTR1
D. ABS MTR2
E. STARTER
F. EFI or ECD
G. C/OPN
H. F/PUMP
I. HTR
J. IG1 NO.1
K. MIR HTR
L. RR HTR
M. FR FOG
N. TAIL
O. PANEL
P. CDS FAN
Q. MG CLT
R. W/TEMP CUT
S. HEAD
T. HEAD HI
U. HORN

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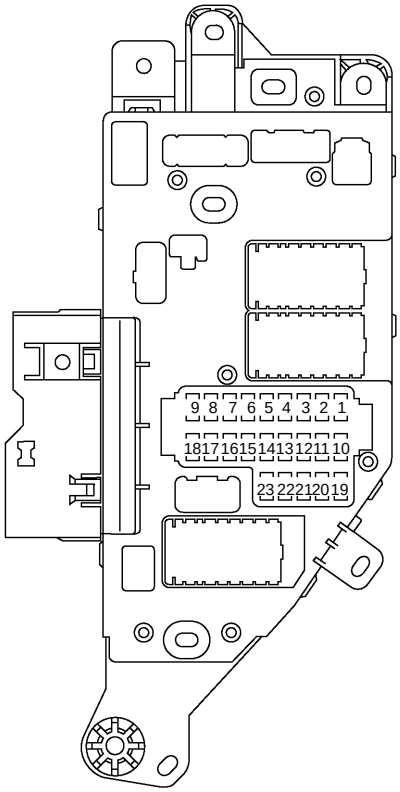
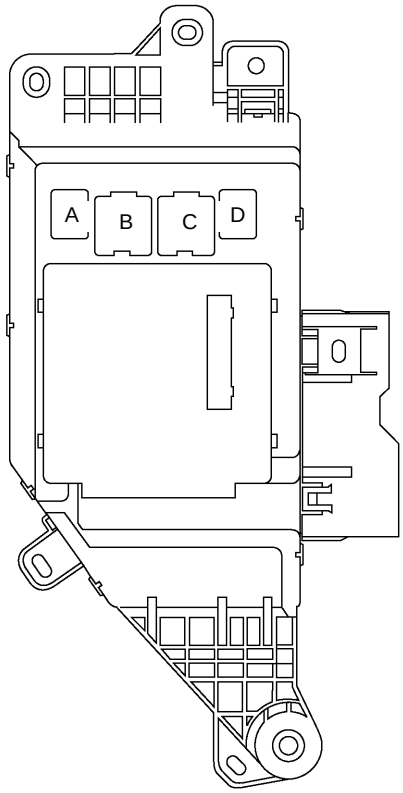
I24921

Cowl Side J/B LH



Fuses:

1. AHC-IG
2. POWER HTR
3. FUEL HTR
4. AHC-B
5. DEFOG
6. AM1
7. ACC
8. CIG
9. PWR OUTLET
10. OBD-2
11. STOP
12. A/C
13. BATT CHARGE
14. DBL LOCK
15. ECU-B1
16. ECU-IG1
17. GAUGE1
18. EFI or ECD NO.2
19. RR WIPER
20. SUN ROOF
21. DOOR
22. LH SEAT
23. IDLE UP



Relays:

A. DEFOG
B. IG1 No.2
C. ACC
D. DOME

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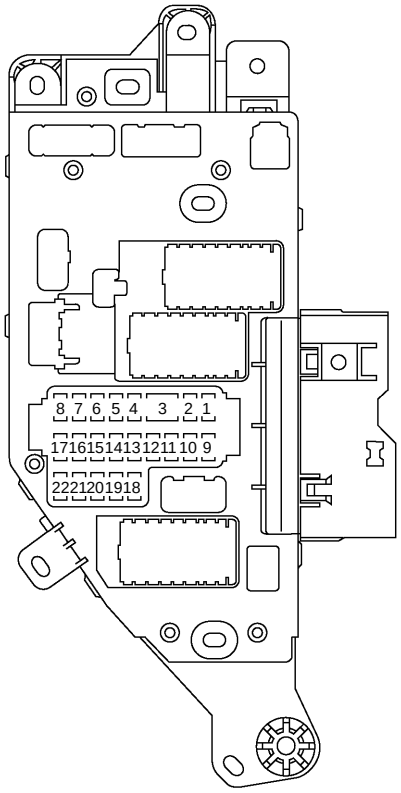
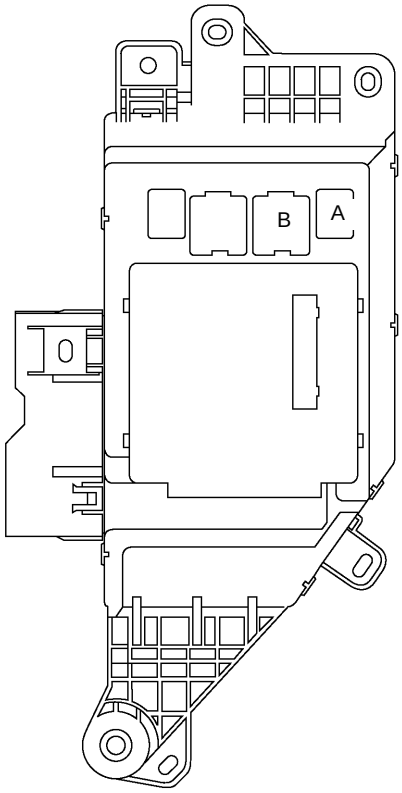
I24922

Cowl Side J/B RH



Fuses:

1. P/W (RL)
2. P/W (FL)
3. VGRS
4. DOME
5. RADIO
6. WASHER
7. DIFF
8. ECU-B2
9. P/W(FR)
10. P/W(RR)
11. SECURITY
12. IGN
13. MET
14. GAUGE 2
15. SEAT HTR
16. ECU-IG2
17. WIPER
18. RH SEAT
19. RR A/C
20. TIL&TEL



Relays:

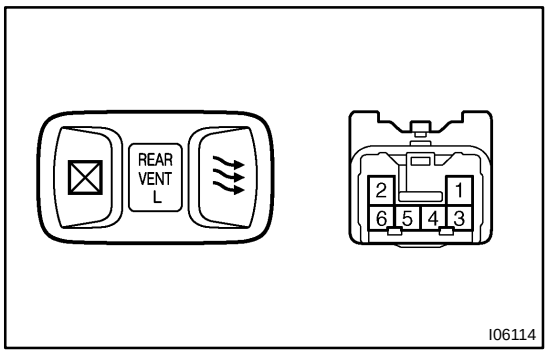
A. ACC CUT
B. IG1 NO.3
C. POWER MAIN

H

I24923

BE0S5-05

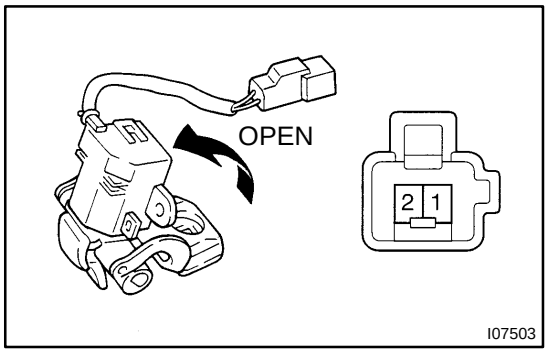
INSPECTION



1. INSPECT POWER QUARTER WINDOW SWITCH CONTINUITY

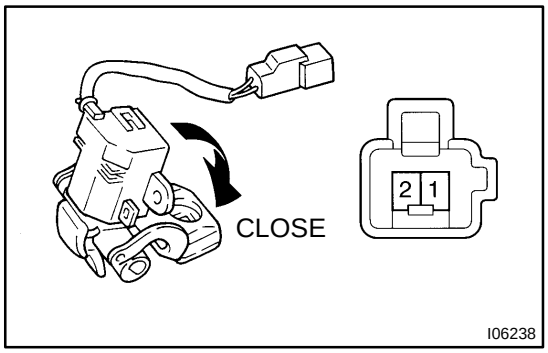
Switch position	Tester connection	Specified condition
CLOSE	3 - 6 4 - 5	Continuity
OFF	-	Continuity
OPEN	3 - 4 5 - 6	Continuity
Illumination Circuit	1 - 2	Continuity

If continuity is not as specified, replace the switch.



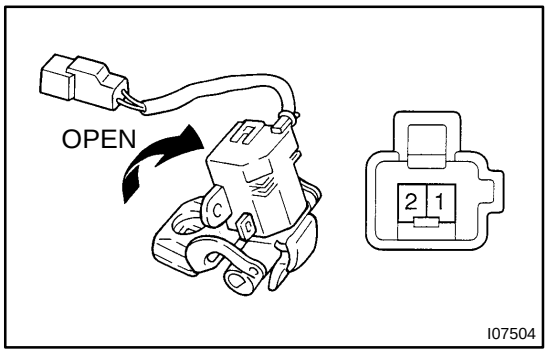
2. Left side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the window link moves to OPEN position.



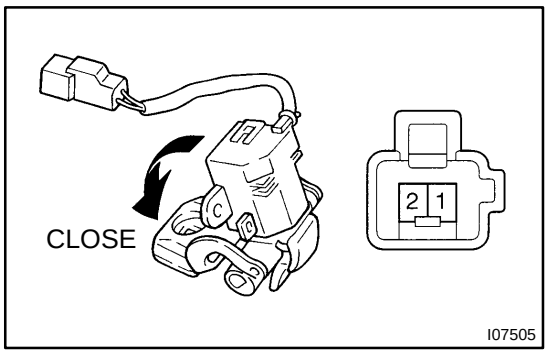
(b) Remove the polarity and check that the window link moves to CLOSE position.

If operation is not as specified, replace the window motor.



3. Right side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, and check that the window link moves to OPEN position.

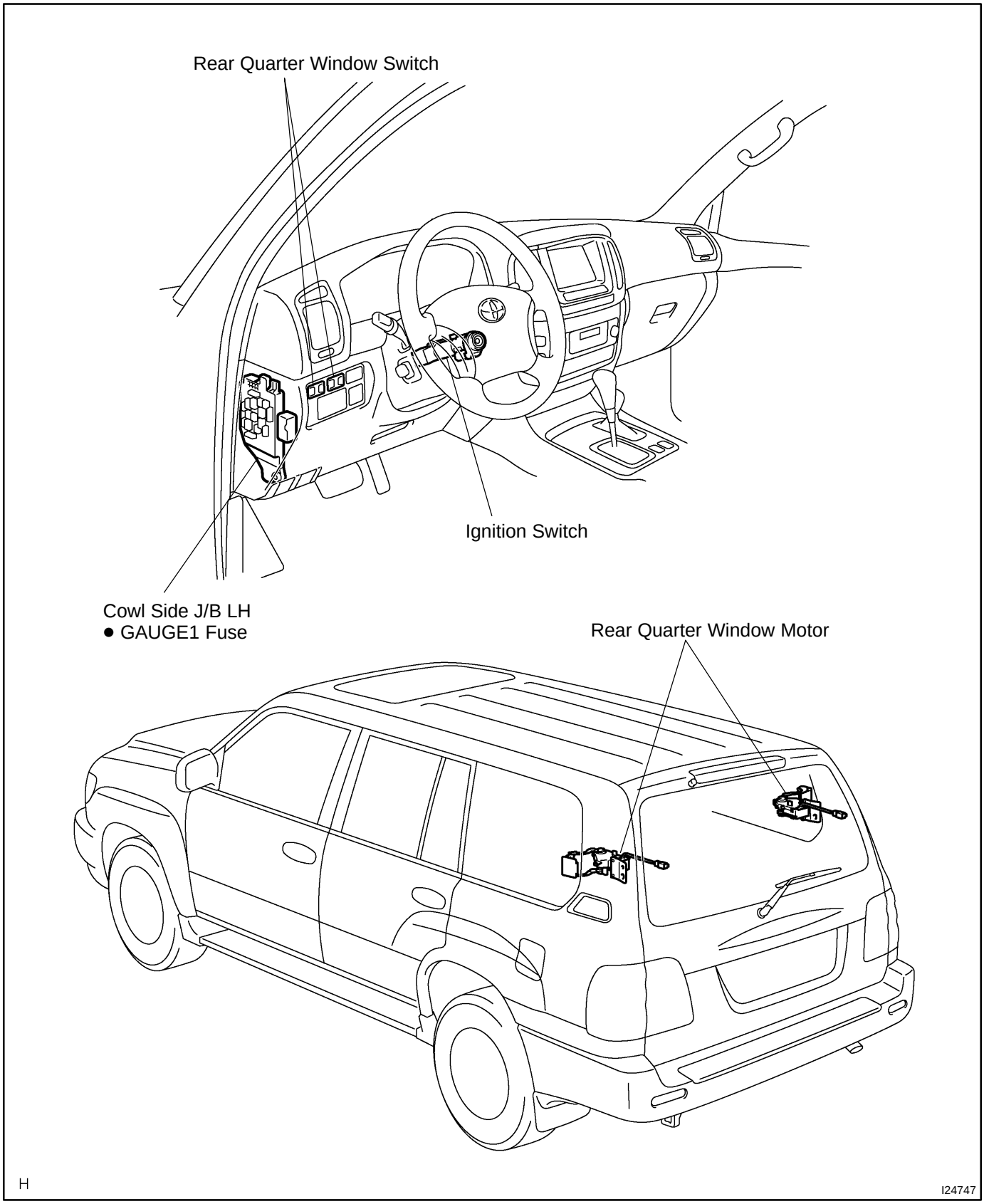


(b) Remove the polarity and check that the window link moves to CLOSE position.

POWER REAR QUARTER WINDOW SYSTEM

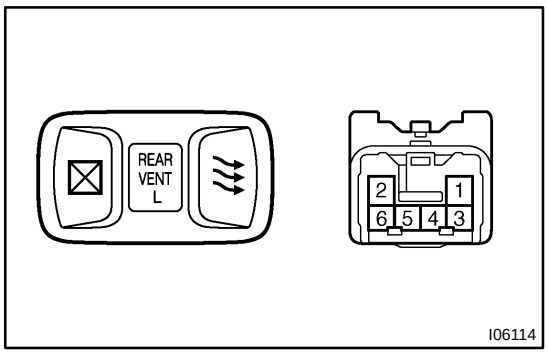
BE0S4-06

LOCATION



BE0S5-05

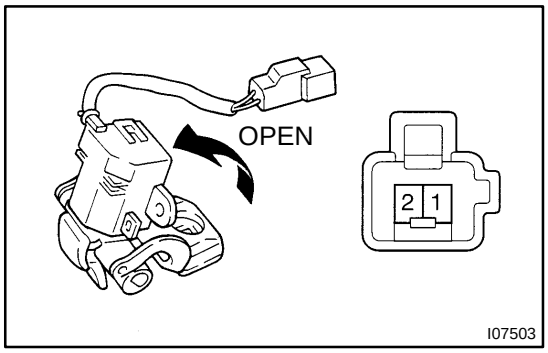
INSPECTION



1. INSPECT POWER QUARTER WINDOW SWITCH CONTINUITY

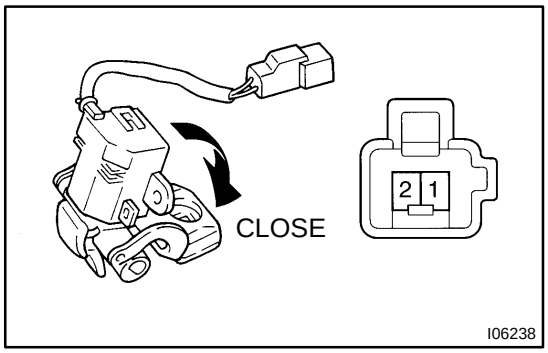
Switch position	Tester connection	Specified condition
CLOSE	3 - 6 4 - 5	Continuity
OFF	-	Continuity
OPEN	3 - 4 5 - 6	Continuity
Illumination Circuit	1 - 2	Continuity

If continuity is not as specified, replace the switch.



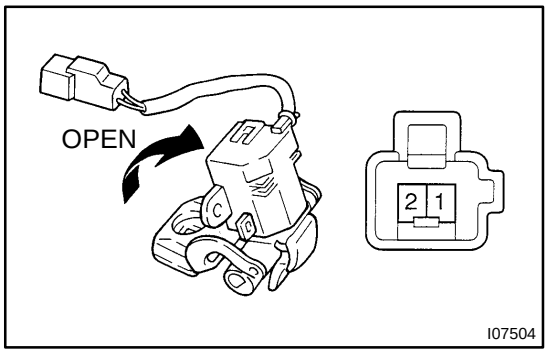
2. Left side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, and check that the window link moves to OPEN position.



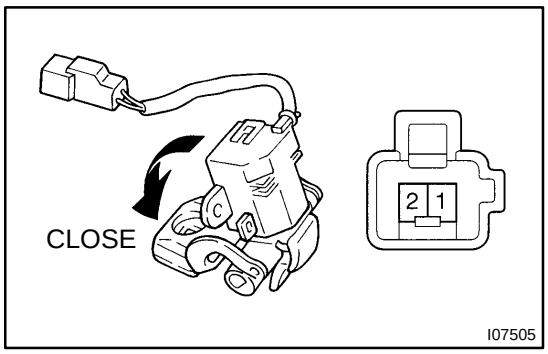
(b) Remove the polarity and check that the window link moves to CLOSE position.

If operation is not as specified, replace the window motor.



3. Right side:
INSPECT POWER VENT WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, and check that the window link moves to OPEN position.

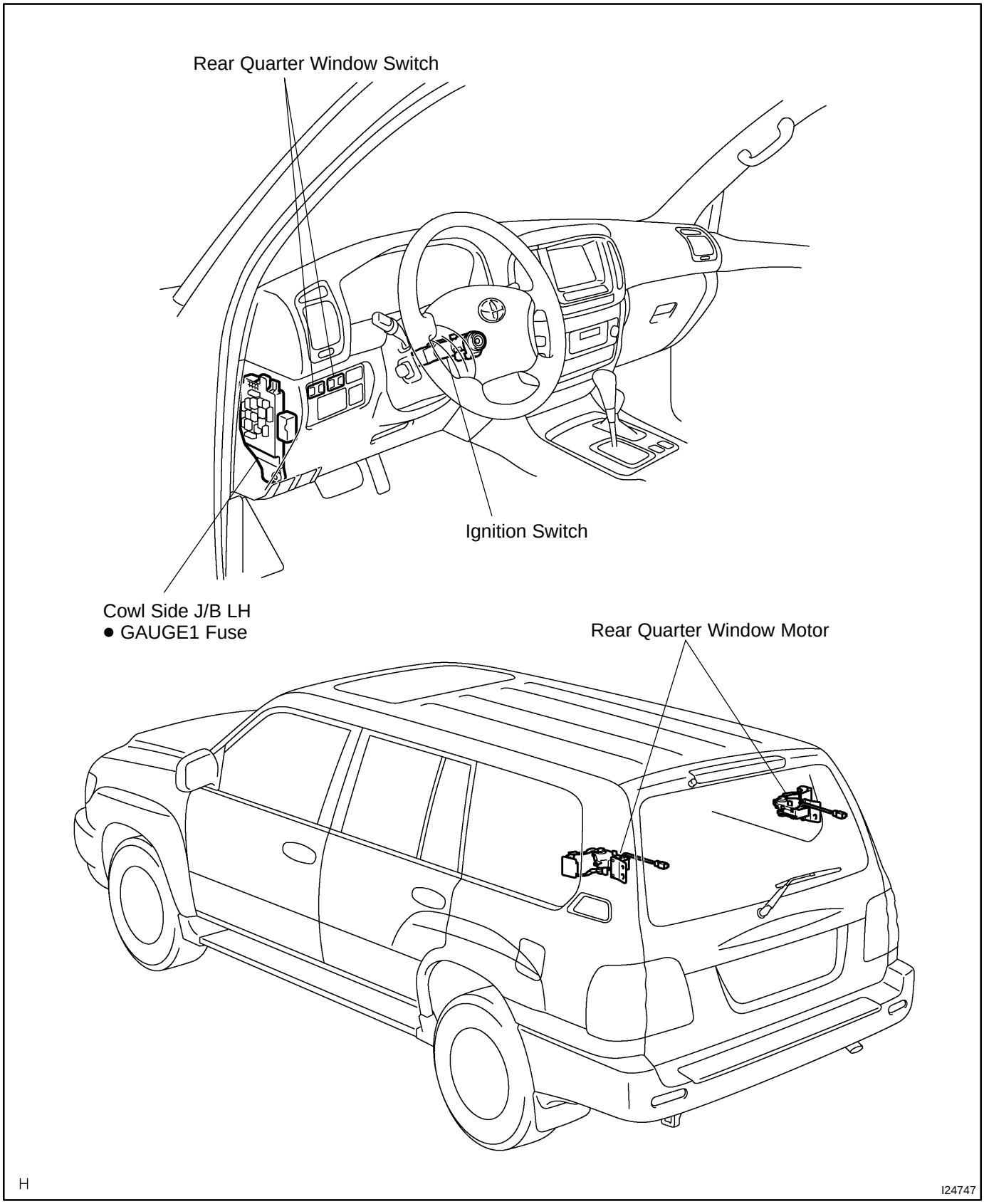


(b) Remove the polarity and check that the window link moves to CLOSE position.

POWER REAR QUARTER WINDOW SYSTEM

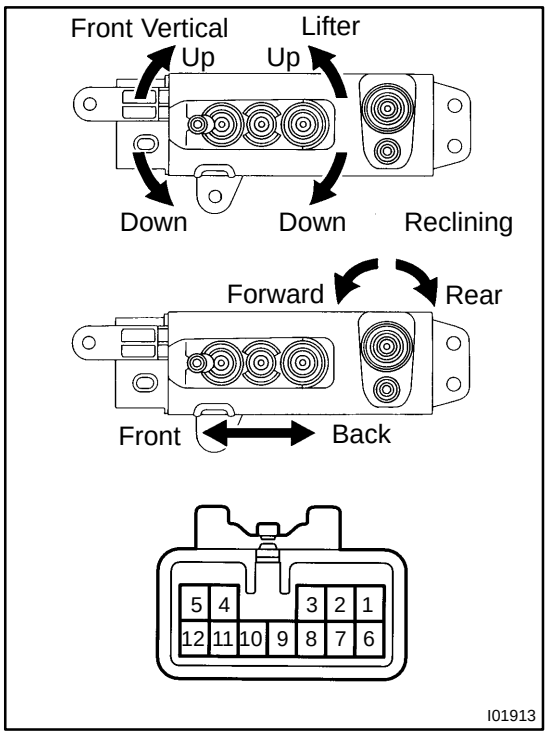
BE0S4-06

LOCATION



BE0S7-02

INSPECTION



1. INSPECT DRIVER'S POWER SEAT SWITCH CONTINUITY

Slide Switch:

Switch position	Tester connection	Specified condition
FRONT	4 - 7 8 - 11	Continuity
OFF	4 - 7 - 8	Continuity
BACK	4 - 11 7 - 8	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	7 - 9 10 - 11	Continuity
OFF	7 - 9 - 10	Continuity
DOWN	7 - 10 9 - 11	Continuity

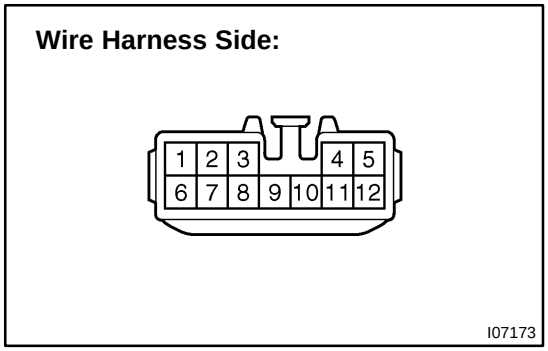
Lifter switch:

Switch position	Tester connection	Specified condition
UP	2 - 11 3 - 7	Continuity
OFF	2 - 3 - 7	Continuity
DOWN	2 - 7 3 - 11	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 - 11 5 - 7	Continuity
OFF	1 - 5 - 7	Continuity
REAR	1 - 7 5 - 11	Continuity

If continuity is not as specified, replace the switch.



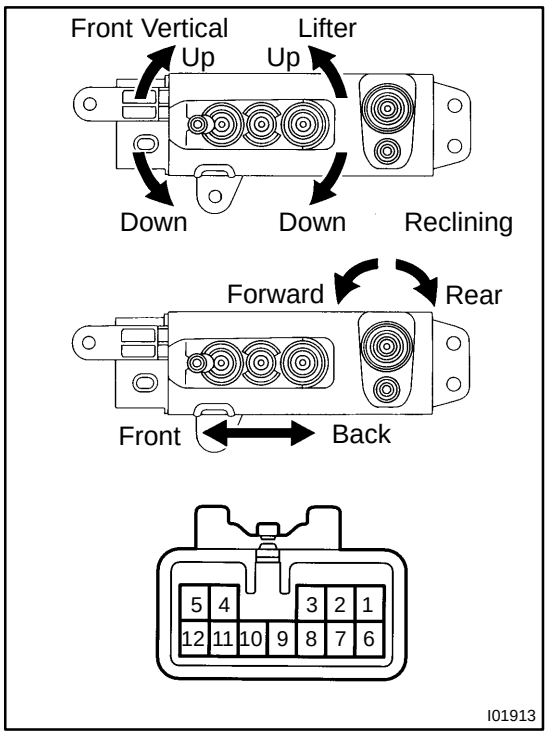
2. INSPECT DRIVER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
7 - Ground	Constant	Continuity
11 - Ground	Constant	Battery positive voltage

If circuit is not as specified, inspect the circuits connected to other parts.



3. INSPECT PASSENGER'S POWER SEAT SWITCH CONTINUITY

Slide switch:

Switch position	Tester connection	Specified condition
FRONT	4 - 7 8 - 11	Continuity
OFF	4 - 7 - 8	Continuity
BACK	4 - 11 7 - 8	Continuity

Front vertical switch:

Switch position	Tester connection	Specified condition
UP	7 - 10 9 - 11	Continuity
OFF	7 - 9 - 10	Continuity
DOWN	6 - 9 10- 11	Continuity

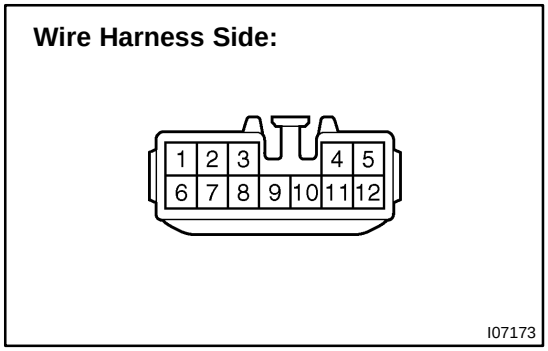
Lifter switch:

Switch position	Tester connection	Specified condition
UP	2 - 7 3 - 11	Continuity
OFF	2 - 3 - 7	Continuity
DOWN	2 - 11 3 - 7	Continuity

Reclining switch:

Switch position	Tester connection	Specified condition
FORWARD	1 - 11 5 - 7	Continuity
OFF	1 - 5 - 7	Continuity
REAR	1 - 7 5 - 11	Continuity

If continuity is not as specified, replace the switch.



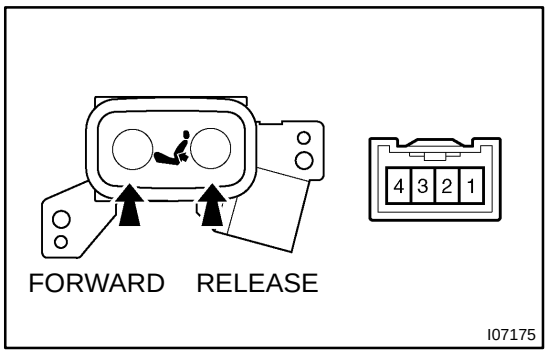
4. INSPECT PASSENGER'S POWER SEAT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
7 - Ground	Constant	Continuity
11 - Ground	Constant	Battery positive voltage

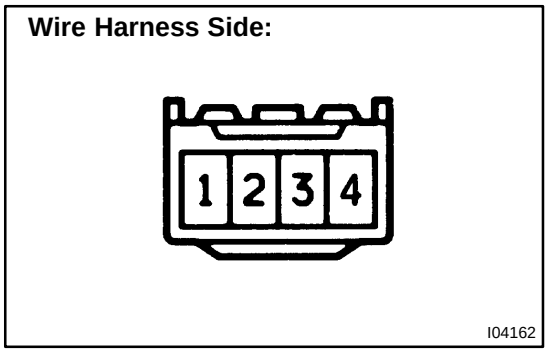
If circuit is not as specified, inspect the circuits connected to other parts.



5. INSPECT DRIVER'S LUMBAR SUPPORT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
FORWARD	1 - 4 2 - 3	Continuity
OFF	1 - 2 - 3	Continuity
RELEASE	1 - 3 2 - 4	Continuity

If continuity is not as specified, replace the switch.



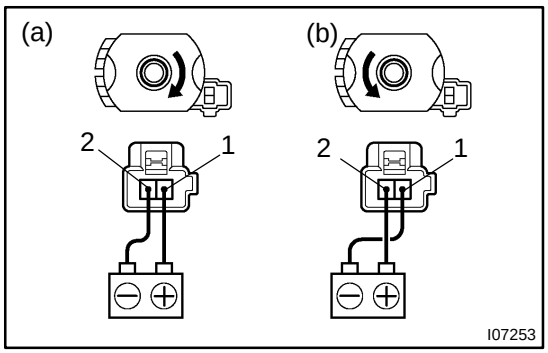
6. INSPECT DRIVER'S LUMBAR SUPPORT SWITCH CIRCUIT

(a) Disconnect the switch connector and connect the seat wire harness to the floor wire harness.

(b) Inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
3 - Ground	Constant	Continuity
4 - Ground	Constant	Battery positive voltage

If circuit is not as specified, inspect the circuits connected to other parts.

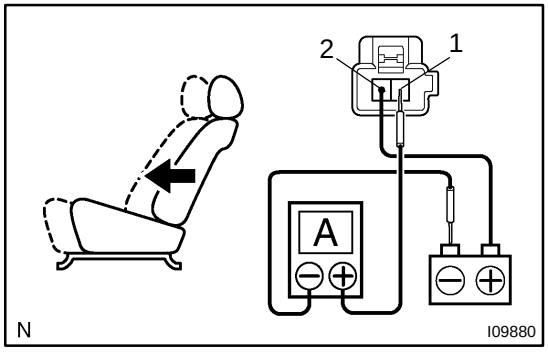


7. INSPECT SLIDE MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

If operation is not as specified, replace the seat adjuster.

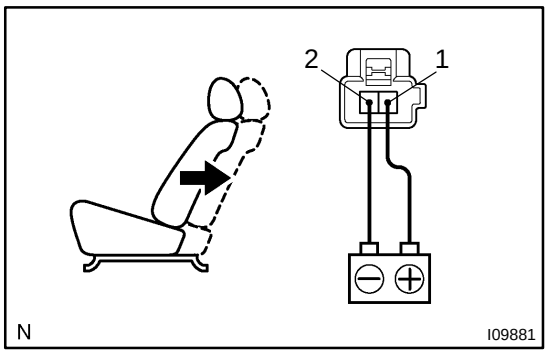


8. INSPECT SLIDE MOTOR PTC THERMISTOR OPERATION

( ): Passenger side

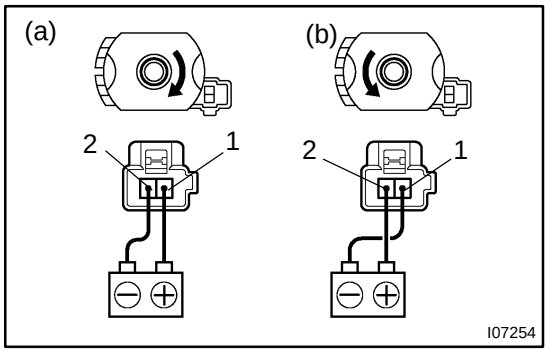
(a) Connect the positive (+) lead from the battery to terminal 2 (1), the positive (+) lead from the ammeter to terminal 1 (2) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the front position.

(b) Continue to apply voltage, check that current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 (2) and the negative (-) lead to terminal 2 (1), check that the seat cushion begins to move backwards.

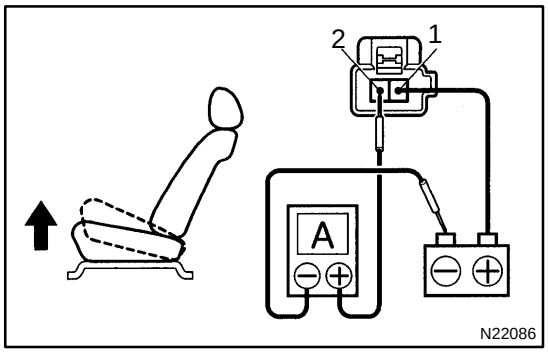
If operation is not as specified, replace the seat adjuster.



9. INSPECT FRONT VERTICAL MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns clockwise.
(b) Reverse the polarity, check that the motor turns counter-clockwise.

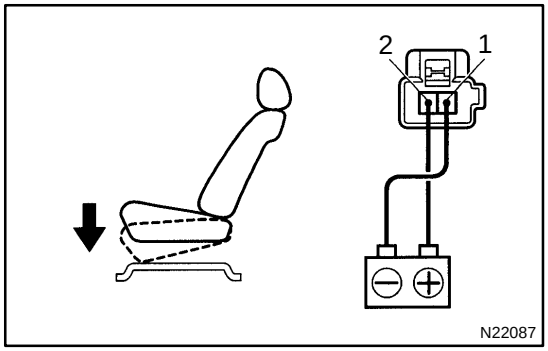
If operation is not as specified, replace the seat adjuster.

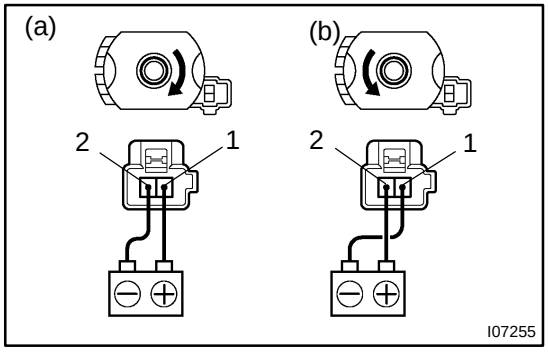


10. INSPECT FRONT VERTICAL MOTOR PTC THERMISTOR OPERATION
( ): Passenger side

(a) Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the highest position.
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.
(c) Disconnect the leads from the terminals.
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (-) lead to terminal 1 (2), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

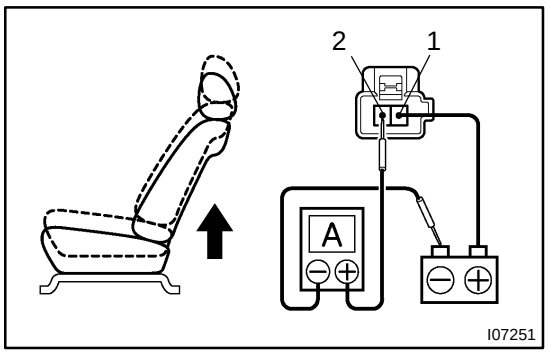




11. INSPECT LIFTER MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns clockwise.
(b) Reverse the polarity, check that the motor turns counter-clockwise.

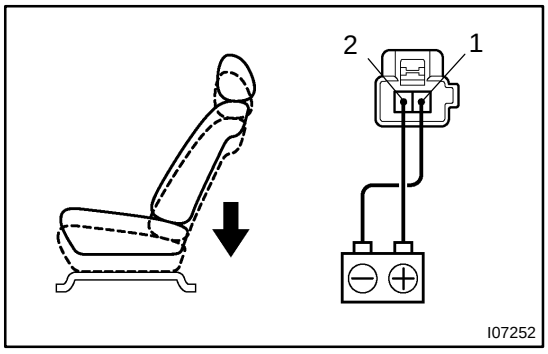
If operation is not as specified, replace the seat adjuster.



12. INSPECT LIFTER MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 (2), the positive (+) lead from the ammeter to terminal 2 (1) and the negative (-) lead to the battery negative (-) terminal, then move the seat cushion to the highest position.

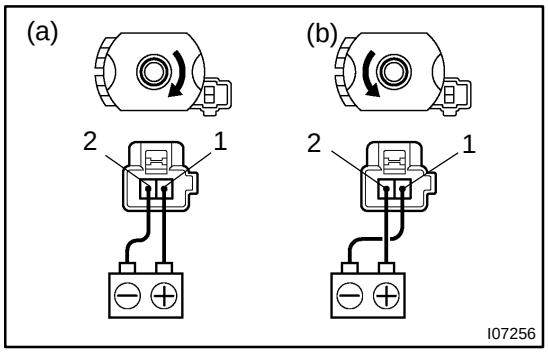
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 (1) and the negative (-) lead to terminal 1 (2), check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

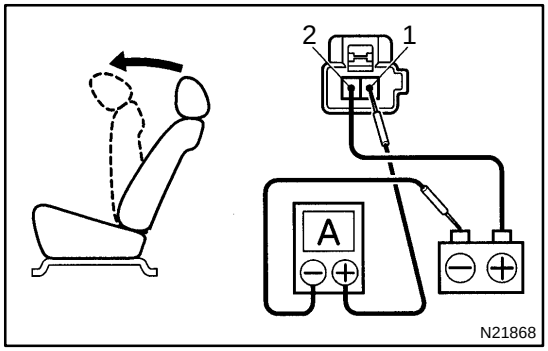


13. INSPECT RECLINING MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the motor turns clockwise.

(b) Reverse the polarity, check that the motor turns counterclockwise.

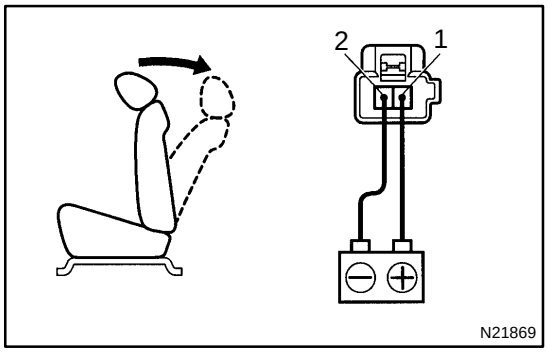
If operation is not as specified, replace the seat adjuster.



14. INSPECT RECLINING MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2, the positive (+) lead from the ammeter to terminal 1 and the negative (-) lead to the battery negative (-) terminal, then recline the seat back to the most forward position.

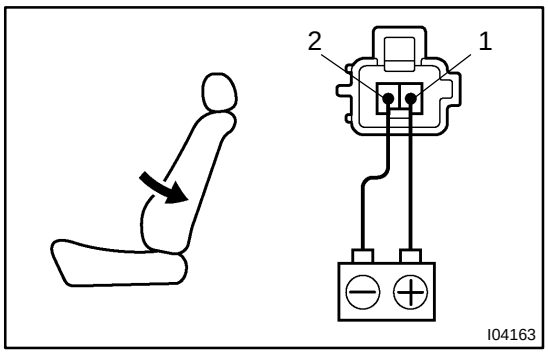
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

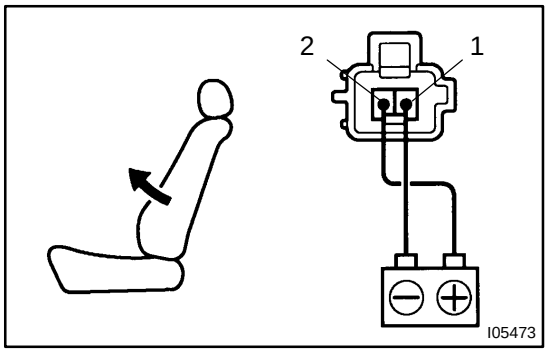
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the seat back begins to fall backward.

If operation is not as specified, replace the seat adjuster.



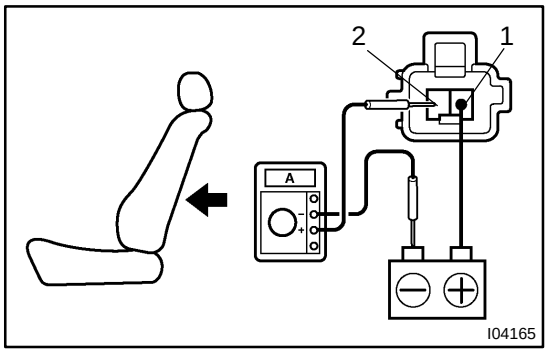
15. INSPECT LUMBAR SUPPORT MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 2, check that the lumbar support moves to release side.



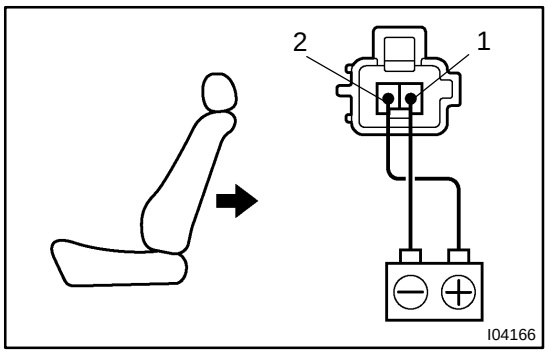
(b) Reverse the polarity, check that the lumbar support moves forward.

If operation is not as specified, replace the seat adjuster.



16. INSPECT LUMBAR SUPPORT MOTOR CIRCUIT BREAKER OPERATION

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1 on the lumbar support motor connector and move the lumbar support to front end position.



(b) Continue to apply voltage, check that a circuit breaker operation noise can be heard within 4 to 60 seconds.

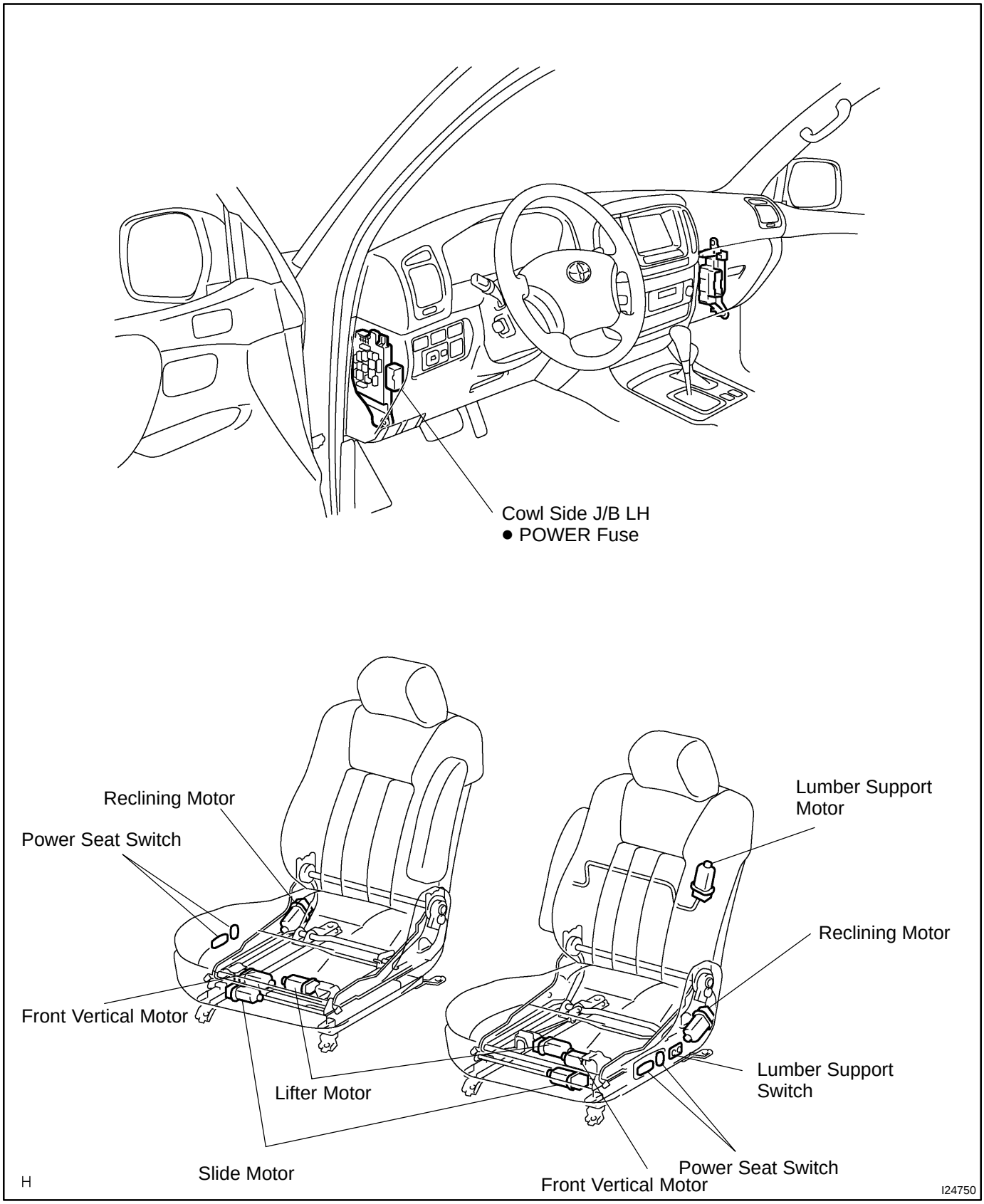
(c) Reverse the polarity, check that the lumbar support begins to move to release side within approximately 60 seconds.

If operation is not as specified, replace the motor.

POWER SEAT CONTROL SYSTEM

LOCATION

BE05S-08



BE1V4-01

ADJUSTMENT

HOW TO RESET POWER WINDOW MOTOR (RESET SWITCH AND PULSE SWITCH)

If the jam protection is not functioned properly, perform the following procedure.

HINT:

It is necessary to reset the power window motor (in initial position for the limit switch) when separating the window regulator from the power window motor or operating the window regulator with the door glass not installed.

(a) Remove the power window motor.

HINT:

Place the matchmarks on the power window motor and window regulator gear.

(b) Connect the power window motor and power window switch to wire harness of the vehicle.

(c) Turn the ignition switch ON and operate the power window switch to idle the power window motor in UP side direction for more than 6 rotations or less than 10 rotates (4 seconds or more).

(d) Assemble the power window motor and regulator.

HINT:

- Install the motor when the regulator arm is below the middle point.
- Align the matchmarks on the power window motor and window regulator gear when install the power window motor.

(e) Assemble the power window regulator and door glass.

HINT:

Never rotate the motor to the down direction until the completion of the window glass installation.

(f) Connect power window switch to wire harness and turn the ignition switch ON.

(g) Repeat UP and DOWN operation several times manually.

(h) Check if AUTO UP $\rightarrow$ AUTO DOWN operates in automatic operation.

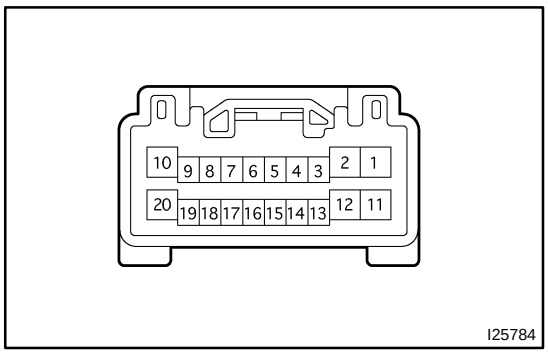
HINT:

- Take care that the jam protection function does not operate just after resetting.
- Reset the regulator again when performing the reverse operating after closing the window fully by AUTO UP operation.

(i) Check the power window function.

BE2ED-01

INSPECTION

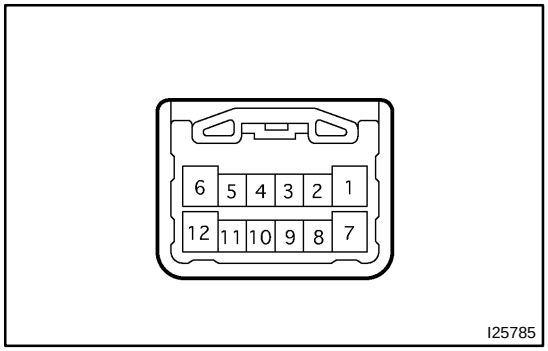


1. INSPECT POWER WINDOW MASTER SWITCH CIRCUIT

Check the voltage and continuity of each terminal of the wire harness side connector.

Tester connection	Condition	Specified condition
2 (GND) - Body ground	Constant	Continuity
10 (BDR) - 2 (GND)	Constant	10 - 14V
9 (CPUB) - 2 (GND)	Constant	10 - 14V
20 (SIG) - 2 (GND)	Ignition switch OFF → ON	0V → 10 - 14V
1 (UP) - 11 (DN)	Constant	Continuity
5 (LMT) - 13 (SGND)	Driver door glass fully closed	No continuity
	Driver door glass opened by 4 mm (1.06in.)	Continuity

If the circuit is not as specified, inspect the circuits connected to other parts.

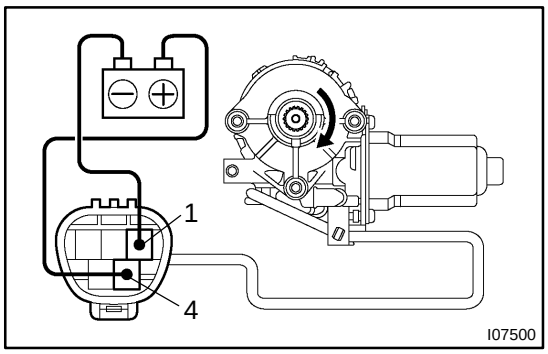


2. INSPECT POWER WINDOW SWITCH CIRCUIT

Check the voltage and continuity of each terminal of the wire harness side connector.

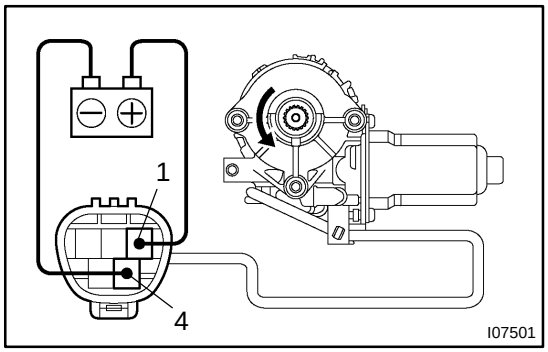
Tester connection	Condition	Specified condition
7 (GND) - Body ground	Constant	Continuity
12 (BDR) - 7 (GND)	Constant	10 - 14V
6 (UP) - 1 (DN)	Constant	Continuity
3 (LMT) - 5 (SGND)	Driver door glass fully closed	No continuity
	Driver door glass opened by 4 mm (1.06in.)	Continuity

If the circuit is not as specified, inspect the circuits connected to other parts.



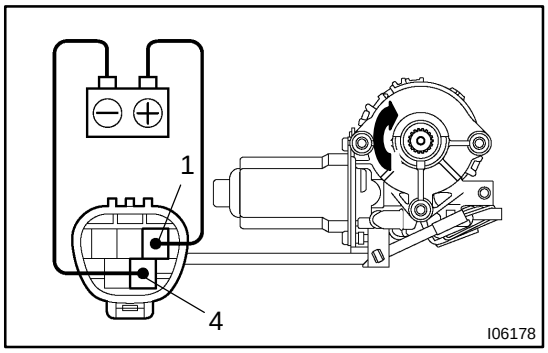
3. Driver's door and rear right door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4, check that the motor turns counterclockwise.



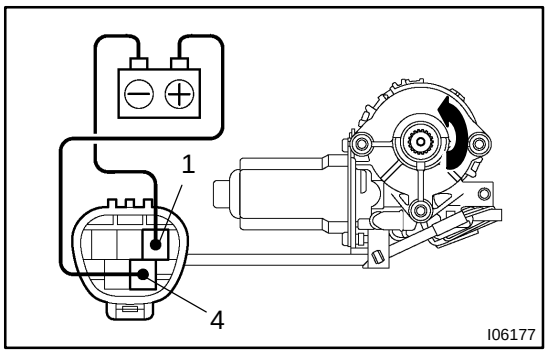
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the motor.



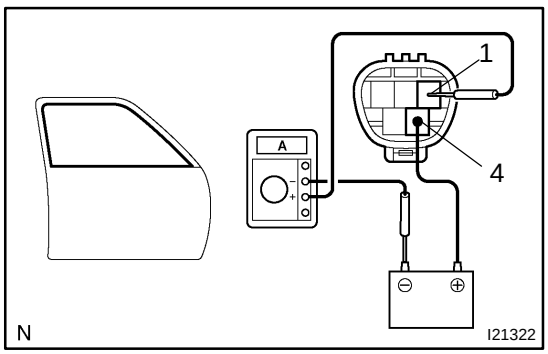
4. Passenger's door and rear left door:
INSPECT POWER WINDOW MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 1, check that the motor turns clockwise.



(b) Reverse the polarity, check that the motor turns counterclockwise.

If operation is not as specified, replace the motor.

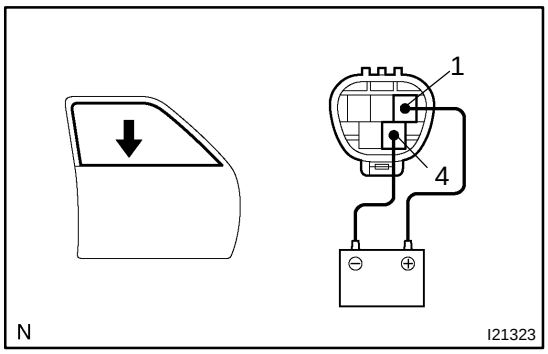


5. INSPECT POWER WINDOW MOTOR PTC THERMISTOR OPERATION

(a) Disconnect the connector from the power window motor.

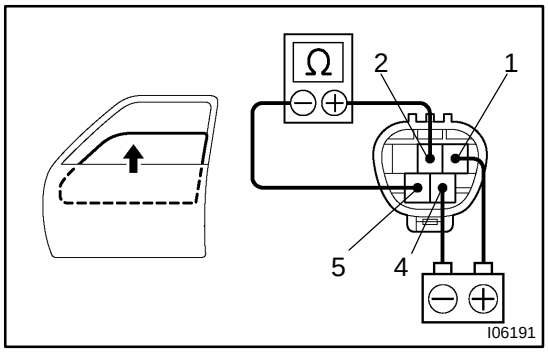
(b) Connect the positive (+) lead from the ammeter to terminal 1 on the wire harness side connector and the negative (-) lead to negative terminal of the battery.

(c) Connect the positive (+) lead from the battery to terminal 4 on the wire harness side connector, and raise the window to the fully position.



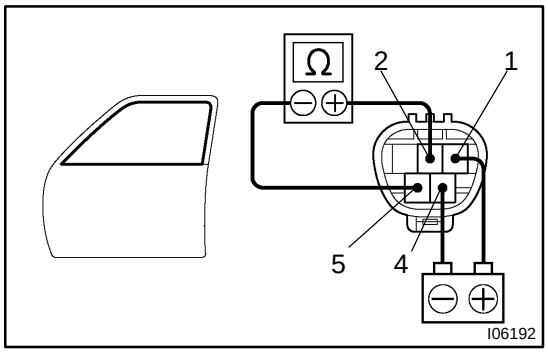
(d) Continue to apply voltage and check that the current changes to less than 1 A within 4 to 90 seconds.
(e) Disconnect the leads from the terminals.
(f) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4, and check that the window begins to descend.

If operation is not as specified, replace the motor.



6. INSPECT JAM PROTECTION LIMIT SWITCH OPERATION

(a) Connect the positive (+) lead from the ohmmeter to terminal 2 and the negative (-) lead to terminal 5.
(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4.
(c) Check that the continuity exists when the window goes up.

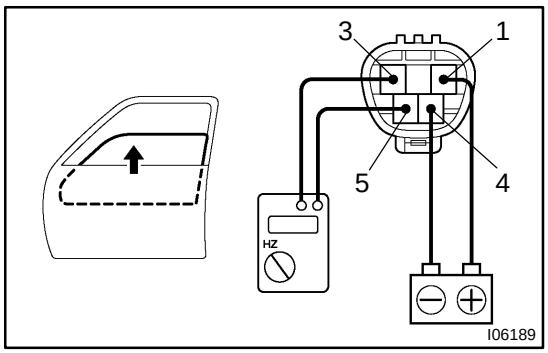


(d) Check that the no continuity exists when the window is in the fully closed position.

If operation is not as specified, replace the motor.

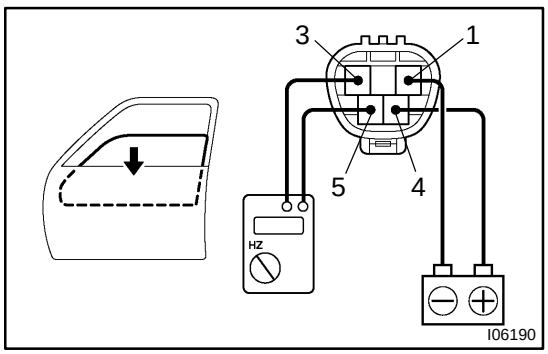
NOTICE:

If connecting the wire harness wrongly, the sensor might be damaged so caution is necessary.



7. INSPECT JAM PROTECTION PULSE SWITCH OPERATION

(a) Connect the positive (+) lead from the TOYOTA electrical tester to terminal 3 and the negative (-) lead to terminal 5.
(b) Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 4.
(c) Check that pulse is generated during the motor running.



(d) Reverse the polarity and check that pulse is generated.

If operation is not as specified, replace the motor.

NOTICE:

If connecting the wire harness wrongly, the sensor might be damaged so caution is necessary.

8. INSPECT JAM PROTECTION FUNCTION

NOTICE:

Never, ever be caught any part of your body when checking.

HINT:

In case of performing resetting of the limit switch, do checking after repeating up and down of the glass with automatic operation.

(a) Confirmation of AUTO up operation:
Confirm that the window will be fully close with AUTO up operation.

(b) Checking of the operation of the jam protection function:
(1) Move up the window with AUTO up operation and check that the window will go down when it touches the handle of the hammer stetted.
(2) Confirm that the window will then stop going down about 200 mm.

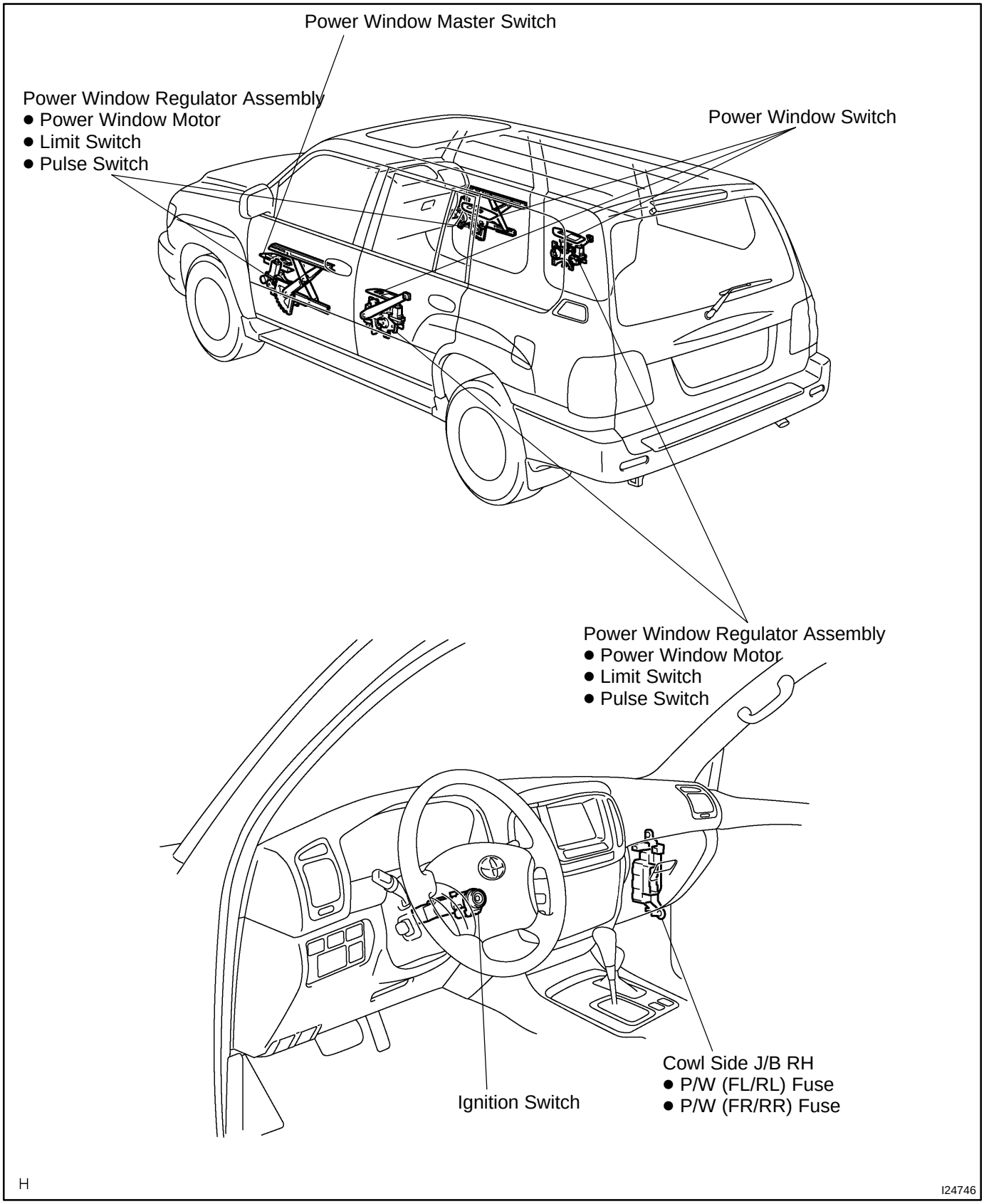
HINT:

In case of removing the glass, glass guide, regulator and etc. be sure to perform checking of the jam protection function.
If the jam protection is not function properly, adjust power window motor reset switch and pulse switch.

POWER WINDOW CONTROL SYSTEM

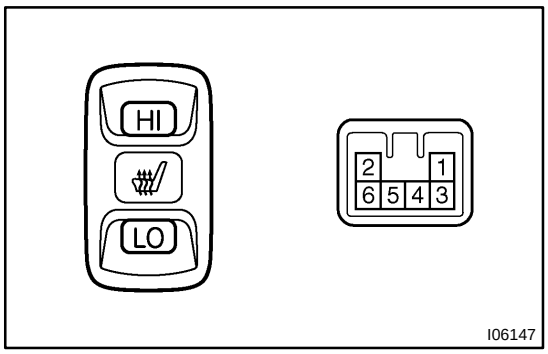
BE0TF-05

LOCATION



BE2EB-01

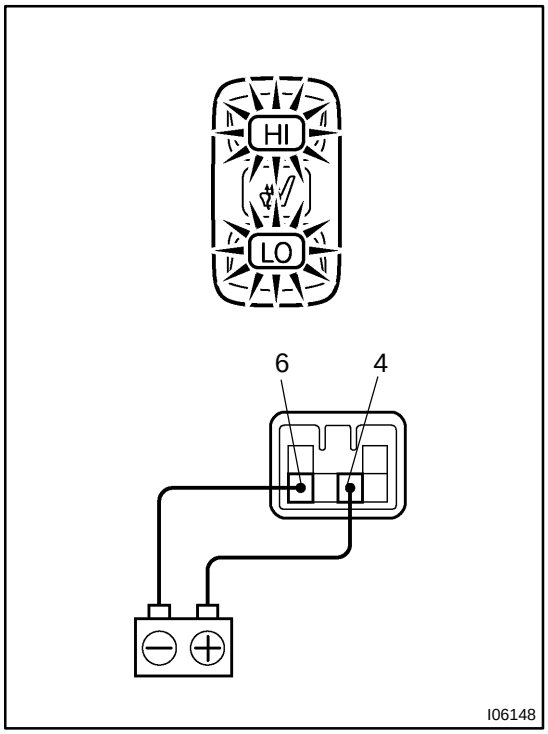
INSPECTION



1. INSPECT SEAT HEATER SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
HI	3 - 4 5 - 6	Continuity
OFF	-	No continuity
LO	4 - 5	Continuity
Illumination circuit	1 - 2	Continuity

If continuity is not as specified, replace the switch.

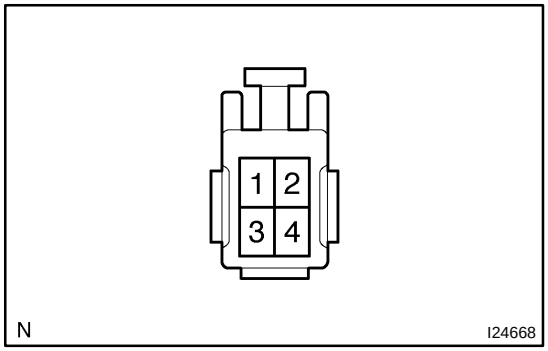


2. INSPECT SEAT HEATER INDICATOR LIGHT OPERATION

(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (-) lead to terminal 4.

(b) Push the seat heater switch Right or Left side and check that the indicator light lights up.

If operation is not as specified, replace the switch and inspect the circuits connected to other parts.

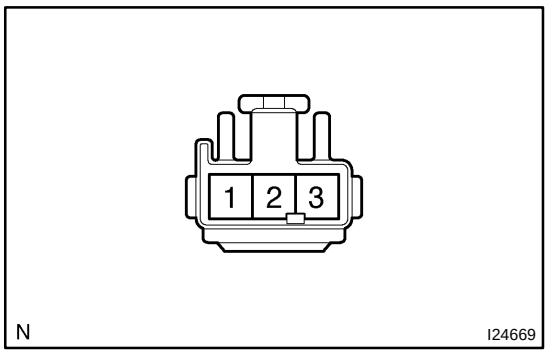


3. INSPECT SEAT HEATER ASSY (SEAT CUSHION) CONTINUITY

Inspect the seat heater assy between terminals, as shown.

Tester connection	Condition	Specified condition
1 - 4	Constant	Continuity
2 - 3	Constant	Continuity

If continuity is not as specified, replace the seat heater assy.

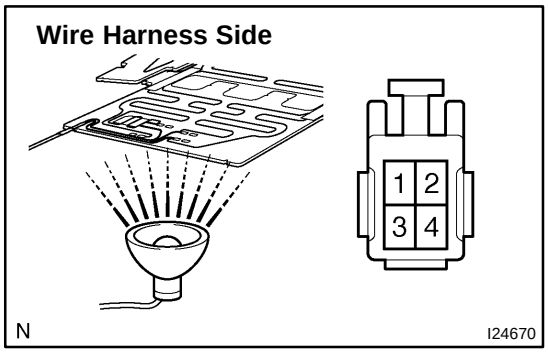


4. INSPECT SEAT HEATER ASSY (SEAT BACK) CONTINUITY

Inspect the seat heater assy between terminals, as shown.

Tester connection	Condition	Specified condition
1 - 2 - 3	Constant	Continuity

If continuity is not as specified, replace the seat heater assy.

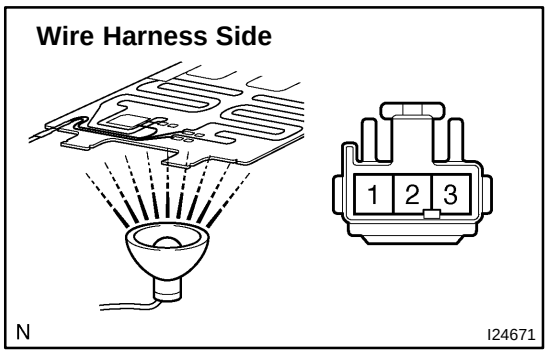


5. INSPECT SEAT HEATER ASSY (SEAT CUSHION) OPERATION

(a) Heat the thermostat with a light.
(b) Connect the seat cushion and seat back connetor.
(c) Inspect the seat heater assy continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 ⟷ 4, 2 ⟷ 3	25 - 35 °C	Continuity
1 ⟷ 4	35 - 45 °C	Continuity
2 ⟷ 3	35 - 45 °C	No continuity

If continuity is not as specified, replace the seat heater assy.



6. INSPECT SEAT HEATER ASSY (SEAT BACK) OPERATION

(a) Heat the thermostat with a light.

(b) Connect the seat cushion and seat back connetor.

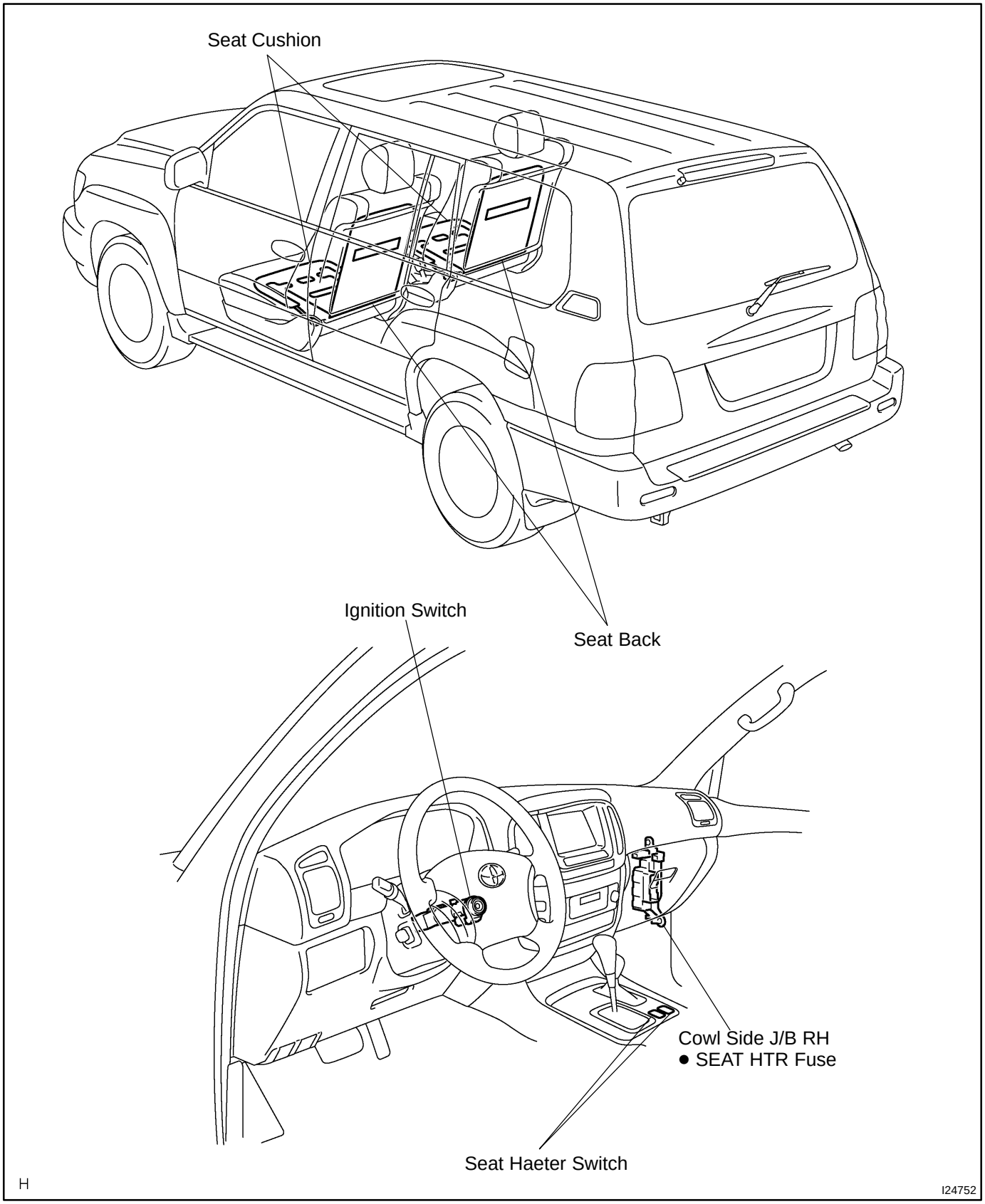
(c) Inspect the seat heater assy continuity between terminals, as shown.

Tester connection	Condition	Specified condition
1 - 2 - 3	25 - 35 ˚C	Continuity
1 - 2	35 - 45 ˚C	Continuity
1 - 3, 2 - 3	35 - 45 ˚C	No continuity

SEAT HEATER SYSTEM

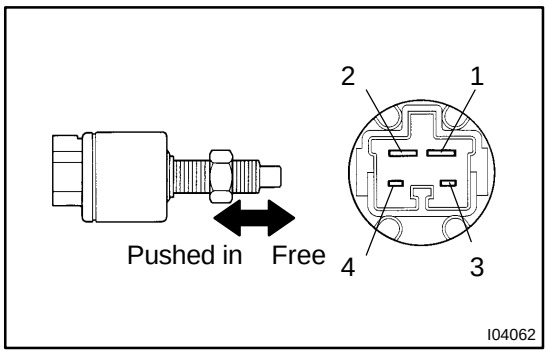
LOCATION

BE0GH-20



BE0RY-02

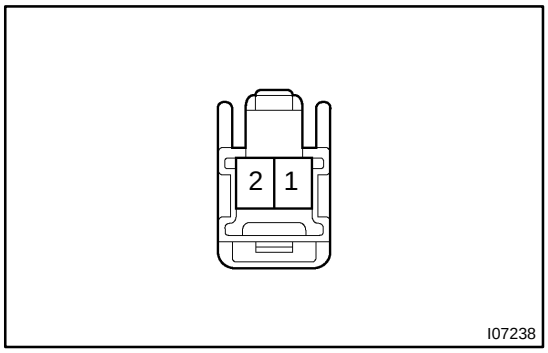
INSPECTION



1. INSPECT STOP LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch pin free (Pedal depressed)	1 - 2	Continuity
Switch pin pushed in (Pedal released)	-	No continuity
Switch pin free (Pedal depressed)	-	No continuity
Switch pin pushed in (Pedal released)	3 - 4	Continuity

If continuity is not as specified, replace the switch.



2. INSPECT HI-MOUNTED STOP LIGHT CONTINUITY

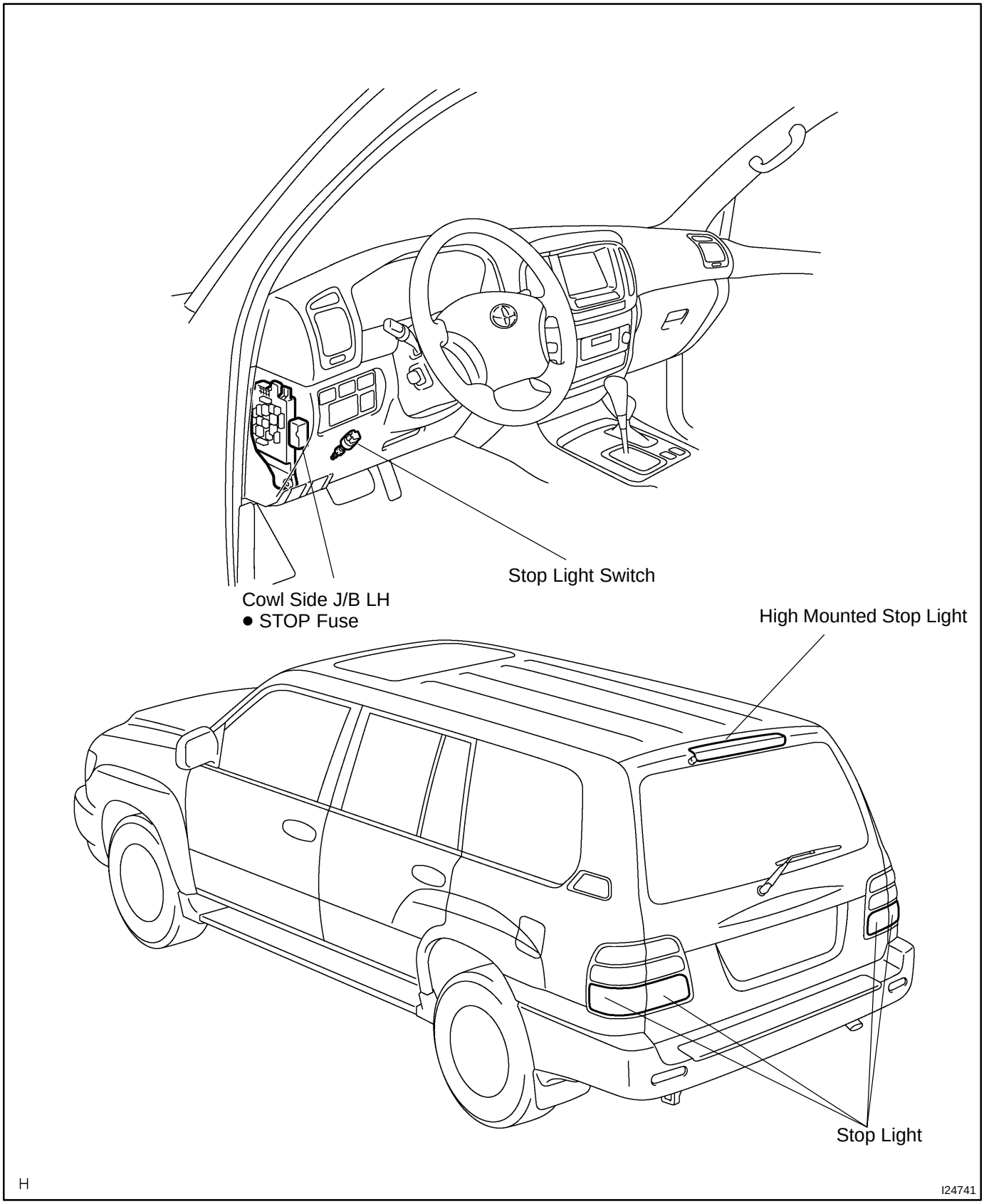
Using an ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the light assembly.

STOP LIGHT SYSTEM

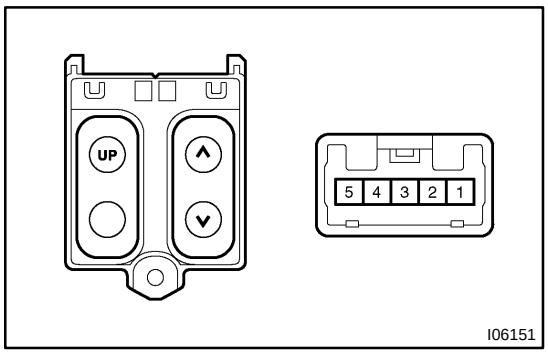
LOCATION

BE0H6-13



BE0S9-04

INSPECTION

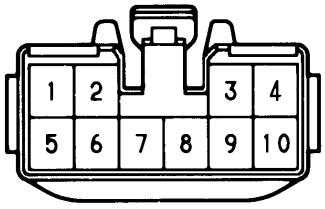


1. INSPECT SLIDING ROOF SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
SLIDE OPEN	3 - 5	Continuity
SLIDE OFF	-	No continuity
SLIDE CLOSE	3 - 4	Continuity
TILT DOWN	2 - 3	Continuity
TILT OFF	-	No continuity
TILT UP	1 - 3	Continuity

If continuity is not as specified, replace the switch.

Wire Harness Side:



2. INSPECT SLIDING ROOF CONTROL ASSEMBLY CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side, as shown in the chart.

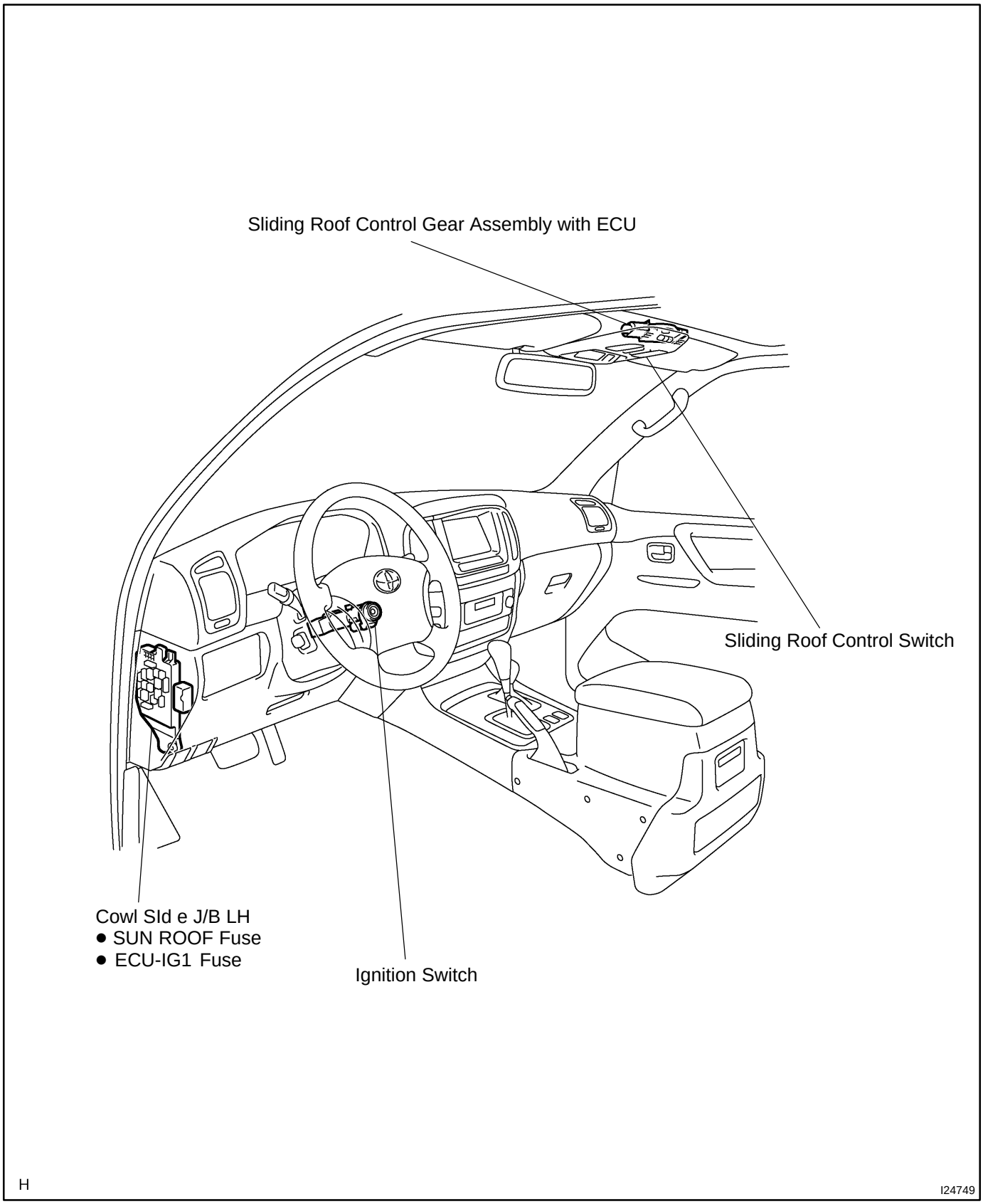
Tester connection	Condition	Specified condition
1 - Ground	Constant	Continuity
4 - Ground	Sliding roof control switch (TILT) OFF or CLOSE	No continuity
4 - Ground	Sliding roof control switch (TILT) UP	Continuity
5 - Ground	Constant	Battery positive voltage
3 - Ground	Constant	Continuity
3 - Ground	Sliding roof control switch (TILT) OFF or UP	No continuity
7 - Ground	Sliding roof control switch (TILT) DOWN	Continuity
8 - Ground	Ignition switch LOCK or ACC	* No voltage
8 - Ground	Ignition switch ON	Battery positive voltage
9 - Ground	Sliding roof control switch (SLIDE) OFF or CLOSE	No continuity
9 - Ground	Sliding roof control switch (SLIDE) OPEN	Continuity
10 - Ground	Sliding roof control switch (SLIDE) OFF or OPEN	No continuity
10 - Ground	Sliding roof control switch (SLIDE) CLOSE	Continuity

*: Exceptions: During 45 second period after ignition switch ON→OFF (ACC) or until driver or passenger door is opened after ignition switch ON→OFF (ACC).

If circuit is as specified, replace the relay.

BE0S8-05

LOCATION

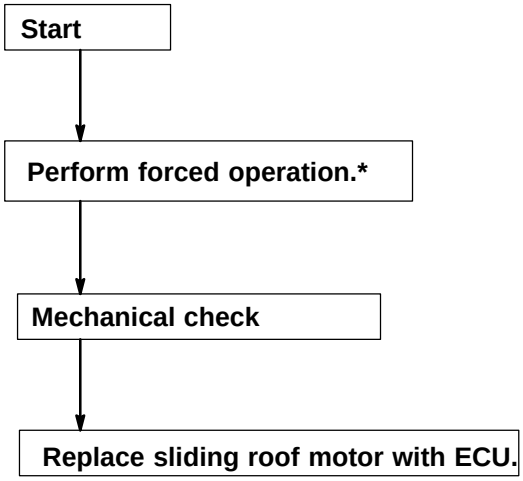


SLIDING ROOF SYSTEM

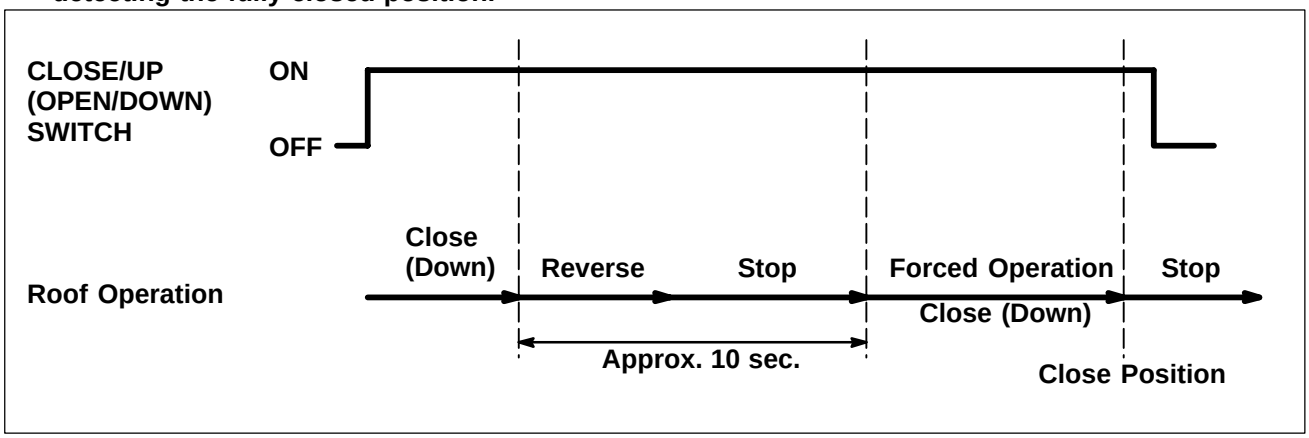
TROUBLESHOOTING

BE0O9-02

Sliding Roof reverses during close (down) operation.



***: Holding the CLOSE/UP (OPEN/DOWN) switch pressed inhibits the jam protection function at approx. 10 sec. after starting the reverse operation.**
If the switch remains pressed any longer, the sliding door starts close operation and it stops when detecting the fully closed position.

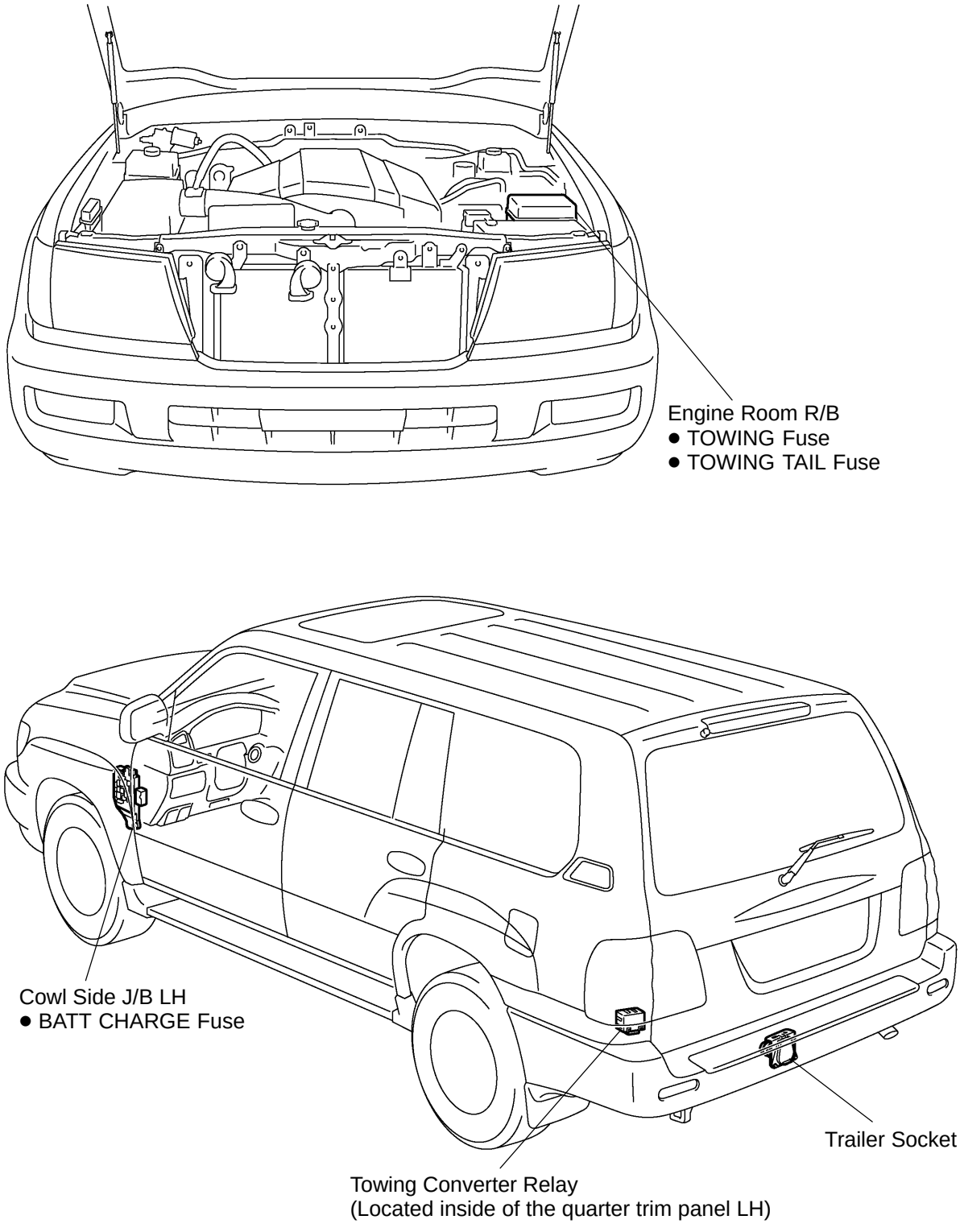


HINT:
At approx. 10 sec. after starting the reverse operation, it is switched to the forced close (down) operation.

TRAILER TOWING

LOCATION

BE2E2-01



H

I25791

BE01J-17

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH:

This system uses the body control system, so check the body control system before you proceed with troubleshooting (See page DI-1038).

Symptom	Suspect Area	See page
Ignition switch is not set to each position.	4. Ignition switch 5. Power source circuit	BE-29 -
Ignition key illumination does not light up.	1. Bulb 2. Body ECU 3. Wire Hauness	- DI-1038 -
Key unlock warning system does not operate. (The buzzer does not sound when the driver's door is opened with the ignition OFF and key inserted)	1. Key Unlock Warning Switch 2. Door Courtesy Switch 3. Wire Harness	BE-29 BE-44 -
Key unlock warning system does not operate. (The buzzer sounds when the ignition key is in ACC or ON)	1. Ignition Switch 2. Wire Harness	BE-29 -

HEADLIGHT AND TAILLIGHT SYSTEM:

This system uses the body control system, so check the body control system before you proceed with troubleshooting (See page DI-1038).

Symptom	Suspect Area	See page
"Automatic light control system" does not operate.	1. Automatic Light Control Sensor 2. Light Control Switch 3. Door Courtesy Switch 4. Wire Harness	BE-32 BE-32 BE-44 -
Auto turn-off system does not operate when the driver's door is opened.	1. Drivers Door Courtesy Switch	BE-44
Auto turn-off system: Headlight and taillight do not come on.	1. Body ECU 2. Wire Harness	DI-1038 -
Auto turn-off system: Headlight and taillight stay on.	1. Body ECU 2. Wire Harness	DI-1038 -
Only one headlight comes on.	1. Daytime Running Light No.3, 4 Relays 2. Body ECU 3. Bulb 4. Wire Harness	BE-32 BE-32 - -
"LO-beam" does not light (All).	1. Engine Room J/B Relay Circuit 2. Wire Harness	BE-15 -
"LO-beam" does not light (One side).	1. Bulb 2. H-LP L-LWR Fuse 3. H-LP R-LWR Fuse 4. Wire Harness	- - - -
"HI-beam" does not light (All).	1. Headlight Dimmer Switch 2. Body ECU 3. Wire Harness	BE-32 BE-32 -
"HI-beam" does not light (One side).	1. Bulb 2. H-LP L-UPR Fuse 3. H-LP R-UPR Fuse 4. Daytime Running Light No.3, 4 Relays 5. Wire Harness	- - - BE-32 -
"Flash" does not light.	1. Headlight Dimmer Switch 2. Body ECU 3. Wire Harness	BE-32 BE-32 -

Headlight does not come on.	1. Engine Room J/B Relay Circuit 2. Body ECU 3. Daytime Running Light No.3, 4 Relays 4. Headlight Dimmer Switch 5. Light Control Switch 6. Wire Harness 7. Bulb	BE-15 BE-32 BE-32 BE-32 BE-32 - -
Headlight does not come on with light control switch in HEAD.	1. Light Control Switch 2. Wire Harness	BE-32 -
Headlight does not go out with light control switch in OFF.	1. Engine Room J/B Relay Circuit 2. Wire Harness	BE-15 -
Headlight flickers.	1. Bulb 2. Wire Harness	- -
Headlight is dark.	1. Bulb 2. Wire Harness	- -
Taillight does not come on with light control switch in TAIL.	1. Engine Room J/B Relay Circuit 2. Light Control Switch 3. Wire Harness	BE-15 BE-32 -
Taillight does not go out with light control switch in OFF.	1. Engine Room J/B Relay Circuit 2. Light Control Switch 3. Wire Harness	BE-15 BE-32 -
Headlight does not come on with engine running and light control switch in OFF.	1. ECU-B1 Fuse 2. ECU-IG1 Fuse 3. Body ECU 4. Daytime Running Light No.3, 4 Relays 5. Generator L Terminal 6. Parking Brake Switch 7. Wire Harness	- - BE-32 BE-32 CH-10 BE-63 -

FOG LIGHT SYSTEM:

Symptom	Suspect Area	See page
Fog light does not light up with light control SW HEAD (Headlight is normal.)	1. FOG Fuse 2. Engine Room J/B Relay Circuit 3. Fog Light Switch 4. Wire Harness	- BE-15 BE-37 -
Fog light does not light up with light control SW HEAD (Headlight does not light).	1. *1 Other Parts 2. Wire Harness	- -
Only one light does not light up.	1. Bulb 2. Wire Harness	- -

*1: Inspect Headlight System

TURN SIGNAL AND HAZARD WARNING SYSTEM:

Symptom	Suspect Area	See page
”Hazard” and ”Turn” do not light up.	1. ECU-IG2 Fuse 2. TURN HAZ Fuse 3. Ignitioin Switch 4. Turn Signal Flasher Relay 5. Wire Harness	- - BE-29 BE-40 -
Hazard warning light does not light up. (Turn is normal)	1. Hazard Warning Switch 2. Wire Harness	BE-40 -
Turn signal does not light up. (Hazard is normal)	1. Turn Signal Switch 2. Wire Harness	BE-40 -

Turn signal does not light up in one direction.	1. Turn Signal Switch 2. Wire Harness	BE-40 -
Only one bulb does not light up.	1. Bulb 2. Wire Harness	- -

INTERIOR LIGHT SYSTEM:

This system uses the body control system, so check the body control system before you proceed with troubleshooting(See page DI-1038).

Symptom	Suspect Area	See page
All the lights do not come ON.	1. DOME Fuse 2. Body ECU 3. DOME Relay(Cowl Side J/B LH)	- DI-1038 -
The light does not come ON when the driver's door is opened.	1. Driver's Door Courtesy Switch 2. Wire Harness	BE-44 -
The light does not come ON when the passenger's door is opened.	1. Passenger's Door Courtesy Switch 2. Wire Harness	BE-44 -
The light does not come on when the rear-right door is opened.	1. Rear-Right Door Courtesy Switch 2. Wire Harness	BE-44 -
The light does not come on when the rear-left door is opened.	1. Rear-Left Door Courtesy Switch 2. Wire Harness	BE-44 -
Only one of the bulbs comes ON.	1. Bulb	-
The illumination does not fade out when all the doors are closed.	1. Courtesy Switch 2. Wire Harness 3. Boby ECU	BE-44 - DI-1038
The illumination does not fade out immediately when the ignition switch is turned to ACC or ON within 15 seconds after all the doors are closed.	1. Ignition Switch 2. ACC Fuse 3. ECU-IG1 Fuse 4. Body ECU 5. Wire Harness	BE-29 - - DI-1038 -
The illumination does not fade out immediately when all the doors are locked within 15 seconds after they are closed.	1. Door Unlock Detection Switch 2. Wire Harness	BE-88 -
Room light does not light up.	1. Bulb 2. Room Light 3. Rear Personal Light 4. Wire Harness	- BE-44 BE-44 -
Front personal light does not light up.	1. Bulb 2. Front Personal Light 3. Room Light 4. Wire Harness	- BE-44 BE-44 -
Rear Room light does not light up.	1. Bulb 2. Rear Room Light 3. Wire Harness	- BE-44 -
Vanity light does not light up.	1. Bulb 2. Vanity Light 3. Wire Harness	- BE-44 -
Glove compartment light does not light up.	1. Bulb 2. Glove Compartment Courtesy Switch 3. Wire Harness	- BE-44 -
Courtesy light does not light up.	1. Bulb 2. Door Courtesy Switch 3. Wire Harness	- BE-44 -

BACK-UP LIGHT SYSTEM:

Symptom	Suspect Area	See page
Back-up Light does not light up.	1. GAUGE2 Fuse 2. Ignition Switch 3. Wire Harness 4. Bulb	- BE-29 - -
Back-up Light remains always on.	1. Park/ Neutral Position Switch 2. Wire Harness	DI-402 -
Only one light does not light up.	1. Bulb 2. Wire Harness	- -

STOP LIGHT SYSTEM:

Symptom	Suspect Area	See page
Stop light does not light up.	1. STOP Fuse 2. Stop Light Switch 3. Wire Harness	- BE-50 -
Stop light always lights up.	1. Stop Light Switch 2. Wire Harness	BE-50 -
Only one light always lights up.	1. Wire Harness	-
Only one light does not light up.	1. Bulb 2. Wire Harness	- -

WIPER AND WASHER SYSTEM:

Symptom	Suspect Area	See page
Front wiper and washer do not operate.	1. WIPER Fuse 2. Wiper Switch 3. Wiper Motor 4. Wire Harness	- BE-52 BE-52 -
Front wiper does not operate in LO or HI.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE-52 BE-52 -
Front wiper does not operate in INT.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE-52 BE-52 -
Front washer motor does not operate.	1. WASHER Fuse 2. Washer Switch 3. Washer Motor 4. Wire Harness	- BE-52 BE-52 -
Front wiper does not operate when washer switch is ON.	1. WASHER Fuse 2. Washer Switch 3. Wiper Motor 4. Wire Harness	- BE-52 BE-52 -
Rear wiper does not operate.	1. RR WIPER Fuse 2. Rear Wiper Motor 3. Rear Wiper Switch 4. Rear Wiper Relay 5. Wire Harness	- BE-52 BE-52 BE-52 -
Rear wiper does not operate in INT or ON position.	1. Rear Wiper Switch 2. Rear Wiper Relay 3. Wire Harness	BE-52 BE-52 -
Rear wiper does not return to OFF position.	1. Rear Wiper Motor 2. Wire Harness	BE-52 -

Rear washer motor does not operate.	1. Rear Washer Motor 2. Rear Washer Switch 3. Wire Harness	BE-52 BE-52 -
Washer fluid does not operate.	1. Washer Hose and Nozzle	-

*1: Inspect wiper arm and blade set positions.

COMBINATION METER (Meter Gauges and Illumination):

Symptom	Suspect Area	See page
Tachometer, fuel gauge and engine coolant temperature gauge do not operate.	1. GAUGE2 Fuse 2. Combination Meter 3. Wire Harness	- BE-58 -
Speedometer does not operate.	1. Speed Sensor 2. Combination Meter 3. Wire Harness	BE-63 BE-58 -
Tachometer does not operate.	1. Igniter 2. Combination Meter 3. Wire Harness	IG-1 BE-58 -
Fuel gauge does not operate or is in abnormal operation.	1. Fuel Receiver Gauge 2. Fuel Sender Gauge 3. Combination Meter 4. Wire Harness	BE-63 BE-63 BE-58 -
Oil pressure gauge does not operate.	1. Oil Pressure Receiver Gauge 2. Oil Pressure Sender Gauge 3. Combination Meter 4. Wire Harness	BE-63 BE-63 BE-58 -
Voltmeter does not operate.	1. Voltmeter 2. Combination Meter 3. Wire Harness	BE-63 BE-58 -
Engine coolant temperature gauge does not operate or is in abnormal operation	1. Engine Coolant Temperature Receiver Gauge 2. Engine Coolant Temperature Sender Gauge 3. Combination Meter 4. Wire Harness	BE-63 BE-63 BE-58 -
All illumination lights do not light up.	1. Light Control Rheostat 2. Wire Harness	BE-63 -
Brightness does not change even when rheostat is turned.	1. Bulb 2. Wire Harness	- -
Only one illumination light does not light up.	1. Bulb 2. Wire Harness	- -

COMBINATION METER (Warning Light):

Symptom	Suspect Area	See page
Warning lights do not light up. (Except discharge, open door and SRS)	1. GAUGE1 Fuse 2. Combination Meter 3. Wire Harness	- BE-58 -
Fuel level warning light does not light up.	1. LED 2. Combination Meter 3. Fuel Sender Gauge 4. Wire Harness	- BE-58 BE-63 -
ABS warning light does not light up.	1. LED 2. ABS ECU 3. Wire Harness	- DI-502 -

Seat belt warning light does not light up.	1. LED 2. Seat Belt Buckle Switch 3. Wire Harness 4. Body ECU	- BE-63 BE-63 DI-1038
Discharge warning light does not light up.	1. METER Fuse 2. LED 3. Wire Harness 4. Generator	- - - CH-2
Brake warning light does not light up.	1. LED 2. Parking Brake Switch 3. Brake Fluid Level Warning Switch 4. LED Check Relay 5. Combination Meter 6. Wire Harness	- BE-63 BE-63 BE-63 BE-58 -
SRS warning light does not light up.	1. ECU-B2 Fuse 2. LED 3. Airbag Sensor Assembly 4. Combination Meter 5. Wire Harness	- - DI-690 BE-58 -
Open door warning light does not light up.	1. DOME Fuse 2. LED 3. Door Courtesy Switch 4. Combination Meter 5. Wire Harness	- - BE-44 BE-58 -
A/T oil temperature warning light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. ECM	- BE-63 BE-58 DI-1

COMBINATION METER (Indicator Light):

Symptom	Suspect Area	See page
Cruise control indicator light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. ECM	- BE-58 - DI-1
High-beam indicator light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. Headlight System	- BE-58 - BE-30
Turn indicator light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. Turn Signal and Hazard Warning System	- BE-58 - BE-39
Shift indicator lights do not light up.	1. LED 2. Combination Meter 3. Park/Neutral Position Switch 4. Wire Harness	- BE-58 - -
Only one shift indicator does not light up.	1. LED 2. Combination Meter	- BE-58
Malfunction indicator light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. ECM	- BE-58 - DI-1

ECT PWR indicator light does not light up.	1. LED 2. ECT Pattern Select Switch 3. Combination Meter 4. Wire Harness 5. ECT System	- - BE-58 - DI-358
2nd start ETCS indicator light does not light up.	1. LED 2. Combination Meter 3. Wire Harness 4. ECM	- BE-58 - DI-1
Center Diff. lock indicator light does not light up.	1. LED 2. Combination Meter 3. Transfer 4WD Position Detection Switch 4. Wire Harness	- BE-58 TR-49 -
Indicator lights do not light up. (Except Turn, Hi-beam and security)	1. GAUGE2 Fuse 2. Wire Harness	- -

DEFOGGER SYSTEM:

Symptom	Suspect Area	See page
All defogger systems do not operate.	1. DEFOG Fuse 2. DEFOG Relay 3. Defogger Switch (Integration Control Panel Assembly) 4. Wire Harness	- - BE-75 -
Rear window defogger does not operate.	1. Defogger Wire 2. Choke Coil 3. Wire Harness	BE-75 - -
Mirror defogger does not operate.	1. MIR HTR Fuse 2. Engine Room J/B Relay Circuit 3. Mirror Defogger 4. Wire Harness	- BE-15 BE-75 -

POWER WINDOW CONTROL SYSTEM:

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the power windows do not operate. (Power Door Lock System is normal.)	1. P/W (FL, FR, RL, RR) Fuse 2. Power Window Master Switch 3. Wire Harness	- BE-79 -
Only the driver's window does not operate.	1. Power Window Master Switch 2. Body ECU 3. Power Window Motor 4. Wire Harness	BE-79 DI-1038 BE-79 -
"Window lock function" does not operate.	1. Power Window Master Switch	BE-79

POWER DOOR LOCK CONTROL SYSTEM:

This system uses the body control system, so check diagnosis system of the body control system before you proceed with troubleshooting.

Symptom	Suspect Area	See page
All the doors cannot be locked or unlocked. (Power Window Control System is normal.)	1. DOOR Fuse 2. Door Lock Control Switch 3. Wire Harness 4. Body ECU	- BE-88 - DI-1038
Only one side door lock control does not operate.	1. Door Lock Motor 2. Wire Harness	BE-88 -

Door key related function does not operate.	1. Door Key Lock and Unlock Switch 2. Wire Harness 3. Body ECU	BE-88 - DI-1038
Key confinement prevention function does not operate.	1. Key Unlock Warning Switch 2. Door Courtesy Switch 3. Wire Harness	BE-29 BE-44 -

POWER SEAT CONTROL SYSTEM:

Symptom	Suspect Area	See page
Both driver and passenger power seats do not operate. (Door lock does not operate.)	1. ALTS Fuse 2. Wire Harness	- -
Driver's seat does not operate.	1. LH SEAT Fuse 2. Power Seat Switch (D) 3. Wire Harness	- BE-110 -
Passenger's seat does not operate.	1. RH SEAT Fuse 2. Power Seat Switch (P) 3. Wire Harness	- BE-110 -
"Slide operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Slide Motor (D, P)	BE-110 - BE-110
"Front vertical operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Front Vertical Motor (D, P)	BE-110 - BE-110
"Lifter operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Lifter Motor (D, P)	BE-110 - BE-110
"Reclining operation" does not operate.	1. Power Seat Switch (D, P) 2. Wire Harness 3. Reclining Motor (D, P)	BE-110 - BE-110
"Lumbar support operation" does not operate.	1. Power Seat Switch (D) 2. Wire Harness 3. Lumbar Support Motor (D)	BE-110 - BE-110

(D): Driver's Seat
(P): Passenger's Seat

POWER MIRROR CONTROL SYSTEM:

Symptom	Suspect Area	See page
Mirror does not operate.	1. ACC Fuse 2. Mirror Switch 3. Wire Harness	- BE-117 -
Mirror operates abnormally.	1. Mirror Switch 2. Mirror Motor 3. Wire Harness	BE-117 BE-117 -

SEAT HEATER SYSTEM:

Symptom	Suspect Area	See page
Seat heaters do not operate. (Driver's and Passenger's)	1. SEAT HTR Fuse 2. Seat Heater Switch (D, P) 3. Wire Harness 4. Seat Heater	- BE-121 - BE-121
Driver's seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE-121 -

Passenger's seat heater does not operate.	1. Seat Heater Switch (D, P) 2. Wire Harness	BE-121 -
Seat heater temperature is too hot.	1. Seat Heater	BE-121

AUDIO SYSTEM:

Symptom	Suspect Area	See page
Audio system abnormal operation.	TROUBLESHOOTINGS	BE-129

MULTI DISPLAY:

Symptom	Suspect Area	See page
Clock will not operate.	TROUBLESHOOTING	BE-178
Clock loses or gains time.	TROUBLESHOOTING	BE-178

GARAGE DOOR OPENER SYSTEM:

Symptom	Suspect Area	See page
The equipment of which code has been registered does not operate.	1. Garage Door Opener Switch 2. Wire Harness 3. *	BE-190 - -
LED does not light up. (Even though either switch is pressed.)	1. Garage Door Opener Switch 2. Wire Harness	BE-190 -
LED does not light up. (Only one switch is pressed.)	Garage Door Opener Switch	BE-190

* As the GARAGE DOOR OPENER on the vehicle side seems to be normal, check the OPENER on the equipment side, of which code has been registered.

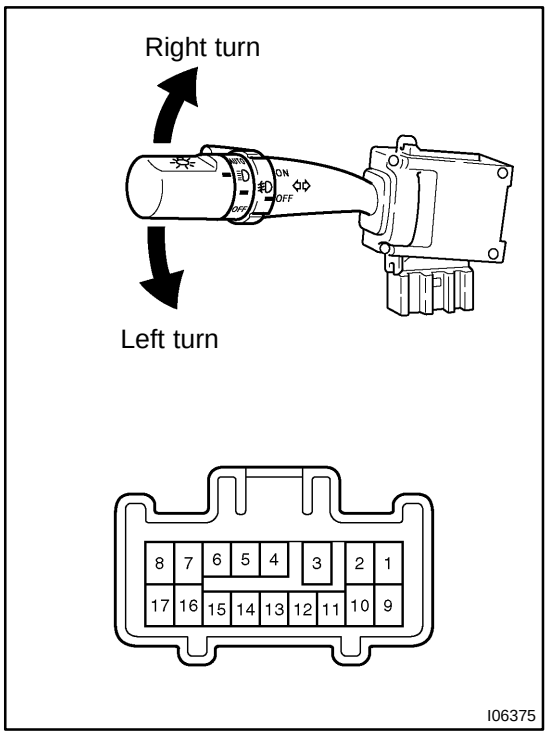
ENGINE IMMOBILIZER SYSTEM:

Symptom	Suspect Area	See page
Engine immobilizer system does not operate.	See DIAGNOSIS SYSTEM	DI-1002

HORN SYSTEM:

Symptom	Suspect Area	See page
Horn system does not operate.	1. HORN Fuse 2. Engine Room J/B Relay Circuit 3. Horn Switch 4. Horn 5. Wire Harness	- BE-15 BE-198 BE-198 -
Horns blow all the time.	1. Engine Room J/B Relay Circuit 2. Horn Switch 3. Wire Harness	BE-15 BE-198 -
One horn operates but the other horn does not operate.	1. Horn 2. Wire Harness	BE-198 -
Horns operate abnormally.	1. Engine Room J/B Relay Circuit 2. Horn 3. Wire Harness	BE-15 BE-198 -

BE0RV-03

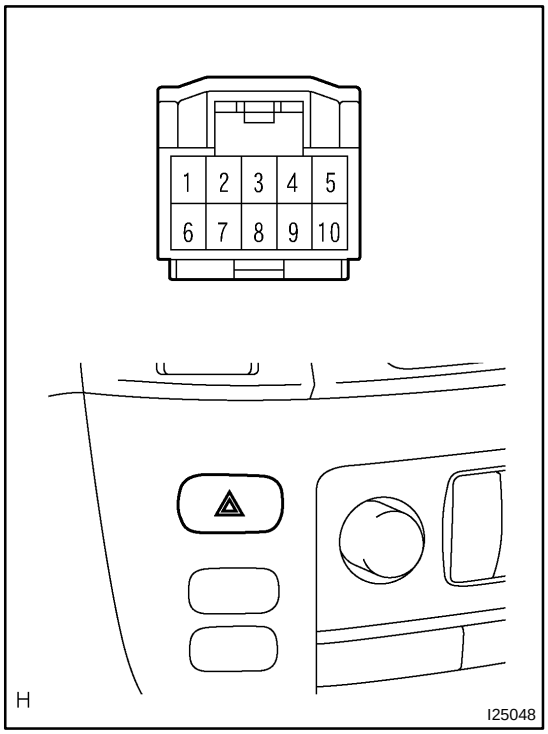


INSPECTION

1. INSPECT TURN SIGNAL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Left turn	7 - 8	Continuity
Neutral	-	No continuity
Right turn	6 - 7	Continuity

If continuity is not as specified, replace the switch.

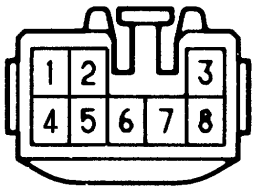


2. INSPECT HAZARD WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Hazard button FREE	3 - 5	No continuity
Hazard button Pushed in	3 - 5	Continuity

If continuity is not as specified, replace the switch.

Wire Harness Side:



I04046

3. INSPECT TURN SIGNAL FLASHER CIRCUIT

Disconnect the connector from the combination switch and inspect the connector on the wire harness side, as shown.

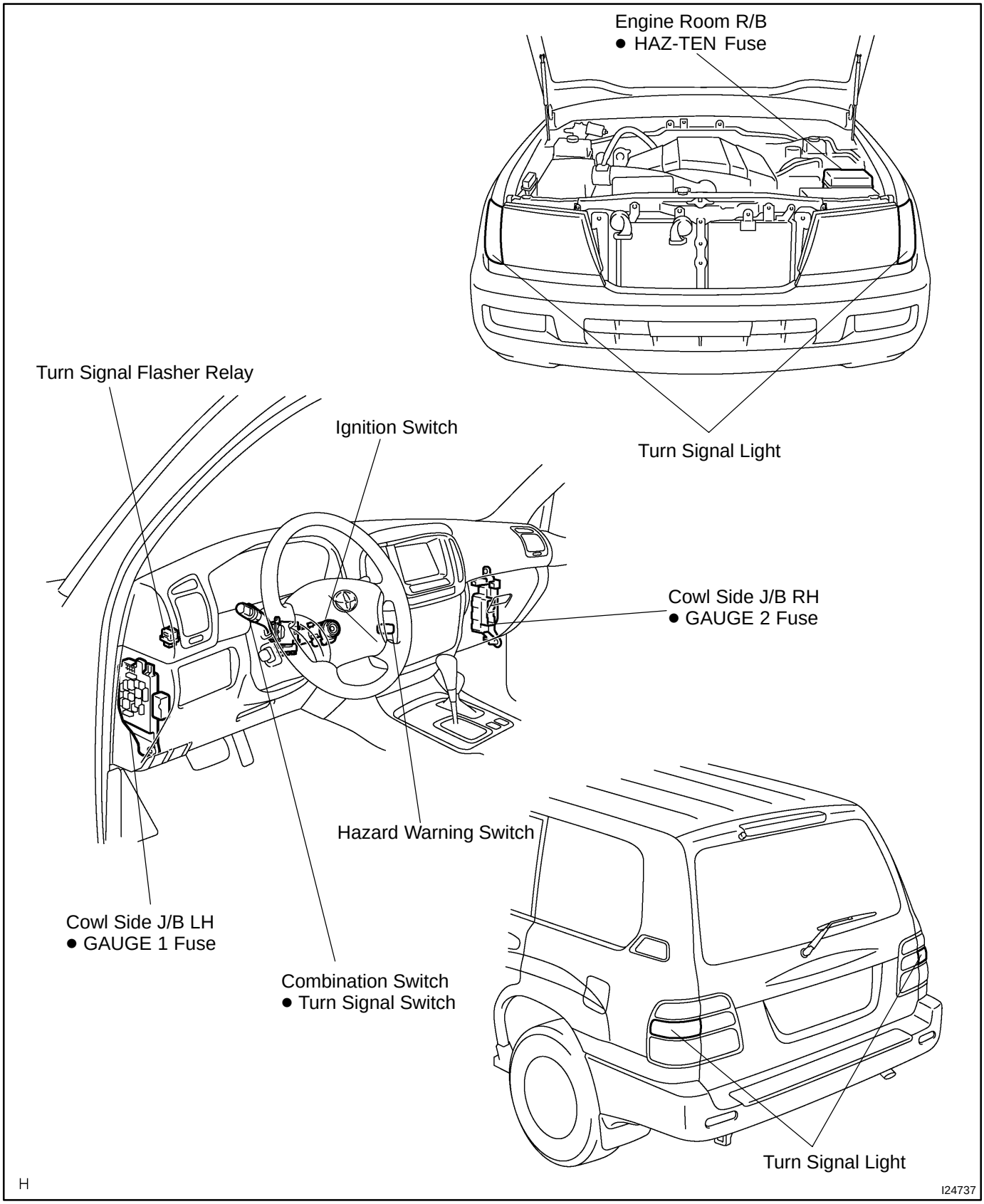
Tester connection	Condition	Specified condition
2 - Ground	Constant	Continuity
3 - Ground	Constant	Continuity
5 - Ground	Turn signal switch RIGHT or OFF	No continuity
5 - Ground	Turn signal switch LEFT	Continuity
6 - Ground	Turn signal switch LEFT or OFF	No continuity
6 - Ground	Turn signal switch RIGHT	Continuity
7 - Ground	Constant	Continuity
8 - Ground	Hazard warning switch OFF	No continuity
8 - Ground	Hazard warning switch ON	Continuity
1 - Ground	Ignition switch LOCK or ACC	No voltage
1 - Ground	Ignition switch ON	Battery positive voltage
4 - Ground	Constant	Battery positive voltage

If circuit is as specified, replace the relay.
If circuit is not as specified, inspect the circuits connected to other parts.

TURN SIGNAL AND HAZARD WARNING SYSTEM

LOCATION

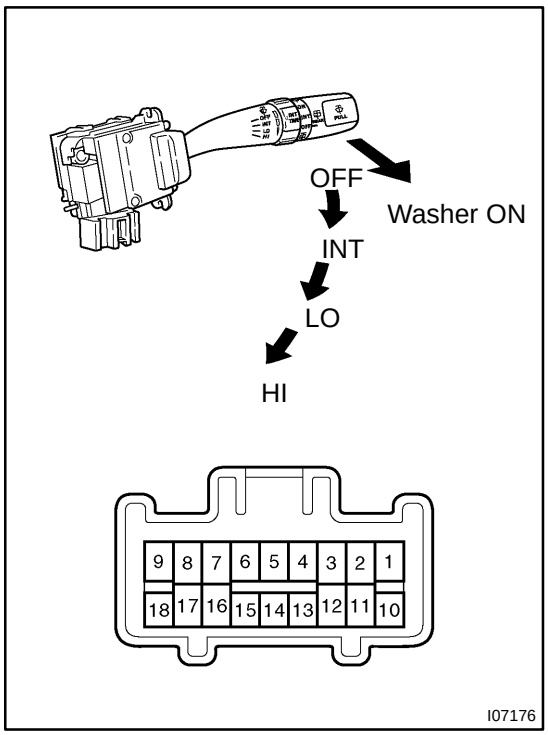
BE0H0-12



BE0RZ-03

INSPECTION

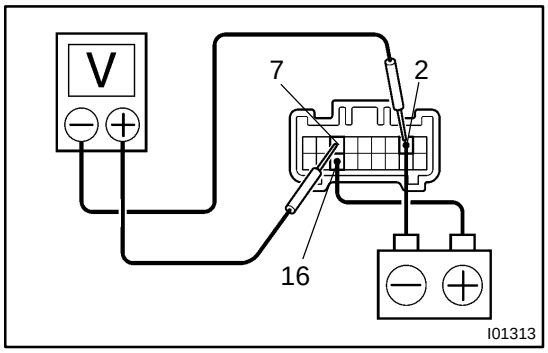
1. INSPECT FRONT WIPER AND WASHER SWITCH CONTINUITY



Switch position	Tester connection	Specified condition
OFF	7 - 16	Continuity
INT	7 - 16	Continuity
LO	7 - 17	Continuity
HI	8 - 17	Continuity
Washer OFF	-	No continuity
Washer ON	2 - 11	Continuity

If continuity is not as specified, replace the switch.

2. INSPECT FRONT WIPER INTERMITTENT OPERATION

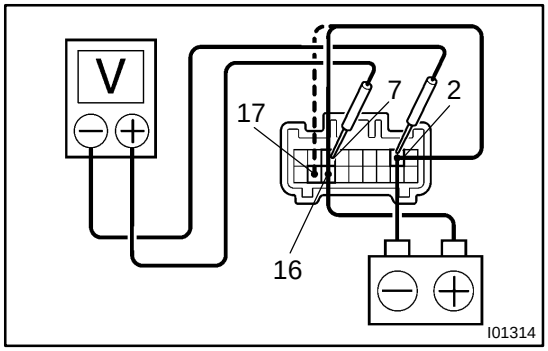


(a) Turn the wiper switch to INT position.

(b) Turn the intermittent time control switch to FAST position.

(c) Connect the positive (+) lead from the battery to terminal 16 and the negative (-) lead to terminal 2.

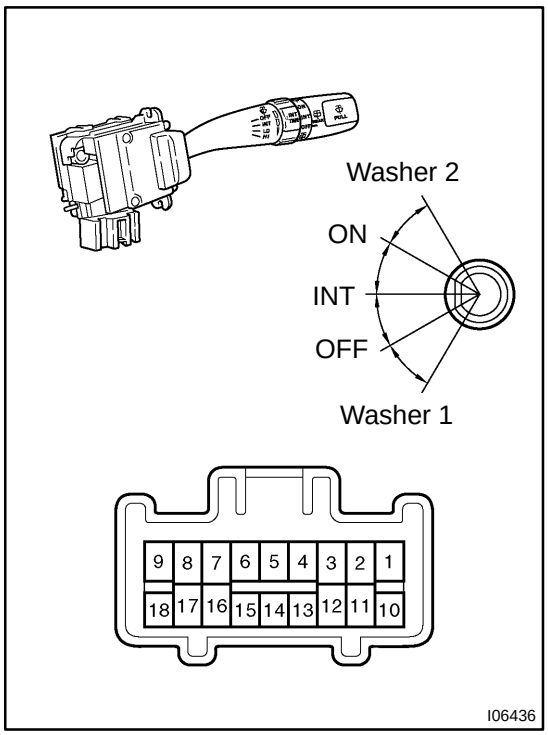
(d) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (-) lead to terminal 2, check that the meter needle indicates battery voltage.



(e) After connecting terminal 16 to terminal 17, connect to terminal 2 to terminal 17, check the voltage rises from 0 volts to battery voltage within the times, as shown in the table.

INT time control switch position	**Voltage**
FAST	0.6 - 2.6 secs. Battery Positive voltage 0 Volt
SLOW	5.7 - 15.7 secs. Battery Positive voltage 0 Volt

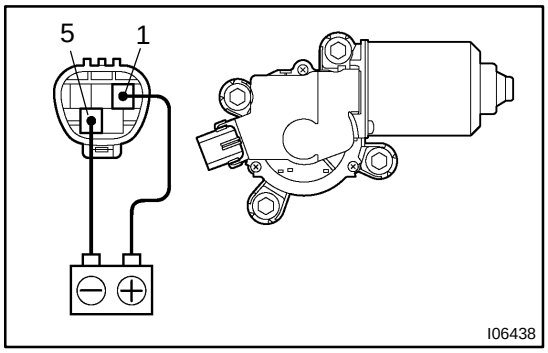
If operation is not as specified, replace the wiper and washer switch.



3. INSPECT REAR WIPER AND WASHER SWITCH CONTINUITY

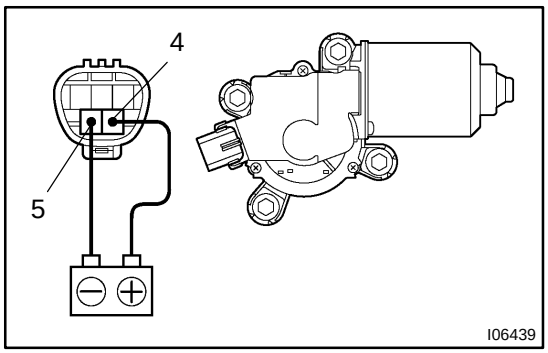
Switch position	Tester connection	Specified condition
Washer 1	2 - 12	Continuity
OFF	-	No Continuity
INT	2 - 13	Continuity
ON	2 - 10	Continuity
Washer 2	2 - 10 - 12	Continuity

If continuity is not as specified, replace the switch.



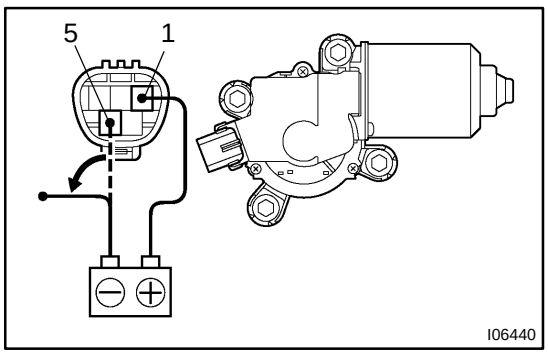
4. Low speed: INSPECT FRONT WIPER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (-) lead to terminal 5, check that the motor operates at low speed.
If operation is not as specified, replace the motor.



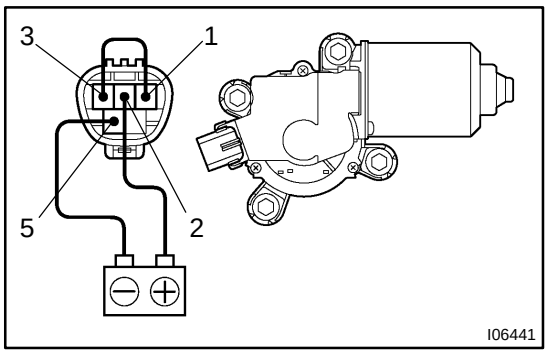
5. High speed: INSPECT FRONT WIPER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 4 and the negative (-) lead to terminal 5, check that the motor operates at high speed.
If operation is not as specified, replace the motor.



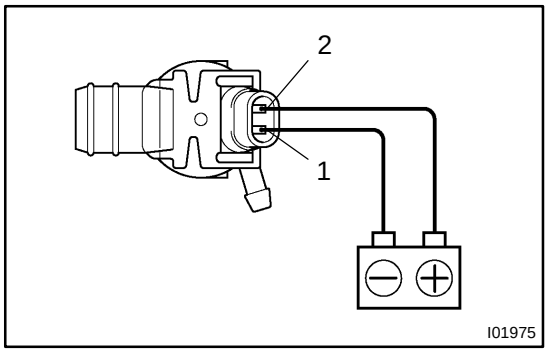
6. Stopping at stop position: INSPECT FRONT WIPER MOTOR OPERATION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 1.



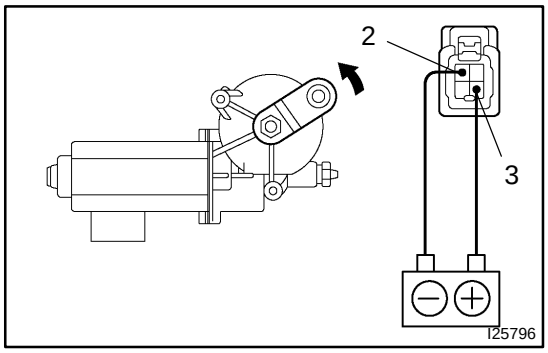
(b) Connect terminals 1 and 3.
(c) Connect the positive (+) lead from the battery to terminal 2 and negative (-) lead to terminal 5, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.



7. INSPECT FRONT WASHER MOTOR OPERATION

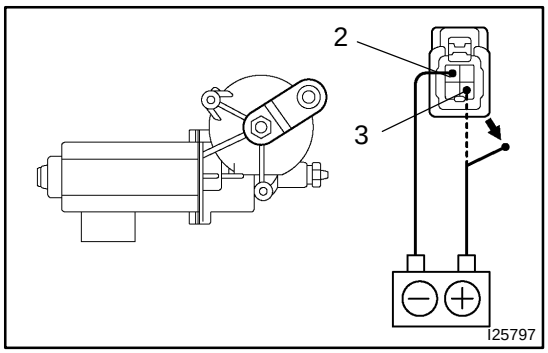
Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, check that the motor operates.



8. Low speed:
INSPECT REAR WIPER MOTOR OPERATION

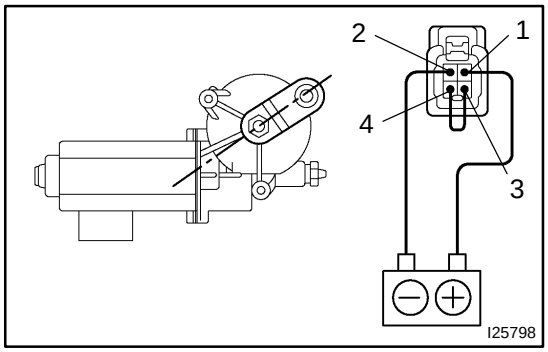
Connect the positive (+) lead from the battery to terminal 3 and negative (-) lead to terminal 2, check that the motor operates at low speed.

If operation is not as specified, replace the motor.



9. Stopping at stop position:
INSPECT REAR WIPER MOTOR OPERATION

(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 3.



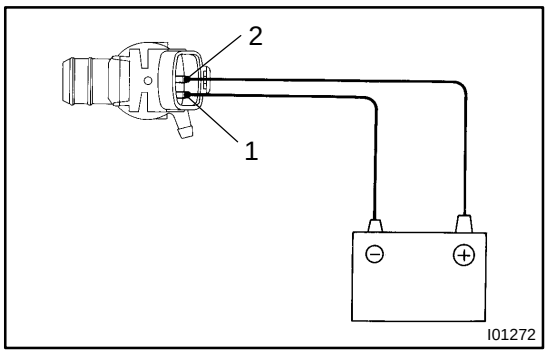
(b) Connect terminals 3 and 4.
(c) Connect the positive (+) lead from the battery to terminal 1 and negative (-) lead to terminal 2, check that the motor stops running at the stop position after the motor operates again.

If operation is not as specified, replace the motor.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



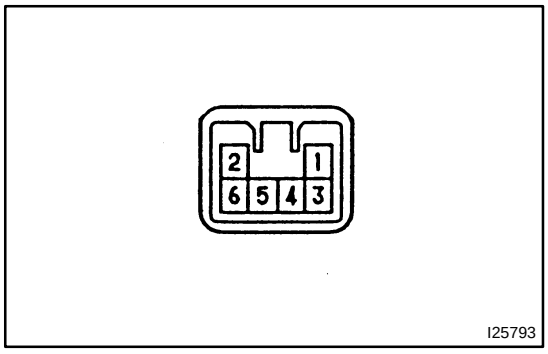
10. INSPECT REAR WASHER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 2 and the negative (-) lead to terminal 1, check that the motor operates.

NOTICE:

These tests must be performed quickly (within 20 seconds) to prevent the coil from burning out.

If operation is not as specified, replace the motor.



11. INSPECT REAR WIPER RELAY CONTINUITY

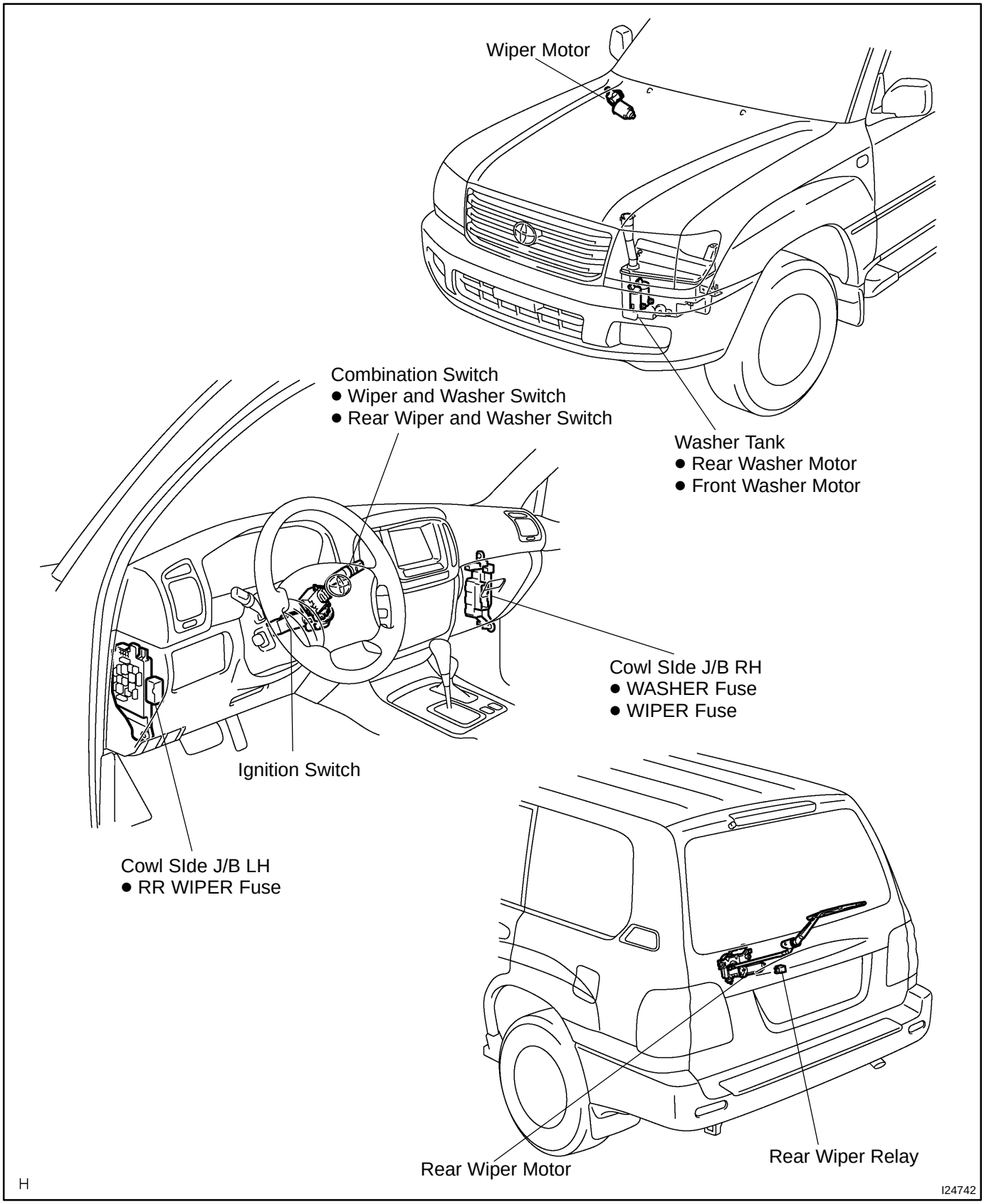
Switch position	Tester connection	Specified condition
OFF	-	-
INT	1 - 4 - 6	Continuity
LO	3 - 5 - 6	Continuity
Wash2	3 - 5 - 6	Continuity

If continuity is not as specified, replace the relay.

WIPER AND WASHER SYSTEM

LOCATION

BE0HN-11



BE2F2-01

INSPECTION

1. CHARACTERS OF WIRELESS DOOR LOCK

(a) The operation distance changes according to how customers hold the transmitter or where it is used.

(b) Because of using the very weak radio wave, if there is a strong wave or noise on the frequency being used, the operation distance may become shorter.

2. WIRELESS DOOR LOCK BASIC FUNCTION

(a) Stand on the driver's side. Stay 1 m away from the vehicle.

(b) Turn the transmitter toward the vehicle and press any one of the transmission switched for 1 sec.

3. INSPECT WIRELESS DOOR LOCK DIAGNOSIS MODE

(a) Start up diagnosis mode.

HINT:

Follow the method below.

(1) Insert the ignition key into the ignition key cylinder.

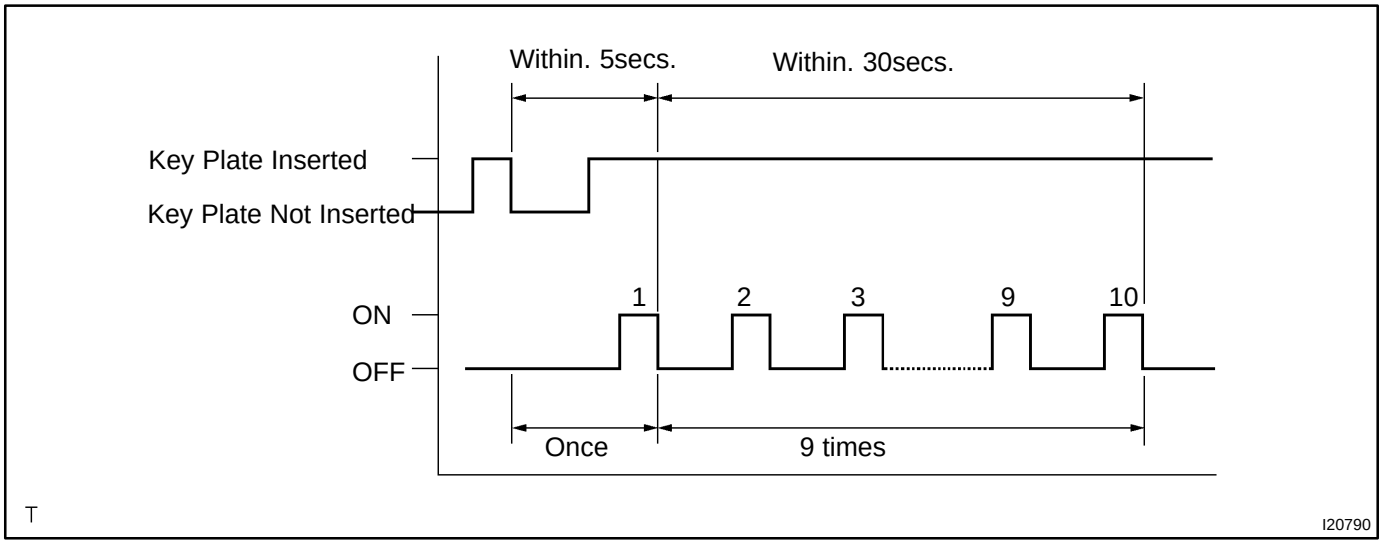
(2) Remove the ignition key from the ignition key cylinder.

(3) Insert the key into the ignition switch.

(4) Turn the ignition switch ON once within 5 sec.

(5) Repeat turnning the ignition switch OFF → ON 9 times within 30 sec.

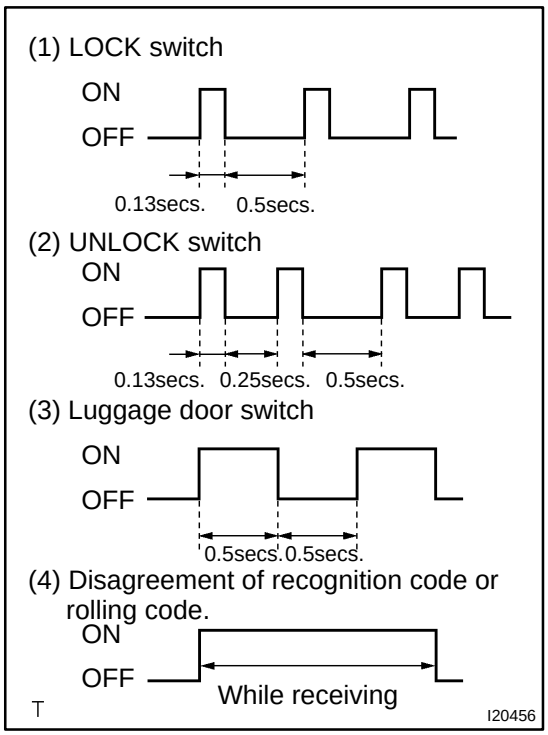
(6) Enter the diagnosis mode, and make sure that the taillight lights up.



(b) Finishing the Diagnosis Mode.

During the Diagnosis mode, turn the ignition switch OFF → ON to go back to the normal mode.

At this time make sure that the taillight lights up.



(c) Diagnosis Mode Check.

HINT:

Check how the taillight lights up when pressing each transmitter switch.

(1) LOCK switch
(2) UNLOCK switch
(3) Luggage door switch
(4) Disagreement of recognition code or rolling code.

HINT:

If (4) is detected in the Diagnosis Check, conduct the recognition code registration.

(5) No response from the taillight.

HINT:

Conduct the following checks.

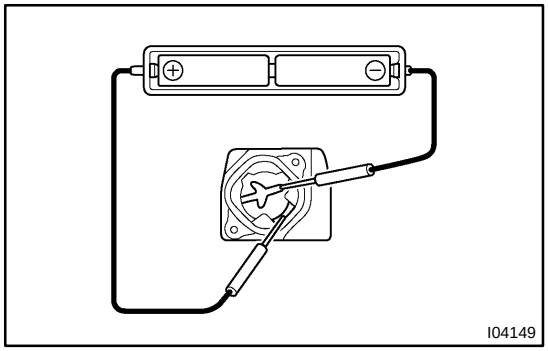
- Wireless door lock transmitter.
- Wireless door lock receiver.

4. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to "Wireless door lock control receiver and transmitter replacement".

(a) Using a screwdriver, remove the screw and cover.
(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and battery (-) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where is approx. 1 M away from driver's outside handle in the right direction, face the key plate of the transmitter to the vehicle, and check the transmitter operation when pressing transmission switch on the side of the transmitter body.
(e) Install the battery (lithium battery).
(f) Install a cover so that O-ring is not distorted or slipped off.
(g) Using a screwdriver, tighten the screw.

Standard:

- **Remote control of vehicle door lock can be operated.**
- **LED lights up more than once.**

HINT:

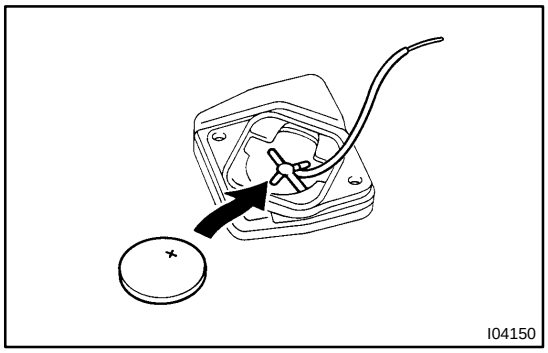
- The minimum operation distance differs according to operator, the way of holding, and location.

- As weak wave is used, operation distance might be shortened when noise is detected in strong wave or used frequency.

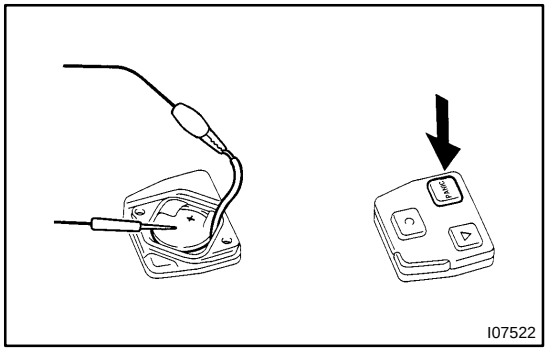
5. CHECK BATTERY CAPACITY

HINT:

- Make sure to use the TOYOTA electrical tester.
- With the battery unloaded, judge can not be made whether the battery is available or not on the test.
- When the transmitter is faulty, the energy amount left in the battery might not be checked correctly.
- On the lithium battery used for the transmitter, the voltage more than 2.5 V with the battery unloaded is shown on the tester until the energy is completely consumed.
  Accordingly when inspecting the energy amount left in the battery, it is necessary to measure the voltage when the battery is loaded. (1.2 kΩ).



(a) Remove the 2 screws and cover using a (-) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (-) terminal of the transmitter and install the battery.



(d) Connect the (+) tester to the (+) battery (lithium battery), and (-) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard: 2.1 V or more

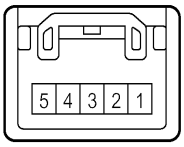
HINT:

- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 ˚C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition 20 seconds after the switch was pressed.
  Make sure to read the voltage before of it.

- High voltage might be shown 1 to 2 times after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.
(h) Set the battery (lithium battery) in the transmitter.
(i) Install the cover, so that the O-ring is not distorted or slipped off.
(j) Using a screwdriver, tighten the 2 screws.

Wire Harness Side



I25814

6. INSPECT WIRELESS DOOR LOCK CONTROL TUNER CIRCUIT

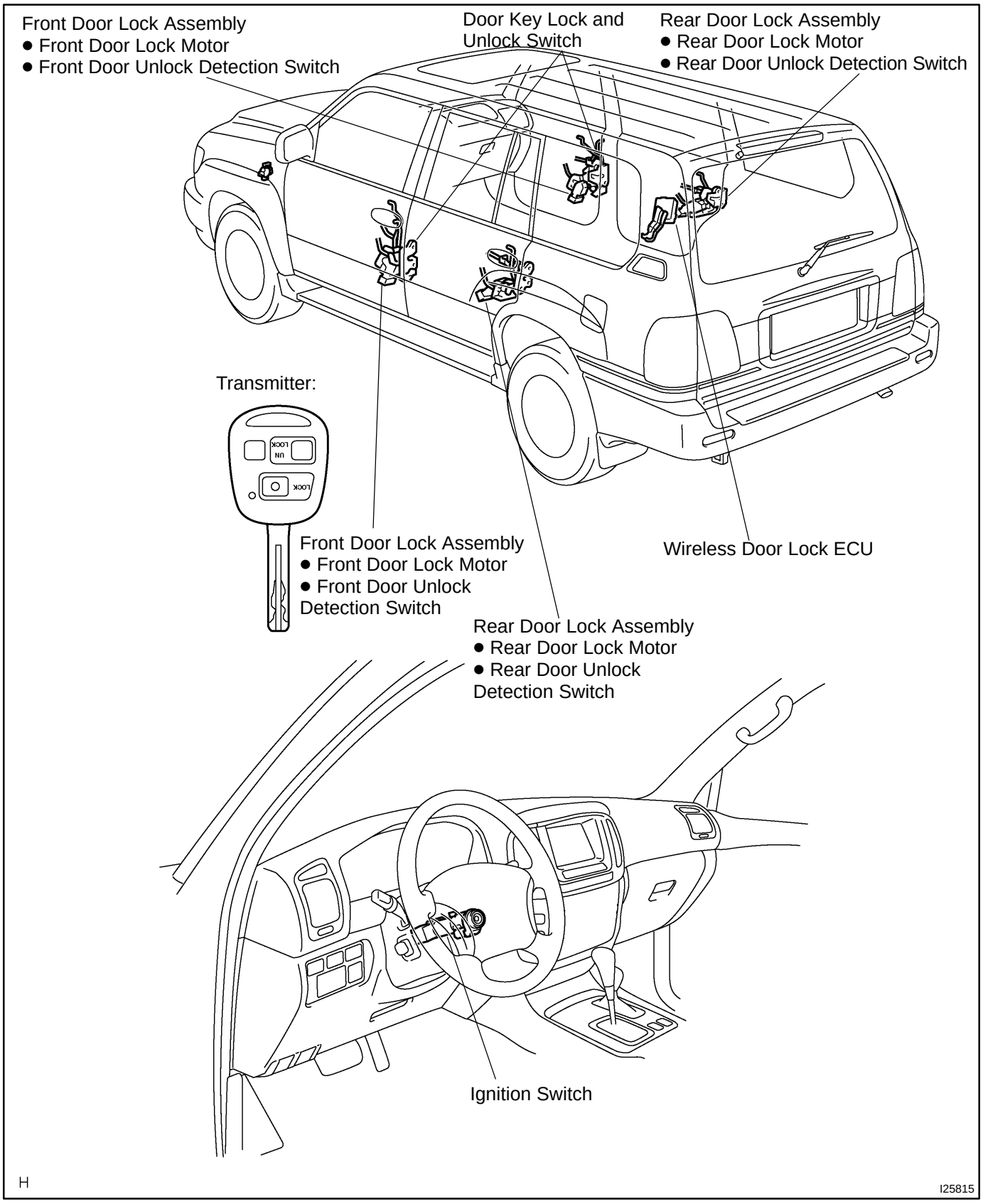
Disconnect the connector from the tuner and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
1 (E) - Ground	Constant	Continuity
2 (RDA) - Ground	Ignition switch OFF, without key, all doors closed,, and transmitter switch OFF → ON	Below 1 V ↔ 6 V
5 (+B) - Ground	-	Repeatedly chage 0 - 5V

If the circuit is not as specified, inspect the circuit connected to other parts.

BE0CH-09

LOCATION



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I25815

BE0CI-07

PRE-CHECK

1. CHARACTERS OF WIRELESS DOOR LOCK

(a) The operation distance changes according to how customers hold the transmitter or where it is used.

(b) Because of using the very weak radio wave, if there is a strong wave or noise on the frequency being used, the operation distance may become shorter.

2. WIRELESS DOOR LOCK BASIC FUNCTION

(a) Stand on the driver's side. Stay 1 m away from the vehicle.

(b) Turn the transmitter toward the vehicle and press any one of the transmission switched for 1 sec.

WIRELESS DOOR LOCK CONTROL SYSTEM

BE226-04

REGISTRATION PROCEDURE

HOW TO CODE REGISTRATION

NOTICE:

When replacing the theft deterrent ECU or transmitter, registration of recognition code is necessary because they are provided as a single components.

(a) Select the operation mode to perform from the following operation modes.
- ★ Add mode
- ★ Rewrite mode
- ★ Prohibition mode
- ★ Confirmation mode

HINT:

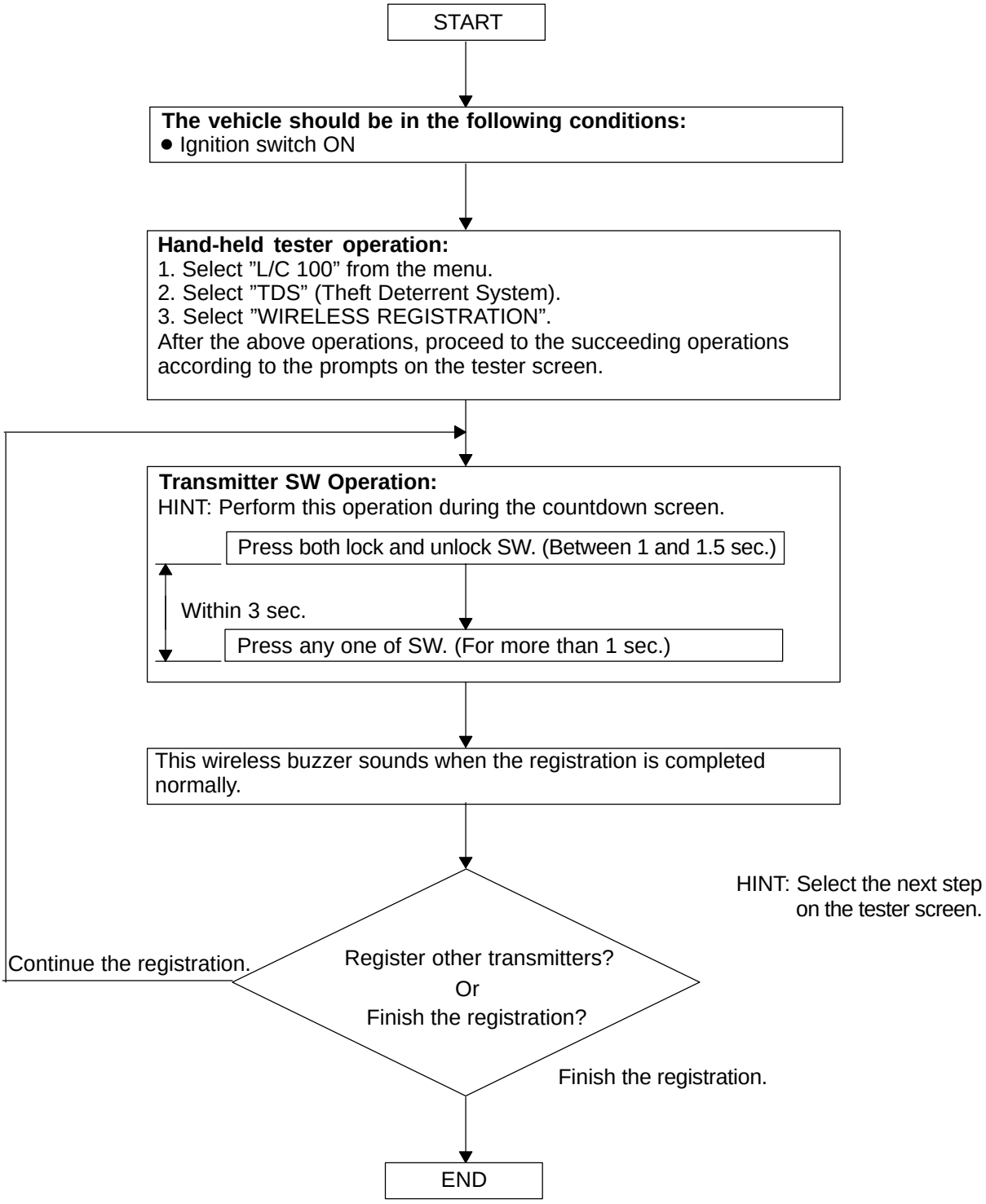
- ★ The ”Add mode” is for adding the newly recognized codes for registration while the already registered codes are retained. This mode is used when the transmitter is added. When the number of the registered codes exceeds 4 codes, the previously registered codes will be erased in order, staring from the first registered code.
- ★ The ”Rewrite mode” is for erasing all the registered codes and registering newly recognized codes only. This mode is used when the transmitter or the door control receiver is replaced.
- ★ The ”Prohibition mode” is for erasing all the registered codes to prohibit the wireless door lock operation. This mode is used when the transmitter is lost.
- ★ The ”Confirmation mode” is for confirming the number of recognition codes that are registered. This mode is used to check the number of registered codes when new codes are added to the registration, etc.

(b) Follow the chart on the following page to register the transmitter recognition code to the theft deterrent ECU.

HINT:

- ★ When procedure is out of the specified, the registration operation is cancelled.
- ★ Maximum 4 recognition codes can be registered.

(c) By TOYOTA Hand-Held Tester



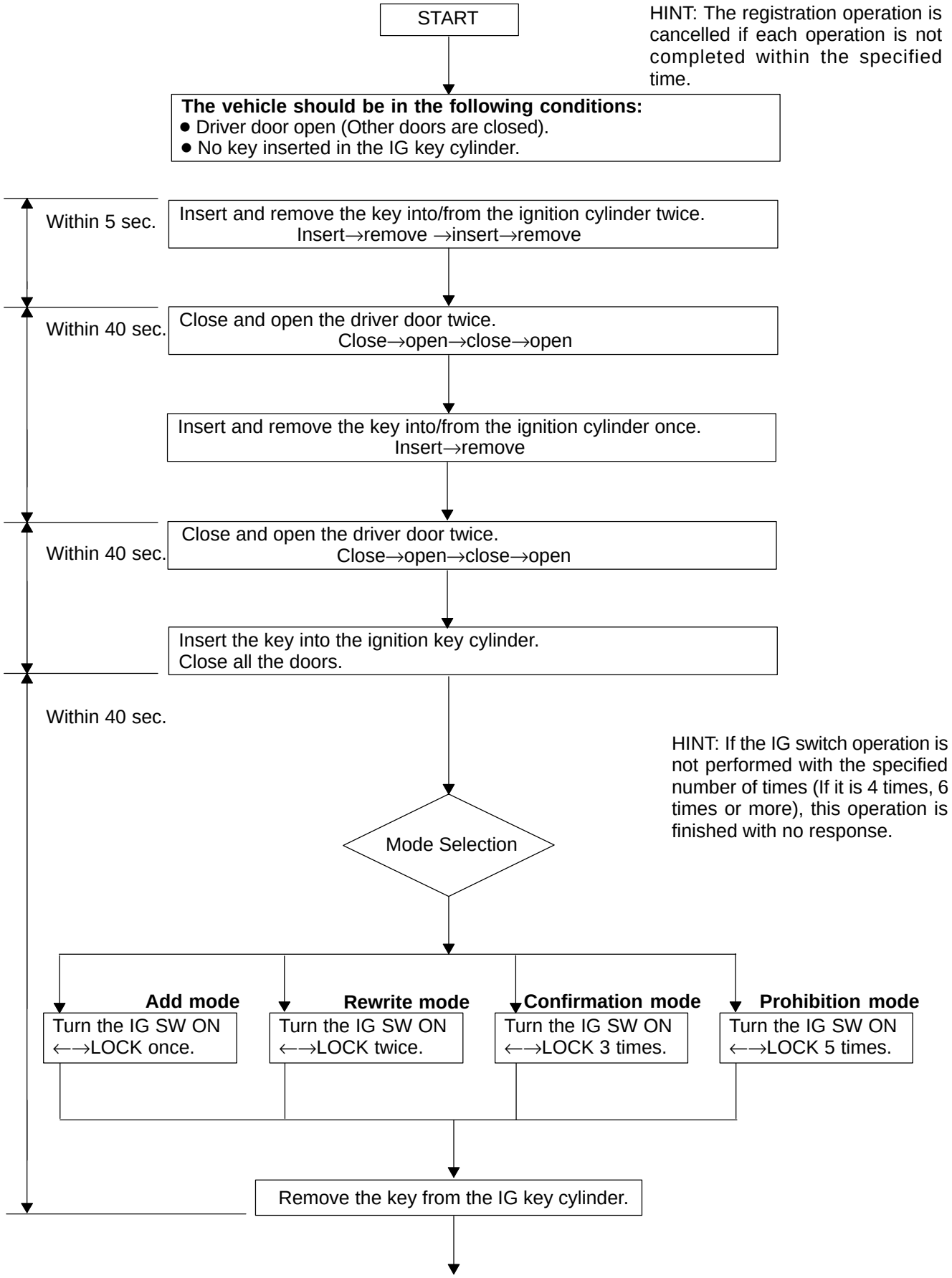
HINT:

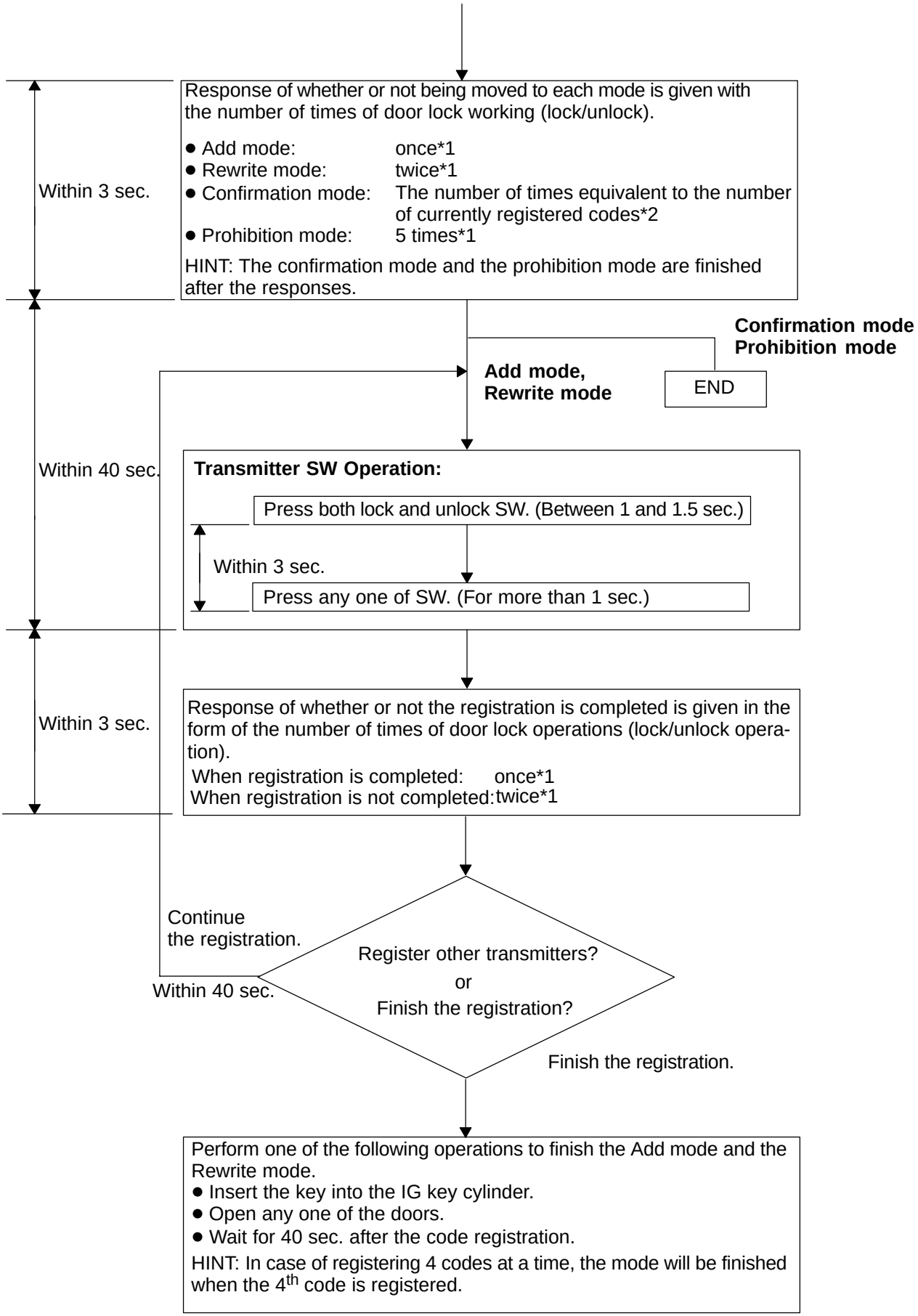
This page is to show briefly the registration procedure using the hand-held tester.

For detailed procedures, please refer to the prompts on the tester screen.

The number of currently registered codes can be checked out on the first screen of the WIRELESS REGISTRATION.

(d) By Switch Operation:

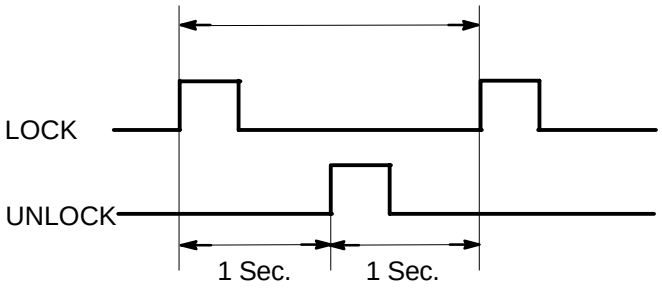



Response of whether or not being moved to each mode is given with the number of times of door lock working (lock/unlock).
● Add mode: once*1
● Rewrite mode: twice*1
● Confirmation mode: The number of times equivalent to the number of currently registered codes*2
● Prohibition mode: 5 times*1
HINT: The confirmation mode and the prohibition mode are finished after the responses.
Within 3 sec.
Confirmation mode
Prohibition mode
Add mode,
Rewrite mode
END
Within 40 sec.
Transmitter SW Operation:
Press both lock and unlock SW. (Between 1 and 1.5 sec.)
Within 3 sec.
Press any one of SW. (For more than 1 sec.)
Within 3 sec.
Response of whether or not the registration is completed is given in the form of the number of times of door lock operations (lock/unlock operation).
When registration is completed: once*1
When registration is not completed: twice*1
Continue
the registration.
Register other transmitters?
or
Finish the registration?
Within 40 sec.
Finish the registration.
Perform one of the following operations to finish the Add mode and the Rewrite mode.
● Insert the key into the IG key cylinder.
● Open any one of the doors.
● Wait for 40 sec. after the code registration.
HINT: In case of registering 4 codes at a time, the mode will be finished when the 4th code is registered.

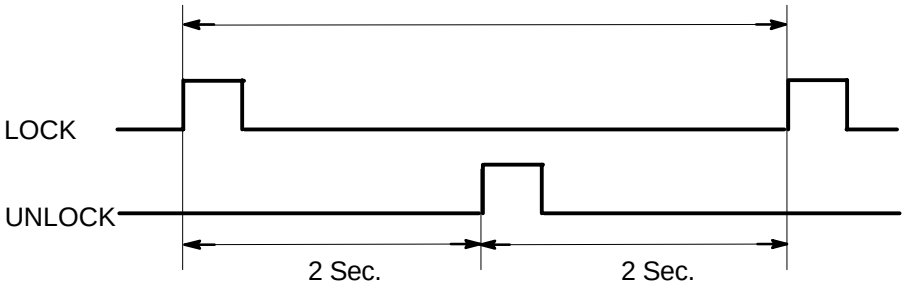
HINT:

Operation cycle of the door lock (lock/unlock operation)

*1: Door Lock Motor

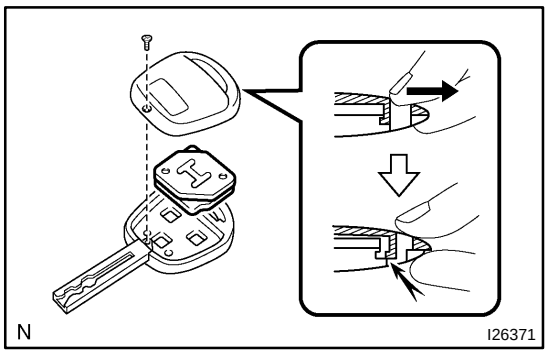


*2: Door Lock Motor



BE23K-02

REPLACEMENT



REPLACE TRANSMITTER (LITHIUM) BATTERY

NOTICE:

Special caution should be taken for handling each component as they are precision electronic components.

(a) Using a screwdriver, remove the screw and cover.

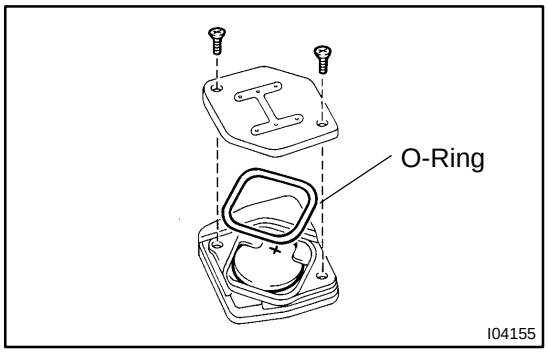
NOTICE:

Do not pry out the cover forcibly.

HINT:

Push the cover with a finger as shown in the illustration, so that there becomes clearance, then pry out the cover from that clearance.

(b) Remove the transmitter.

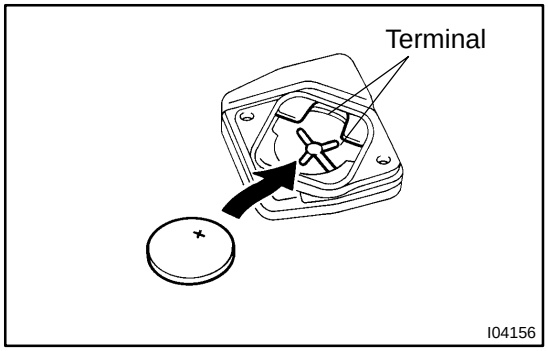


(c) Using a screwdriver, remove the 2 screws and cover.

(d) Remove the battery (lithium battery).

NOTICE:

- **Do not push the terminals with a finger.**
- **If prying up the battery (lithium battery) forcibly to remove, the terminals are deformed.**



(e) Install a battery (lithium battery) as shown in the illustration.

NOTICE:

Face the battery upward. Take care not to deform the terminals.

(f) Check that O-ring is not distorted or slipped off, and install the cover.

(g) Using a screwdriver, tighten the 2 screws.

NOTICE:

When the shrews are tightened loosely, it might cause faulty contact of battery (lithium battery) and terminals.

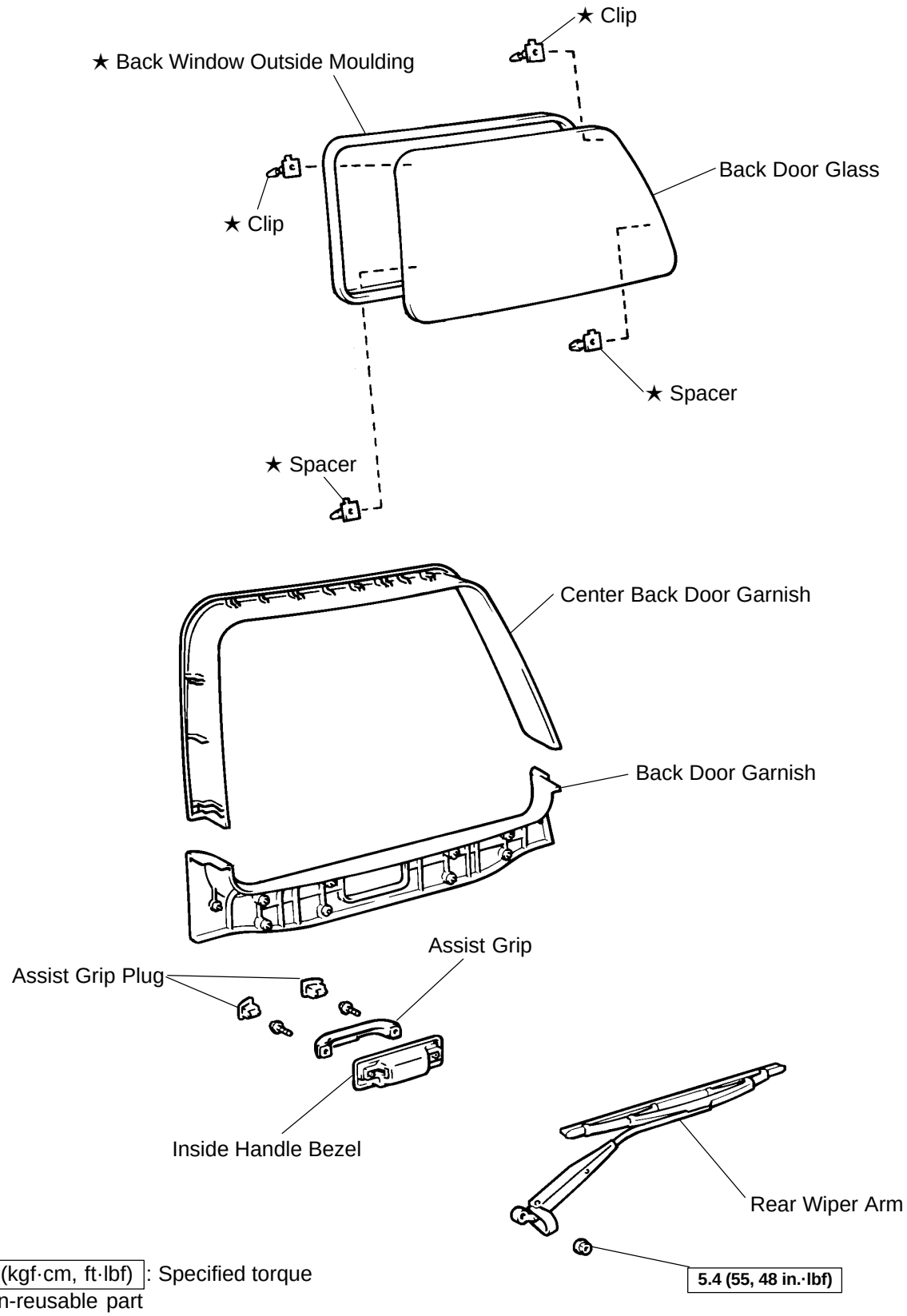
(h) Assemble the transmitter to the key plate and the cover.

(i) Using a screwdriver, tighten the screw.

BACK DOOR GLASS

BO1KA-02

COMPONENTS

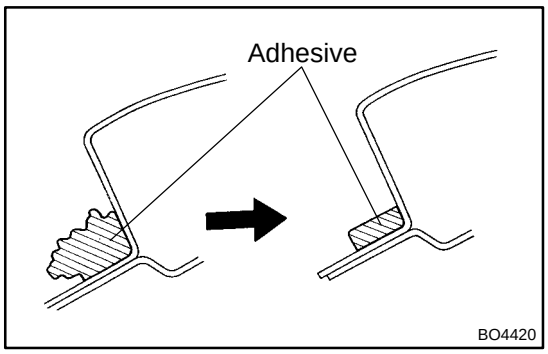


N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part

H06468

BO21C-02

INSTALLATION



1. CLEAN AND SHAPE CONTACT SURFACE OF DOOR PANEL

(a) Using a knife, cut away any rough areas on the door panel.

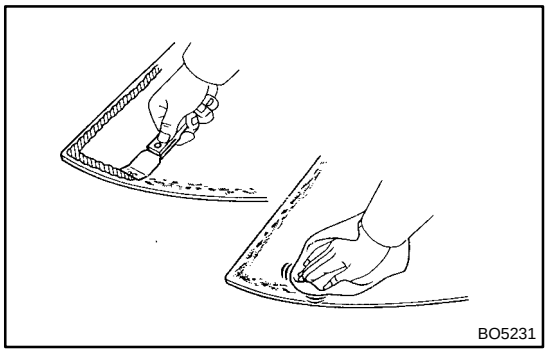
HINT:

Leave as much of the adhesive on the door panel as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag saturated in cleaner.

HINT:

Even if all the adhesive has been removed, clean the door panel.



2. CLEAN REMOVED GLASS

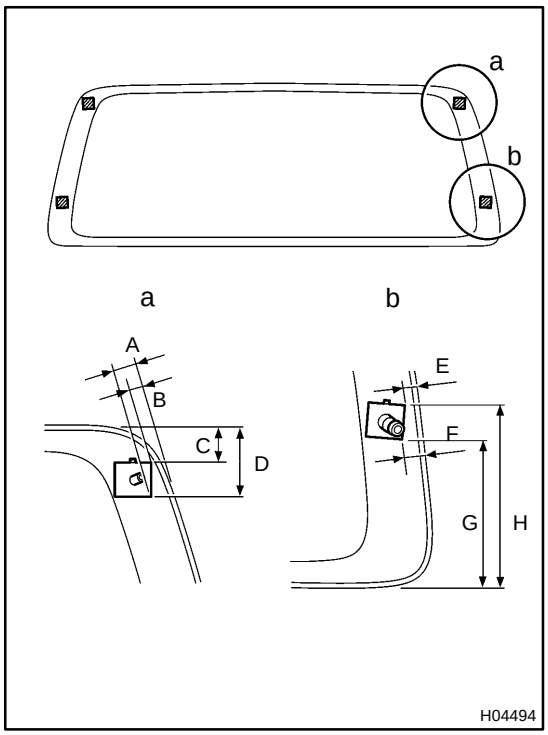
(a) Remove the damaged clips and spacers.

(b) Using a scraper, remove the adhesive sticking to the glass.

(c) Clean the glass with cleaner.

NOTICE:

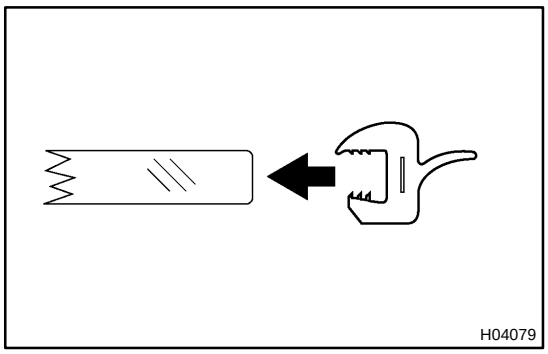
Do not touch the glass after cleaning it.



3. INSTALL NEW CLIPS AND SPACERS

Install new clips and spacers onto the glass as shown in the illustration.

A: 24.3 mm (0.957 in.)
B: 18.6 mm (0.732 in.)
C: 33.1 mm (1.303 in.)
D: 52.8 mm (2.079 in.)
E: 14.4 mm (0.567 in.)
F: 18.0 mm (0.709 in.)
G: 156.6 mm (6.165 in.)
H: 176.8 mm (6.961 in.)

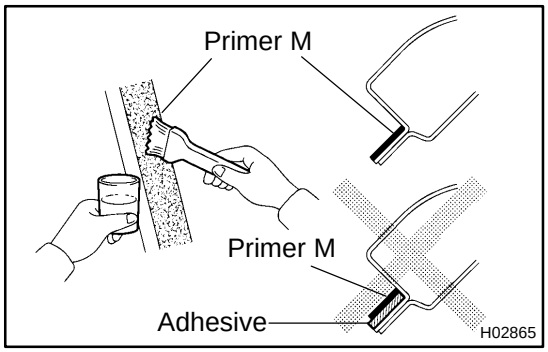


4. INSTALL BACK WINDOW MOULDING

Install a new back window moulding as shown in the illustration.

NOTICE:

Do not touch the glass face after cleaning it.

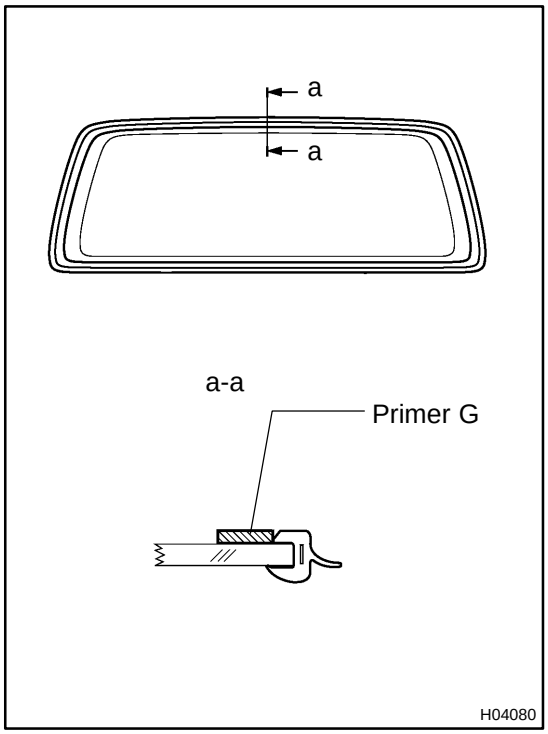


5. COAT CONTACT SURFACE OF DOOR PANEL WITH PRIMER "M"

Using a brush, coat Primer M to the exposed part of door panel on the vehicle side.

NOTICE:

- ★ **Let the primer coating dry for 3 minutes or more.**
- ★ **Do not coat Primer M to the adhesive.**
- ★ **Do not keep any of the opened Primer M for later use.**



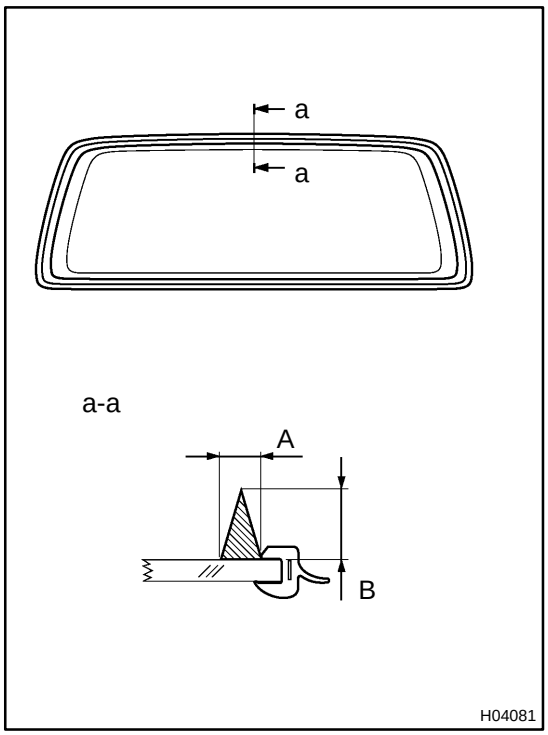
6. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and contact surface with Primer G.

(b) When the primer coated wrongly to the area other than the specified, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- ★ **Let the primer coating dry for 3 minutes or more.**
- ★ **Do not keep any of the opened Primer G for later use.**



7. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.

HINT:

After cutting off the tip, use all adhesive within the time described in the table below.

Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 hours

(b) Load the cartridge into the sealer gun.

(c) Coat the glass with adhesive, as shown in the illustration.

A: 8.0 mm (0.315 in.)

B: 12.0 mm (0.472 in.)

8. INSTALL BACK DOOR GLASS

(a) Install the glass to the body.

(b) Hold back window glass in place securely with protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle during the time described in the table below.

Temperature	Minimum time prior to moving a car
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5 ˚C (41 ˚F)	24 hours

9. INSPECT FOR LEAKS AND REPAIR

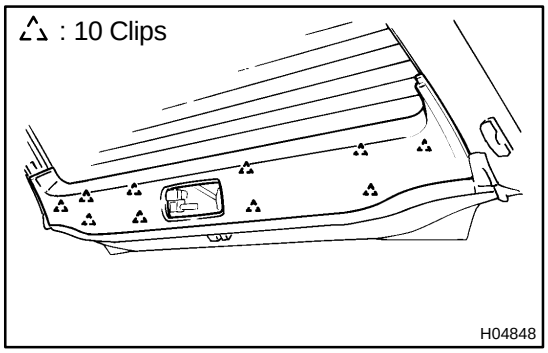
(a) Conduct a leak test after the hardening time has elapsed.

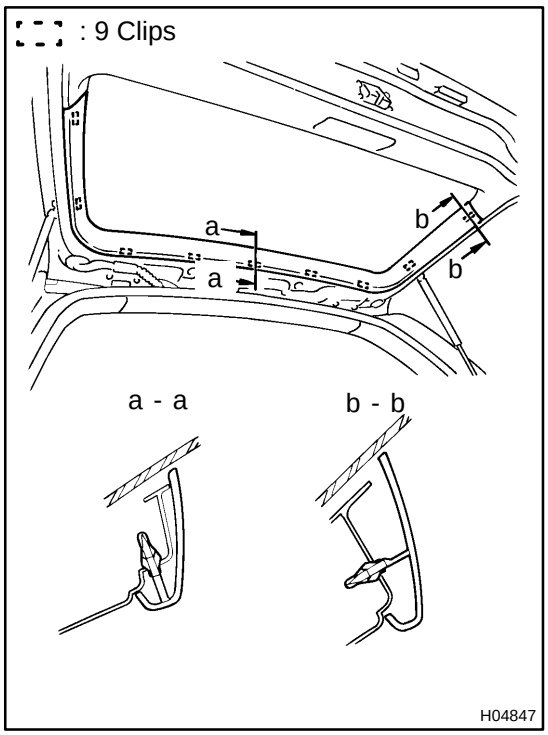
(b) Seal any leak with sealant.

Part No. 08833-00030 or equivalent.

10. INSTALL REAR WIPER ARM (See page BO-42)

11. INSTALL BACK DOOR GARNISH





12. INSTALL CENTER BACK DOOR GARNISH

13. INSTALL INSIDE HANDLE BEZEL

14. INSTALL ASSIST GRIP

Install the assist grip with the 2 screws, then install 2 assist grip plugs.

BO21B-01

REMOVAL

1. REMOVE ASSIST GRIP

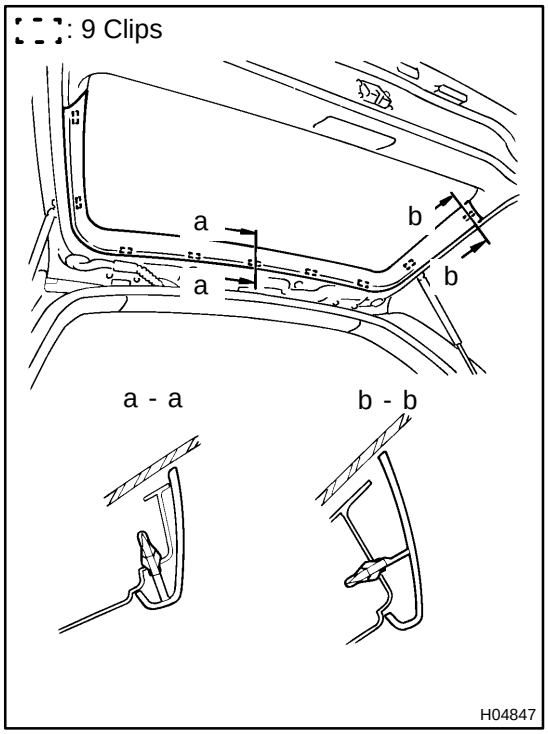
(a) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and assist grip.

2. REMOVE INSIDE HANDLE BEZEL

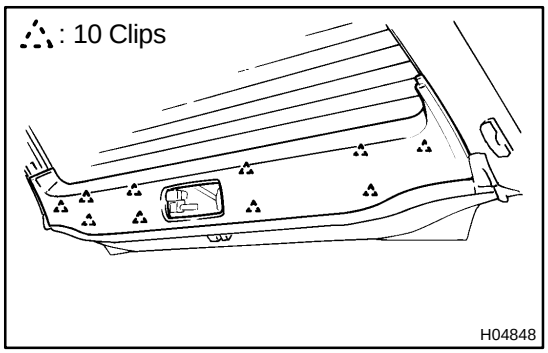


3. REMOVE CENTER BACK DOOR GARNISH

Using a screwdriver, remove the center back door garnish.

HINT:

Tape the screwdriver tip before use.



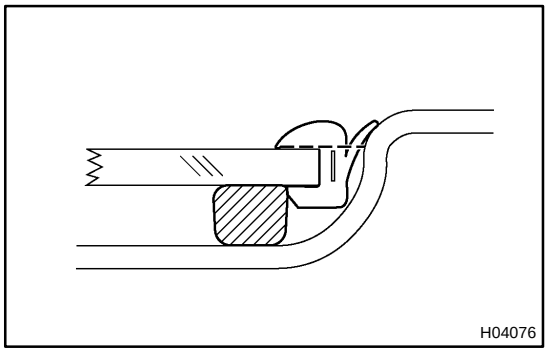
4. REMOVE BACK DOOR GARNISH

Using a screwdriver, remove the back door garnish.

HINT:

Tape the screwdriver tip before use.

5. REMOVE REAR WIPER ARM (See page BO-38)

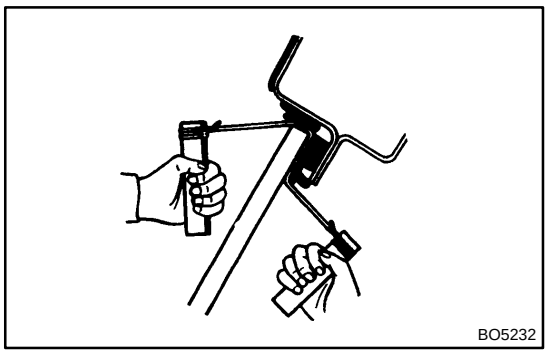


6. REMOVE OUTSIDE BACK WINDOW MOULDING

Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

Do not damage the body with the knife.


BO5232

7. REMOVE BACK DOOR GLASS

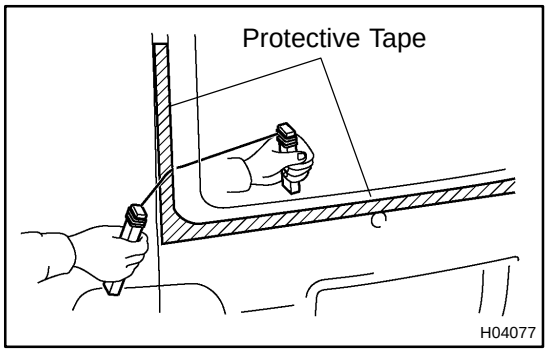
(a) Disconnect the connector.

(b) Push piano wire through between the body and glass from the interior.

(c) Tie both wire ends to wooden blocks or similar objects.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.



H04077

NOTICE:

When separating the glass, take care not to damage the paint and exterior ornaments.

(d) Cut the adhesive by pulling the piano wire around it.

(e) Remove the glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting off the glass.

BACK DOOR STAY

BO1JQ-03

REPLACEMENT

1. REMOVE BACK DOOR STAY

(a) Remove the bolts and back door stay from the back door.

HINT:

While supporting the back door with your hand, remove the back door stay.

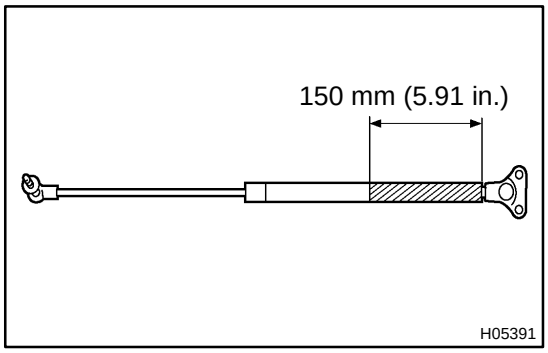
(b) Remove the bolt and back door stay from the body.

2. IF NECESSARY, REPLACE BACK DOOR STAY

NOTICE:

When handling the back door stay.

- ★ **Do not disassemble the back door stay because the cylinder is filled with pressurized gas.**



- ★ **If the back door stay is to be replaced, drill a 2.0 - 3.0 mm (0.079 - 0.118 in.) hole in the bottom of the back door stay as shown in the illustration to completely release the high-pressure gas before disposing of it.**
- ★ **When drilling, chips may fly out so work carefully.**
- ★ **The gas is colorless, odorless and non-toxic.**
- ★ **When working, handle the back door stay carefully. Never score or scratch the exposed part of the piston rod, and never allow paint or oil to get on it.**
- ★ **Do not turn the piston rod and cylinder with the back door stay fully extended.**

3. INSTALL BACK DOOR STAY

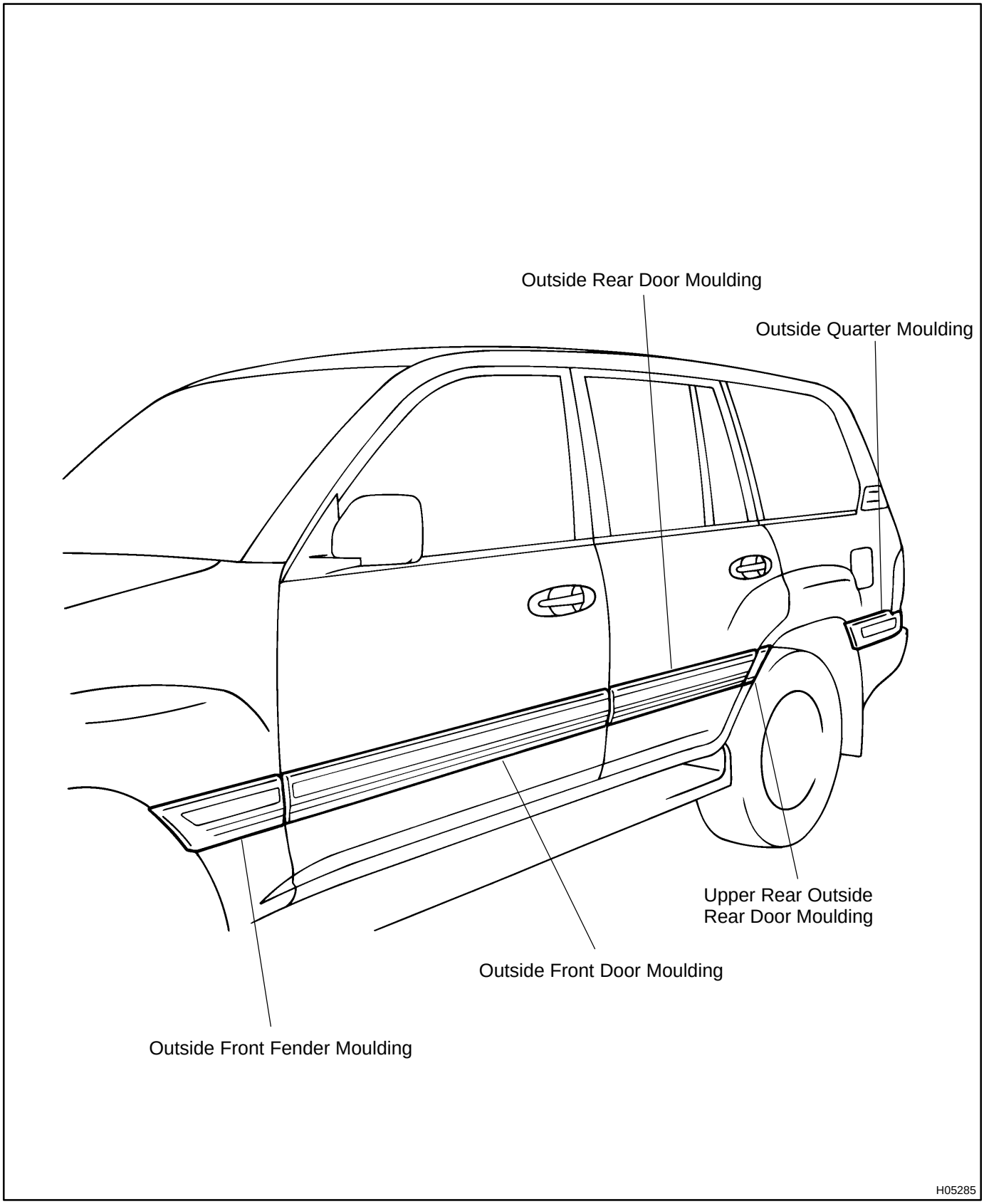
(a) Install the bolt and back door stay to the body.
Torque: 17.5 N·m (178 kgf·cm, 13 ft·lbf)

(b) Install the bolts and back door stay to the back door.
Torque: 13 N·m (133 kgf·cm, 10 ft·lbf)

BODY OUTSIDE MOULDING

COMPONENTS

BO1K1-02



BO1K3-02

INSTALLATION

1. CLEAN BODY MOUNTING SURFACE

(a) Using a heat light, heat the body mounting surface to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the body excessively.

(b) Wipe off stains with cleaner.

2. If reusing the moulding:

CLEAN MOULDING

(a) Using a heat light, heat the moulding surface to 20 - 30 ˚C (68 - 86 ˚F).

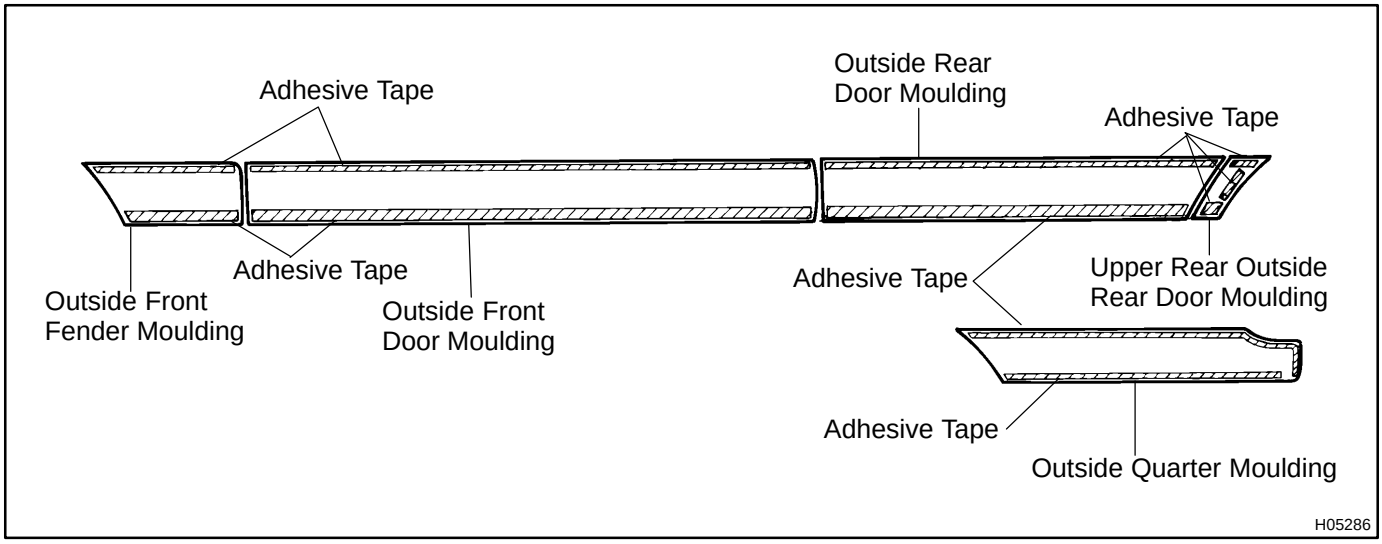
NOTICE:

Do not heat the moulding excessively.

(b) Remove the adhesive tape from the moulding.

(c) Wipe off stains with cleaner.

(d) Apply new adhesive tape to moulding as shown in the illustration.



3. INSTALL MOULDING

(a) Using a heat light, heat the body and moulding.

Body: 40 - 60 ˚C (104 - 140 ˚F)

Moulding: 20 - 30 ˚C (68 - 86 ˚F)

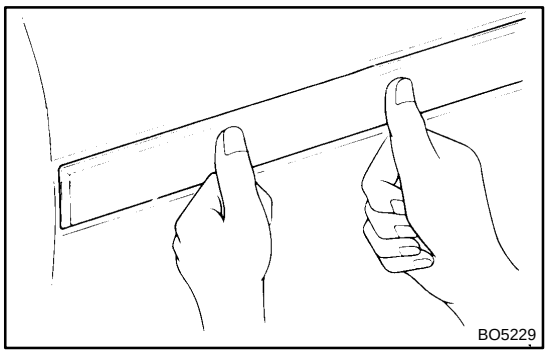
NOTICE:

Do not heat the body and moulding excessively.

(b) Lift moulding release sheet from the face of moulding.

NOTICE:

When the moulding release sheet is removed, make sure that no dirt of dust can get onto the uncoated area.



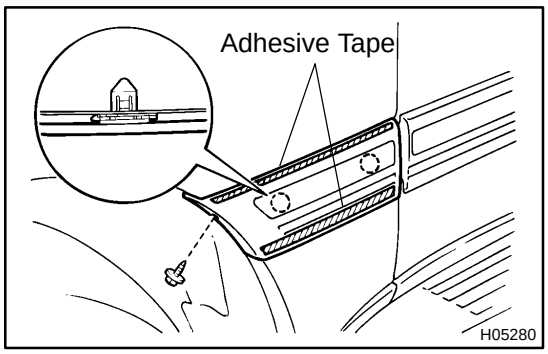
(c) Press firmly on the moulding. Refer to the illustration for the moulding application procedures.

NOTICE:

Do not apply excessive force onto the moulding, but steady pressure with your thumbs.

BO1K2-02

REMOVAL



1. REMOVE OUTSIDE FRONT FENDER MOULDING

(a) Remove the screw.

(b) Using a heat light, heat the moulding to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the moulding excessively.

(c) Cut the adhesive tape with a knife.

NOTICE:

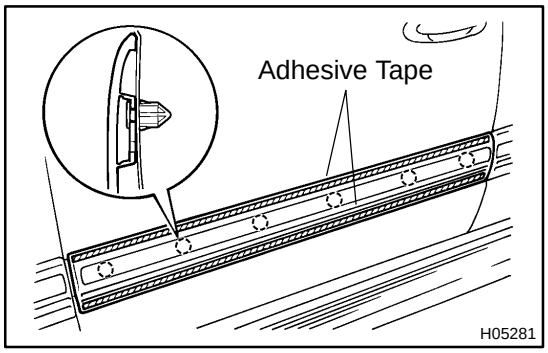
★ **If reusing the moulding, take care not to damage the moulding.**

★ **Do not damage the body.**

(d) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



2. REMOVE OUTSIDE FRONT DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

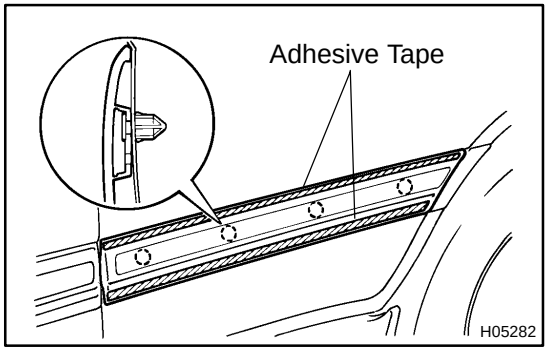
★ **If reusing the moulding, take care not to damage the moulding.**

★ **Do not damage the body.**

(c) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



3. REMOVE OUTSIDE REAR DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

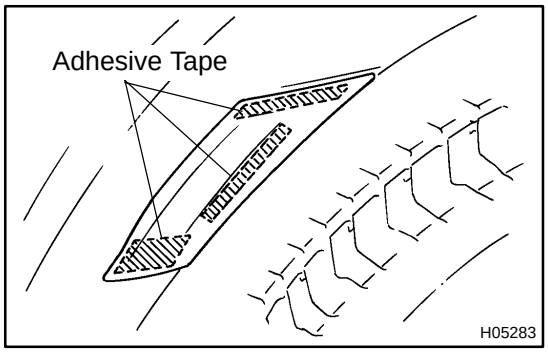
★ **If reusing the moulding, take care not to damage the moulding.**

★ **Do not damage the body.**

(c) Using a screwdriver, remove the moulding.

HINT:

Tape the screwdriver tip before use.



4. REMOVE UPPER REAR OUTSIDE REAR DOOR MOULDING

(a) Using a heat light, heat the moulding to 40 - 60 °C (104 - 140°F).

NOTICE:

Do not heat the moulding excessively.

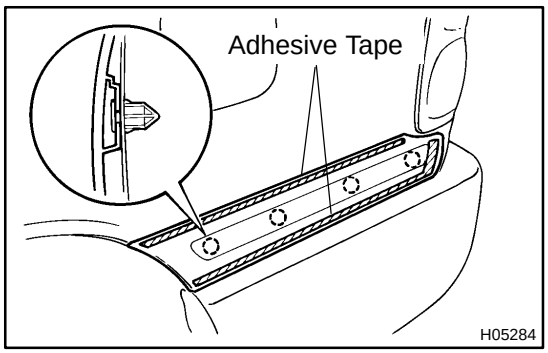
(b) Cut the adhesive tape with a knife.

NOTICE:

★ **If reusing the moulding, take care not to damage the moulding.**

★ **Do not damage the body.**

(c) Remove the moulding.



5. REMOVE OUTSIDE QUARTER MOULDING

(a) Using a heat light, heat the moulding to 40 - 60 °C (104 - 140 °F).

NOTICE:

Do not heat the moulding excessively.

(b) Cut the adhesive tape with a knife.

NOTICE:

★ **If reusing the moulding, take care not to damage the moulding.**

★ **Do not damage the body.**

(c) Using a screwdriver, remove the moulding.

HINT:

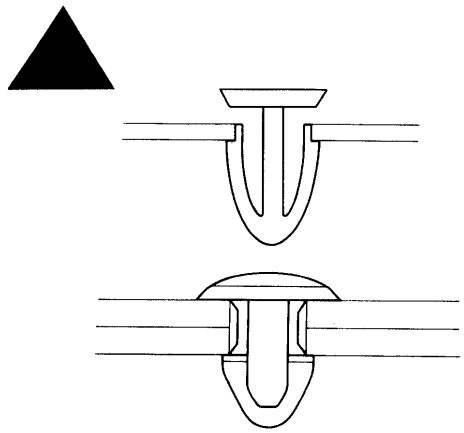
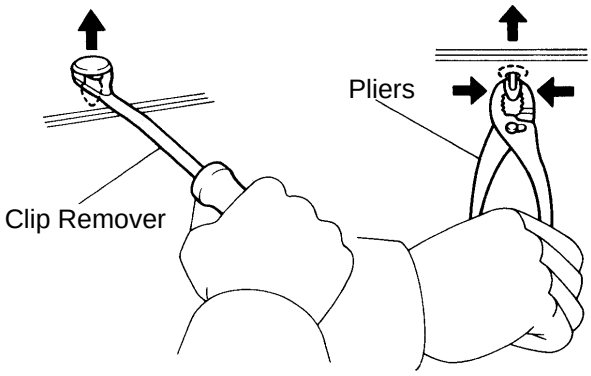
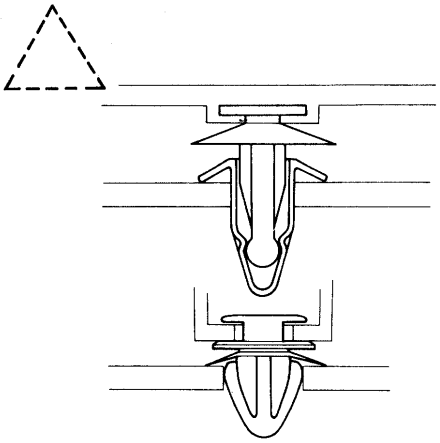
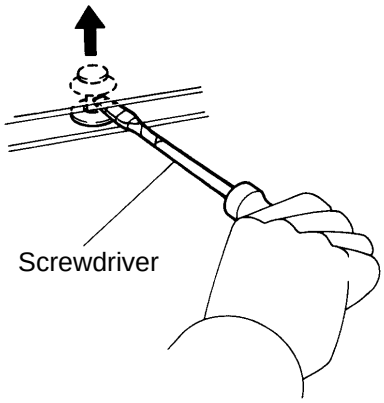
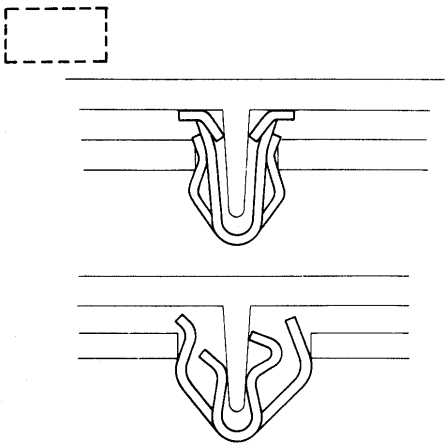
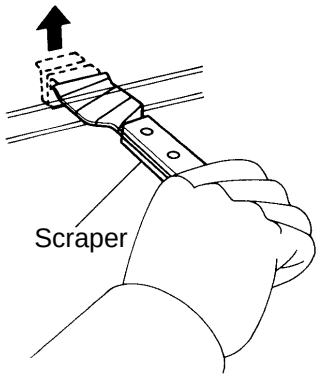
Tape the screwdriver tip before use.

CLIP

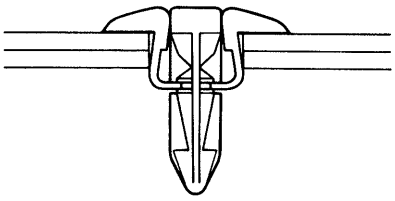
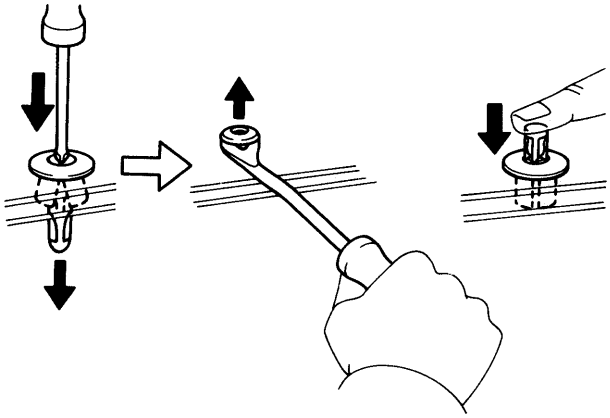
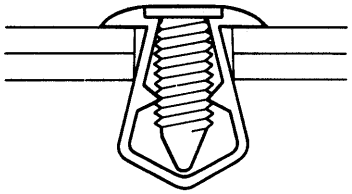
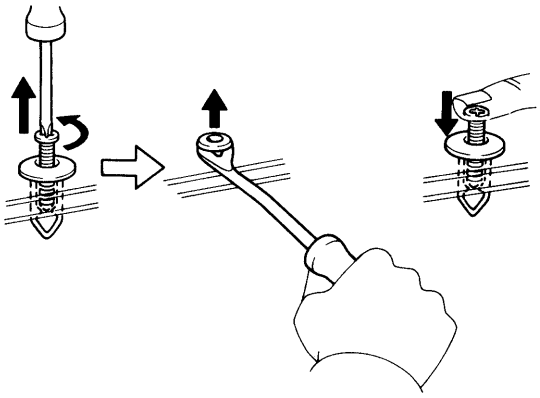
BO023-04

REPLACEMENT

The removal and installation methods of typical clips used in body parts are shown in the table below.
HINT:
If the clip is damaged during the operation, always replace it with a new clip.

Shape (Example)	Removal/Installation
	
	
	

V00005

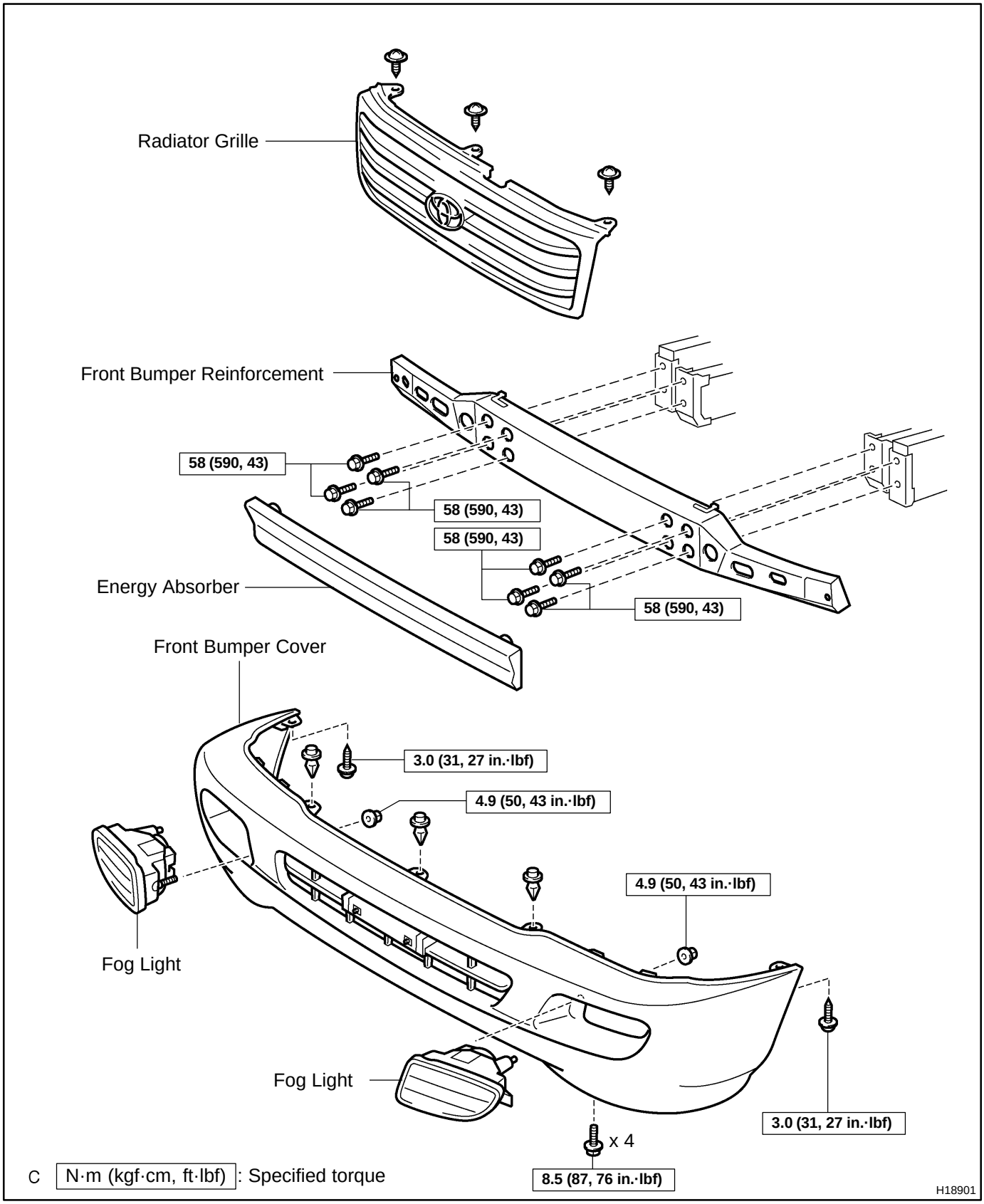
Shape (Example)	Removal/Installation
	Removal Installation 
	Removal Installation 

V00012

FRONT BUMPER

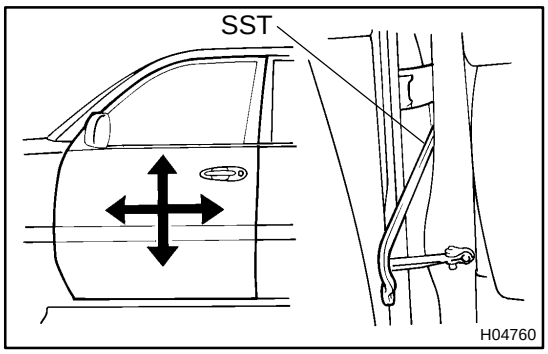
COMPONENTS

BO1J6-03



BO1JC-03

ADJUSTMENT

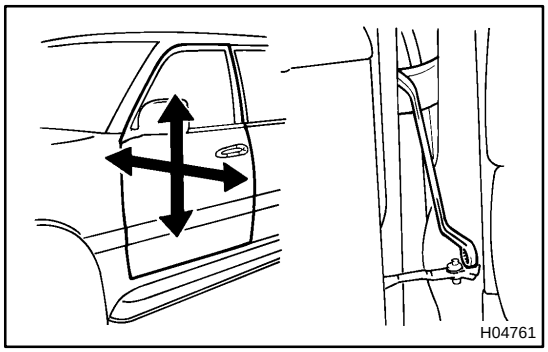


1. ADJUST DOOR IN FORWARD/BACKWARD AND VERTICAL DIRECTIONS

Using SST, loosen the body side hinge bolts to adjust.

SST 09812-00010

Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)



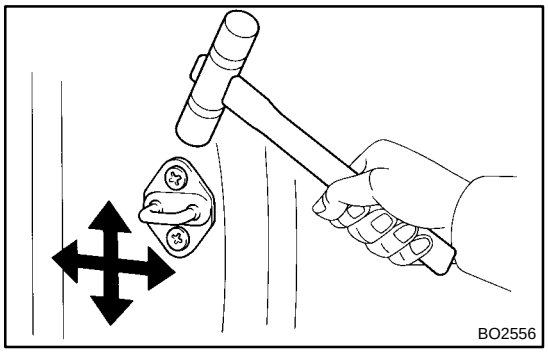
2. ADJUST DOOR IN RIGHT/LEFT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

HINT:

Substitute the bolt with washer for the centering bolt (See page BO-6).

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.

(b) Loosen the striker mounting screws.

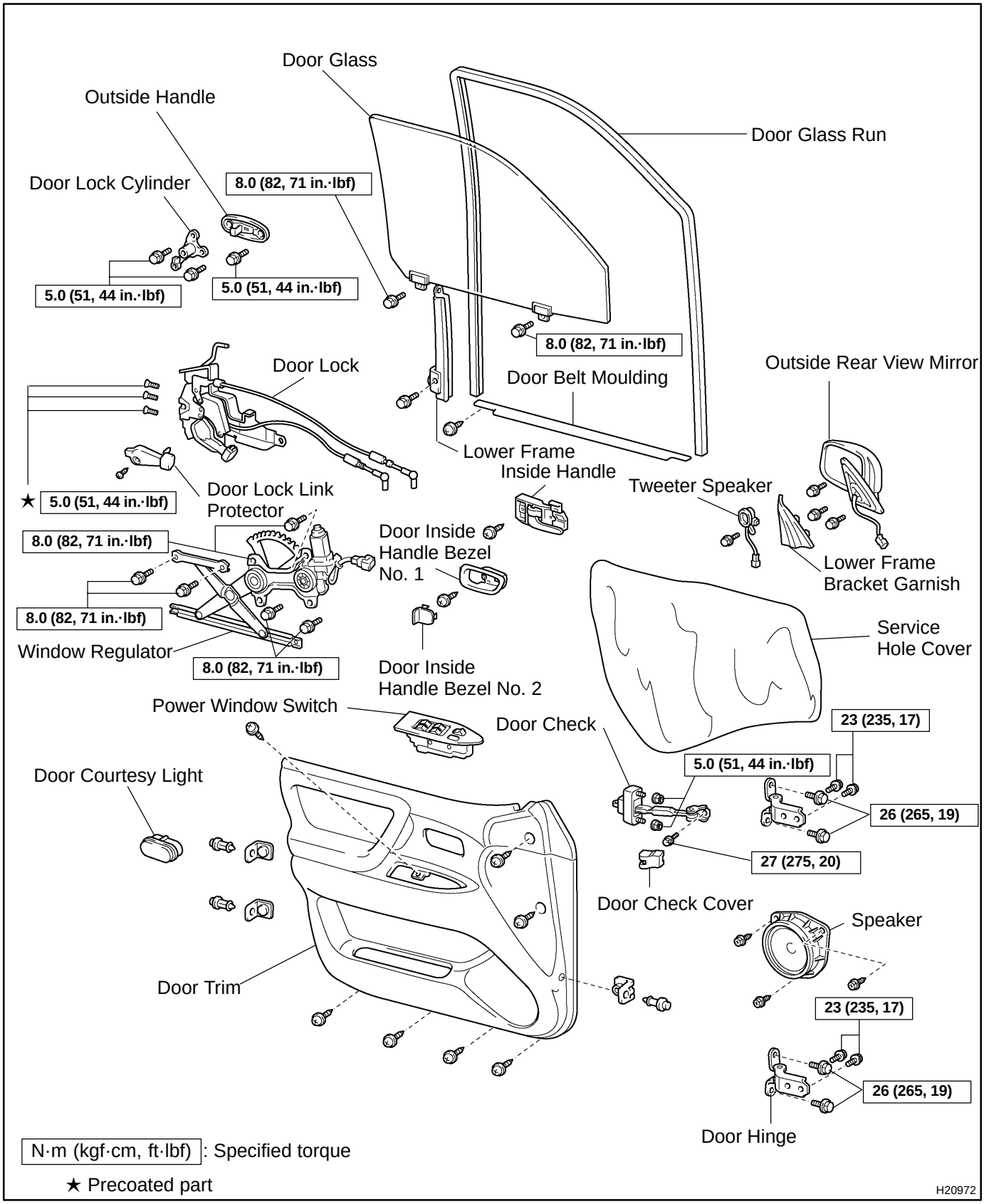
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the striker to adjust it.

FRONT DOOR

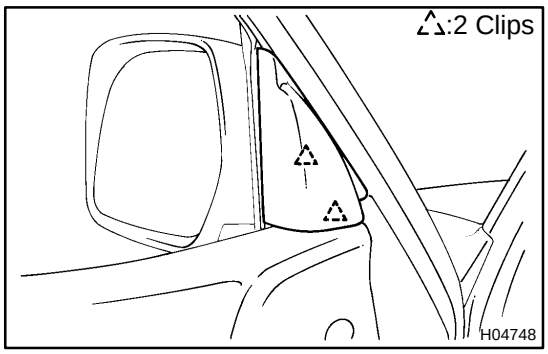
COMPONENTS

BO1JA-04



BO1JB-03

DISASSEMBLY

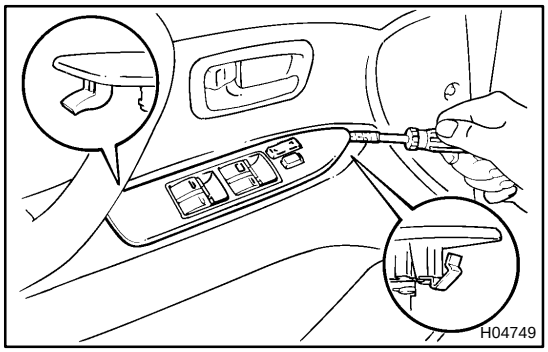


1. REMOVE LOWER FRAME BRACKET GARNISH

Using a screwdriver, remove the lower frame bracket garnish.

HINT:

Tape up the screwdriver tip before use.



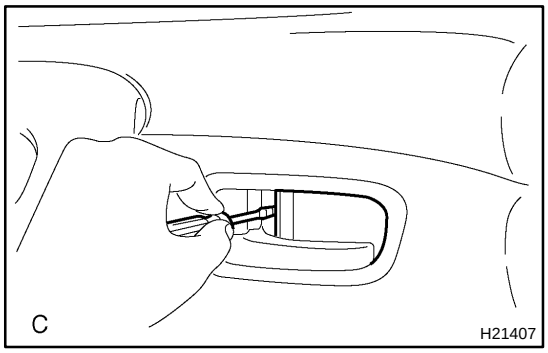
2. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

(b) Disconnect the connector.

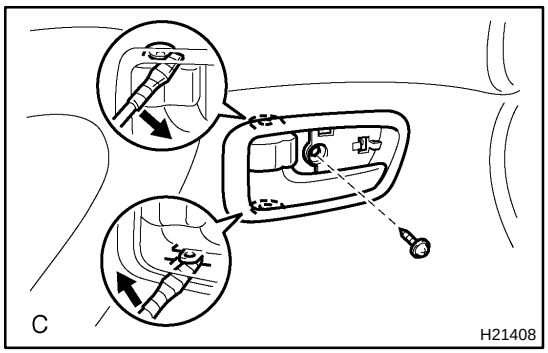


3. REMOVE DOOR INSIDE HANDLE BEZEL No. 2

Using a screwdriver, remove the door inside handle bezel No. 2 as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.



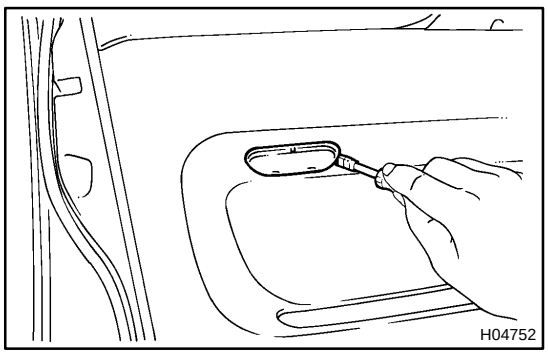
4. REMOVE DOOR INSIDE HANDLE BEZEL No. 1

(a) Remove the screw.

(b) Using a screwdriver, remove the door inside handle bezel No. 1 as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

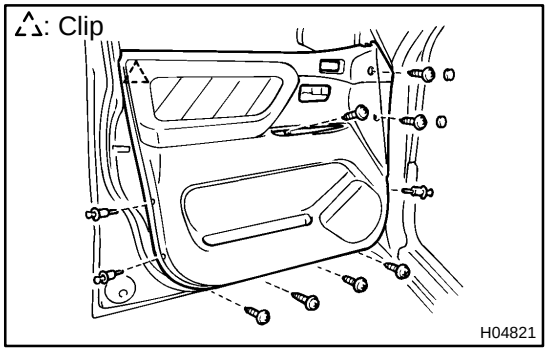


5. REMOVE DOOR COURTESY LIGHT

Using a screwdriver, remove the door courtesy light, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.



6. REMOVE DOOR TRIM

(a) Remove the 2 caps and the 7 screws.

(b) Remove the 3 clips.

(c) Insert a screwdriver between the door and the door trim to pry the trim.

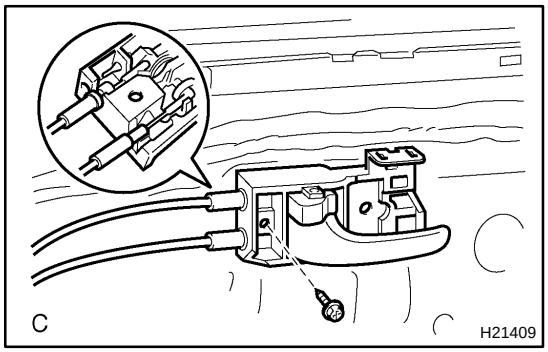
NOTICE:

Be careful not to damage the door and the door trim.

HINT:

Tape up the screwdriver tip before use.

(d) Pull the trim upward to remove it.



7. REMOVE INSIDE HANDLE

(a) Remove the screw and the inside handle.

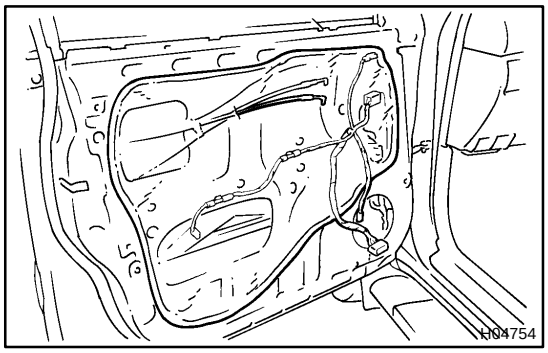
(b) Disconnect the 2 control cables from the inside handle as shown in the illustration.

8. REMOVE TWEETER SPEAKER

Disconnect the connector, then remove the bolt and the tweeter speaker.

9. REMOVE OUTSIDE REAR VIEW MIRROR

Disconnect the connector, then remove the 3 bolts and the outside rear view mirror.



10. REMOVE SERVICE HOLE COVER

(a) Remove the clamps and the wire harness.

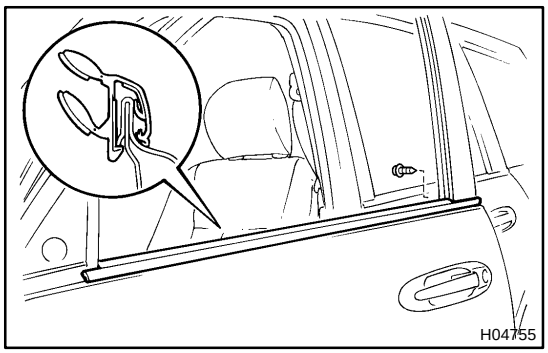
(b) Remove the service hole cover.

NOTICE:

Do not tear the cover.

HINT:

At the time of reassembly, pull out the 2 control cables and wire harness through the service hole cover.



11. REMOVE DOOR BELT MOULDING

(a) Remove the screw.

(b) Using a scraper, remove the door belt moulding.

HINT:

Tape up the scraper tip before use.

12. REMOVE DOOR GLASS

(a) Open the door glass until the bolts appear in the service hole.

(b) Remove the 2 bolts and the door glass.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

Do not damage the door glass.

HINT:

Pull the glass upward to remove it.

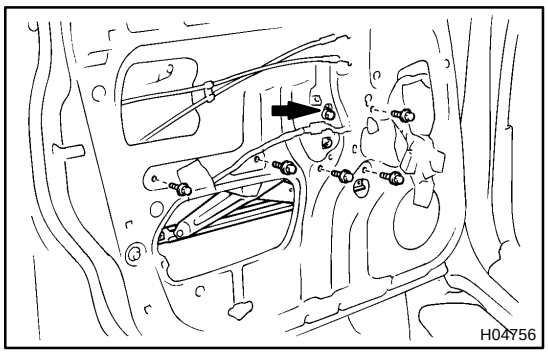
13. REMOVE SPEAKER

Remove the 3 screws and the speaker, then disconnect the connector.

14. REMOVE DOOR GLASS RUN

15. REMOVE LOWER FRAME

Remove the bolt and the lower frame.



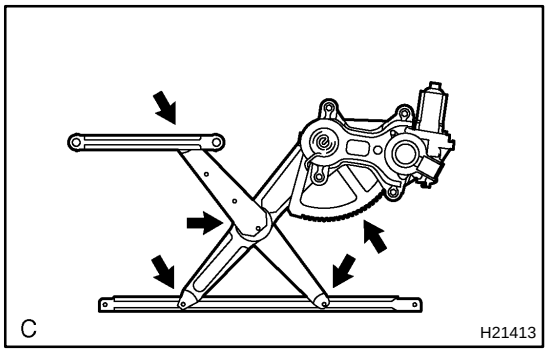
16. REMOVE WINDOW REGULATOR

(a) Disconnect the connector, then remove the 5 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(b) Loosen the bolt and the window regulator.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HINT:

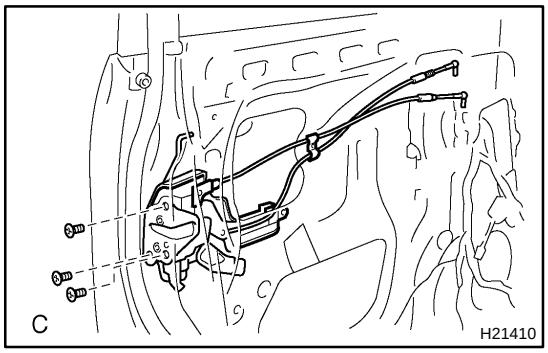
★ Remove the regulator through the service hole.



★ At the time of reassembly, apply MP grease to the window regulator.

NOTICE:

At the time of reassembly, do not apply grease to the spring of the window regulator.



17. REMOVE DOOR LOCK

(a) Remove the clip and the door lock link protector.

(b) Disconnect the connector.

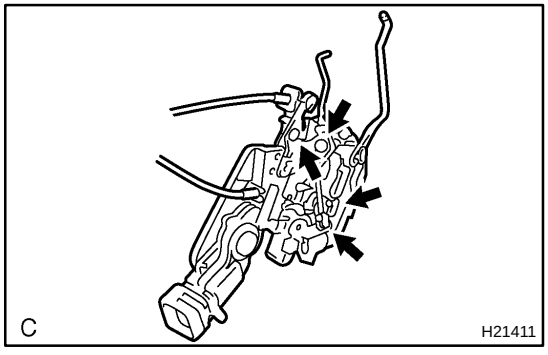
(c) Disconnect the 2 links from the outside handle and the door lock cylinder.

(d) Using a torx wrench, remove the 3 screws and the door lock through the service hole.
Torx wrench: T30 (Part No. 09042-00010 or locally manufactured tool)
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:

At the time of reassembly:

★ Apply adhesive to the 3 screws.
Part No. 08833-00070, THREE BOND 1324 or equivalent.



★ Remove the protector, and apply MP grease to the sliding and rotating parts of the door lock.

18. REMOVE OUTSIDE HANDLE WITH DOOR LOCK CYLINDER

(a) Remove the 2 bolts and the outside handle with the door lock cylinder.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Remove the bolt and the door lock cylinder from the outside handle.
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

BO1JD-01

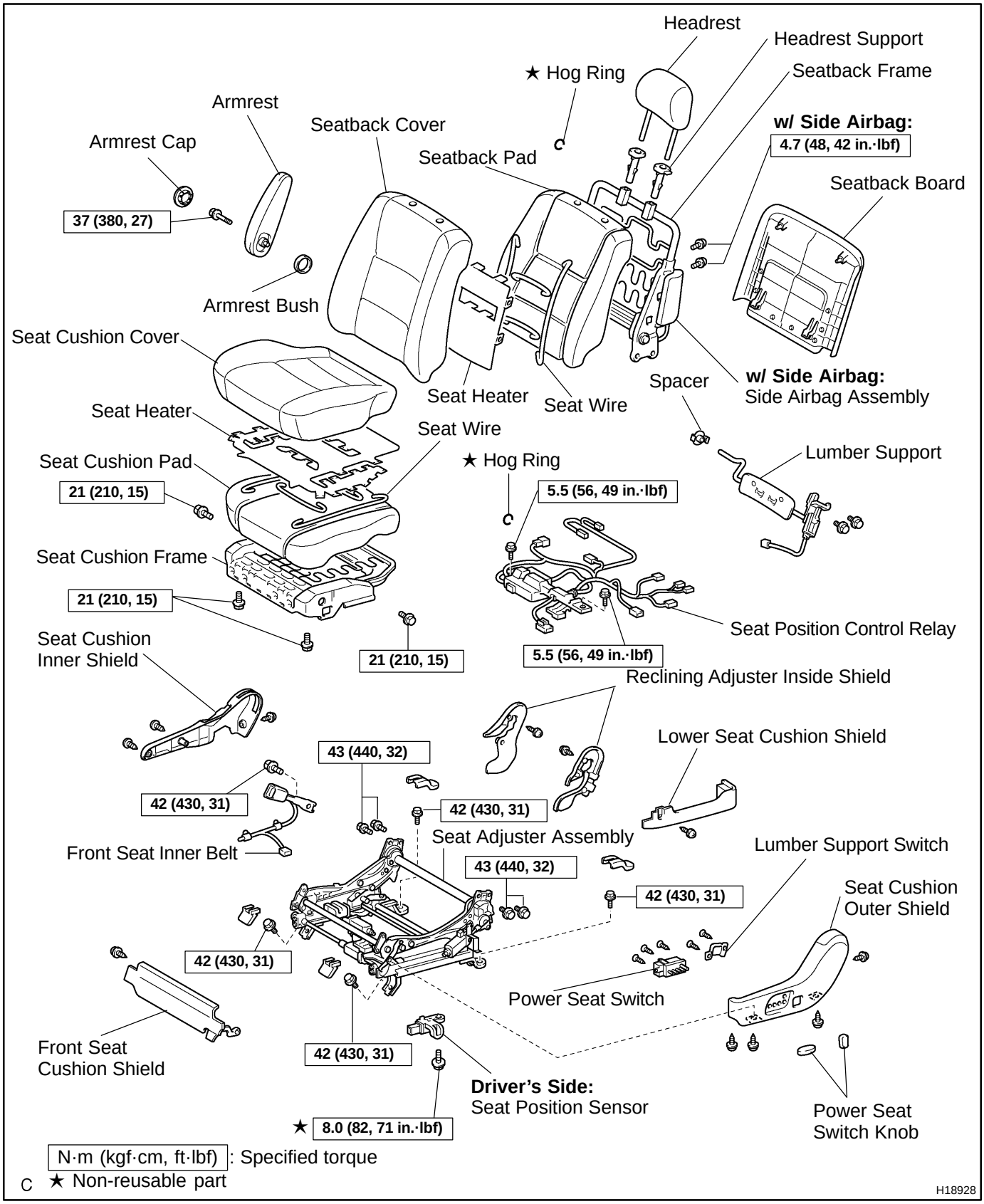
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-9).

FRONT SEAT

COMPONENTS

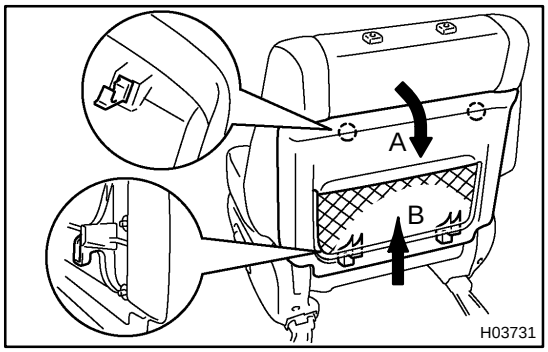
BO1KT-04



BO4J1-01

DISASSEMBLY

1. REMOVE HEADREST



2. REMOVE SEATBACK BOARD

Remove the seatback board as shown in the illustration.

HINT:

Remove the seatback board in the order of ”A” and ”B” as shown in the illustration.

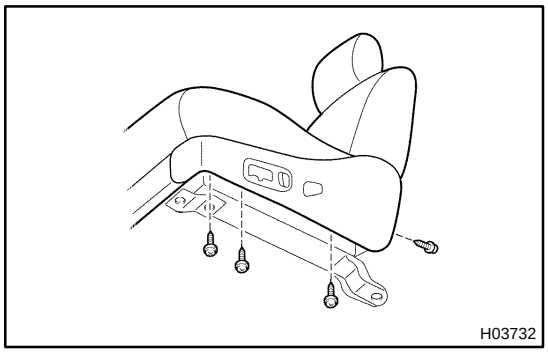
3. REMOVE SEAT CUSHION OUTER SHIELD

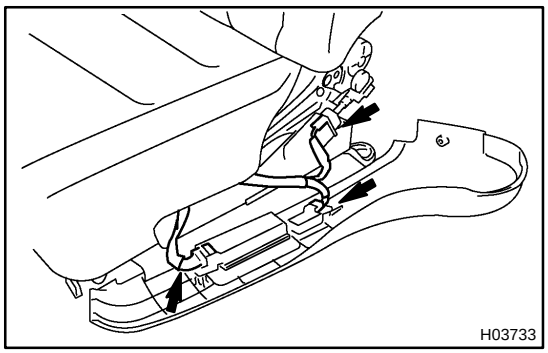
(a) Using a screwdriver, remove the power seat switch knobs.

HINT:

Tape up the screwdriver tip before use.

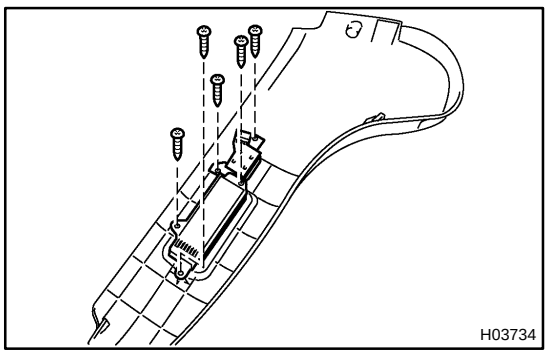
(b) Remove the 4 screws.





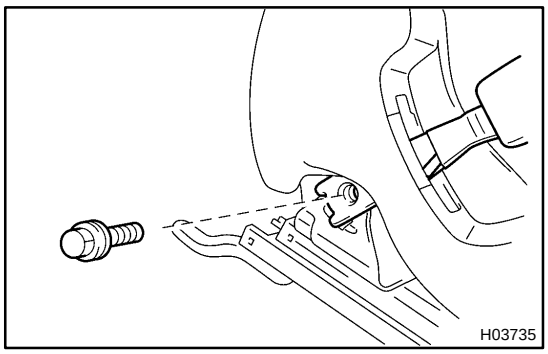
(c) Disconnect the connectors as shown in the illustration.

(d) Remove the seat cushion outer shield.



(e) Remove the 3 screws and the power seat switch from the seat cushion outer shield.

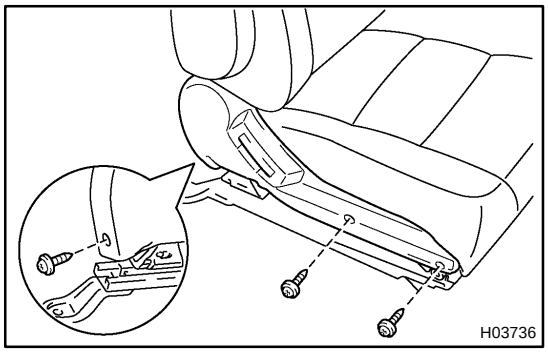
(f) Remove the 2 screws and lumber support switch from the seat cushion outer shield.



4. REMOVE FRONT SEAT INNER BELT

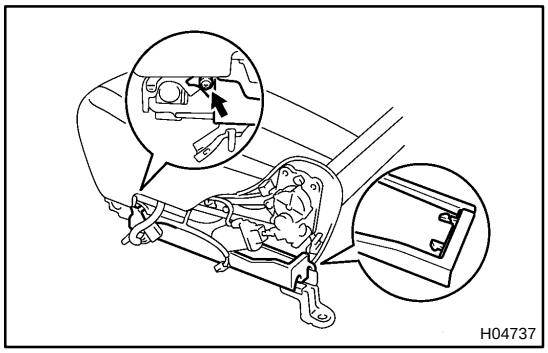
(a) Remove the clamp, then disconnect the connector.

(b) Remove the bolt and the inner belt.



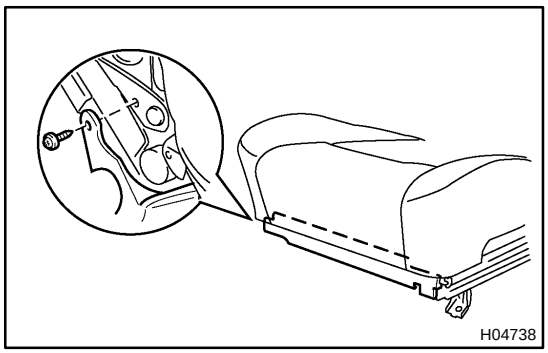
5. REMOVE SEAT CUSHION INNER SHIELD

Remove the 3 screws and the seat cushion inner shield.



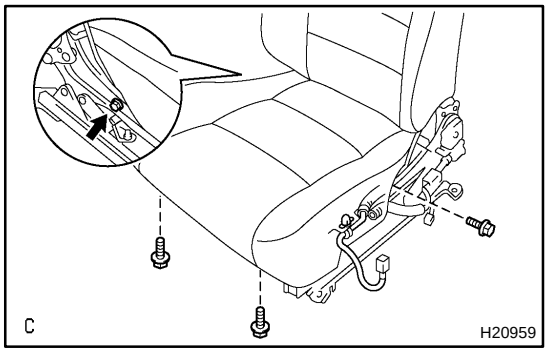
6. REMOVE LOWER SEAT CUSHION SHIELD

Remove the screw and the lower seat cushion shield as shown in the illustration.



7. REMOVE FRONT SEAT CUSHION SHIELD

Remove the screw and the front seat cushion shield.



8. REMOVE SEAT CUSHION ASSEMBLY

(a) Remove the 4 bolts.

(b) Remove the clamps from the seat cushion assembly.

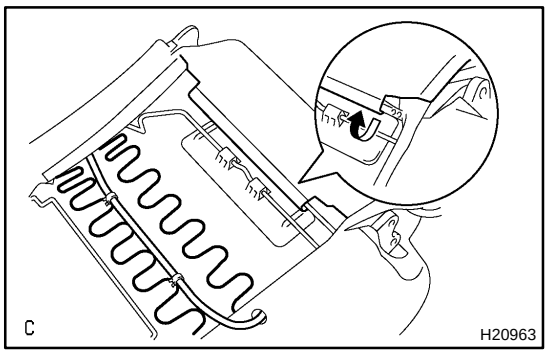
9. REMOVE SEAT CUSHION FRAME

(a) Disengage the hook.

(b) Remove the hog rings and the seat cushion frame from the seat cushion cover with pad.

10. REMOVE SEAT CUSHION COVER (See page BO-1 10)

11. IF NECESSARY, REPLACE SEAT CUSHION HEATER (See page BO-1 10)

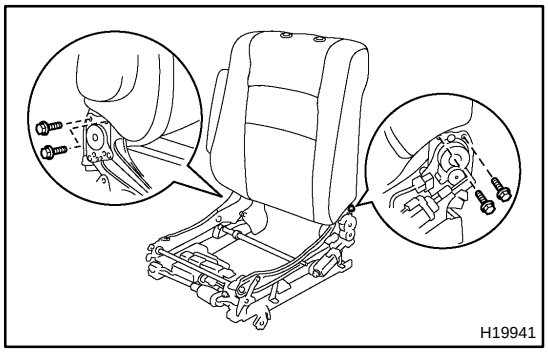


12. REMOVE SEATBACK ASSEMBLY

(a) Remove the hog rings.

(b) Disengage the hook as shown in the illustration.

(c) Disconnect the connectors.



(d) Remove the 4 bolts and the seatback assembly.

NOTICE:

When handling the airbag connector take care not to damage the airbag wire harness.

(e) Remove the screw and the RH reclining adjuster inside shield.

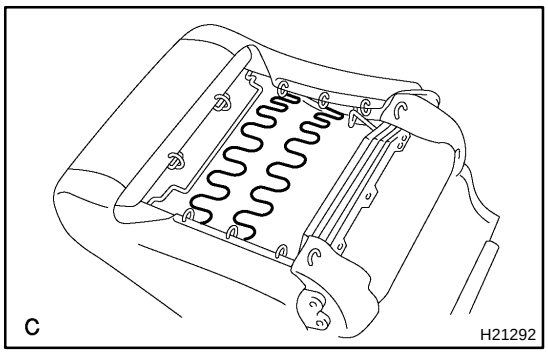
(f) w/ Side Airbag:
Disconnect the side airbag connector.

NOTICE:

When handling the airbag connector take care not to damage the airbag wire harness.

(g) Remove the screw and the LH reclining adjuster inside shield.

13. REMOVE ARMREST

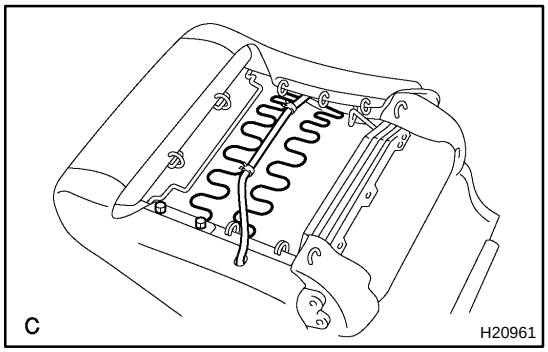


14. w/o Side Airbag:
REMOVE SEATBACK FRAME

(a) Remove the hog rings.

(b) Remove the 2 headrest supports.

(c) Remove the seatback frame from the seatback cover with pad.

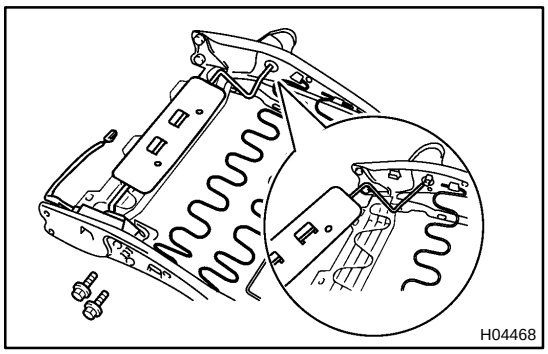


15. w/ Side Airbag:
REMOVE SEATBACK FRAME

(a) Remove the hog rings, the clamps and the 2 bolts.

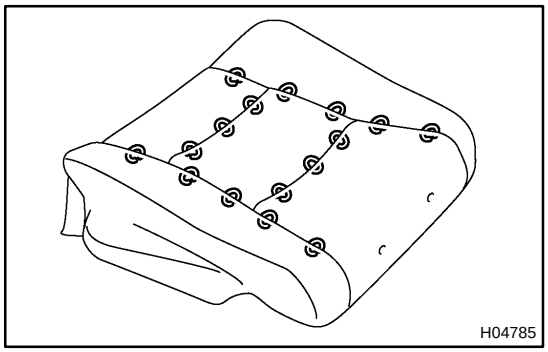
(b) Remove the 2 headrest supports.

(c) Remove the seatback frame from the seatback cover with pad.



16. REMOVE LUMBER SUPPORT

Remove the 2 bolts, the lumber support and the spacer.



17. REMOVE SEATBACK COVER

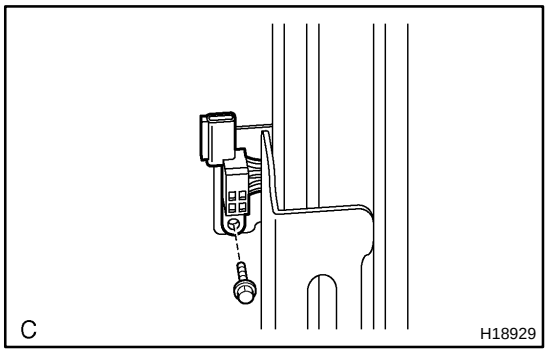
Remove the hog rings and the seatback cover from the seatback pad.

18. IF NECESSARY, REPLACE SEATBACK HEATER
(See page BO-110)

19. REMOVE SEAT POSITION CONTROL RELAY

(a) Disconnect the connectors.

(b) Remove the 2 bolts and the seat position control relay.



20. Driver's Side:
REMOVE SEAT POSITION SENSOR

Remove the bolt and the seat position sensor then disconnect the connector.

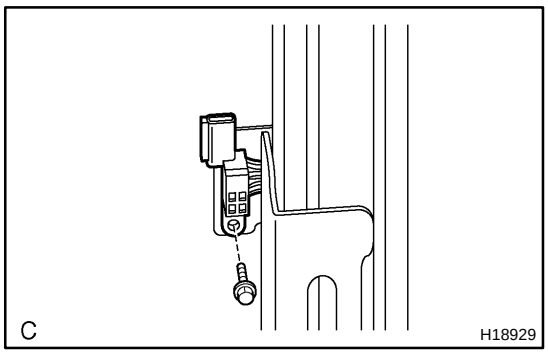
BO1KX-02

INSTALLATION

Installation is in the reverse order of removal (See page BO-105).

BO4J3-01

REASSEMBLY



1. Driver's Side:

INSTALL SEAT POSITION SENSOR

Install the seat position sensor with a new bolt, then connect the connector.

Part No.:

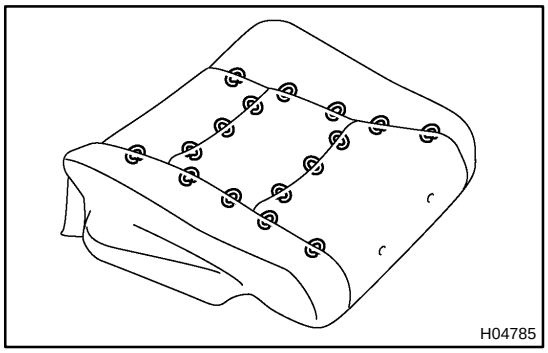
Bolt: 90119-06871

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

2. INSTALL SEAT POSITION CONTROL RELAY

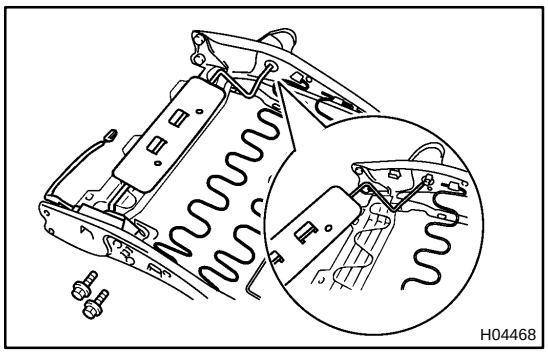
Install the seat position control relay with the 2 bolts, then connect the connectors.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



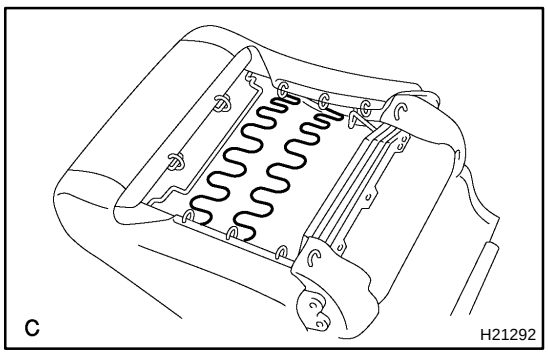
3. INSTALL SEATBACK COVER

Install the seatback cover to the seatback pad with new hog rings.



4. INSTALL LUMBER SUPPORT

Install the lumber support and the spacer with the 2 bolts.



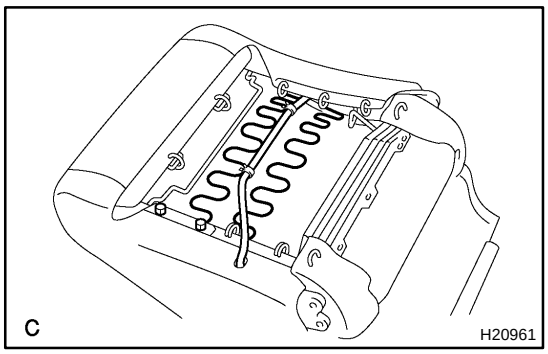
5. w/o Side Airbag:

INSTALL SEATBACK FRAME

(a) Install the seatback cover to the seatback frame.

(b) Install new hog rings.

(c) Install the 2 headrest supports.



6. w/ Side Airbag:
INSTALL SEATBACK FRAME

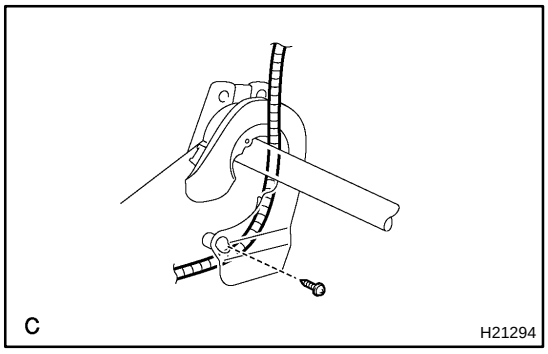
(a) Install the seatback cover to the seatback frame.

(b) Install new hog rings, the clamps and the 2 bolts.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)

(c) Install the 2 headrest supports.

7. INSTALL SEATBACK ASSEMBLY

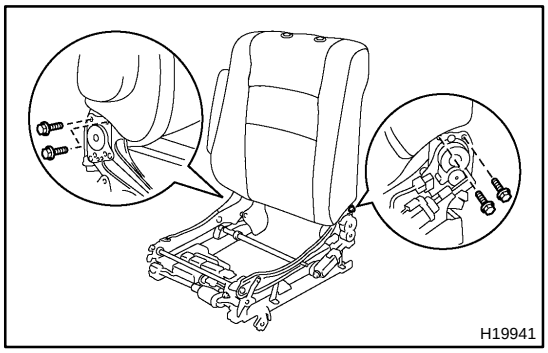
(a) w/o Side Airbag:
Install the RH reclining adjuster inside shield with a screw.



(b) w/ Side Airbag:
Place the airbag connector along the inner seat adjuster, and then install the RH reclining adjuster inside shield with a screw so that the connector is placed in between.

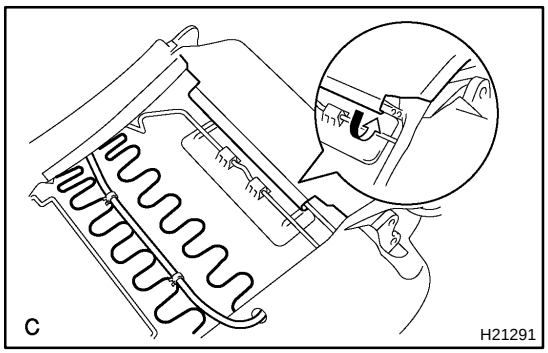
NOTICE:
When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Install the LH reclining adjuster inside shield with a screw.



(d) Install the seatback assembly with the 4 bolts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(e) Install new hog rings.



(f) Hang the hook.

(g) Connect the connectors.

8. INSTALL ARMREST
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

9. INSTALL HEADREST

10. INSTALL SEAT CUSHION COVER (See page BO-1 10)

11. INSTALL SEAT CUSHION FRAME

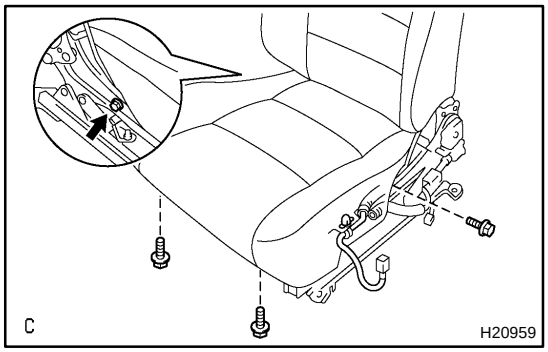
(a) Install the seat cushion frame with new hog rings to the seat cushion cover with pad.

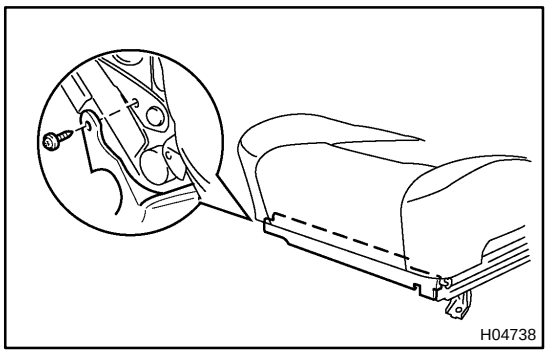
(b) Hang the hook.

12. INSTALL SEAT CUSHION ASSEMBLY

(a) Install the seat cushion assembly with the 4 bolts to the seat adjuster.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

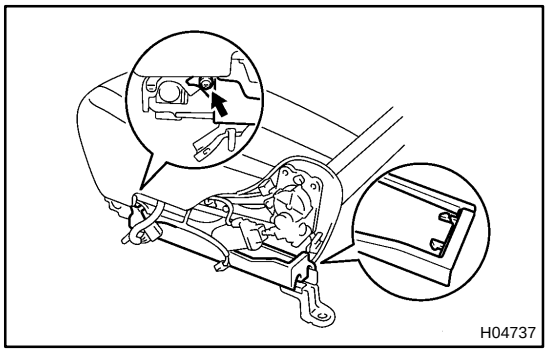
(b) Engage the wire harness clamp.





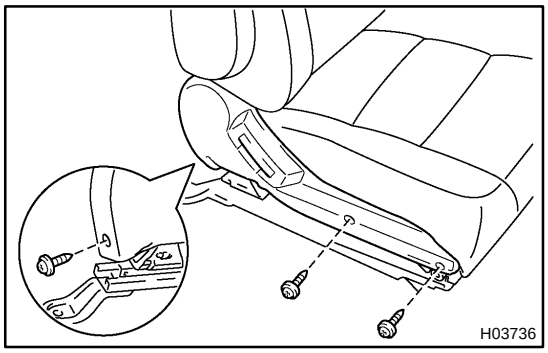
13. INSTALL FRONT SEAT CUSHION SHIELD

Install the seat cushion shield with the screw.



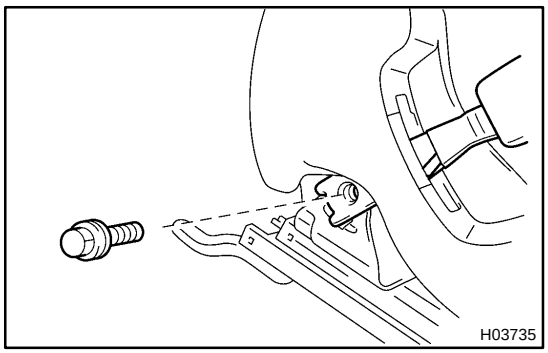
14. INSTALL LOWER SEAT CUSHION SHIELD

Install the seat cushion shield with the screw.



15. INSTALL SEAT CUSHION INNER SHIELD

Install the seat cushion inner shield with the 3 screws.



16. INSTALL FRONT SEAT INNER BELT

(a) Engage the clamp, then connect the connector.

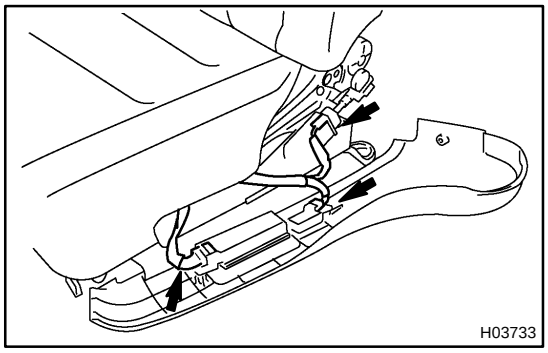
(b) Install the inner belt with the bolt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

17. INSTALL SEAT CUSHION OUTER SHIELD

(a) Install the power seat switch with the 3 screws.

(b) Install the lumber support switch with the 2 screws.



(c) Connect the connectors as shown in the illustration.

(d) Install the seat cushion outer shield with the 4 screws.

(e) Install the power seat switch knobs.

18. INSTALL SEATBACK BOARD

BO1KU-04

REMOVAL

1. REMOVE SEAT TRACK OUTER COVERS

Using a screwdriver, remove the 4 seat track outer covers.

HINT:

Tape up the screwdriver tip before use.

2. REMOVE FRONT SEAT

(a) Remove the 4 bolts.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(b) Disconnect the connectors, then remove the front seat.

NOTICE:

★ **When handling the airbag connector, take care not to damage the airbag wire harness.**

★ **Be careful not to damage the body.**

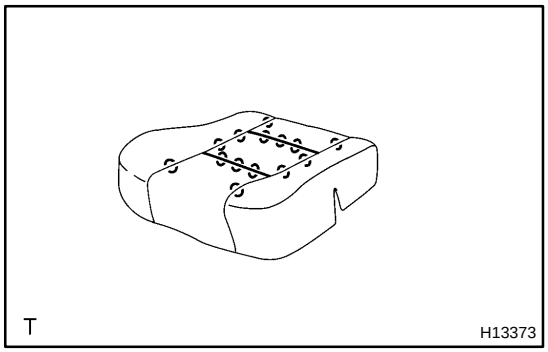
BO4J2-01

REPLACEMENT

HINT:

★ Following is the seat heater replacement procedure.

★ Care should be taken during operation to protect the seat cover from scratches, dirt or accidental cut of thread.

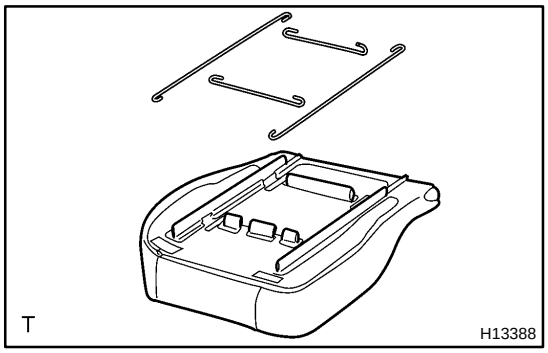


1. Seat cushion cover:
REMOVE SEAT HEATER

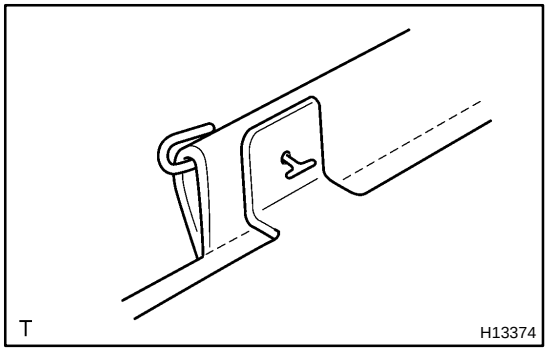
(a) Remove the hog rings.

(b) Remove the seat cushion cover from the pad.

(c) Turn the seat cushion cover inside out.

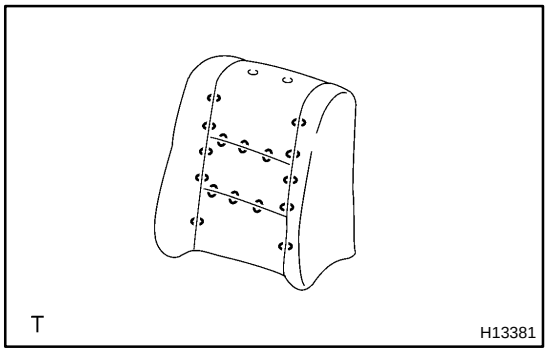


(d) Disconnect the seat wires.



(e) Remove the tack pins which are fastened to the heater.

(f) Remove the seat heater from the seat cushion cover.

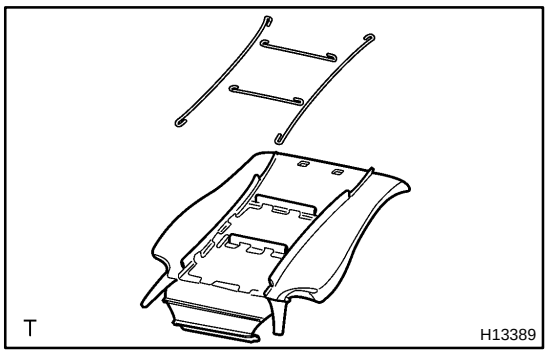


2. Seatback cover:
REMOVE SEAT HEATER

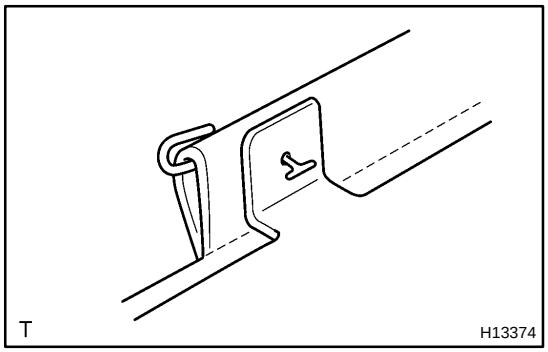
(a) Remove the hog rings and the wires.

(b) Remove the seatback cover from the pad.

(c) Turn the seatback cover inside out.



(d) Disconnect the seat wires.



(e) Remove the tack pins which are fastened to the seat heater.

(f) Remove the seat heater from the seatback cover.

3. INSTALL SEAT HEATER TO SEAT COVER

Using a tacker, install a new seat heater to the seat cushion cover with tack pins.

Tacker: BANZAI 303XT or equivalent

NOTICE:

Do not substitute other metal parts for the of tack pins. Insufficient distance between the heater and the cover may result in damage to the heater.

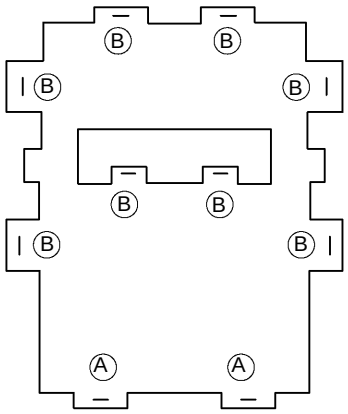
HINT:

★ Illustration ”A” and ”B”:
Fasten the cover and the heater with the tack pins matching the seam with the V slit of the heater.

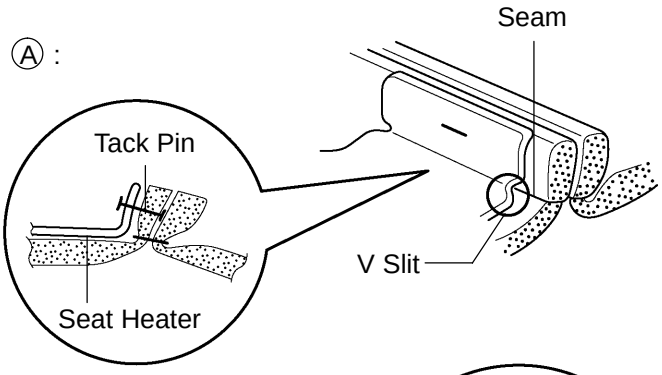
★ Illustration ”C”:
Fasten the out-stretch cloth pad and the heater with the tack pins matching the edge of the cloth pad with the V slit of the heater.

★ Sewing thread can be substituted for the tack pins. However, allow a distance of 6 - 7 mm (0.24 - 0.28 in.) between both sewed parts of the heater and the cover.

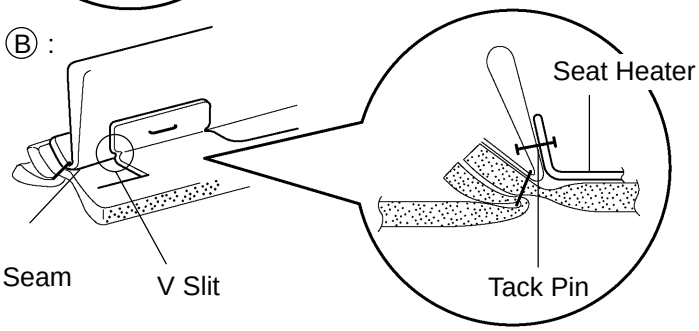
Seatback Cover:



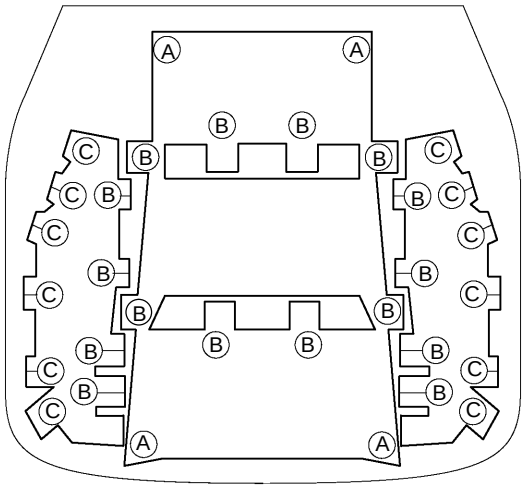
Ⓐ :



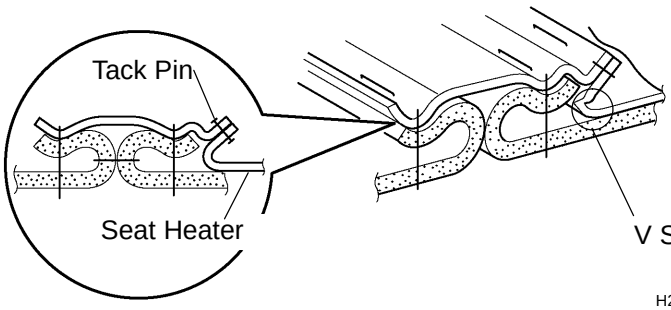
Ⓑ :



Seat Cushion Cover:

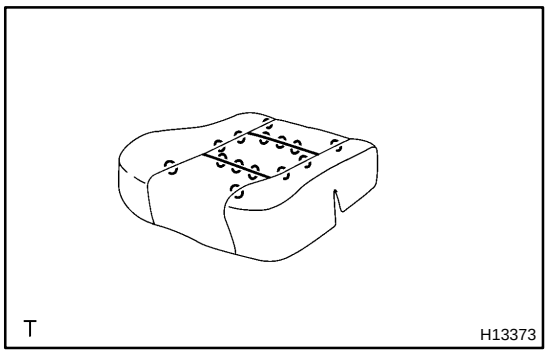


Ⓒ :



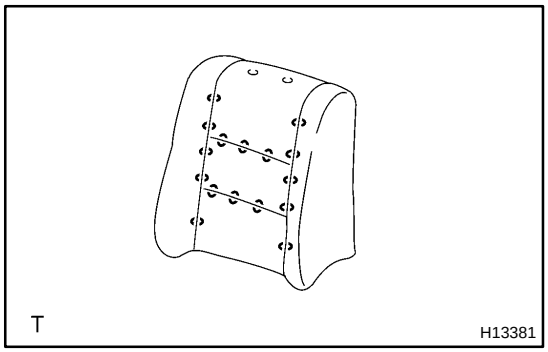
C

H20974



4. INSTALL SEAT CUSHION COVER TO SEAT CUSHION PAD

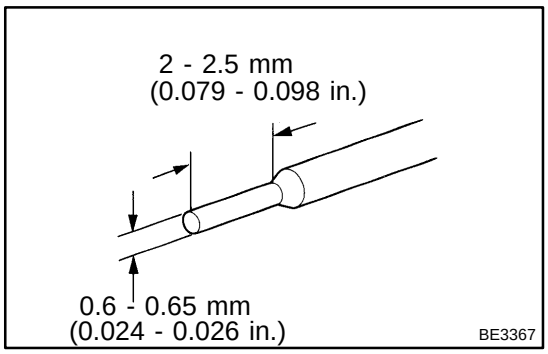
(a) Thread the wires through the listing pocket.
(b) Install the seat cushion cover with new hog rings.
(c) Turn the seat cushion cover inside out to put it back to its original position.



5. INSTALL SEATBACK COVER TO PAD

(a) Thread the wires though the listing pocket.
(b) Turn the seatback cover inside out to put it back to its original position.
(c) Install the seatback cover to pad with new hog rings.

BO1JU-03



ADJUSTMENT

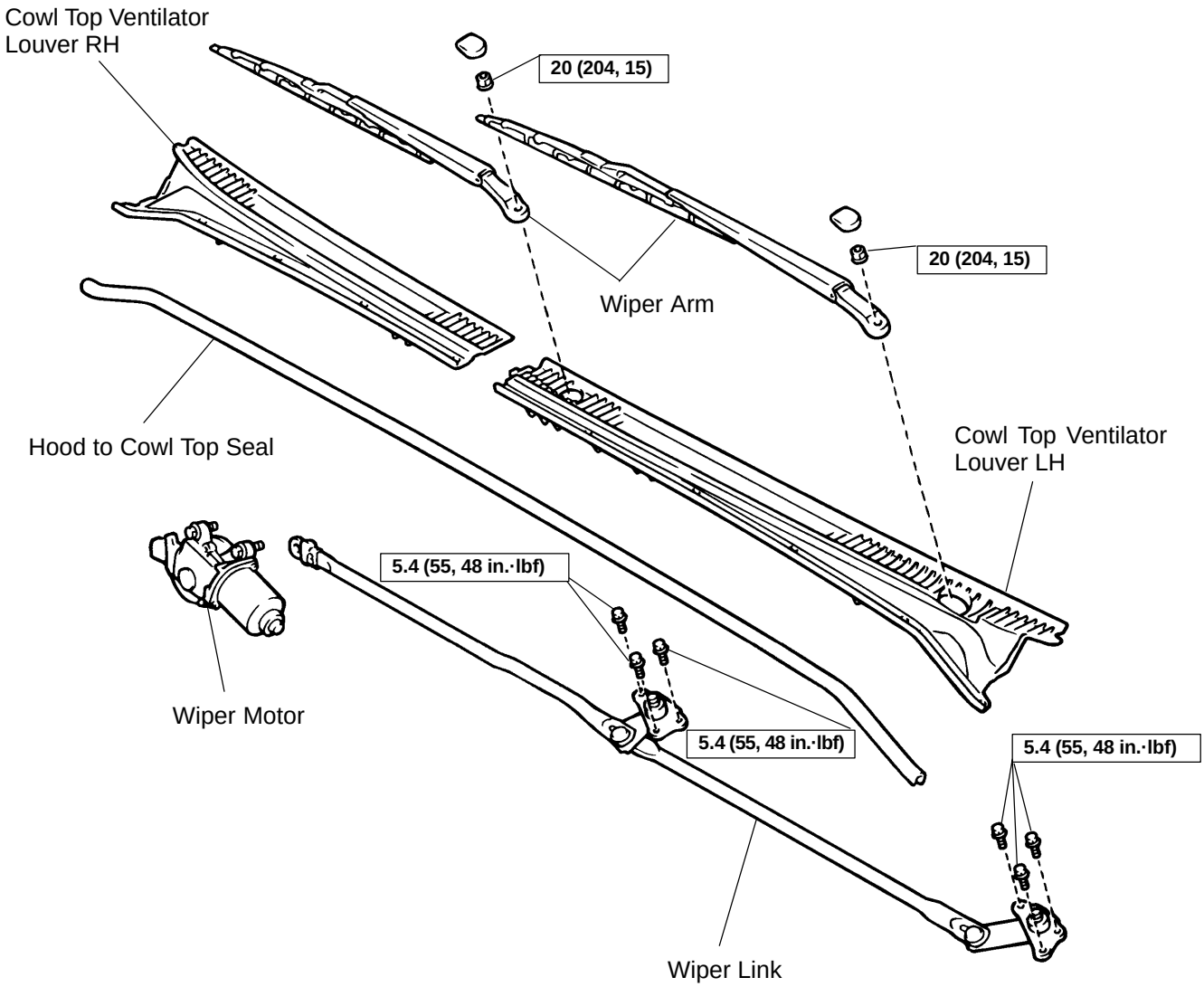
ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

FRONT WIPER AND WASHER

COMPONENTS

BO1JR-03



N·m (kgf·cm, ft·lbf) : Specified torque

H04846

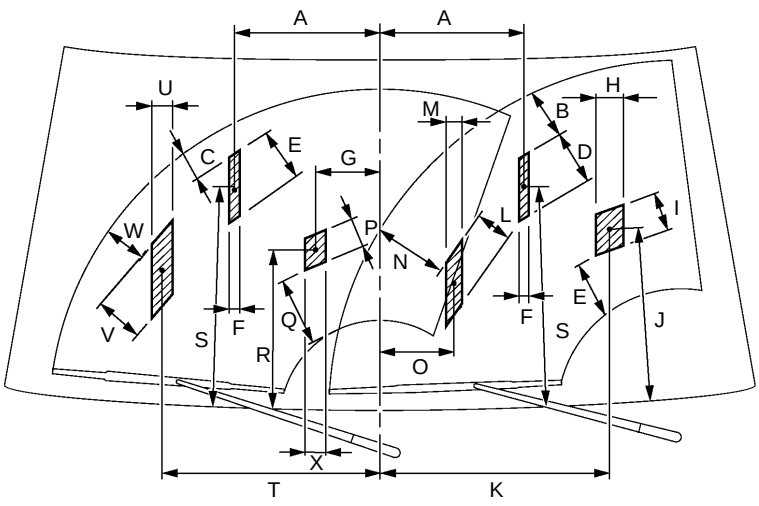
BO1JT-03

INSPECTION

INSPECT WASHER NOZZLE

While operating the washer, check if the point where the washer fluid hits the windshield is within the range indicated by the hatched line.

A: Approx. 311 mm (12.24 in.)
B: Approx. 110 mm (4.33 in.)
C: Approx. 86 mm (3.39 in.)
D: Approx. 116 mm (4.57 in.)
E: Approx. 205 mm (8.07 in.)
F: Approx. 22 mm (0.87 in.)
G: Approx. 138 mm (5.43 in.)
H: Approx. 60 mm (2.36 in.)
I: Approx. 85 mm (3.35 in.)
J: Approx. 364 mm (14.33 in.)
K: Approx. 496 mm (19.53 in.)
L: Approx. 81 mm (3.19 in.)
M: Approx. 35 mm (1.38 in.)
N: Approx. 157 mm (6.18 in.)
O: Approx. 159 mm (6.26 in.)
P: Approx. 63 mm (2.48 in.)
Q: Approx. 169 mm (6.65 in.)
R: Approx. 331 mm (13.03 in.)
S: Approx. 465 mm (18.31 in.)
T: Approx. 468 mm (18.43 in.)
U: Approx. 45 mm (1.77 in.)
V: Approx. 104 mm (4.09 in.)
W: Approx. 119 mm (4.69 in.)
X: Approx. 44 mm (1.73 in.)



H04842

BO1JV-04

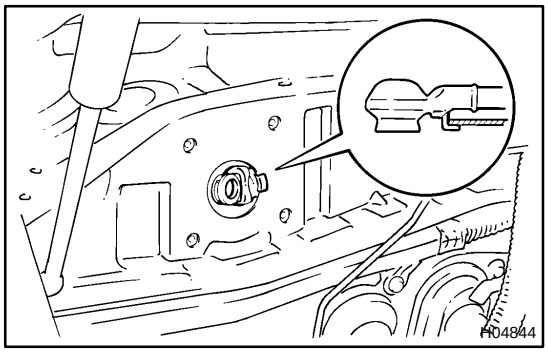
INSTALLATION

1. INSTALL WASHER NOZZLES

2. INSTALL WIPER LINK

Install the wiper link through the service hole, then torque the 6 bolts.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



HINT:

When installing the wiper link, connect the claw of wiper link to the panel.

3. INSTALL WIPER MOTOR

(a) Connect the wiper motor to wiper link.

(b) Torque the 4 bolts.

(c) Connect the connector.

4. INSTALL COWL TOP VENTILATOR LOUVERS

(a) Install the cowl top ventilator louver LH.

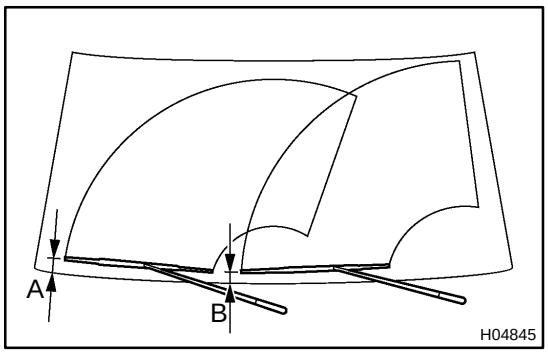
(b) Install the cowl top ventilator louver RH.

5. INSTALL HOOD TO COWL TOP SEAL

6. INSTALL WIPER ARMS

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten nuts by hand.



(c) Adjust the installation position of the wiper arms to the positions shown in the illustration.

A: Approx. 40 mm (1.57 in.)

B: Approx. 16 - 26 mm (0.63 - 1.02 in.)

(d) Torque the nuts.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(e) Install the wiper arm caps.

BO1JS-03

REMOVAL

1. REMOVE WIPER ARMS

(a) Remove the 2 caps and 2 nuts.

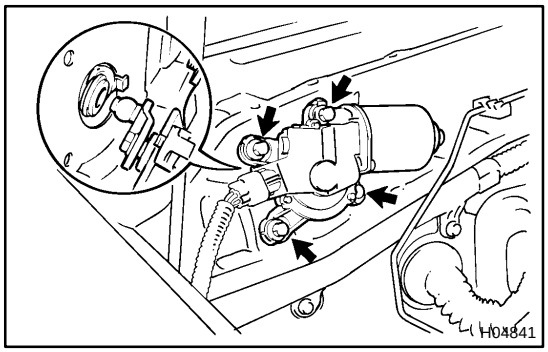
(b) Remove the 2 wiper arms.

2. REMOVE HOOD TO COWL TOP SEAL

3. REMOVE COWL TOP VENTILATOR LOUVERS

(a) Remove the cowl top ventilator louver RH.

(b) Remove the cowl top ventilator louver LH.



4. REMOVE WIPER MOTOR

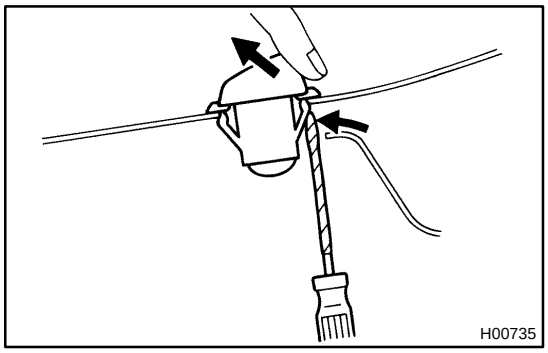
(a) Disconnect the connector, unfasten the 4 bolts.

(b) Disconnect the wiper motor from the wiper link, then remove the wiper motor.

5. REMOVE WIPER LINK

(a) Loosen the 6 bolts.

(b) Remove the wiper link through the service hole.



6. REMOVE WASHER NOZZLE

(a) Disconnect the washer hose.

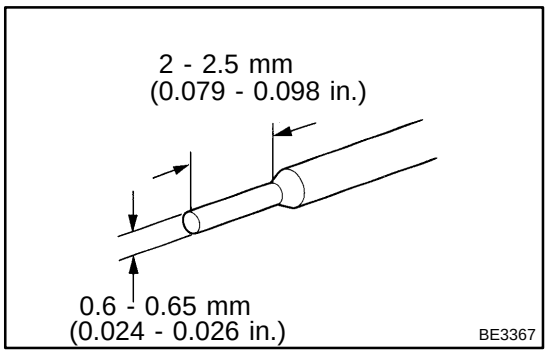
(b) Using a screwdriver, remove the washer nozzle.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other side.

BO1JU-03



ADJUSTMENT

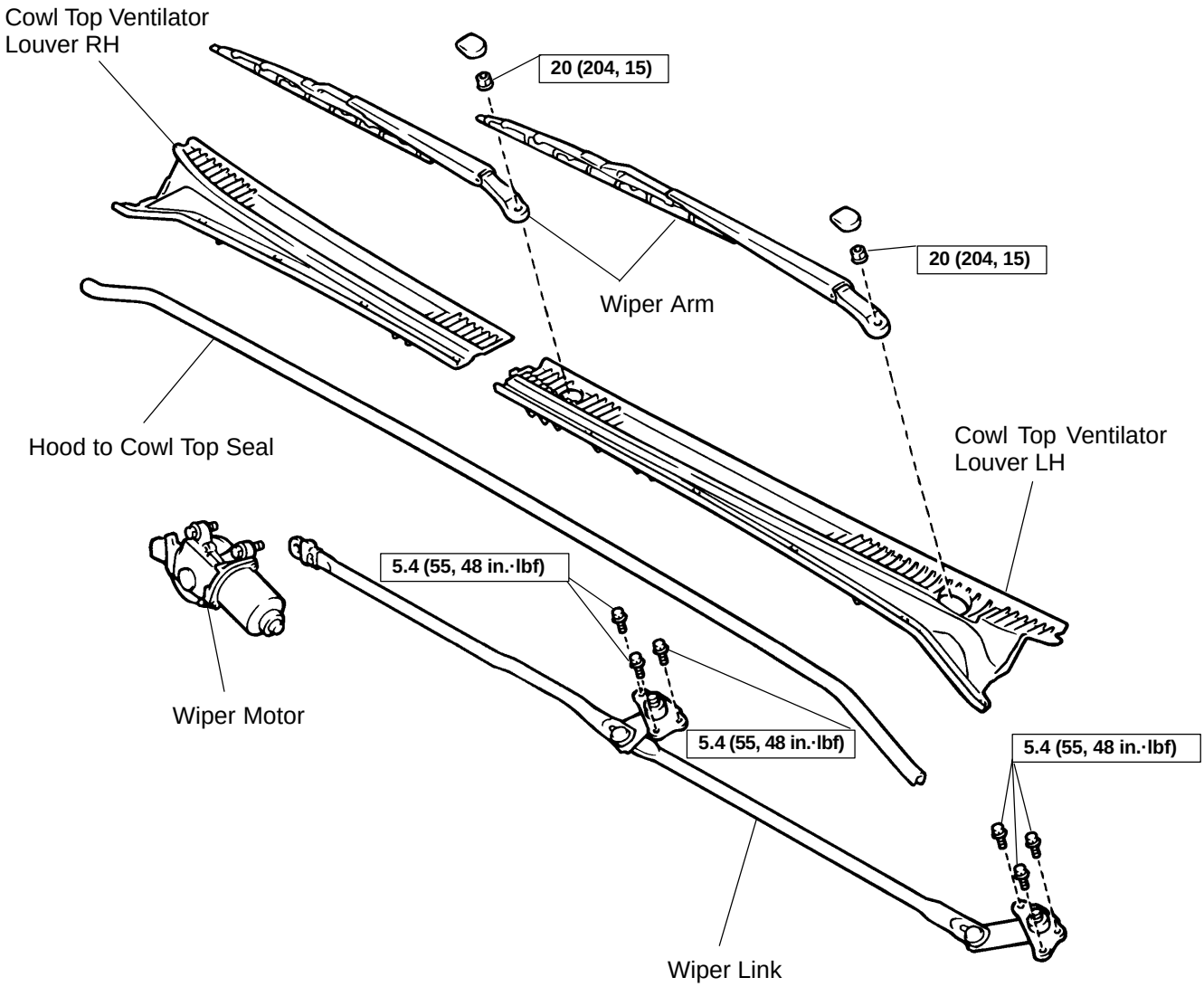
ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the windshield.

FRONT WIPER AND WASHER

COMPONENTS

BO1JR-03



N·m (kgf·cm, ft·lbf) : Specified torque

H04846

BO1JT-03

INSPECTION

INSPECT WASHER NOZZLE

While operating the washer, check if the point where the washer fluid hits the windshield is within the range indicated by the hatched line.

A: Approx. 311 mm (12.24 in.)
B: Approx. 110 mm (4.33 in.)
C: Approx. 86 mm (3.39 in.)
D: Approx. 116 mm (4.57 in.)
E: Approx. 205 mm (8.07 in.)
F: Approx. 22 mm (0.87 in.)
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R: Approx. 331 mm (13.03 in.)
S: Approx. 465 mm (18.31 in.)
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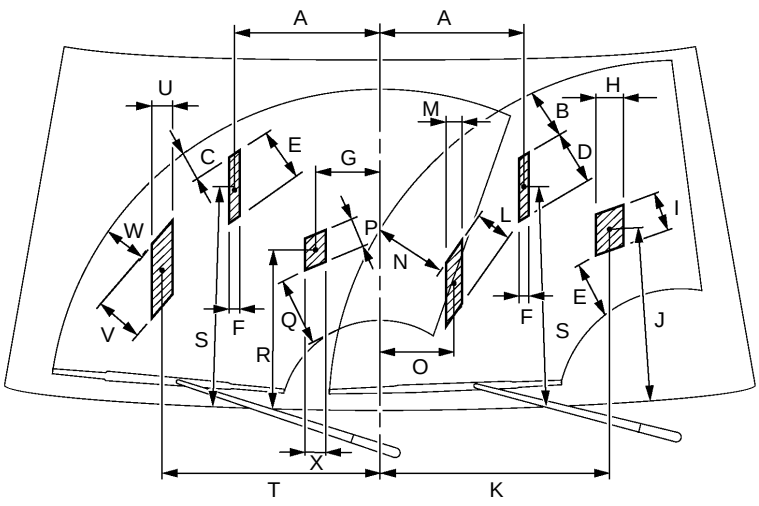
U: Approx. 45 mm (1.77 in.)
V: Approx. 104 mm (4.09 in.)
W: Approx. 119 mm (4.69 in.)
X: Approx. 44 mm (1.73 in.)



H04842

BO1JV-04

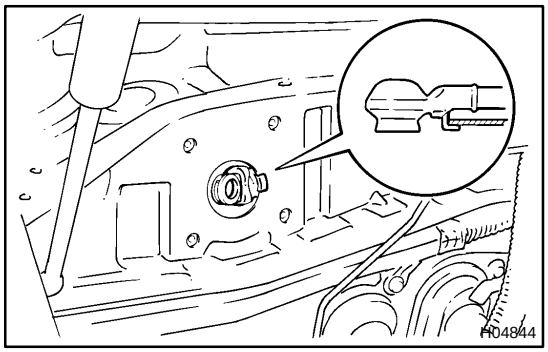
INSTALLATION

1. INSTALL WASHER NOZZLES

2. INSTALL WIPER LINK

Install the wiper link through the service hole, then torque the 6 bolts.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



HINT:

When installing the wiper link, connect the claw of wiper link to the panel.

3. INSTALL WIPER MOTOR

(a) Connect the wiper motor to wiper link.

(b) Torque the 4 bolts.

(c) Connect the connector.

4. INSTALL COWL TOP VENTILATOR LOUVERS

(a) Install the cowl top ventilator louver LH.

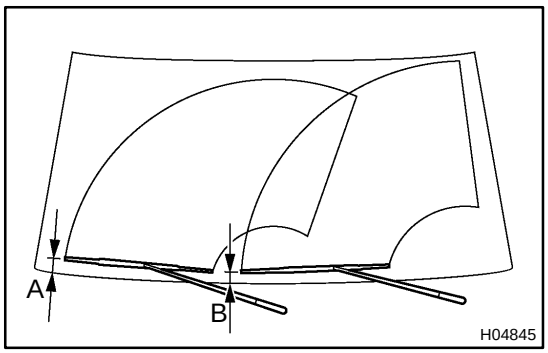
(b) Install the cowl top ventilator louver RH.

5. INSTALL HOOD TO COWL TOP SEAL

6. INSTALL WIPER ARMS

(a) Operate the wipers once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten nuts by hand.



(c) Adjust the installation position of the wiper arms to the positions shown in the illustration.

A: Approx. 40 mm (1.57 in.)

B: Approx. 16 - 26 mm (0.63 - 1.02 in.)

(d) Torque the nuts.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(e) Install the wiper arm caps.

BO1JS-03

REMOVAL

1. REMOVE WIPER ARMS

(a) Remove the 2 caps and 2 nuts.

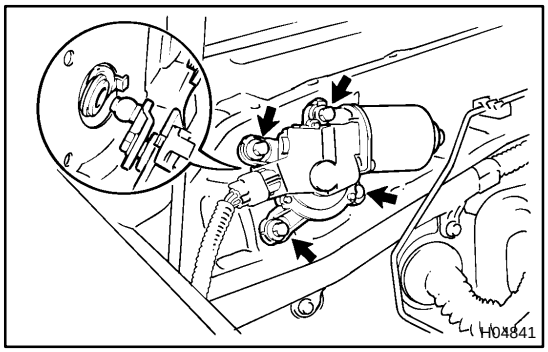
(b) Remove the 2 wiper arms.

2. REMOVE HOOD TO COWL TOP SEAL

3. REMOVE COWL TOP VENTILATOR LOUVERS

(a) Remove the cowl top ventilator louver RH.

(b) Remove the cowl top ventilator louver LH.



4. REMOVE WIPER MOTOR

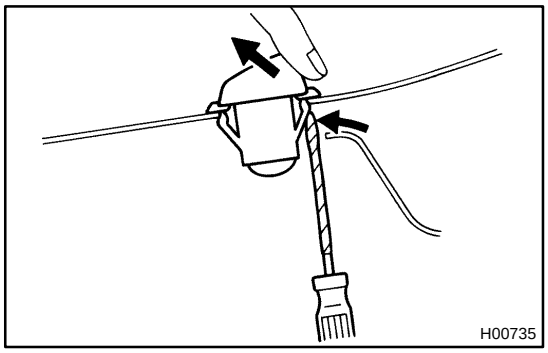
(a) Disconnect the connector, unfasten the 4 bolts.

(b) Disconnect the wiper motor from the wiper link, then remove the wiper motor.

5. REMOVE WIPER LINK

(a) Loosen the 6 bolts.

(b) Remove the wiper link through the service hole.



6. REMOVE WASHER NOZZLE

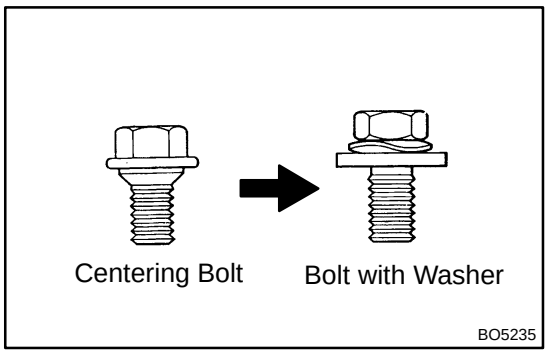
(a) Disconnect the washer hose.

(b) Using a screwdriver, remove the washer nozzle.

HINT:

Tape the screwdriver tip before use.

(c) Employ the same manner described above to the other side.



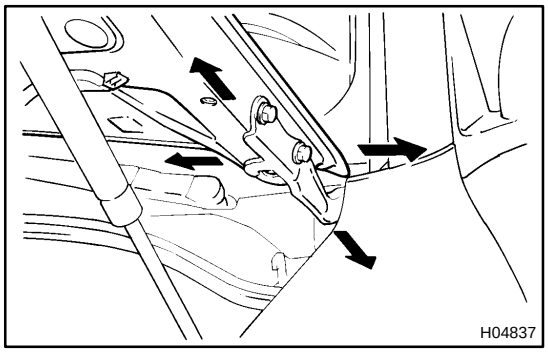
HOOD

ADJUSTMENT

BO1J8-03

HINT:

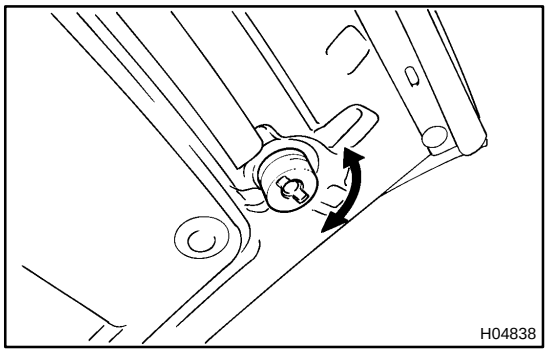
Since the centering bolt is used as a hood hinge set bolt, the hood cannot be adjusted with it on. Substitute the bolt with a washer for the centering bolt.



1. ADJUST HOOD IN FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

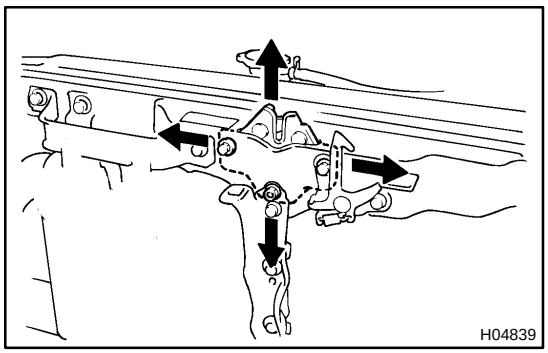
Adjust the hood by loosening the hood side hinge bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



2. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



3. ADJUST HOOD LOCK

Adjust the lock by loosening the bolts.

HOOD SUPPORT

BO1J9-03

REPLACEMENT

1. REMOVE HOOD SUPPORT

(a) Remove the bolt and hood support from the hood.

HINT:

While supporting the hood by hand, remove the hood support from the hood.

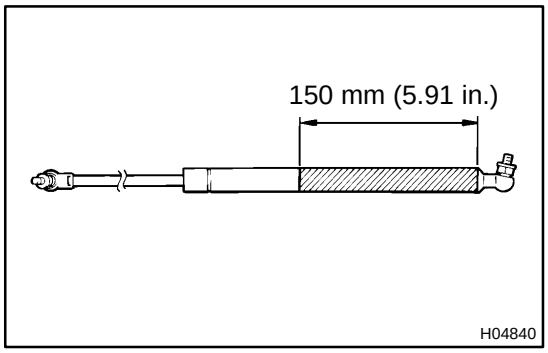
(b) Remove the bolt and hood support.

2. IF NECESSARY, REPLACE HOOD SUPPORT

NOTICE:

Handling the hood support

- ★ **Do not disassemble the support as the cylinder is filled with pressurized gas.**



- ★ **If the hood support is to be replaced, drill a 2.0 - 3.0 mm (0.079 - 0.118 in.) hole in the area shown in the illustration to completely release the high pressure gas before disposing of it.**
- ★ **When drilling, chips may fly out so work carefully.**
- ★ **The gas is colorless, odorless and non - toxic.**
- ★ **When working, handle the hood support carefully. Never score or scratch the exposed part of the piston rod, and allow any paint or oil to get on it.**
- ★ **Do not turn the piston rod and cylinder with the hood support fully extended.**

3. INSTALL HOOD SUPPORT

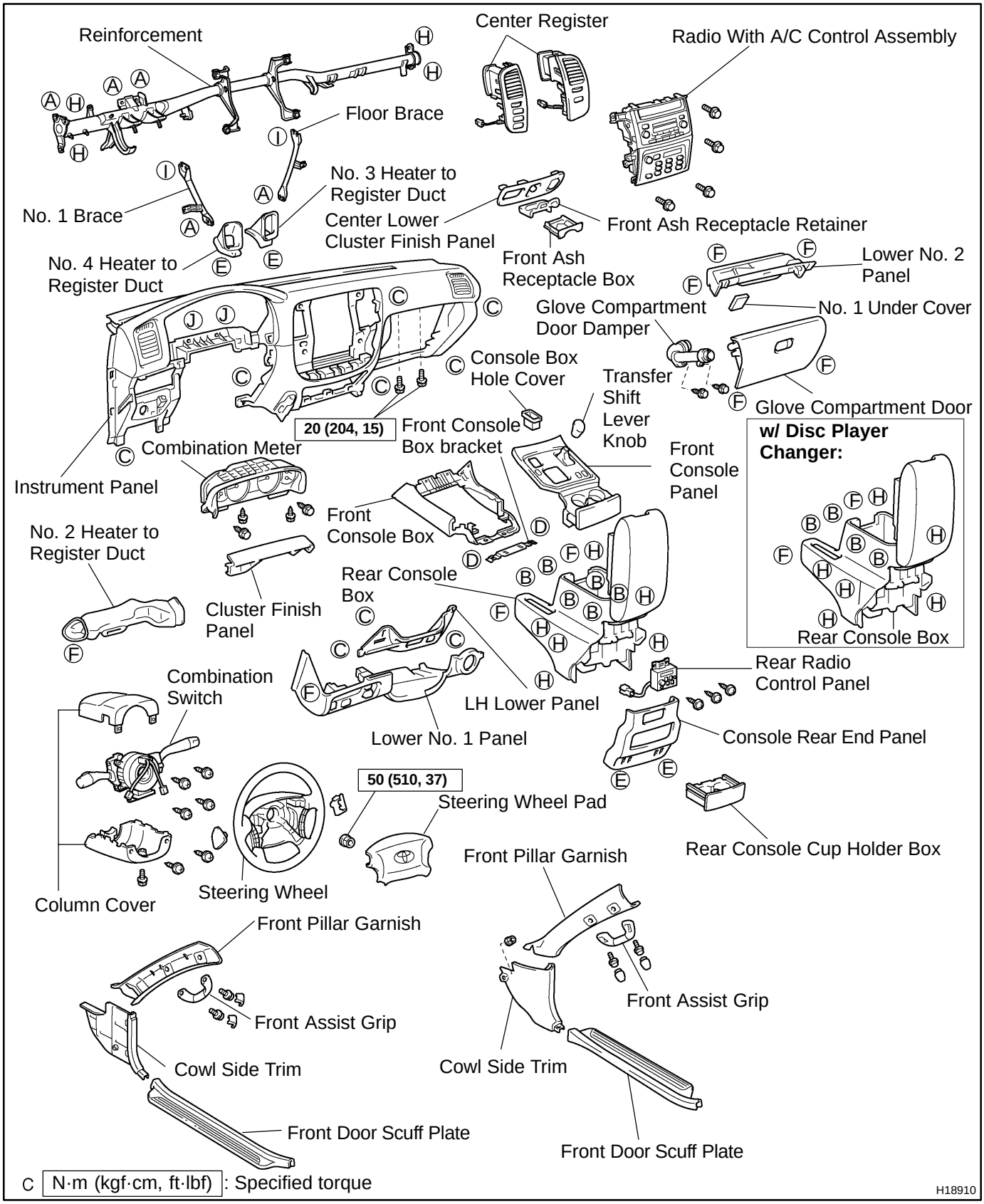
(a) Install the bolt and hood support to the body.

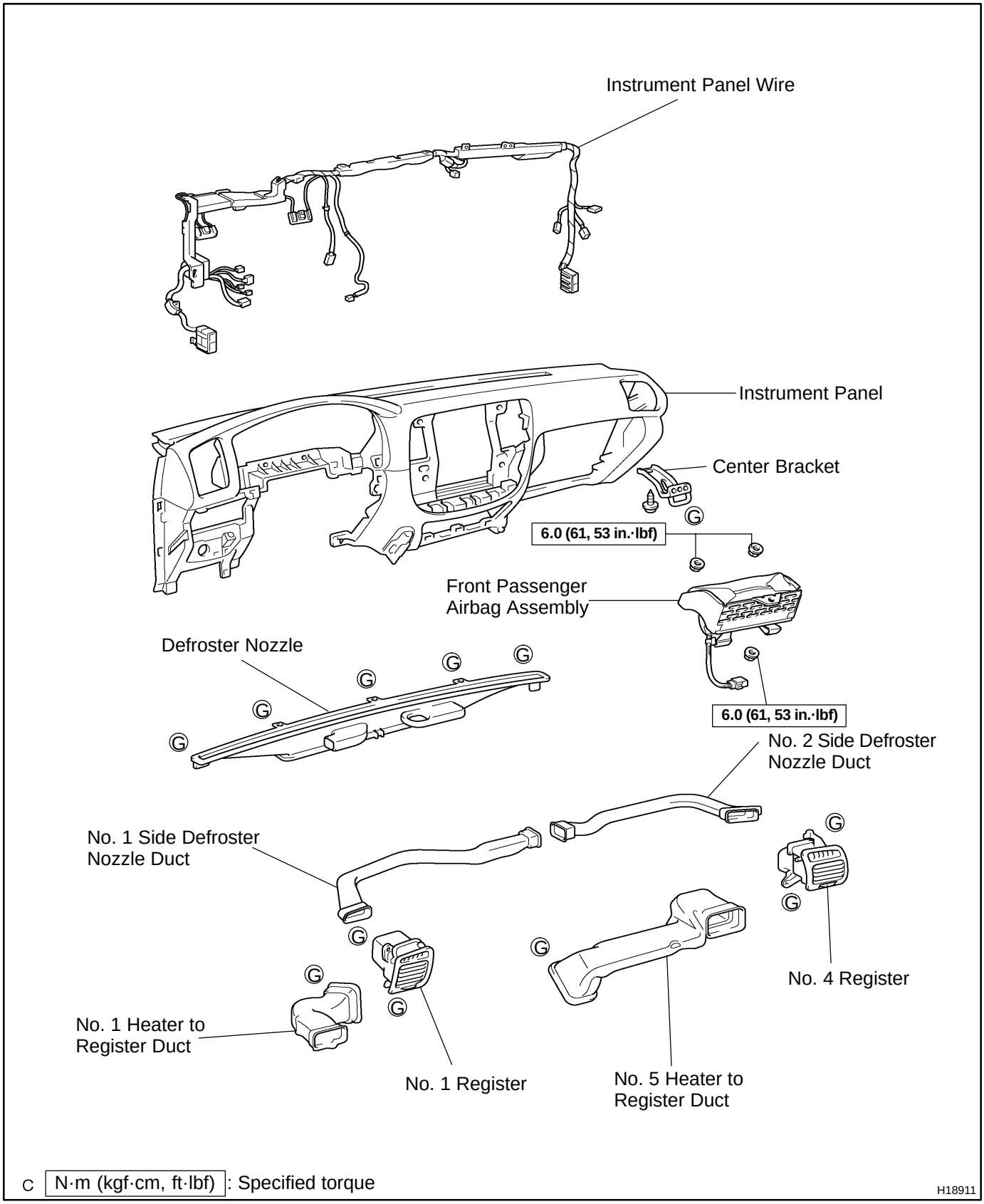
(b) Install the bolt and hood support to the hood.

INSTRUMENT PANEL

COMPONENTS

BO1KK-04



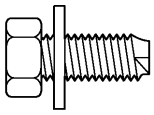
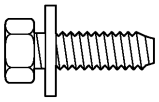
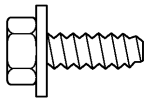
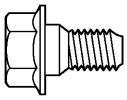
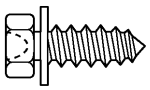
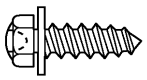
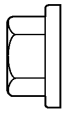


C N·m (kgf·cm, ft·lbf) : Specified torque

H18911

HINT:
Screw shapes and sizes are indicated in the table below. The codes (”A” to ”I”) correspond to those indicated on the previous page.

mm (in.)

	Shape	Size		Shape	Size		Shape	Size
Ⓐ		ø = 8 (0.31) L =16 (0.63)	Ⓑ		ø = 6 (0.24) L =18 (0.71)	Ⓒ		ø = 6 (0.24) L =16 (0.63)
Ⓓ		ø = 6 (0.24) L =11 (0.43)	Ⓔ		ø = 6 (0.24) L =16 (0.63)	Ⓕ		ø = 5 (0.20) L =16 (0.63)
Ⓖ		ø = 5 (0.20) L =14 (0.55)	Ⓗ		ø = 5 (0.20) L =14 (0.55)	Ⓘ		ø = 8 (0.31)
Ⓙ		ø = 6 (0.24)						

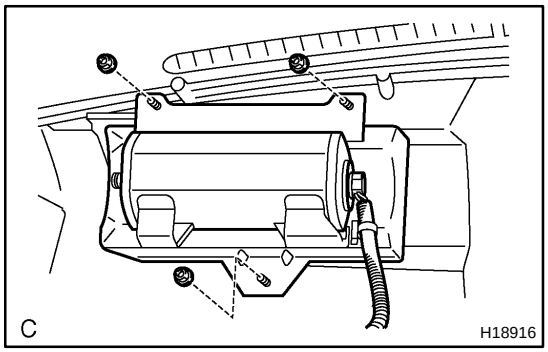
C

H21419

BO4IY-01

DISASSEMBLY

1. **REMOVE NO. 2 SIDE DEFROSTER NOZZLE DUCT**
2. **REMOVE NO. 1 SIDE DEFROSTER NOZZLE DUCT**
3. **REMOVE DEFROSTER NOZZLE**
4. **REMOVE CENTER BRACKET**
5. **REMOVE NO. 1 HEATER TO REGISTER DUCT**
6. **REMOVE INSTRUMENT PANEL WIRE HARNESS**
7. **REMOVE NO. 5 HEATER TO REGISTER DUCT**



8. **REMOVE FRONT PASSENGER AIRBAG ASSEMBLY**

Remove the 3 nuts and the front passenger airbag assembly.

Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

CAUTION:

- ★ **Do not store the front passenger airbag assembly with the airbag deployment side facing down.**
- ★ **Never disassemble the front passenger airbag assembly.**

NOTICE:

At the time of reassembly, please refer to the following items.

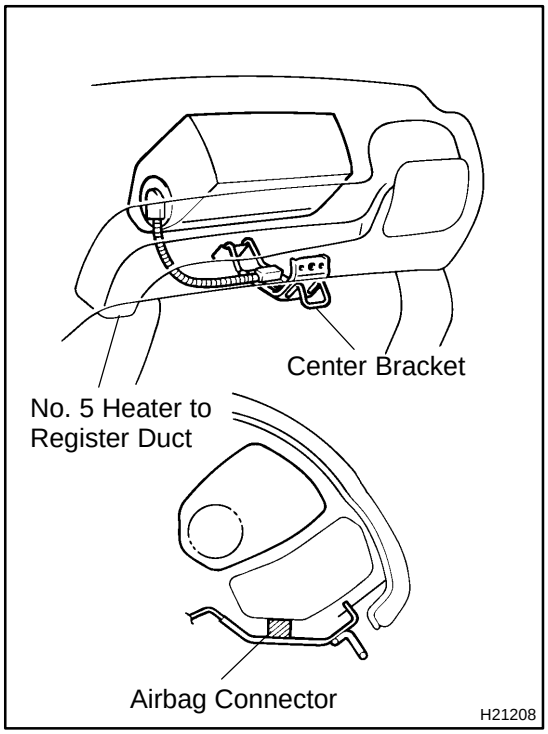
- ★ **Make sure that the front passenger airbag assembly is installed with the specified torque.**
- ★ **If the front passenger airbag assembly has been dropped, or if there are cracks, dents or other defects in the case or the connector, replace the front passenger airbag assembly with a new one.**
- ★ **When installing the front passenger airbag assembly, take care that the wiring does not interfere with other parts and is not pinched between other parts.**

9. **REMOVE NO. 1 REGISTER**
10. **REMOVE NO. 4 REGISTER**

BO3XU-02

INSTALLATION

1. **INSTALL REINFORCEMENT**
2. **INSTALL NO. 1 BRACE**
3. **INSTALL FLOOR BRACE**
4. **INSTALL GLOVE COMPARTMENT DOOR DAMPER**
5. **INSTALL NO. 4 HEATER TO REGISTER DUCT**
6. **INSTALL NO. 3 HEATER TO REGISTER DUCT**
7. **INSTALL ECM (See page SF-60)**



8. INSTALL INSTRUMENT PANEL

HINT:

★ Install the airbag connector between the No. 5 heater to register duct and the center bracket temporarily, then install the instrument panel.

★ Remove the airbag connector before installing the lower No. 2 panel.

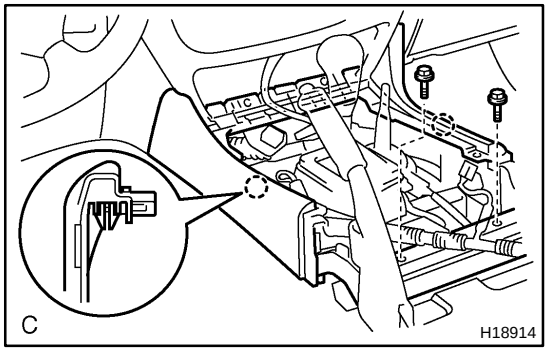
(a) Install the 6 bolts, the 2 nuts and the instrument panel, then connect the connectors.

(b) Install the 2 bolts to the front passenger airbag assembly.
Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(c) Connect the junction connectors.

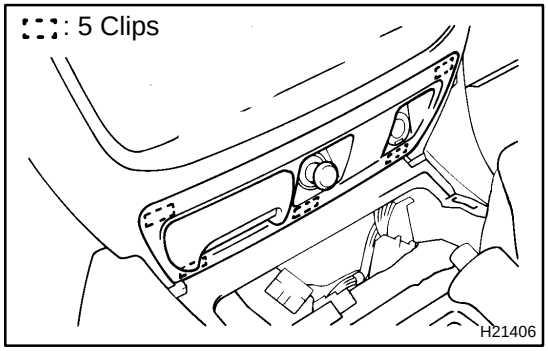
HINT:

The connectors can be connected by tightening the bolts.



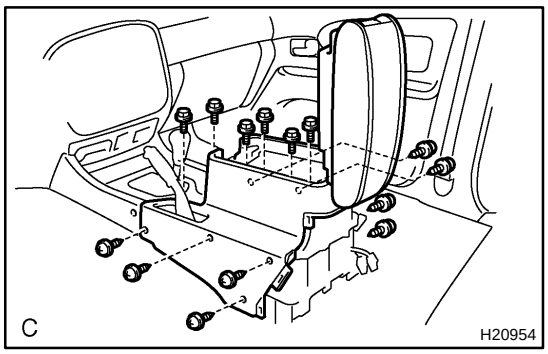
9. INSTALL FRONT CONSOLE BOX AND FRONT CONSOLE BOX BRACKET

Install the front console box and the front console box bracket with the 2 bolts.



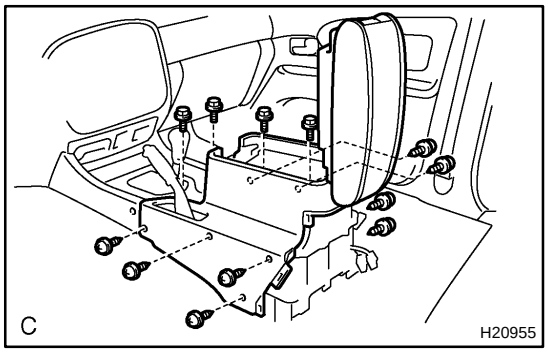
10. INSTALL CENTER LOWER CLUSTER FINISH PANEL

Connect the connector, then install the center lower cluster finish panel.



11. INSTALL REAR CONSOLE BOX

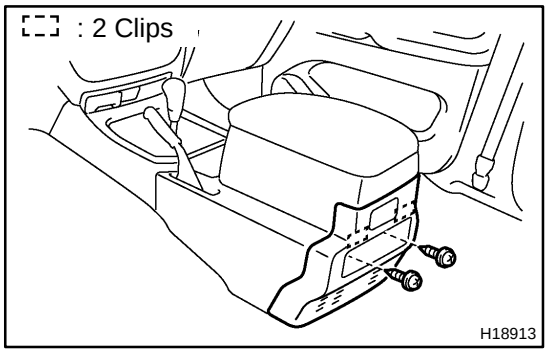
(a) w/o Disc player changer:
Install the rear console box with the 6 bolts and the 8 screws.



(b) w/ Disc player changer:
Install the rear console box with the 4 bolts and the 8 screws.

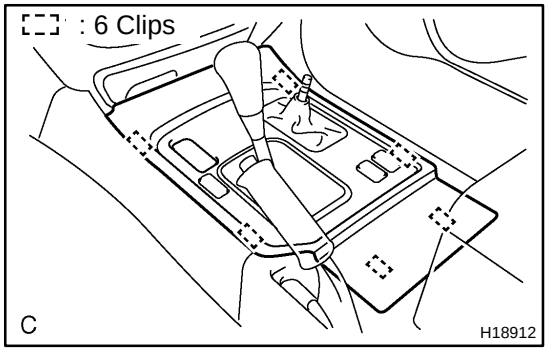
12. INSTALL REAR RADIO CONTROL PANEL

Install the rear radio control panel with the 3 screws, then connect the connector.



13. INSTALL CONSOLE REAR END PANEL

(a) Install the console rear end panel with the 2 screws.
(b) Install the rear console cup holder box.



14. INSTALL FRONT CONSOLE PANEL

Install the front console panel, then install the transfer shift lever knob.

15. INSTALL RADIO WITH A/C CONTROL ASSEMBLY

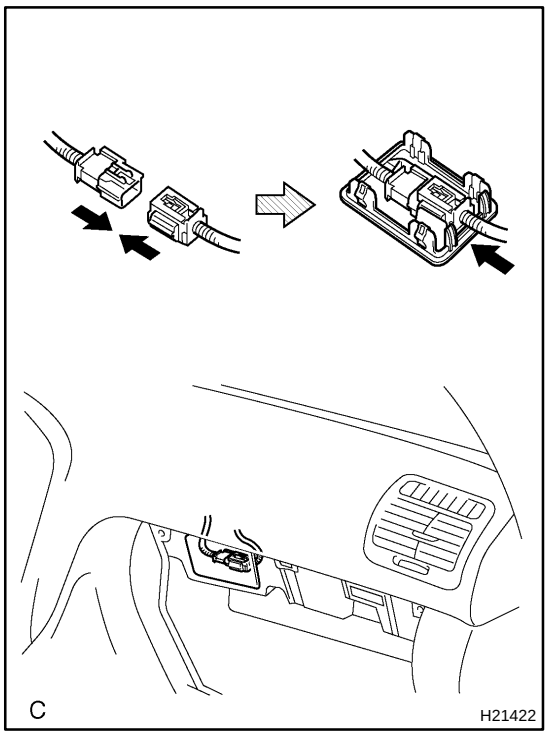
HINT:
w/ Navigation System:
When removing/installing or replacing EMV, or when disconnecting/connecting the battery terminal, turn the IG ON and OFF twice for initial display setting.

16. INSTALL CENTER REGISTERS

Connect the connectors, then install the center registers.

17. INSTALL LOWER NO. 2 PANEL

Install the lower No. 2 panel with the 3 screws.

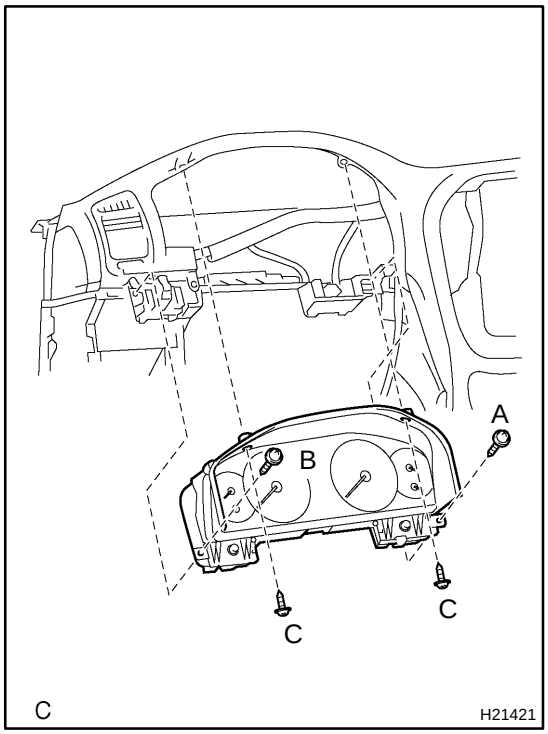


18. CONNECT AIRBAG CONNECTOR (See page RS-41)

19. INSTALL GLOVE COMPARTMENT DOOR

(a) Connect the glove compartment door damper clip, then install the glove compartment door.

(b) Install the 2 screws.

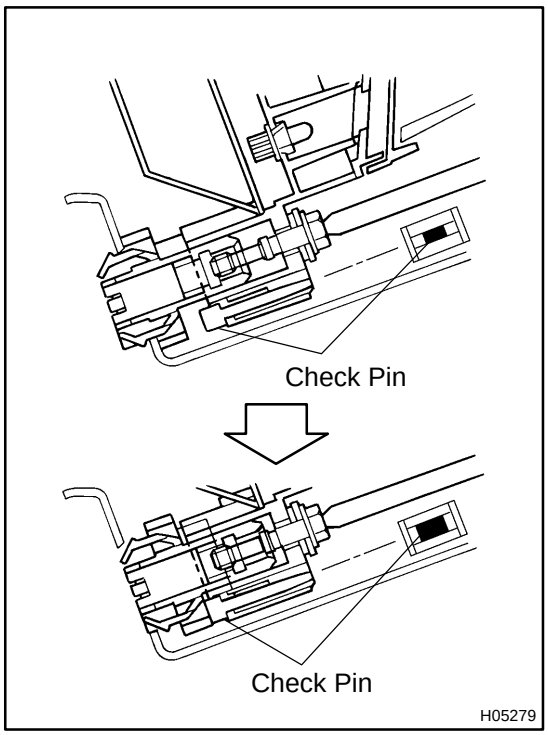


20. INSTALL COMBINATION METER

(a) Check that the set-in connectors are connected securely in the installation holes on the instrument panel.

(b) Place the combination meter on the instrument panel.

(c) Install the combination meter by tightening the screws, ”A”, ”B” and ”C” in order.



(d) Tighten the connection bolts.

HINT:

★ When connection completes, the bolts turns idly, causing turning noise.

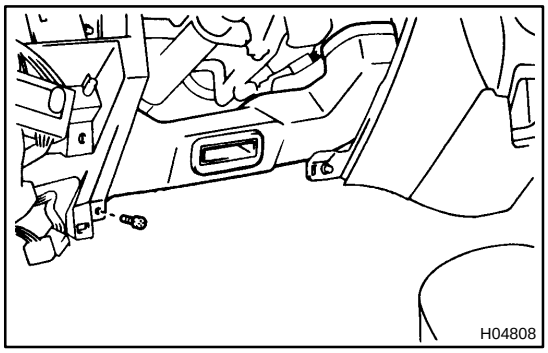
★ Check that the connection check pins protrude from the lower side of the connection bolts.

NOTICE:

Follow the procedures in the order of (c) and (d). Otherwise, set-in connectors on the wire harness side and connectors on the meter side might not be connected properly.

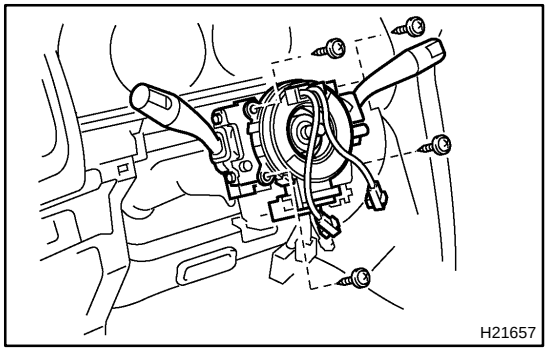
21. INSTALL STEERING COLUMN

(See page SR-24 or SR-37)



22. INSTALL NO. 2 HEATER TO REGISTER DUCT

Install the No. 2 heater to register duct with the screw.



23. INSTALL COMBINATION SWITCH

(a) Install the combination switch with the 4 screws.

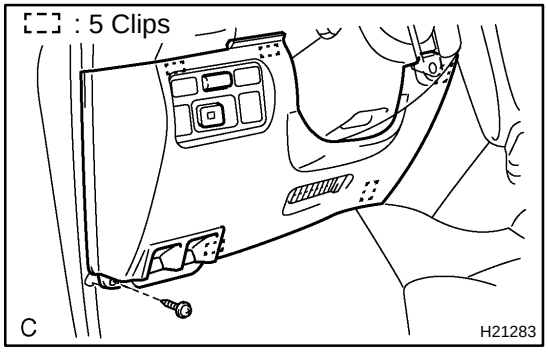
(b) Install the clamp, then connect the connectors.

24. INSTALL COLUMN COVERS

Install the column covers with the 3 screws.

25. INSTALL LH LOWER PANEL

Install the LH lower panel with the 3 bolts.



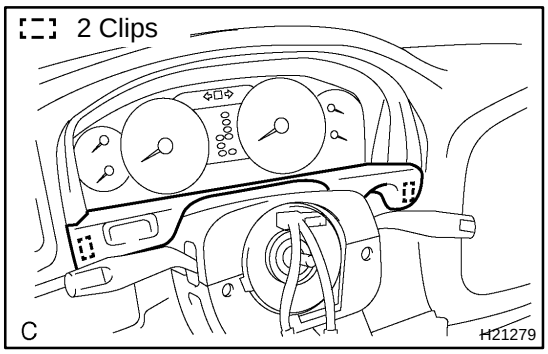
26. INSTALL LOWER NO. 1 PANEL

Connect the connector, then install the lower No. 1 panel with the screw.

27. INSTALL HOOD LOCK CONTROL CABLE LEVER AND FUEL LID CONTROL CABLE LEVER

(a) Install the fuel lid control cable lever with the 2 screws.

(b) Install the hood lock control cable lever with the 2 screws.

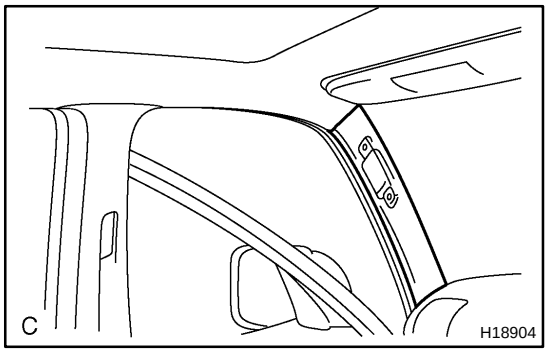


28. INSTALL CLUSTER FINISH PANEL

Connect the connecter, then install the cluster finish panel.

29. INSTALL STEERING WHEEL

(See page SR-24 or SR-37)



30. INSTALL FRONT PILLAR GARNISH

(a) Install the front pillar garnish.

(b) Use the same manner described above to the other side.

31. INSTALL FRONT ASSIST GRIP

(a) Install the assist grip with the 2 screws, then install the 2 assist grip plugs.

(b) Use the same manner described above to the other side.

32. INSTALL FRONT DOOR OPENING TRIMS

33. INSTALL COWL SIDE TRIMS

34. INSTALL FRONT DOOR SCUFF PLATES

BO1KN-01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-89).

BO4IX-01

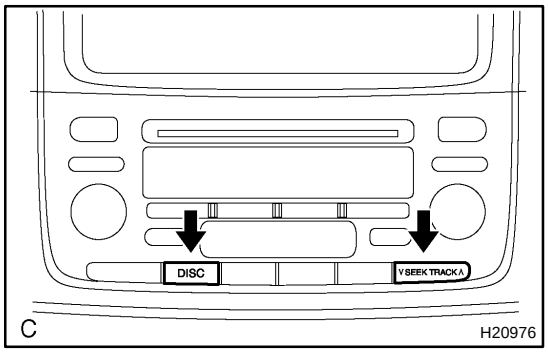
REMOVAL

1. w/ CD Changer Built In The Audio System: SHIP MODE SETTING

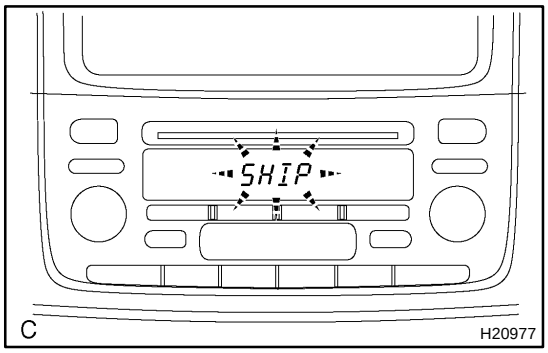
(a) Take out all of the CDs.

NOTICE:

If they cannot be taken out, do not attempt to take out forcibly and send the unit for repair.



(b) Turn the ignition switch to ACC as pressing the "SEEK UP" and "DISC" switches at the same time.



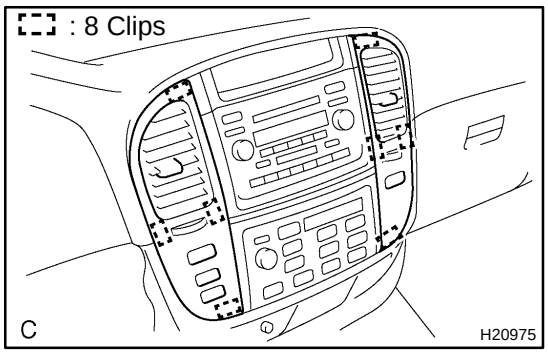
HINT:

When the ship mode has been set, "SHIP" must be displayed.

(c) Turn the ignition switch to OFF and disconnect the battery negative cable.

NOTICE:

Connecting the battery negative cable automatically end the ship mode.



2. REMOVE CENTER REGISTER

(a) Using a moulding remover, remove the center register.

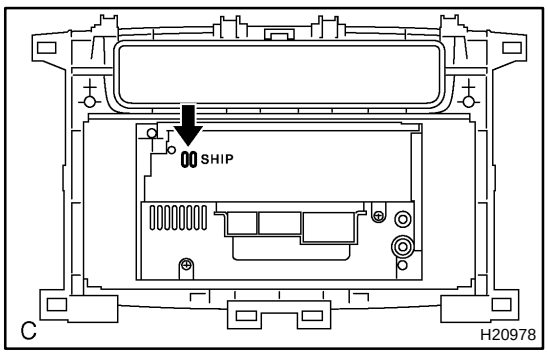
(b) Disconnect the connector.

(c) Use the same manner described above to the other side.

3. REMOVE RADIO WITH A/C CONTROL ASSEMBLY

(a) Remove the 4 bolts.

(b) Disconnect the radio with A/C control assembly cable and remove the radio with A/C control assembly.



4. w/ CD Changer Built In The Audio System: SHIP MODE CONFIRMATION

Check that a metal can be seen from holes marked "SHIP" on the back of the radio with A/C control assembly.

NOTICE:

If a metal cannot be seen from a hole on the back of the radio with A/C control assembly, repeat "SHIP MODE".

5. REMOVE FRONT DOOR SCUFF PLATES

6. REMOVE COWL SIDE TRIMS

7. REMOVE FRONT DOOR OPENING TRIMS

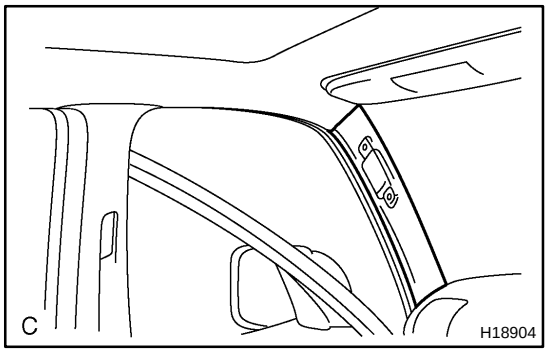
8. REMOVE FRONT ASSIST GRIP

(a) Using a screwdriver, remove the assist grip plugs, then remove the 2 screws and assist grip.

HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.



9. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the front pillar garnish.

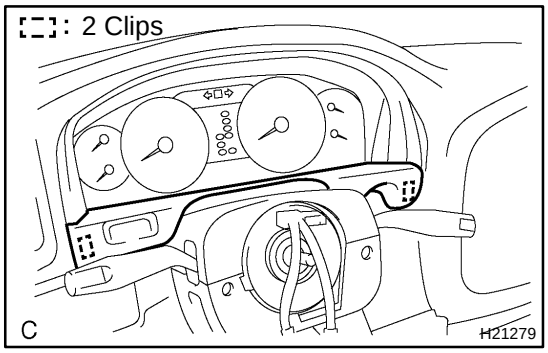
HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.

10. REMOVE STEERING WHEEL

(See page SR-14 or SR-29)



11. REMOVE CLUSTER FINISH PANEL

Using a screwdriver, remove the cluster finish panel, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

12. REMOVE HOOD LOCK CONTROL CABLE LEVER AND FUEL LID CONTROL CABLE LEVER

(a) Remove the 2 screws and the hood lock control cable lever.

(b) Remove the 2 screws and the fuel lid control cable lever.

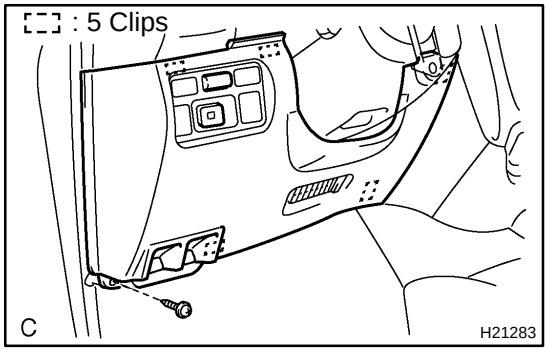
13. REMOVE LOWER NO. 1 PANEL

(a) Remove the screw.

(b) Using a screwdriver, remove the lower No. 1 panel, then disconnect the connectors.

HINT:

Tape up the screwdriver tip before use.



14. REMOVE LH LOWER PANEL

Remove the 3 bolts and the LH lower panel.

15. REMOVE COLUMN COVERS

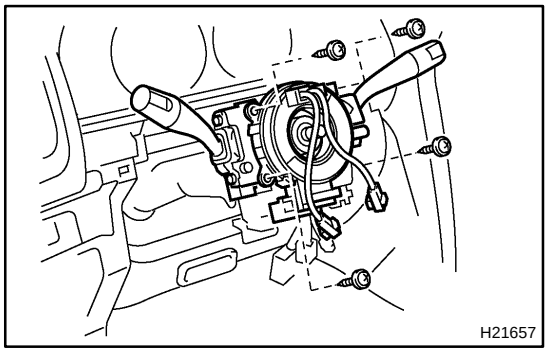
Remove the 3 screws and the column covers.

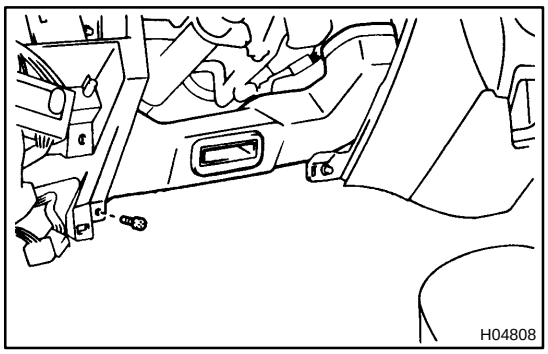
16. REMOVE COMBINATION SWITCH

(a) Disconnect the connectors.

(b) Remove the clamp.

(c) Remove the 4 screws and the combination switch.



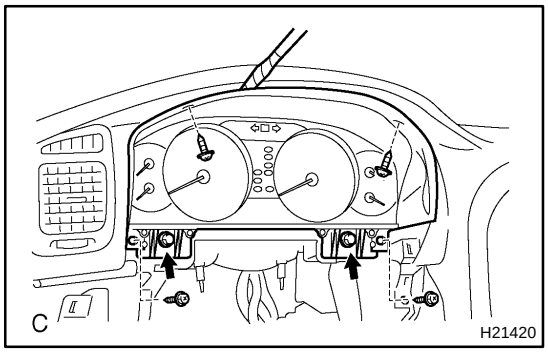


17. REMOVE NO. 2 HEATER TO REGISTER DUCT

Remove the screw and the No. 2 heater to register duct as shown in the illustration.

18. REMOVE STEERING COLUMN

(See page SR-14 or SR-29)



19. REMOVE COMBINATION METER

(a) Disconnect the connectors.

HINT:

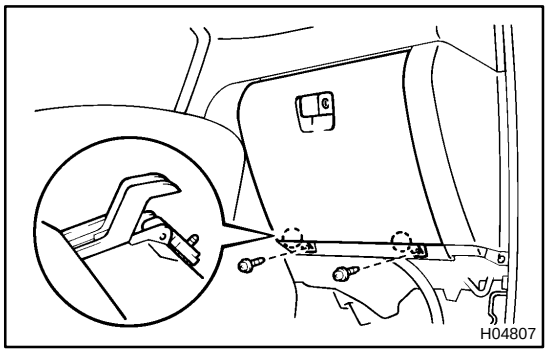
The connectors can be disconnected by loosening the bolts.

(b) Remove the 4 screws.

(c) Using a screwdriver, remove the combination meter.

HINT:

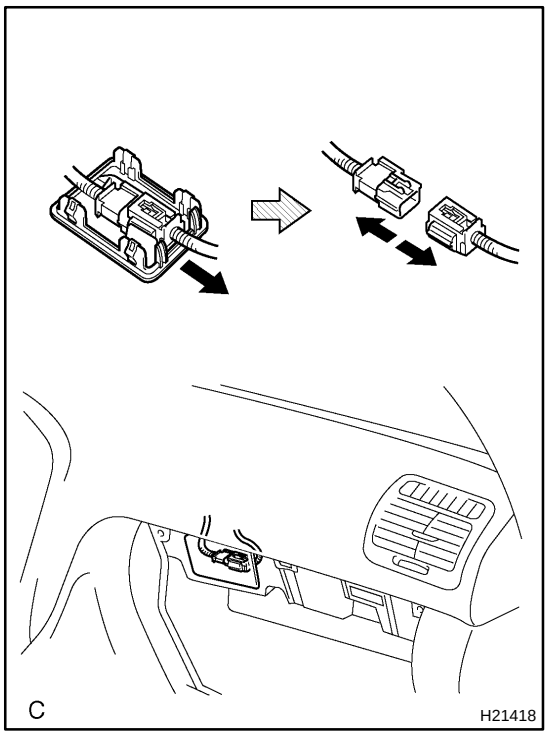
Tape up the screwdriver tip before use.



20. REMOVE GLOVE COMPARTMENT DOOR

(a) Remove the 2 screws.

(b) Remove the glove compartment door, then disconnect the glove compartment door damper clip.



21. DISCONNECT AIRBAG CONNECTOR

(See page RS-31)

(a) Using a screwdriver, remove the No. 1 under cover.

HINT:

Tape up the screwdriver tip before use.

(b) Slide the airbag connector to pull out from the No. 1 under cover.

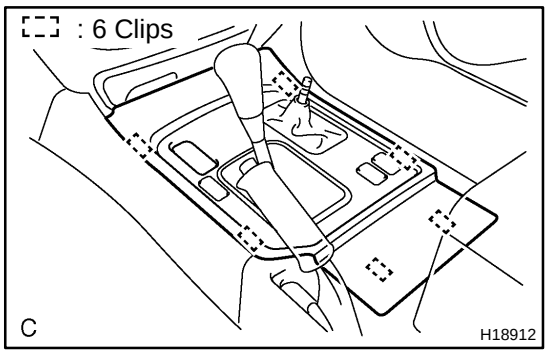
(c) Disconnect the airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

22. REMOVE LOWER NO. 2 PANEL

Remove the 3 screws and the lower No. 2 panel.



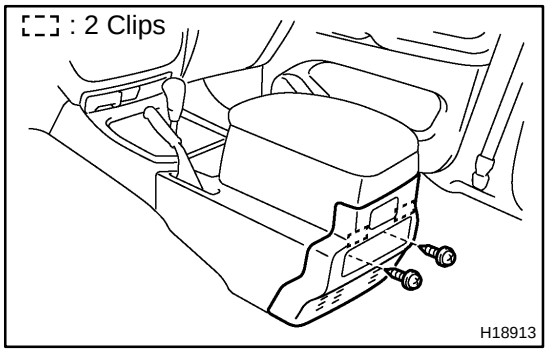
23. REMOVE FRONT CONSOLE PANEL

(a) Remove the transfer shift lever knob.

(b) Using a screwdriver, remove the front console panel.

HINT:

Tape up the screwdriver tip before use.



24. REMOVE CONSOLE REAR END PANEL

(a) Remove the rear console cup holder box.

(b) Remove the 2 screws.

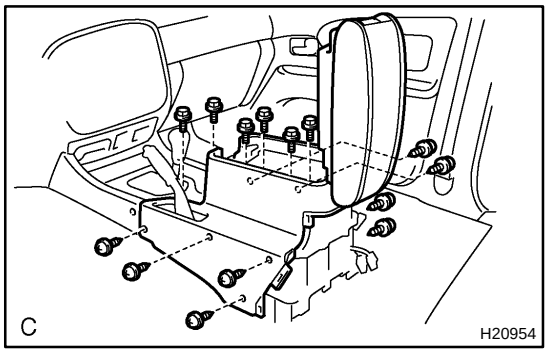
(c) Using a screwdriver, remove the console rear end panel.

HINT:

Tape up the screwdriver tip before use.

25. REMOVE REAR RADIO CONTROL PANEL

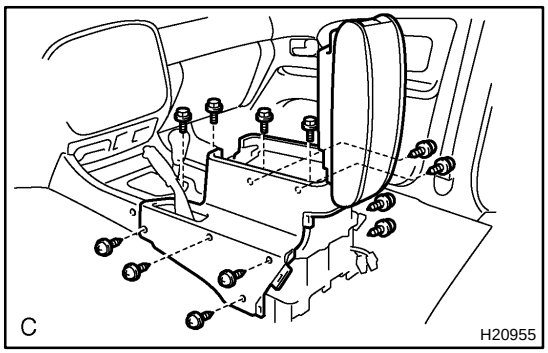
Disconnect the connector, then remove the 3 screws and the rear radio control panel.



26. REMOVE REAR CONSOLE BOX

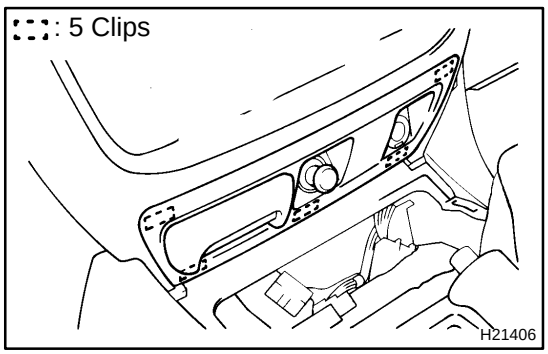
(a) w/o Disc player changer :

Remove the 6 bolts, the 8 screws and the rear console box.



(b) w/ Disc player changer :

Remove the 4 bolts, the 8 screws and the rear console box.

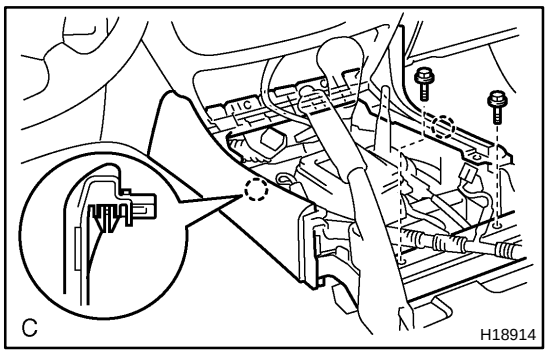


27. REMOVE CENTER LOWER CLUSTER FINISH PANEL

Using a screwdriver, remove the center lower cluster finish panel, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.



28. REMOVE FRONT CONSOLE BOX AND FRONT CONSOLE BOX BRACKET

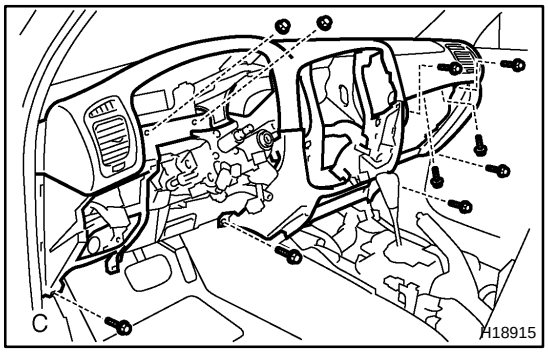
Remove the 2 bolts, the front console box and the front console box bracket.

29. REMOVE INSTRUMENT PANEL

(a) Disconnect the junction connectors.

HINT:

The connectors can be disconnected by loosening the bolts.



(b) Disconnect the connector, then remove the 8 bolts, the 2 nuts and the instrument panel.

30. REMOVE ECM (See page SF-60)

31. REMOVE NO. 3 HEATER TO REGISTER DUCT

32. REMOVE NO. 4 HEATER TO REGISTER DUCT

33. REMOVE GLOVE COMPARTMENT DOOR DAMPER

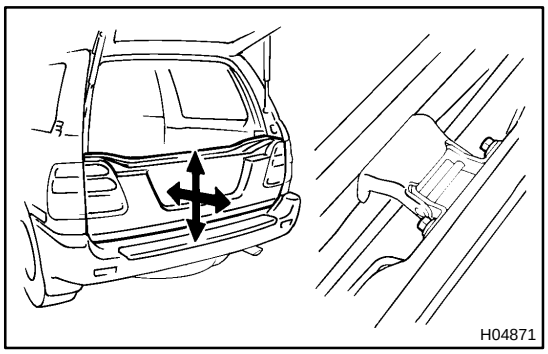
34. REMOVE FLOOR BRACE

35. REMOVE NO. 1 BRACE

36. REMOVE REINFORCEMENT

BO1JO-03

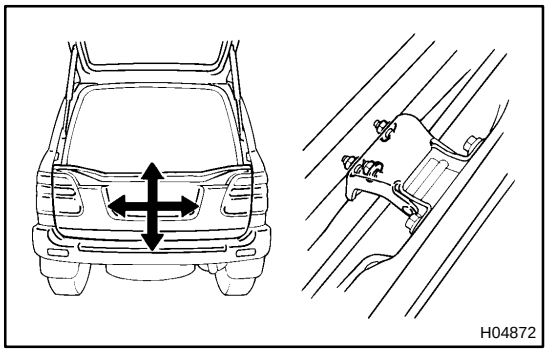
ADJUSTMENT



1. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

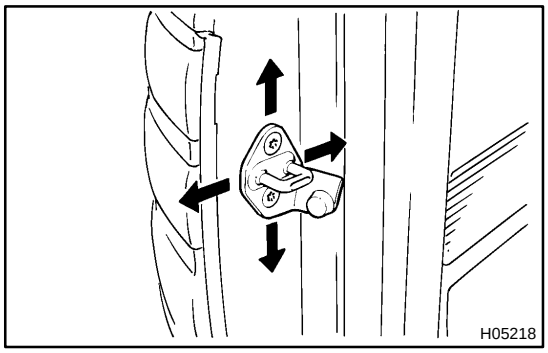
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)



2. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the body side hinge bolts and nut to adjust.

Torque: 31 N·m (316 kgf·cm, 23 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door linkages are adjusted correctly.

(b) Using a torx wrench, loosen the door lock striker mounting screws.

Torx wrench: T40 (Part No. 09042-00020 or locally manufactured tool)

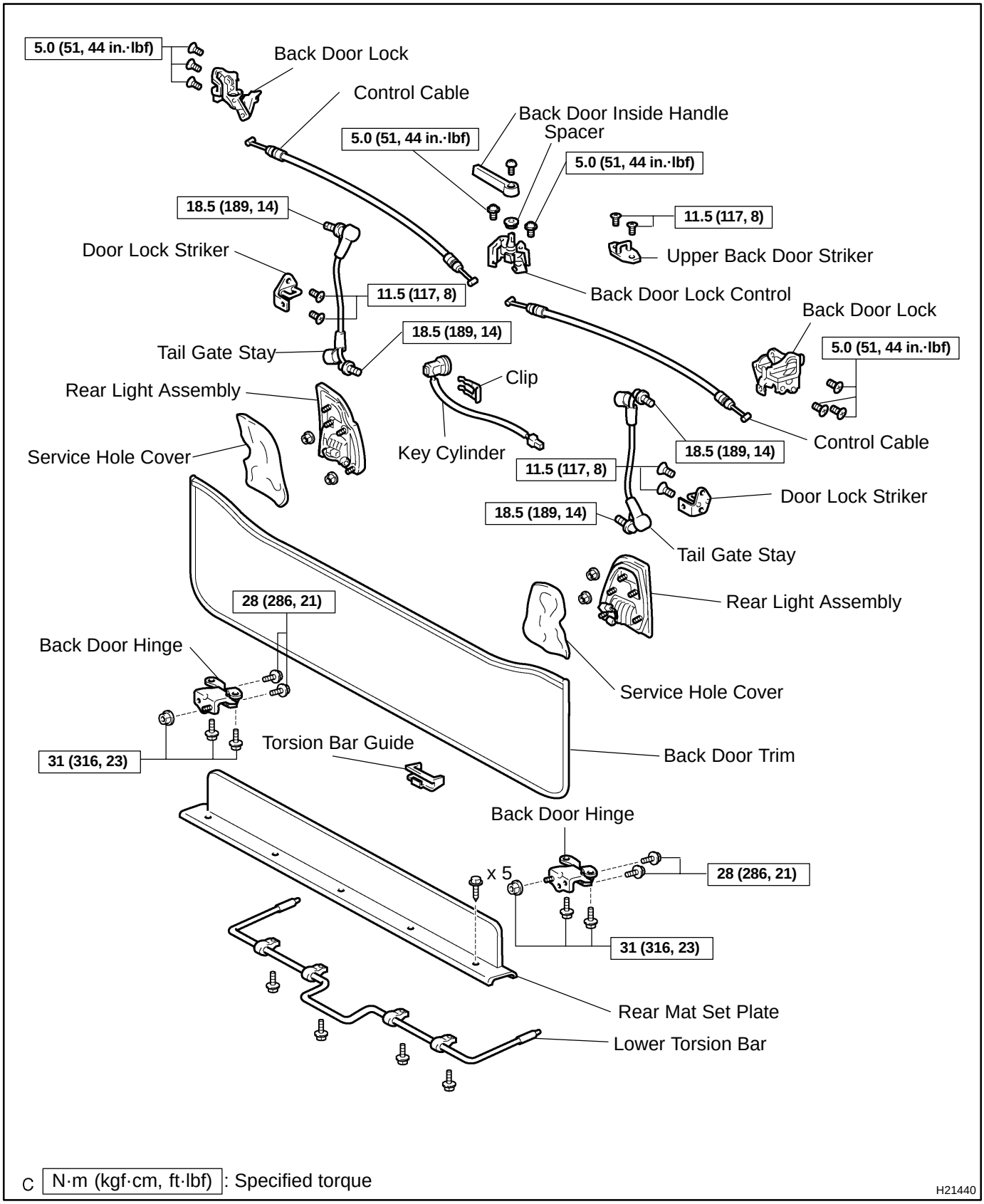
Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the striker to adjust it.

LOWER BACK DOOR

COMPONENTS

BO1JM-03

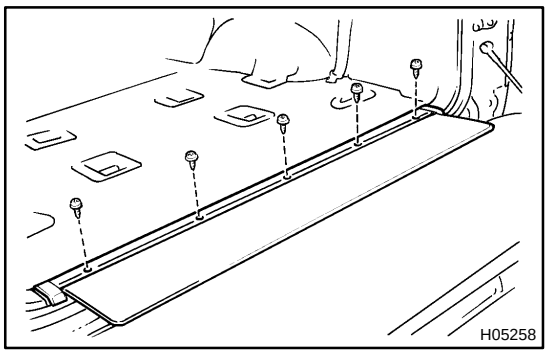


C N·m (kgf·cm, ft·lbf) : Specified torque

H21440

BO217-02

DISASSEMBLY



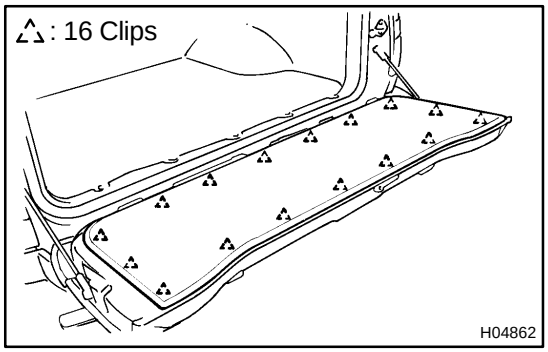
1. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape the screwdriver tip before use.



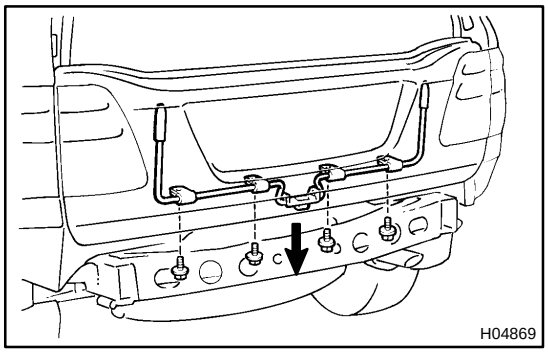
2. REMOVE BACK DOOR TRIM

(a) Insert a screwdriver between the door and door trim to pry out.

HINT:

Tape the screwdriver tip before use.

(b) Remove the back door trim.

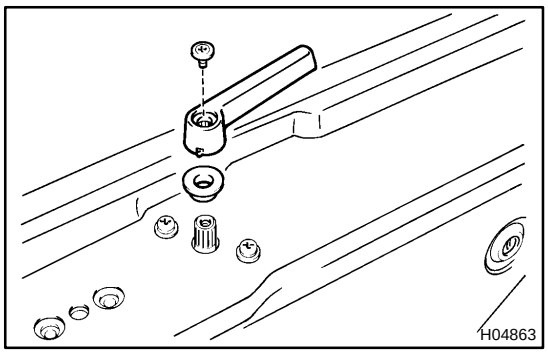


3. REMOVE LOWER TORSION BAR

(a) Remove the rear bumper (See page BO-5).

(b) Remove the 4 bolts and lower torsion bar as shown in the illustration.

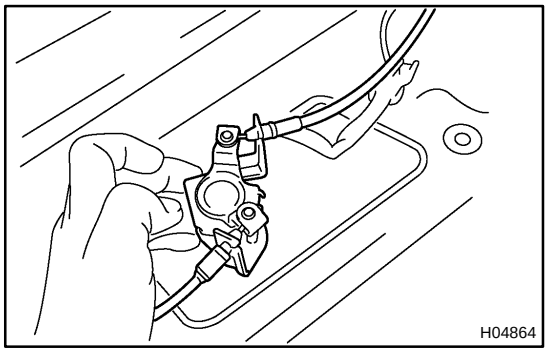
(c) Remove the torsion bar guide.



4. REMOVE BACK DOOR INSIDE HANDLE

(a) Remove the screw and back door inside handle.

(b) Remove the spacer.



5. REMOVE BACK DOOR LOCK CONTROL

(a) Remove the 2 screws.

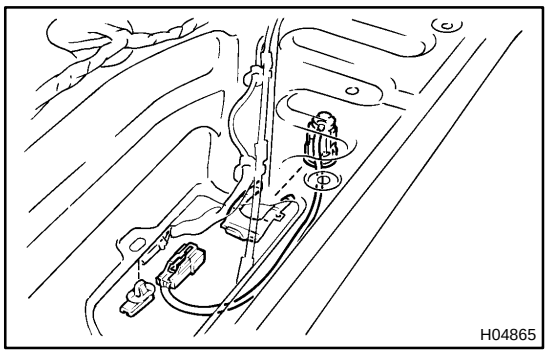
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(b) Disconnect the back door lock control cables, then remove the back door control.

6. REMOVE SERVICE HOLE COVERS

NOTICE:

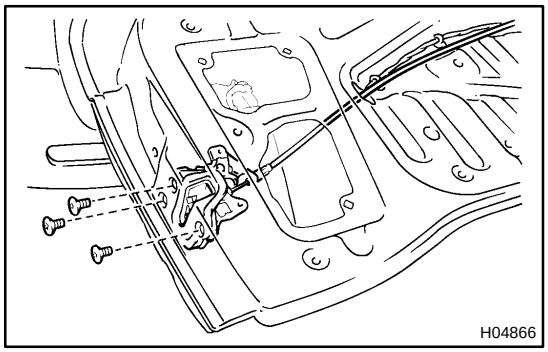
Do not tear the service hole cover.



7. REMOVE KEY CYLINDER

(a) Disconnect the connector.

(b) Remove the clip and key cylinder.



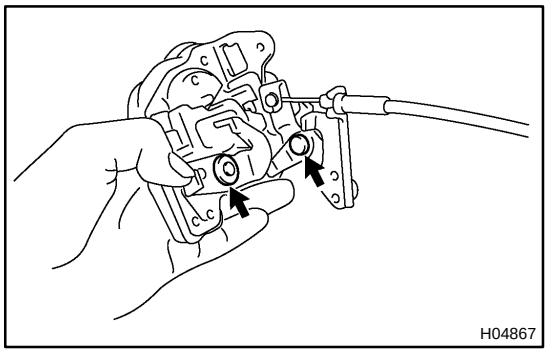
8. REMOVE BACK DOOR LOCK

(a) Disconnect the control cable from the clamp.

(b) Using a torx wrench, remove the 3 screws and back door lock.

Torx wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

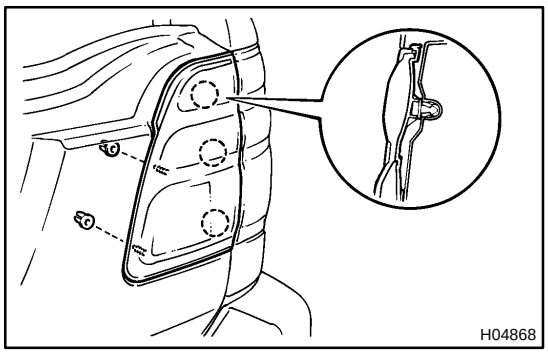


HINT:

At the time of reassembly, please refer to the following item.

Apply MP grease to the rotating parts of the door lock.

(c) Employ the same manner described above to the other side.



9. REMOVE REAR LIGHT ASSEMBLY

(a) Disconnect the connector.

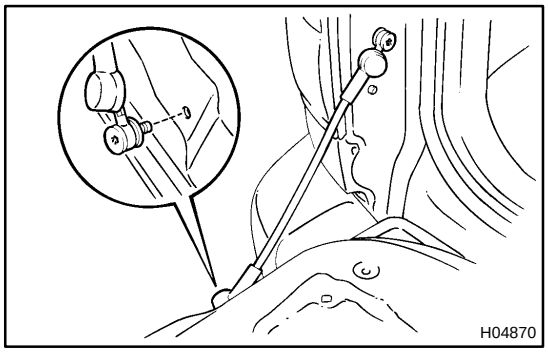
(b) Remove the 2 nuts.

(c) Using a screwdriver, remove the rear light assembly.

HINT:

Tape the screwdriver tip before use.

(d) Employ the same manner described above to the other side.



10. REMOVE TAIL GATE STAY

(a) Using a torx wrench, remove the 2 screws and tail gate stay.

Torx wretch: T30 (Part No. 09042-00010 or locally manufactured tool)

Torque: 18.5 N·m (189 kgf·cm, 14 ft·lbf)

(b) Employ the same manner described above to the other side.

BO1JP-01

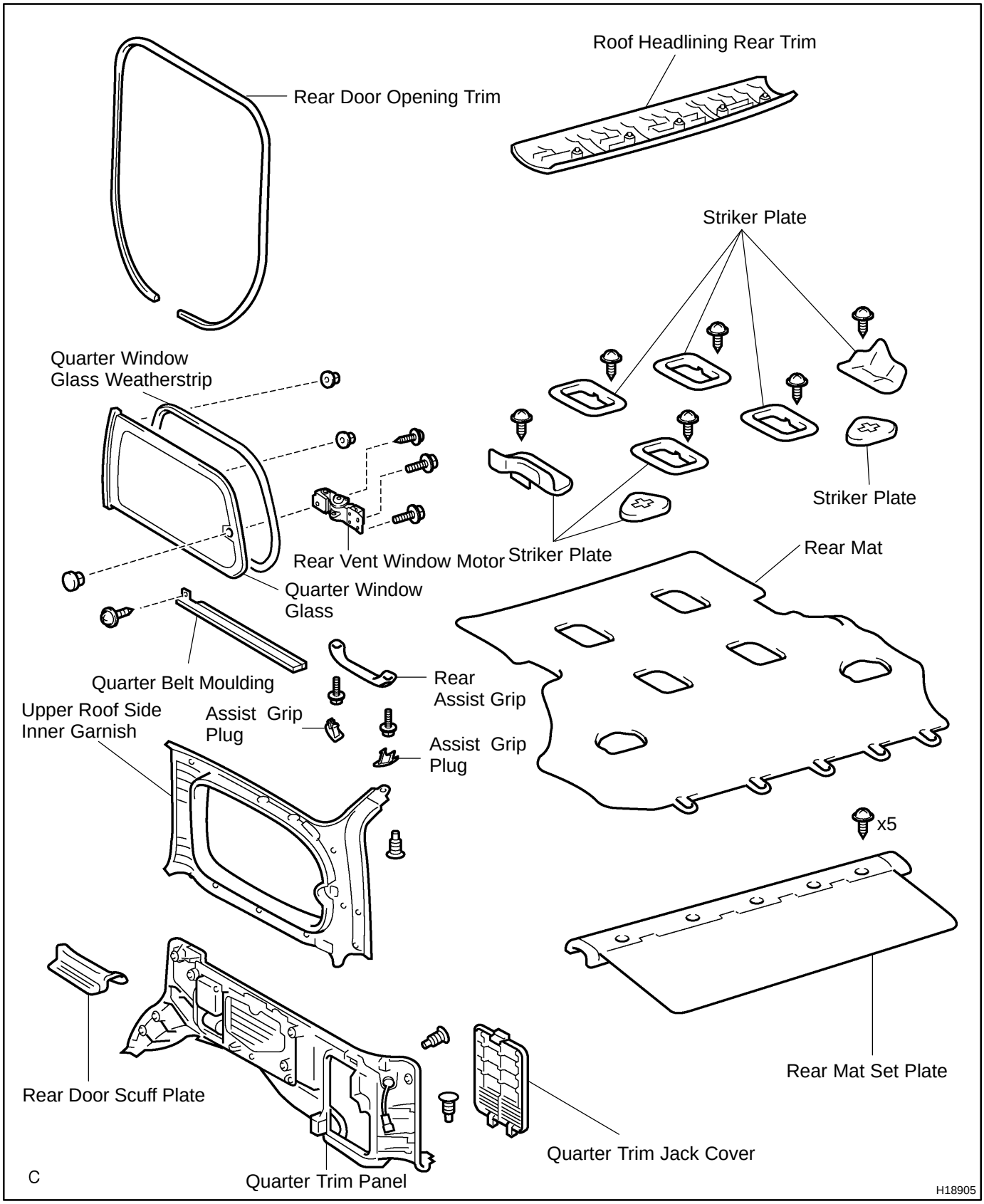
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-27).

QUARTER WINDOW GLASS

COMPONENTS

BO1LD-03

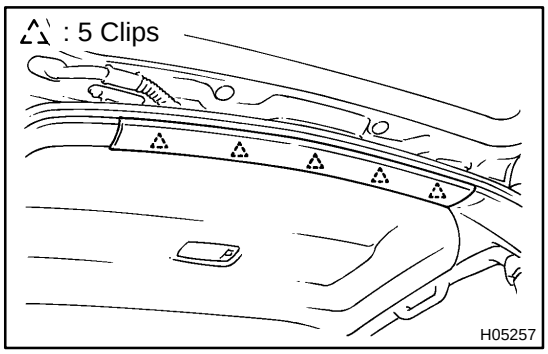


BO1LF-02

INSTALLATION

Installation is in the reverse order of removal (See page BO-62).

BO4IW-01



REMOVAL

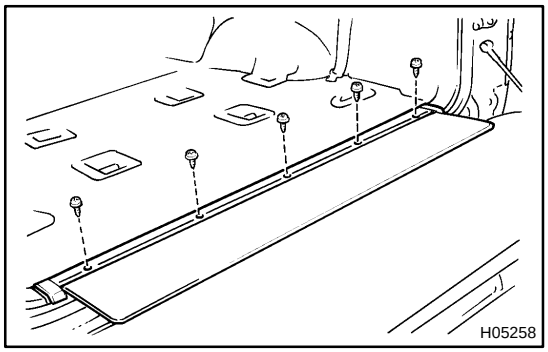
1. REMOVE ROOF HEADLINING REAR TRIM

Using a screwdriver, remove the roof headlining rear trim.

HINT:

Tape up the screwdriver tip before use.

2. REMOVE REAR NO. 2 SEATS



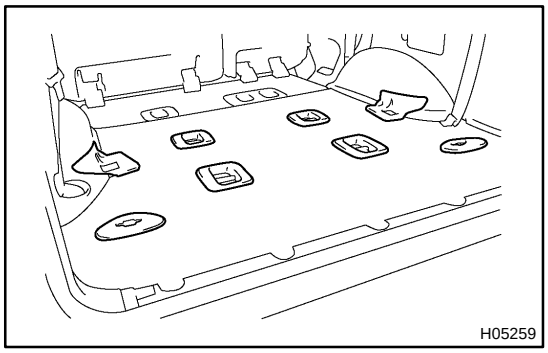
3. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape up the screwdriver tip before use.



4. REMOVE STRIKER PLATE

(a) Remove the 6 screws.

(b) Using a screwdriver, remove the striker plates.

HINT:

Tape up the screwdriver tip before use.

5. REMOVE REAR MAT

6. REMOVE REAR NO. 2 SEAT OUTER BELT FLOOR ANCHOR

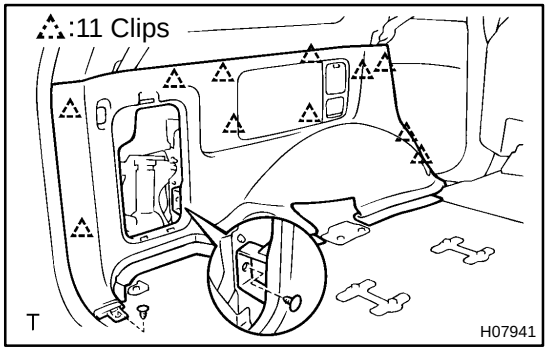
Torque:42 N·m (430 kgf·cm, 31 ft·lbf)

7. REMOVE REAR NO. 1 SEAT OUTER BELT FLOOR ANCHOR

Torque:42 N·m (430 kgf·cm, 31 ft·lbf)

8. REMOVE REAR DOOR SCUFF PLATE

9. REMOVE REAR DOOR OPENING TRIM



10. REMOVE QUARTER TRIM PANEL

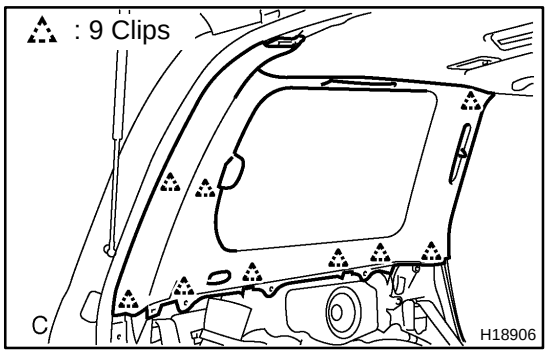
(a) Remove the quarter trim jack cover.

(b) Using a clip remover, remove the 2 clips.

(c) Remove the quarter trim panel, then disconnect the connector.

11. REMOVE REAR NO. 2 SEAT OUTER BELT SHOULDER ANCHOR

12. REMOVE REAR NO. 1 SEAT OUTER BELT SHOULDER ANCHOR



13. REMOVE UPPER ROOF SIDE INNER GARNISH

(a) Using a screwdriver, remove the assist grip plugs, then remove the 2 screws and the rear assist grip.

HINT:

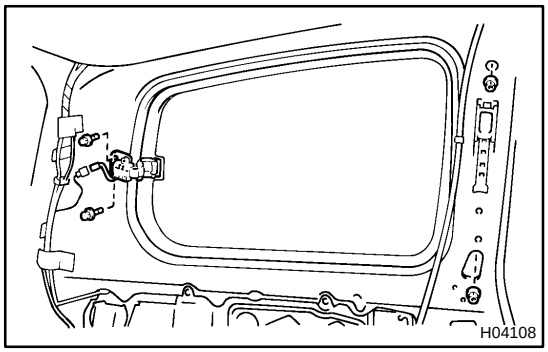
Tape up the screwdriver tip before use.

(b) Using a clip remover, remove the clip.

(c) Using a screwdriver, remove the upper roof side inner garnish.

HINT:

Tape the screwdriver tip before use.



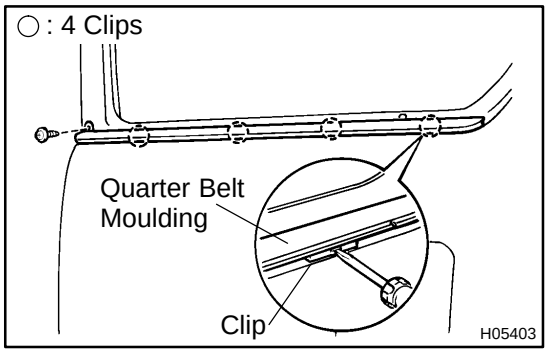
14. REMOVE QUARTER WINDOW GLASS

(a) Disconnect the connector.

(b) w/ Antenna:
Disconnect the connector.

(c) Remove the 2 bolts, the 2 nuts and the quarter window glass.

15. REMOVE QUARTER WINDOW GLASS WEATHERSTRIP



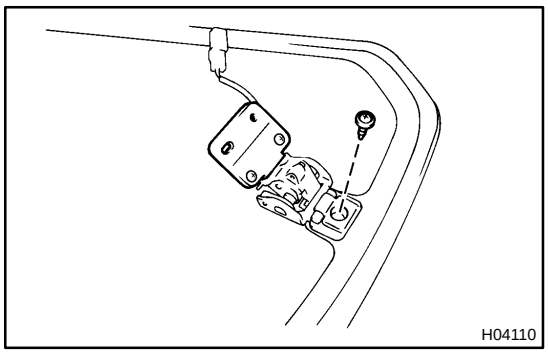
16. REMOVE QUARTER BELT MOULDING

(a) Remove the screw.

(b) Using a screwdriver, remove the quarter belt moulding.

HINT:

Tape up the screwdriver tip before use.



17. REMOVE REAR VENT WINDOW MOTOR

Remove the screw and the rear vent window motor.

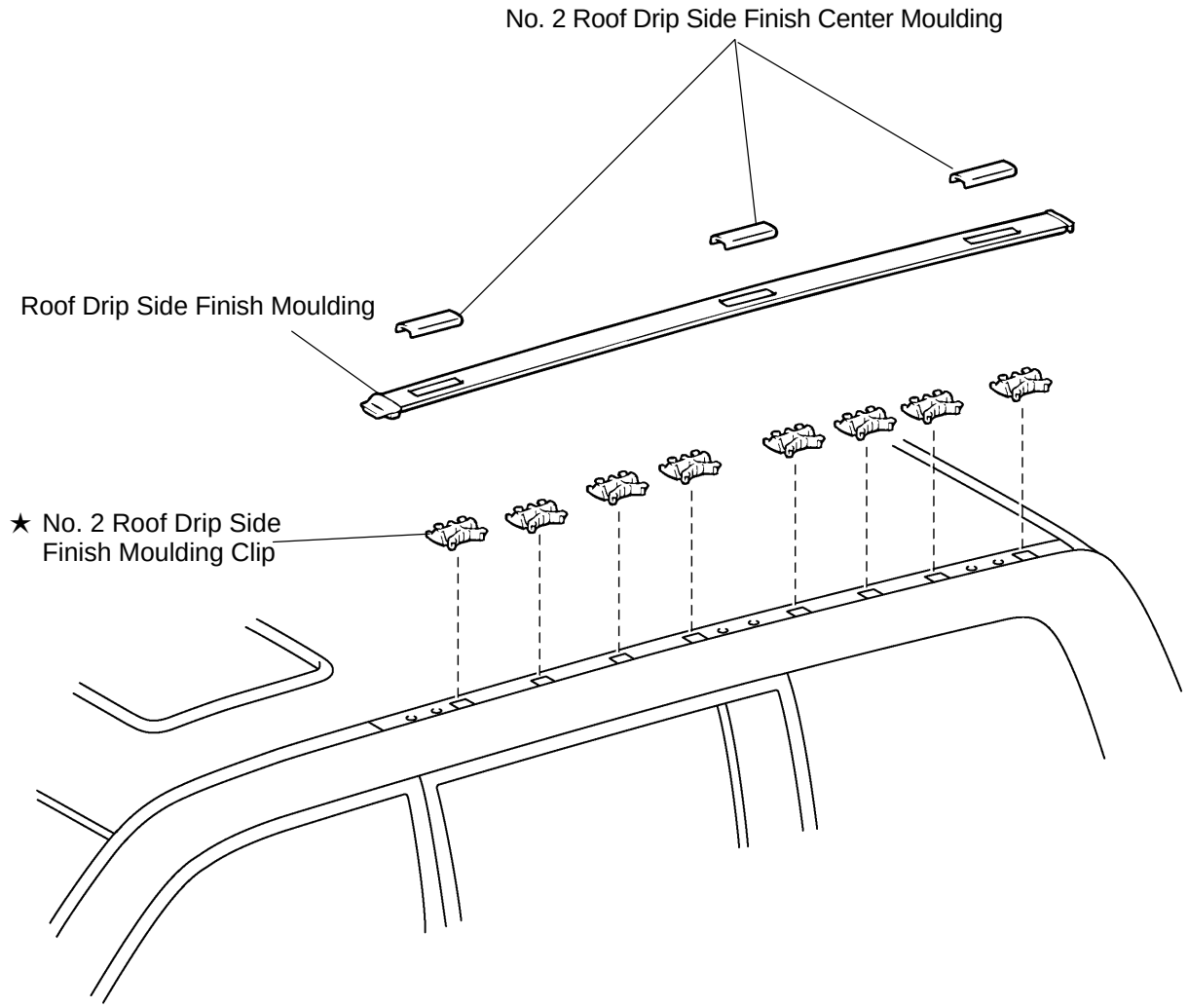
18. REMOVE QUARTER WINDOW LOCK

Remove the screw and the quarter window lock.

ROOF DRIP SIDE FINISH MOULDING

BO1K4-05

COMPONENTS



★ Non-reusable part

H05401

BO1K6-05

INSTALLATION

1. INSTALL NO. 2 ROOF DRIP SIDE FINISH MOULDING CLIP

If the No. 2 roof drip side finish moulding clip comes off.

(a) Using a heat light, heat the body mounting surface to 40 - 60 ˚C (104 - 140 ˚F).

NOTICE:

Do not heat the body excessively.

(b) Remove the adhesive tape and adhesive from the body.

(c) Wipe off stains with cleaner.

(d) Using a heat light, heat the body and clip.

Body: 40 - 60 ˚C (104 - 140 ˚F)

Clip: 20 - 30 ˚C (68 - 86 ˚F)

NOTICE:

Do not heat the body and clip excessively.

(e) Install the clip.

2. INSTALL NO. 2 ROOF DRIP SIDE FINISH CENTER MOULDING

Install the No. 2 roof drip side finish center moulding to the roof drip side finish moulding.

3. INSTALL ROOF DRIP SIDE FINISH MOULDING

BO1K5-03

REMOVAL

1. REMOVE NO. 2 ROOF DRIP SIDE FINISH CENTER MOULDINGS

2. REMOVE ROOF DRIP SIDE FINISH MOULDING

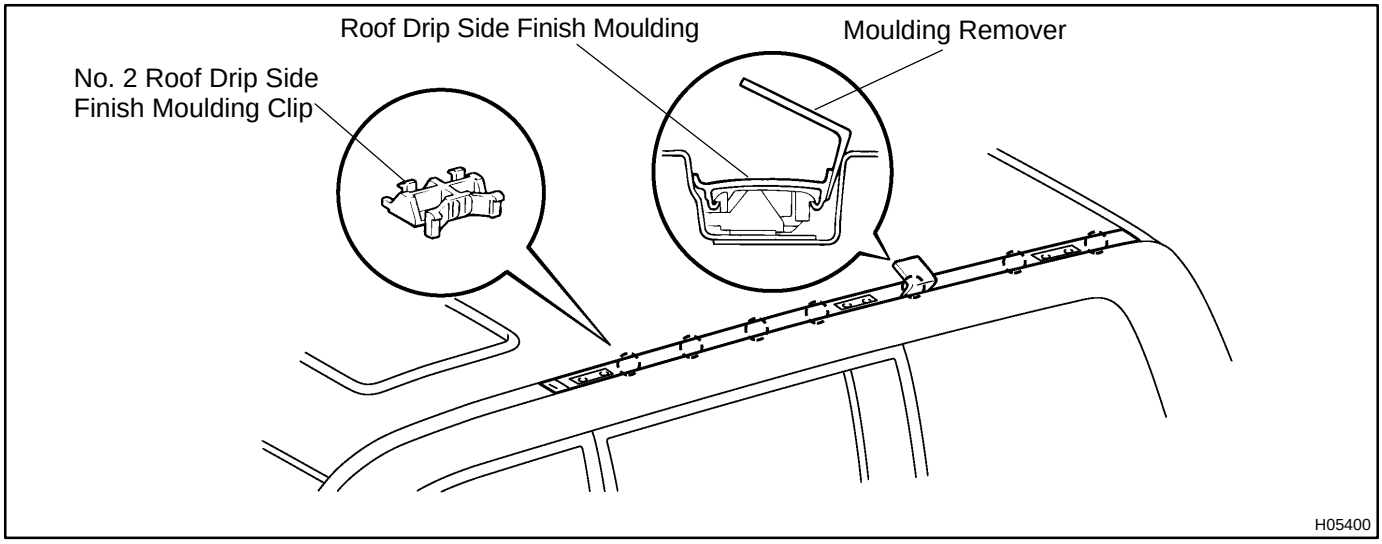
Using a moulding remover, remove the roof drip side finish moulding.

NOTICE:

- ★ **Do not damage the body.**
- ★ **Do not remove the No. 2 roof drip side finish moulding clip.**
- ★ **When the clip comes off, replace it with a new one.**

HINT:

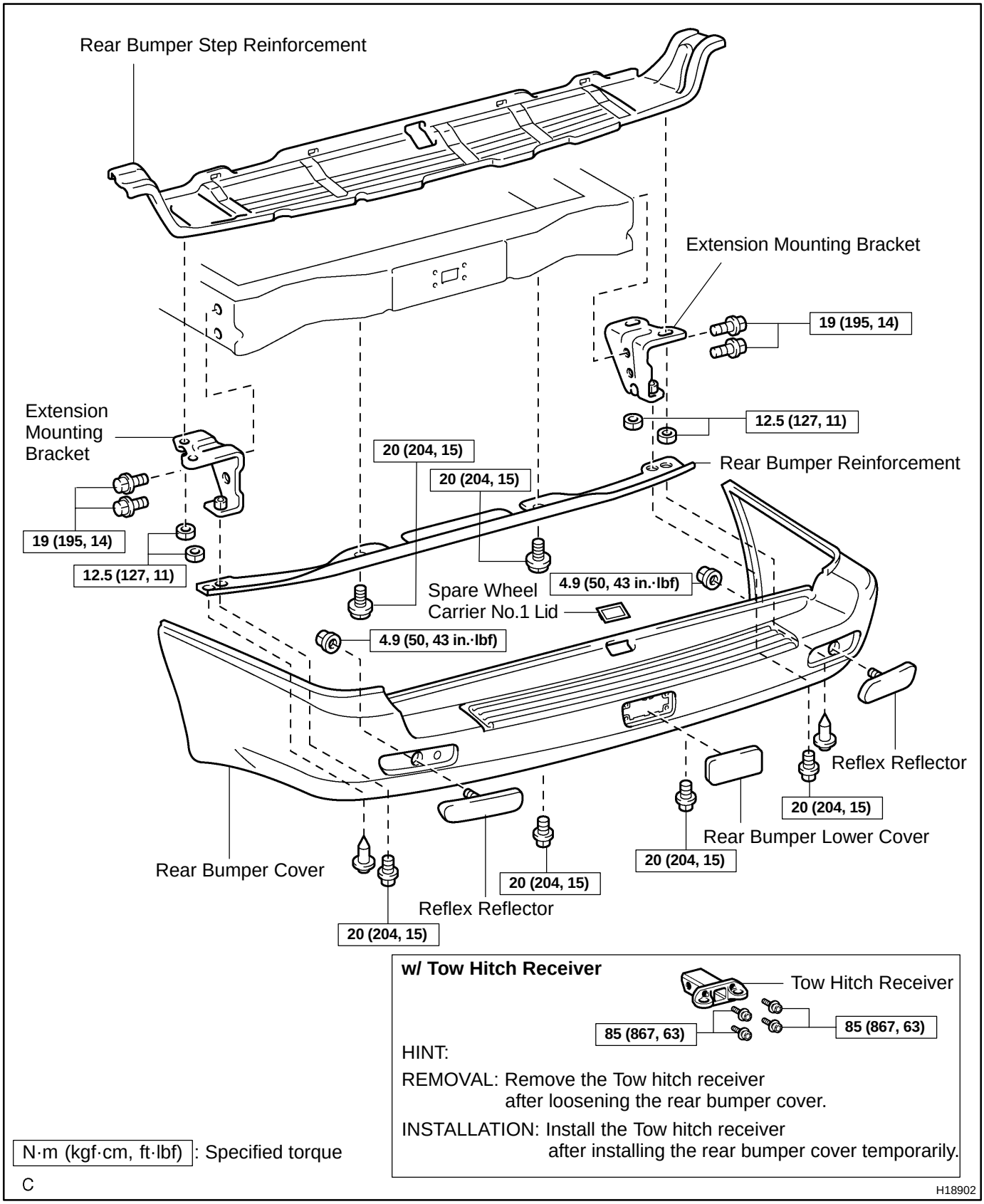
Tape the moulding remover tip before use.



REAR BUMPER

COMPONENTS

BO1J7-03

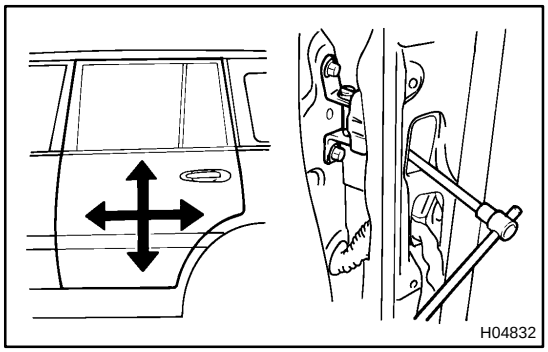


BO1JG-03

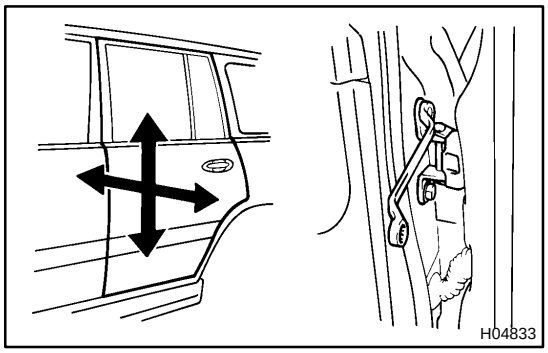
ADJUSTMENT

1. ADJUST DOOR IN FORWARD/BACKWARD AND VERTICAL DIRECTIONS

(a) Remove the front door scuff plate.
(b) Remove the rear door scuff plate.
(c) Remove the front door opening trim.
(d) Remove the rear door opening trim.
(e) Remove the center pillar lower garnish.

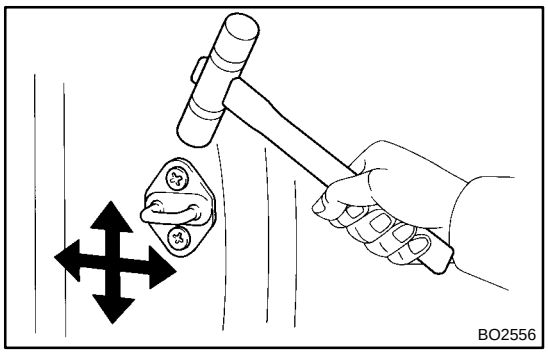


(f) Loosen the body side hinge nuts to adjust.
Torque: 23 N·m (235 kgf·cm, 17 ft·lbf)
(g) Install the removed parts.



2. ADJUST DOOR IN RIGHT/LEFT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.
Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



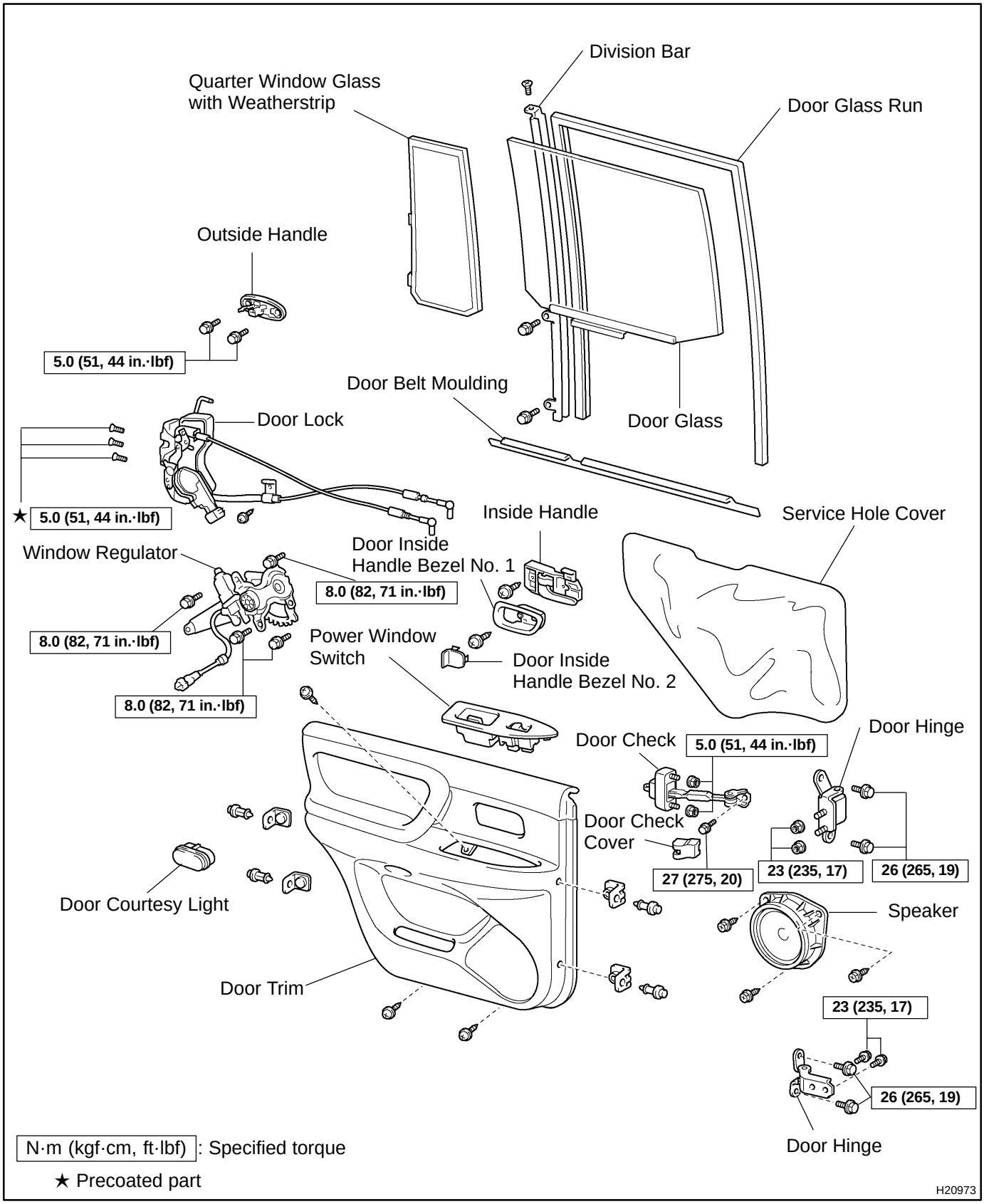
3. ADJUST DOOR LOCK STRIKER

(a) Check that the door fit and door lock linkages are adjusted correctly.
(b) Loosen the striker mounting screws to adjust.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)
(c) Using a plastic hammer, tap the striker to adjust it.

REAR DOOR

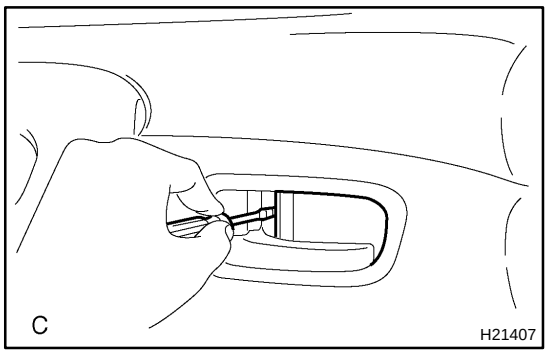
COMPONENTS

BO1JE-03



BO1JF-03

DISASSEMBLY

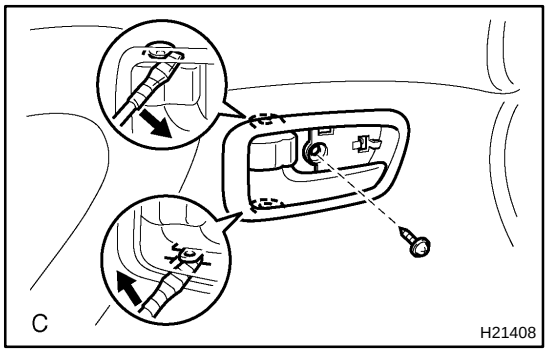


1. REMOVE DOOR INSIDE HANDLE BEZEL No. 2

Using a screwdriver, remove the door inside handle bezel No. 2 as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.



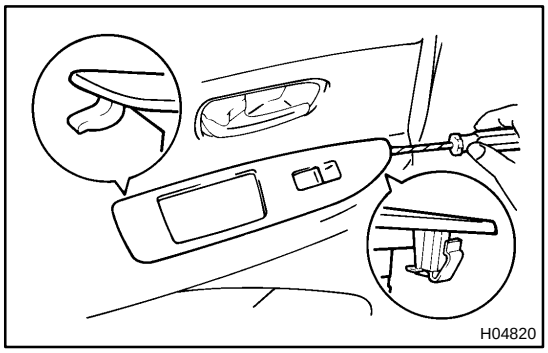
2. REMOVE DOOR INSIDE HANDLE BEZEL No. 1

(a) Remove the screw.

(b) Using a screwdriver, remove the door inside handle bezel No. 1 as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.



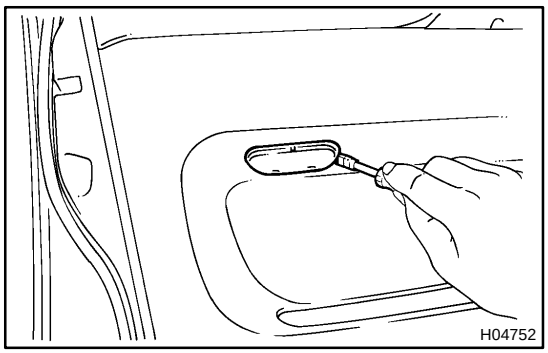
3. REMOVE POWER WINDOW SWITCH

(a) Using a screwdriver, remove the power window switch as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

(b) Disconnect the connector.

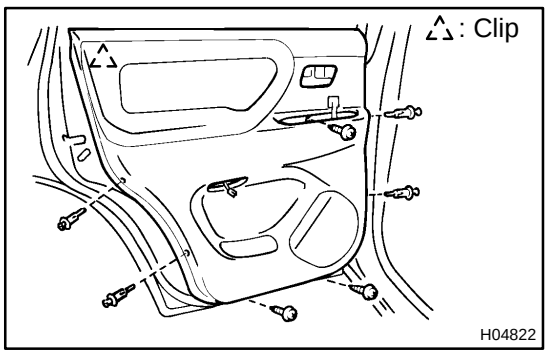


4. REMOVE DOOR COURTESY LIGHT

Using a screwdriver, remove the door courtesy light, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.



5. REMOVE DOOR TRIM

(a) Remove the 3 screws and 4 clips.

(b) Insert a screwdriver between the door and door trim to pry the trim.

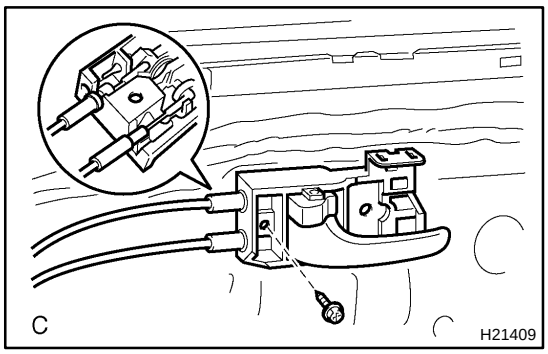
NOTICE:

Be careful not to damage the door and door trim.

HINT:

Tape up the screwdriver tip before use.

(c) Pull the trim upward to remove it.



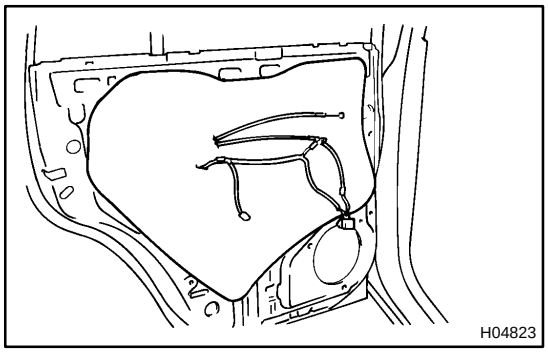
6. REMOVE INSIDE HANDLE

(a) Remove the screw and the inside handle.

(b) Disconnect the 2 control cables from the inside handle as shown in the illustration.

7. REMOVE SPEAKER

Remove the 3 screws and speaker, then disconnect the connector.



8. REMOVE SERVICE HOLE COVER

(a) Remove the clamps and wire harness.

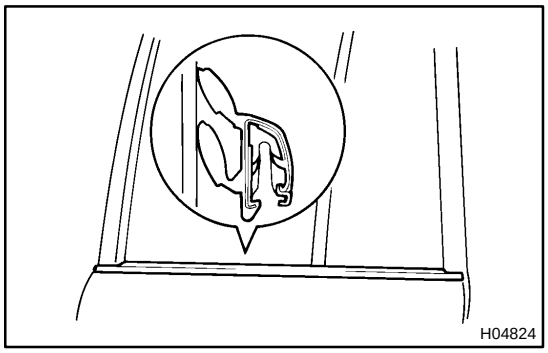
(b) Remove the service hole cover.

NOTICE:

Do do not tear the cover.

HINT:

At the time of reassembly, bring out the 2 control cables and wire harness through the service hole cover.



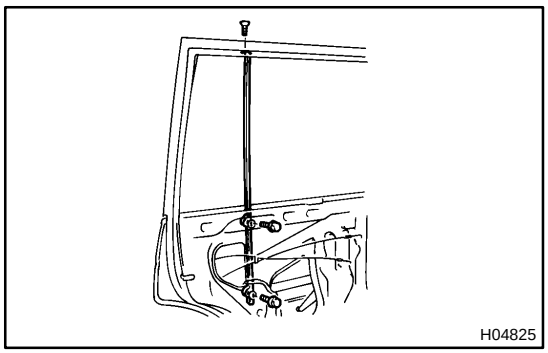
9. REMOVE DOOR BELT MOULDING

Using a scraper, remove the door belt moulding.

HINT:

Tape up the scraper tip before use.

10. REMOVE DOOR GLASS RUN



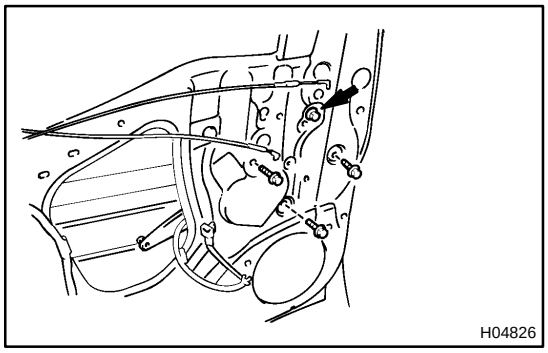
11. REMOVE DIVISION BAR

Remove the 2 bolts, screw and division bar.

12. REMOVE DOOR GLASS

Disconnect the glass from the regulator arm and remove the door glass by pulling it upward.

13. REMOVE QUARTER WINDOW GLASS WITH WEATHERSTRIP



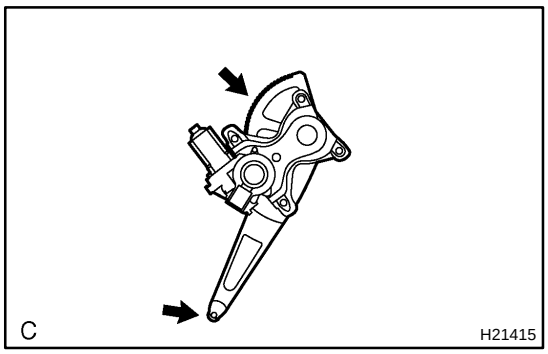
14. REMOVE WINDOW REGULATOR

(a) Disconnect the connector, then remove the 3 bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(b) Loosen the bolt and window regulator.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HINT:

★ Remove the regulator through the service hole.

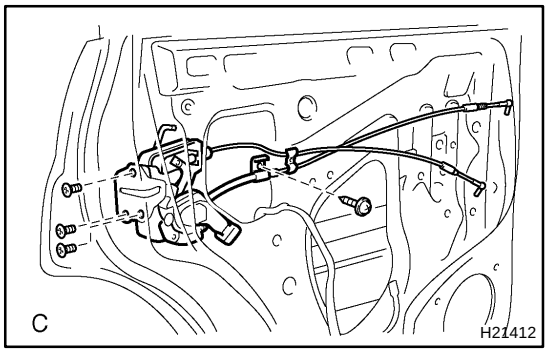


★ At the time of reassembly, apply MP grease to the window regulator.

NOTICE:

At the time of reassembly, please refer to the following item.

Do not apply grease to the spring of the window regulator.



15. REMOVE DOOR LOCK

(a) Remove the screw.

(b) Disconnect the connector.

(c) Disconnect the link from outside handle.

(d) Using a torx wrench, remove the 3 screws and door lock through the service hole.

Torx wrench: T30 (Part No. 09042-00010 or locally manufactured tool)

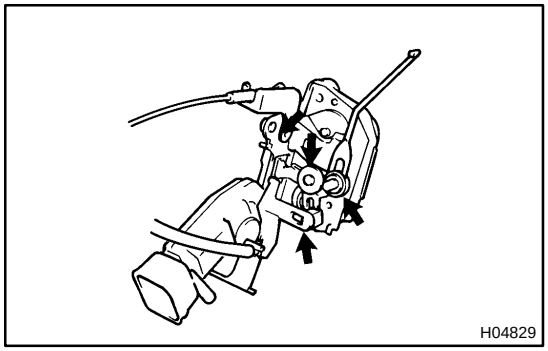
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:

At the time of reassembly:

★ Apply adhesive to the 3 screws.

Part No. 08833-00070, THREE BOND 1324 or equivalent.



★ Remove the protector, and apply MP grease to the sliding and rotating parts of the door lock.

16. REMOVE OUTSIDE HANDLE

Remove the 2 bolts and outside handle.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

BO1JH-01

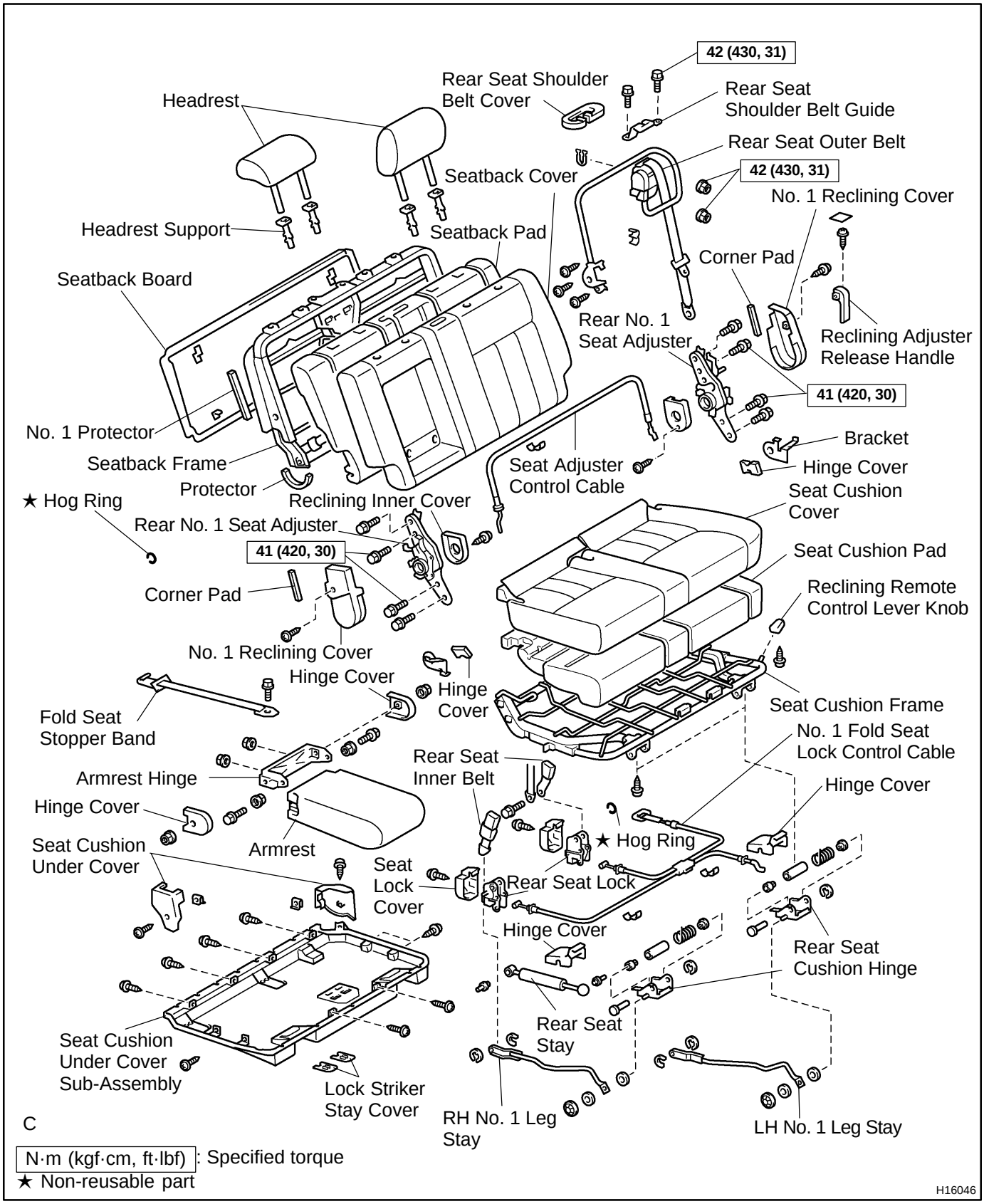
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-15).

REAR NO.1 SEAT (LH)

COMPONENTS

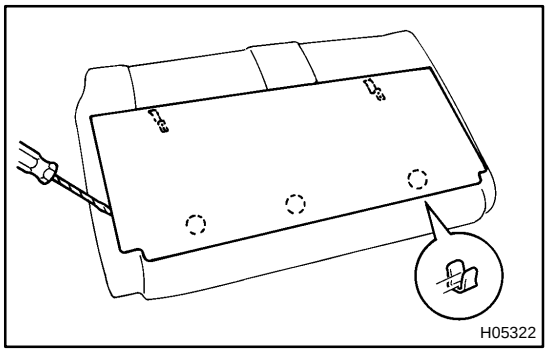
BO1L0-05



BO1L2-06

DISASSEMBLY

1. REMOVE HEADRESTS



2. REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver, remove the cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw and reclining adjuster release handle.

4. REMOVE NO. 1 RECLINING COVERS

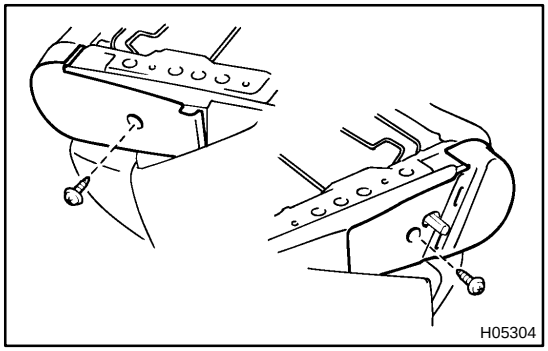
(a) Remove the 4 hog rings and open the seatback cover.

HINT:

At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

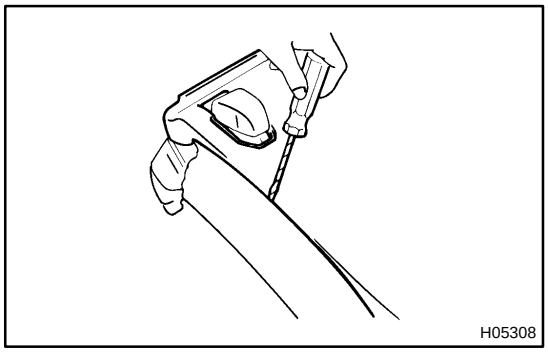
(b) Remove the 2 corner pads.



(c) Remove the 2 screws and 2 No. 1 reclining covers as shown in the illustration.

5. REMOVE SEAT CUSHION UNDER COVERS

Remove the 2 screws and 2 seat cushion under covers.

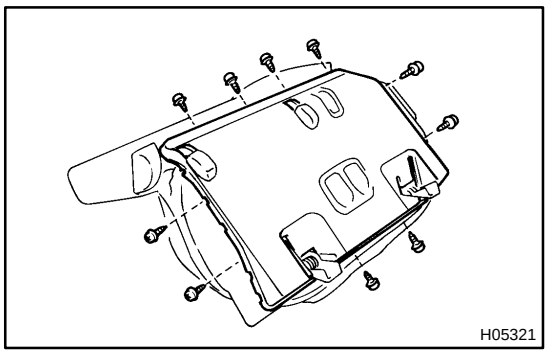


6. REMOVE SEAT CUSHION UNDER COVER SUB-ASSEMBLY

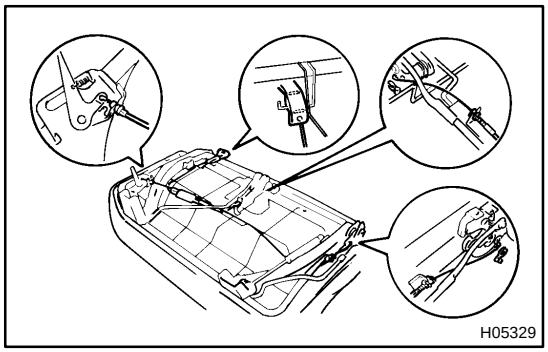
(a) Using a screwdriver, disengage the hooks as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

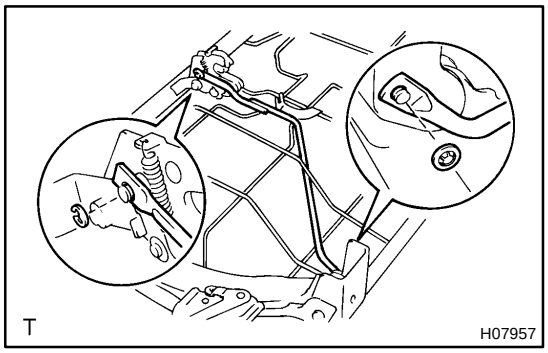


(b) Remove 10 screws and seat cushion under cover sub-assembly.



7. REMOVE NO. 1 FOLD SEAT LOCK CONTROL CABLE

Remove the 2 clamps and No. 1 fold seat lock control cable as shown in the illustration.

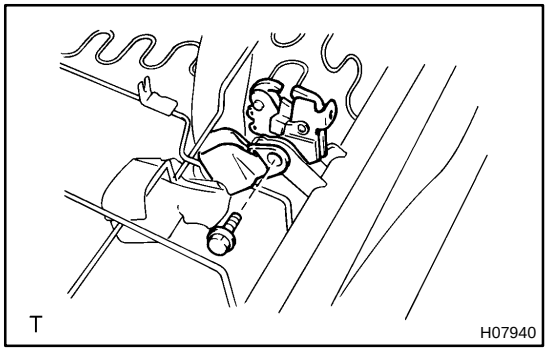


8. REMOVE RH NO. 1 SEAT LEG STAY

Using a screwdriver, remove the 2 E-rings and No. 1 seat leg stay.

HINT:

Tape the screwdriver tip before use.

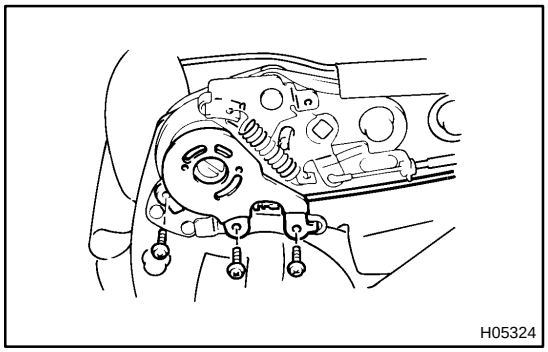


9. REMOVE RH REAR SEAT LOCK

(a) Remove the screw and rear seat lock cover.

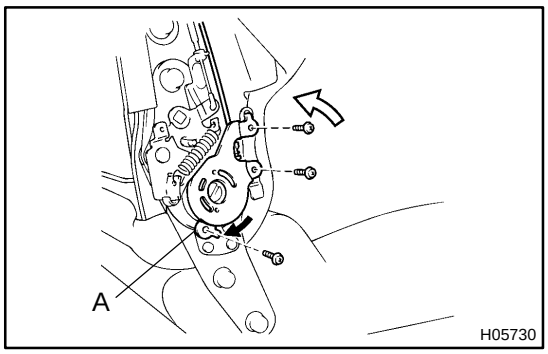
(b) Remove the bolt, seat belt anchor and inner belt.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

(c) Remove the RH rear seat lock.



10. REMOVE SEATBACK ASSEMBLY

(a) Remove the 3 screws and seat belt reclining detecting part.
Torque: 3.9 N·m (40 kgf·cm, 35 in.·lbf)



HINT:

At the time of reassembly, please refer to the following items.

★ Tighten the 2 screws on the seatback side.

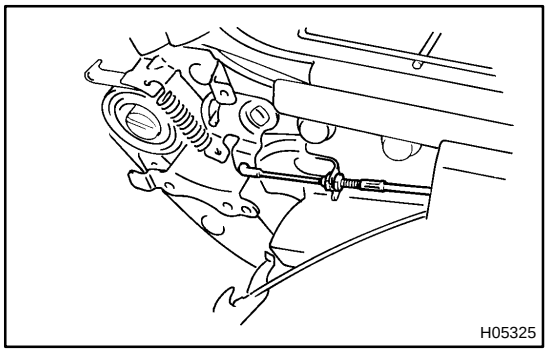
★ Fold down the seatback forward and raise it up to the first lock position.

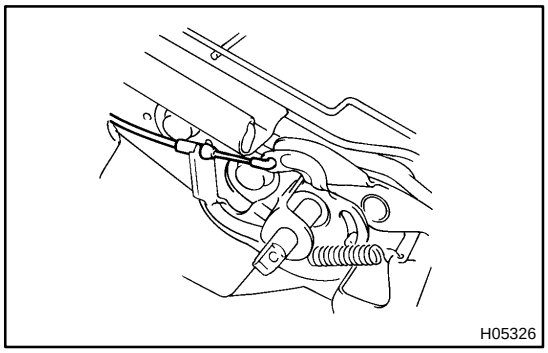
★ Turn A to the rear side of the seat cushion for initial positioning.

★ Check visually that the reference holes are penetrated.

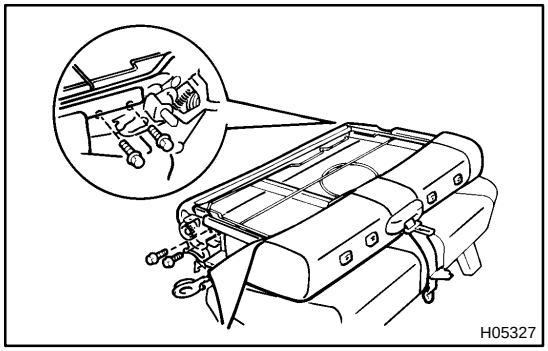
★ Tighten the screws on the cushion side of seat belt reclining detecting part.

(b) Loosen the nut, remove the reclining connecting wire of LH side edge.





(c) Remove the reclining connecting wire of RH side edge.



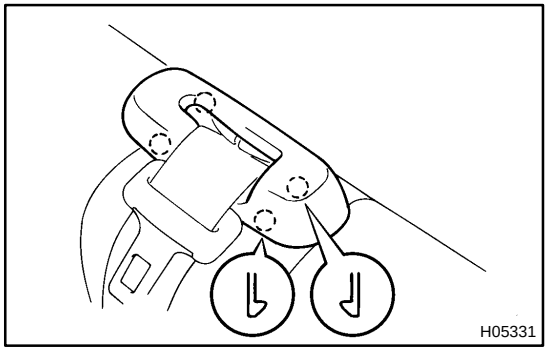
(d) Remove the 4 bolts and seatback assembly.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

11. w/ Armrest:
REMOVE ARMREST

(a) Remove the 2 nuts and armrest.

(b) Remove the 2 screws and 2 hinge covers.

(c) Remove the 2 bolts and hinges.



12. REMOVE SEATBACK FRAME

(a) Using a screwdriver, remove the rear seat shoulder belt cover.

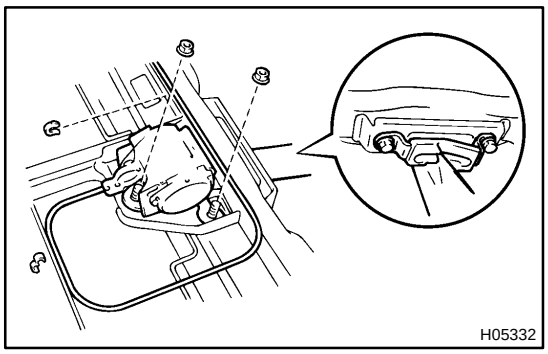
HINT:

Tape the screwdriver tip before use.

(b) Remove the 4 headrest supports.

(c) Disengage the hooks, remove the seatback frame.

13. REMOVE SEAT ADJUSTER CONTROL CABLE



14. REMOVE REAR SEAT OUTER BELT

(a) Remove the 2 bolts and rear seat shoulder belt guide.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

HINT:

At the time of reassembly, please refer to the following item.
Install the shoulder belt guide to the seatback frame with a slit the guide facing to the rear side of the vehicle.

(b) Remove the 2 nuts and rear seat outer belt.
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

15. REMOVE NO. 1 PROTECTOR

16. REMOVE SEATBACK COVER

Remove the hog rings and seatback cover.

HINT:

At the time of reassembly, please refer to the following item.
When installing hog rings, take care to prevent wrinkles as little as possible.

17. REMOVE SEAT CUSHION FRAME

Remove the hog rings and seat cushion frame.

HINT:

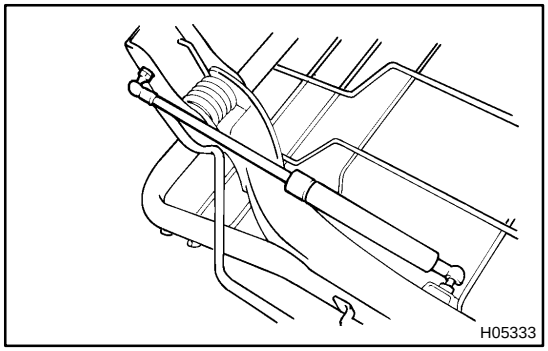
At the time of reassembly, please refer to the following item.
When installing hog rings, take care to prevent wrinkles as little as possible.

18. REMOVE REAR NO. 1 SEAT ADJUSTER

(a) Remove the 2 bolts and rear No. 1 seat outer adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

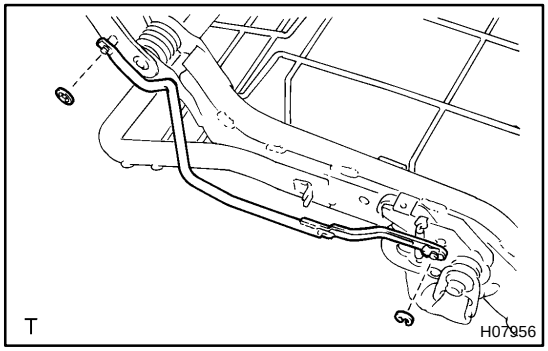
(b) Remove the 2 bolts and rear No. 1 seat inner adjuster.
Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(c) Remove the 2 hinge covers from the outer and inner adjuster.



19. REMOVE REAR SEAT STAY

Remove the 2 bolts and rear seat stay.



20. REMOVE LH NO. 1 SEAT LEG STAY

Using a screwdriver, remove the spring nut, E-ring and LH No. 1 seat leg stay.

21. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the spring nut and E-ring.

(b) Remove the 2 hinge pins, 2 cushion spacers, 2 cushion support springs and 2 rear seat cushion hinges.

22. REMOVE LH REAR SEAT LOCK

Unfasten the bolt, then remove the inner belt and LH rear seat lock.

BO1L4-03

INSTALLATION

Installation is in the reverse order of removal (See page BO-1 19).

BO1L3-01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-120).

BO1L1-04

REMOVAL

REMOVE REAR NO. 1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

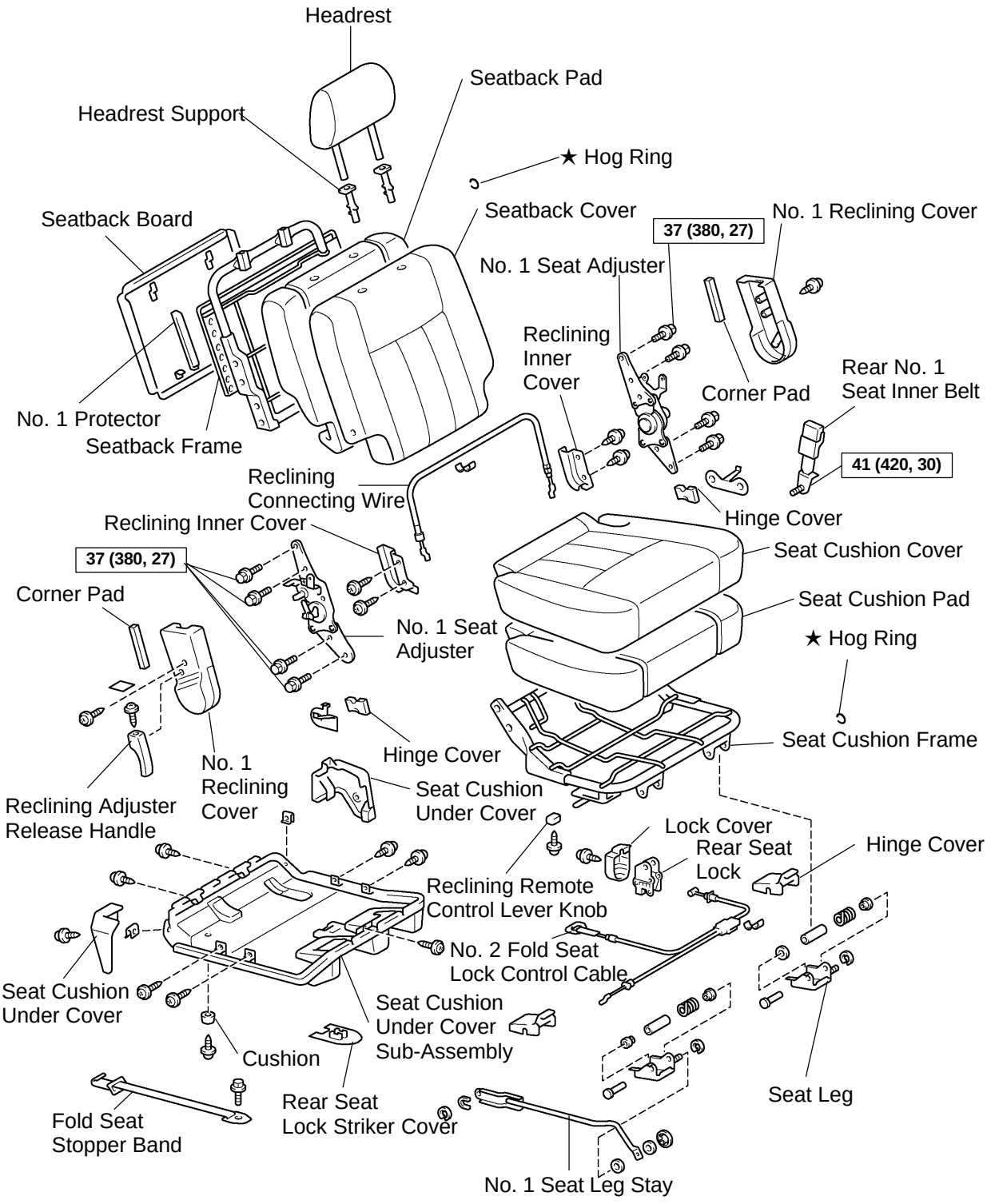
(d) Remove the 4 bolts and rear No. 1 seat.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

REAR NO.1 SEAT (RH)

COMPONENTS

BO1L5-05



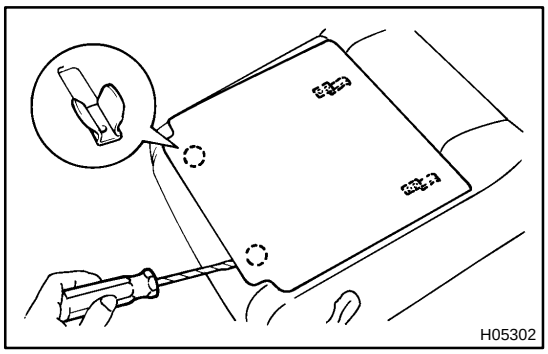
N·m (kgf·cm, ft·lbf) : Specified torque

★ Non-reusable part

H07958

BO1L7-05

DISASSEMBLY



1. REMOVE HEADREST

2. REMOVE SEATBACK BOARD

Using a screwdriver, remove the seatback board as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

3. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver, remove the cover.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screw and reclining adjuster release handle.

4. REMOVE NO. 1 RECLINING COVER

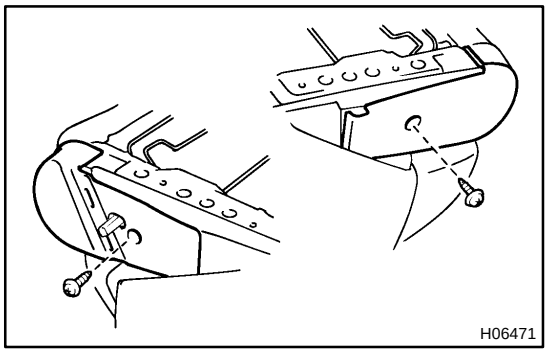
(a) Remove the 4 hog rings and open the seatback cover.

HINT:

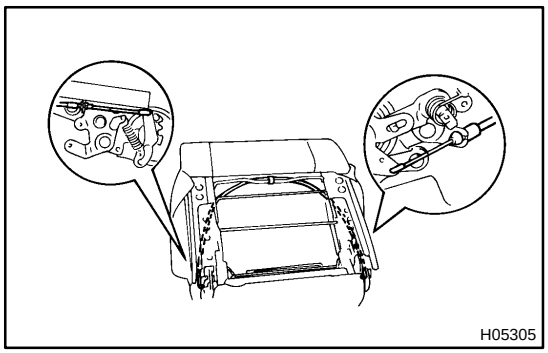
At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

(b) Remove the 2 corner pads.



(c) Remove the 2 screws and 2 No. 1 reclining covers as shown in the illustration.

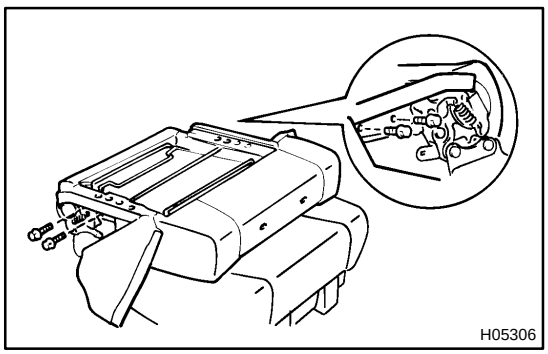


5. REMOVE RECLINING CONNECTING WIRE

(a) Loosen the nuts, then remove the reclining connecting wire of RH side edge.

(b) Remove the reclining connecting wire of LH side edge.

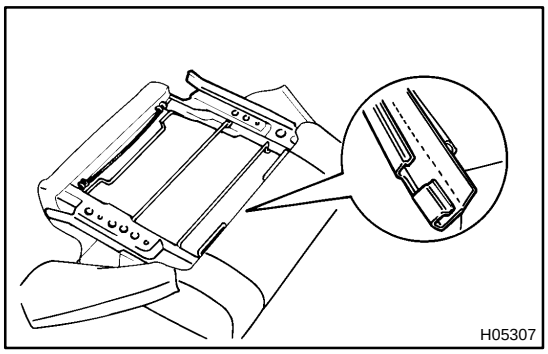
(c) Remove the clamp and reclining connecting wire.



6. REMOVE SEATBACK ASSEMBLY

Remove the 4 bolts and seatback assembly.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)



7. REMOVE SEATBACK FRAME

(a) Remove the 4 screws and reclining inner cover.

(b) Remove the 2 hog rings.

HINT:

At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

(c) Disengage the hook, then remove the headrest supports.

(d) Remove the seatback frame.

(e) Remove the 2 No. 1 protectors from the seatback frame.

8. REMOVE SEATBACK COVER

Remove the hog rings and seatback cover.

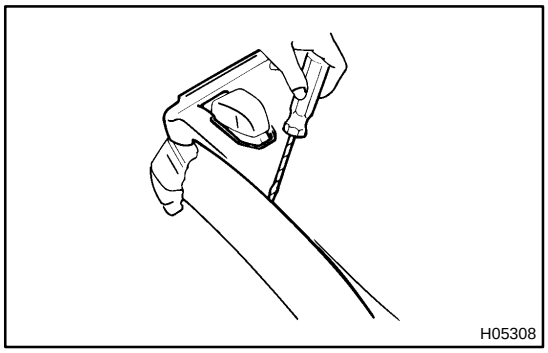
HINT:

At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

9. REMOVE SEAT CUSHION UNDER COVER

Remove the 2 screws and 2 seat cushion under covers.



10. REMOVE SEAT CUSHION COVER WITH PAD

(a) Using a screwdriver, disengage the hooks as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

(b) Remove the seat cushion cover with pad.

11. REMOVE SEAT CUSHION COVER

Remove the hog rings and seatback cover.

HINT:

At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

12. REMOVE CUSHION

Remove the screw and cushion from the seat cushion under cover sub-assembly.

13. REMOVE LOCK COVER

Remove the screw and lock cover.

14. REMOVE RECLINING REMOTE CONTROL LEVER KNOB

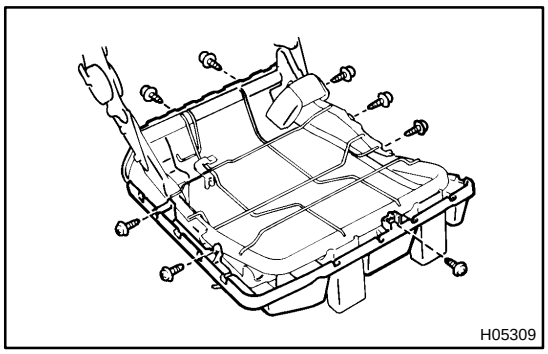
Remove the screw and reclining remote control lever knob.

15. REMOTE FOLD SEAT STOPPER BAND

Remove the bolt and fold seat stopper band.

16. REMOVE SEAT CUSHION UNDER COVERS

Remove the 2 screws and 2 seat cushion under covers.



17. REMOVE REAR SEAT CUSHION UNDER COVER SUB-ASSEMBLY

Remove the 8 screws and rear seat cushion under cover.

18. REMOVE REAR NO. 1 SEAT ADJUSTER

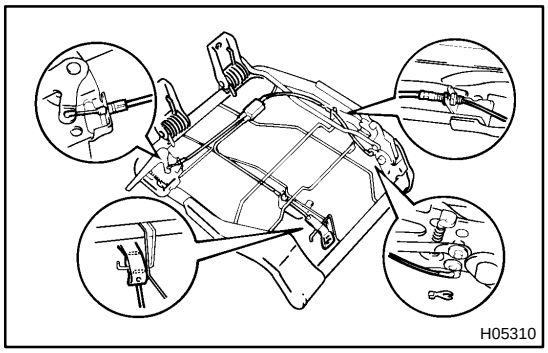
(a) Remove the 2 bolts and rear No. 1 seat outer adjuster.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(b) Remove the 2 bolts and rear No. 1 seat inner adjuster.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

(c) Remove the 2 hinge covers from the outer and inner adjusters.

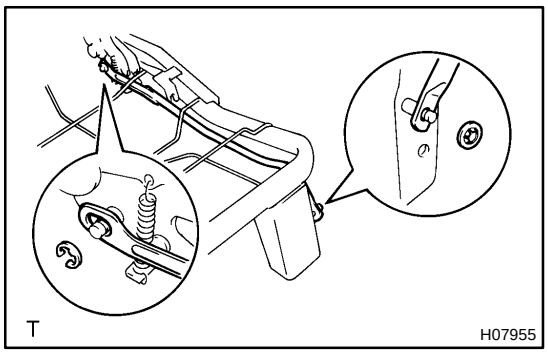
19. REMOVE REAR NO. 1 SEAT INNER BELT

Loosen the bolt, then remove the rear No. 1 seat inner belt.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



20. REMOVE NO. 2 FOLD SEAT LOCK CONTROL CABLE

Loosen the clamp and No. 2 fold seat lock control cable as shown in the illustration.



21. REMOVE NO. 1 SEAT LEG STAY

(a) Using a screwdriver, remove the spring nut and E-ring.

HINT:

Tape the screwdriver tip before use.

(b) Remove the No. 1 seat leg stay.

22. REMOVE REAR SEAT CUSHION HINGE

(a) Using a screwdriver, remove the 2 E-rings.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 hinge pins, 2 cushion spacers, 2 cushion support springs and 2 rear seat cushion hinges.

23. REMOVE REAR SEAT LOCK

BO1L9-01

INSTALLATION

Installation is in the reverse order of removal (See page BO-127).

BO1L8-02

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-128).

BO1L6-03

REMOVAL

REMOVE REAR NO.1 SEAT

(a) Fold the seatback down.

(b) Unlock the seat lock, and swing the whole seat up and forward.

(c) Using a screwdriver, remove the seat leg covers.

HINT:

Tape the screwdriver tip before use.

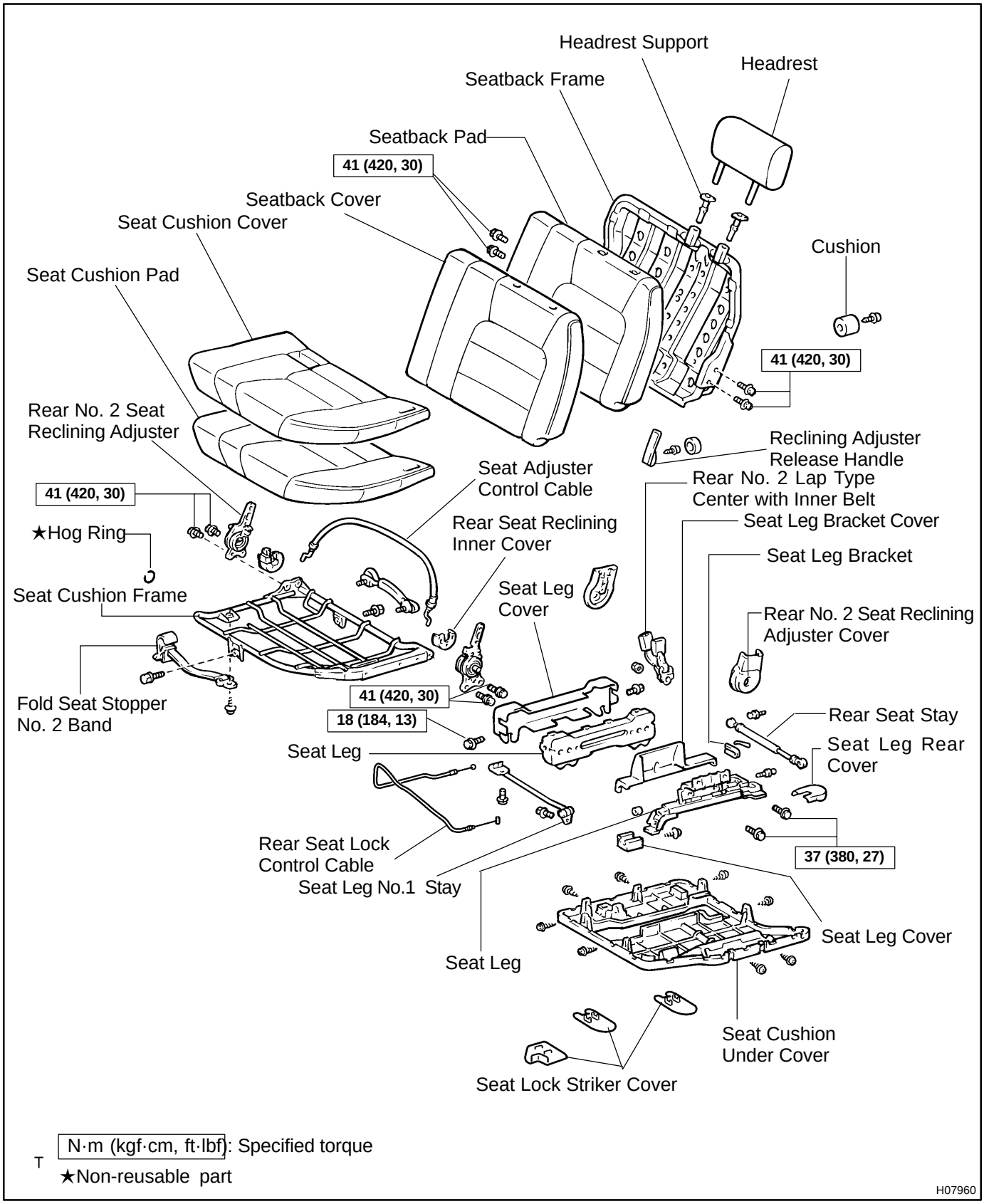
(d) Remove the 4 bolts and rear No.1 seat.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

REAR NO.2 SEAT

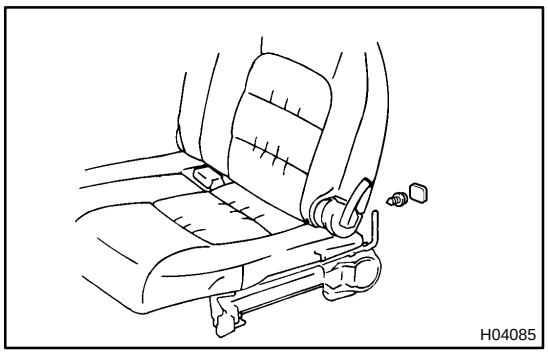
COMPONENTS

BO1LG-03



BO21F-02

DISASSEMBLY



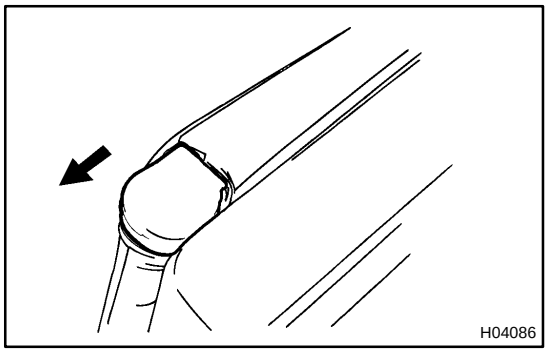
1. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver, remove the cover.

HINT:

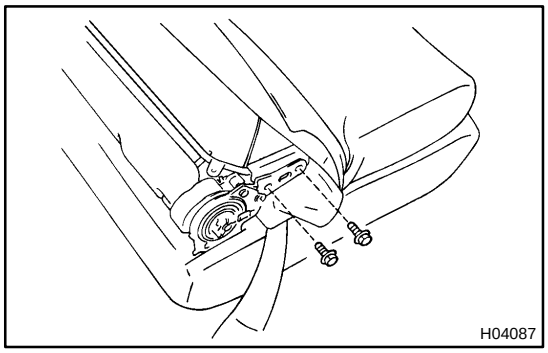
Tape the screwdriver tip before use.

(b) Remove the screw and reclining adjuster release handle.



2. REMOVE REAR NO. 2 SEAT RECLINING ADJUSTER COVERS

Remove the No. 2 rear seat reclining covers.



3. REMOVE SEATBACK ASSEMBLY

(a) Disengage the hook.

(b) Remove the 4 bolts and seatback assembly.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

4. REMOVE HEADREST

Remove the headrest.

5. REMOVE SEATBACK COVER

(a) Remove the headrest supports.

(b) Remove the cushion.

(c) Remove the seatback cover with pad from the seatback frame.

(d) Remove the seatback cover from the seatback pad.

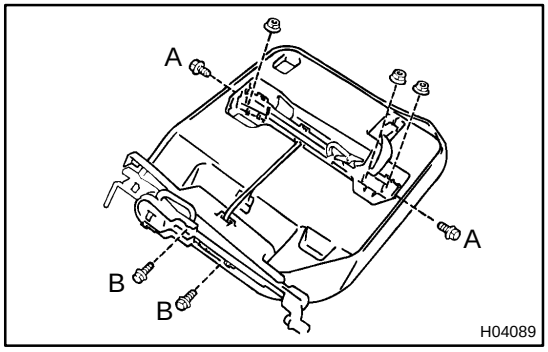
6. REMOVE REAR NO. 2 LAP TYPE CENTER WITH INNER BELT

Remove the nut and rear No. 2 lap type center with inner belt.

7. REMOVE REAR SEAT LOCK CONTROL CABLE

8. REMOVE REAR SEAT STAY

Remove the 2 bolts and rear seat stay.



9. REMOVE ADJUSTER

(a) Remove the 3 nuts.

(b) Remove the 4 bolts.

Torque:

A bolt: 18 N·m (185 kgf·cm, 13 ft·lbf)

B bolt: 37 N·m (380 kgf·cm, 27 ft·lbf)

(c) Remove the adjuster.

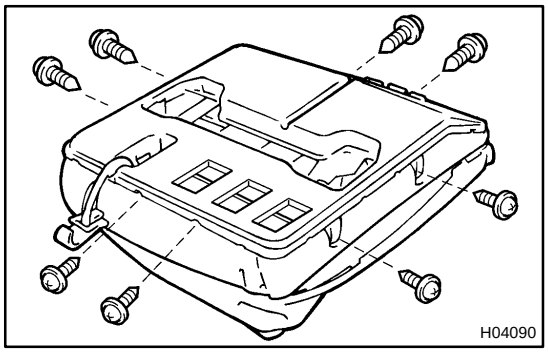
(d) Remove the seat leg bracket cover.

(e) Remove the 2 screws and seat leg No. 1 stay.

10. REMOVE SEAT LEG BRACKET

11. REMOVE SEAT LEG REAR COVER

12. REMOVE SEAT LEG COVER



13. REMOVE SEAT CUSHION UNDER COVER

(a) Remove the assist grip.

(b) Using a screwdriver, disengage the hooks.

HINT:

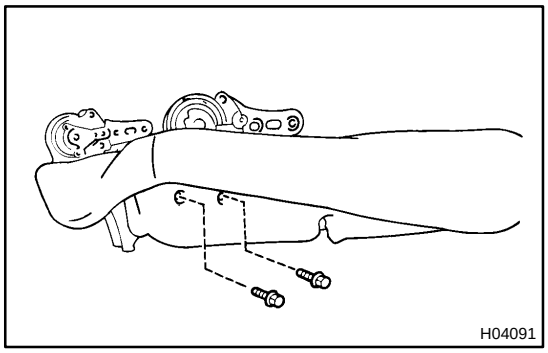
Tape the screwdriver tip before use.

(c) Remove the 8 screws.

(d) Remove the seat cushion under cover.

14. REMOVE SEAT ADJUSTER CONTROL CABLE

15. REMOVE SEAT RECLINING INNER COVERS



16. REMOVE REAR NO. 2 SEAT RECLINING ADJUSTERS

(a) Remove the 4 bolts.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

(b) Remove the rear No. 2 seat reclining adjusters.

17. REMOVE SEAT CUSHION COVER

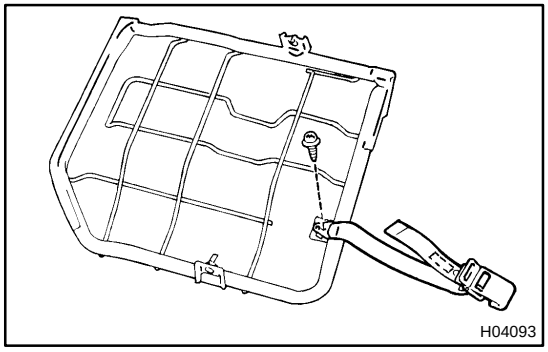
(a) Remove hog rings and seat cushion frame.

HINT:

At the time of reassembly, please refer to the following item.

When installing hog rings, take care to prevent wrinkles as little as possible.

(b) Remove the seat cushion cover from the seat cushion pad.



18. REMOVE HOLD SEAT STOPPER NO. 2 BAND

(a) Remove the screw.

(b) Remove the hold seat stopper No. 2 band.

BO1LP-02

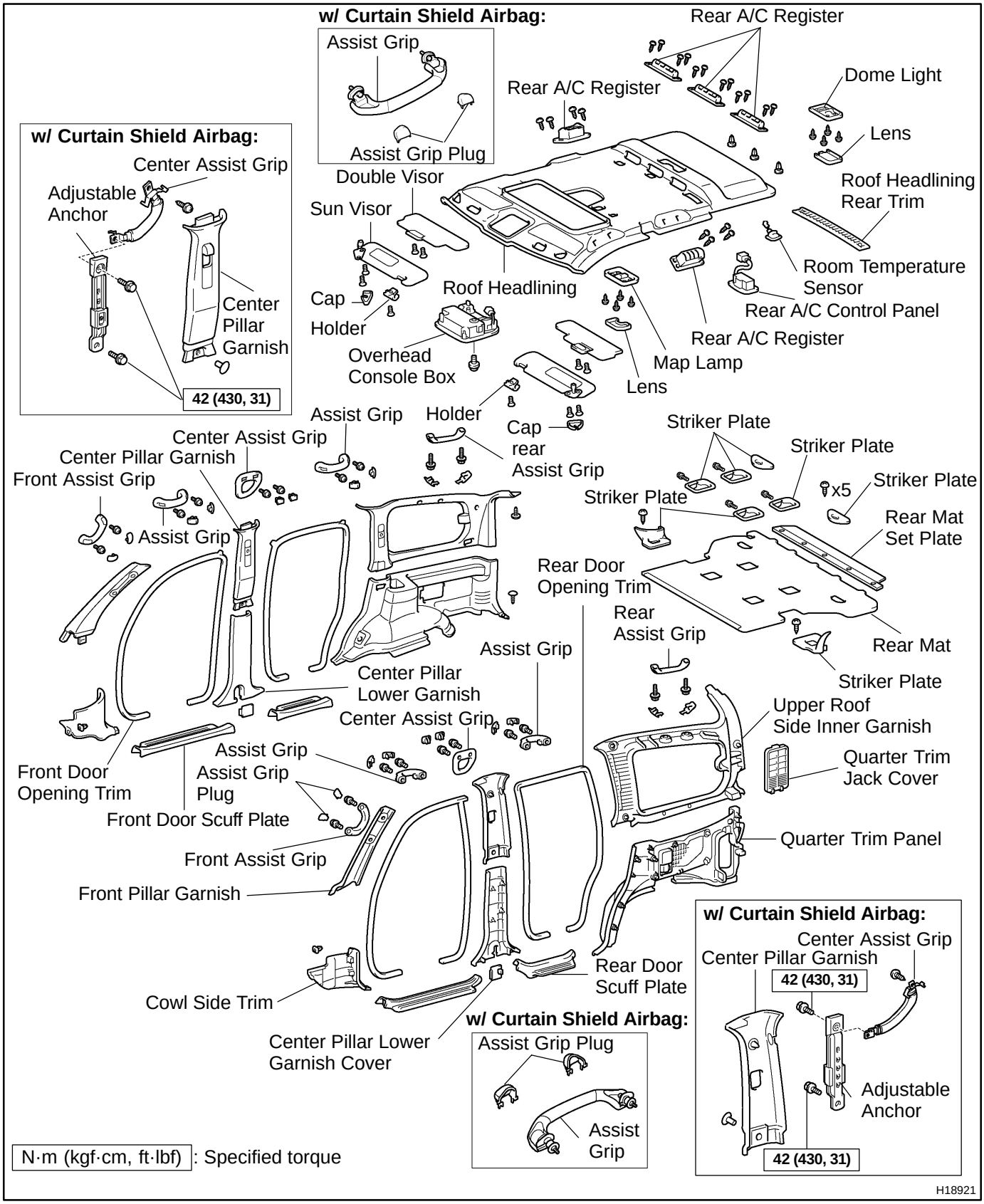
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-134).

ROOF HEADLINING

COMPONENTS

BO1KP-04

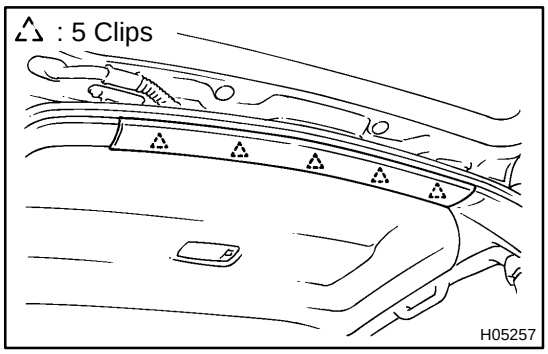


INSTALLATION

Installation is in the reverse order of removal (See page BO-97).

BO4IZ-01

REMOVAL



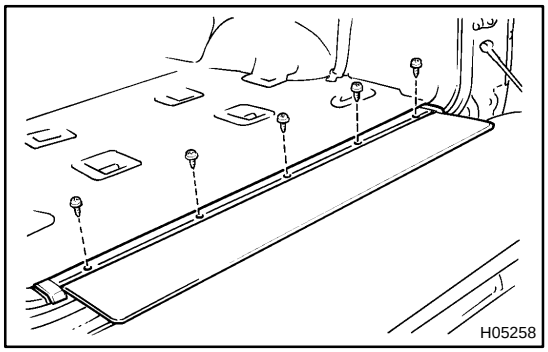
1. REMOVE ROOF HEADLINING REAR TRIM

Using a screwdriver, remove the roof headlining rear trim.

HINT:

Tape up the screwdriver tip before use.

2. REMOVE REAR NO. 2 SEATS



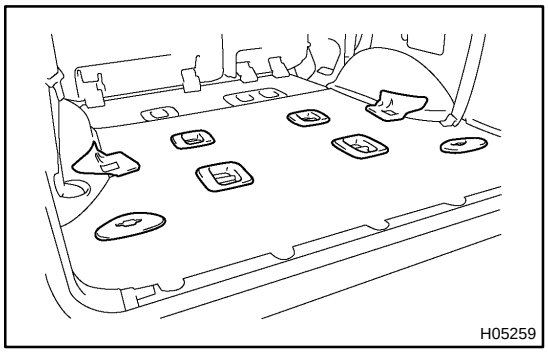
3. REMOVE REAR MAT SET PLATE

(a) Remove the 5 screws.

(b) Using a screwdriver, remove the rear mat set plate.

HINT:

Tape up the screwdriver tip before use.



4. REMOVE STRIKER PLATES

(a) Remove the 6 screws.

(b) Using a screwdriver, remove the striker plates.

HINT:

Tape up the screwdriver tip before use.

5. REMOVE REAR MAT

6. REMOVE REAR NO. 2 SEAT OUTER BELT FLOOR ANCHOR

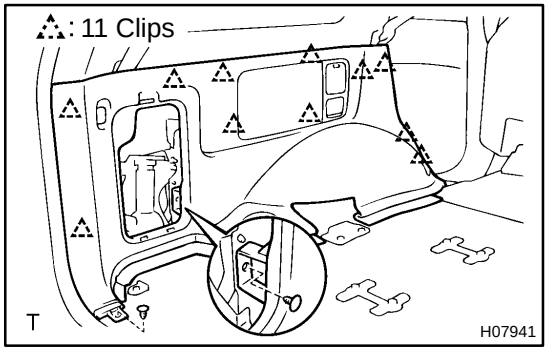
Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

7. REMOVE REAR NO. 1 SEAT OUTER BELT FLOOR ANCHOR

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

8. REMOVE REAR DOOR SCUFF PLATES

9. REMOVE REAR DOOR OPENING TRIMS

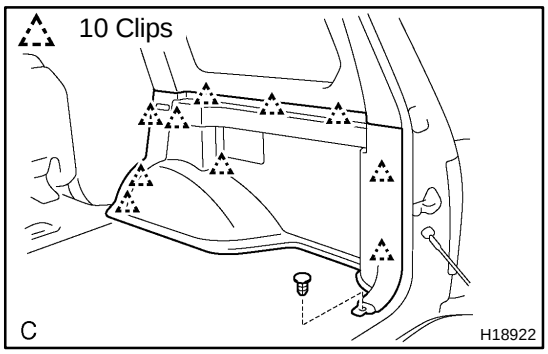


10. REMOVE QUARTER TRIM PANEL LH

(a) Remove the quarter trim jack cover.

(b) Using a clip remover, remove the 2 clips.

(c) Remove the quarter trim panel LH, then disconnect the connector.



11. REMOVE QUARTER TRIM PANEL RH

(a) Using a clip remover, remove the clip.

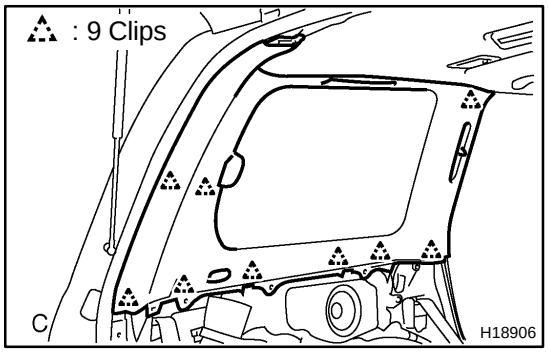
(b) Remove the quarter trim panel RH.

12. REMOVE REAR NO. 2 SEAT OUTER BELT SHOULDER ANCHORS

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

13. REMOVE REAR NO. 1 SEAT OUTER BELT SHOULDER ANCHORS

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



14. REMOVE UPPER ROOF SIDE INNER GARNISHES

(a) Using a screwdriver, remove the 2 assist grip plugs, then remove the 2 screws and the assist grip.

HINT:

Tape up the screwdriver tip before use.

(b) Using a clip remover, remove the clip.

(c) Using a screwdriver, remove the upper roof side inner garnish.

HINT:

Tape up the screwdriver tip before use.

(d) Use the same manner described above to the other side.

15. REMOVE FRONT DOOR SCUFF PLATES

16. REMOVE COWL SIDE TRIMS

17. REMOVE FRONT DOOR OPENING TRIMS

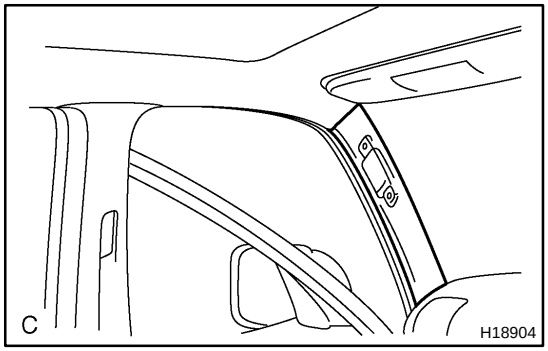
18. REMOVE FRONT ASSIST GRIP

(a) Using a screwdriver, remove the 2 assist grip plugs, then remove the 2 screws and front assist grip.

HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.



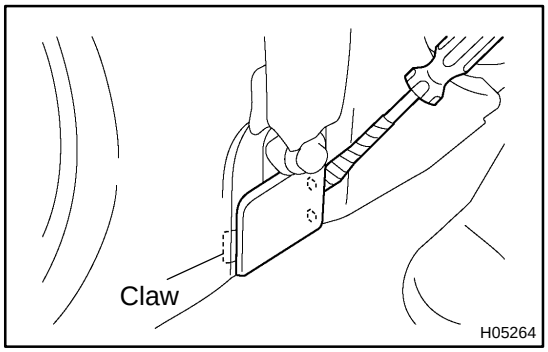
19. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the front pillar garnish.

HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.

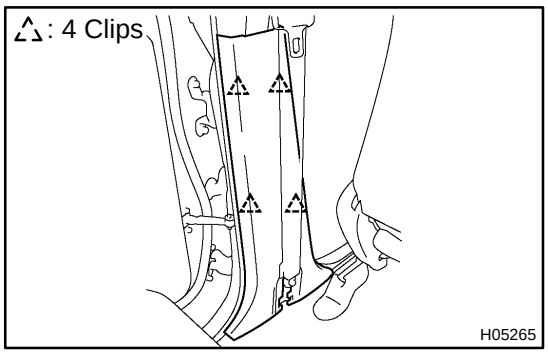


20. REMOVE CENTER PILLAR LOWER GARNISH

(a) Using a screwdriver, remove the center pillar garnish cover.

HINT:

Tape up the screwdriver tip before use.

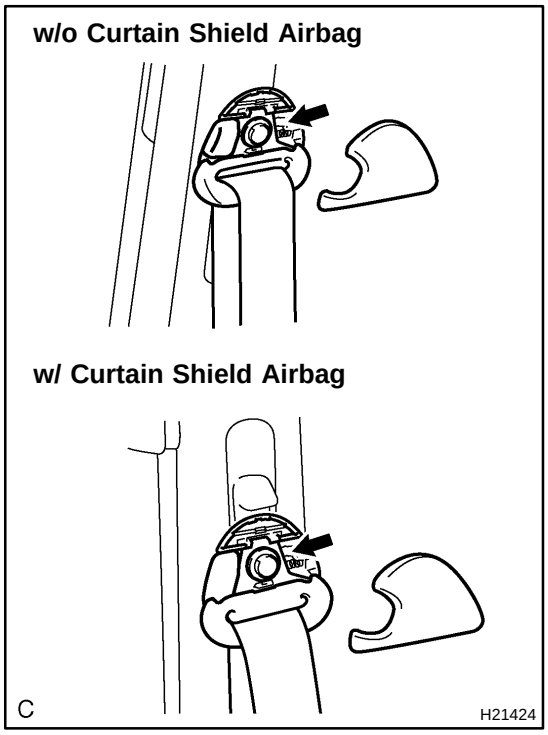


(b) Using a screwdriver, remove the center pillar lower garnish as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

(c) Use the same manner described above to the other side.



21. REMOVE CENTER PILLAR GARNISH

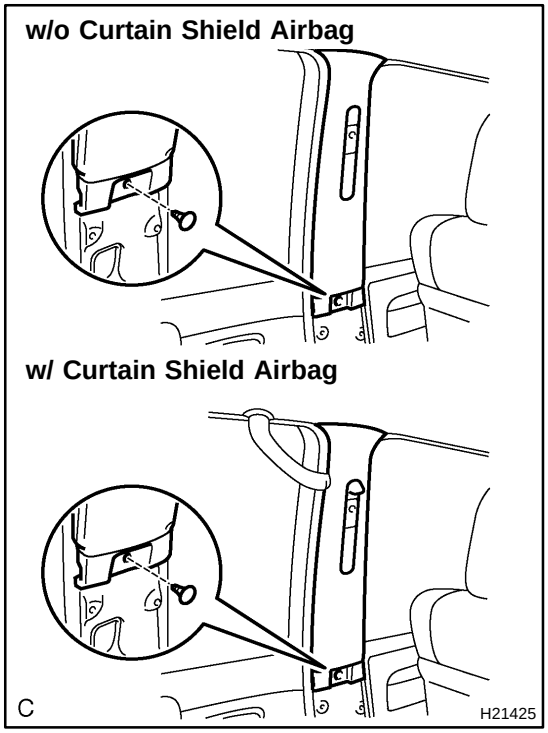
(a) Using a screwdriver, remove the seat belt anchor cover cap.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the bolt and the front seat outer belt shoulder anchor.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



(c) Using a clip remover, remove the clip.

(d) Using a screwdriver, remove the center pillar garnish.

HINT:

Tape up the screwdriver tip before use.

(e) Use the same manner described above to the other side.

22. REMOVE SUN VISOR

(a) Using a screwdriver, remove the caps.

HINT:

Tape the screwdriver tip before use.

(b) Remove the screws, then disconnect the connectors.

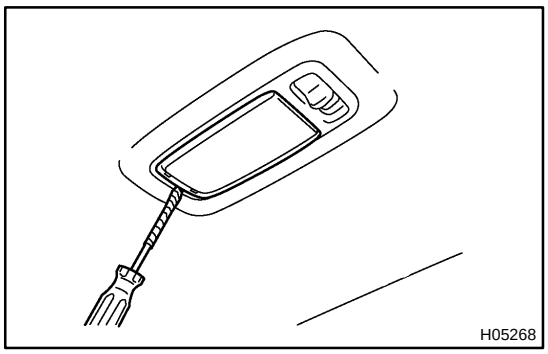
(c) Remove the sun visors.

23. REMOVE DOUBLE VISOR

Remove the screws and the double visors.

24. REMOVE HOLDER

Remove the screws and the holders.



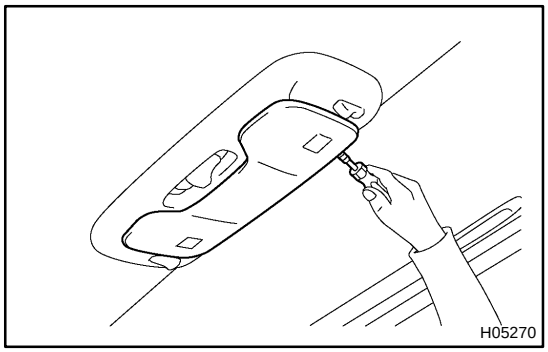
25. REMOVE DOME LIGHT

(a) Using a screwdriver, remove the lens as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the 4 screws and the dome light, then disconnect the connector.



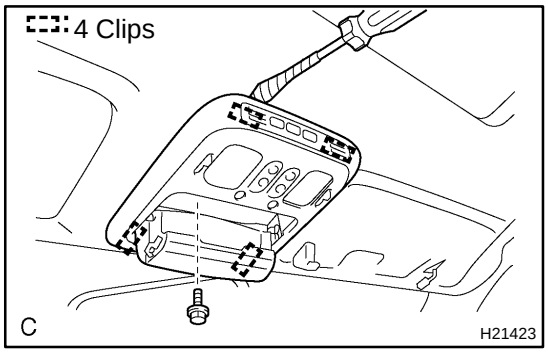
26. REMOVE MAP LAMP

(a) Using a screwdriver, remove the lens as shown in the illustration.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the 4 screws and the map lamp, then disconnect the connector.



27. REMOVE OVERHEAD CONSOLE BOX

(a) Remove the bolt.

(b) Using a screwdriver, remove the overhead console box, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

28. REMOVE REAR A/C CONTROL PANEL

Using a screwdriver, release the 4 claws and pull out the rear A/C control panel, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

29. REMOVE ROOM TEMPERATURE SENSOR

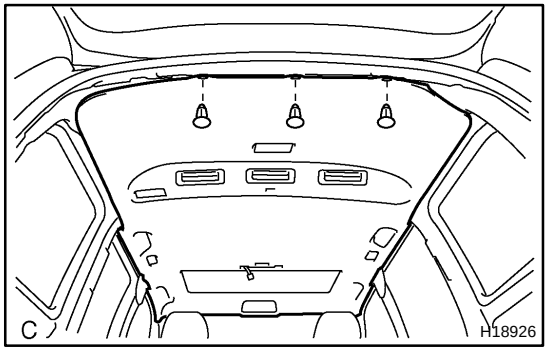
Using a scrwedriver, pull out the room temperature sensor, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

30. REMOVE ASSIST GRIPS

31. w/o Curtain Shield Airbag:
REMOVE CENTER ASSIST GRIPS



32. REMOVE ROOF HEADLINING

Using a clip remover, remove the 3 clips and the roof headlining.

33. REMOVE REAR A/C REGISTER

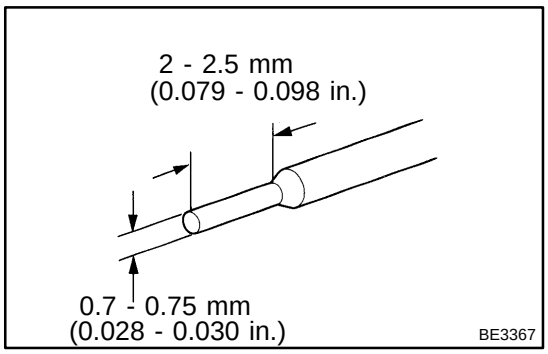
34. w/ Curtain Shield Airbag:
REMOVE ADJUSTABLE ANCHOR

Remove the 2 bolts and the adjustable anchor.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

35. w/ Curtain Shield Airbag:
REMOVE CENTER ASSIST GRIPS

BO1JZ-03



ADJUSTMENT

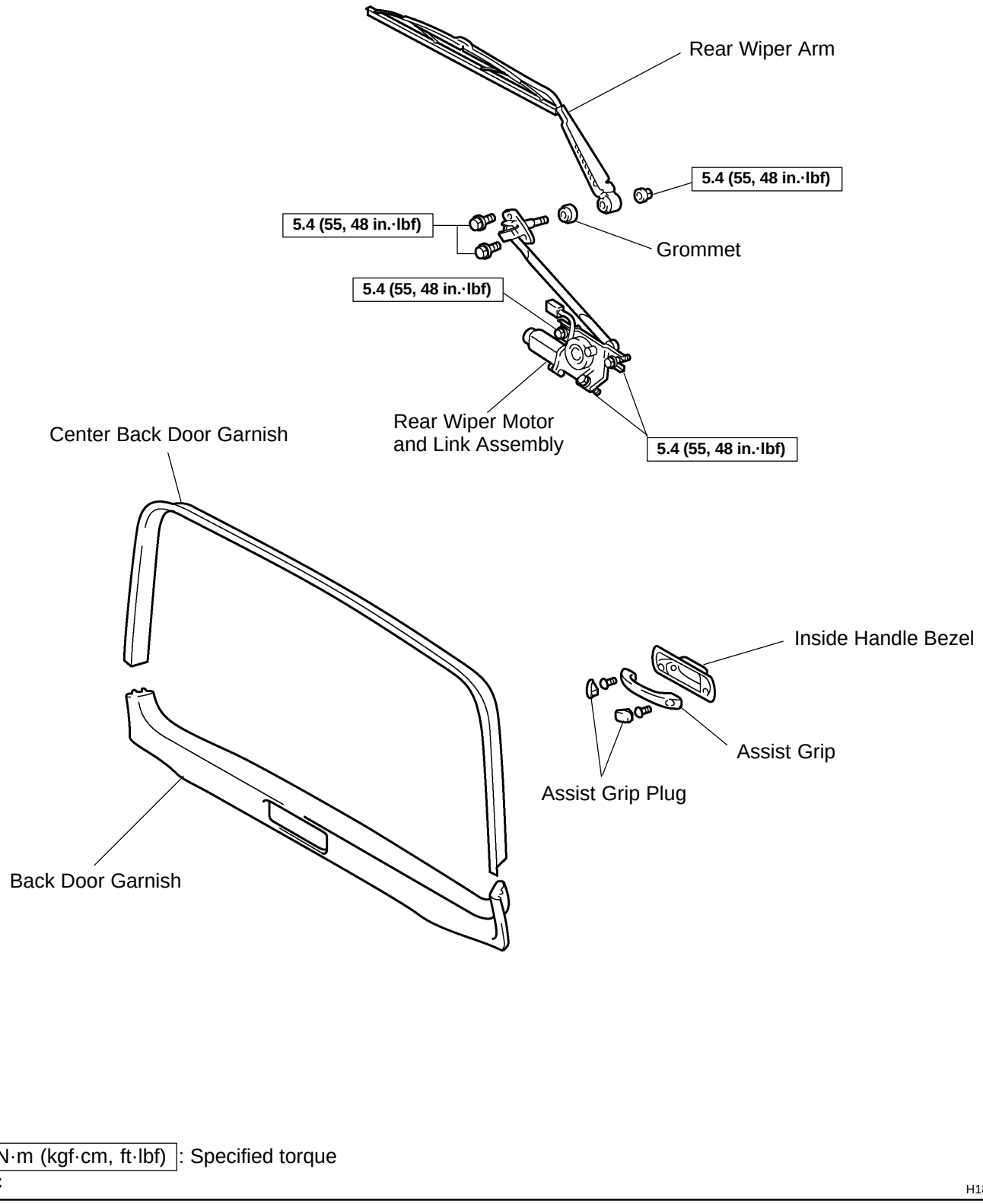
ADJUST WASHER NOZZLE

Using a tool like the one shown in the illustration, change the direction of the nozzle hole to adjust the point where washer fluid hits the back door glass.

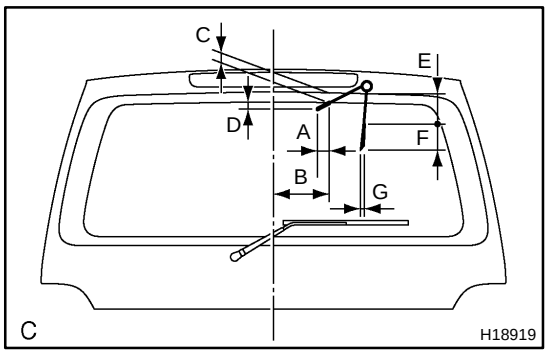
REAR WIPER AND WASHER

COMPONENTS

BO1JW-03



BO1JY-03



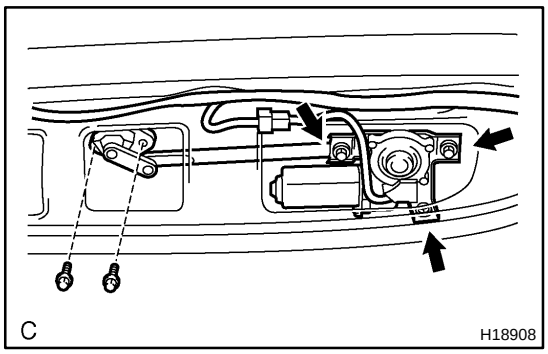
INSPECTION

INSPECT WASHER NOZZLE

While operating the washer, check if the point where the washer fluid hits the back door glass is within the range indicated in the illustration.

A: Approx. 40 mm (1.57 in.)
B: Approx. 180 mm (7.09 in.)
C: Approx. 40 mm (1.57 in.)
D: Approx. 30 mm (1.18 in.)
E: Approx. 120 mm (4.72 in.)
F: Approx. 90 mm (3.54 in.)
G: Approx. 15 mm (0.59 in.)

BO1K0-03



INSTALLATION

1. INSTALL REAR WIPER MOTOR AND LINK ASSEMBLY

(a) Install the wiper motor and link assembly with 5 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(b) Connect the connector.

2. INSTALL BACK DOOR GARNISH

3. INSTALL CENTER BACK DOOR GARNISH

4. INSTALL INSIDE HANDLE BEZEL

5. INSTALL ASSIST GRIP

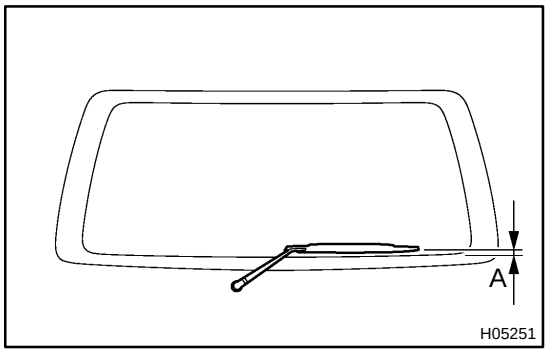
Install the assist grip with the 2 screws, then install the 2 assist grip plugs.

6. INSTALL REAR WIPER ARM

(a) Install the grommet.

(b) Operate the wiper once and turn the wiper switch OFF.

(c) Install the wiper arm and tighten the nut by hand.

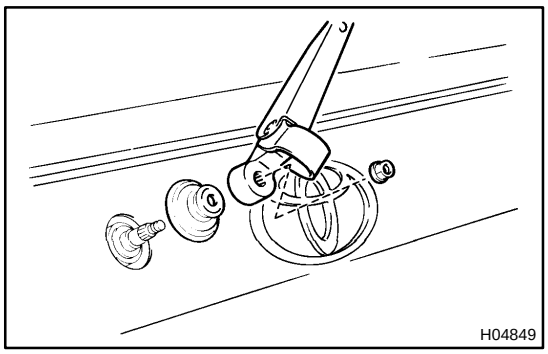


(d) Adjust the installation position of the wiper arm to the position as shown in the illustration.
A: Approx. 38 ± 10 mm (1.50 ± 0.39 in.)

(e) Torque the nut.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(f) Close the cover.

BO1JX-03



REMOVAL

1. REMOVE REAR WIPER ARM

(a) Open the cover.

(b) Remove the nut and rear wiper arm.

(c) Remove the grommet.

2. REMOVE ASSIST GRIP

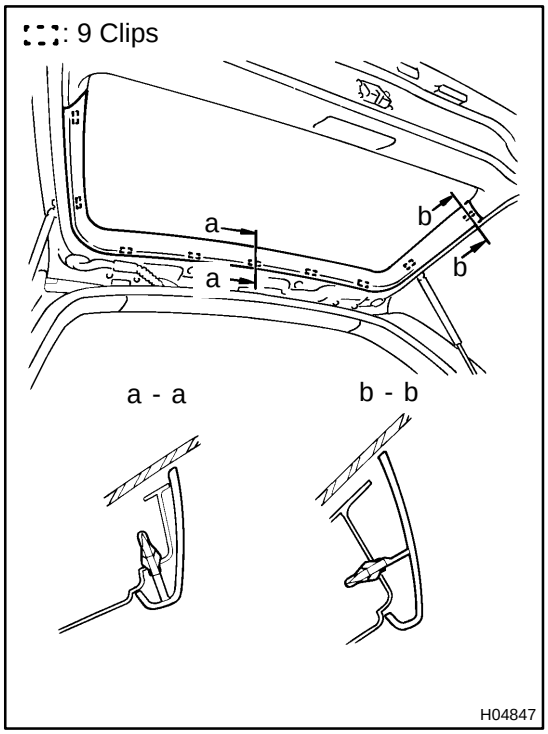
(a) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the 2 screws and assist grip.

3. REMOVE INSIDE HANDLE BEZEL

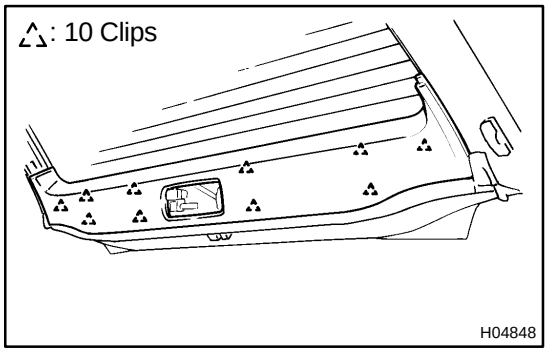


4. REMOVE CENTER BACK DOOR GARNISH

Using a screwdriver, remove the center back door garnish.

HINT:

Tape up the screwdriver tip before use.

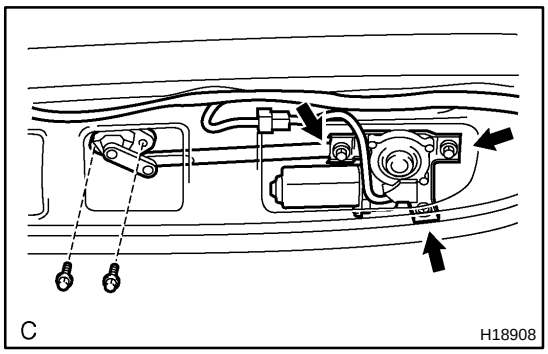


5. REMOVE BACK DOOR GARNISH

Using a screwdriver, remove the back door garnish.

HINT:

Tape up the screwdriver tip before use.



6. REMOVE REAR WIPER MOTOR AND LINK ASSEMBLY

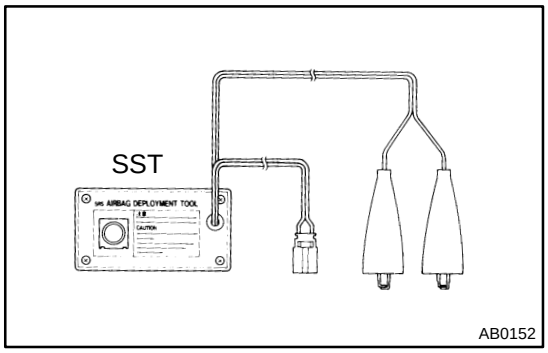
(a) Disconnect the connector.
(b) Remove the 2 bolts.
(c) Unfasten the 3 bolts and remove the rear wiper motor with link assembly.

BO1LL-02

DISPOSAL

HINT:

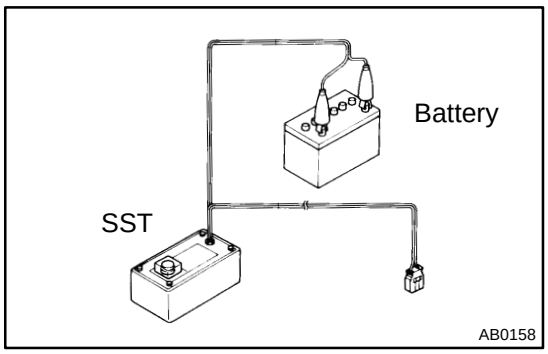
When scrapping vehicle equipped with an SRS or disposing of a front seat outer belt (with seat belt pretensioner), always first deploy the airbag in accordance with the procedure given in RS section or activate the seat belt pretensioner. If any abnormality occurs with the airbag deployment or seat belt pretensioner activation, contact the SERVICE DEPT. of TOYOTA MOTORS SALES, U.S.A., INC.. When disposing of a front seat outer belt (with seat belt pretensioner) activated in a collision, follow the same procedure given in step 1-(d) in ”DISPOSAL”.



CAUTION:

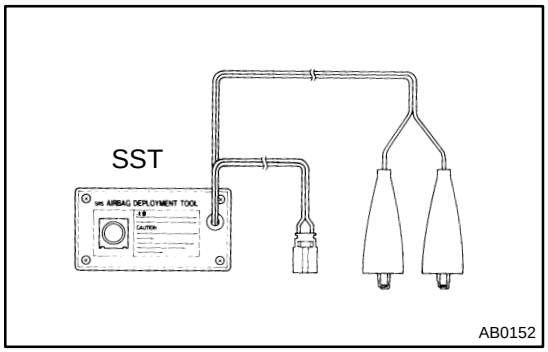
- ★ **Never dispose of front seat outer belt which has inactivated pretensioner.**
- ★ **The seat belt pretensioner produces a sizeable exploding sound when it activates, so perform the operation out-of-door and where it will not create a nuisance to nearby residents.**
- ★ **When activating the seat belt pretensioner, always use the specified SST. (SRS Airbag Deployment Tool) Perform the operation in a place away from electrical noise.**

  SST 09082-00700, 09082-00740
- ★ **When activating a front seat outer belt (with seat belt pretensioner), perform the operation 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 activated pretensioner.**
- ★ **Always wash your hands with water after completing the operation.**
- ★ **Do not apply water, etc. to a front seat outer belt with activated pretensioner.**



1. SEAT BELT PRETENSIONER ACTIVATION WHEN SCRAPPING VEHICLE

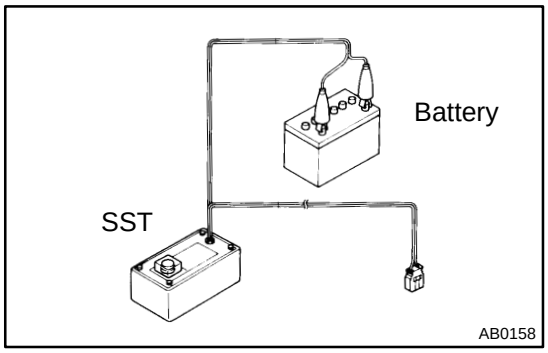
HINT:
Have a battery ready as the power source to activate the seat belt pretensioner.



(a) Check functioning of SST.

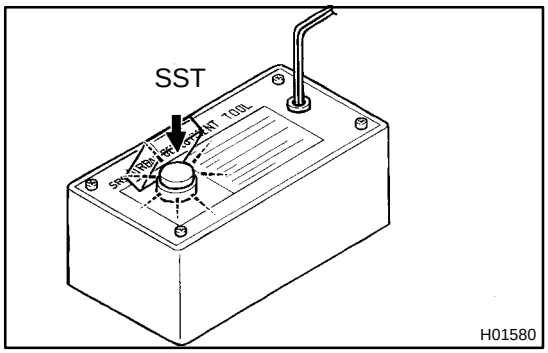
CAUTION:
When activating the seat belt pretensioner, always use the specified SST: SRS Airbag Deployment Tool.

SST 09082-00700, 09082-00740



(1) Connect the SST to battery.
Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

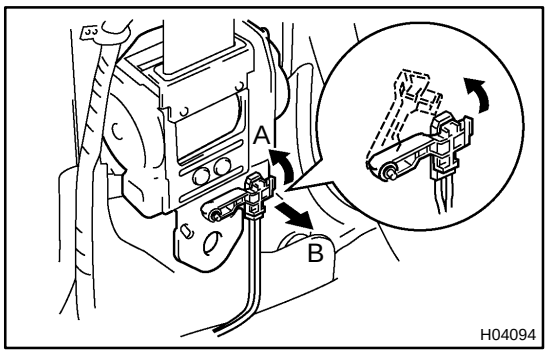
HINT:
Do not connect the yellow connector which will be connected with the seat belt pretensioner.



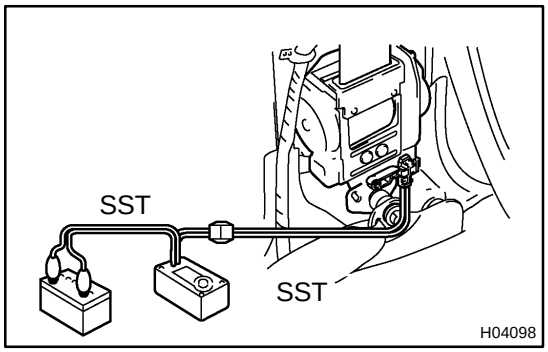
(2) Check functioning of SST.
Press the SST activation switch, and check the LED of the SST activation switch lights up.

CAUTION:
If the LED lights up when the activation switch is not being pressed, SST malfunction is probable, so definitely do not use the SST.

(b) Disconnect the pretensioner connector.
(1) Remove the front door scuff plate.
(2) Remove the front door opening trim.
(3) Remove the rear door scuff plate.
(4) Remove the rear door opening trim.
(5) Remove the center pillar lower garnish.



(6) Disconnect the pretensioner connector in the order "A" and "B" as shown in the illustration.



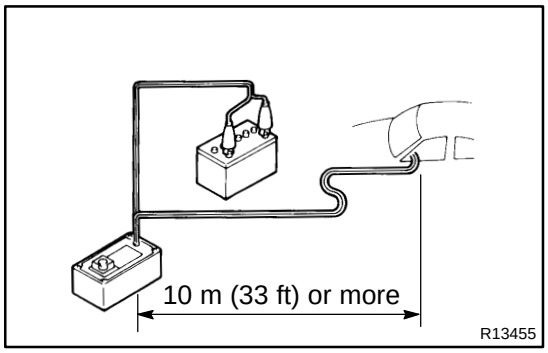
(c) Install the SST.

(1) Connect the 2 SST each other, then connect them to the seat belt pretensioner.

SST 09082-00700, 09082-00740

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock secondary lock of the twin lock.



(2) Move the SST to at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.

(d) Activate seat belt pretensioner.

(1) Confirm that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and activate the seat belt pretensioner.

HINT:

The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.

(e) Dispose of the front seat outer belt (with seat belt pretensioner).

CAUTION:

- ★ **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- ★ **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- ★ **Always wash your hands with water after completing the operation.**
- ★ **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

2. ACTIVATION WHEN DISPOSING OF FRONT SEAT OUTER BELT ONLY

HINT:
When scrapping a vehicle, activate the seat belt pretensioner and scrap the vehicle with activated front seat outer belt still installed.

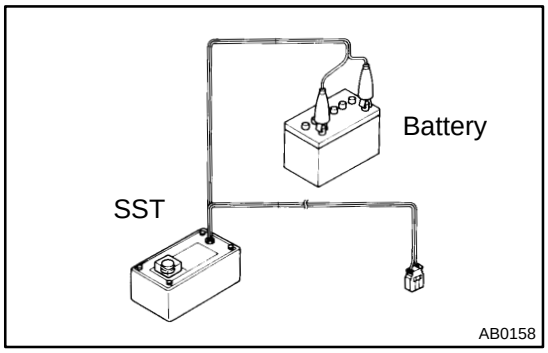
NOTICE:

- ★ **When disposing of the front seat outer belt (with seat belt pretensioner) only, never use the customer's vehicle to activate the seat belt pretensioner.**
- ★ **Be sure to follow the procedure given below when activating the seat belt pretensioner.**

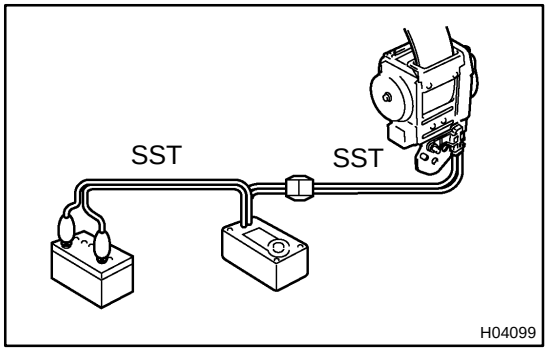
HINT:
Have a battery ready as the power source to activate the seat belt pretensioner.

(a) Remove the front seat outer belt (See page BO-137).

HINT:
Cut the belt near the seat belt retractor.

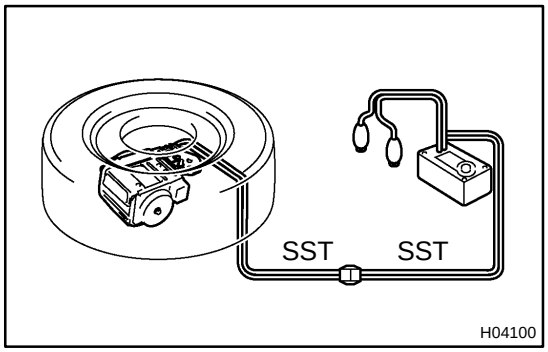


(b) Check functioning of SST (See step 1-(a)).
SST 09082-00700, 09082-00740



(c) Install the SST.
(1) Connect the 2 SST each other, then connect them to the seat belt pretensioner.
SST 09082-00700, 09082-00740

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 the disc wheel with tire.

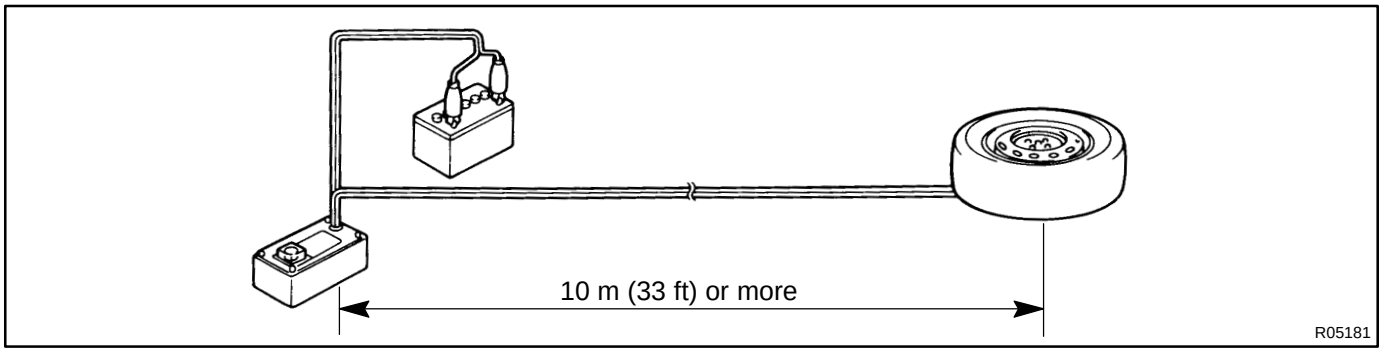
NOTICE:
Place the front seat outer belt as shown in the illustration.

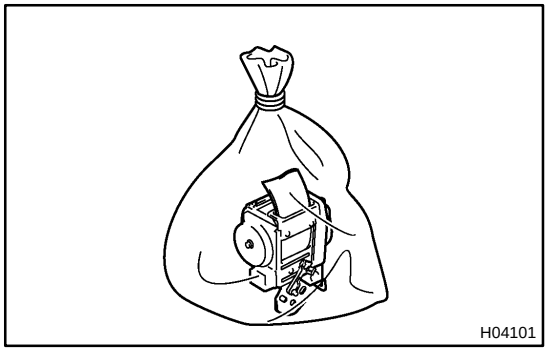
(3) Move the SST to at least 10 m (33 ft) away from the disc wheel.

NOTICE:
Take care not to damage the SST wire harness.

(d) Activate the seat belt pretensioner.
   (1) Connect the SST red clip to the battery positive (+) terminal and black clip to the battery negative (-) terminal.
   (2) Check that no one is within 10 m (33 ft) area around the disc wheel.
   (3) Press the SST activation switch and activate the seat belt pretensioner.

HINT:
The seat belt pretensioner operates simultaneously as the LED of the SST activation switch lights up.



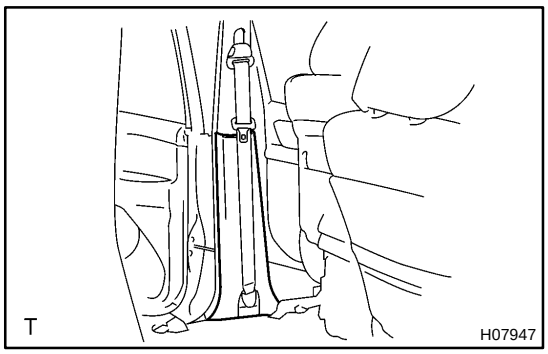


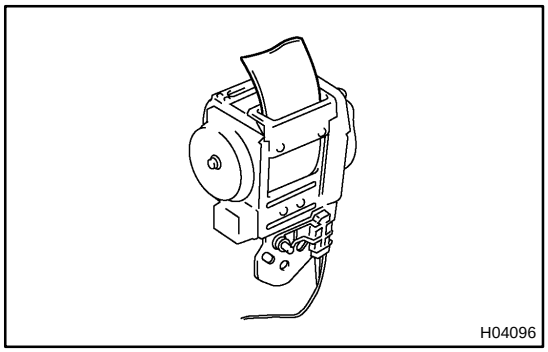
(e) Dispose of the front seat outer belt (with seat belt pretensioner).

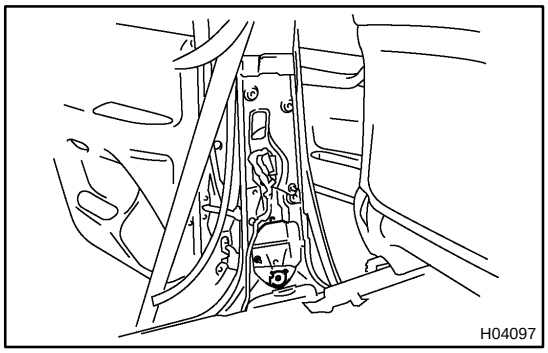
CAUTION:
- ★ **The front seat outer belt is very hot when the seat belt pretensioner is activated, so leave it alone for at least 30 minutes after activation.**
- ★ **Use gloves and safety glasses when handling a front seat outer belt with activated seat belt pretensioner.**
- ★ **Always wash your hands with water after completing the operation.**
- ★ **Do not apply water, etc. to a front seat outer belt with activated seat belt pretensioner.**

   (1) Remove the disc wheel and SST.
   (2) Place the front seat outer belt in a vinyl bag, tie the end tightly and dispose of it in the same way as other general parts disposal.

BO1LK-02







INSPECTION

1. PRETENSIONER IS NOT ACTIVATED

(a) Perform a diagnostic system check (See page DI-692).

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

★ Check for cuts and cracks in, or marked discoloration of the center pillar lower garnish.

★ Check for cuts and cracks in wire harness, and for chipping in connectors.

★ Check for deformation of the center pillar.

CAUTION:

For removal and installation of the front seat outer belt, see page BO-141 and BO-150 .

Be sure to follow the correct procedure.

2. PRETENSIONER IS ACTIVATED

(a) Perform a diagnostic system check (See page DI-692).

(b) Perform a visual check which includes the following items with the front seat outer belt removed from the vehicle.

★ Check for deformation of the center pillar.

★ Check for damage on the connector and wire harness.

BO21H-03

INSTALLATION

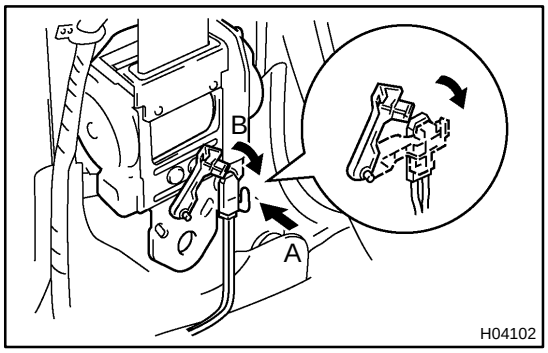
NOTICE:

- ★ **Never use seat belt pretensioner from another vehicle. When replacing parts, replace them with new parts.**
- ★ **Make sure that the front seat outer belt is installed with the specified torque.**
- ★ **If the front seat outer belt has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front seat outer belt with a new one.**
- ★ **When installing the front seat outer belt, take care that the wiring does not interfere with other parts and is not pinched between other parts.**

1. INSTALL RETRACTOR OF FRONT SEAT OUTER BELT

(a) Install the retractor of front seat outer belt with the bolt.

Torque:
Upper bolt: 4.9 N·m (50 kgf·cm, 43 in.·lbf)



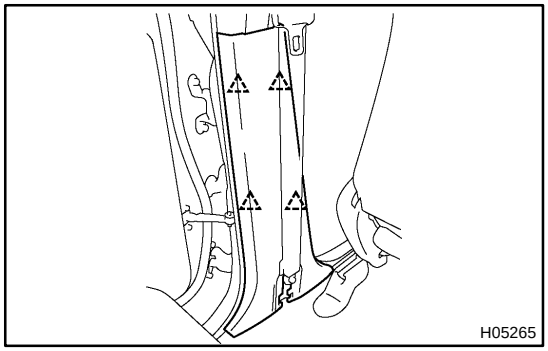
(b) Connect the pretensioner connector in the order ”A” and ”B” as shown in the illustration.

2. INSTALL FRONT SEAT OUTER BELT SHOULDER ANCHOR

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

3. INSTALL FRONT SEAT OUTER BELT FLOOR ANCHOR

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



4. INSTALL CENTER PILLAR LOWER GARNISH

(a) Install the center pillar lower garnish.

(b) Install the center pillar garnish cover.

5. INSTALL REAR DOOR OPENING TRIM

6. INSTALL REAR DOOR SCUFF PLATE

7. INSTALL FRONT DOOR OPENING TRIM

8. INSTALL FRONT DOOR SCUFF PLATE

SEAT BELT PRETENSIONER

BO21G-03

REMOVAL

NOTICE:

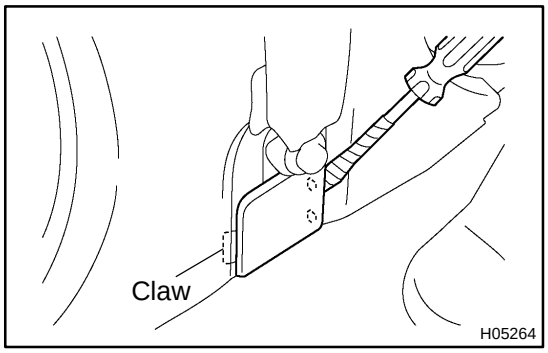
- ★ **If the wiring connector of the seat belt pretensioner is disconnected with the ignition switch at ON or ACC, diagnostic trouble codes will be recorded.**
- ★ **Never use seat belt pretensioner from another vehicle. When replacing seat belt pretensioner, replace it with a new one.**

1. REMOVE FRONT DOOR SCUFF PLATE

2. REMOVE FRONT DOOR OPENING TRIM

3. REMOVE REAR DOOR SCUFF PLATE

4. REMOVE REAR DOOR OPENING TRIM

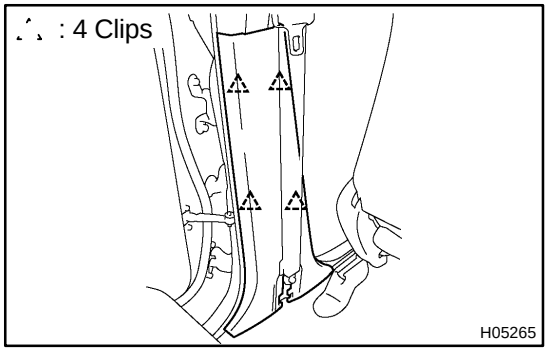


5. REMOVE CENTER PILLAR LOWER GARNISH

(a) Using a screwdriver, remove the center pillar garnish cover.

HINT:

Tape the screwdriver tip before use.



(b) Using a screwdriver, remove the center pillar lower garnish as shown in the illustration.

HINT:

Tape the screwdriver tip before use.

6. REMOVE FRONT SEAT OUTER BELT SHOULDER ANCHOR

7. REMOVE FRONT SEAT OUTER BELT FLOOR ANCHOR

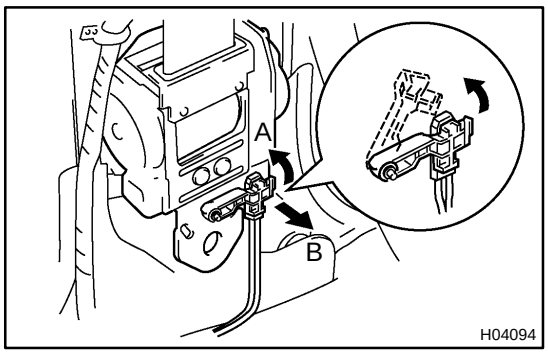
8. REMOVE RETRACTOR OF FRONT SEAT OUTER BELT

CAUTION:

Never disassemble the retractor of front seat outer belt.

NOTICE:

When removing the retractor of front seat outer belt, take care not to pull the seat belt pretensioner wire harness.



(a) Disconnect the pretensioner connector in the order ”A” and ”B” as shown in the illustration.

CAUTION:

When removing the seat belt pretensioner, work must be started 90 seconds after the ignition switch is turned to the ”LOCK” position and the negative (-) terminal cable is disconnected from the battery.

(b) Remove the bolt and retractor of front seat outer belt.

BO1LM-02

REPLACEMENT

REPLACE REQUIREMENTS

In the following cases, replace the seat belt pretensioner.

- ★ If the seat belt pretensioner has been activated.
- ★ If the seat belt pretensioner has been found to be faulty in troubleshooting.
- ★ If the front seat outer belt has been found to be faulty during the check of items 1-(b) or 2-(b).
- ★ If the front seat outer belt has been dropped.

CAUTION:

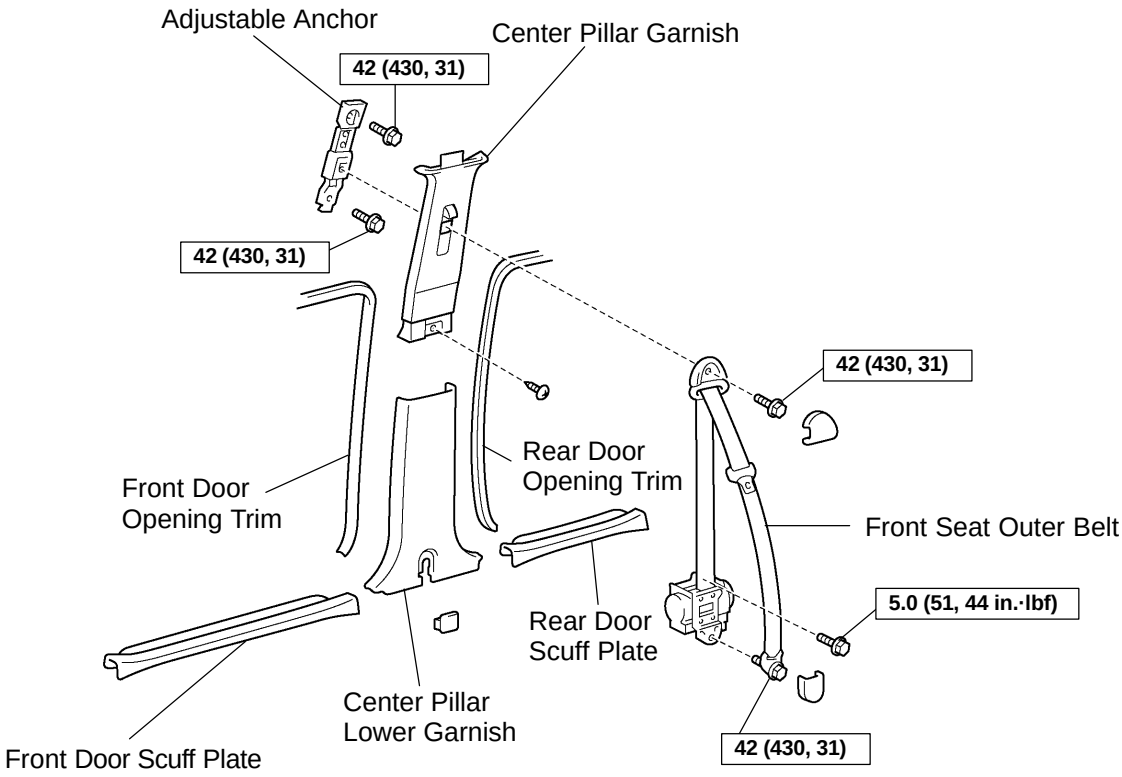
For removal and installation of the seat belt pretensioner, see page BO-141 and BO-150 .
Be sure to follow the correct procedure.

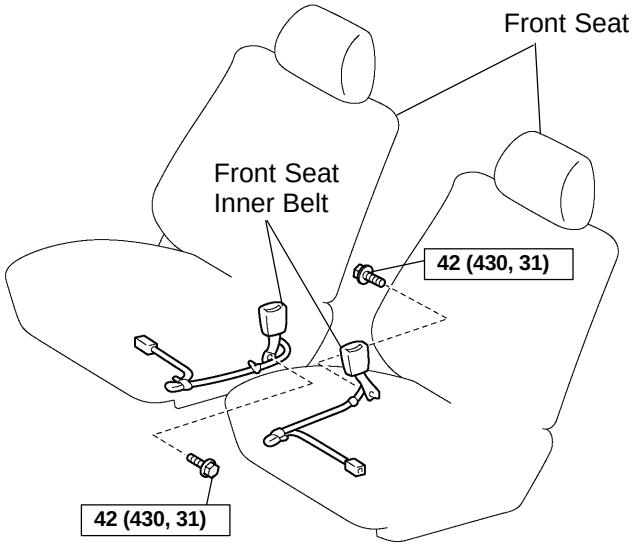
SEAT BELT

COMPONENTS

BO1KY-04

Front Seat Belt:

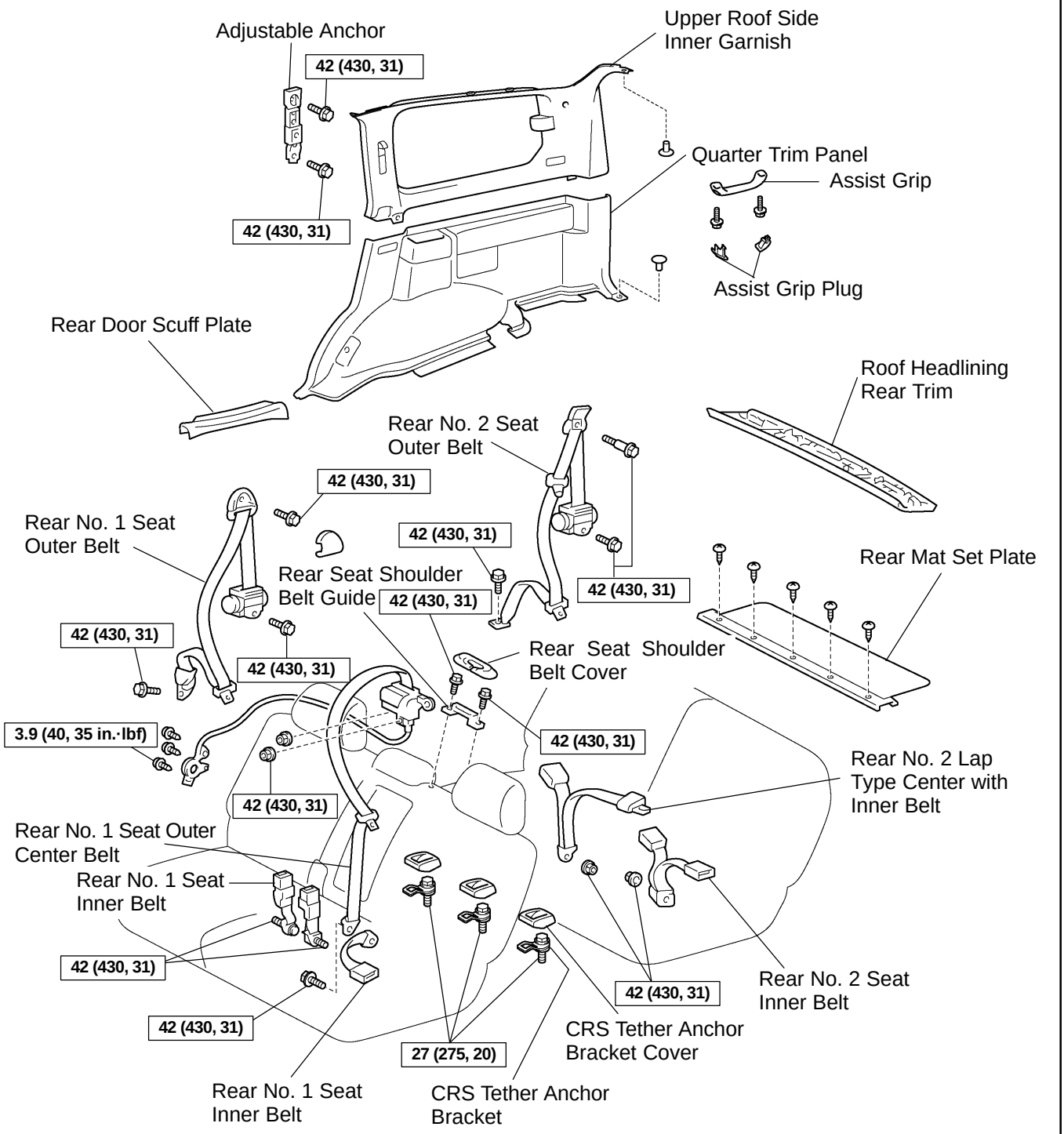




C N·m (kgf·cm, ft·lbf): Specified torque

H18930

Rear Seat Belt:



N·m (kgf·cm, ft·lbf) : Specified torque

H18931

BO1KZ-04

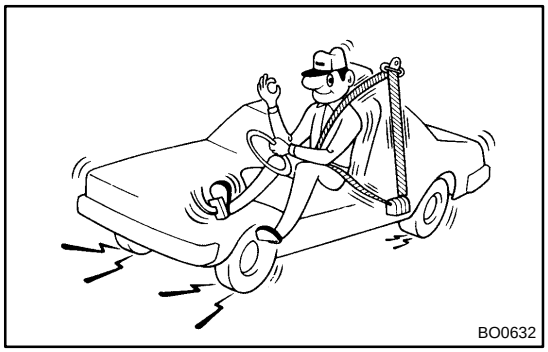
INSPECTION

CAUTION:

Replace the seat belt assembly (outer belt, inner belt, bolts, nuts or sill-bar) if it has been used in a severe impact. The entire assembly should be replaced even if damage is not obvious.

1. Except manual type:
RUNNING TEST (IN SAFE AREA)

(a) Fasten the front seat belts.


BO0632

(b) Drive the car at 10 mph (16 km/h) and slam on the brakes. Check that the belt locks and cannot be extended at this time.

HINT:

Conduct this test in a safe area. If the belt does not lock, remove the belt mechanism assembly and conduct the following static check. Also, whenever installing a new belt assembly.

2. Driver's seat belt (ELR):
STATIC TEST

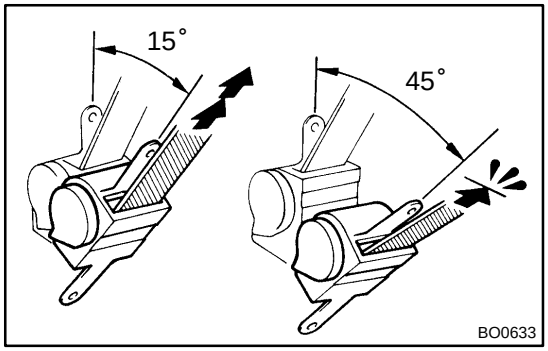
(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

HINT:

Before removing the pretensioner connector, be sure to read the precautionary notice in the RS section.

(c) Tilt the retractor slowly.



BO0633

(d) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out over 45 degrees of tilt.

If a problem is found, replace the assembly.

3. Except driver's seat belt (ELR/ALR):
STATIC TEST

(a) Make sure that the belt locks when pulled out quickly.

(b) Remove the locking retractor assembly.

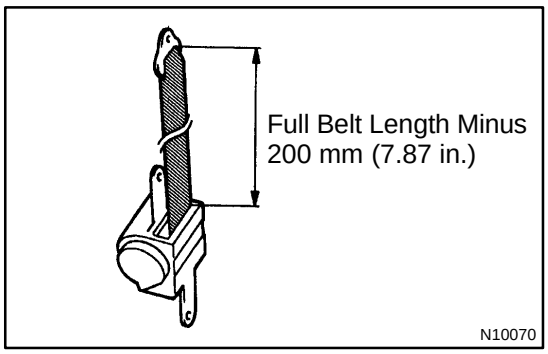
HINT:

Before removing the pretensioner connector, be sure to read the precautionary notice in the RS section.

(c) Pull out the whole belt and measure the length of the whole belt.
Then retract the belt slightly and pull it out again

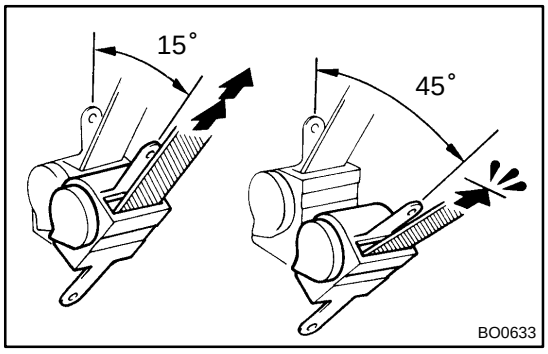
(d) Make sure that the belt cannot be extended further.

If a problem is found, replace the assembly.



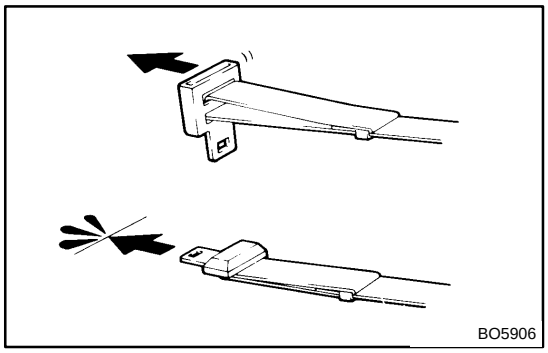
(e) Retract the whole belt, then pull out the belt until 200 mm (7.87 in.)of the belt remaining in the retractor.

(f) Tilt the retractor slowly.



(g) Make sure that the belt can be pulled out at a tilt of 15 degrees or less, and cannot be pulled out at over 45 degrees of tilt.

If a problem is found, replace the assembly.



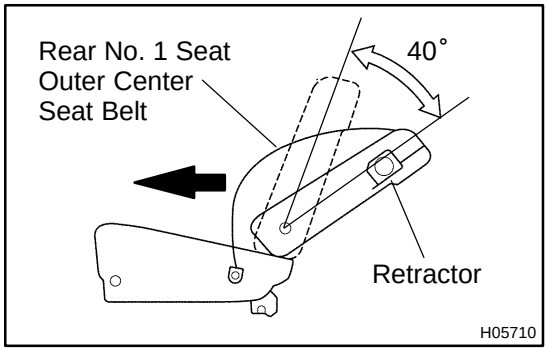
4. Manual type:

TESTING

(a) Adjust the belt to the proper length.

(b) Apply a firm load to the belt.

(c) Make sure that the belt does not extend.

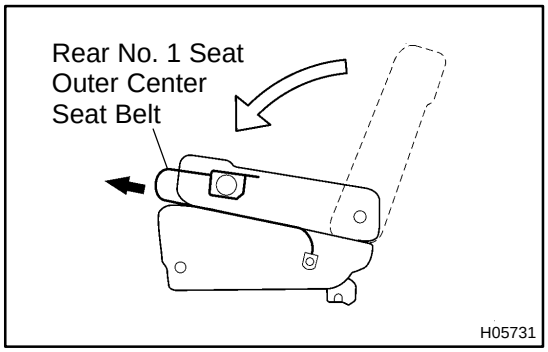


5. INSPECT REAR NO. 1 SEAT CENTER BELT

(a) After pulling out 300 mm (11.81 in.) of the seat belt, check that the belt is locked when pulled out quickly.

(b) Check that the belt can be pulled out 300 mm (11.81 in.) without being locked when the seat is reclined as shown in the illustration.

(c) Check that the belt is locked when the belt is pulled out by a certain amount under (a) condition.



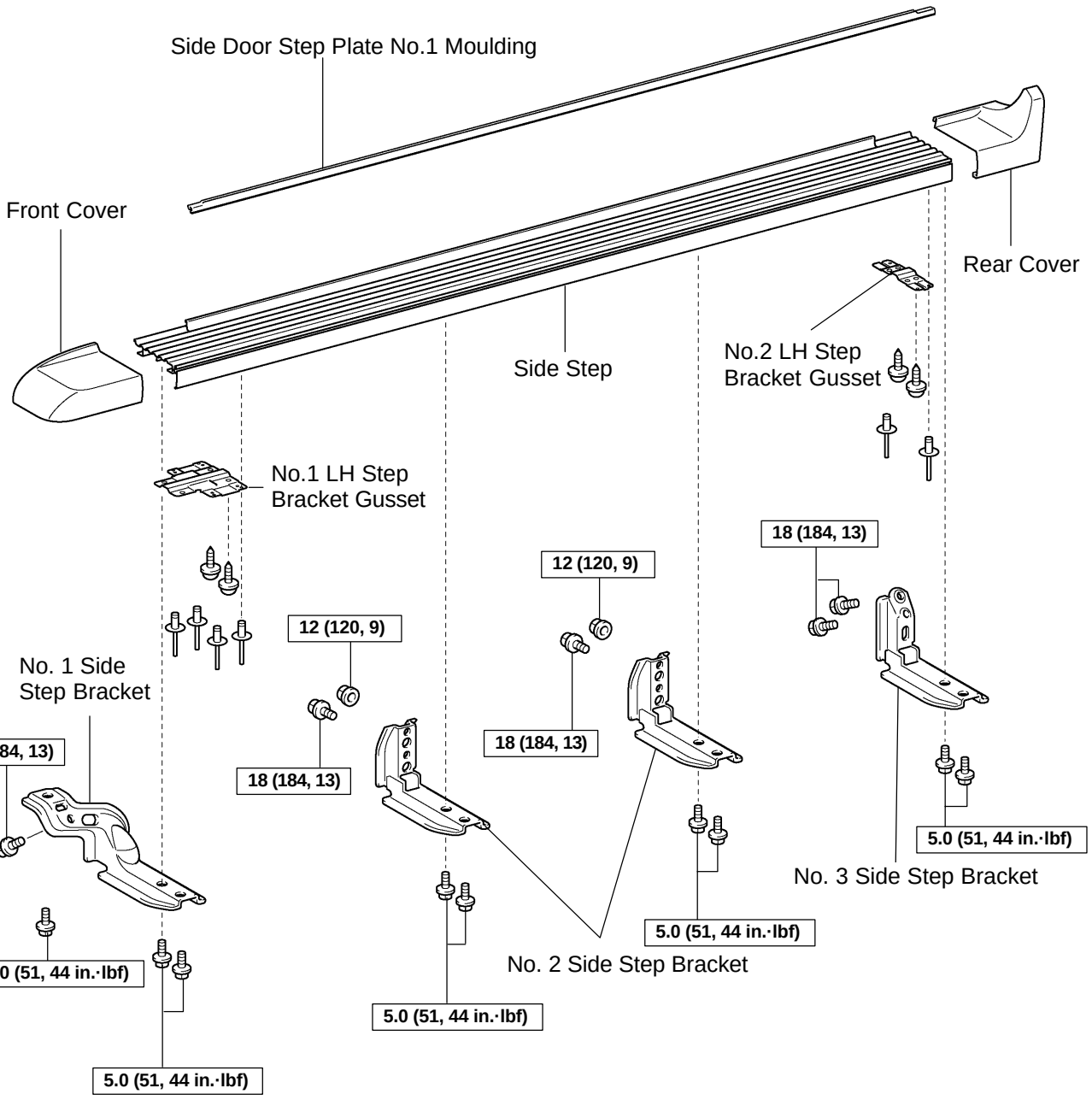
(d) When folding down the seatback forward and extracting the seat belt slowly, check that the belt is locked after a certain length (approx. 500 mm (19.69 in.)) of the belt has been extracted.

SIDE STEP

COMPONENTS

BO4J0-01

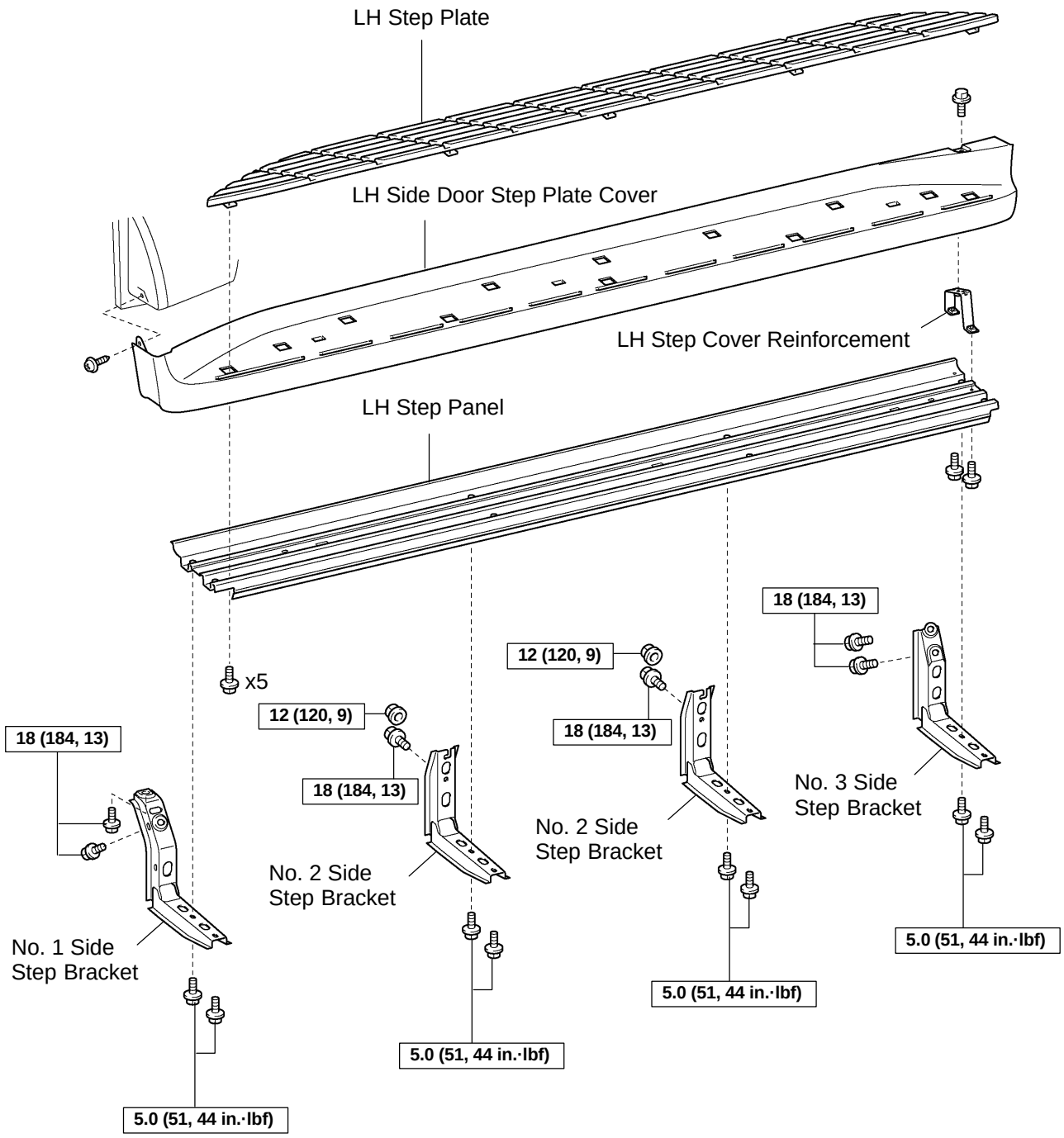
Except Full Cover Type:



C N·m (kgf·cm, ft·lbf) : Specified torque

H21009

Full Cover Type:

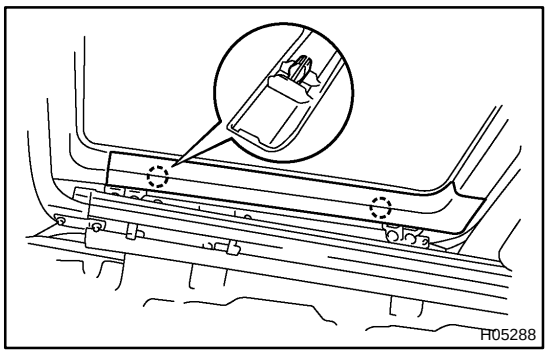


C N·m (kgf·cm, ft·lbf): Specified torque

H21008

BO1KH-02

ADJUSTMENT



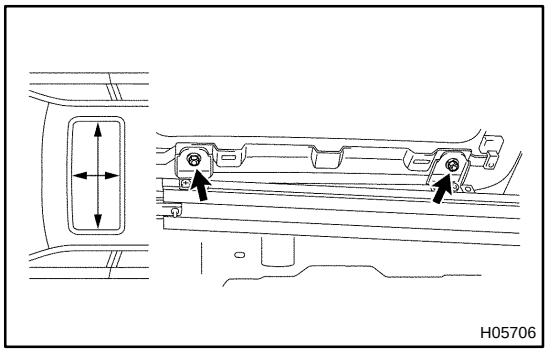
1. REMOVE SIDE GARNISH

Before making adjustment, using a screwdriver, remove the side garnishes.

HINT:

★ Tape the screwdriver tip before use.

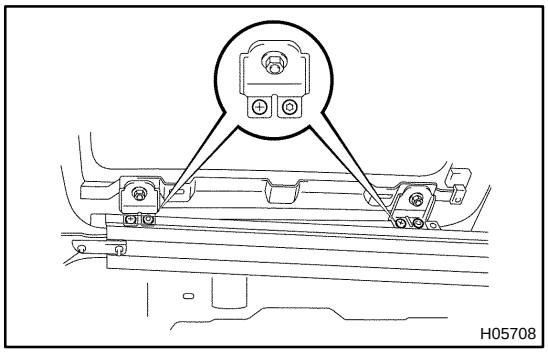
★ After adjustment, reinstall the side garnishes.



2. ADJUST SLIDING ROOF GLASS IN FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

(a) Loosen the sliding roof glass installation nuts.

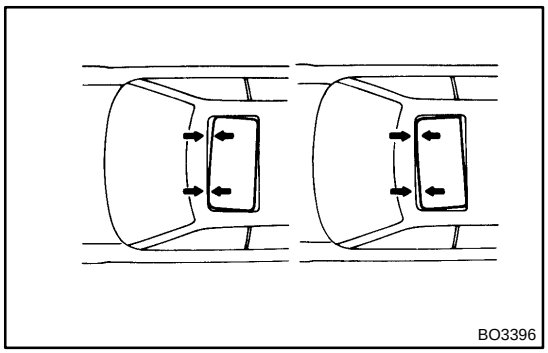
(b) Adjust the sliding roof glass forward/rearward or left/right.



3. ADJUST SLIDING ROOF GLASS IN UPWARD OR DOWNWARD DIRECTIONS

(a) Loosen the screws shown in the illustration.

(b) Adjust the sliding roof glass upward or downward.

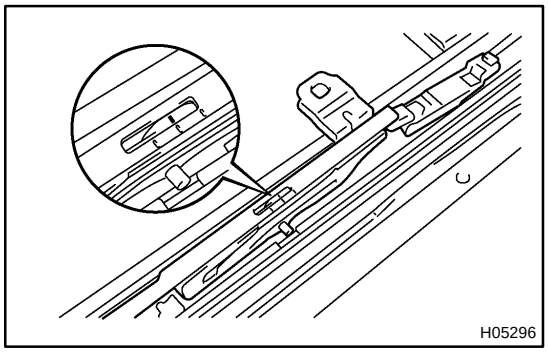


4. ADJUST SLIDING ROOF GLASS IN CLEARANCE (Difference in left and right clearance)

(a) When the front or rear alignment is not correct, remove the drive gear and sliding roof glass, then adjust the drive cables.

NOTICE:

Remove the drive gear with the sliding roof fully closed.

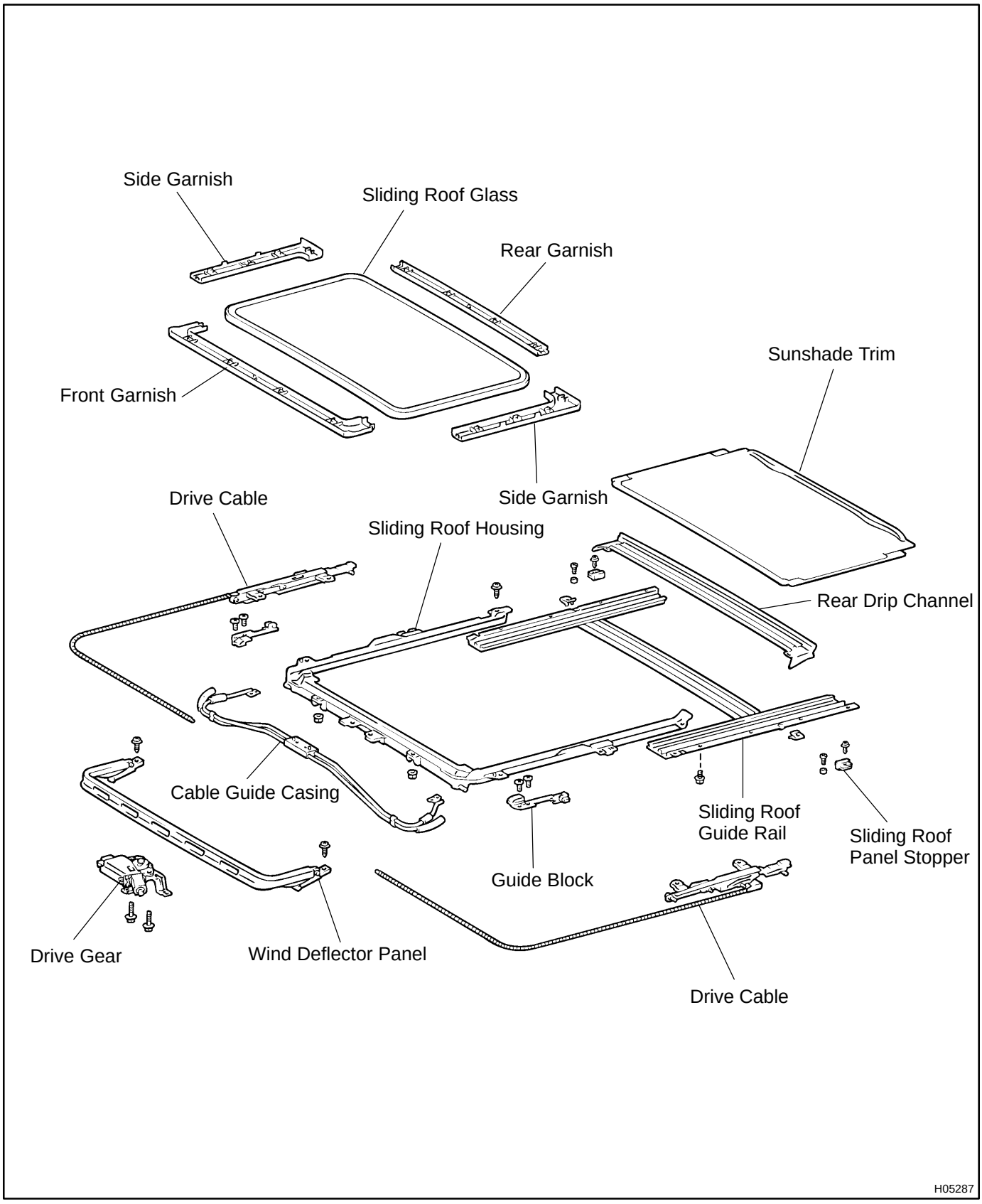


(b) Adjust by sliding the cables forward or rearward to align the 2 marks as shown.

(c) Install the drive gear and sliding roof glass.

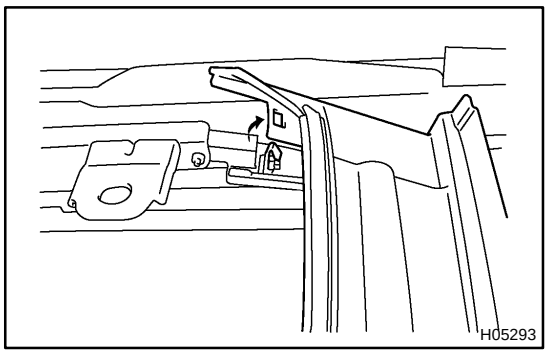
BO1KE-02

COMPONENTS



BO1KG-02

DISASSEMBLY

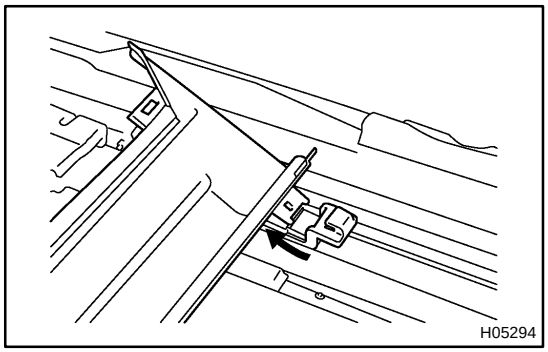


1. REMOVE REAR DRIP CHANNEL

(a) Using a screwdriver, remove the front side of rear drip channel.

HINT:

Tape the screwdriver tip before use.

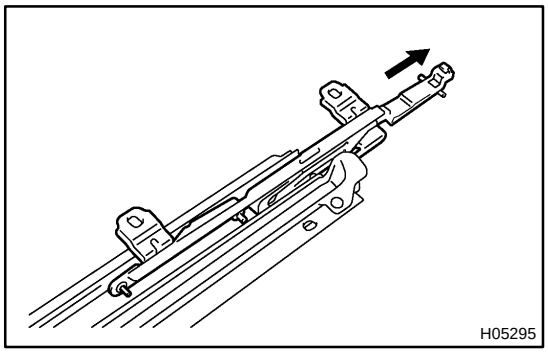


(b) Remove the rear drip channel as shown in the illustration.

2. REMOVE SLIDING ROOF PANEL STOPPERS

Remove the 2 screws and 2 stoppers.

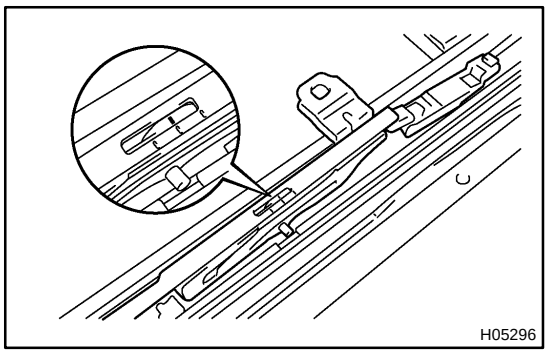
3. REMOVE SUNSHADE TRIM



4. REMOVE DRIVE CABLE

(a) Remove the screw and guide rail stopper.

(b) Slide the drive cable rearward, then remove it.



HINT:

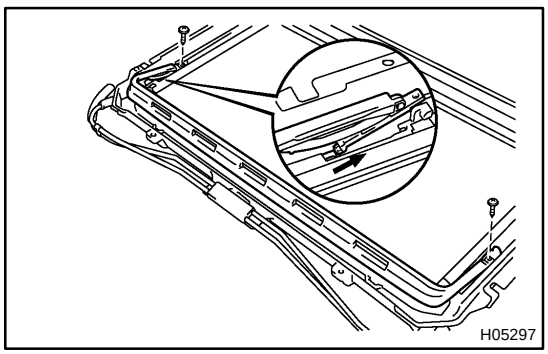
At the time of reassembly, please refer to the following items.

★ Adjust the drive cable to a closed and tilted down position.

★ Slide the cable forward or backward to align the 2 marks as shown.

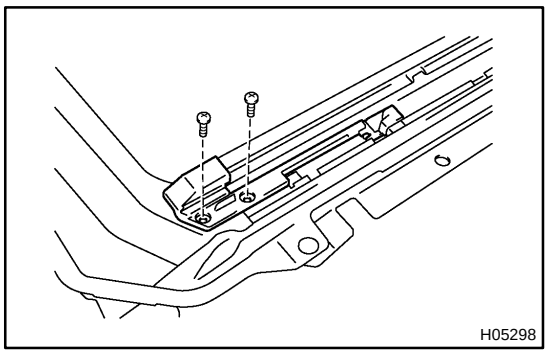
★ Slide the cable to the forefront with your hand.

(c) Employ the same manner described above to the other side.



5. REMOVE WIND DEFLECTOR PANEL

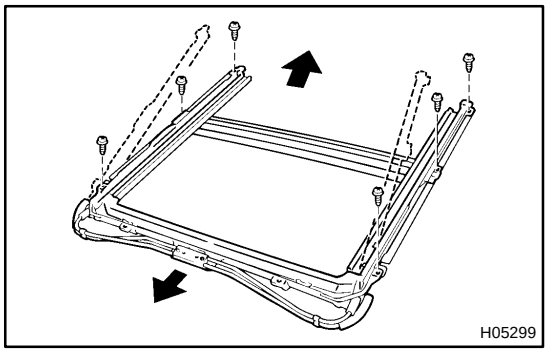
Remove the 2 screws and wind deflector panel as shown in the illustration.



6. REMOVE GUIDE BLOCK

(a) Remove the 2 screws and guide block.

(b) Employ the same manner described above to the other side.



7. REMOVE SLIDING ROOF HOUSING

Remove the 6 screws and sliding roof housing.

8. REMOVE CABLE GUIDE CASING

BO1KJ-02

INSTALLATION

Installation is in the reverse order of removal (See page BO-74).

SLIDING ROOF

BO1KD-02

ON-VEHICLE INSPECTION

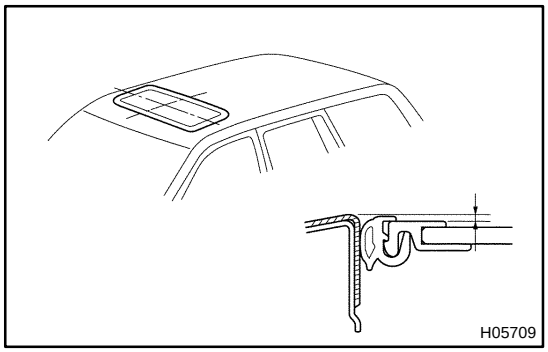
1. INSPECT SLIDING ROOF GLASS

(a) Start the engine and check the operation time of the sliding roof.

Operation time:
Approx. 6 secs.

(b) Check for abnormal noise or binding during operation.

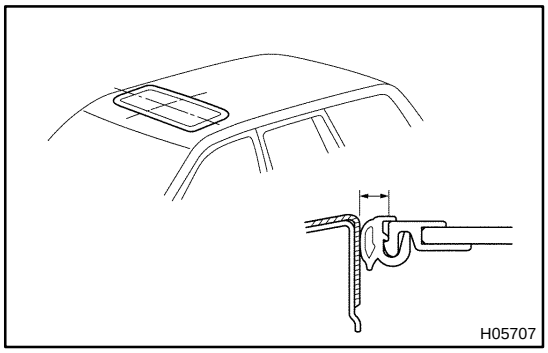
(c) With the sliding roof fully closed, check for water leakage.



2. INSPECT DIFFERENCE IN LEVEL

Inspect the difference in level between the roof panel and sliding roof glass (weatherstrip part) when the sliding roof glass is fully closed.

Except rear end:
0 + 1.5 mm (0 + 0.059 in.)
0 - 1.0 mm (0 - 0.039 in.)
Rear end:
0 ± 1.5 mm (0 ± 0.059 in.)



3. INSPECT SLIDING ROOF GLASS CLEARANCE

Inspect the clearance between the roof panel and sliding roof glass when the sliding roof is fully closed.

Clearance: Uniform all around

BO1KI-01

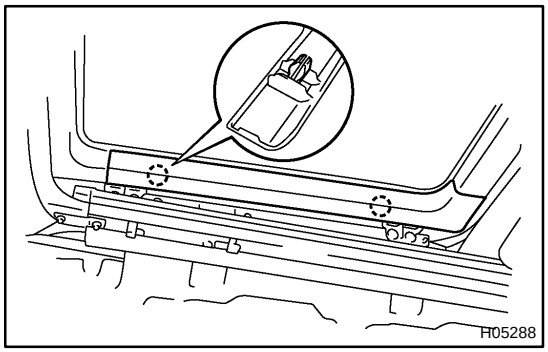
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-76).

BO1KF-03

REMOVAL

1. REMOVE ROOF HEADLINING (See page BO-97)



2. REMOVE SIDE GARNISH

(a) Using a screwdriver, remove the garnish.

HINT:

Tape the screwdriver tip before use.

(b) Employ the same manner described above to the other side.

3. REMOVE FRONT AND REAR GARNISHES

Using a screwdriver, remove the front and rear garnishes.

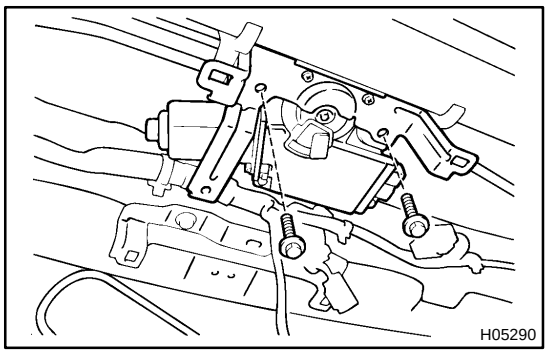
HINT:

Tape the screwdriver tip before use.

4. REMOVE SLIDING ROOF GLASS

(a) Remove the 4 nuts.

(b) Pull the glass upward to remove it.



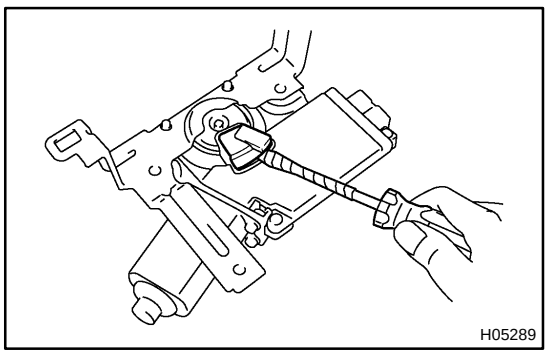
5. REMOVE DRIVE GEAR

NOTICE:

Remove the drive gear with the sliding roof fully closed.

(a) Disconnect the connector.

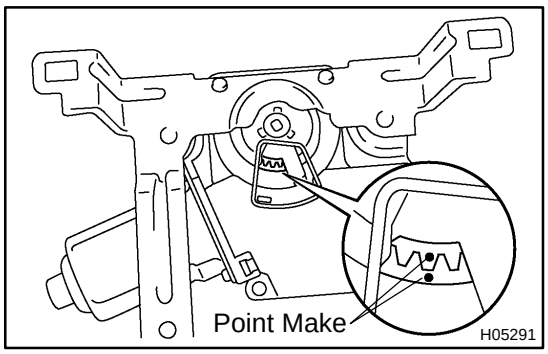
(b) Remove the 2 bolts and drive gear.



(c) Using a screwdriver, remove the cam plate cover.

HINT:

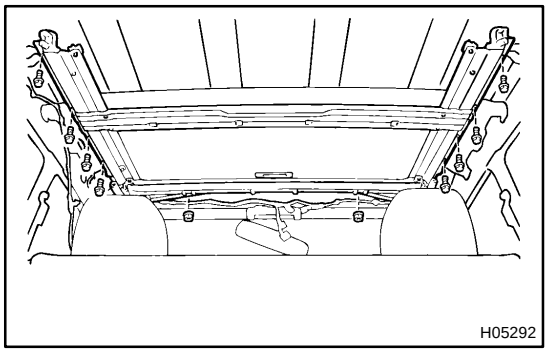
Tape the screwdriver tip before use.



(d) Turn the drive gear to align the point marks as shown in the illustration.
(e) Install the cam plate cover.

NOTICE:

At the time of installation, please refer to the following item. If the sliding roof position and drive gear fully closed position are not matched, the sliding roof does not operate normally.



6. REMOVE SLIDING ROOF HOUSING

(a) Remove the 4 drain hoses from the housing.
(b) Disengage the room light wire harness clamps.
(c) Remove the 8 bolts, 2 nuts and sliding roof housing.

SRS AIRBAG

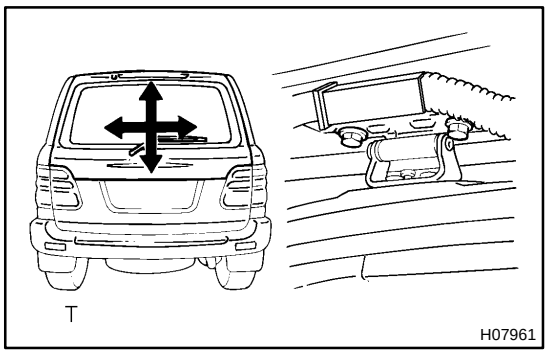
BO0RW-09

PRECAUTION

The LAND CRUISER is equipped with SRS (Supplemental Restraint System) such as the driver airbag and the front passenger airbag. (The side airbag and the curtain shield airbag are optional.) Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during the servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.

BO1JK-03

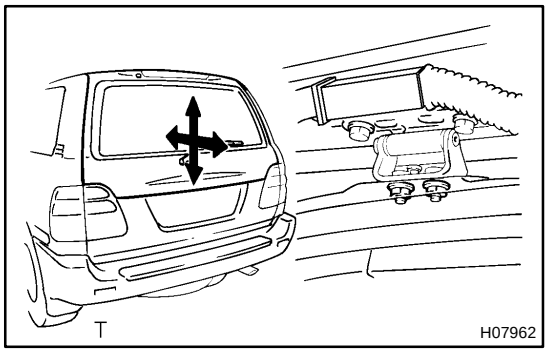
ADJUSTMENT



1. ADJUST DOOR IN LEFT/RIGHT AND VERTICAL DIRECTIONS

Loosen the door side hinge bolts to adjust.

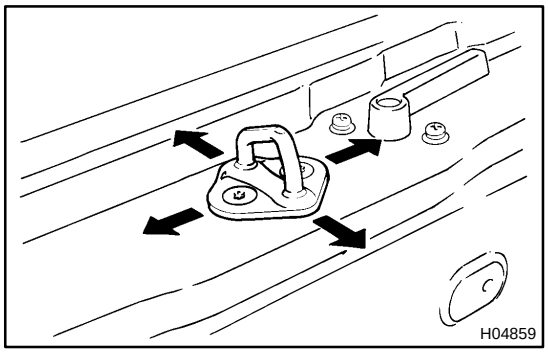
Torque: 28 N·m (286 kgf·cm, 21 ft·lbf)



2. ADJUST DOOR IN FORWARD/REARWARD AND VERTICAL DIRECTIONS

Loosen the body side hinge nuts to adjust.

Torque: 31 N·m (316 kgf·cm, 23 ft·lbf)



3. ADJUST DOOR LOCK STRIKER

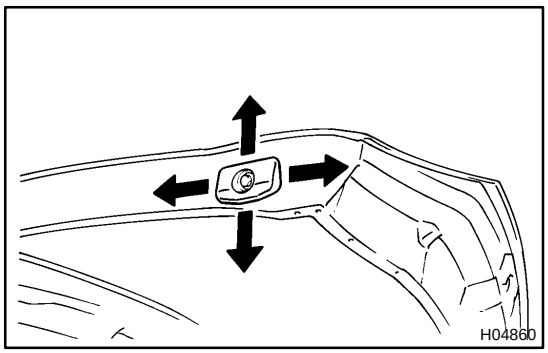
(a) Check that the door fit and door linkages are adjusted correctly.

(b) Using a torx wrench, loosen the door lock striker mounting screws.

Torx wrench: T40 (Part No. 09042-00020 or locally manufactured tool)

Torque: 11.5 N·m (117 kgf·cm, 8 ft·lbf)

(c) Using a plastic hammer, tap the door lock striker to adjust.



4. ADJUST LOWER STOPPER

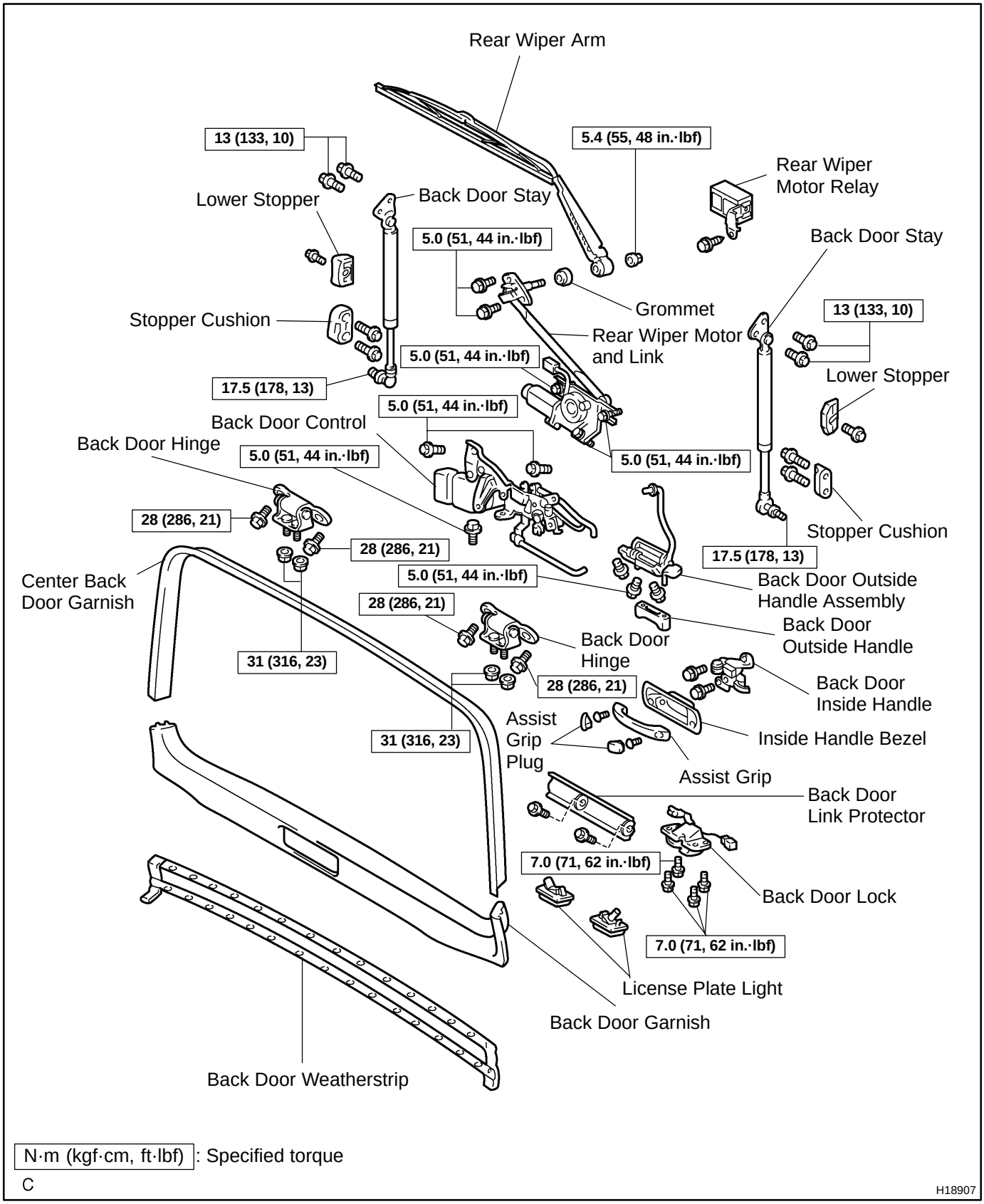
(a) Loosen the stopper mounting bolt to adjust.

(b) Use the same manner described above to the other side.

UPPER BACK DOOR

COMPONENTS

BO1JI-04



BO1JJ-04

DISASSEMBLY

1. REMOVE ASSIST GRIP

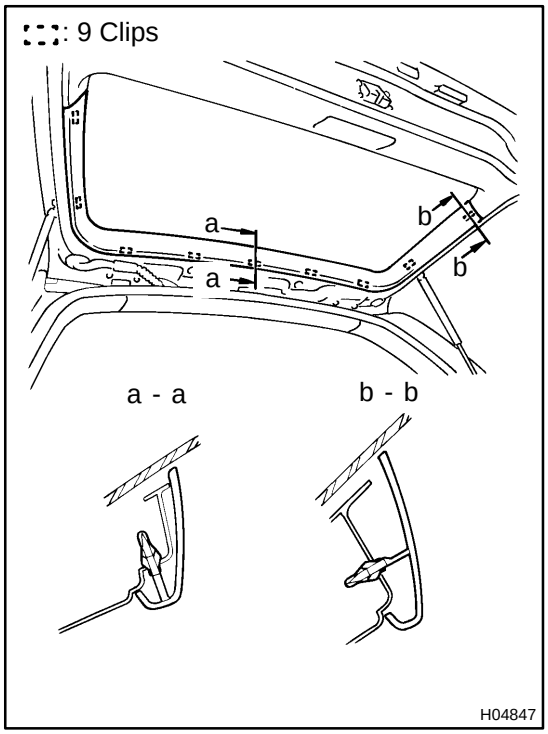
(a) Using a screwdriver, remove the 2 assist grip plugs.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws and assist grip.

2. REMOVE INSIDE HANDLE BEZEL

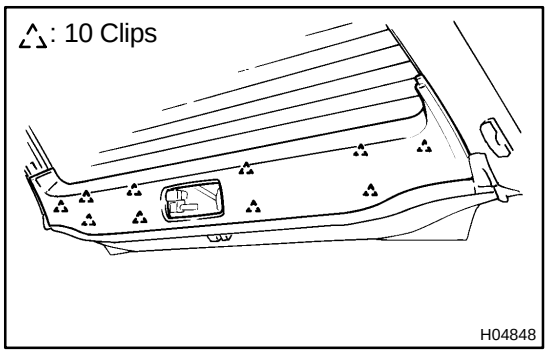


3. REMOVE CENTER BACK DOOR GARNISH

Using a screwdriver, remove the center back door garnish.

HINT:

Tape up the screwdriver tip before use.

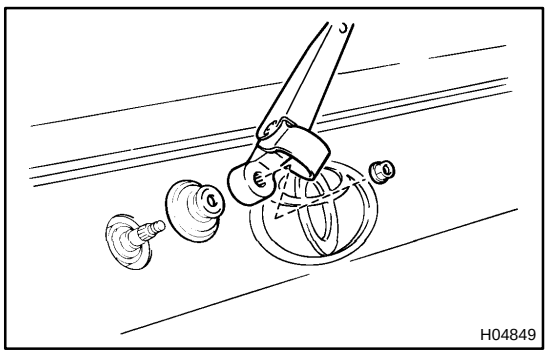


4. REMOVE BACK DOOR GARNISH

Using a screwdriver, remove the back door garnish.

HINT:

Tape up the screwdriver tip before use.



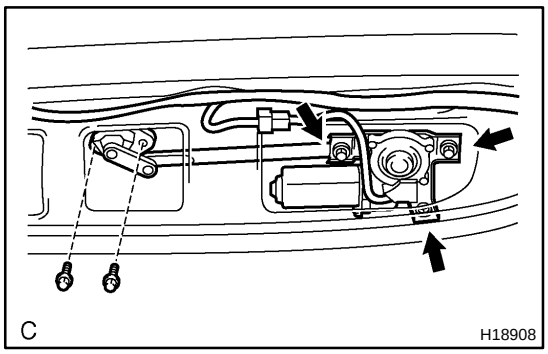
5. REMOVE REAR WIPER ARM

(a) Open the cover.

(b) Remove the nut and rear wiper arm.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(c) Remove the grommet.



6. REMOVE REAR WIPER MOTOR AND LINK ASSEMBLY

(a) Disconnect the connector.

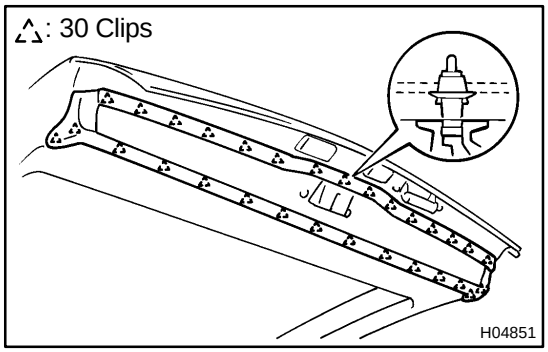
(b) Remove the 2 bolts.

(c) Unfasten the 3 bolts and remove the rear wiper motor and link assembly.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

7. REMOVE REAR WIPER MOTOR RELAY

Remove the bolt and rear wiper motor relay.

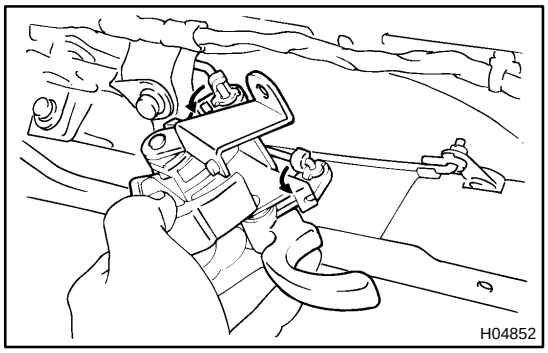


8. REMOVE BACK DOOR WEATHERSTRIP

Remove the back door weatherstrip.

NOTICE:

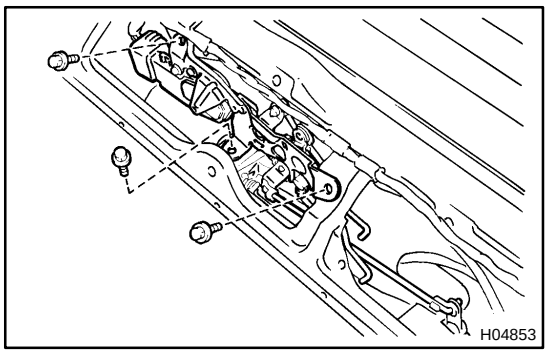
Do not pull strongly on the weatherstrip as it may tear.



9. REMOVE BACK DOOR INSIDE HANDLE

(a) Remove the 2 bolts.

(b) Disconnect the back door lock locking rod and back door lock inside opening link, then remove the back door inside handle.



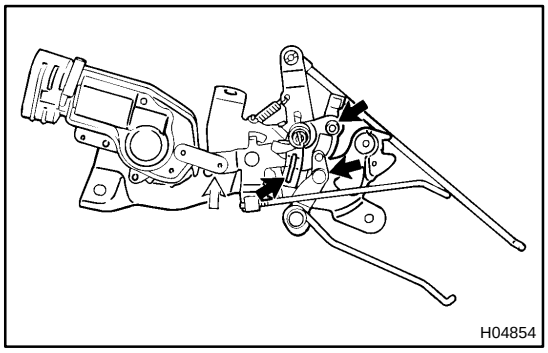
10. REMOVE BACK DOOR CONTROL

(a) Disconnect the links.

(b) Remove the 3 bolts.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

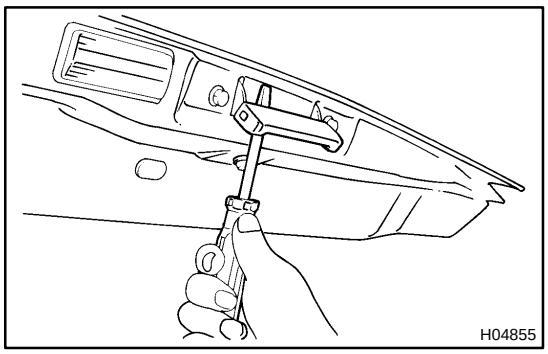
(c) Disconnect the connector, then remove the back door control.



HINT:

At the time of reassembly, please refer to the following item.

Apply MP grease to the sliding surface of the back door control.

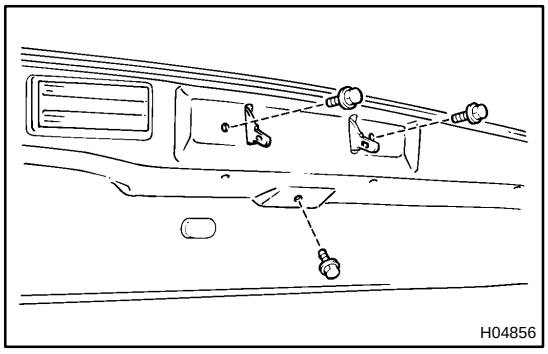


11. REMOVE BACK DOOR OUTSIDE HANDLE ASSEMBLY

(a) Using a screwdriver, remove the back door outside handle.

HINT:

Tape up the screwdriver tip before use.



(b) Remove the 3 bolts and back door outside handle assembly.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

12. REMOVE LICENSE PLATE LIGHTS

13. REMOVE BACK DOOR LOCK

Remove the 4 bolts and back door lock.

Torque: 7.0 N·m (71 ft·lbf, 62 in.·lbf)

14. REMOVE BACK DOOR LINK PROTECTOR

BO1JL-01

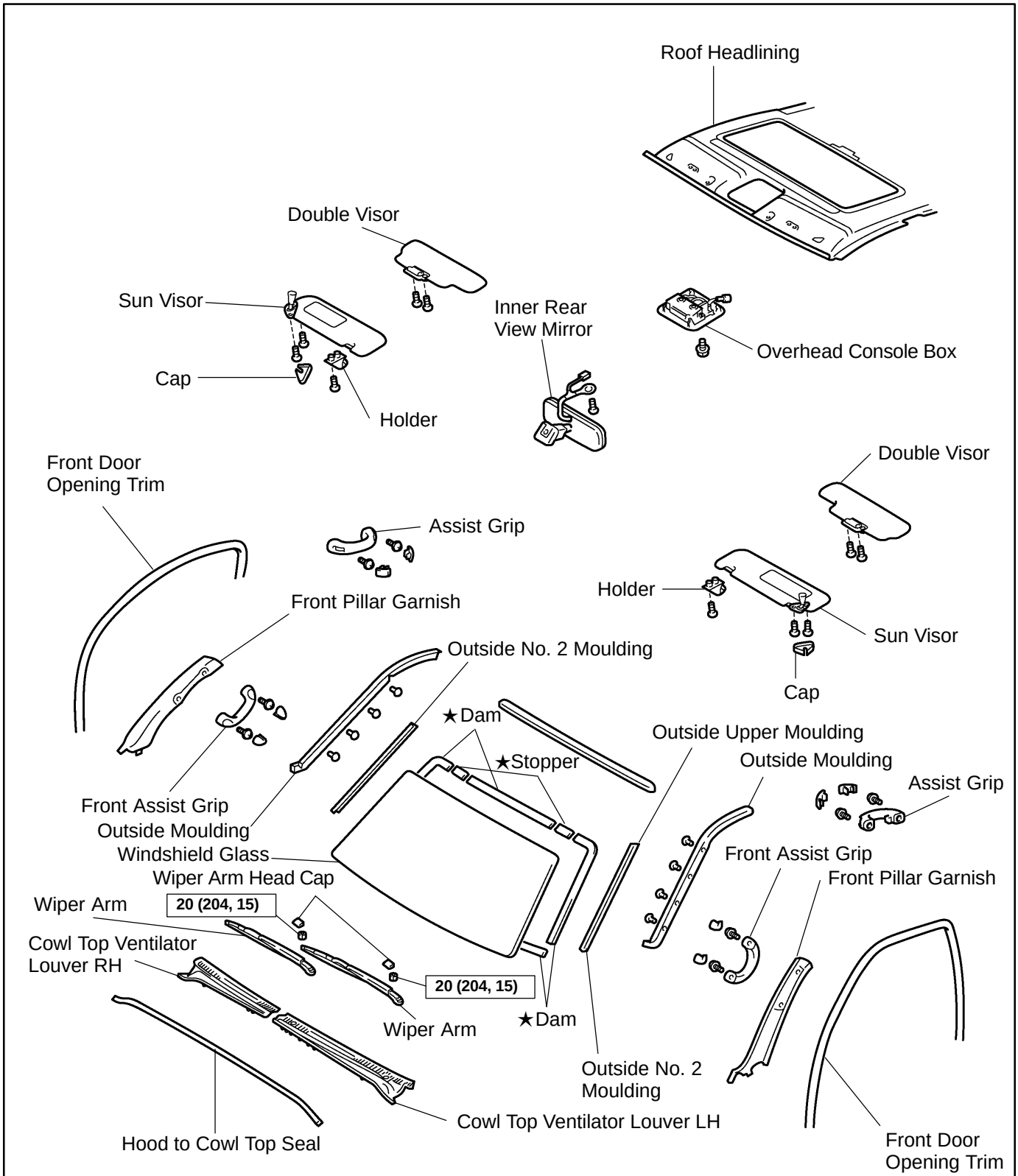
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO-21).

WINDSHIELD

COMPONENTS

BO1K7-04



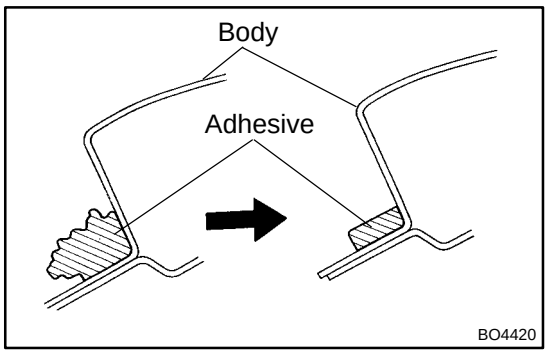
N·m (kgf·cm, ft·lbf) : Specified torque

C ★ Non-reusable part

H18903

BO4IV-01

INSTALLATION



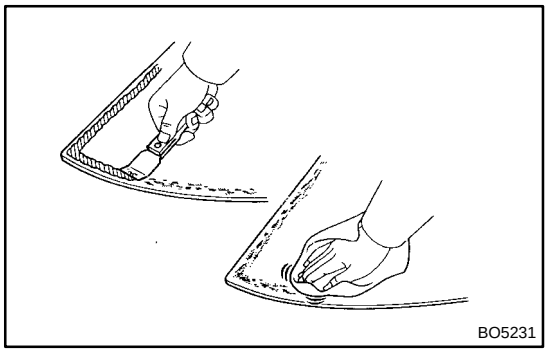
1. CLEAN AND SHAPE CONTACT SURFACE OF BODY

(a) Using a knife, cut away any rough areas on the body.

HINT:

Leave as much adhesive on the body as possible.

(b) Clean the cutting surface of the adhesive with a piece of shop rag dampen with cleanser.



2. CLEAN REMOVED GLASS

(a) Remove the damaged stoppers and dams.

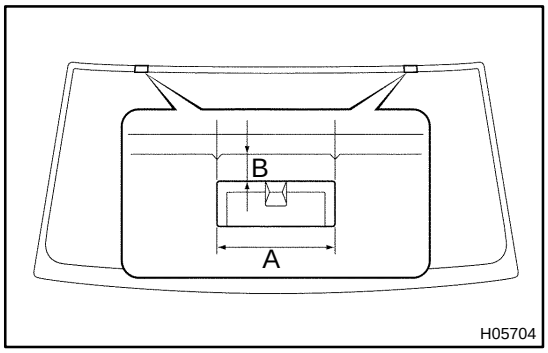
(b) Using a scraper, remove the adhesive sticking to the glass.

(c) Clean the glass with cleanser.

NOTICE:

★ **Do not touch the glass surface after cleaning it.**

★ **Be careful not to damage the glass.**

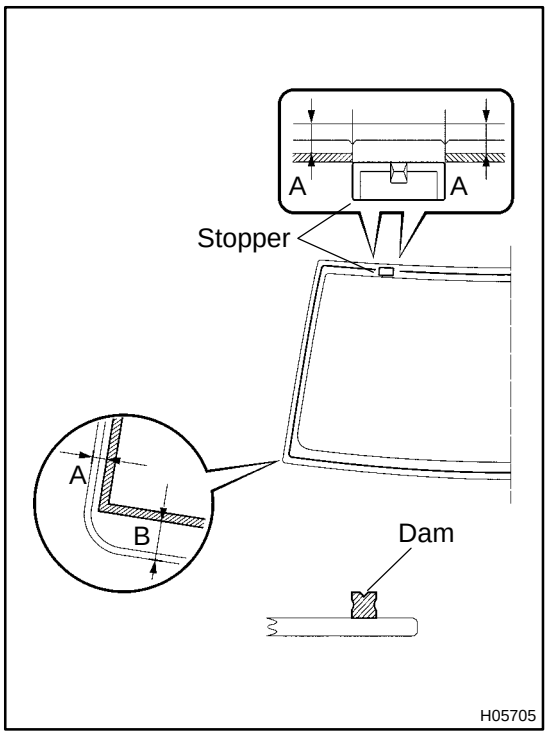


3. INSTALL NEW STOPPERS

Install new stoppers onto the glass.

A: 9 mm (0.35 in.)

B: 25 mm (0.98 in.)



4. INSTALL NEW DAMS

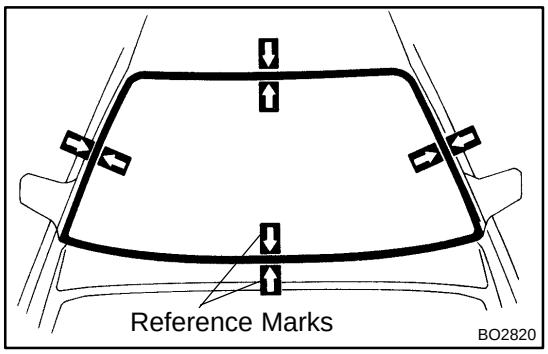
Install new dams with adhesive tape as shown in the illustration.

A: 7 mm (0.28 in.)

B: 20 mm (0.79 in.)

NOTICE:

Do not touch the glass surface after cleaning it.



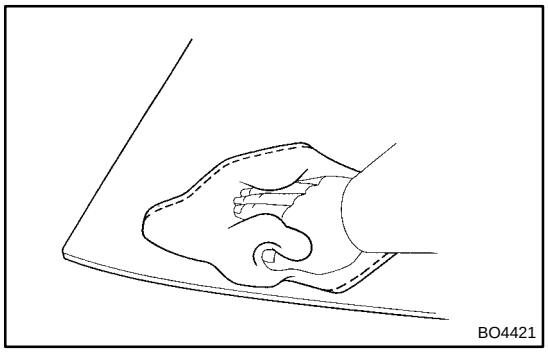
5. POSITION GLASS

(a) Place the glass in the correct position.

(b) Check that all contacting parts of the glass rim are perfectly even.

(c) Place reference marks between the glass and the body.

(d) Remove the glass.

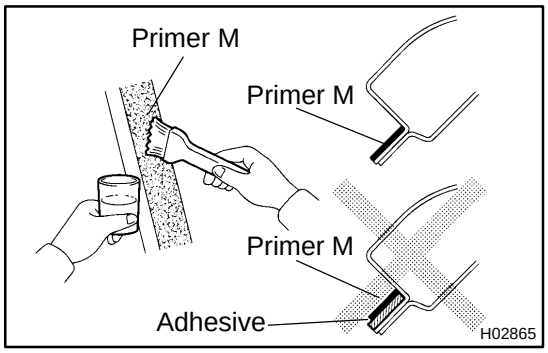


6. CLEAN CONTACT SURFACE OF GLASS

Using cleanser, clean the contact surface which is black-colored area around the entire glass rim.

NOTICE:

Do not touch the glass surface after cleaning it.

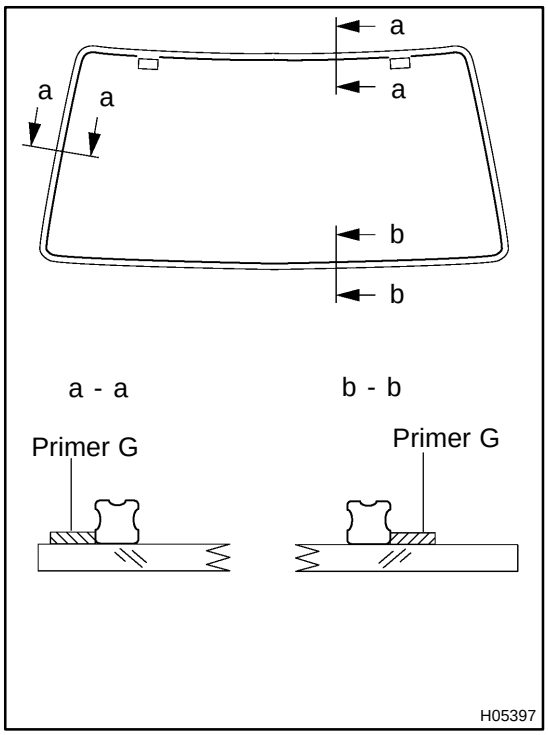


7. COAT CONTACT SURFACE OF BODY WITH PRIMER "M"

Using a brush, apply Primer M to the exposed part of the body on the vehicle side.

NOTICE:

- ★ **Let the primer coating dry for more than 3 minutes.**
- ★ **Do not coat Primer M to the adhesive.**
- ★ **Do not keep remaining Primer M for later use.**



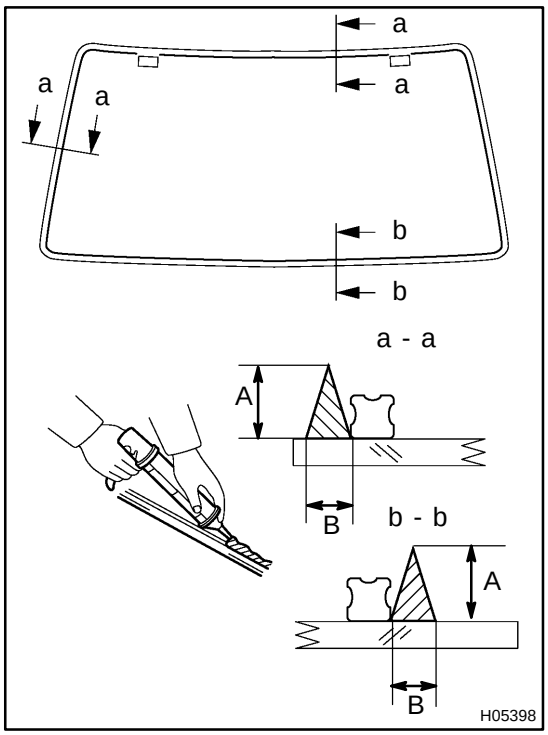
8. COAT CONTACT SURFACE OF GLASS WITH PRIMER "G"

(a) Using a brush or sponge, coat the edge of the glass and the contact surface with Primer G.

(b) If the primer is coated wrongly to the area not specified by accident, wipe it off with a clean shop rag before the primer dries.

NOTICE:

- ★ **Let the primer coating dry for more than 3 minutes.**
- ★ **Do not keep remaining Primer G for later use.**



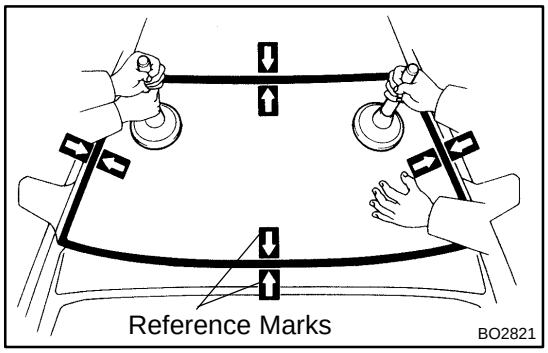
9. APPLY ADHESIVE

(a) Cut off the tip of the cartridge nozzle.
Part No.08850-00801 or equivalent.

HINT:
After cutting off the tip, finish up all adhesive within the time described in the table below.

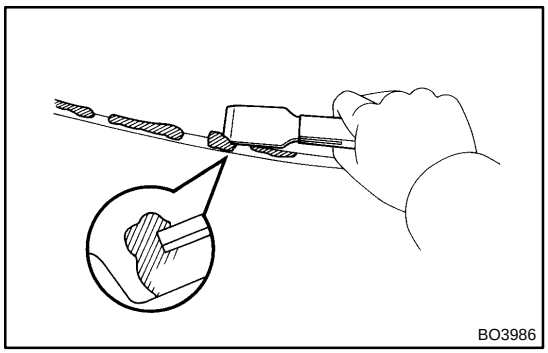
Temperature	Tackfree time
35 ˚C (95 ˚F)	15 minutes
20 ˚C (68 ˚F)	100 minutes
5 ˚C (41 ˚F)	8 hours

(b) Load the cartridge into the sealer gun.
(c) Coat the glass with adhesive as shown.
A: 12.0 mm (0.472 in.)
B: 8.0 mm (0.315 in.)

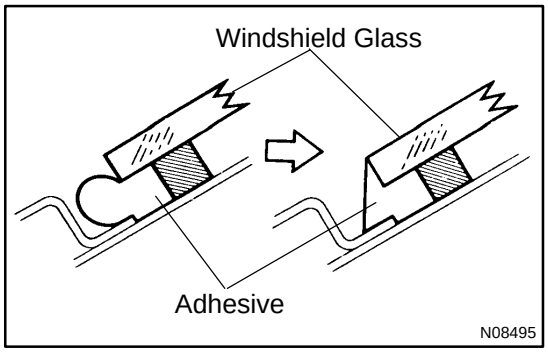


10. INSTALL WINDSHIELD GLASS

(a) Position the glass so that the reference marks are lined up, and press in gently along the rim.
(b) Using a spatula, apply adhesive on the glass rim.



(c) Use a scraper to remove any excess or protruding adhesive.



HINT:
Make sure the dam is attached to the body panel, as shown in the illustration.

(d) Hold the windshield glass in place securely with a protective tape or equivalent until the adhesive hardens.

NOTICE:

Take care not to drive the vehicle within the time described in the table below.

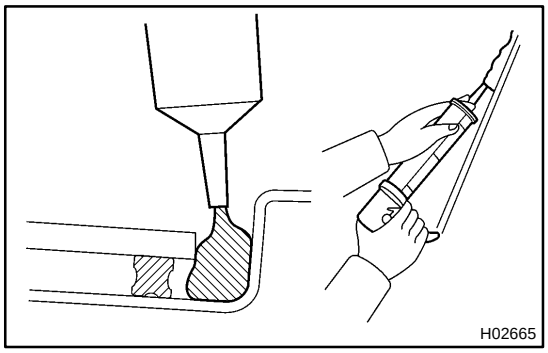
Temperature	Minimum time prior to driving the vehicle
35 ˚C (95 ˚F)	1.5 hours
20 ˚C (68 ˚F)	5 hours
5 ˚C (41 ˚F)	24 hours

11. INSPECT FOR LEAK AND REPAIR

(a) Conduct a leak test after the adhesive dried completely.

(b) Seal any leak with sealant.

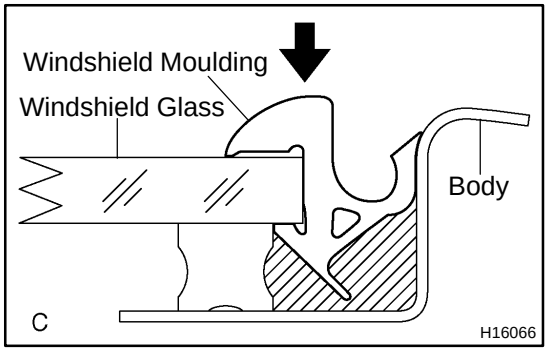
Part No. 08833-00030 or equivalent.



12. APPLY ADHESIVE TO MOULDING INSTALLATION AREA

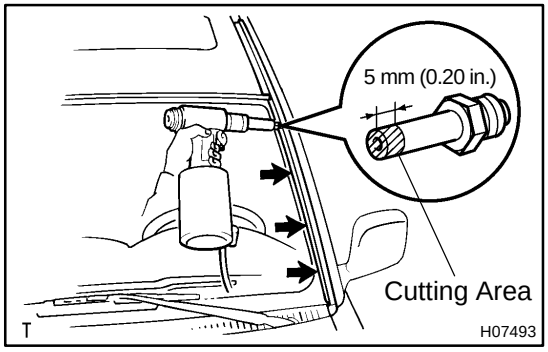
Apply adhesive to the moulding installation area between the glass and the body.

Part No. 08833-00030 or equivalent.



13. INSTALL UPPER OUTSIDE MOULDING

Place a new moulding onto the body and tap it by hand.

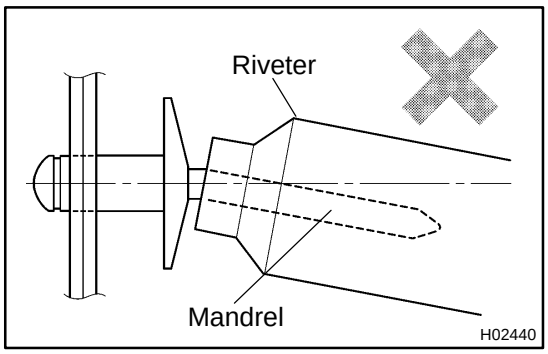


14. INSTALL OUTSIDE NO. 2 MOULDING

(a) Using an air riveter with nose piece No. 4, install 4 new rivets and the outside No. 2 moulding.

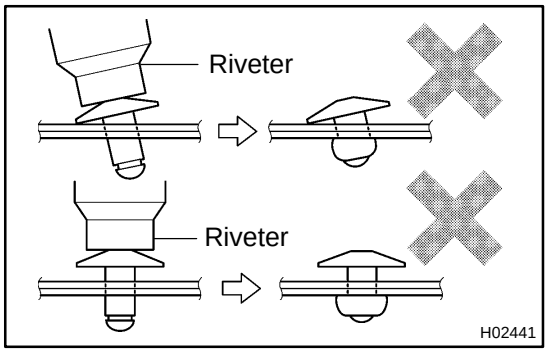
HINT:

Before using the air riveter with nose piece No. 4, cut 5 mm (0.20 in.) from the edge of nose piece No. 4 as shown in the illustration.



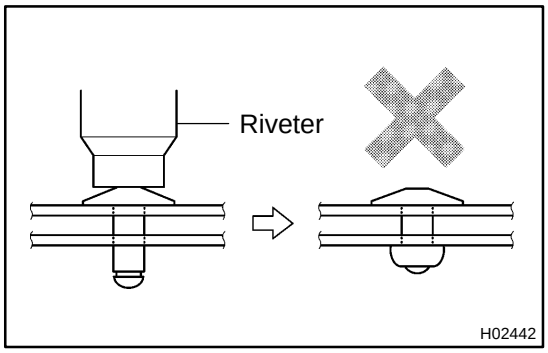
NOTICE:

★ **Do not prize a riveter. It could damage the riveter and cause loose fitting and mandrel bend.**



★ **Do not tilt the riveter when fasten the rivet to the material to avoid loose fitting.**

★ **Do not allow gap spacing between the rivet head and the material.**



★ **Do not allow gap spacing between the materials.**

(b) Use the same manner described above to the other side.

15. INSTALL COWL TOP VENTILATOR LOUVERS

(a) Install the cowl top ventilator louver LH.

(b) Install the cowl top ventilator louver RH.

16. INSTALL HOOD TO COWL TOP SEAL

17. INSTALL WIPER ARMS

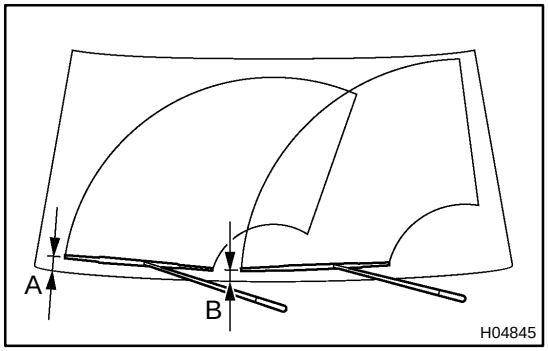
(a) Operate the wiper motor once and turn the wiper switch OFF.

(b) Install the wiper arms and tighten the nuts by hand.

(c) Adjust the installation positions of the wiper arms to the positions as shown in the illustration.

A: Approx. 33 mm (1.30 in.)

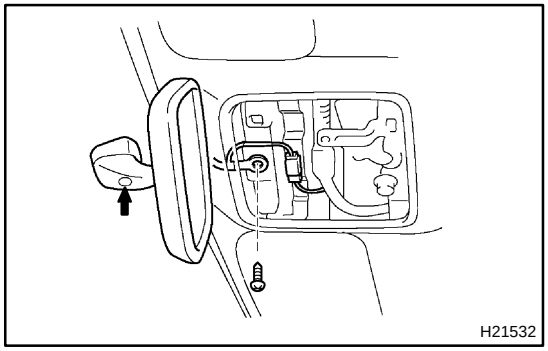
B: Approx. 21 mm (0.83 in.)



(d) Torque the nuts.

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

(e) Install the 2 wiper arm head caps.



18. INSTALL INNER REAR VIEW MIRROR

(a) Install the inner rear view mirror with the 2 screws.

(b) Connect the connector.

19. INSTALL FRONT SIDE OF ROOF HEADLINING

20. INSTALL ASSIST GRIPS

21. INSTALL OVERHEAD CONSOLE BOX

Connect the connector, then install the overhead console box with the bolt.

22. INSTALL HOLDER

Install the holders with the screws.

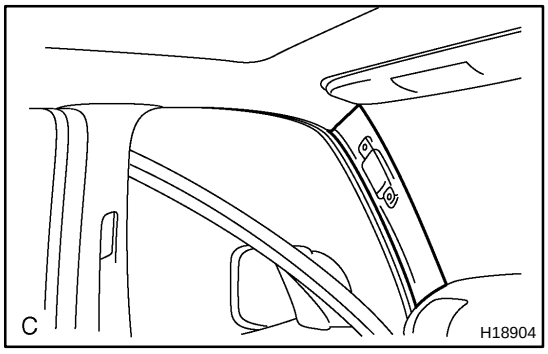
23. INSTALL DOUBLE VISOR

Install the double visors with the screws.

24. INSTALL SUN VISOR

(a) Install the sun visors with the screws, then connect the connectors.

(b) Install the caps.



25. INSTALL FRONT PILLAR GARNISH

(a) Install the front pillar garnish.

(b) Use the same manner described above to the other side.

26. INSTALL FRONT ASSIST GRIP

(a) Install the front assist grip with the 2 screws, then install the 2 assist grip plugs.

(b) Use the same manner described above to the other side.

27. INSTALL FRONT DOOR OPENING TRIMS

BO4IU-01

REMOVAL

1. REMOVE FRONT DOOR OPENING TRIMS

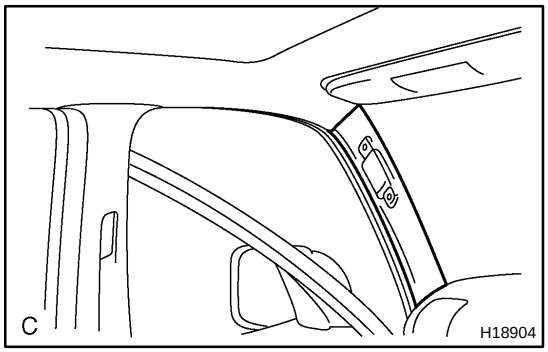
2. REMOVE FRONT ASSIST GRIP

(a) Using a screwdriver, remove the 2 assist grip plugs, then remove the 2 screws and the front assist grip.

HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.



3. REMOVE FRONT PILLAR GARNISH

(a) Using a screwdriver, remove the front pillar garnish.

HINT:

Tape up the screwdriver tip before use.

(b) Use the same manner described above to the other side.

4. REMOVE SUN VISOR

(a) Using a screwdriver, remove the caps.

HINT:

Tape up the screwdriver tip before use.

(b) Remove the screws, then disconnect the connectors.

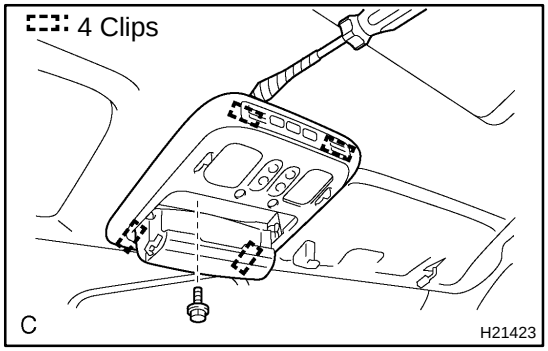
(c) Remove the sun visors.

5. REMOVE DOUBLE VISOR

Remove the screws and the double visors.

6. REMOVE HOLDER

Remove the screws and the holders.



7. REMOVE OVERHEAD CONSOLE BOX

(a) Remove the bolt.

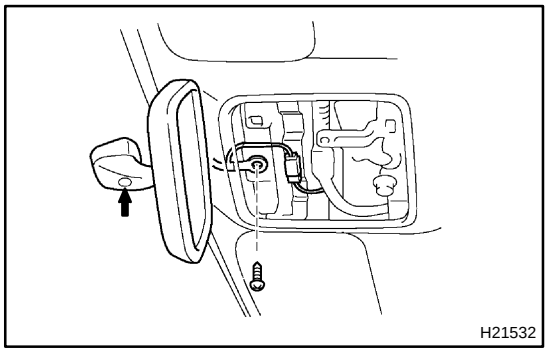
(b) Using a screwdriver, remove the overhead console box, then disconnect the connector.

HINT:

Tape up the screwdriver tip before use.

8. REMOVE ASSIST GRIPS

9. PULL DOWN FRONT SIDE OF ROOF HEADLINING



10. REMOVE INNER REAR VIEW MIRROR

(a) Disconnect the connector.

(b) Unfasten a screw, and remove the other screw and the inner rear view mirror.

11. REMOVE WIPER ARMS

(a) Remove the 2 wiper arm head caps and the 2 nuts.

(b) Remove the 2 wiper arms.

12. REMOVE HOOD TO COWL TOP SEAL

13. REMOVE COWL TOP VENTILATOR LOUVERS

(a) Remove the cowl top ventilator louver RH.

(b) Remove the cowl top ventilator louver LH.

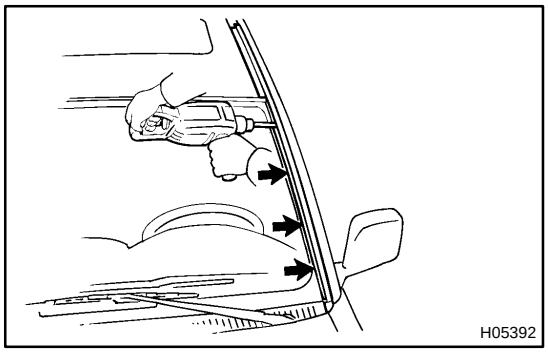
14. REMOVE OUTSIDE NO. 2 MOULDING

(a) Using a screwdriver, remove the outside No. 2 moulding.

HINT:

Tape up the screwdriver tip before use.

(b) Using a drill of less then ø 4 mm (0.16 in.).



(c) Gently and vertically put the drill to the rivet and cut the rivet flanges.

NOTICE:

- ★ **Prizing the hole with a drill can lead to damage to the rivet hole or breaking the drill.**
- ★ **Take cafe as the cut rivet is hot.**

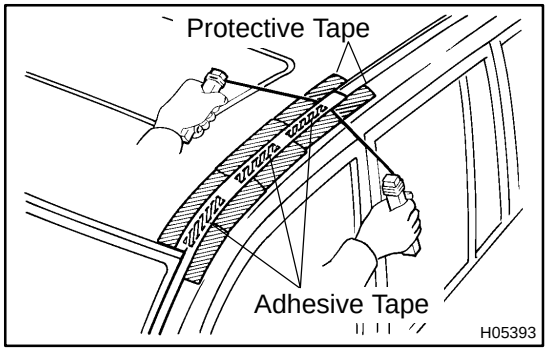
(d) Even if flange is taken off, continue drilling and push out remaining fragments with the drill.

(e) Using a heat light, heat the moulding to 20 - 30 ˚C (68 - 86 ˚F).

NOTICE:

Do not heat the moulding excessively.

(f) Tie both piano wire ends to wooden blocks or similar objects.



(g) Cut the adhesive tape by pulling the piano wire as shown.

NOTICE:

- ★ **If reusing the moulding, take care not to damage the moulding.**
- ★ **Do not damage the body.**

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.

(h) Remove the moulding.

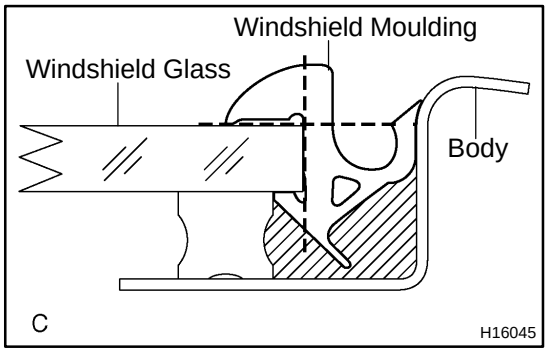
(i) Use the same manner described above to the other side.

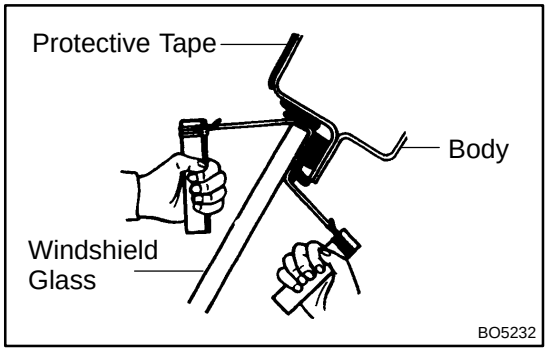
15. REMOVE OUTSIDE UPPER MOULDING

Using a knife, cut off the moulding as shown in the illustration.

NOTICE:

Do not damage the body with the knife.





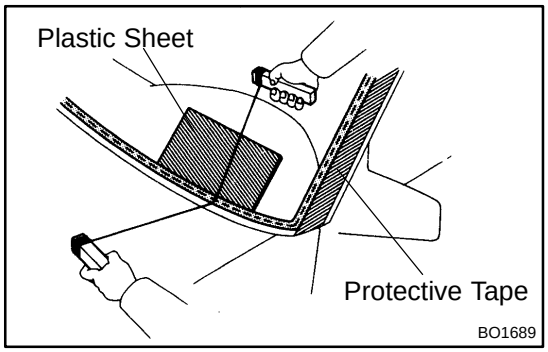
16. REMOVE WINDSHIELD GLASS

(a) Push piano wire through between the body and glass from the interior.

(b) Tie both wire ends to wooden blocks or similar objects.

HINT:

Apply protective tape to the outer surface to keep the surface from being scratched.



NOTICE:

When separating the glass, take care not to damage the paint and interior and exterior ornaments. To prevent scratching the safety pad from scratching when removing the windshield, place a plastic sheet between the piano wire and the safety pad.

(c) Cut the adhesive by pulling the piano wire around it.

(d) Remove the windshield glass.

NOTICE:

Leave as much of the adhesive on the body as possible when cutting the glass.

BRAKE FLUID

BR12E-07

BLEEDING

HINT:

- If any work is done on the brake system or if air in the brake lines is suspected, bleed the air from the system.
- When bleeding, keep the amount of the fluid within the line of reservoir between Min. and Max.

NOTICE:

- **Do not let brake fluid remain on painted surfaces. Wash it off immediately.**
- **With the reservoir cap removed, when depressing the brake pedal, the fluid will spray.**

1. FILL RESERVOIR WITH BRAKE FLUID
Fluid: SAE J1703 or FMVSS NO. 116 DOT3

2. In case of using TOYOTA hand-held tester:
BLEED HYDRAULIC BRAKE BOOSTER

HINT:

If the hydraulic brake booster has been disassembled, disconnect the brake line from the hydraulic brake booster or if the reservoir becomes empty, bleed the hydraulic brake booster.

(a) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Turn the ignition switch ON, check that the pump stops after approx. 30 to 40 sec.

NOTICE:

When the pump does not stop, repeat step (a) and (b) again.

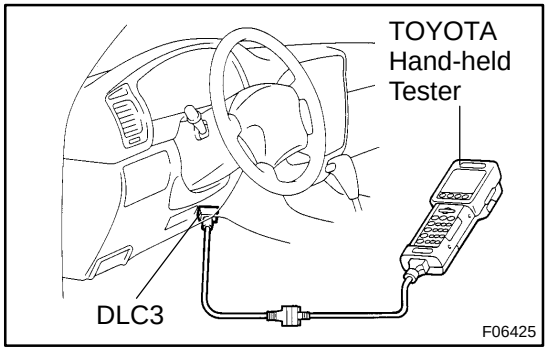
(c) With the ignition switch remained ON, depress the brake pedal more than 20 times.

(d) Observe the procedure in step 4 and bleed the right and left front brake caliper.

(e) Holding the brake pedal depressed, bleed the right and left rear brake caliper.

HINT:

It is not necessary to depress the pedal continuously, as brake fluid flows out by first depressing.



(f) Connect TOYOTA hand-held tester.

(1) Turn the ignition switch OFF, connect the TOYOTA hand-held tester to DLC3.

(2) Turn the ignition switch ON and select ”AIR BLEEDING” on the TOYOTA hand-held tester.

HINT:

Please refer to the TOYOTA hand-held tester operator’s manual for further details.

(g) Bleed right front brake line.
  (1) Select ”FR LINE” on the TOYOTA hand-held tester.
  (2) With ”FR LINE” turned ON with the TOYOTA hand-held tester, depress the brake pedal and hold it to bleed the right front brake caliper.
  (3) Repeat step (2) until there are no more air bubbles in the fluid.

(h) Bleed left front brake line.
  (1) Select ”FL LINE” on the TOYOTA hand-held tester.
  (2) With ”FL LINE” turned ON with the TOYOTA hand-held tester, depress the brake pedal and hold it to bleed the left front brake caliper.
  (3) Repeat step (2) until there are no more air bubbles in the fluid.

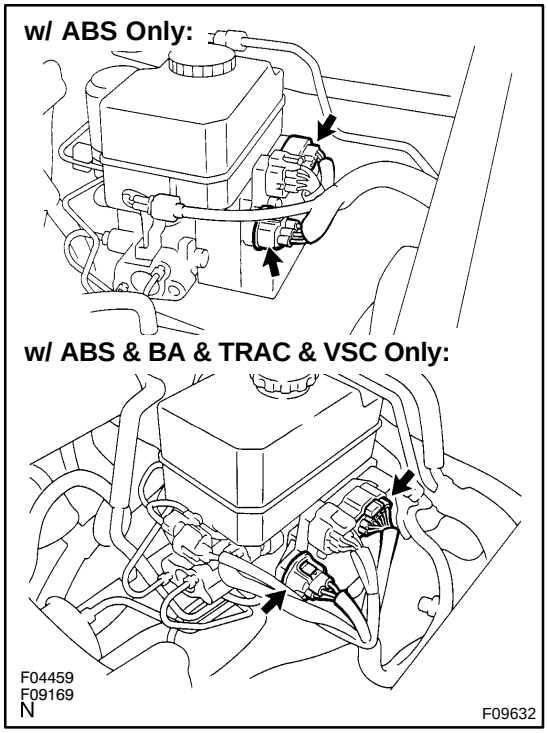
(i) w/ ABS & TRAC & VSC only:
Bleed rear brake line.
  (1) Select ”RR LINE” on the TOYOTA hand-held tester.
  (2) With ”RR LINE” turned ON with the TOYOTA hand-held tester, bleed the left and right rear brake caliper.

(j) Disconnect the TOYOTA hand-held tester from DLC3.

(k) Clear the DTC (See page DI-505).

3. In case of using ABS actuator checker (SST): BLEED HYDRAULIC BRAKE BOOSTER

HINT:
If the hydraulic brake booster has been disassembled, disconnect the brake line from the hydraulic brake booster or if the reservoir becomes empty, bleed the hydraulic brake booster.

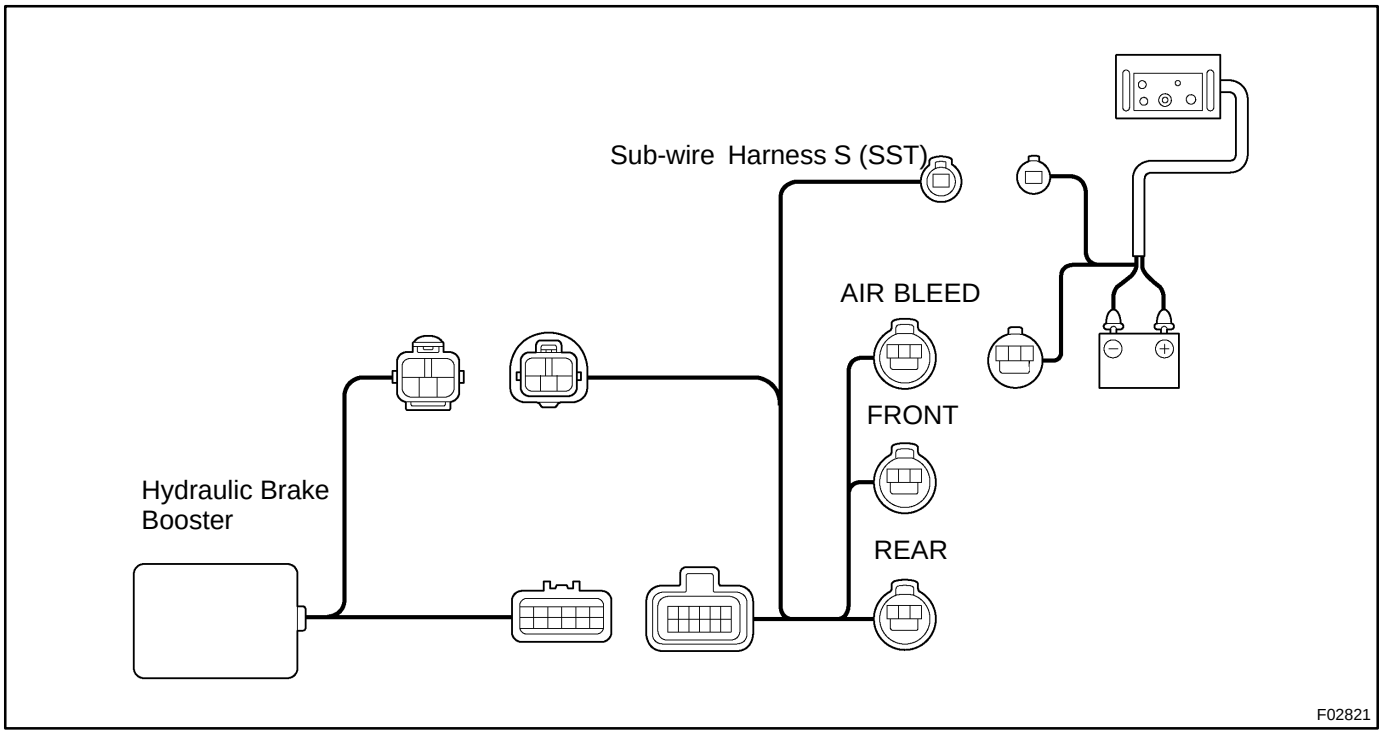


(a) Disconnect the 2 connectors from the hydraulic brake booster.

(b) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub-wire harness (SST), as shown in the chart below.
SST 09990-00150, 09990-00480

HINT:
Connect the connector with the label of "AIR BLEED" attached to the connector of actuator checker.

(c) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (-) terminal.



(d) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(e) Turn the ignition switch ON, check that the pump stops after 30 to 40 sec.

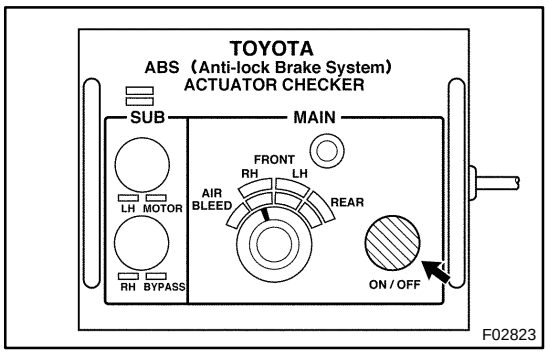
NOTICE:
When the pump does not stop, repeat step (d) and (e) again.

(f) With the ignition switch remained ON, depress the brake pedal more than 20 times.

(g) Observe the procedure in step 4 and bleed the right and left front wheel caliper.

(h) Holding the brake pedal depressed, bleed the right and left rear brake caliper.

HINT:
It is not necessary to depress the pedal continuously, as brake fluid flows out by first depressing.



(i) Bleed right front brake line.

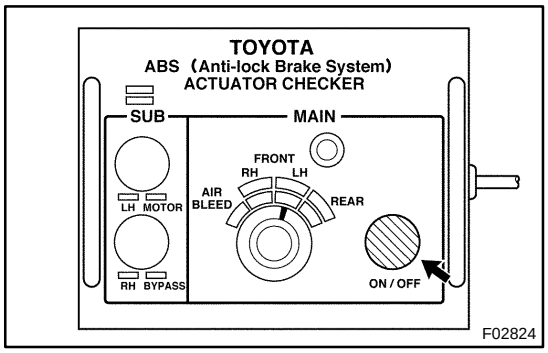
(1) Turn the selector switch of the actuator checker to the ”FRONT RH” position.

(2) Push and hold in MAIN push switch, depress the brake pedal and hold it to bleed the right front brake caliper.

NOTICE:

Do not keep the MAIN switch pushed in for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(3) Repeat step (2) until there are no more air bubbles in the fluid.



(j) Bleed left front brake line.

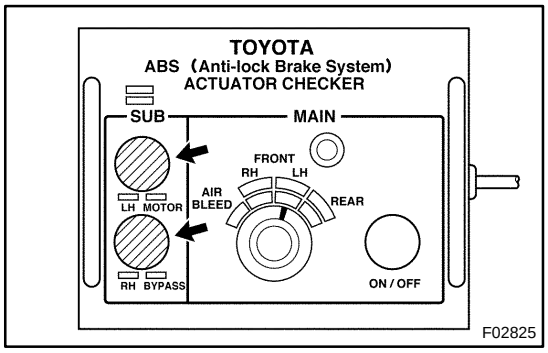
(1) Turn the selector switch of the actuator checker to the ”FRONT LH” position.

(2) Push and hold in the MAIN push switch, depress the brake pedal and hold it to bleed the left front brake caliper.

NOTICE:

Do not keep the MAIN switch pushed in for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(3) Repeat step (2) until there are no more air bubbles in the fluid.



(k) w/ ABS & TRAC & VSC only:

Bleed right rear brake line.

(1) Push and hold in the ”SUB LH” and ”SUB RH” switches, bleed the right rear brake caliper.

NOTICE:

Do not keep the MAIN switch pushed in for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

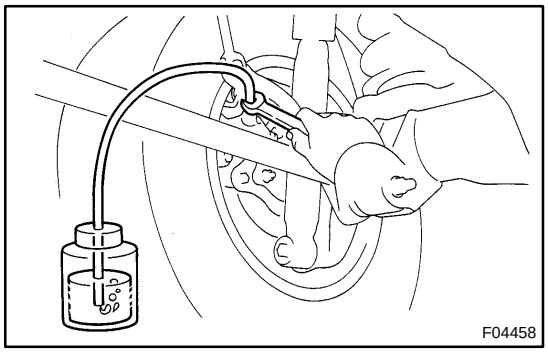
(2) Repeat step (1) until there are no more air bubbles in the fluid.

(l) Observe the procedure in step (k) and bleed left rear brake line.

(m) Disconnect the actuator checker (SST) and sub-wire harness (SST) from the actuator.
SST 09990-00150, 09990-00480

(n) Connect the 2 connectors to the hydraulic brake booster.

(o) Clear the DTC (See page DI-505).



4. BLEED BRAKE LINE

(a) Connect the vinyl tube to the brake caliper.

(b) Depress the brake pedal several times, then loosen the bleeder plug with the pedal held down.

(c) At the point when fluid stops coming out, tighten the bleeder plug, then release the brake pedal.

(d) Repeat (b) and (c) until all the air in the fluid has been bled out.

(e) Repeat the above procedure to bleed the brake line for each wheel.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

5. CHECK FLUID LEVEL IN RESERVOIR

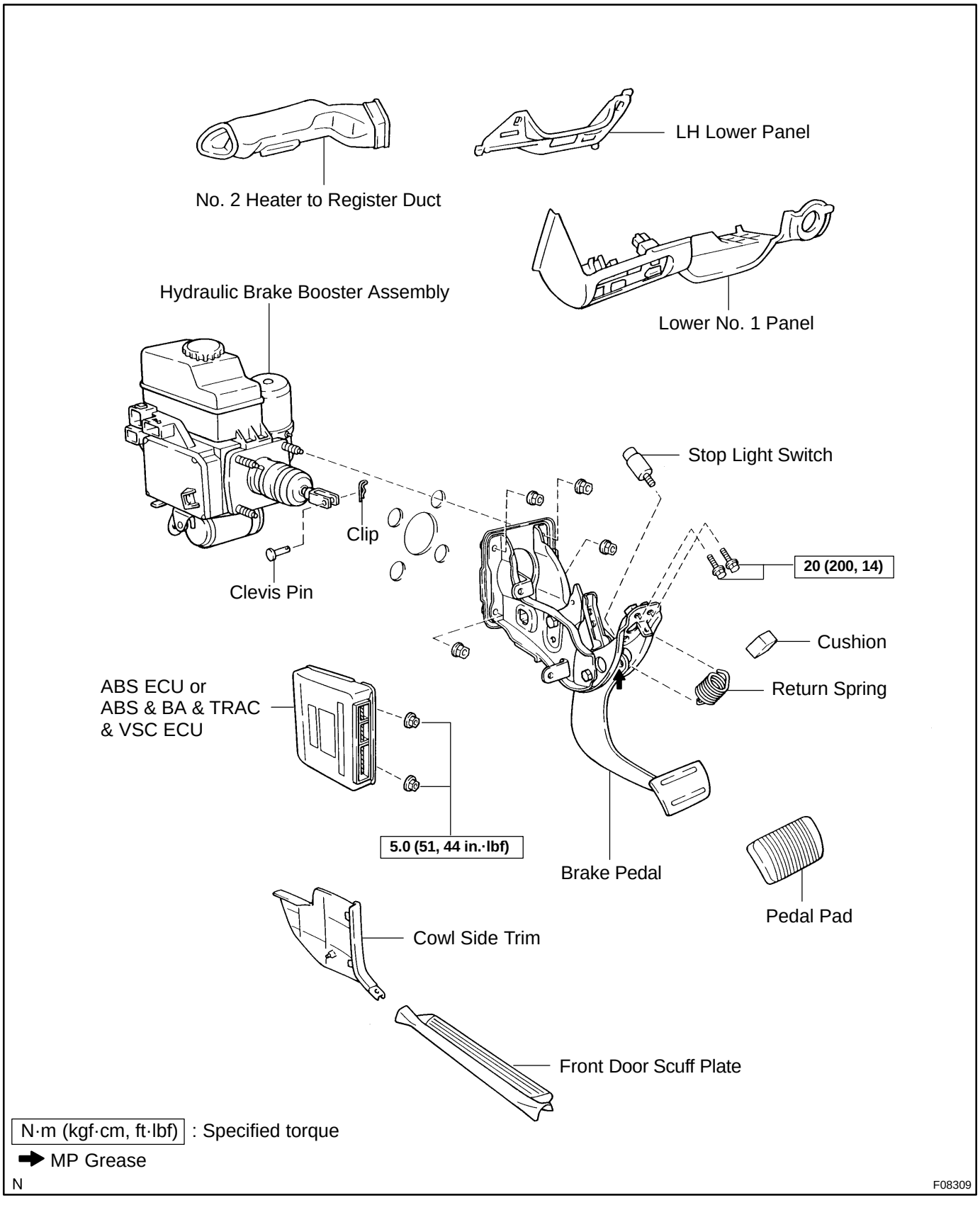
(a) With the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Remove the reservoir cap. Add brake fluid up to the ”MAX” line.
Fluid: SAE J1703 or FMVSS NO. 116 DOT3

BR0X9-02

COMPONENTS



BR0XB-02

INSTALLATION

1. REASSEMBLY BRAKE PEDAL

(a) Install the pedal pad.

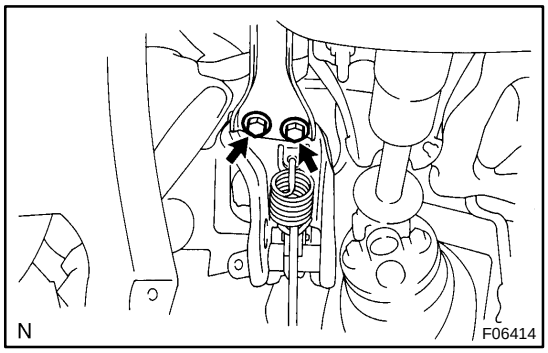
(b) Install the stop light switch cushion.

(c) Temporarily install the stop light switch to the pedal bracket.

(d) Install the return spring with cushion and pedal pad.

HINT:

Apply MP grease to the parts indicates by arrow (See page BR-1 1).



2. INSTALL BRAKE PEDAL ASSEMBLY

Install the brake pedal assembly and temporarily fasten the 2 bolts.

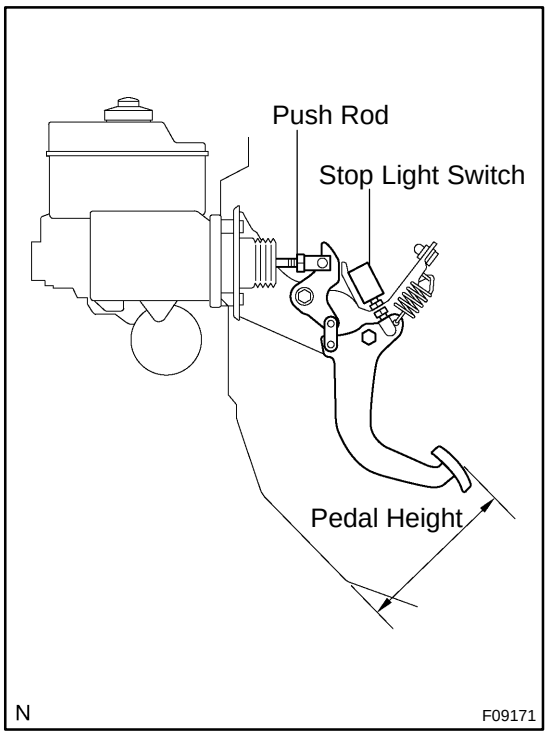
3. INSTALL HYDRAULIC BRAKE BOOSTER
(See page BR-67)

4. TIGHTEN 2 BOLTS OF BRAKE PEDAL BRACKET
Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

5. AFTER INSTALLATION, FILL BRAKE RESERVOIR WITH BRAKE FLUID AND BLEED BRAKE SYSTEM
(See page BR-4)

6. CHECK FOR LEAKS

7. CHECK AND ADJUST BRAKE PEDAL
(See page BR-9)



BRAKE PEDAL

BR0JB-08

ON-VEHICLE INSPECTION

1. CHECK PEDAL HEIGHT

Pedal height from asphalt sheet:
183.7 - 193.7 mm (7.232 - 7.626 in.)

If the pedal height is incorrect, adjust it.

2. IF NECESSARY, ADJUST PEDAL HEIGHT

(a) Remove the scuff plate, cowl side trim, lower No. 1 panel, LH lower panel and No. 2 heater to register duct (See page BO-81).

(b) Remove the steering wheel pad, steering wheel lower No. 2 and No. 3 covers, steering wheel, combination switch, column upper and lower covers, steering column assembly and thrust stopper (See page SR-14 or SR-29).

(c) Disconnect the connector from the stop light switch.

(d) Loosen the stop light switch lock nut and remove the stop light switch.

(e) Loosen the push rod lock nut.

(f) Adjust the pedal height by turning the pedal push rod.

(g) Tighten the push rod lock nut.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

(h) Install the stop light switch.

(i) Connect the connector to the stop light switch.

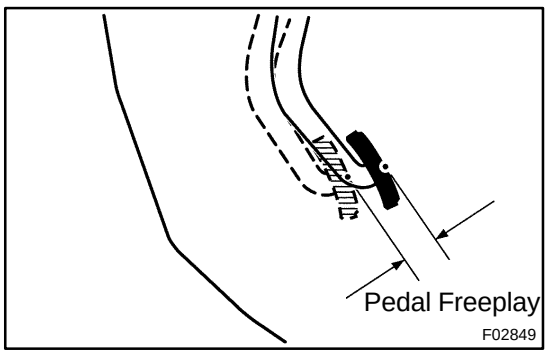
(j) Push in the brake pedal 5 - 15 mm (0.20 - 0.59 in.), turn the stop light switch to lock the nut in the position where the stop light goes off.

(k) After installation, push in the brake pedal 5 - 15 mm (0.20 - 0.59 in.), check that stop light lights up.

(l) After adjusting the pedal height, check the pedal freeplay.

(m) Install the thrust stopper, steering column assembly, column upper and lower covers, combination switch, steering wheel, steering wheel lower No. 2 and No. 3 covers, and steering wheel pad (See page SR-14 or SR-29).

(n) Install the No. 2 heater to register duct, LH lower panel, lower No. 1 panel, cowl side trim and scuff plate (See page BO-81).



3. CHECK PEDAL FREEPLAY

(a) Stop the engine and depress the brake pedal more than 40 times until there is no more pressure left in the booster.

(b) Push in the pedal by hand until the second point of resistance begins to be felt, then measure the distance, as shown.

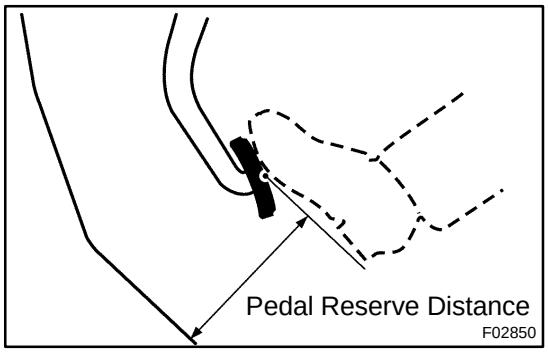
Pedal freeplay: 1.0 - 6.0 mm (0.039 - 0.236 in.)

If incorrect, check the stop light switch clearance. If the clearance is OK, then troubleshoot the brake system.

Stop light switch clearance: 1.9 mm (0.075 in.)

HINT:

The freeplay to the 1st point of resistance is due to the play between the clevis, pedal link and pin. It is 1.0 - 6.0 mm (0.039 - 0.236 in.) on the pedal.



4. CHECK PEDAL RESERVE DISTANCE

(a) Remove the floor carpet.

(b) Release the parking brake.

With the engine running, depress the pedal and measure the pedal reserve distance, as shown.

Pedal reserve distance at 490 N (50 kgf, 110.1 lbf): More than 116 mm (4.57 in.)

If the reserve distance is incorrect, troubleshoot the brake system.

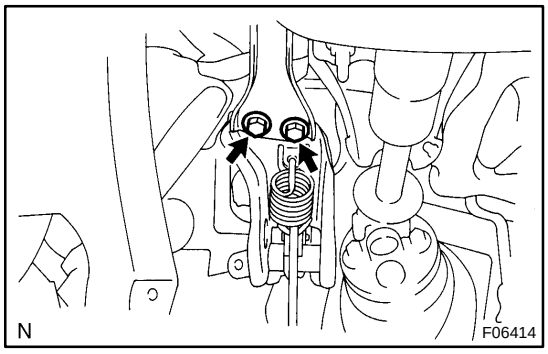
BR0XA-02

REMOVAL

1. REMOVE HYDRAULIC BRAKE BOOSTER ASSEMBLY (See page BR-60)

2. REMOVE BRAKE PEDAL ASSEMBLY

(a) Disconnect the connector from the stop light switch.



(b) Remove the 2 bolts.

(c) Remove the brake pedal assembly.

3. DISASSEMBLY BRAKE PEDAL ASSEMBLY

(a) Remove the return spring with cushion.

(b) Remove the stop light switch.

(c) Remove the pedal pad.

BRAKE SYSTEM

BR12F-01

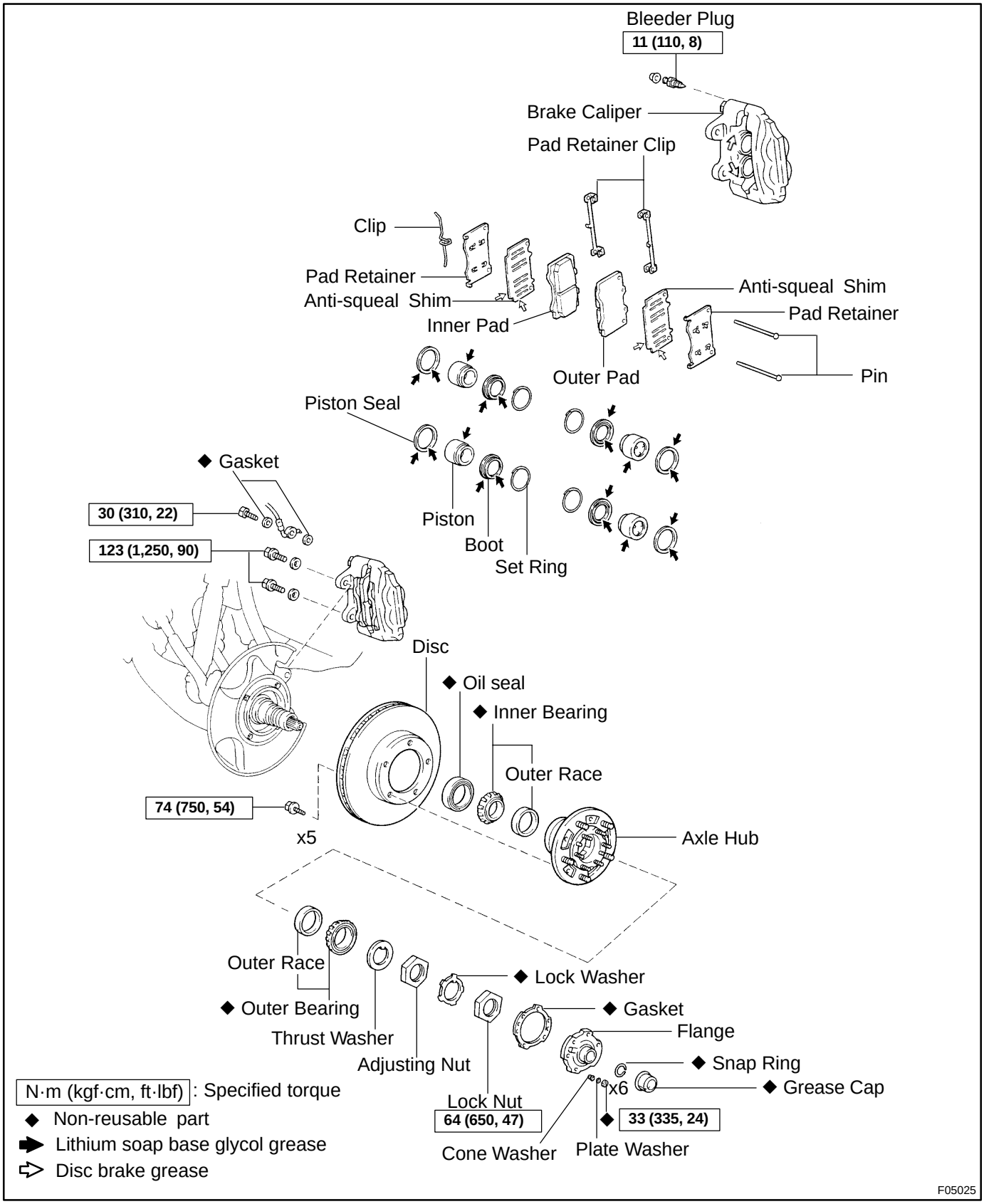
PRECAUTION

- **Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with parts of the same part number or equivalent.**
- **It is very important to keep parts and the area clean when repairing the brake system.**
- **If the vehicle is equipped with a mobile communication system, refer to the precautions in the IN section.**

FRONT BRAKE CALIPER

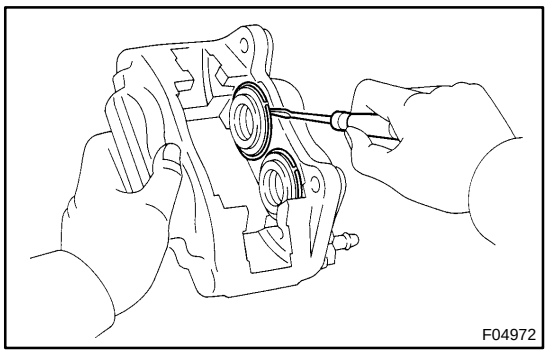
BR0JJ-06

COMPONENTS



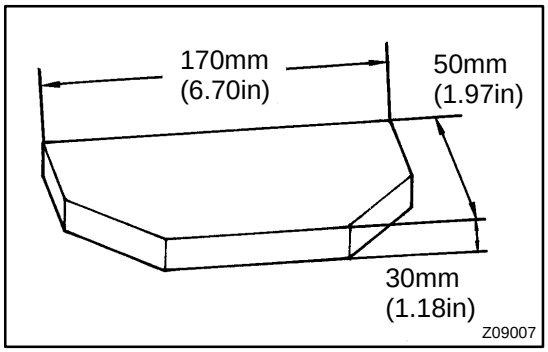
BR0JL-03

DISASSEMBLY



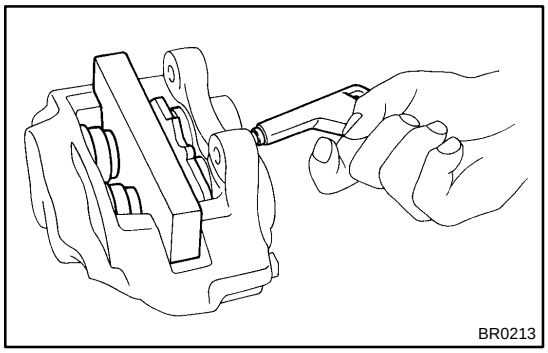
1. REMOVE CYLINDER BOOT SET RINGS AND CYLINDER BOOTS

Using a screwdriver, remove the 4 cylinder boot set rings and 4 cylinder boots from the caliper.



2. REMOVE PISTONS FROM CYLINDER

(a) Prepare the wooden plate to hold the pistons.

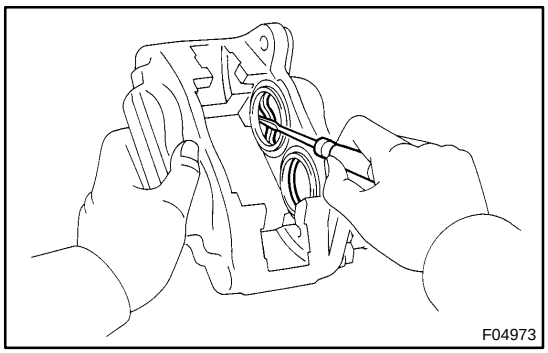


(b) Place the plate between the pistons and insert a pad at one side.

(c) Use compressed air to remove the pistons alternately from the cylinder.

CAUTION:

Do not place your fingers in front of the piston when using compressed air.

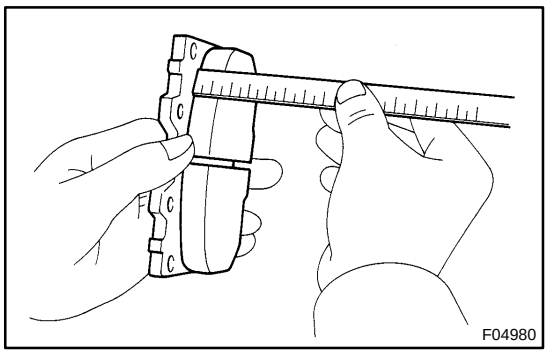


3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the 4 piston seals from the cylinder.

BR0JM-06

INSPECTION



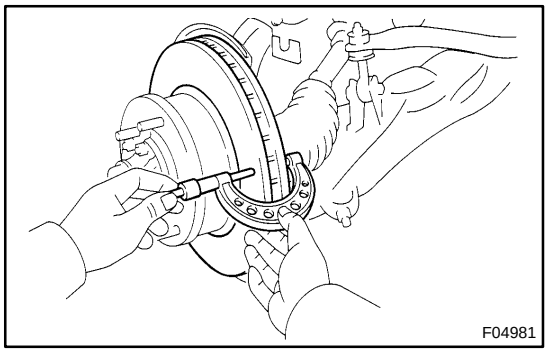
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 11.5 mm (0.453 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.



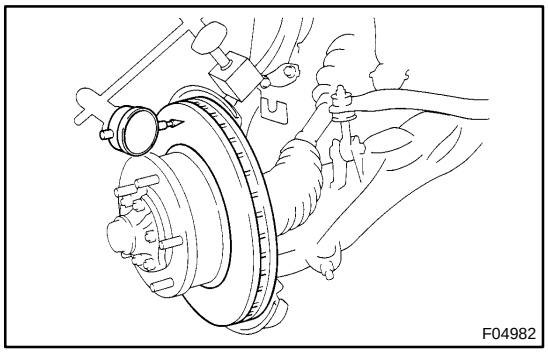
2. MEASURE DISC THICKNESS

Using a micrometer, measure the disc thickness.

Standard thickness: 32.0 mm (1.260 in.)

Minimum thickness: 30.0 mm (1.181 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the out side edge.

Maximum disc runout: 0.07 mm (0.0028 in.)

If the bearing play and axle hub runout are not abnormal, replace the disc or grind it on an "On-Car brake lathe".

HINT:

Before measuring the runout, confirm that the front bearing preload is within the specification (See page SA-16).

4. IF NECESSARY, REPLACE DISC

(a) Remove the front axle hub (See page SA-12).

(b) Remove the disc from the axle hub (See pageSA-13).

(c) Install a new disc and torque the 5 bolts.

Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)

(d) Install the axle hub and adjust the front bearing preload (See page SA-16).

BR0JO-06

INSTALLATION

Installation is in the reverse order of removal (See page BR-19).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.

BR0JN-04

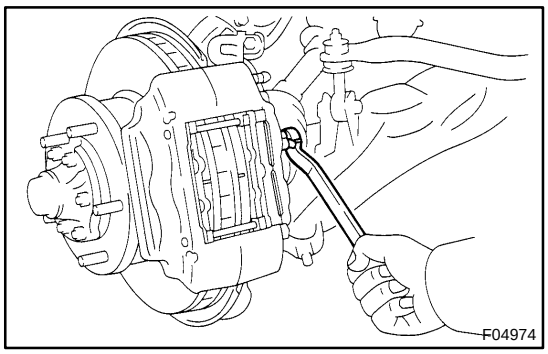
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-20).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR-18).

BR0TA-04



REMOVAL

1. REMOVE FRONT WHEEL

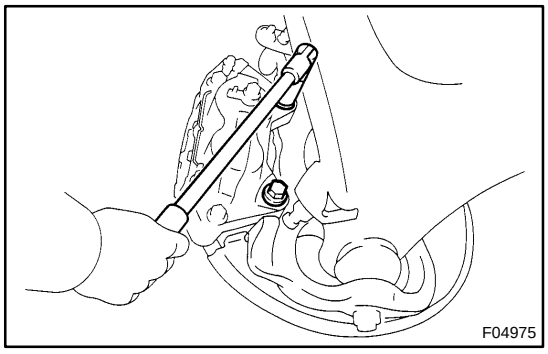
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

2. DISCONNECT BRAKE LINE

(a) Remove the union bolt and 2 gaskets from the caliper, then disconnect the flexible hose from the caliper.

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

(b) Use a container to catch the brake fluid as it drains out.



3. REMOVE CALIPER

Remove the 2 mounting bolts and remove the caliper.

Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

4. REMOVE CLIP AND 2 PINS

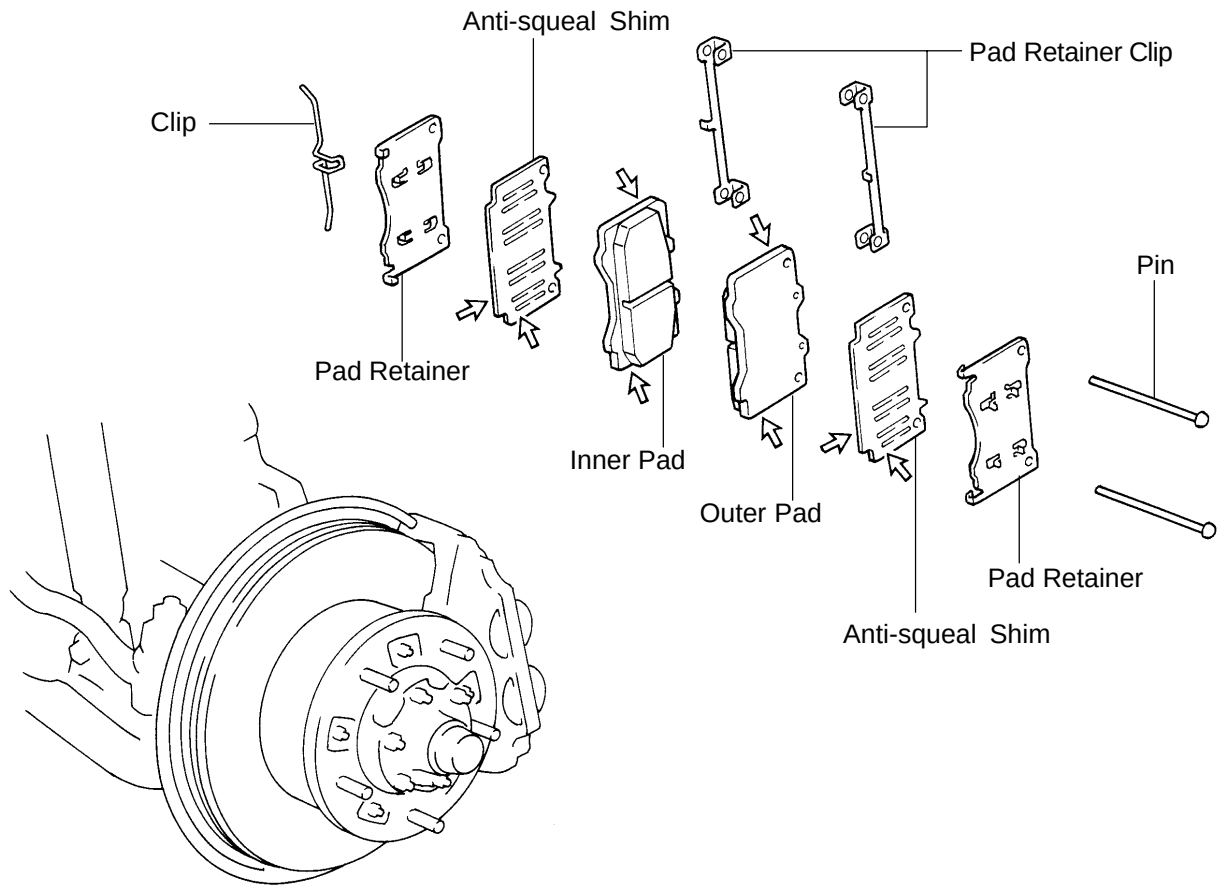
5. REMOVE 2 PAD RETAINER CLIPS

6. REMOVE 2 PADS, ANTI-SQUEAL SHIMS AND PAD RETAINERS

FRONT BRAKE PAD

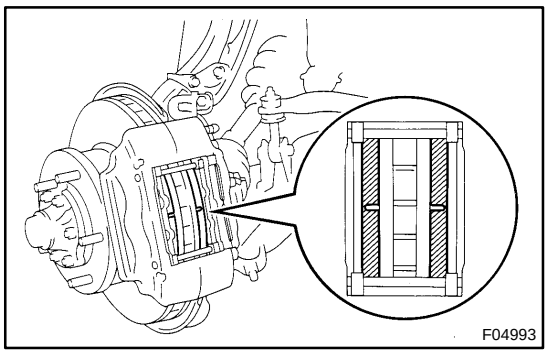
BR0JH-03

COMPONENTS



BR0JI-11

REPLACEMENT

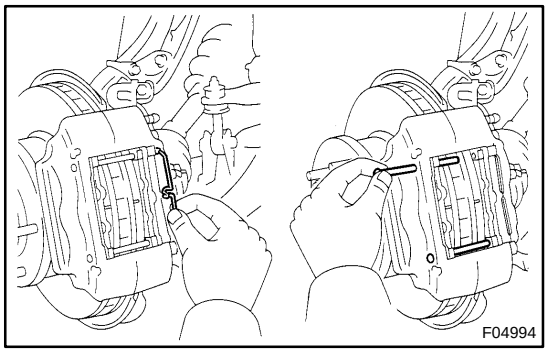


1. REMOVE FRONT WHEEL

2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace the pads if they are not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE CLIP AND 2 PINS

4. REMOVE 2 PAD RETAINER CLIPS

5. REMOVE 2 PADS, ANTI-SQUEAL SHIMS AND PAD RETAINERS

NOTICE:

The pad retainer clip and clip can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

6. CHECK DISC THICKNESS AND DISC RUNOUT

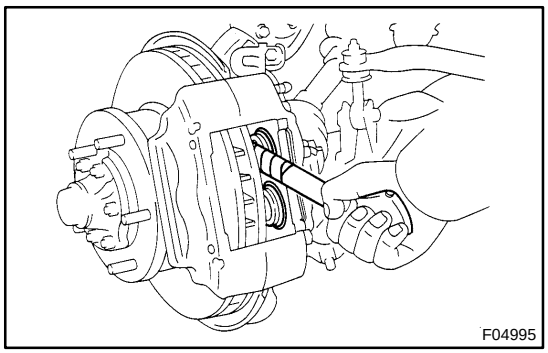
(See page BR-21)

7. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti-squeal shims must be replaced together with the pad.

(a) Draw out a small amount of brake fluid from the reservoir.



(b) Press in the piston with a hammer handle or an equivalent.

HINT:

- Always change the pads on one wheel at a time as there is a possibility of opposite piston fling out.
- If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some brake fluid escape.

(c) Install the 2 pad retainers to each caliper piston.

(d) Install the anti-squeal shim to each pad.

HINT:

Apply disc brake grease to both sides of the anti-squeal shims (See page BR-15).

(e) Install the 2 pads.

HINT:

Apply disc brake grease to the pads indicated by the arrows (See page BR-15).

NOTICE:
There should be no oil or grease adhering to the friction surfaces of the pads or the disc.

8. INSTALL 2 PAD RETAINER CLIPS AND 2 PINS

9. INSTALL CLIP

10. INSTALL FRONT WHEEL
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

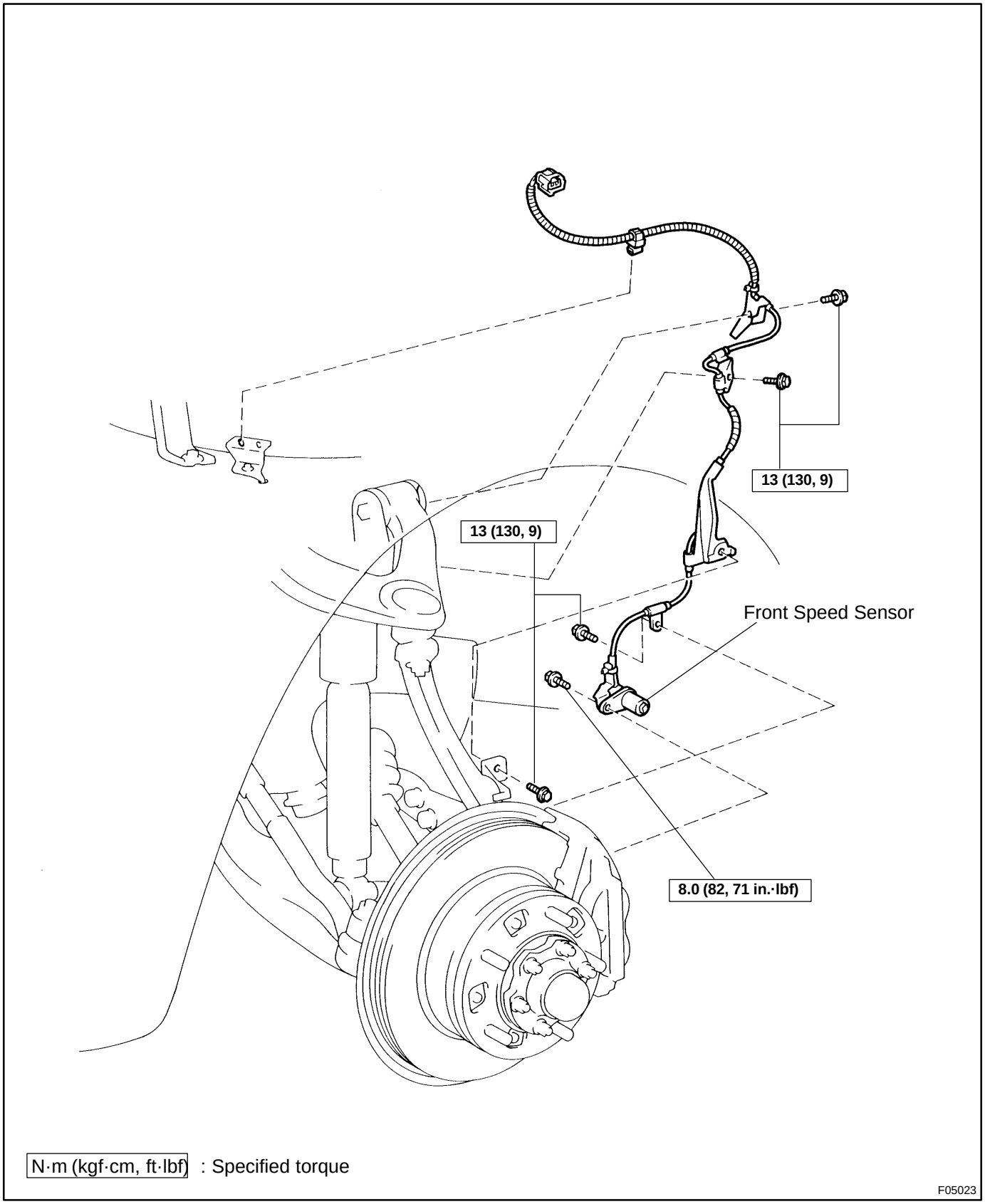
11. DEPRESS BRAKE PEDAL SEVERAL TIMES

12. CHECK THAT FLUID LEVEL IS AT MAX LINE

FRONT SPEED SENSOR

COMPONENTS

BR0K1-06



BR0K3-13

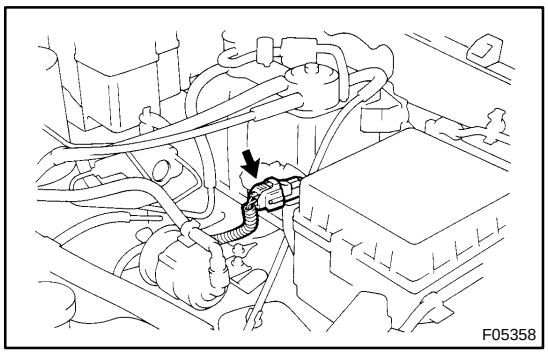
INSTALLATION

Installation is in the reverse order of removal (See page BR-69).

HINT:

After installation, check the speed sensor signal (See page DI-505).

BR0K2-03

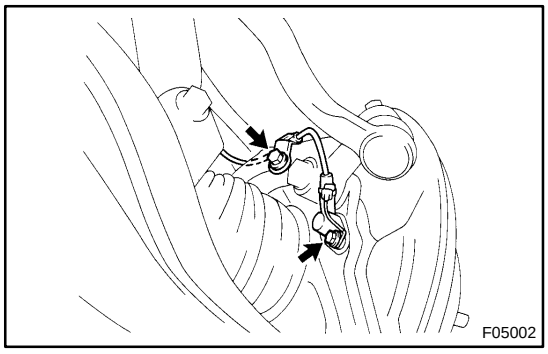


REMOVAL

REMOVE SPEED SENSOR

(a) Disconnect the speed sensor connector.

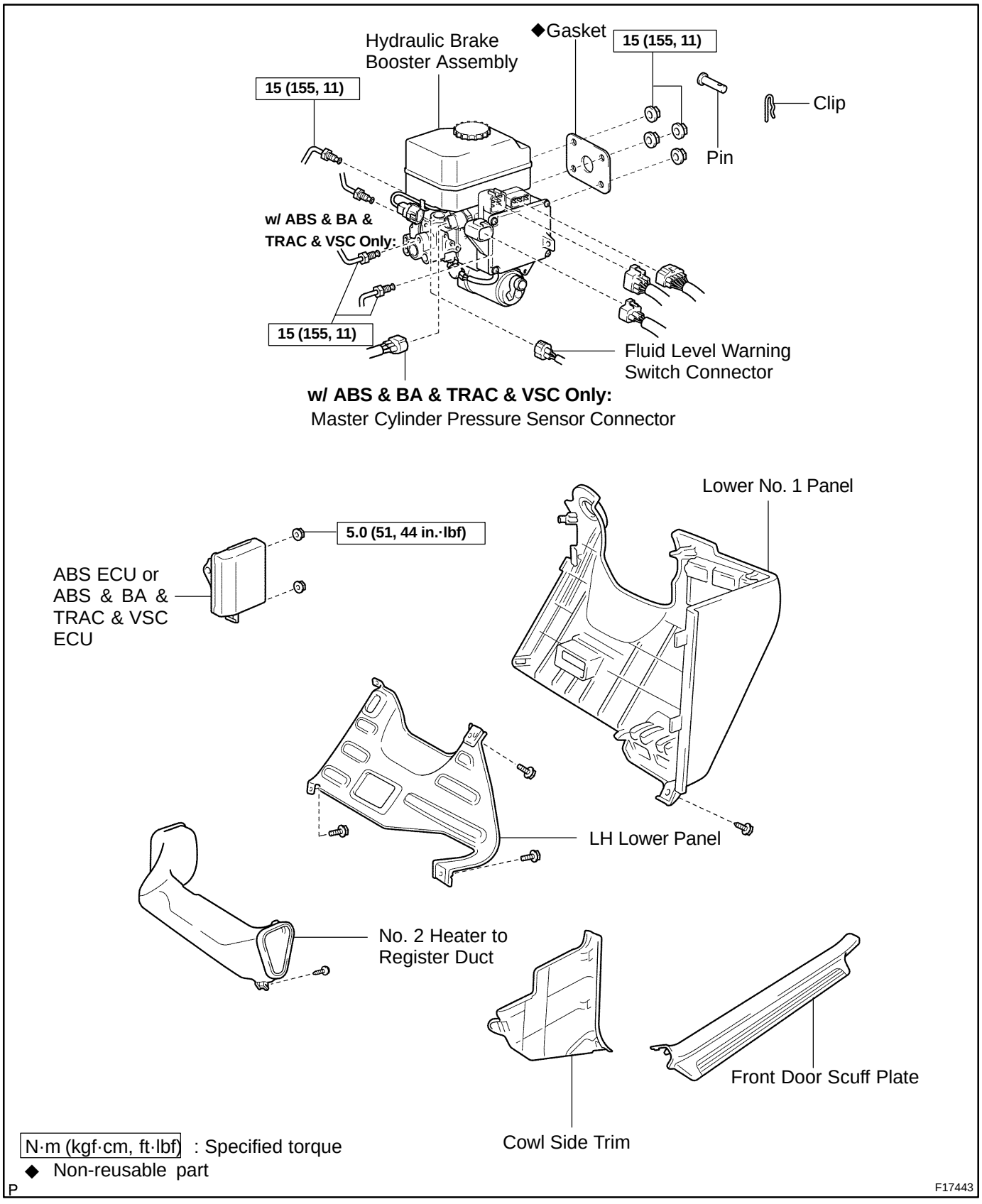
(b) Remove the resin clip and 4 clamp bolts holding the sensor harness from the steering knuckle and upper arm.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

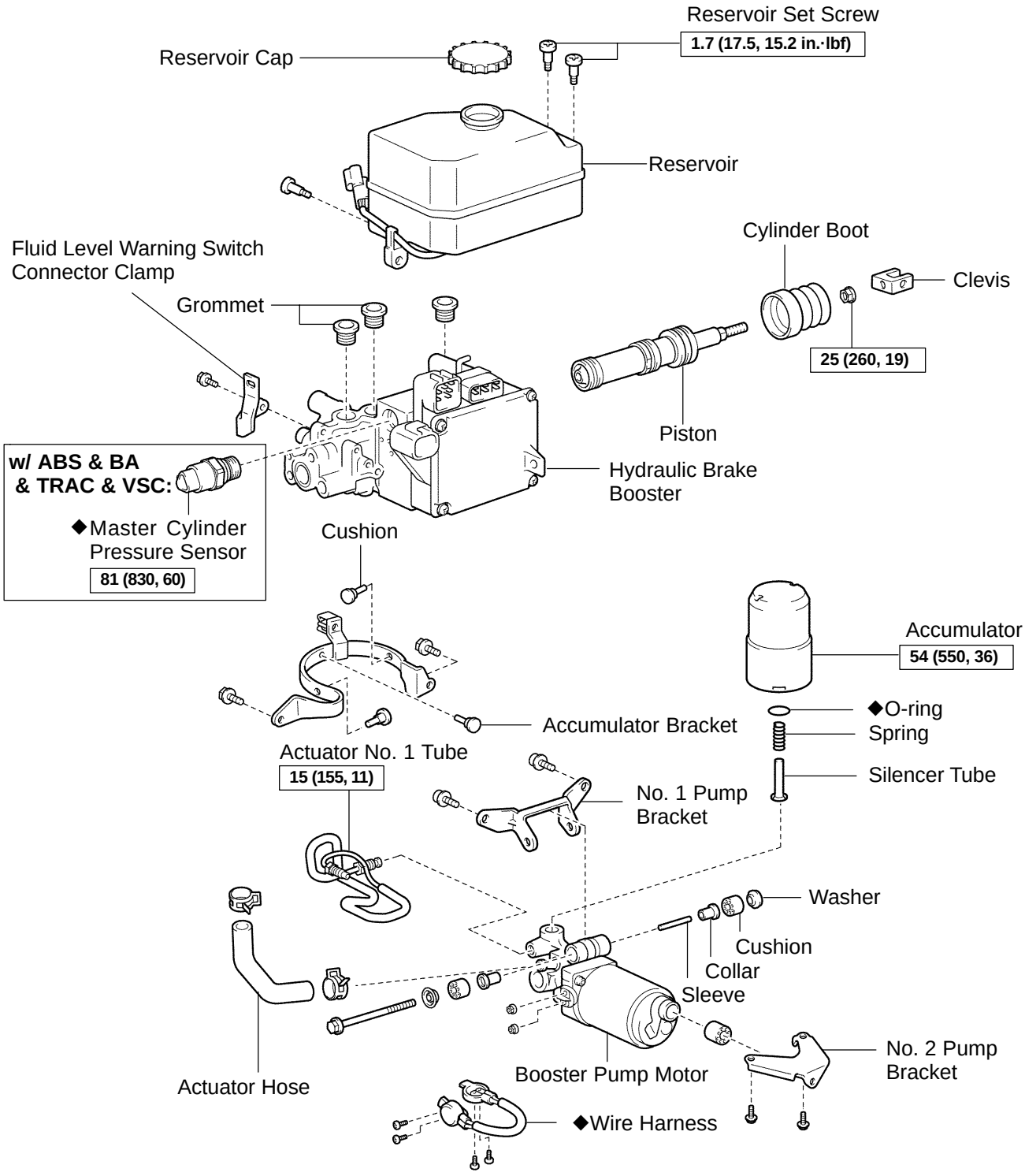


(c) Remove the speed sensor installation bolt and speed sensor from the steering knuckle.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

BR0K8-20

COMPONENTS



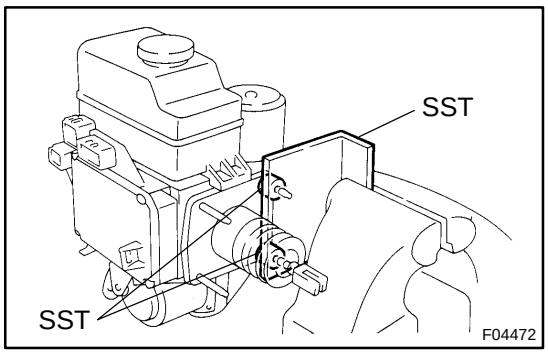


N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

P F13209

BR12D-05

DISASSEMBLY



1. PLACE HYDRAULIC BRAKE BOOSTER IN VISE

Using SST, set the hydraulic brake booster in vise.

SST 09630-00014 (09631-00142),
09950-60010 (09951-00180, 09951-00190)

2. REMOVE FLUID LEVEL WARNING SWITCH CONNECTOR CLAMP

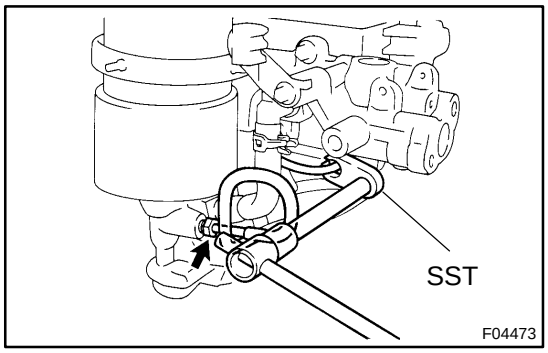
(a) Disconnect the connector.
(b) Remove the bolt and clamp.

3. REMOVE RESERVOIR AND GROMMETS

(a) Remove reservoir cap.
(b) Remove the 3 set screws and pull out the reservoir.
Torque: 1.7 N·m (17.5 kgf·cm, 15.2 in.·lbf)
(c) Remove the 3 grommets.

4. REMOVE CLEVIS AND CYLINDER BOOT

(a) Loosen the lock nut, then remove the clevis and lock nut.
Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)
(b) Remove the cylinder boot.



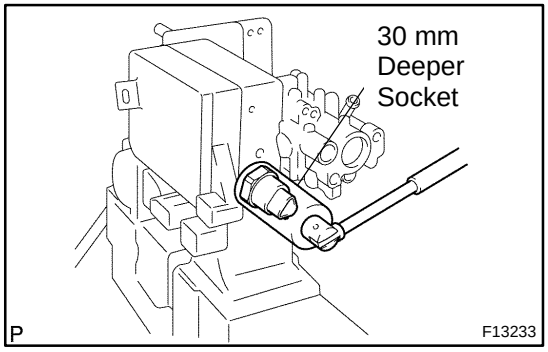
5. REMOVE BRAKE ACTUATOR TUBE NO. 1

Using SST, remove the brake actuator tube No. 1.

SST 09023-00100
Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

6. REMOVE BOOSTER PUMP AND ASSEMBLY

(a) Remove the actuator hose.
(b) Remove the 4 screws and wire harness from the booster and pump.
(c) Remove the 2 bolts, accumulator bracket.
(d) Remove the 2 bolts and booster pump motor assembly.
(e) Remove the bolt and No. 1 pump bracket.
(f) Remove the 2 washers, 2 cushions, 2 collars and sleeve.
(g) Remove the 2 bolts and No. 2 pump bracket.
(h) Remove the cushion from No. 2 pump bracket.



7. ABS & BA & TRAC & VSC only:
REMOVE MASTER CYLINDER PRESSURE SENSOR

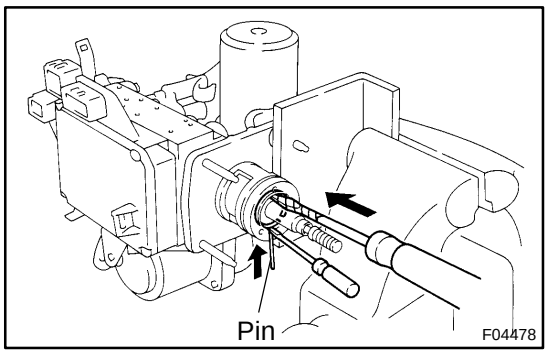
Using 30 mm deeper socket wrench and remove the oil pressure sensor.

Torque: 81 N·m (830 kgf·cm, 60 ft·lbf)

NOTICE:

If replacing the master cylinder pressuer sensor, since the sensor is non-reusable, use a sensor of the supply part No shown below.

PART NO: 89637-30050



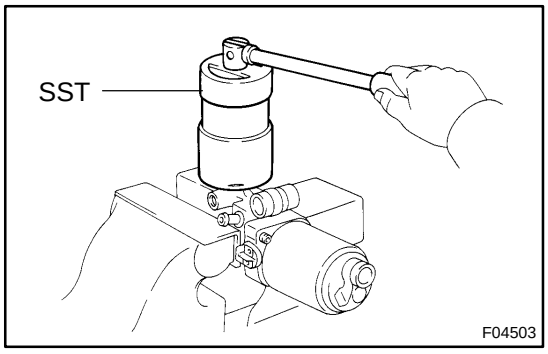
8. REMOVE PISTON

(a) Pressing the piston in with a screwdriver, use a pin or an equivalent to push the snap ring from the hole in the body then remove it with another screwdriver.

(b) Remove the piston, pulling straight out, not at an angle.

NOTICE:

- **If pulled out and installed at an angle, there is a possibility that the cylinder bore could be damaged.**
- **At the time of reassembly, be careful not to damage the rubber lips on the pistons.**



9. REMOVE ACCUMULATOR FROM BOOSTER PUMP

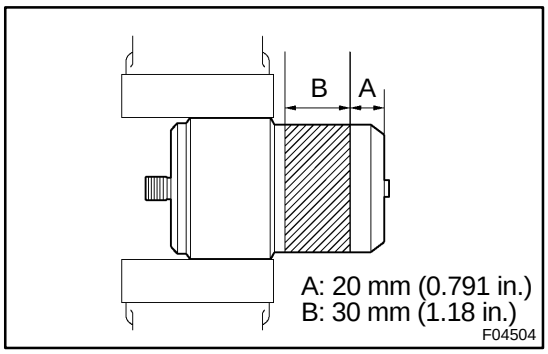
(a) Using SST, remove the accumulator.

SST 09318-12010

Torque: 54 N·m (550 kgf·cm, 36 ft·lbf)

(b) Remove the silencer tube, spring and O-ring.

BR0TH-09



DISPOSAL

DISPOSAL METHOD OF ACCUMULATOR

(a) Place the accumulator in a vise, cover it with a cloth over.

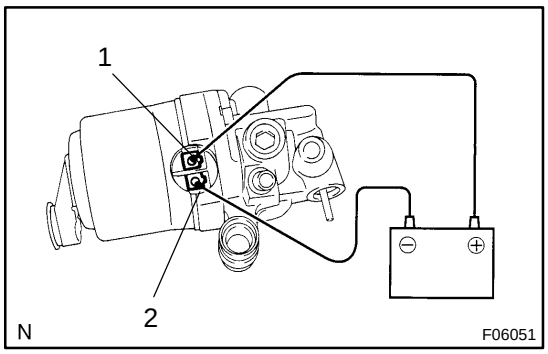
(b) Using a saw, then cut the accumulator body slowly.

CAUTION:

Do not cut at a place except a stretch.

(c) When the outer body of the accumulator is cut, gas discharges.

BR120-08



INSPECTION

INSPECT HYDRAULIC BRAKE BOOSTER PUMP MOTOR OPERATION

(a) Connct the positive (+) lead from the battery to terminal 1 of pump motor, and the negative (-) lead to terminal 2.

(b) Check that the pump motor operation.

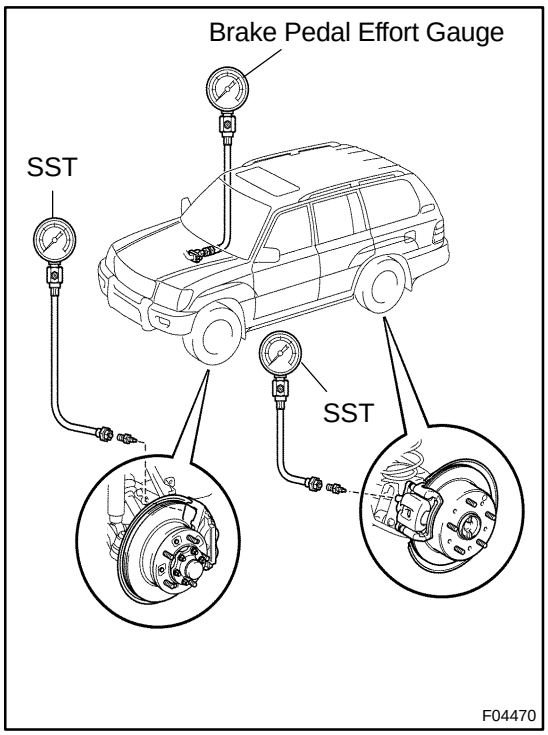
BR0KD-04

INSTALLATION

Installation is in the reverse order of removal (See page BR-60).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.



HYDRAULIC BRAKE BOOSTER

BR12B-07

ON-VEHICLE INSPECTION

1. CHECK HYDRAULIC BRAKE BOOSTER FLUID PRESSURE CHANGE

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 - 14 V

(b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Install LSPV gauge (SST) and brake pedal effort gauge, bleed air.

SST 09709-29018

(d) When booster does not operate:

Depress the brake pedal and check fluid pressure.

At 245 N (25 kgf, 55 lbf):

Front brake pressure	Rear brake pressure
2,700 kPa (27.5 kgf/cm^2, 391 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

At 343 N (35 kgf, 77 lbf):

Front brake pressure	Rear brake pressure
3,950 kPa (40 kgf/cm^2, 568 psi) or more	0 kPa (0 kgf/cm^2, 0 psi)

(e) w/ ABS only, when booster operate:

(1) Turn the ignition switch ON and wait until the pump motor has stopped.

(2) Depress the brake pedal and check fluid pressure.

At 49 N (5 kgf, 11 lbf):

Front brake pressure	Rear brake pressure
1,618 - 2,795kPa (16.5 - 28.5 kgf/cm^2, 234 - 405 psi)	1,716 - 2,893 kPa (17.5 - 29.5 kgf/cm^2, 249 - 419 psi)

At 98 N (10 kgf, 22 lbf):

Front brake pressure	Rear brake pressure
4,413 - 5,624 kPa (45 - 57 kgf/cm^2, 639 - 809 psi)	3,187 - 4,364 kPa (32.5 - 44.5 kgf/cm^2, 462 - 632 psi)

At 147 N (15 kgf, 33 lbf):

Front brake pressure	Rear brake pressure
7,208 - 8,436 kPa (73.5 - 85.5 kgf/cm^2, 1,043 - 1,214 psi)	4,609 - 5,786 kPa (47 - 59 kgf/cm^2, 667 - 838 psi)

At 196 N (20 kgf, 44 lbf):

Front brake pressure	Rear brake pressure
9,905 - 11,082 kPa (101 - 113 kgf/cm^2, 1,434 - 1,604 psi)	6,031 - 7,208 kPa (61.5 - 73.5 kgf/cm^2, 873 - 1,044 psi)

(f) w/ ABS & TRAC & VSC ECU only, when booster operate:

(1) Turn the ignition switch ON and wait until the pump motor has stopped.

(2) Depress the brake pedal and check fluid pressure.

At 49 N (5 kgf, 11 lbf):

Front brake pressure	Rear brake pressure
1,618 - 2,795kPa (16.5 - 28.5 kgf/cm^2, 234 - 405 psi)	1,716 - 2,893 kPa (17.5 - 29.5 kgf/cm^2, 249 - 419 psi)

At 98 N (10 kgf, 22 lbf):

Front brake pressure	Rear brake pressure
4,413 - 5,624 kPa (45 - 57 kgf/cm^2, 639 - 809 psi)	4,609 - 5,786 kPa (47 - 59 kgf/cm^2, 668 - 839 psi)

At 147 N (15 kgf, 33 lbf):

Front brake pressure	Rear brake pressure
7,208 - 8,436 kPa (73.5 - 85.5 kgf/cm^2, 1,043 - 1,214 psi)	7,502 - 8,679 kPa (76.5 - 88.5 kgf/cm^2, 1,088 - 1,259 psi)

At 196 N (20 kgf, 44 lbf):

Front brake pressure	Rear brake pressure
9,905 - 11,082 kPa (101 - 113 kgf/cm^2, 1,434 - 1,604 psi)	10,346 - 11,523 kPa (105.5 - 117.5 kgf/cm^2, 1,501 - 1,671 psi)

2. w/ ABS only,

In case of using TOYOTA hand-held tester:

INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

(a) Inspect the battery positive voltage.

Battery positive voltage: 10 - 14 V

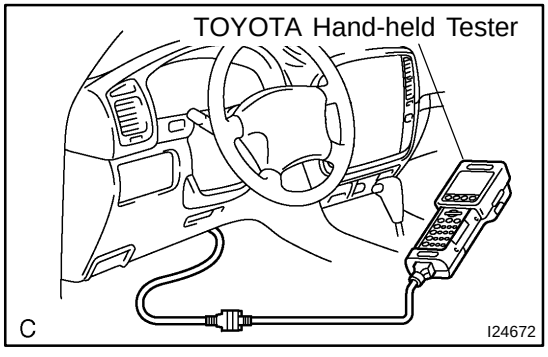
(b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-64).



(d) Connect the TOYOTA hand-held tester.

(1) Connect the TOYOTA hand- held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Select the ”ACTIVE TEST” mode on the TOYOTA hand-held tester.

HINT:

◆ Please refer to the TOYOTA hand-held tester operator’s manual for further details.

◆ To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

(e) Inspect the front ABS switching solenoid operation.
   (1) Select ”SA1” and ”SA2” on the TOYOTA hand-held tester.
   (2) With ”SA1” and ”SA2” turned ON simultaneously with the TOYOTA hand-held tester, depress the brake pedal with stable force and check that the pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

NOTICE:
When operating it continuously, set the interval of more than 20 sec.

   (3) Once, release the brake pedal.
   (4) When the solenoids are OFF, after depressing the brake pedal again and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(f) Inspect the front ABS solenoid operation.
   (1) Select ”SFRH” and ”SFLH” on the TOYOTA hand-held tester.
   (2) With ”SFRH” and ”SFLH” turned ON simultaneously with the TOYOTA hand-held tester, depress the brake pedal with stable force and check that the brake pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

If the pedal can be depressed, replace the hydraulic brake booster.

   (3) Once, release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

   (4) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFRH and SFRR solenoids ON simultaneously.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

(5) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(6) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFLH and SFLR solenoids ON simultaneously.

HINT:

To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

(7) Once release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(g) Jack up and support the vehicle.

(h) Release the parking brake lever.

(i) Inspect the rear ABS solenoid.

(1) Select the ”SRH” on the TOYOTA hand-held tester.

(2) Turn the ”SRH” ON with the TOYOTA hand-held tester and depress the brake pedal with stable force, and rotate the right rear wheel by hand and check it.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the rear wheels stop, replace the hydraulic brake booster.

(3) Once, release the brake pedal and turn the ”SRH” OFF, after depressing the brake pedal with stable force and stop the rear right wheel by hand and check it.

If the rear wheel rotate, replace the hydraulic brake booster.

(4) Depress the pedal with stable force, then turn the ”SRH” and ”SRR” ON simultaneously.

(5) When the solenoids are ON, rotate the rear wheel by hand and check it.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically for 2 sec. after every solenoid has been turned ON.

◆ When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

(j) Lower the vehicle.

(k) Disconnect the TOYOTA hand-held tester.

3. w/ ABS & TRAC & VSC only,
In case of using TOYOTA hand-held tester:
INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 - 14 V

(b) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

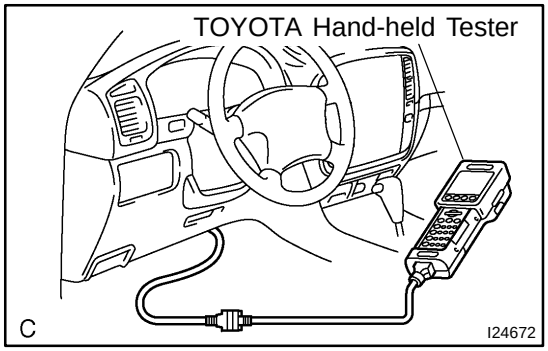
HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(c) Check that the brake pedal becomes light to depress.

If the pedal does not become to be light to depress, check and replace the brake line and hydraulic brake booster.

(d) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-64).



(e) Connect the TOYOTA hand-held tester.
(1) Connect the TOYOTA hand- held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Select the ”ACTIVE TEST” mode on the TOYOTA hand-held tester.

HINT:
◆ Please refer to the TOYOTA hand-held tester operator’s manual for further details.
◆ To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(f) Inspect the front TRAC & VSC solenoid operation.
(1) Select ”SA1” and ”SA2” on the TOYOTA hand-held tester.
(2) With ”SA1” and ”SA2” turned ON simultaneously with the TOYOTA hand-held tester, depress the brake pedal with stable force and check that the pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON. If the pedal can be depressed, replace the hydraulic brake booster.

NOTICE:
When operating it continuously, set the interval of more than 20 sec.

(3) Once, release the brake pedal.
(4) When the solenoids are OFF, after depressing the brake pedal again and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(g) Inspect the front ABS solenoid operation.
(1) Select ”SFRH” and ”SFLH” on the TOYOTA hand-held tester.
(2) With ”SFRH” and ”SFLH” turned ON simultaneously with the TOYOTA hand-held tester, depress the brake pedal with stable force and check that the brake pedal cannot be depressed.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON. If the pedal can be depressed, replace the hydraulic brake booster.

(3) Once, release the brake pedal when the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(4) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFRH and SFRR solenoids ON simultaneously.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(5) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(6) Once, release the brake pedal. After depressing and holding the brake pedal with stable force, turn the SFLH and SFLR solenoids ON simultaneously.

HINT:
To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(7) When the solenoids are OFF, check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(h) Jack up and support the vehicle.

(i) Release the parking brake lever.

(j) Shift the transfer shift lever to ”N” position and check that the rear wheels by rotating them by hand.

(k) Inspect the rear TRAC & VSC solenoid operation.

(1) Select the ”SA3” and ”STR” on the TOYOTA hand-held tester.

(2) Turn the ”SA3” and ”STR” ON simultaneously with the TOYOTA hand-held tester, and check that the rear wheel does not rotate by hand.

HINT:

When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels rotate, replace the hydraulic brake booster.

(3) Turn the ”SA3” and ”STR” OFF simultaneously, and check that the rear wheels by rotating them by hand.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

NOTICE:

When operating it continuously, set the interval of more than 20 sec.

If the rear wheels stop, replace the hydraulic brake booster.

(l) Inspect the right rear ABS solenoid.

(1) Select the ”SA3”, ”STR” and ”SRRH”, on the TOYOTA hand-held tester.

(2) Turn the ”SA3”, ”STR” and ”SRRH” ON simultaneously with the TOYOTA hand-held tester, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the rear wheels stop, replace the hydraulic brake booster.

(3) Turn the ”SA3”, ”STR” and ”SRRH” OFF, and check that the right rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the right rear wheel stop, replace the hydraulic brake booster.

(4) Depress the pedal with stable force, then turn the ”SRRH” and ”SRRR” ON simultaneously.

(5) When the solenoids are ON, check that the right rear wheel by rotating it by hand.

(m) Inspect the left rear ABS solenoid operation.

(1) Select the ”SA3”, ”STR” and ”SRLH” on the TOYOTA hand-held tester.

(2) Turn the ”SA3”, ”STR” and ”SRLH” ON with TOYOTA hand-held tester, and check that the left rear wheel by rotating it by hand.

HINT:

When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

If the rear wheels stop, replace the hydraulic brake booster.

(3) Turn the ”SA3”, ”STR” and ”SRLH” OFF and check that the left rear wheel by rotating it by hand.

HINT:

- To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.
- When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.
- When solenoid is OFF, the wheel might stop temporarily. However if the wheel rotates again, the function works normally.

If the left rear wheel stop, replace the hydraulic brake booster.

(4) Depress the pedal with stable force, then turn the ”SRLH” and ”SRLR” ON simultaneously.

HINT:

To protect the solenoids, TOYOTA hand-held tester turns OFF automatically 2 sec. after every solenoid has been turned ON.

(5) When the solenoids are ON, check that the left rear wheel by rotating it by hand.

HINT:

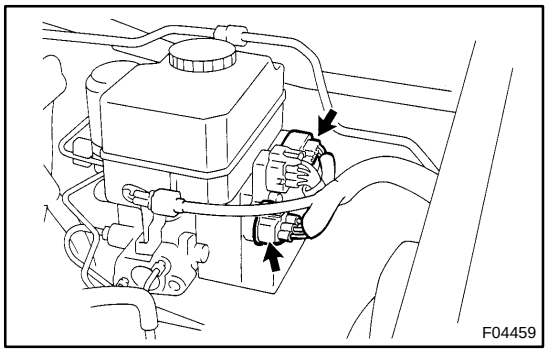
When rotating the wheel fast, the fail-safe function is activated and judgement cannot be made properly. So rotate the wheel as slowly as possible.

(n) Lower the vehicle.

(o) Disconnect the TOYOTA hand-held tester.

4. w/ ABS only,
In case of using ABS actuator checker (SST):
INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 - 14 V

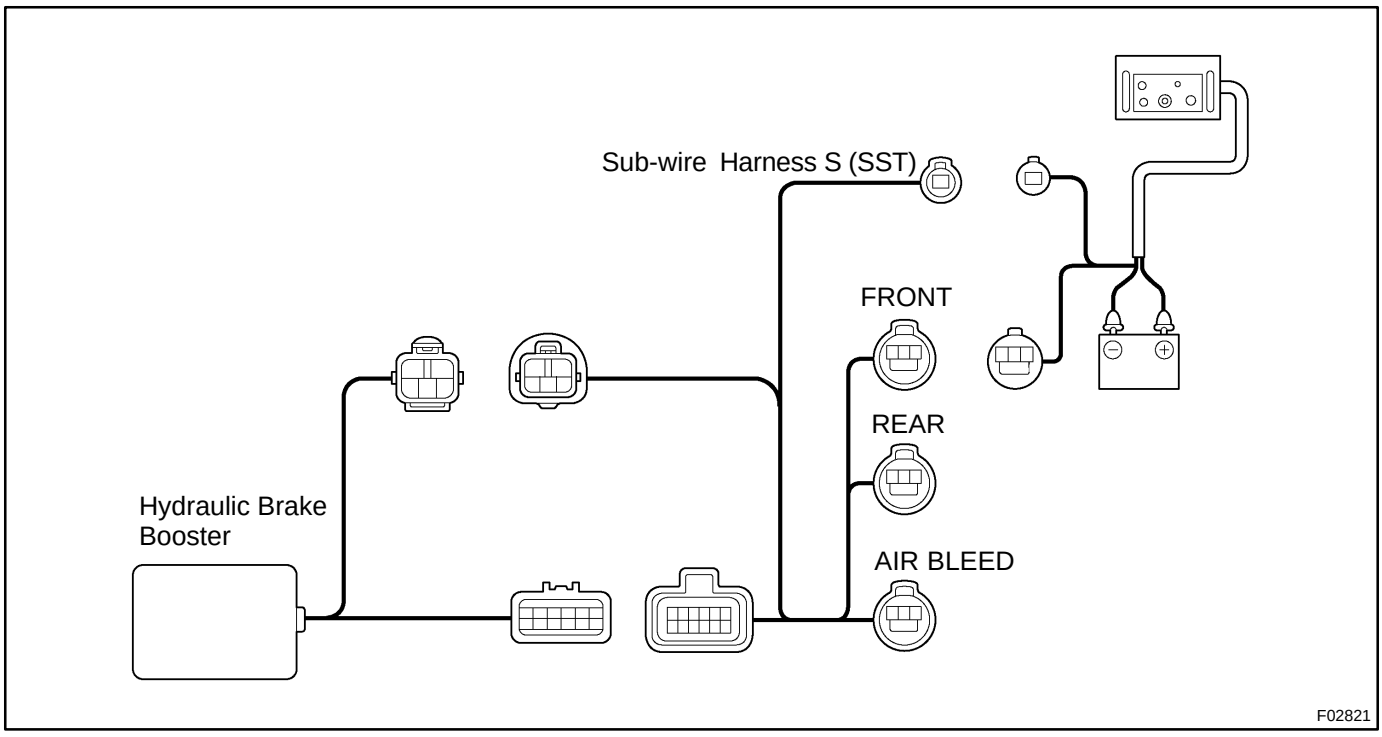


(b) Disconnect the 2 connectors from hydraulic brake booster.

(c) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub-wire harness (SST), as shown in the following chart.
SST 09990-00150, 09990-00480

HINT:
Connect the connector with the label of "FRONT" attached to the connector of actuator checker.

(d) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (-) terminal.



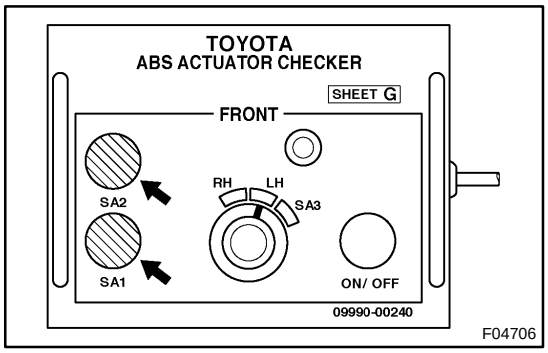
(e) Place "SHEET G" (SST) of "FRONT" on actuator checker.
SST 09990-00240

(f) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(g) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-64).



(h) Inspect the front switching solenoid operation.

(1) Push in and hold the "SA1" and "SA2" switches simultaneously, depress strongly and hold the brake pedal with stable force.

NOTICE:
Do not keep the "SA1" and "SA2" pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(2) Check that the brake pedal cannot be depressed.

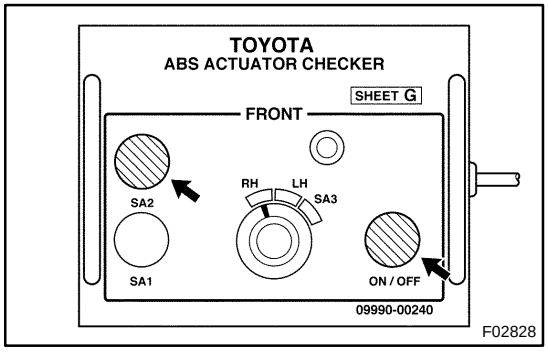
If the pedal can be depressed, replace the hydraulic brake booster.

(3) Release the "SA1" switch and check that the brake pedal can be depressed.

If the pedal can not be depressed, replace the hydraulic brake booster.

(4) Release the "SA2" switch and check that the brake pedal can be depressed.

If the pedal can not be depressed, replace the hydraulic brake booster.



(i) Inspect the right front solenoid operation.

(1) Turn the selector switch to "RH" position.

(2) Push and hold in the MAIN push switch and "SA2" switch simultaneously depress and hold the brake pedal with stable force.

NOTICE:
Do not keep the MAIN push switch and "SA2" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

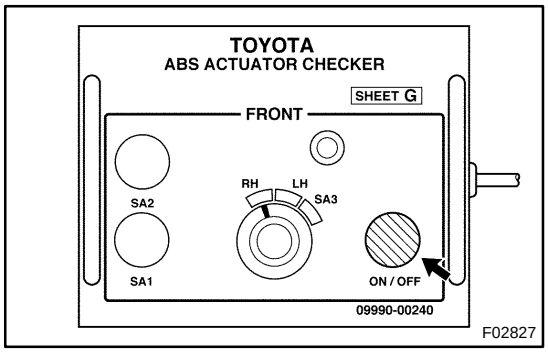
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and "SA2" switch simultaneously and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

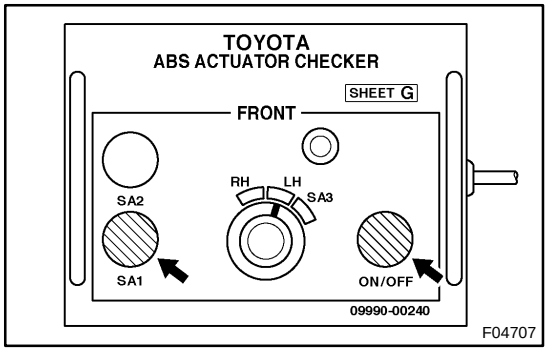
(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(9) Release the brake pedal.



(j) Inspect the left front solenoid operation.

(1) Turn the selector switch to "LH" position.

(2) Push and hold in the MAIN push switch and "SA1" switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and "SA1" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

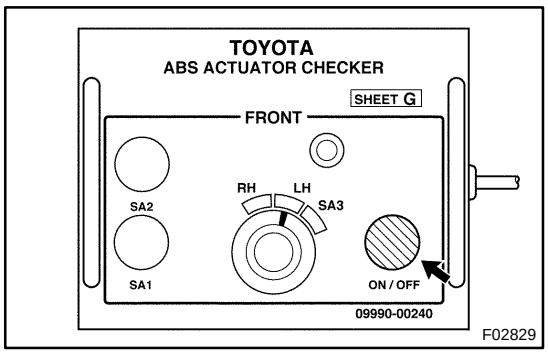
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and "SA1" switch simultaneously, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

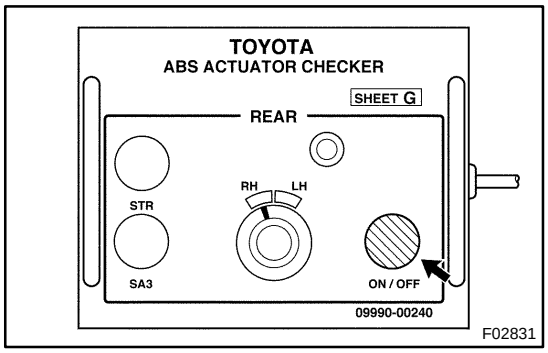
(9) Release the brake pedal.

(k) Turn the ignition switch OFF, then reconnect the connector of sub- wire harness from the one with label of ”FRONT” to ”REAR”.

(l) Place ”SHEET G” of ”REAR” on the actuator checker.

(m) Jack up and support the vehicle.

(n) Start the engine and run it at idle.



(o) Inspect the rear solenoid operation.

(1) Turn the selector switch to ”RH” position.

(2) Depress the brake pedal several times and release the pedal when the pump begins rotating. Wait until the pump stops.

(3) Turn the ignition switch OFF.

(4) Depress the brake pedal with a force of 343 N (35 kgf, 77 lbf), record the fluid surface in the reservoir tank of the hydraulic brake booster.

(5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the hydraulic brake booster dose not rise up at this time.

If the fluid surface level rises up, replace the hydraulic brake booster.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

(6) Release the brake pedal and check that brake pedal is not hard to depress.

If pedal is hard to depress, replace the hydraulic brake booster.

(7) Start the engine and run it at idle.

(8) Depress the brake pedal.

(9) Release the parking brake lever and shift the shift lever to ”L” position.

(10) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.

(11) Check that the right rear wheel rotates.

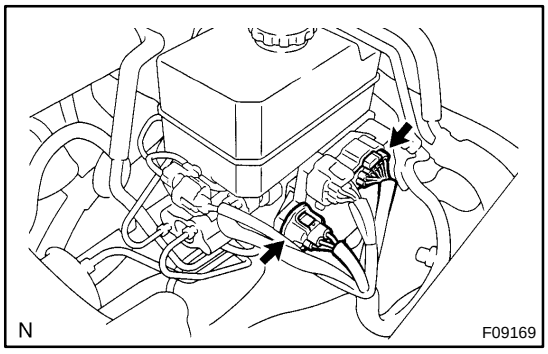
If the right rear wheels stops, replace the hydraulic brake booster.

(p) Stop the engine and lower the vehicle.

(q) Remove the "SHEET G" (SST) and disconnect the actuator checker (SST) and sub-wire harness (SST) from the hydraulic brake booster.

(r) Connect the 2 connectors to the actuator.

(s) Clear the DTC (See page DI-505).



5. w/ ABS & TRAC & VSC only,
In case of using ABS actuator checker (SST):
INSPECT HYDRAULIC BRAKE BOOSTER OPERATION

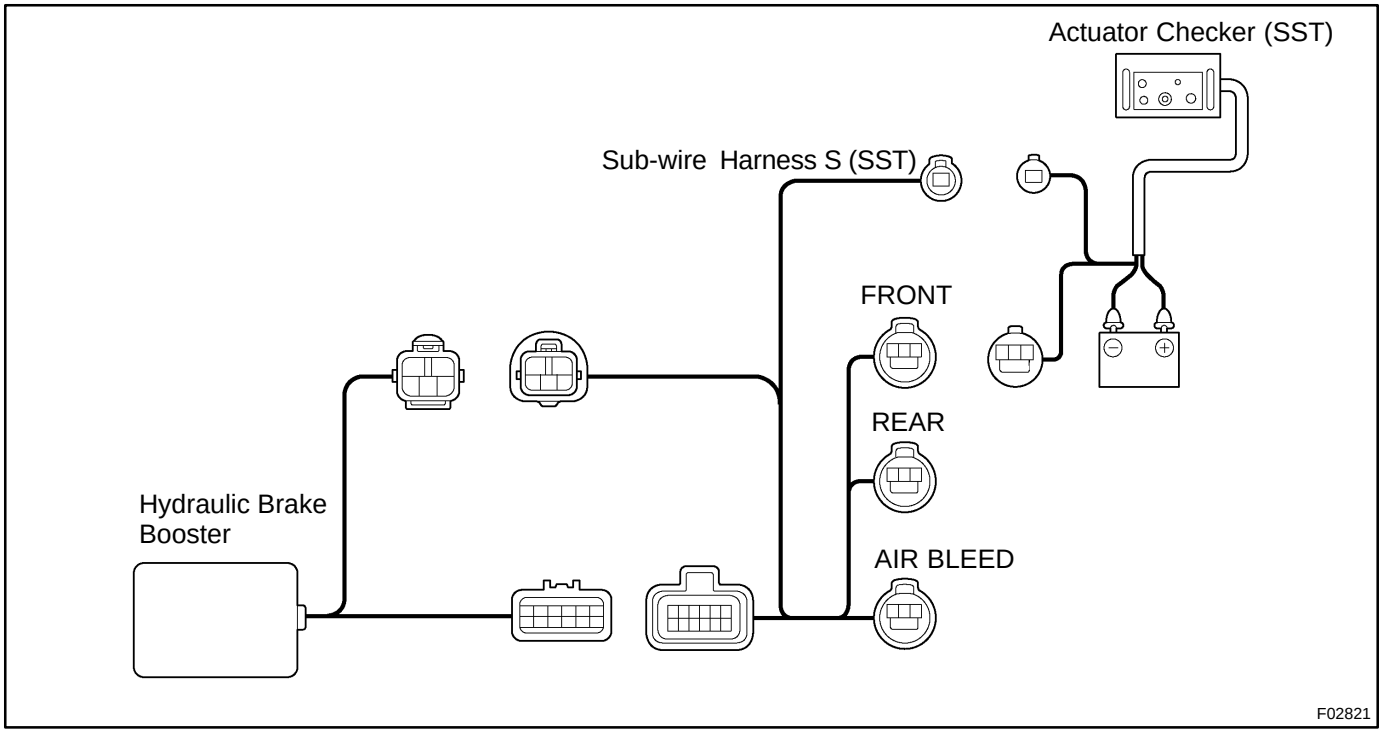
(a) Inspect the battery positive voltage.
Battery positive voltage: 10 - 14 V

(b) Disconnect the 2 connectors from hydraulic brake booster.

(c) Connect the actuator checker (SST) to the hydraulic brake booster side wire harness via the sub-wire harness S (SST), as shown in the following chart.
SST 09990-00150, 09990-00480

HINT:
Connect the connector with the label of "FRONT" attached to the connector of actuator checker.

(d) Connect the red cable of the checker to the battery positive (+) terminal and the black cable to the negative (-) terminal.



(e) Place "SHEET G" (SST) of "FRONT" on actuator checker.
SST 09990-00240

(f) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

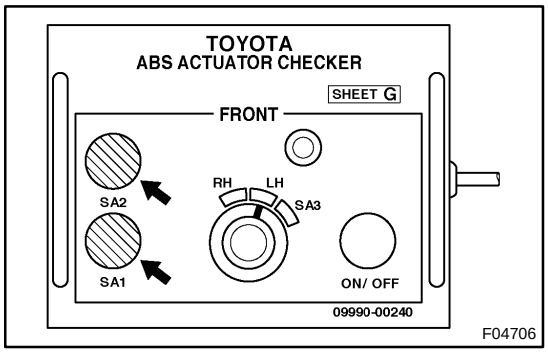
HINT:
When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

(g) Check that the brake pedal becomes light to depress.

If the pedal does not become to be light to depress, check and replace the brake line and hydraulic brake booster.

(h) Turn the ignition switch ON, check the pump motor operation noise.

If the pump motor does not operate, check and replace the wire harness and pump motor (See page BR-64).



(i) Inspect the front TRAC & VSC solenoid operation.

(1) Push in and hold the "SA1" and "SA2" switches simultaneously, depress strongly and hold the brake pedal with stable force.

NOTICE:
Do not keep the "SA1" and "SA2" pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(2) Check that the brake pedal cannot be depressed.

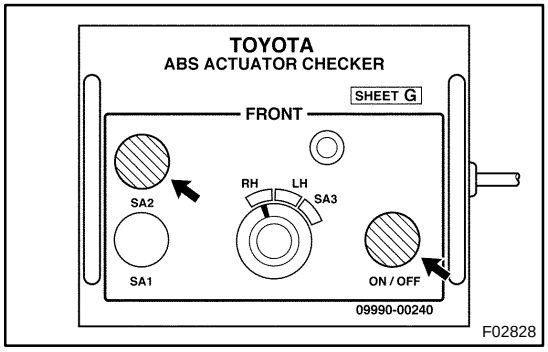
If the pedal can be depressed, replace the hydraulic brake booster.

(3) Release the "SA1" switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(4) Release the "SA2" switch and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.



(j) Inspect the right front ABS solenoid operation.

(1) Turn the selector switch to "RH" position.

(2) Push and hold in the MAIN push switch and "SA2" switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:
Do not keep the MAIN push switch and "SA2" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

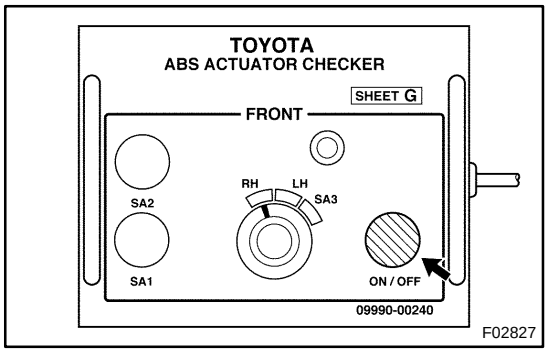
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and "SA2" switch simultaneously and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

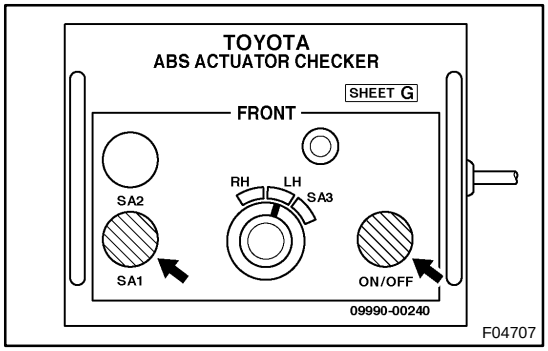
(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(9) Release the brake pedal.



(k) Inspect the left front ABS solenoid operation.

(1) Turn the selector switch to "LH" position.

(2) Push and hold in the MAIN push switch and "SA1" switch simultaneously, depress and hold the brake pedal with stable force.

NOTICE:

Do not keep the MAIN push switch and "SA1" switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

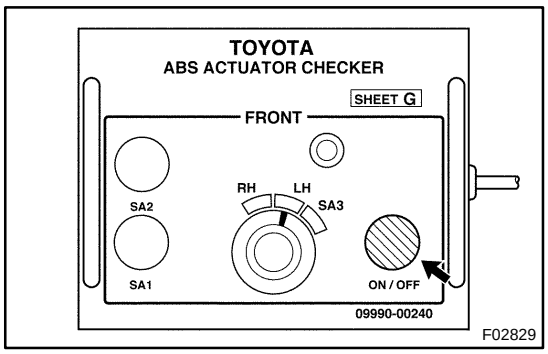
(3) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(4) Release the MAIN push switch and "SA1" switch simultaneously, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(5) Release the brake pedal.



(6) Depress and hold the brake pedal with stable force, push and hold in MAIN push switch.

NOTICE:

Do not keep the MAIN push switch pushed down for more than 10 sec. When operating it continuously, set the interval of more than 20 sec.

(7) Check that the brake pedal cannot be depressed.

If the pedal can be depressed, replace the hydraulic brake booster.

(8) Release the MAIN push switch, and check that the brake pedal can be depressed.

If the pedal cannot be depressed, replace the hydraulic brake booster.

(9) Release the brake pedal.

(l) Turn the ignition switch OFF, then reconnect the connector of sub- wire harness from the one with label of ”FRONT” to ”REAR”.

(m) Place ”SHEET G” of ”REAR” on the actuator checker.

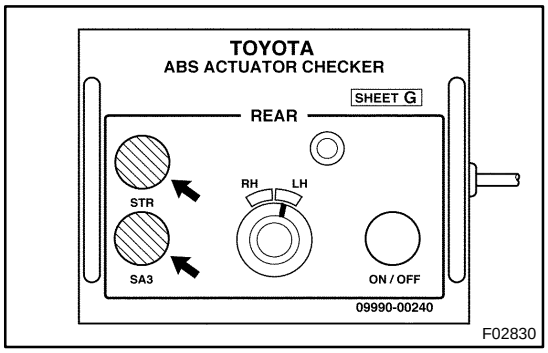
(n) Jack up and support the vehicle.

(o) Start the engine and run it at idle.

(p) Inspect the rear TRAC & VSC solenoid.

(1) Release the parking brake lever and shift the shift lever to ”L” position.

(2) Push and hold the ”SA3” switch and ”STR” switch simultaneously.



NOTICE:

- **Do not keep the ”STR” switch pushed down for more than 10 sec.**
- **Do not keep the ”SA3” switch pushed down for more than 5 sec.**
- **When operating it continuously, set the interval of more than 20 sec.**

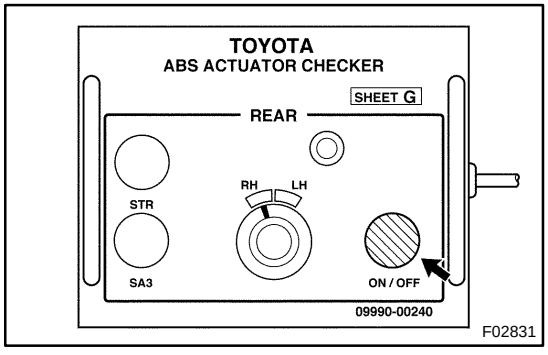
(3) Check that the rear wheels stop.

If the rear wheels rotate, replace the hydraulic brake booster.

(4) Release the ”SA3” switch and ”STR” switch simultaneously.

(5) Check that the rear wheels rotate.

If the rear wheels stop, replace the hydraulic brake booster.



(q) Inspect the right rear ABS solenoid.

(1) Turn the selector switch to ”RH” position.

(2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.

(3) Turn the ignition switch OFF.

(4) Depress the brake pedal with a force of 343 N (35 kgf, 77 lbf), record the fluid surface in the reservoir tank of the hydraulic brake booster.

(5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the hydraulic brake booster does not rise up at this time.

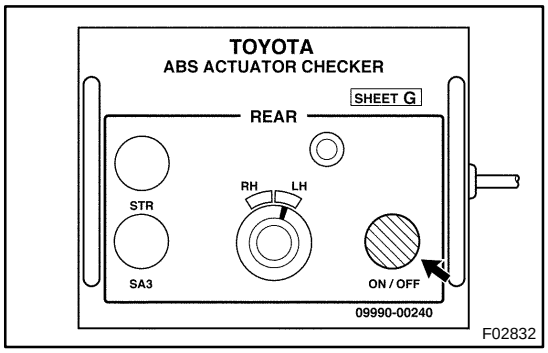
If the fluid surface level rises up, replace the hydraulic brake booster.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

(6) Start the engine and run it at idle.
(7) Depress the brake pedal.
(8) Release the parking brake lever and shift the shift lever to ”L” position.
(9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
(10) Check that the right rear wheel rotates.

If the right rear wheel stops, replace the hydraulic brake booster.



(r) Inspect the left rear ABS solenoid.
(1) Turn the selector switch to ”LH” position.
(2) Depress the brake pedal several times and release the brake pedal when the pump begins rotating. Wait until the pump stops.
(3) Turn the ignition switch OFF.
(4) Depress the brake pedal with a force of 343 N (35 kgf, 77 lbf), record the fluid surface in the reservoir tank of the hydraulic brake booster.
(5) Press the MAIN push switch for 10 sec., and check that the fluid surface in the reservoir tank of the hydraulic brake booster does not rise up at this time.

If the fluid surface level rises up, replace the hydraulic brake booster.

NOTICE:

Do not press MAIN push switch for more than 10 sec. When operating the switch continuously, do it an interval of more than 20 sec.

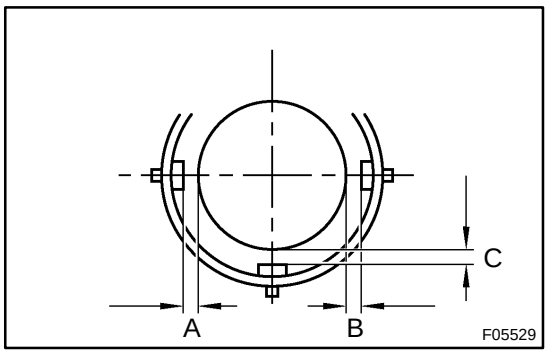
(6) Start the engine and run it at idle.
(7) Depress the brake pedal.
(8) Release the parking brake lever and shift the shift lever to ”L” position.
(9) Once, release the brake pedal. After depressing the brake pedal with stable force, then push and hold MAIN push switch.
(10) Check that the left rear wheel rotates.

If the left rear wheel stops, replace the hydraulic brake booster.

(s) Stop the engine and lower the vehicle.

(t) Remove the ”SHEET G” (SST) and disconnect the actuator checker (SST) and sub-wire harness S (SST) from the hydraulic brake booster.
(u) Connect the 2 connectors to the actuator.
(v) Clear the DTC (See page DI-505).

BR0TI-09



REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-62).

INSTALL ACCUMULATOR BRACKET

When installing the accumulator bracket, adjust to secure the clearance shown in the illustration on the left.

Standard clearance:

A + B: 4.1 mm (0.161 in.) or less

C: 0.3 - 3.8 mm (0.012 - 0.150 in.)

HINT:

Secure more than 0.3 mm (0.012 in.) clearance for A and B each.

BR12C-05

REMOVAL

NOTICE:

Before starting the work, make sure that the ignition switch is OFF and depress the brake pedal more than 40 times.

HINT:

When a pressure in power supply system is released, reaction force becomes light and stroke becomes longer.

NOTICE:

- **As high pressure is applied to the brake actuator tube No. 1, never deform it.**
- **Until the work is over, do not turn the ignition switch ON.**

1. DRAW OUT FLUID WITH SYRINGE

NOTICE:

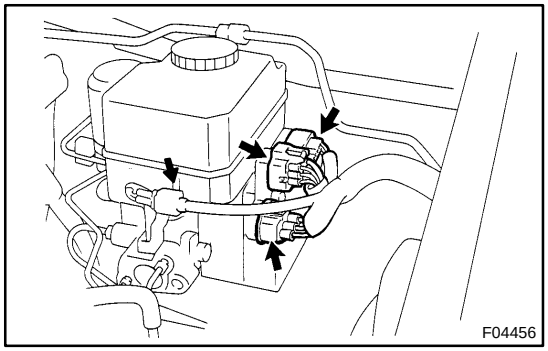
Do not let brake fluid remain on a painted surface. Wash it off immediately.

2. REMOVE SCUFF PLATE, COWL SIDE TRIM, LOWER NO. 1 PANEL, LH LOWER PANEL AND NO. 2 HEATER TO REGISTER DUCT (See page BO-81)

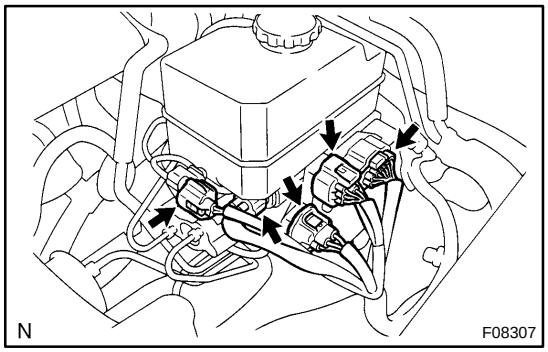
3. REMOVE ABS OR ABS & TRAC & VSC ECU

Remove the 2 nuts and ABS or ABS & TRAC & VSC ECU.

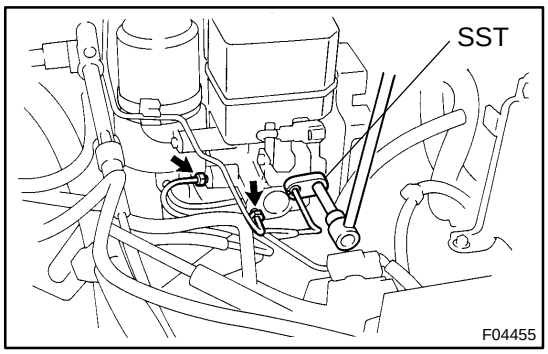
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)



4. w/ ABS only:
DISCONNECT 4 CONNECTORS



5. w/ ABS & TRAC & VSC only:
DISCONNECT 5 CONNECTORS

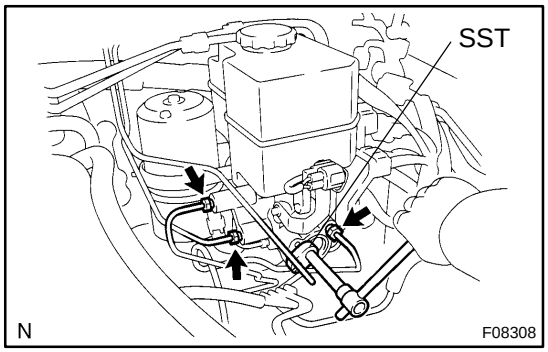


6. w/ ABS only:
DISCONNECT BRAKE LINES

Using SST, disconnect the 3 brake lines.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)



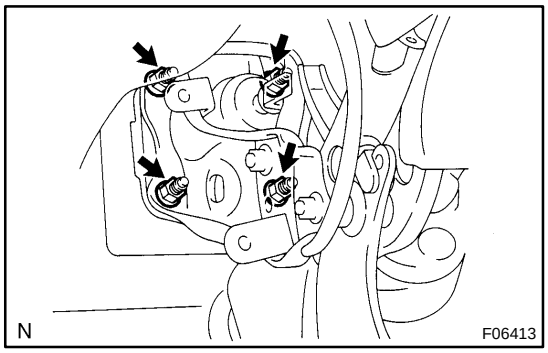
7. w/ ABS & TRAC & VSC only:
DISCONNECT BRAKE LINES

Using SST, disconnect the 4 brake lines.

SST 09023-00100

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

8. REMOVE CLIP AND CLEVIS PIN



9. REMOVE HYDRAULIC BRAKE BOOSTER ASSEMBLY

(a) Remove the 4 booster installation nuts.

Torque: 15 N·m (155 kgf·cm, 11 ft·lbf)

(b) Remove the booster assembly and gasket.

PROPORTIONING AND BY-PASS VALVE (P & B VALVE)

BR0NC-06

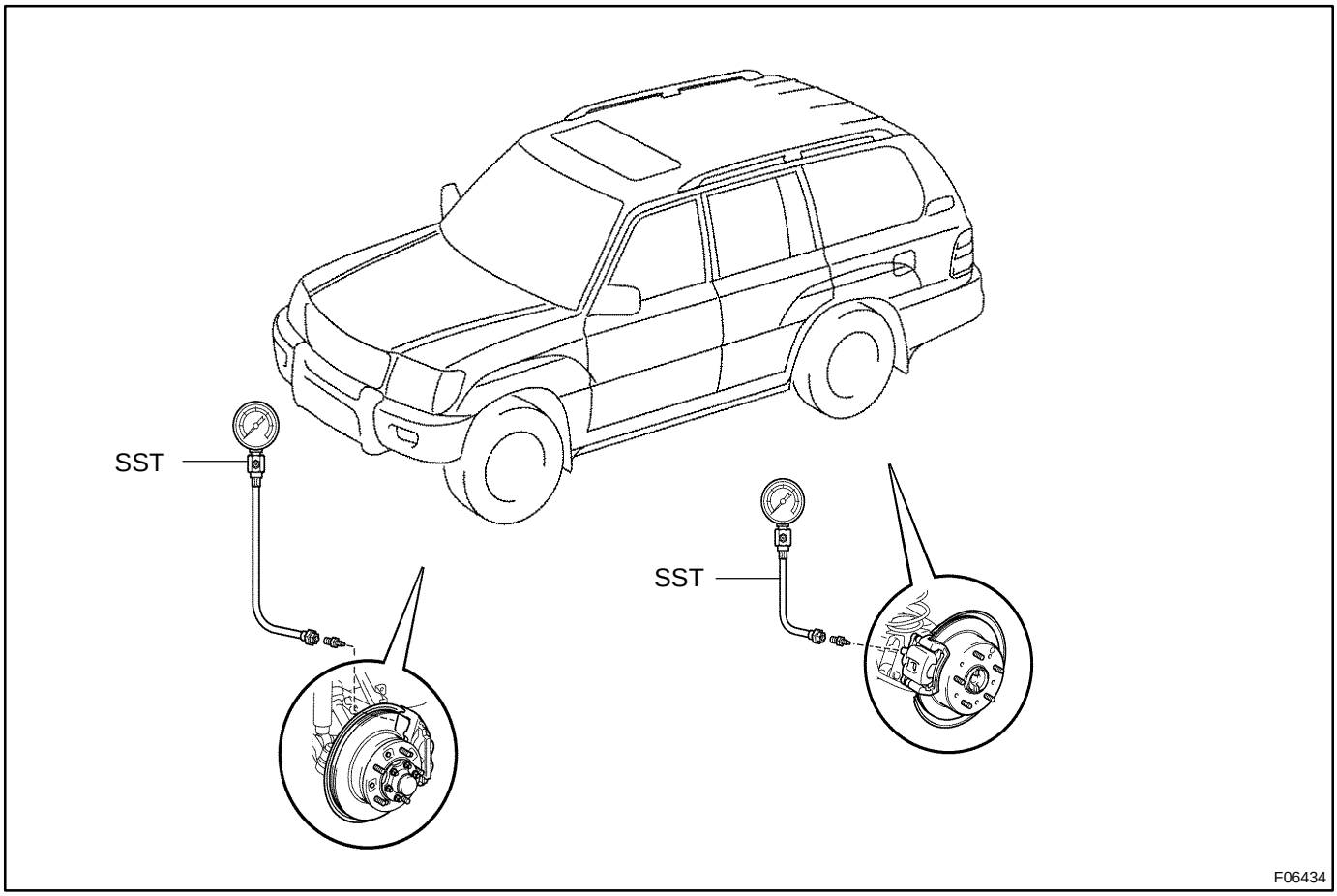
ON-VEHICLE INSPECTION

1. INSTALL LSPV GAUGE (SST) AND BLEED AIR

(a) Turn the ignition switch OFF, depress the brake pedal more than 40 times.

(b) Install the LSPV gauge (SST) and bleed air.

SST 09709-29018



(c) Turn the ignition switch ON, and wait until the pump motor has stopped.

2. RAISE FRONT BRAKE CALIPER PRESSURE AND CHECK REAR BRAKE CALIPER PRESSURE

Depress the brake pedal and check fluid pressure.

Front brake caliper pressure	Rear brake caliper pressure
2,256 kPa (23 kgf·cm^2, 327 psi)	2,452 kPa (25 kgf·cm^2, 356 psi)
4,413 kPa (45 kgf·cm^2, 640 psi)	3,334 - 3,727 kPa (34 - 38 kgf·cm^2, 484 - 540 psi)
7,845 kPa (80 kgf·cm^2, 1,138 psi)	5,197 kPa (53 kgf·cm^2, 754 psi)

If the rear brake caliper pressure is incorrect, replace the hydraulic brake booster.

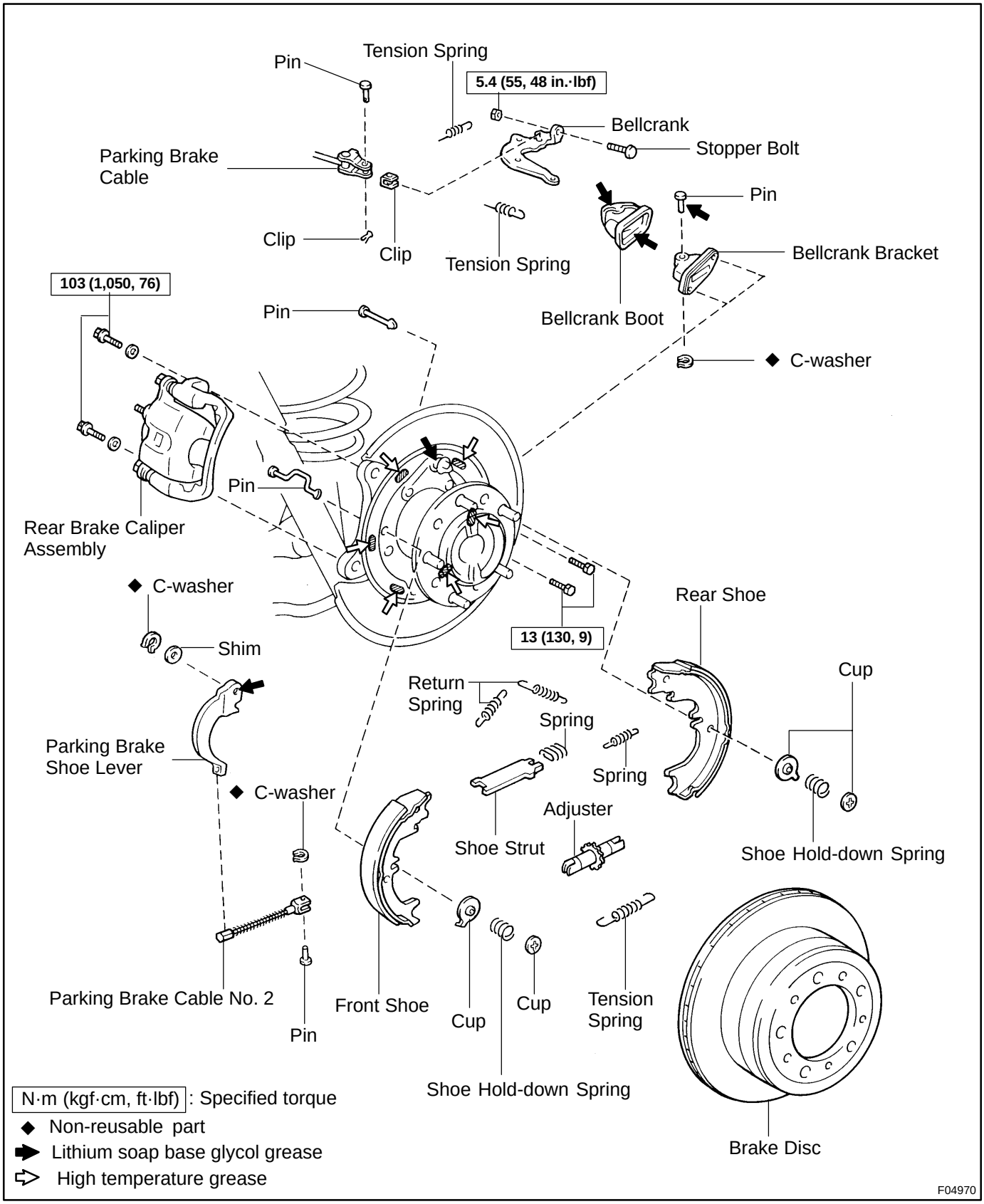
3. REMOVE LSPV GAUGE (SST) AND BLEED BRAKE SYSTEM (See page BR-4)

4. CHECK FOR FLUID LEAKAGE

PARKING BRAKE

BR0JX-05

COMPONENTS



BR0TD-06

DISASSEMBLY

1. REMOVE REAR WHEEL

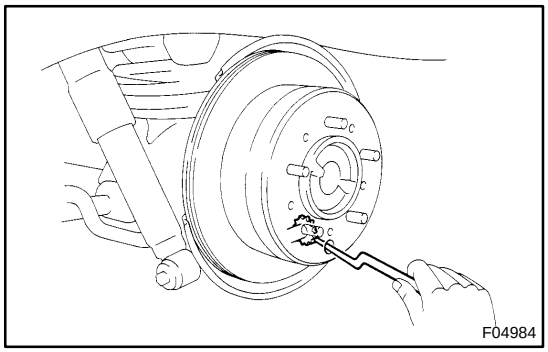
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

2. REMOVE REAR DISC BRAKE ASSEMBLY

(a) Remove the 2 mounting bolts and remove the disc brake assembly.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

(b) Suspend the disc brake securely. Ensure that the hose is not stretched.



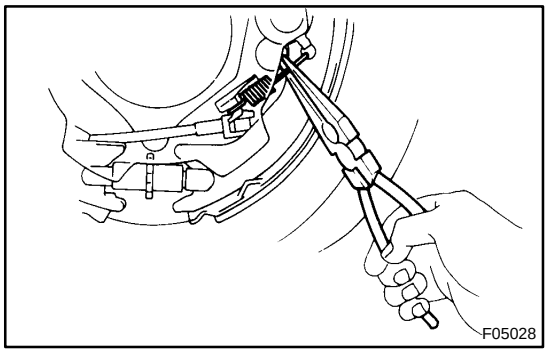
3. REMOVE DISC

(a) Place matchmarks on the disc and rear hub.

(b) Remove the disc.

HINT:

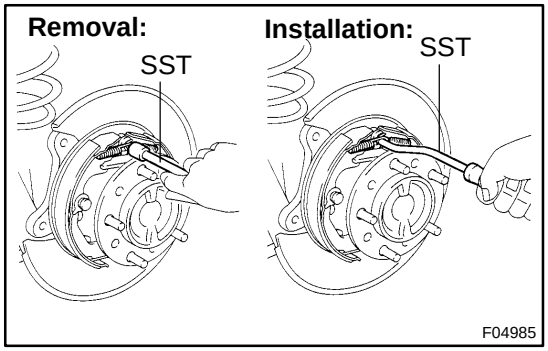
If the disc cannot be removed easily, turn the shoe adjuster until the wheel turns freely.



4. REMOVE TENSION SPRING

(a) Using needle-nose pliers, remove the spring from the rear shoe and backing plate.

(b) Remove the lower side tension spring.



5. REMOVE SHOE RETURN SPRINGS

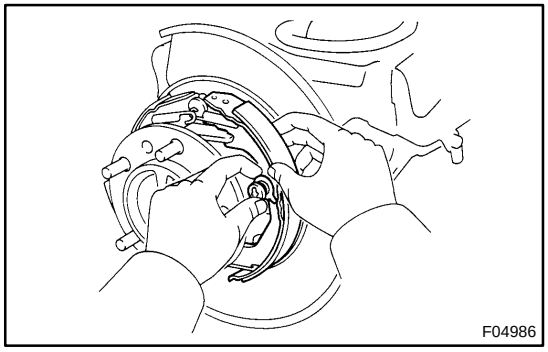
Using SST, remove the 2 shoe return springs.

SST 09717-20010

HINT:

At the time of installation, using SST, install the rear shoe return spring and then install the front shoe return spring.

SST 09718-20010

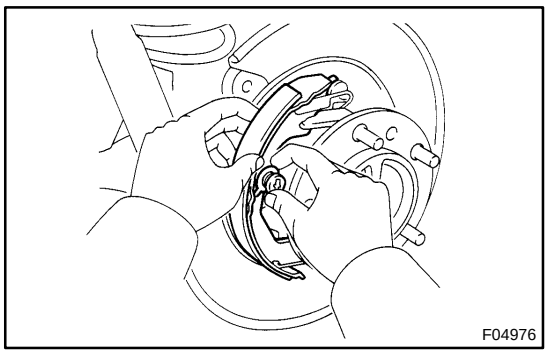


6. REMOVE SHOE STRUT WITH SPRING

7. REMOVE REAR SHOE, ADJUSTER AND TENSION SPRING

(a) Slide out the rear shoe and remove the adjuster.

(b) Remove the shoe hold-down spring, 2 cups and pin.

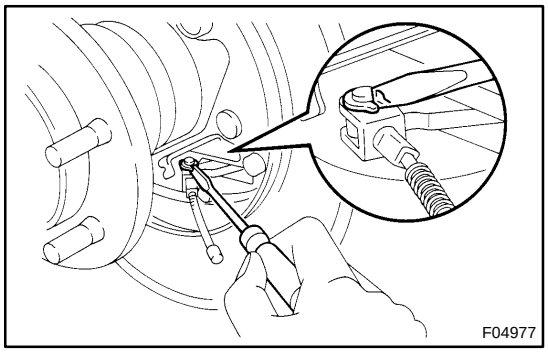


8. REMOVE FRONT SHOE

(a) Slide out the front shoe.

(b) Disconnect the parking brake cable No. 2 from the parking brake shoe lever.

(c) Remove the shoe hold-down spring, 2 cups and pin.



9. IF NECESSARY, REMOVE AND DISASSEMBLE PARKING BRAKE BELLCRANK ASSEMBLY

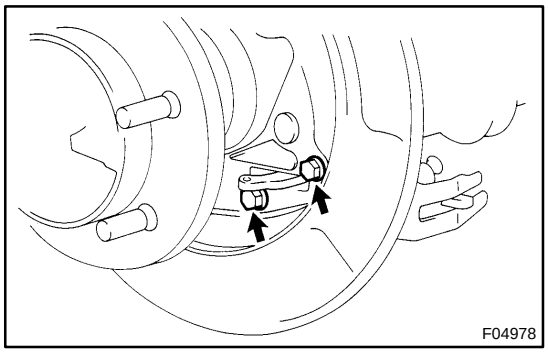
(a) Using a screwdriver, remove the C-washer.

(b) Remove the pin and disconnect the parking brake cable No. 2 from the bellcrank.

(c) Remove the clip and pin.

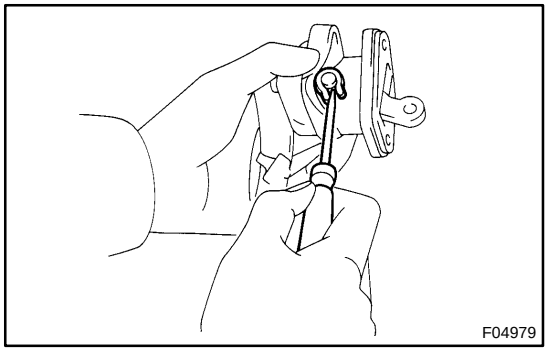
(d) Disconnect the parking brake cable and remove the clip.

(e) Remove the 2 tension springs.



(f) Remove the 2 bolts and parking brake bellcrank assembly.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



(g) Turn the boot over from parking brake bellcrank bracket.

(h) Using a screwdriver, remove the C-washer and pin.

(i) Remove the parking brake bellcrank from the bellcrank bracket.

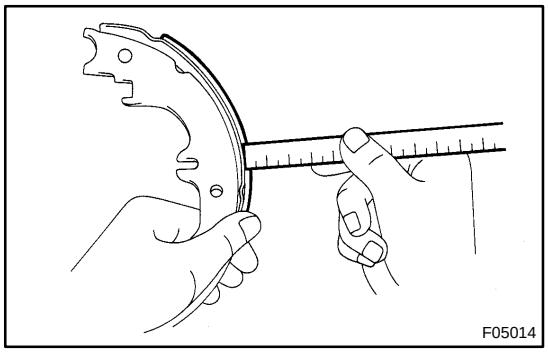
(j) Remove the bellcrank boot from the bellcrank.

BR0HM-06

INSPECTION

1. INSPECT DISASSEMBLED PARTS

Inspect the disassembled parts for wear, rust or damage.



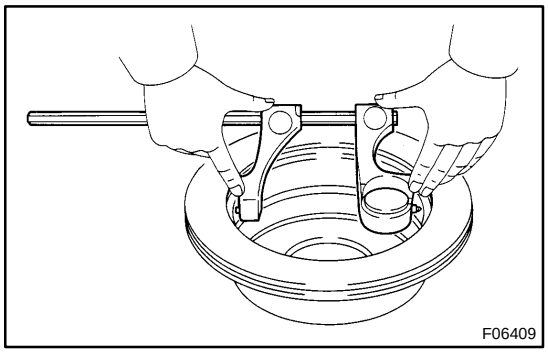
2. MEASURE BRAKE SHOE LINING THICKNESS

Using a ruler, measure the thickness of the shoe lining.

Standard thickness: 4.0 mm (0.157 in.)

Minimum thickness: 1.0 mm (0.039 in.)

If the lining thickness is at the minimum thickness or less, or if there is severe and uneven wear, replace the brake shoe.



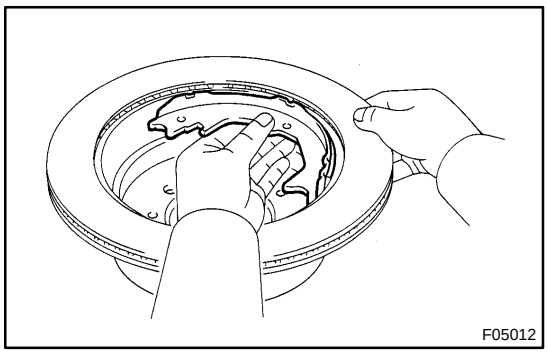
3. MEASURE BRAKE DISC INSIDE DIAMETER

Using brake drum gauge or equivalent, measure the inside diameter of the disc.

Standard inside diameter: 230 mm (9.06 in.)

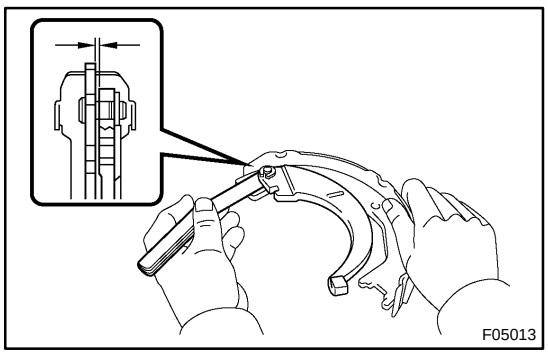
Maximum inside diameter: 231 mm (9.09 in.)

Replace the disc if the inside diameter is at the maximum value or more. Replace the disc or grind it with a lathe if the disc is scored or is worn unevenly.



4. INSPECT PARKING BRAKE LINING AND DISC FOR PROPER CONTACT

Apply chalk to the inside surface of the disc, then grind down the brake shoe lining to fit. If the contact between the disc and the brake shoe lining is improper, repair it using a brake shoe grinder or replace the brake shoe assembly.



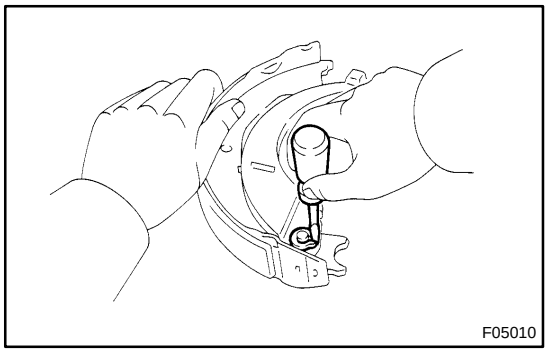
5. MEASURE CLEARANCE BETWEEN PARKING BRAKE SHOE AND LEVER

Using a feeler gauge, measure the clearance.

Standard clearance: Less than 0.25 mm (0.0098 in.)

If the clearance is not within the specification, replace the shim with one of the correct size.

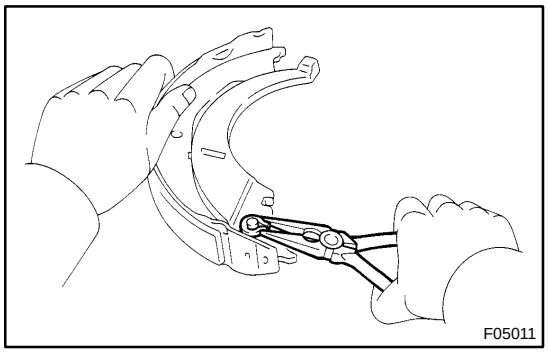
Thickness mm (in.)	Thickness mm (in.)
0.3 (0.012)	0.6 (0.024)
0.4 (0.016)	0.9 (0.035)
0.5 (0.020)	-



6. IF NECESSARY, REPLACE SHIM

(a) Using a screwdriver, remove the C-washer.

(b) Remove the parking brake shoe lever and shim, and install the correct sized shim.



(c) Install the parking brake shoe lever with a new C-washer.

(d) Remeasure the clearance.

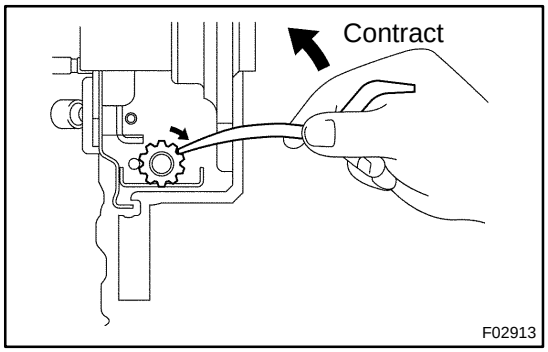
BR0TE-08

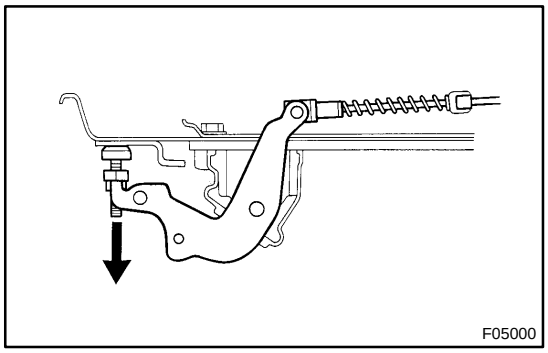
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-34).

HINT:

Apply high temperature grease and lithium soap base glycol grease to the parts indicated by the arrows (See page BR-33).





1. ADJUST PARKING BRAKE SHOE CLEARANCE

(a) Disconnect the parking brake cable from the bellcrank.
(b) Remove the 2 bellcrank tension springs.
(c) Loosen the bellcrank adjusting bolt.
(d) Temporarily install the 3 hub nuts.
(e) Remove the hole plug.
(f) Turn the adjuster and expand the shoes until the disc locks.
(g) Return the adjuster 8 notches.
(h) Install the hole plug.

2. ADJUST BELLCRANK

(a) Pull the bellcrank until all play in the interior linkage is taken up.
(b) Screw in the bellcrank adjusting bolt to where it contacts on the dust seal.
(c) Loosen it one turn, and lock it at that position with the lock nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

(d) Install the 2 bellcrank tension springs.
(e) Connect the parking brake cable.
(f) Remove the 3 hub nuts.

3. SETTLING PARKING BRAKE SHOES AND DISC

(a) Drive the vehicle at about 50 km/h (31 mph) on a safe, level and dry road.
(b) With the parking brake release button pushed in, pull on the lever with 88 N (9 kgf, 19.8 lbf) of force.
(c) Drive the vehicle for about 400 meters (0.25 mile) in this condition.
(d) Repeat this procedure 2 or 3 times.

4. RECHECK AND ADJUST PARKING BRAKE LEVER TRAVEL (See page BR-14)

PARKING BRAKE LEVER

BR0XC-01

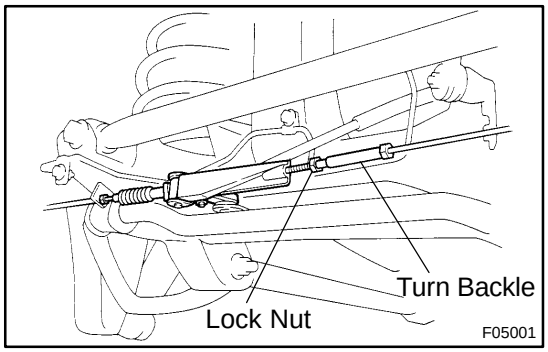
ON-VEHICLE INSPECTION

1. CHECK PARKING BRAKE LEVER TRAVEL

Pull the parking brake lever all the way up, and count the number of clicks.

Parking brake lever travel at 196 N (20 kgf, 44 lbf): 4 - 6 clicks

If incorrect, adjust the parking brake.



2. IF NECESSARY, ADJUST PARKING BRAKE

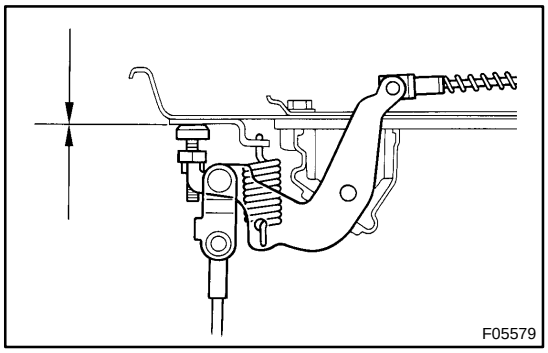
HINT:

Before adjusting the parking brake, make sure that the rear brake shoe clearance has been adjusted. For shoe clearance adjustment see page BR-38 .

(a) Loosen the lock nut and turn the turn backle until the lever travel is correct.

(b) Tighten the lock nut.

Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



3. CHECK BELLCRANK

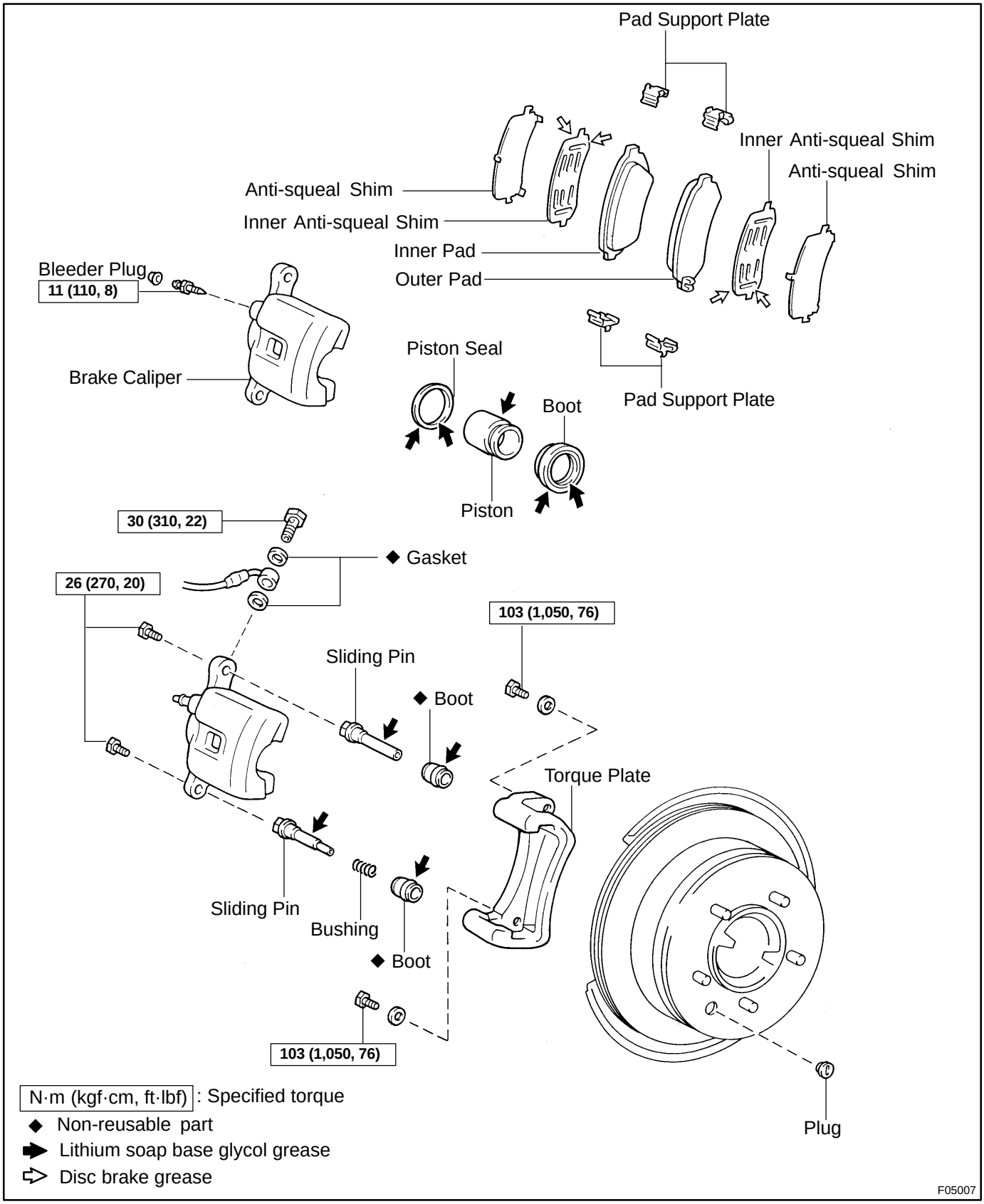
(a) Check that the adjusting bolt on the bellcrank is not apart from the backing plate.

(b) When the adjusting bolt on the bellcrank is apart from the backing plate adjust the parking brake cable once again.

REAR BRAKE CALIPER

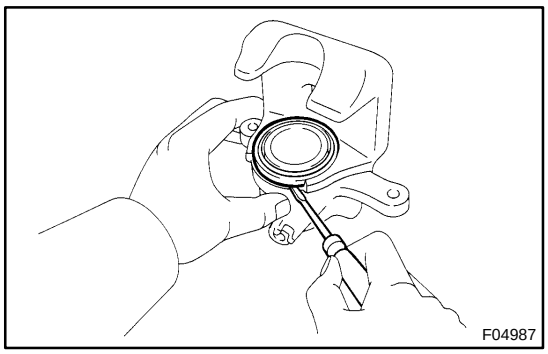
BR0JR-06

COMPONENTS



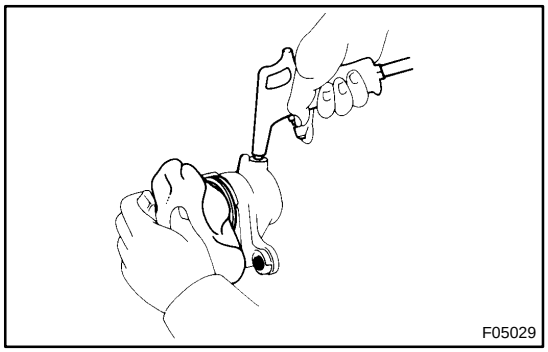
BR0TC-04

DISASSEMBLY



1. REMOVE CYLINDER BOOTS

Using a screwdriver, remove the cylinder boot from the caliper.



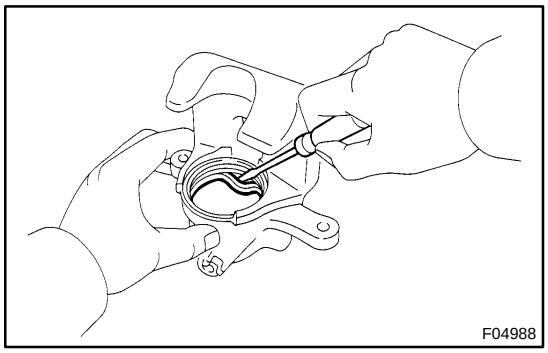
2. REMOVE PISTON

(a) Place a piece of cloth or a similar, object between the piston and caliper.

(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.



3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the piston seals from the caliper.

4. REMOVE PIN BOOT AND SLIDING BUSHING

Using a screwdriver, pull out sliding pin, pin boot and sliding bushing.

HINT:

Tape the screwdriver tip before use.

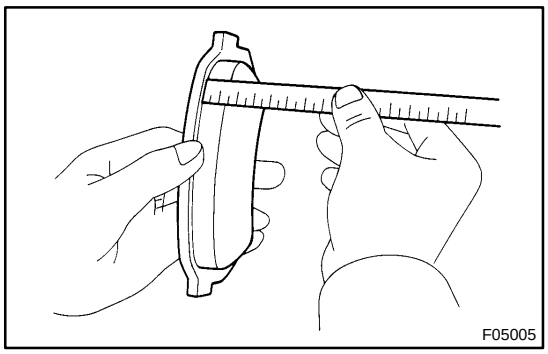
NOTICE:

At the time of reassembly, please refer to the following item.

Insert the sliding pin with sliding bushing into the lower part, and insert the sliding pin without sliding bushing into the upper part.

BR0JU-03

INSPECTION



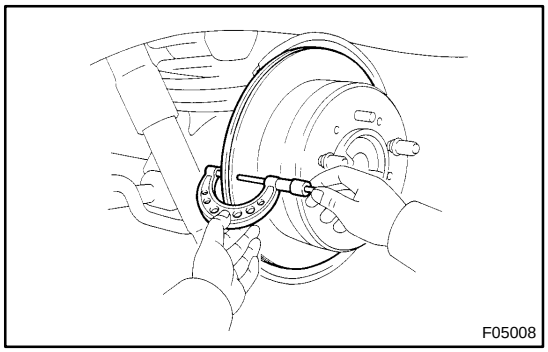
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 12.0 mm (0.472 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.



2. MEASURE DISC THICKNESS

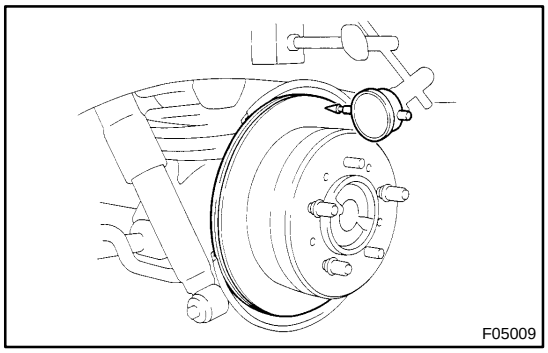
(a) Temporarily fasten the disc with the 3 hub nuts.

(b) Using a micrometer, measure the disc thickness.

Standard thickness: 18.0 mm (0.709 in.)

Minimum thickness: 16.0 mm (0.611 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.1 mm (0.0040 in.)

If the disc's runout is at the maximum value or greater, check the bearing play is in the axial direction and check the axle hub runout (See page SA-84). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on an "On-Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the backing plate.

(b) Remove the hub nuts and the disc. Reinstall the disc rotating 1/5 of a turn from its original position on the hub. Install and torque the hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

(d) If the minimum runout recorded in (b) and (c) is less than 0.1 mm (0.0040 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.1 mm (0.0040 in.), replace the disc and repeat step 3.

(f) Install the torque plate and tighten the 2 bolts.

Torque: 103 N·m(1,050 kgf·cm, 76 ft·lbf)

BR0JW-03

INSTALLATION

Installation is in the reverse order of removal (See page BR-28).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.

BR0JV-03

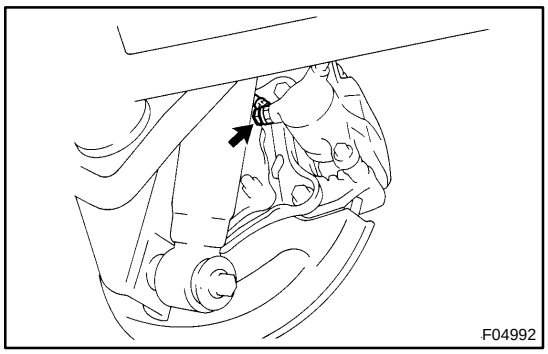
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-29).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR-27).

BR0JS-03



REMOVAL

1. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

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

HINT:

At the time of installation, please refer to the following item.

Install the flexible hose lock securely in the lock hole in the caliper.

2. REMOVE CALIPER

(a) Hold the sliding pin and loosen the 2 installation bolts.

Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

(b) Remove the 2 installation bolts.

(c) Remove the caliper from the torque plate.

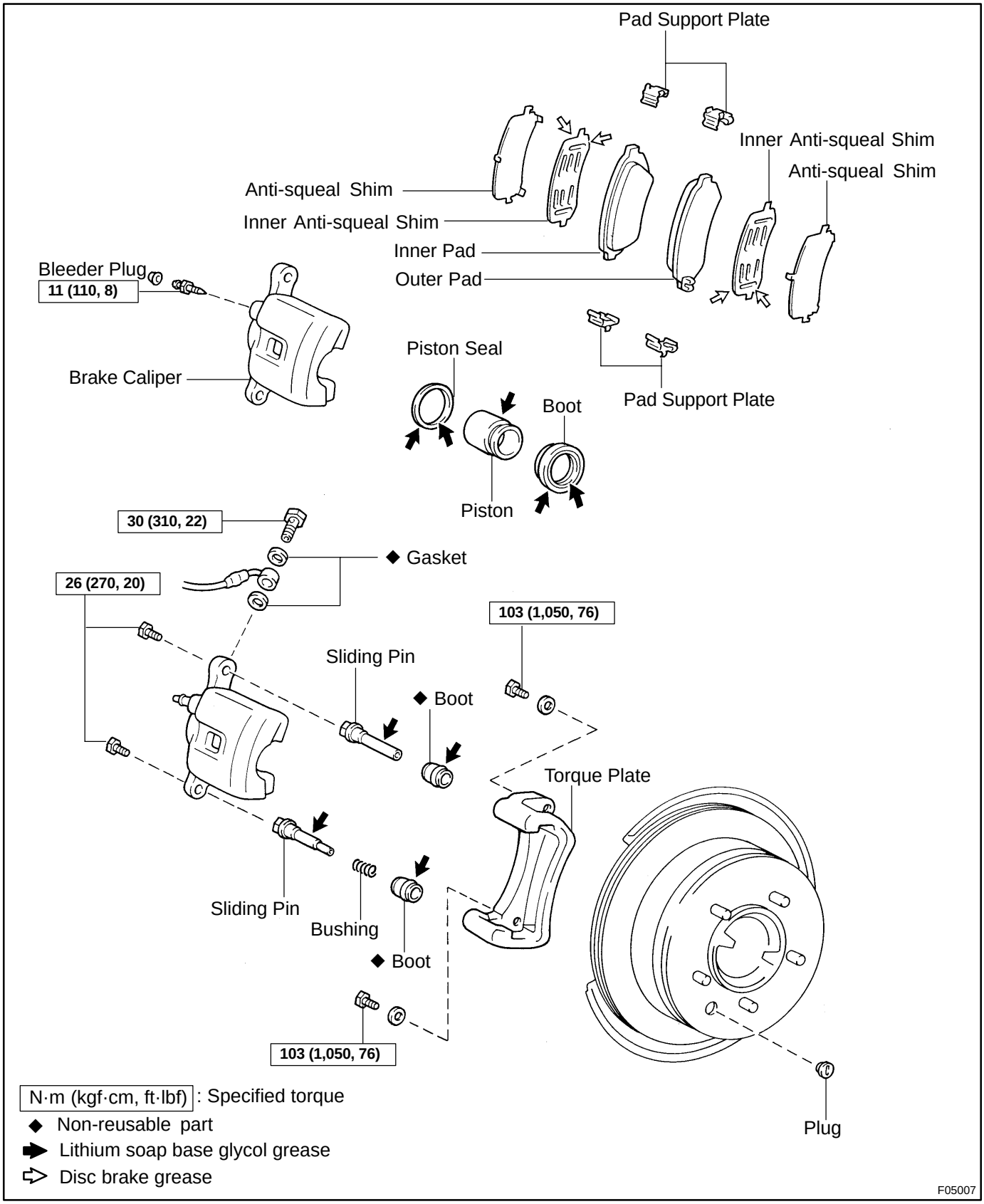
3. REMOVE 2 BRAKE PADS WITH ANTI- SQUEAL SHIMS

4. REMOVE 4 PAD SUPPORT PLATES

REAR BRAKE CALIPER

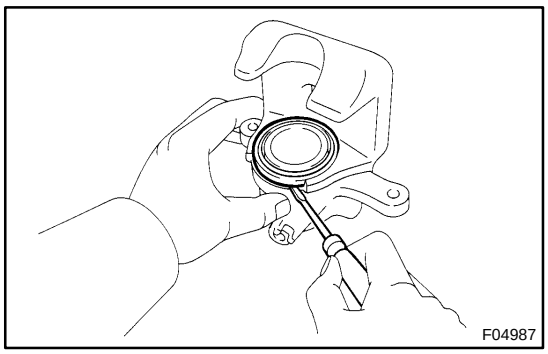
BR0JR-06

COMPONENTS



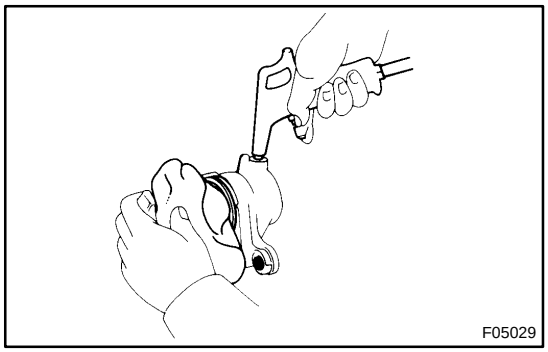
BR0TC-04

DISASSEMBLY



1. REMOVE CYLINDER BOOTS

Using a screwdriver, remove the cylinder boot from the caliper.



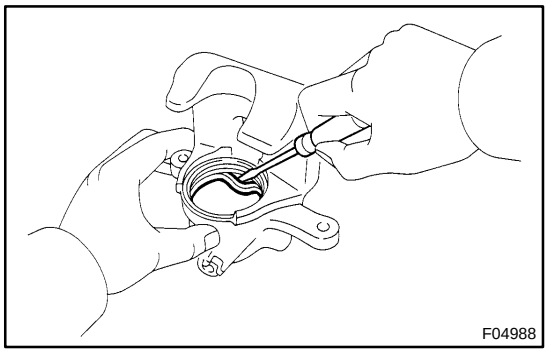
2. REMOVE PISTON

(a) Place a piece of cloth or a similar, object between the piston and caliper.

(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.



3. REMOVE PISTON SEALS FROM BRAKE CYLINDER

Using a screwdriver, remove the piston seals from the caliper.

4. REMOVE PIN BOOT AND SLIDING BUSHING

Using a screwdriver, pull out sliding pin, pin boot and sliding bushing.

HINT:

Tape the screwdriver tip before use.

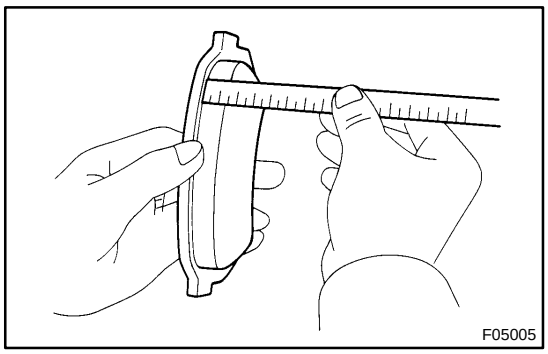
NOTICE:

At the time of reassembly, please refer to the following item.

Insert the sliding pin with sliding bushing into the lower part, and insert the sliding pin without sliding bushing into the upper part.

BR0JU-03

INSPECTION



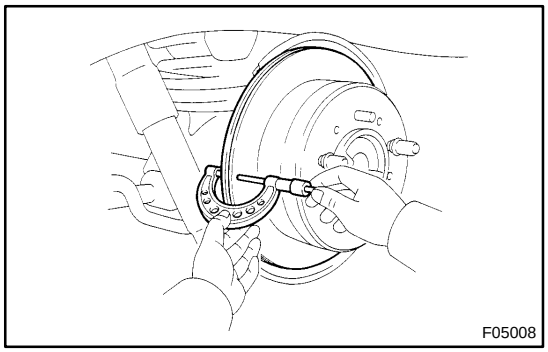
1. MEASURE PAD LINING THICKNESS

Using a ruler, measure the pad lining thickness.

Standard thickness: 12.0 mm (0.472 in.)

Minimum thickness: 1.0 mm (0.039 in.)

Replace the pad if the pad's thickness is at the minimum or if it shows signs of uneven wear.



2. MEASURE DISC THICKNESS

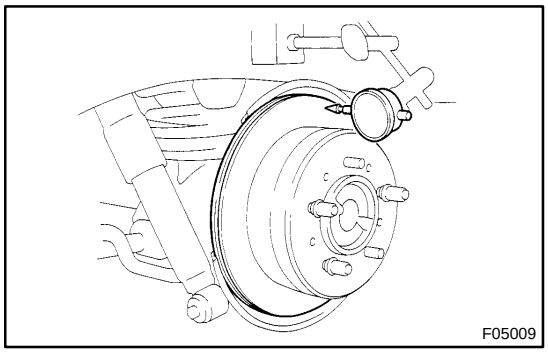
(a) Temporarily fasten the disc with the 3 hub nuts.

(b) Using a micrometer, measure the disc thickness.

Standard thickness: 18.0 mm (0.709 in.)

Minimum thickness: 16.0 mm (0.611 in.)

Replace the disc if the thickness of the disc is at the minimum thickness or less. Replace the disc or grind it on a lathe if it is scored or is worn unevenly.



3. MEASURE DISC RUNOUT

Using a dial indicator, measure the disc runout at a position 10 mm (0.39 in.) from the outside edge.

Maximum disc runout: 0.1 mm (0.0040 in.)

If the disc's runout is at the maximum value or greater, check the bearing play is in the axial direction and check the axle hub runout (See page SA-84). If the bearing play and axle hub runout are not abnormal, adjust the disc runout or grind it on an "On-Car" brake lathe.

4. IF NECESSARY, ADJUST DISC RUNOUT

(a) Remove the torque plate from the backing plate.

(b) Remove the hub nuts and the disc. Reinstall the disc rotating 1/5 of a turn from its original position on the hub. Install and torque the hub nuts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

Remeasure the disc runout. Make a note of the runout and the disc's position on the hub.

(c) Repeat (b) until the disc has been installed on the 3 remaining hub positions.

(d) If the minimum runout recorded in (b) and (c) is less than 0.1 mm (0.0040 in.), install the disc in that position.

(e) If the minimum runout recorded in (b) and (c) is greater than 0.1 mm (0.0040 in.), replace the disc and repeat step 3.

(f) Install the torque plate and tighten the 2 bolts.

Torque: 103 N·m(1,050 kgf·cm, 76 ft·lbf)

BR0JW-03

INSTALLATION

Installation is in the reverse order of removal (See page BR-28).

HINT:

- After installation, fill the brake reservoir with brake fluid and bleed brake system (See page BR-4).
- Check for leaks.

BR0JV-03

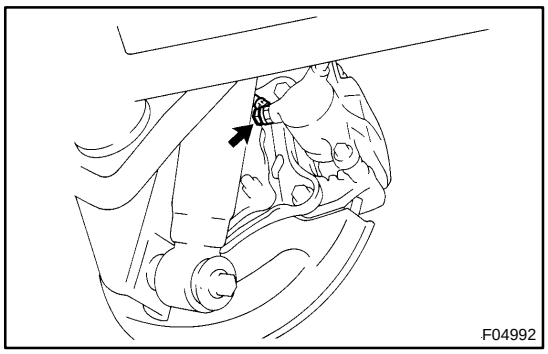
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BR-29).

HINT:

Apply lithium soap base glycol grease to the parts indicated by the arrows (See page BR-27).

BR0JS-03



REMOVAL

1. DISCONNECT FLEXIBLE HOSE

Remove the union bolt and gasket from the caliper, then disconnect the flexible hose from the caliper. Use a container to catch brake fluid as it drains out.

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

HINT:

At the time of installation, please refer to the following item.

Install the flexible hose lock securely in the lock hole in the caliper.

2. REMOVE CALIPER

(a) Hold the sliding pin and loosen the 2 installation bolts.

Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

(b) Remove the 2 installation bolts.

(c) Remove the caliper from the torque plate.

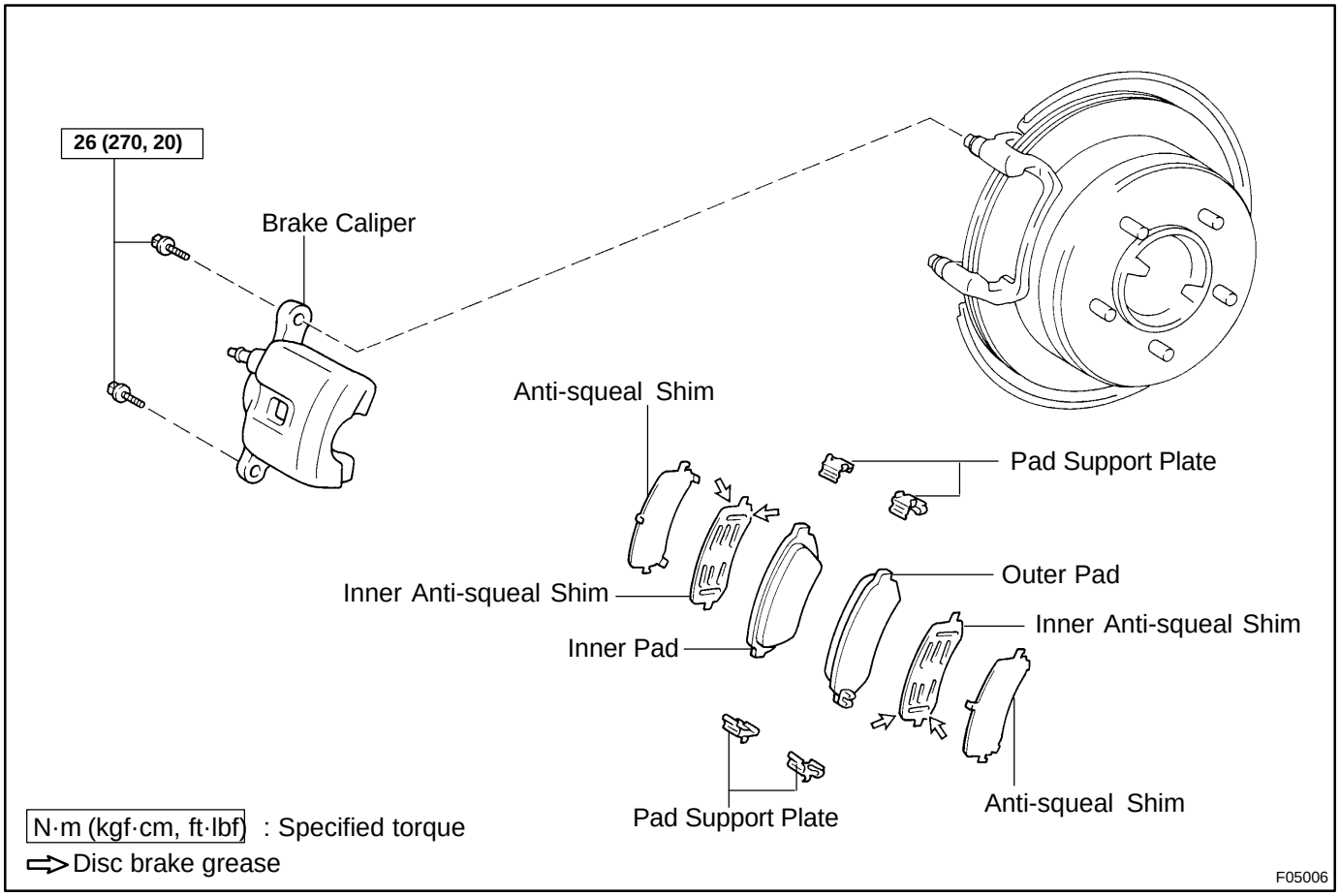
3. REMOVE 2 BRAKE PADS WITH ANTI- SQUEAL SHIMS

4. REMOVE 4 PAD SUPPORT PLATES

REAR BRAKE PAD

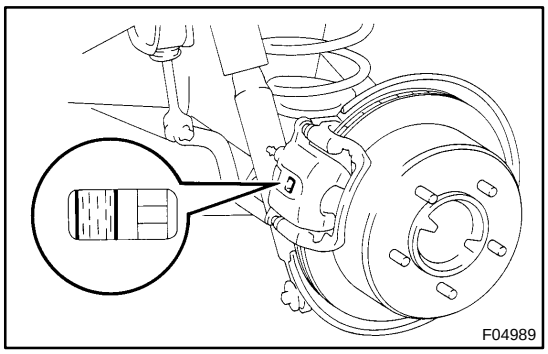
COMPONENTS

BR0JP-07



BR0TB-04

REPLACEMENT

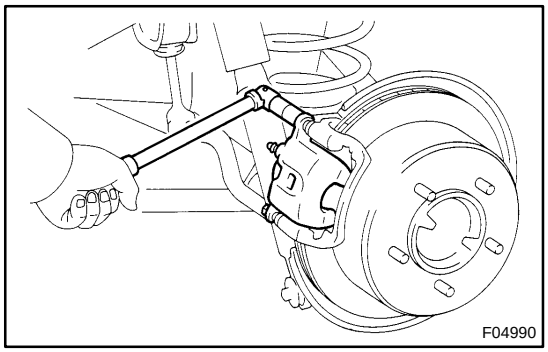


1. REMOVE REAR WHEEL

2. INSPECT PAD LINING THICKNESS

Check the pad thickness through the caliper inspection hole and replace pads if not within the specification.

Minimum thickness: 1.0 mm (0.039 in.)



3. REMOVE BRAKE CALIPER

(a) Remove the 2 mounting bolts.

(b) Remove the caliper and suspend it so the hose is not stretched.

HINT:

Do not disconnect the flexible hose.

4. REMOVE 2 PADS AND 4 ANTI-SQUEAL SHIMS

5. REMOVE 4 PAD SUPPORT PLATES

NOTICE:

The pad support plates can be used again provided that they have sufficient rebound, no deformation, cracks or wear, and have had all rust, dirt and foreign particles cleaned off.

6. CHECK DISC THICKNESS AND RUNOUT

(See page BR-30)

7. INSTALL PAD SUPPORT PLATES

8. INSTALL NEW PADS

NOTICE:

When replacing worn pads, the anti-squeal shims must be replaced together with the pads.

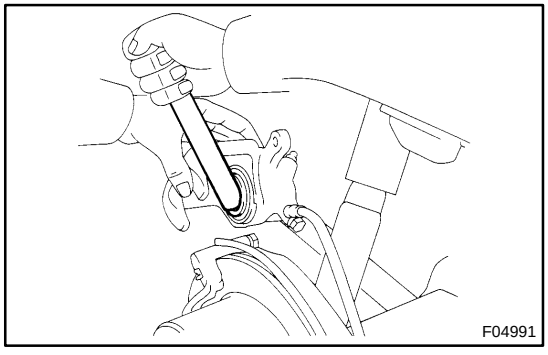
Install the 4 anti-squeal shims to the pads.

HINT:

Apply disc brake grease to both sides of the inner anti-squeal shims (See page BR-24).

NOTICE:

Do not allow oil or grease to get on the rubbing face.



9. INSTALL CALIPER

(a) Draw out a small amount of brake fluid from the reservoir.

(b) Press in the pistons with a hammer handle or an equivalent.

HINT:

- Always change the pads on one wheel at a time as there is a possibility of the opposite piston flying out.
- If the piston is difficult to push in, loosen the bleeder plug and push in the piston while letting some fluid escape.

(c) Install the caliper carefully so the boot is not wedged.

(d) Install 2 mounting bolts.

Torque: 26 N·m (270 kgf·cm, 20 ft·lbf)

10. INSTALL REAR WHEEL

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

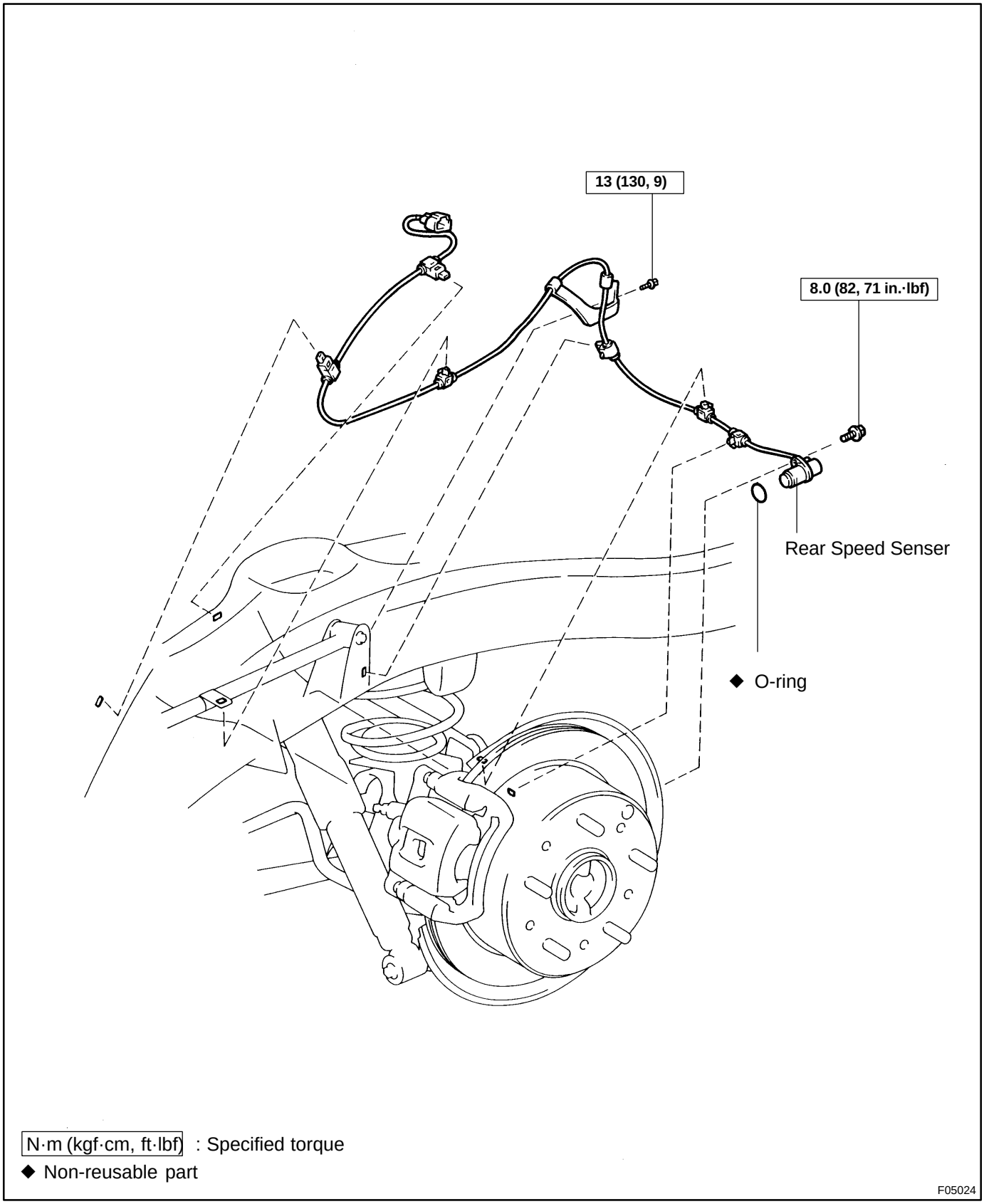
11. DEPRESS BRAKE PEDAL SEVERAL TIMES

12. CHECK THAT FLUID LEVEL IS AT MAX LINE

REAR SPEED SENSOR

COMPONENTS

BR0K4-06



BR0K6-13

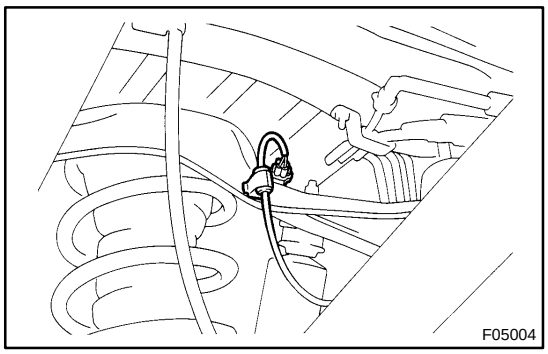
INSTALLATION

Installation is in the reverse order of removal (See page BR-72).

HINT:

After installation, check the speed sensor signal (See page DI-505).

BR0K5-06



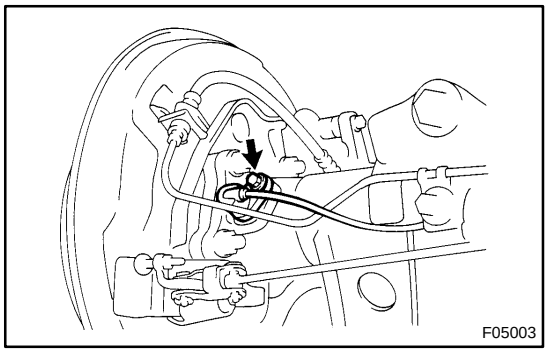
REMOVAL

REMOVE SPEED SENSOR

(a) Disconnect the speed sensor connector.

(b) Remove the clamp bolt from the upper control bracket.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(c) Remove the 6 resin clips, holding the sensor wire harness from the frame, upper control arm and axle housing.



(d) Remove the mounting bolt and speed sensor.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(e) Remove the O-ring from the speed sensoe.

TROUBLESHOOTING

PROBLEM SYMPTOMS TABLE

BR0JA-17

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Low pedal or spongy pedal	1. Fluid leaks for brake system	DI-655
	2. Air in brake system	BR-4
	3. Piston seals (Worn or damaged)	BR-18
		BR-27
	4. Hydraulic brake booster (Faulty)	BR-40
Brake drags	1. Brake pedal freeplay (Minimum)	BR-9
	2. Parking brake lever travel (Out of adjustment)	BR-14
	3. Parking brake wire (Sticking)	-
	4. Parking brake (Shoe clearance out of adjustment)	BR-33
	5. Pad (Cracked or distorted)	BR-15
		BR-24
	6. Piston (Stuck)	BR-18
		BR-27
	7. Piston (Frozen)	BR-18
		BR-27
	8. Tension or return spring (Faulty)	BR-33
	9. Hydraulic brake booster (Faulty)	BR-40
Brake pulls	1. Piston (Stuck)	BR-18
		BR-27
	2. Pad (Cracked or distorted)	BR-15
		BR-24
	3. Piston (Frozen)	BR-18
		BR-27
	4. Disc (Scored)	BR-21
		BR-30
	5. Hydraulic brake booster (Faulty)	BR-40
Hard pedal but brake inefficient	1. Fluid leaks for brake system	DI-655
	2. Air in brake system	BR-4
	3. Pad (Worn)	BR-15
		BR-24
	4. Pad (Cracked or distorted)	BR-15
		BR-24
	5. Pad (Oily)	BR-15
		BR-24
	6. Pad (Glazed)	BR-15
		BR-24
	7. Disc (Scored)	BR-21
		BR-30
	8. Hydraulic brake booster (Faulty)	BR-40

Noise from brakes	1. Pad (Cracked or distorted) 2. Installation bolt (Loose) 3. Disc (Scored) 4. Pad support plate (Loose) 5. Sliding pin (Worn) 6. Pad (Dirty) 7. Pad (Glazed) 8. Tension or return spring (Faulty) 9. Anti-squeal shim (Damaged) 10.Shoe hold-down spring (Damaged)	BR-15 BR-24 BR-18 BR-27 BR-21 BR-30 BR-24 BR-27 BR-15 BR-24 BR-15 BR-24 BR-33 BR-15 BR-24 BR-33
Noise from hydraulic brake booster (Abnormal pump motor operation noise)	Accumulator bracket clearance (Out of adjustment)	BR-66
Brake warning light lights up*1 (Parking brake pedal released)	1. Brake fluid level 2. Hydraulic brake booster power supply system (Faulty)	- BR-40
Brake warning light lights up and brake warning buzzer sounds*2	Hydraulic brake booster power supply system (Faulty)	BR-40
ABS warning light lights up*3	1. Anti - lock brake system (Faulty) 2. Hydraulic brake booster power supply system (Faulty)	- BR-40

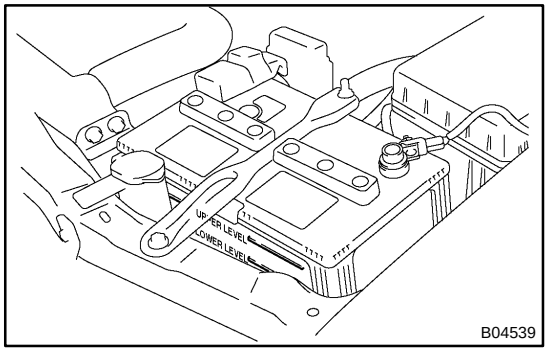
*1, *3: The light may stay on for about 60 seconds after the engine is started. It is normal if it goes out after a while.

*2, *3: Depressing the brake pedal repeatedly may turn on the warning light and buzzer. It is normal if the light goes off and the buzzer stops sounding after a few seconds.

*3: While ABS warning light is ON.

CH0JZ-02

ON-VEHICLE INSPECTION



1. CHECK BATTERY ELECTROLYTE LEVEL

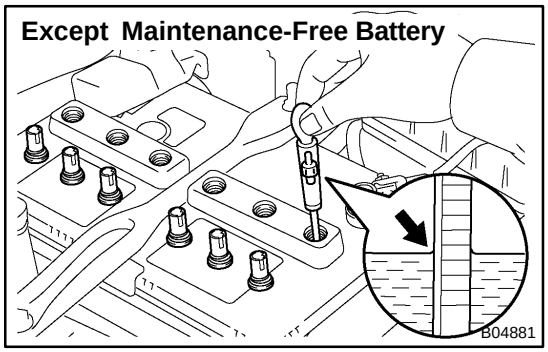
Check the electrolyte quantity of each cell.

Maintenance-Free Battery:

If under the lower level, replace the battery (or add distilled water if possible). and check the charging system.

Except Maintenance-Free Battery:

If under the lower level, add distilled water.

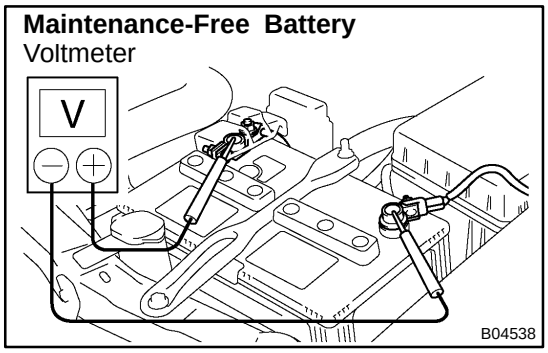


2. Except Maintenance-Free Battery: CHECK BATTERY SPECIFIC GRAVITY

Check the specific gravity of each cell.

Standard specific gravity:
1.25 - 1.29 at 20˚C (68˚F)

If the specific gravity is less than specification, charge the battery.



3. Maintenance-Free Battery: CHECK BATTERY VOLTAGE

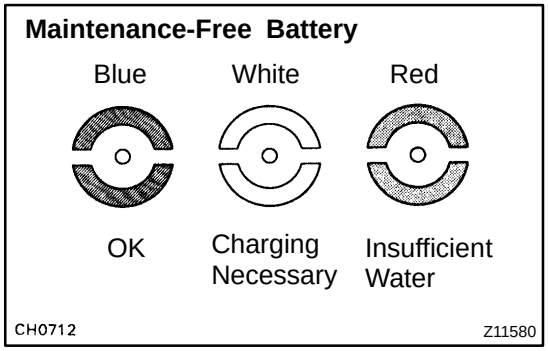
(a) After having driven the vehicle and in the case that 20 minutes have not passed after having stopped the engine, turn the ignition switch ON and turn on the electrical system (headlight, blower motor, rear defogger etc.) for 60 seconds to remove the surface charge.

(b) Turn the ignition switch OFF and turn off the electrical systems.

(c) Measure the battery voltage between the negative (-) and positive (+) terminals of the battery.

Standard voltage:
12.5 - 12.9 V at 20˚C (68˚F)

If the voltage is less than specification, charge the battery.



HINT:

Check the indicator as shown in the illustration.

4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

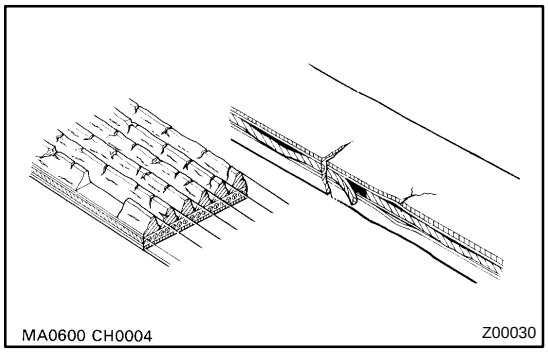
(a) Check that the battery terminals are not loose or corroded.

(b) Check the fusible link and fuses for continuity.

5. INSPECT DRIVE BELT

HINT:

A belt tensioner is used, so checking the belt tension is not necessary.

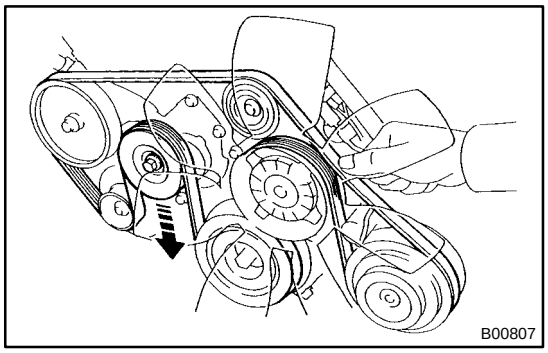


(a) Visually check the drive belt for excessive wear, frayed cords etc.

If necessary, replace the drive belt.

HINT:

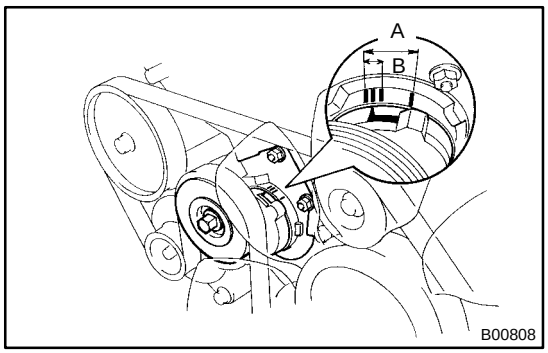
- Cracks on the rib side of a drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.
- The drive belt tension can be released by turning the belt tensioner counterclockwise. The pulley bolt for the belt tensioner has a left-hand thread.



(b) Check the belt tensioner operation.

- Check that the belt tensioner moves downward when the drive belt is pressed down at the points indicated in the illustration with approx. 98 N (10 kgf, 22.0 lbf) of force.
- Check the alignment of the belt tensioner pulley to make sure the drive belt has not slipped off the pulley.

If necessary, replace the belt tensioner.

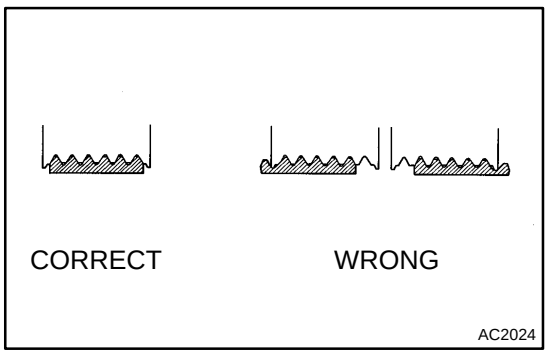


- Check that the arrow mark on the belt tensioner falls within area A of the scale.

If it is outside area A, replace the drive belt.

HINT:

- When a new belt is installed, it should lie within area B. If not, the drive belt is not correct.



- After installing a belt, check that it fits properly in the ribbed grooves.
- Check by hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.

6. REMOVE ENGINE UNDER COVER NO.1

7. VISUALLY CHECK GENERATOR WIRING AND LISTEN FOR ABNORMAL NOISES

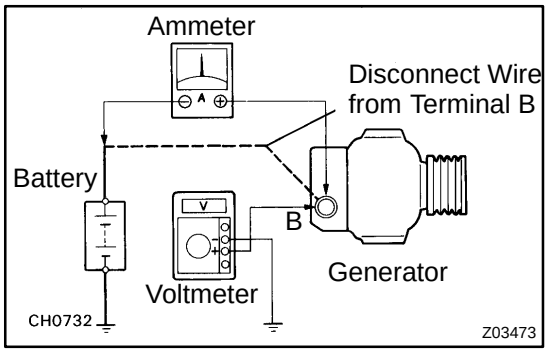
(a) Check that the wiring is in good condition.

(b) Check that there is no abnormal noise from the generator while the engine is running.

8. CHECK CHARGE WARNING LIGHT CIRCUIT

(a) Warm up the engine and then turn it off.
(b) Switch off all accessories.
(c) Turn the ignition switch ON, and check that the charge warning light is lit.
(d) Start the engine, and check that the light goes off.

If the light does not go off as specified, troubleshoot the charge light circuit.



9. INSPECT CHARGING CIRCUIT WITHOUT LOAD

HINT:
If a battery/generator tester is available, connect the tester to the charging circuit as per manufacturer's instructions.

(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
- Disconnect the wire from terminal B of the generator, and connect it to the negative (-) tester probe of the ammeter.
- Connect the positive (+) tester probe of the ammeter to terminal B of the generator.
- Connect the positive (+) tester probe of the voltmeter to terminal B of the generator.
- Ground the negative (-) tester probe of the voltmeter.

(b) Check the charging circuit as follows:
With the engine running from idling to 2,000 rpm, check the reading on the ammeter and voltmeter.
Standard amperage:
10 A or less
Standard voltage:
13.2 - 14.8 V

If the value is not specified, check the generator.

10. INSPECT CHARGING CIRCUIT WITH LOAD

(a) With the engine running at 2,000 rpm, turn on the high beam headlights and place the heater blower switch at HI.
(b) Check the reading on the ammeter.
Standard amperage:
30 A or more

If the ammeter reading is less than the standard amperage, repair the generator.

HINT:
If the battery is fully charged, the indication will sometimes be less than standard amperage.

11. REINSTALL ENGINE UNDER COVER NO.1

CHARGING SYSTEM

CH06F-01

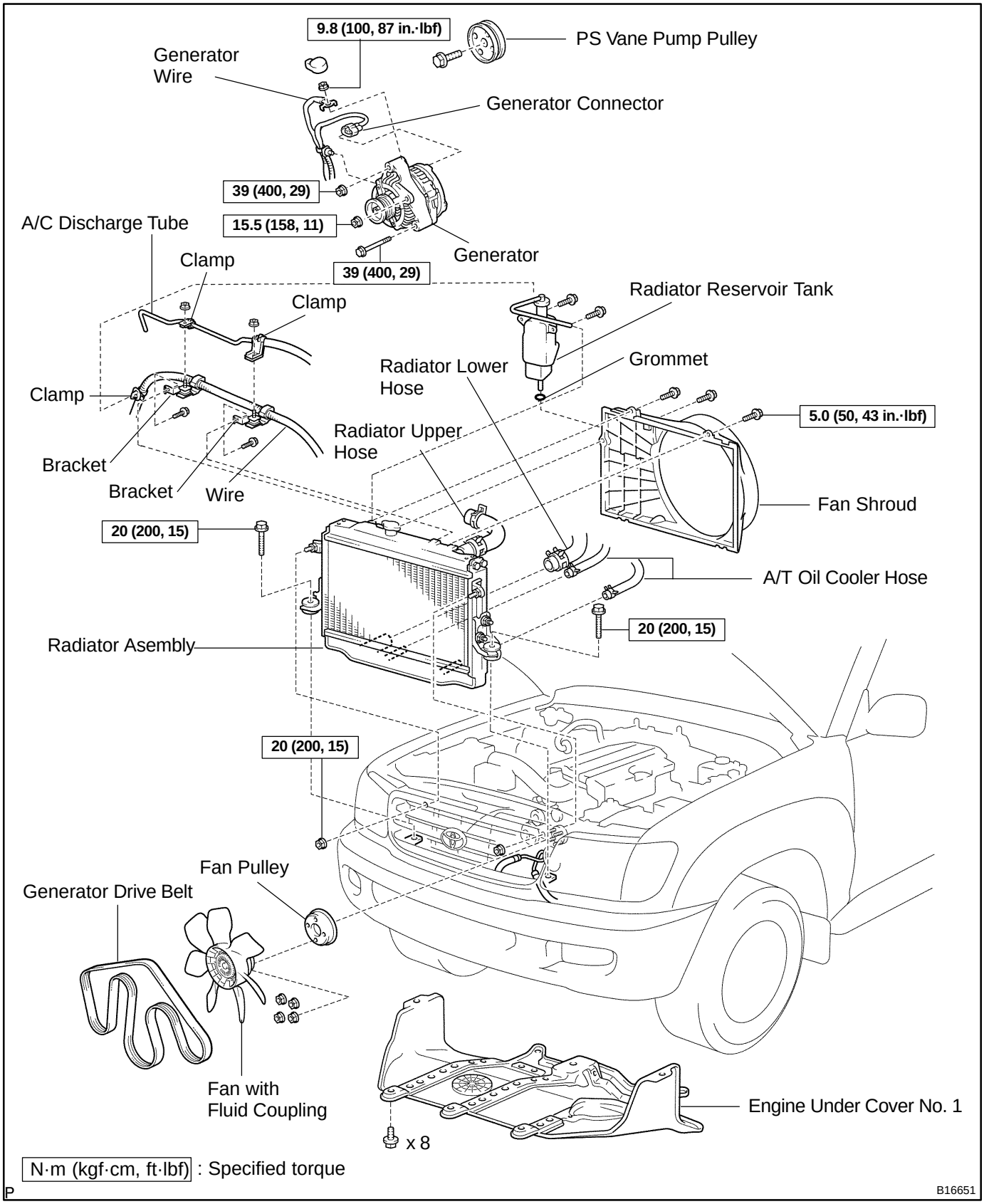
PRECAUTION

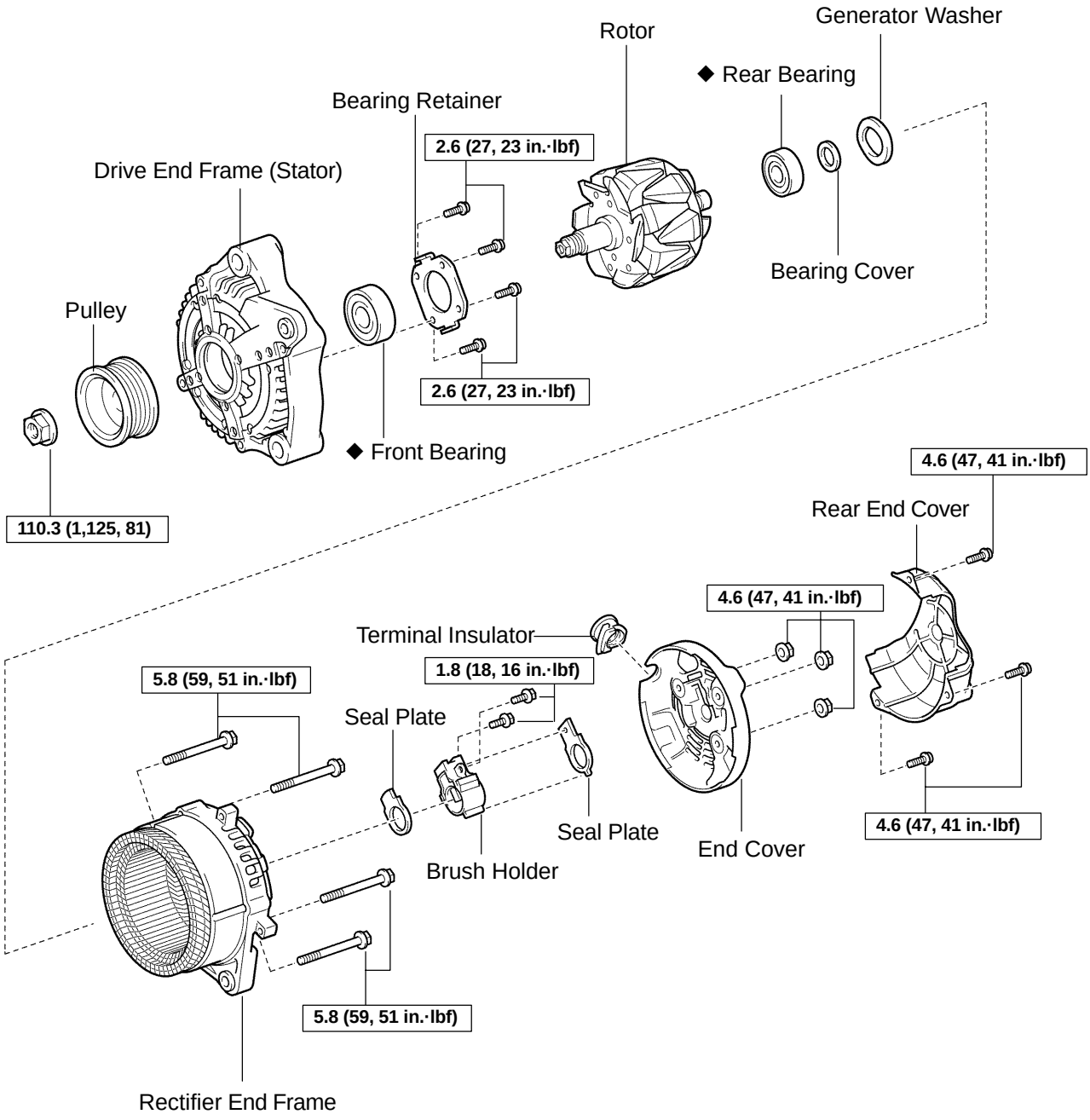
- **Check that the battery cables are connected to the correct terminals.**
- **Disconnect the battery cables when the battery is given a quick charge.**
- **Do not perform tests with a high voltage insulation resistance tester.**
- **Never disconnect the battery while the engine is running.**

GENERATOR

COMPONENTS

CH06H-09





P

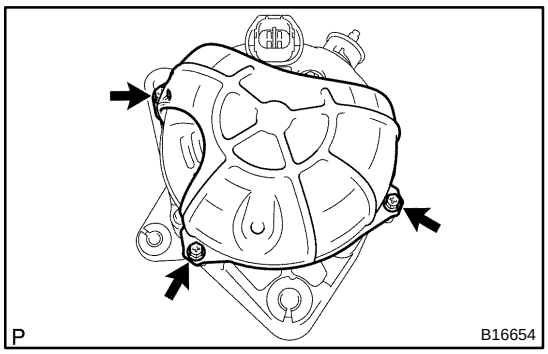
N·m (kgf·cm, ft·lbf): Specified torque

◆ Non-reusable part

B16652

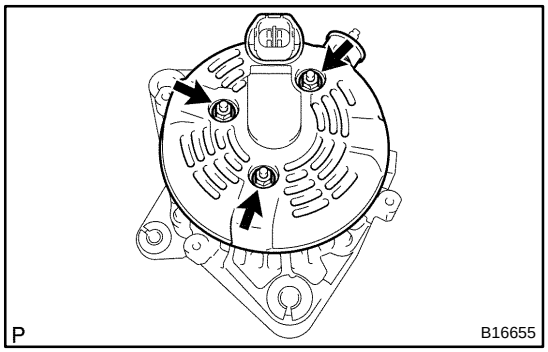
CH06J-03

DISASSEMBLY



1. REMOVE REAR END COVER

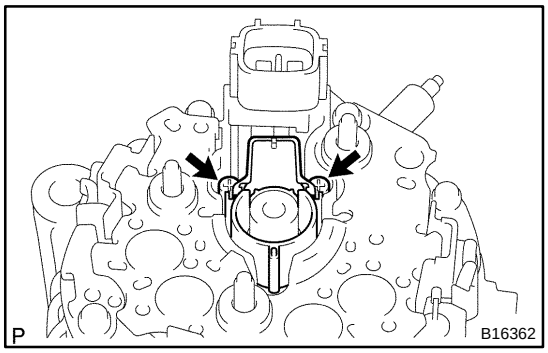
(a) Remove the 3 screws and rear end cover.



2. REMOVE END COVER

(a) Remove the 3 nuts and end cover.

(b) Remove the terminal insulator.

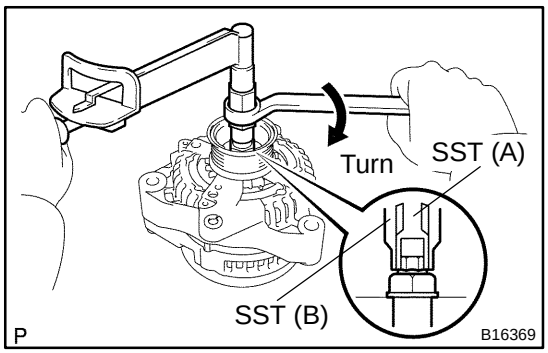


3. REMOVE BRUSH HOLDER

(a) Remove the rear seal plate from the brush holder.

(b) Remove the 2 screws and brush holder.

(c) Remove the front seal plate from the coil assembly.



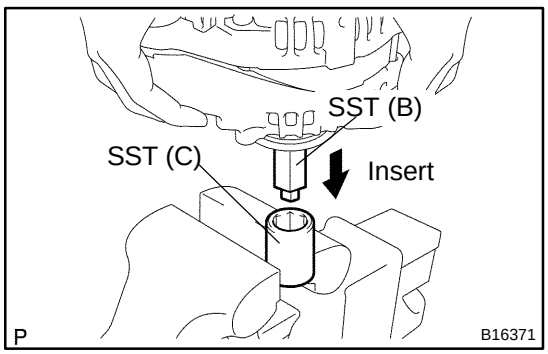
4. REMOVE PULLEY

(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820-6301 1

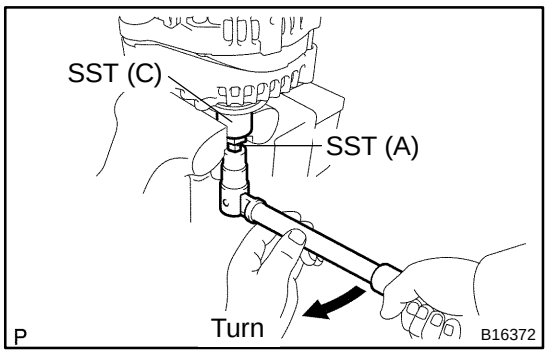
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Check that SST (A) is secured to the rotor shaft.



(c) Mount SST (C) in a vise.

(d) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

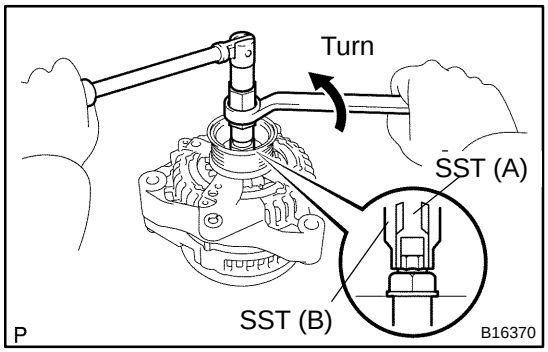


(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

NOTICE:

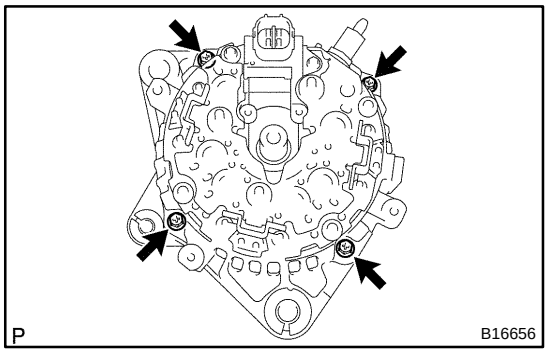
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one-half of a turn.

(f) Remove the generator from SST (C).



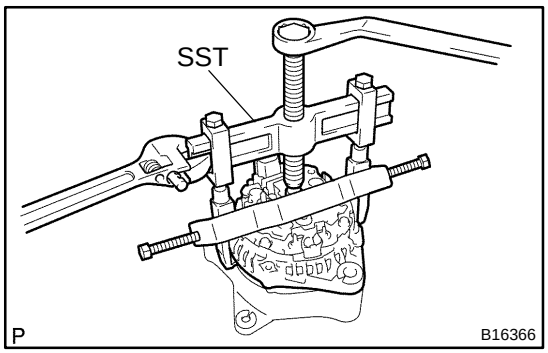
(g) Turn SST (B), and remove SST (A and B).

(h) Remove the pulley nut and pulley.



5. REMOVE COIL ASSEMBLY

(a) Remove the 4 bolts.



(b) Using SST, remove the coil assembly.

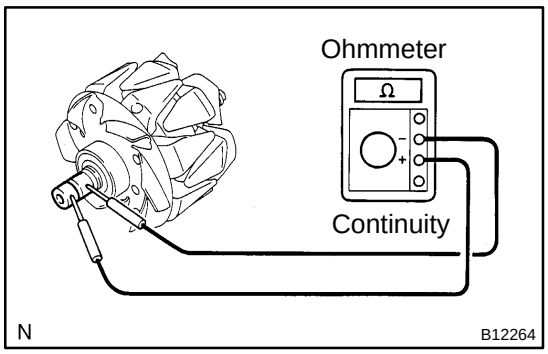
SST 09950-4001 1 (09951-04020, 09952-04010 09953- 04020, 09954- 04010, 09955- 04071, 09958-0401 1)

(c) Remove the generator washer.

6. REMOVE ROTOR FROM DRIVE END FRAME

CH0M4-01

INSPECTION



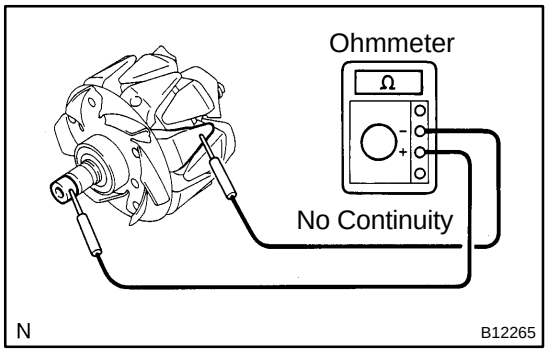
1. INSPECT ROTOR

(a) Check the rotor for open circuit.

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance: 2.3 - 2.7 Ω at 20˚C (68˚F)

If there is no continuity, replace the rotor.



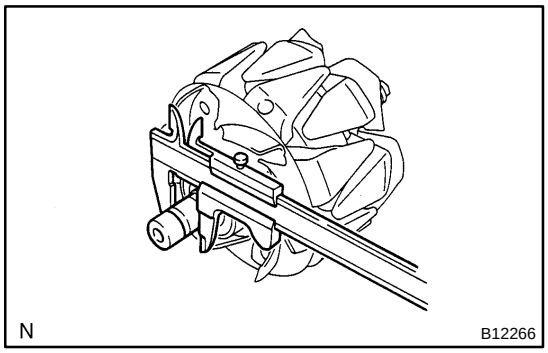
(b) Check the rotor for ground.

Using an ohmmeter, check that there is no continuity between the slip ring and rotor.

If there is continuity, replace the rotor.

(c) Check that the slip rings are not rough or scored.

If rough or scored, replace the rotor.

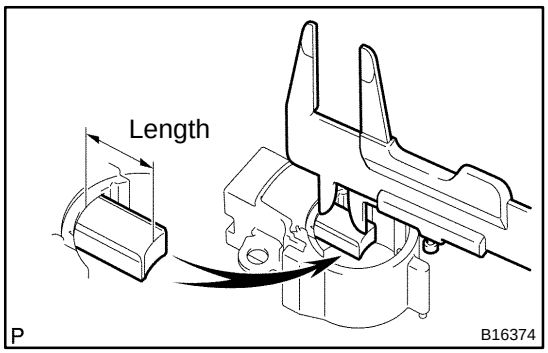


(d) Using vernier calipers, measure the slip ring diameter.

Standard diameter: 14.2 - 14.4 mm (0.559 - 0.567 in.)

Minimum diameter: 14.0 mm (0.551 in.)

If the diameter is less than minimum, replace the rotor.



2. INSPECT BRUSHES

Using vernier caliper, measure the exposed brush length.

Standard exposed length: 10.5 mm (0.413 in.)

Minimum exposed length: 4.5 mm (0.177 in.)

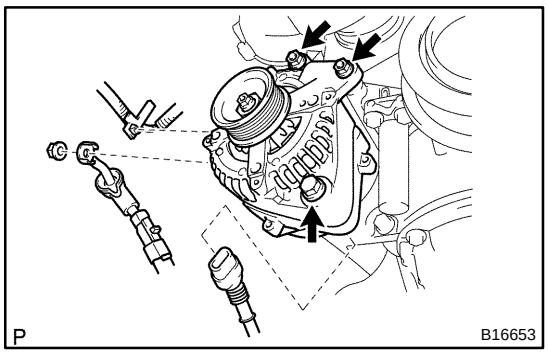
If the exposed length is less than minimum, replace the brushes and brush holder assembly.

3. INSPECT BEARING

Check the bearing is not rough or worn.

If necessary, replace the bearing (See page CH-11).

CH06N-05



INSTALLATION

1. INSTALL GENERATOR

(a) Install the generator with the bolt and 2 nuts.
Torque:
Bolt: 39 N·m (400 kgf·cm, 29 ft·lbf)
Nut 10 mm: 39 N·m (400 kgf·cm, 29 ft·lbf)
Nut 8 mm: 15.5 N·m (158 kgf·cm, 11 ft·lbf)

(b) Connect the generator connector.

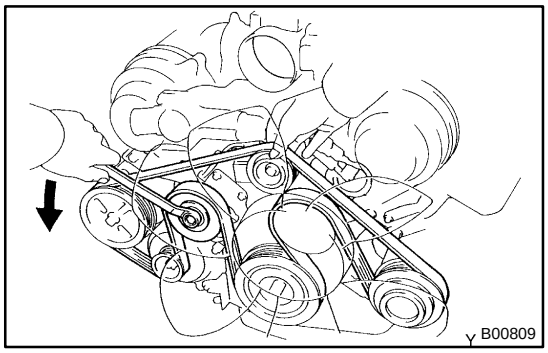
(c) Connect the generator wire with the nut.
Torque: 9.8 N·m (100 kgf·cm, 87 in.·lbf)

(d) Install the terminal cap.

(e) Install the wire clamp to the cord clip on the generator.

2. INSTALL PS VANE PUMP PULLEY
(See page SR-47)

3. INSTALL RADIATOR ASSEMBLY
(See page CO-19)



4. INSTALL GENERATOR DRIVE BELT

Install the belt by turning the belt tensioner counterclockwise.

HINT:

The pulley bolt for the belt tensioner has a left - hand thread.

5. FULL ENGINE COOLANT

6. START ENGINE AND CHECK FOR LEAKS

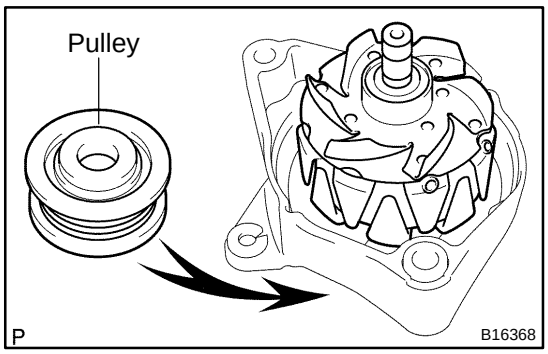
7. RECHECK ENGINE COOLANT LEVEL

8. PERFORM ON-VEHICLE INSPECTION
(See page CH-2)

9. INSTALL ENGINE UNDER COVER NO.1

CH0M6-01

REASSEMBLY



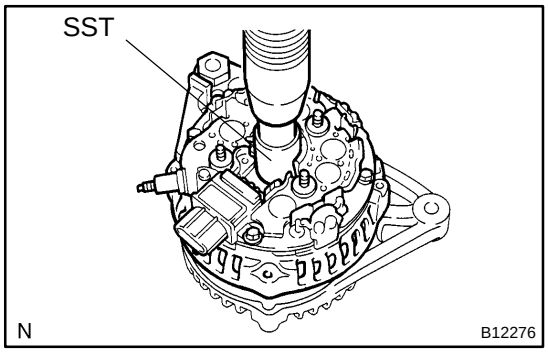
1. INSTALL ROTOR TO DRIVE END FRAME

(a) Place the drive end frame on the pulley.

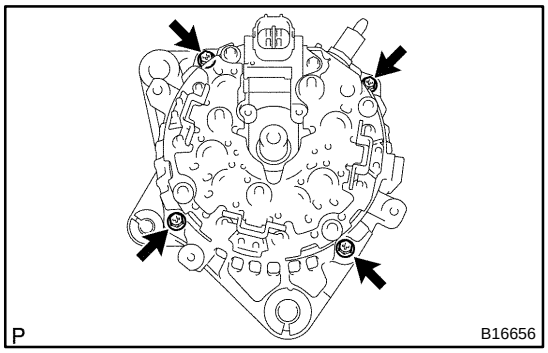
(b) Install the rotor to the drive end frame.

2. INSTALL COIL ASSEMBLY

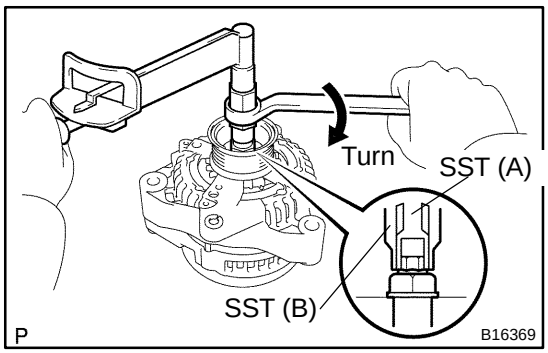
(a) Place the generator washer on the rotor.



(b) Using SST and a press, slowly press in the coil assembly.
SST 09285-76010



(c) Install the coil assembly with the 4 bolts.
Torque: 5.8 N·m (59 kgf·cm, 51 in.·lbf)

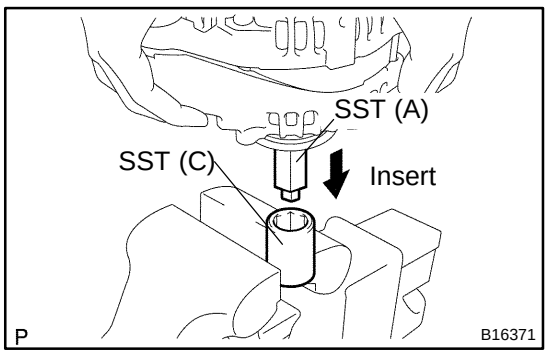


3. INSTALL PULLEY

(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

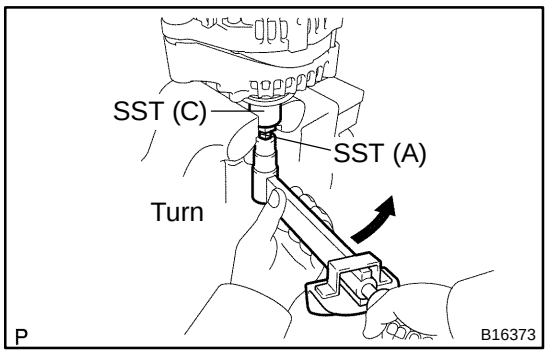
(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820-6301 1
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(c) Check that SST (A) is secured to the pulley shaft.



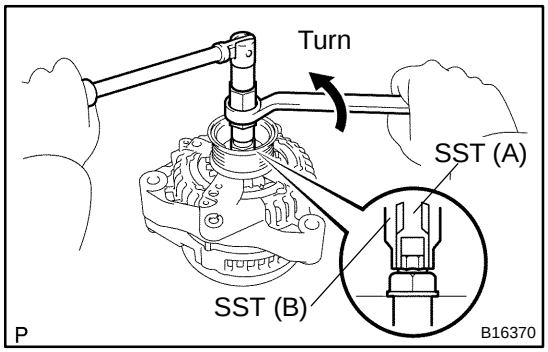
(d) Mount SST (C) in a vise.

(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).

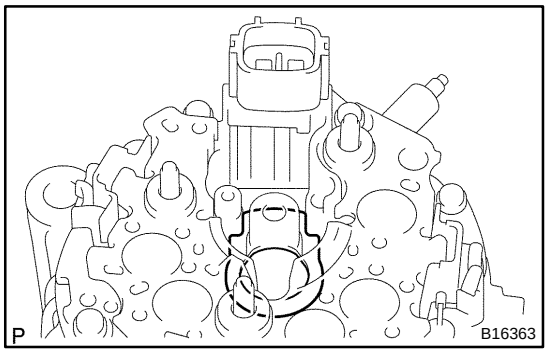


(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110.3 N·m (1,125 kgf·cm, 81 ft·lbf)

(g) Remove the generator from SST (C).

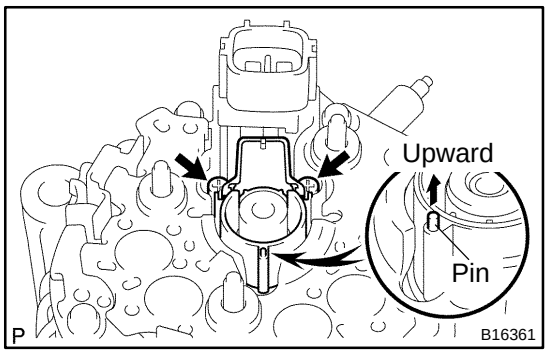


(h) Turn SST (B), and remove SST (A and B).



4. INSTALL BRUSH HOLDER

(a) Place the front seal plate on the coil assembly.

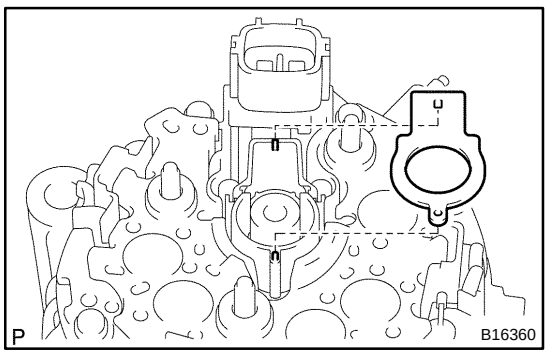


(b) Place the brush holder on the coil assembly with the pin facing upward.

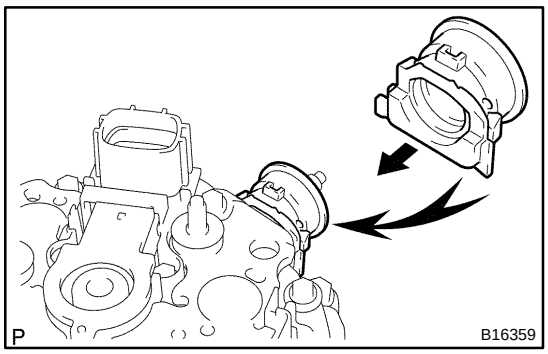
NOTICE:

Be careful of the holder installation direction.

(c) Install the 2 screws.
Torque: 1.8 N·m (18 kgf·cm, 16 in.·lbf)



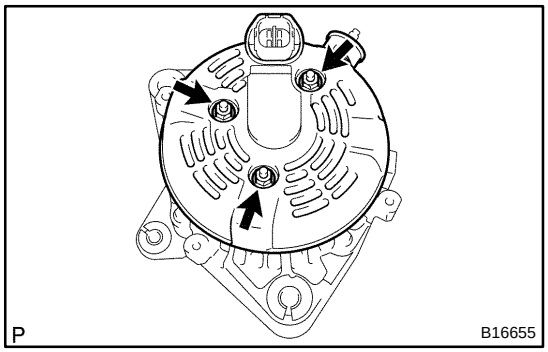
(d) Align the pins of the brush holder with the holes of the rear seal plate, and install the rear seal plate.



5. INSTALL END COVER

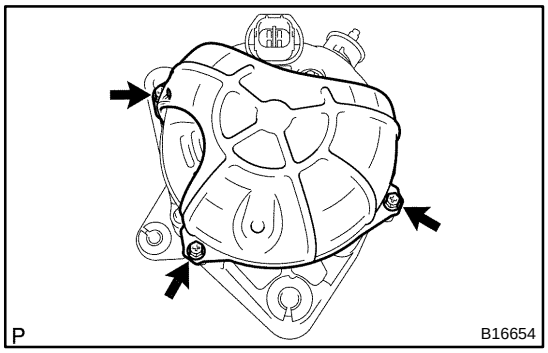
(a) Install the terminal insulator.

NOTICE: Be careful of the terminal insulator installation direction.



(b) Install the end cover with the 3 nuts.

Torque: 4.6 N·m (47 kgf·cm, 41 in.·lbf)



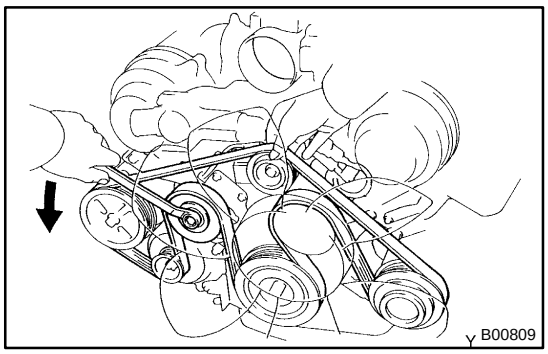
6. INSTALL REAR END COVER

Install the rear end cover with the 3 scerws.

Torque: 4.6 N·m (47 kgf·cm, 41 in.·lbf)

7. CHECK THAT ROTOR ROTATES SMOOTHLY

CH06I-04



REMOVAL

1. DRAIN ENGINE COOLANT
(See page CO-2)

2. REMOVE GENERATOR DRIVE BELT

Loosen the belt tension by turning the belt tensioner counter-clockwise, and remove the drive belt.

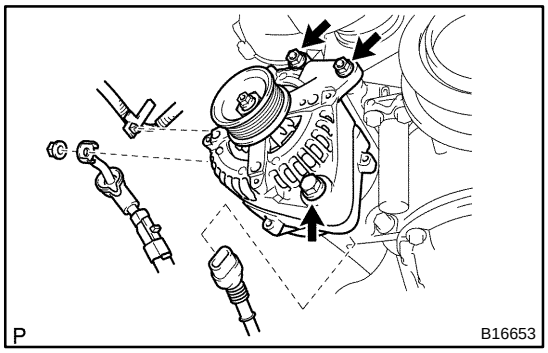
HINT:

The pulley bolt for the belt tensioner has a left - hand thread.

3. REMOVE ENGINE UNDER COVER NO.1

4. REMOVE RADIATOR ASSEMBLY
(See page CO-17)

5. REMOVE PS VANE PUMP PULLEY
(See page SR-40)



6. REMOVE GENERATOR

(a) Disconnect the generator connector.

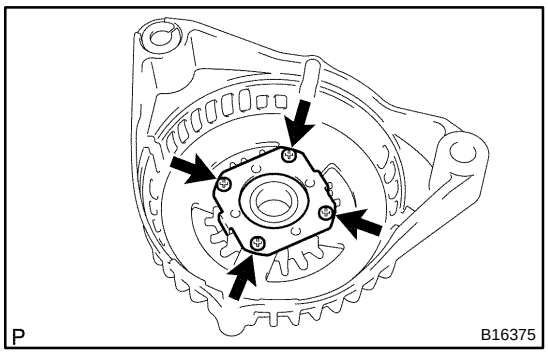
(b) Remove the rubber cap and nut, and disconnect the generator wire.

(c) Disconnect the generator wire clamp from the cord clip on the generator.

(d) Remove the bolt, 2 nuts and generator.

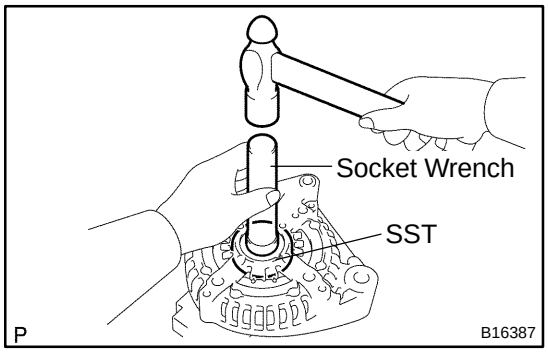
CH0M5-01

REPLACEMENT

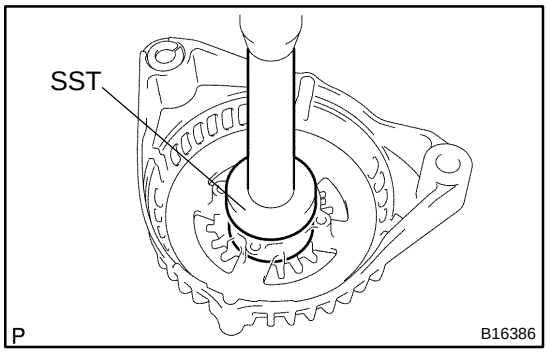


1. REPLACE FRONT BEARING

(a) Remove the 4 screws, bearing retainer and bearing.

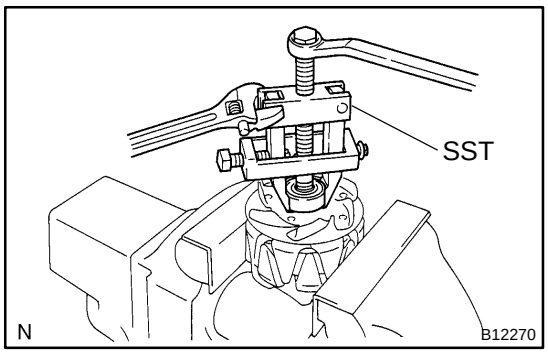


(b) Using SST and a hammer, tap out the bearing.
SST 09950- 60010 (09951- 00250), 09950- 70010 (09951-07100)



(c) Using SST and a press, press in a new bearing.
SST 09950- 60010 (09951- 00470), 09950- 70010 (09951-07100)

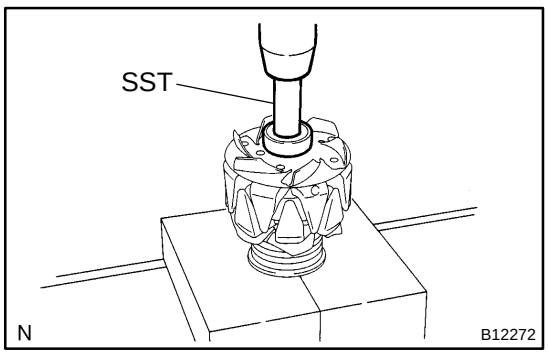
(d) Install the bearing retainer with the 4 screws.
Torque: 2.6 N·m (27 kgf·cm, 23 in.·lbf)



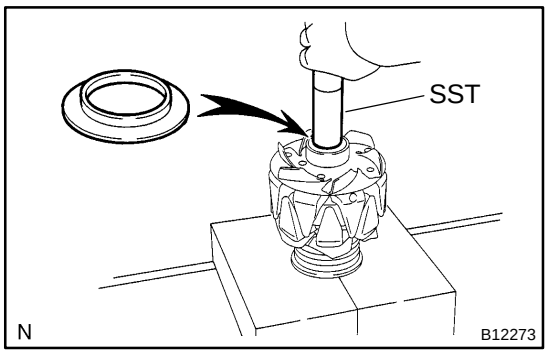
2. REPLACE REAR BEARING

(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820-00021

NOTICE:
Be careful not to damage the fan.



(b) Using SST and a press, press in a new bearing.
SST 09820-00031



(c) Using SST, push in the bearing cover (outside).
SST 09285-76010

COOLANT

CO0IO-06

INSPECTION

HINT:

Check the coolant level when the engine is cold.

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the ”LOW” and ”FULL” lines at normal temperature (20˚C(68˚F)).

If low, check for leaks and add ”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 up to the ”FULL” line.

2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.

(b) There should not be any excessive deposits of rust or scale around the radiator cap or radiator filler hole, and the coolant should be free from oil.

If excessively dirty, clean the coolant passages and replace the coolant.

(c) Reinstall the radiator cap.

CO0IP-10

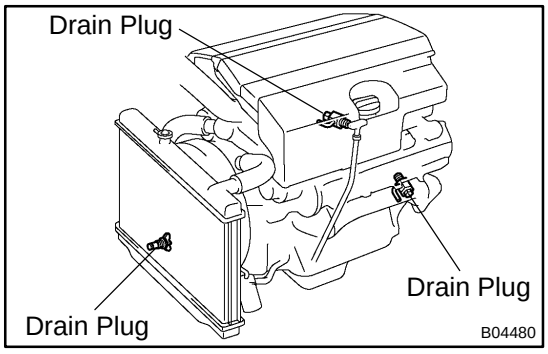
REPLACEMENT

1. DRAIN ENGINE COOLANT

(a) Remove the radiator cap.

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



(b) Remove the 3 drain plugs on the engine and radiator, and drain the coolant.

(c) Close the 3 drain plugs.

Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf) for engine

2. REFILL WITH ENGINE COOLANT

(a) Slowly fill the system with coolant.

Capacity:

w/ Front heater: 14.8 liters (15.6 US qts, 13.0 Imp. qts)

w/ Front heater and rear heater:

15.3 liters (16.2 US qts, 13.4 Imp. qts)

NOTICE:

Do not use plain water alone.

HINT:

- Use of improper coolants may damage the engine cooling system.
- 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.
- 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.
- Observe 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 the coolant.

If the coolant level goes down, add the coolant.

(b) Install the radiator cap.

(c) Bleed the cooling system.

(1) Start the engine, and open the heater water valve.

(2) Maintain the engine speed at 2,000 - 2,500 rpm, and warm up the engine.

(d) Stop the engine, and wait until the engine coolant cools down.

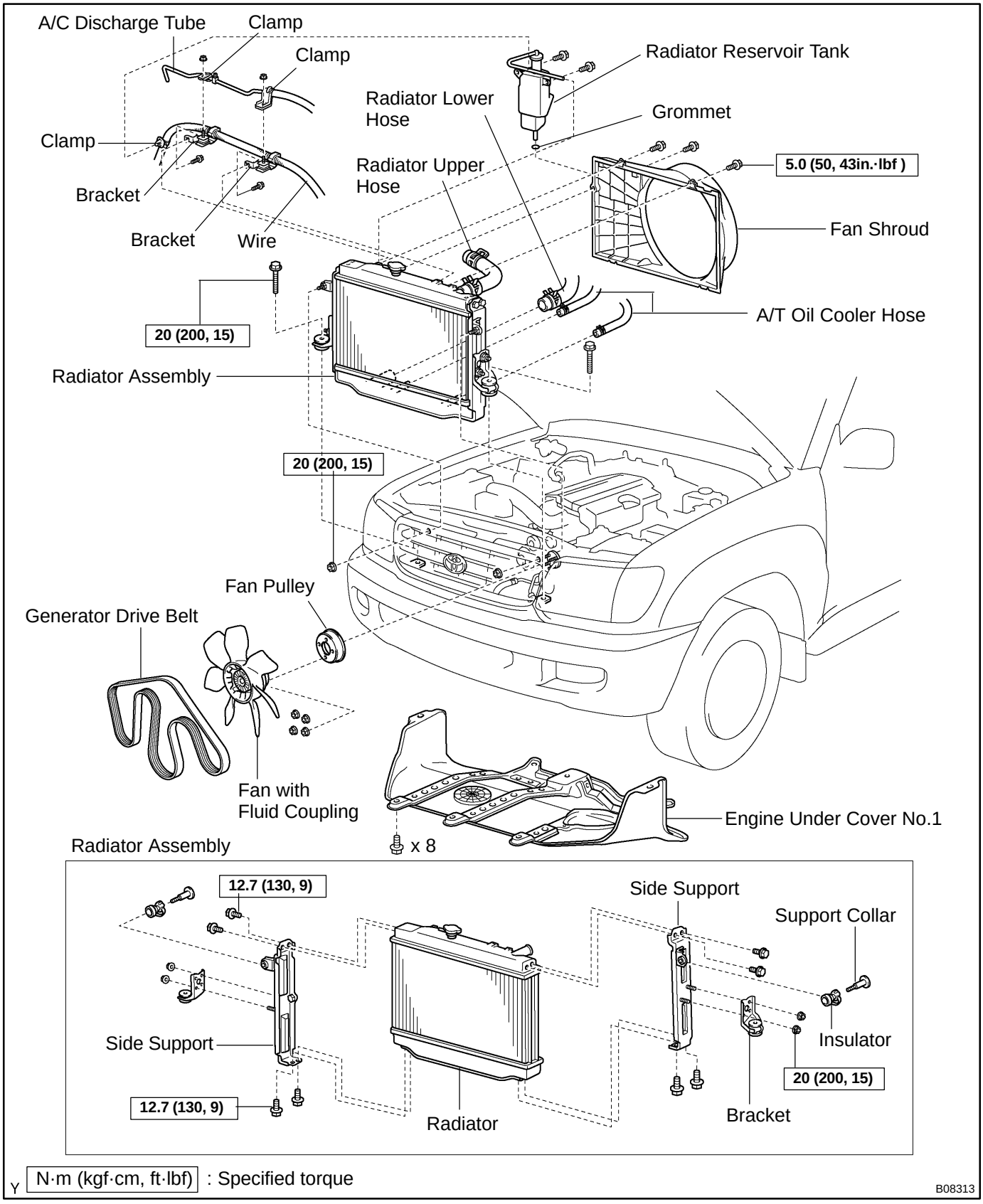
(e) Refill coolant into the reservoir until it is ”FULL”.

3. CHECK FOR ENGINE COOLANT LEAKS

4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

CO0J0-02

COMPONENTS

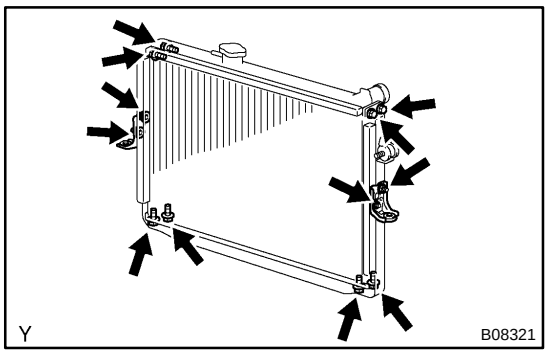


Y N·m (kgf·cm, ft·lbf) : Specified torque

B08313

CO0J2-03

INSTALLATION



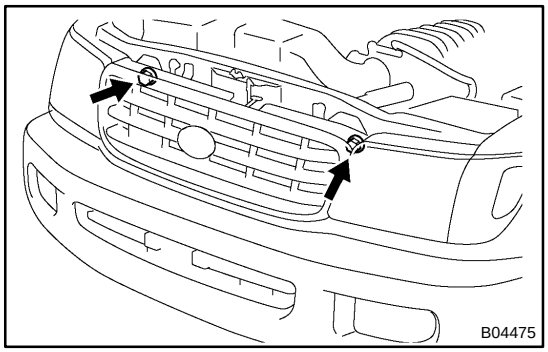
1. INSTALL SIDE SUPPORTS TO RADIATOR

(a) Install the 2 side support with 8 nuts.
Torque: 12.7 N·m (130 kgf·cm, 9 ft·lbf)

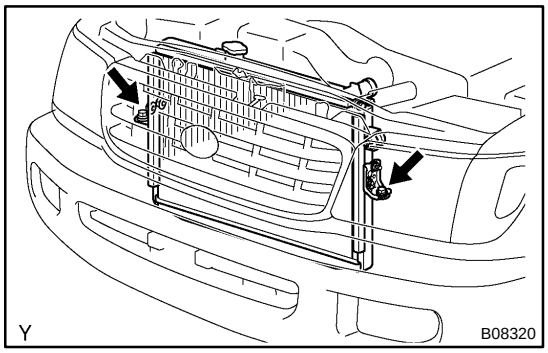
(b) Install the 2 brackets with the 4 nuts.
Torque: 20 N·m (200 kgf·cm, 13 ft·lbf)

2. INSTALL RADIATOR ASSEMBLY

(a) Place the radiator assembly to the body.



(b) Install the 2 nuts.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



(c) Install the radiator assembly with the 2 bolts to the body.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

3. INSTALL FAN PULLEY, FAN SHROUD, FAN WITH FLUID COUPLING AND GENERATOR DRIVE BELT

(a) Place the fan with fluid coupling, fan pulley and fan shroud in position.

(b) Temporarily install the fan pulley mounting nuts.

(c) Install the fan shroud with the 3 bolts.
Torque: 5.0 N·m (50 kgf·cm, 43 in.·lbf)

(d) Connect the A/T oil cooler hoses to the clamp on the fan shroud.

(e) Install the generator drive belt. (See page CH-16)

(f) Tighten the 4 fan pulley mounting nuts.

(g) Install the 2 brackets on wire to the radiator wire with 2 bolts.

(h) Install the 2 clamps on the A/C discharge tube to the brackets on the wire with the 2 nuts.

4. INSTALL RADIATOR RESERVOIR

(a) Install the grommet to the reservoir.

(b) Attach the lower side of the reservoir to the fun shuroud.

(c) install the reservoir with the 2 bolts.

(d) Connect the reservoir hose to the radiator.

(e) Install the clamp on the wire to the radiator.

5. CONNECT A/T OIL COOLER HOSES TO RADIATOR

6. CONNECT RADIATOR UPPER HOSE TO RADIATOR

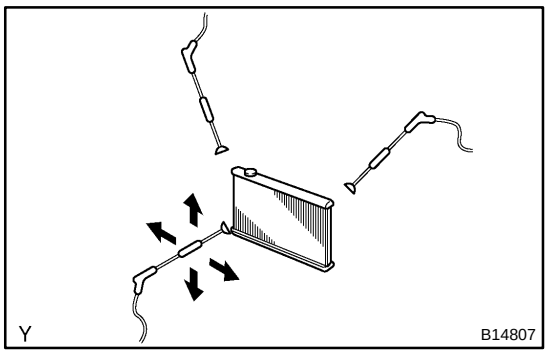
7. CONNECT RADIATOR LOWER HOSE TO RADIATOR

8. FILL WITH ENGINE COOLANT

9. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

10. RECHECK ENGINE COOLANT LEVEL

11. INSTALL ENGINE UNDER COVER NO.1



RADIATOR

CO1B0-01

ON-VEHICLE CLEANING

INSPECT FINS FOR BLOCKAGE

If fins are clogged, wash them with water or a steam cleaner and dry with compressed air.

NOTICE:

- **If the distance between the steam cleaner and the core is too close, there is a possibility of damaging the fin, so keep the following injection distance.**

Injection Pressure	Injection Distance
2,942 - 4,903 kpa (30 - 50 kg/cm^{2,} 427 -711 psi)	300 mm (11.811 in)
4,903 - 7,845 kpa (50 - 80 kg/cm^{2,} 711 - 1,138 psi)	500 mm (19.685 in)

- **If the fins are bent, straighten them with a screwdriver or pliers.**
- **Never apply water directly onto the electronic components.**

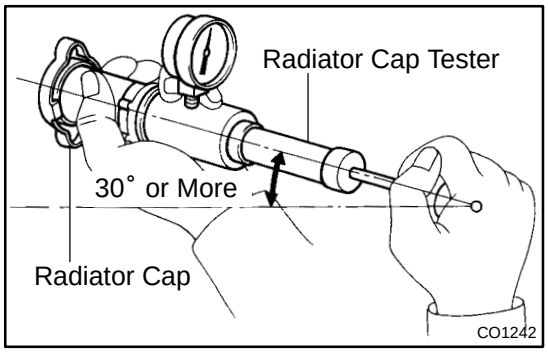
CO0IZ-01

ON-VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

CAUTION:

To avoid the danger of being burned, do not remove the radiator cap while the engine and radiator are still hot, as fluid and steam can be blown out under pressure.



2. INSPECT RADIATOR CAP

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**
- **When performing steps (a) and (b) below, keep the tester at an angle of over 30° above the horizontal.**

(a) Using a radiator cap tester, slowly pump the tester and check that air is coming from the vacuum valve.

Pump speed: 1 push/(3 seconds or more)

NOTICE:

Push the pump at a constant speed.

If air is not coming from the vacuum valve, replace the radiator cap.

(b) Pump the radiator cap tester, and measure the relief valve opening pressure.

Pump speed: 1 push within 1 second

NOTICE:

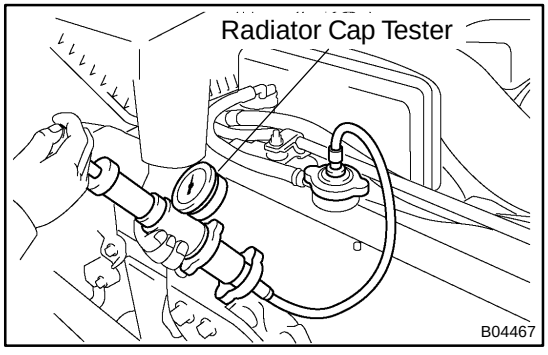
This pump speed is for the first pump only (in order to close the vacuum valve). After this, the pump speed can be reduced.

Standard opening pressure:
93 - 123 kPa (0.95 - 1.25 kgf/cm^2, 13.5 - 17.8 psi)
Minimum opening pressure:
78 kPa (0.8 kgf/cm^2, 11.4 psi)

HINT:

Use the tester's maximum reading as the opening pressure.

If the opening pressure is less than minimum, replace the radiator cap.



3. INSPECT COOLING SYSTEM FOR LEAKS

(a) Fill the radiator with coolant and attach a radiator cap tester.

(b) Warm up the engine.

(c) Pump it to 118 kPa (1.2 kgf/cm^2, 17.1 psi), and check that the pressure does not drop.

If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and head.

4. REINSTALL RADIATOR CAP

CO0J1-02

REMOVAL

1. REMOVE ENGINE UNDER COVER NO.1

2. DRAIN ENGINE COOLANT

3. DISCONNECT RADIATOR UPPER HOSE FROM RADIATOR

4. DISCONNECT RADIATOR LOWER HOSE FROM RADIATOR

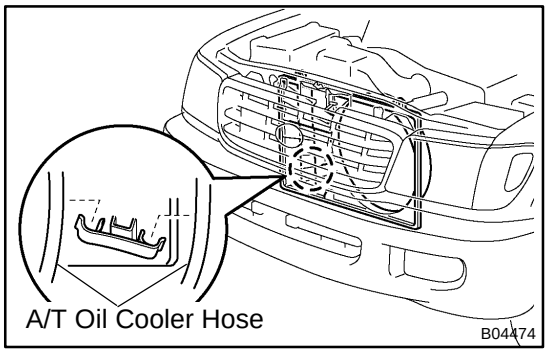
5. DISCONNECT A/T OIL COOLER HOSES FROM RADIATOR

6. REMOVE RADIATOR RESERVOIR

(a) Disconnect the clamp on the wire from the radiator.

(b) Disconnect the resorvoir hose from the radiator.

(c) Remove the 2 bolts, resorvoir and grommet.



7. REMOVE RADIATOR ASSEMBLY

(a) Remove the 2 nuts, and disconnect the 2 clamps on the A/C discharge tube from the bracket.

(b) Remove the 2 bolts, and disconnect the 2 brackets on the wire from the radiator.

(c) Disconnect the A/T oil cooler hoses from the clamp on the fan shroud.

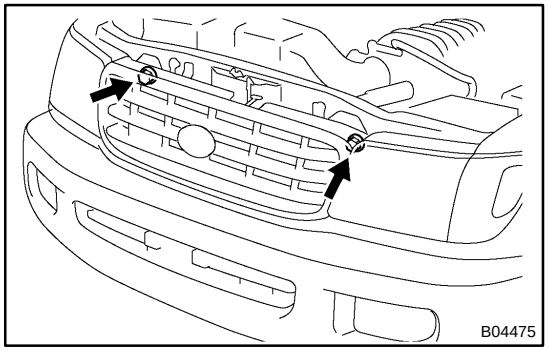
(d) Loosen the fan pulley mounting nuts holding the fluid coupling to the fan bracket.

(e) Remove generator drive belt. (See page CH-7)

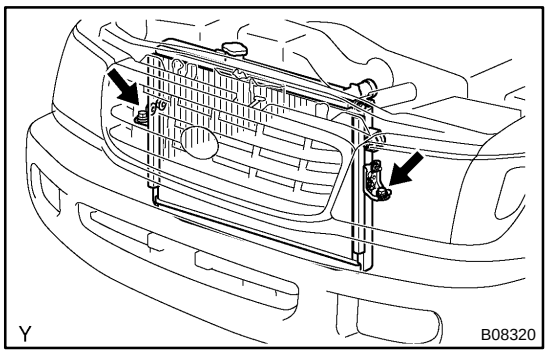
(f) Remove the 3 bolts holding the fan shroud to the radiator.

(g) Remove the 4 fan pulley mounting nuts.

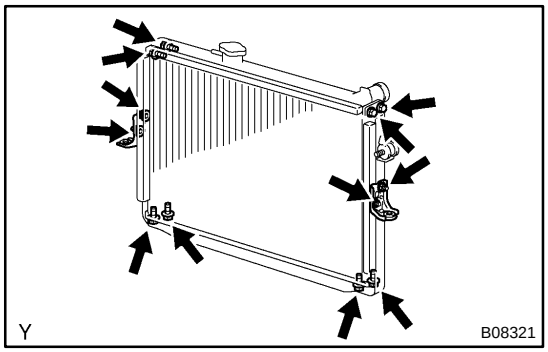
(h) Pull out the fan with fluid coupling, fan pulley and fan shroud.



(i) Remove the 2 nuts.



(j) Remove the 2 bolts.
(k) Lift out the radiator assembly.



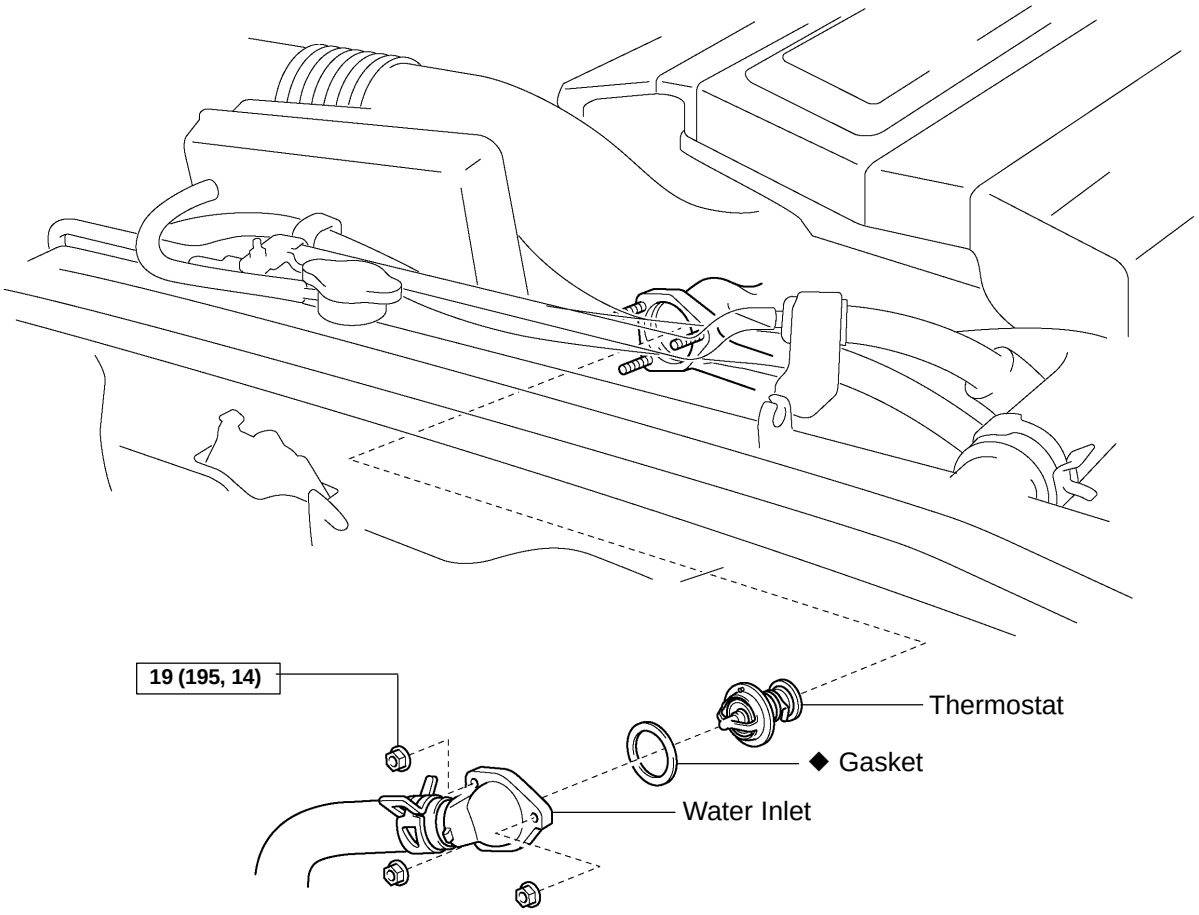
8. REMOVE RADIATOR SIDE SUPPORTS FROM RADIATOR

(a) Remove the 4 nuts and 2 brackets.
(b) Remove the 8 nuts and 2 side supports.

THERMOSTAT

COMPONENTS

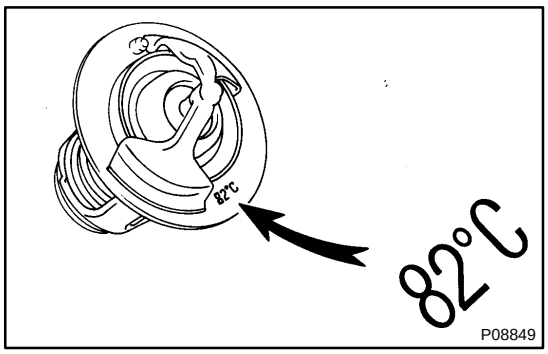
CO0IU-01



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

B04464

CO0IW-01



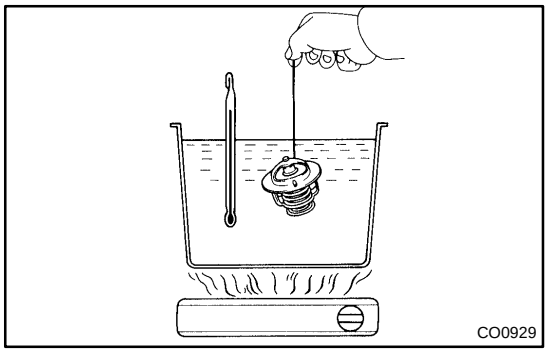
P08849

INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

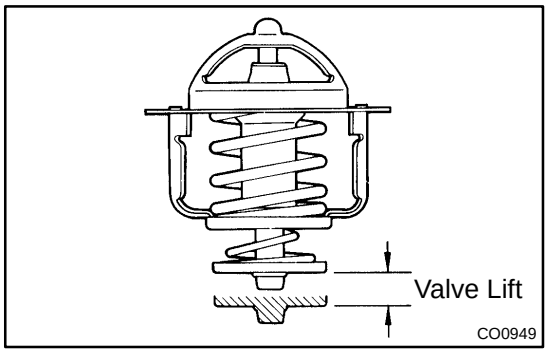

CO0929

(a) Immerse the thermostat in water and gradually heat the water.

(b) Check the valve opening temperature.

Valve opening temperature: 80 - 84˚C (176 - 183˚F)

If the valve opening temperature is not as specified, replace the thermostat.



CO0949

(c) Check the valve lift.

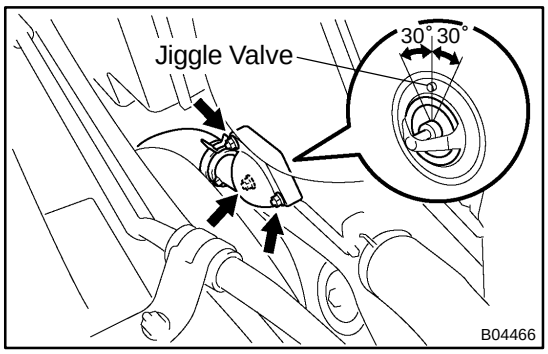
Valve lift: 10 mm (0.39 in.) or more at 95˚C (203˚F)

If the valve lift is not as specified, replace the thermostat.

(d) Check that the valve is fully closed when the thermostat is at low temperatures (below 40˚C (104˚F)).

If not closed, replace the thermostat.

CO0IX-02



INSTALLATION

1. PLACE THERMOSTAT IN WATER INLET HOUSING

(a) Install a new gasket to the thermostat.

(b) Insert the thermostat into the water inlet housing with the jiggle valve facing straight upward.

HINT:

The jiggle valve may be set within 30° of either side of the prescribed position.

2. INSTALL WATER INLET

Install the water inlet with the 3 nuts.

Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR COOLANT LEAKS

5. RECHECK ENGINE COOLANT LEVEL

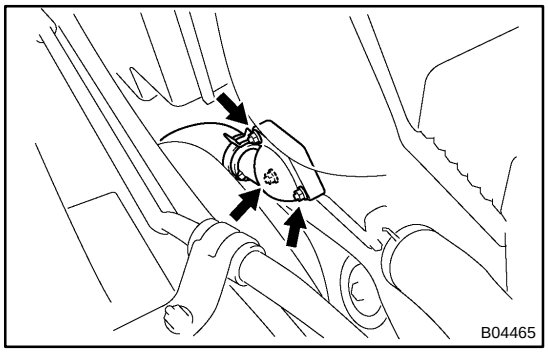
CO0IV-01

REMOVAL

HINT:

Removal of the thermostat would have an adverse effect, causing a lowering of cooling efficiency. Do not remove the thermostat, even if the engine tends to overheat.

1. DRAIN ENGINE COOLANT



2. DISCONNECT WATER INLET FROM WATER INLET HOUSING

Remove the 3 nuts and disconnect the water inlet from the water inlet housing.

3. REMOVE THERMOSTAT

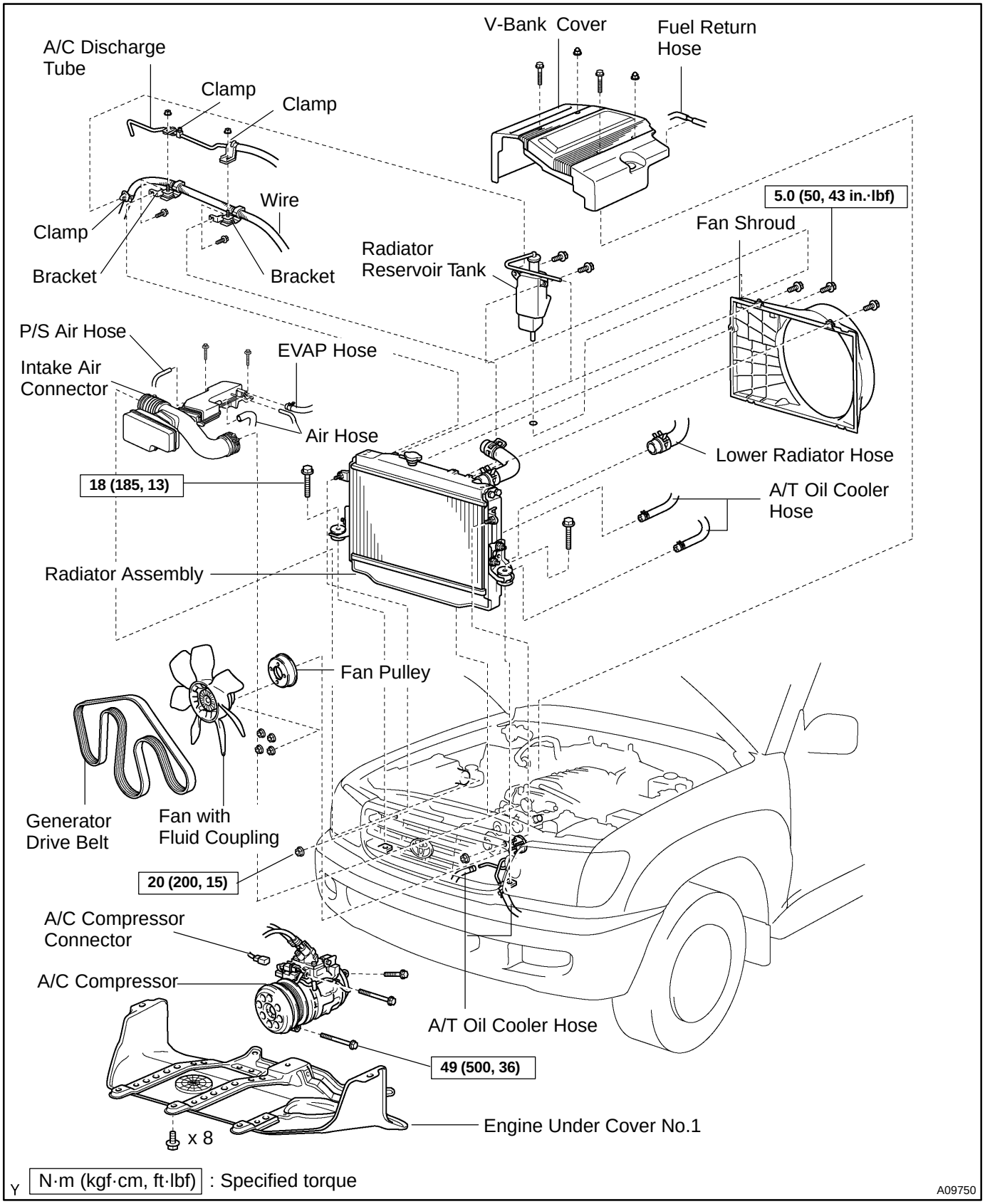
(a) Remove the thermostat.

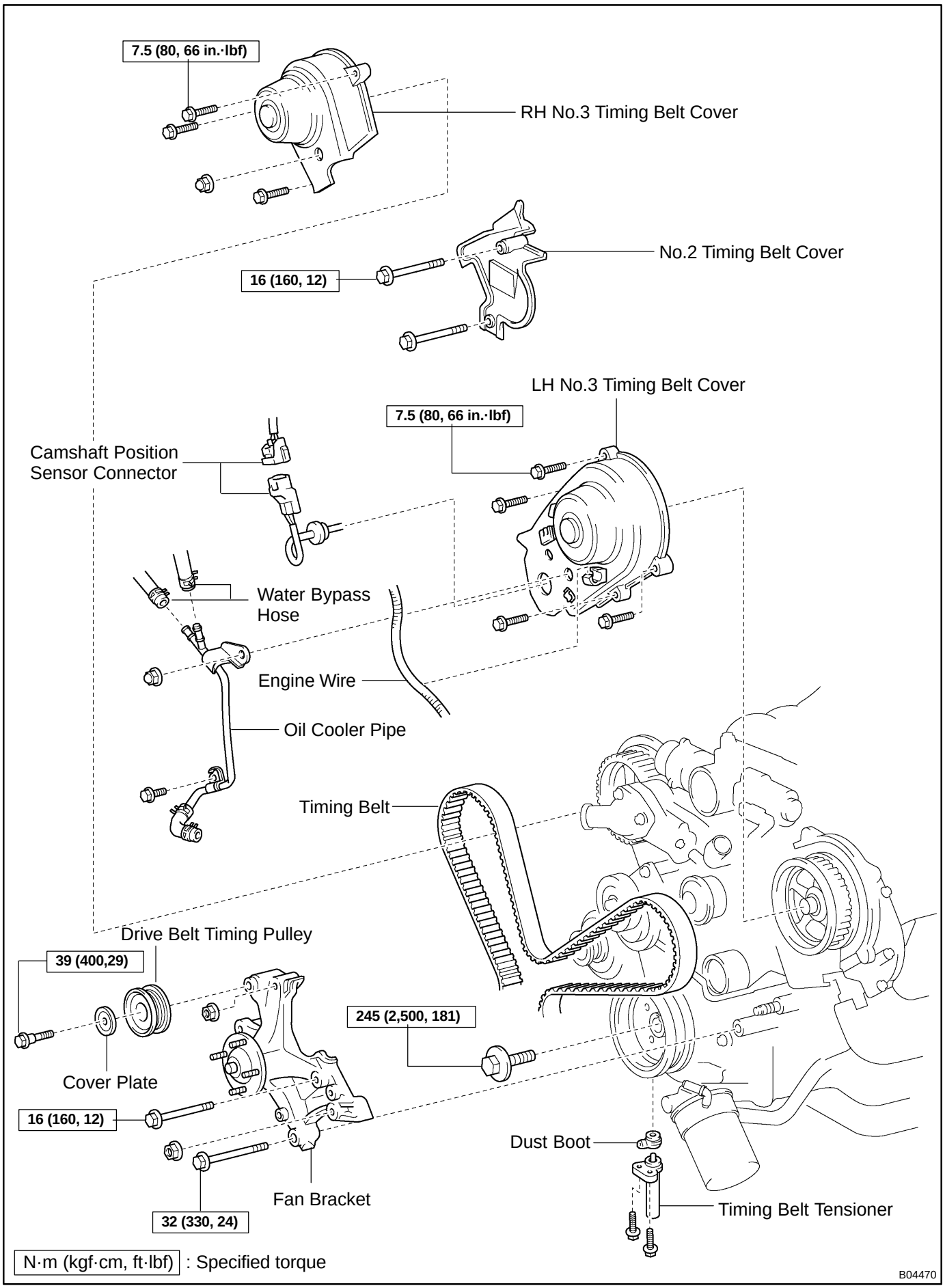
(b) Remove the gasket from the thermostat.

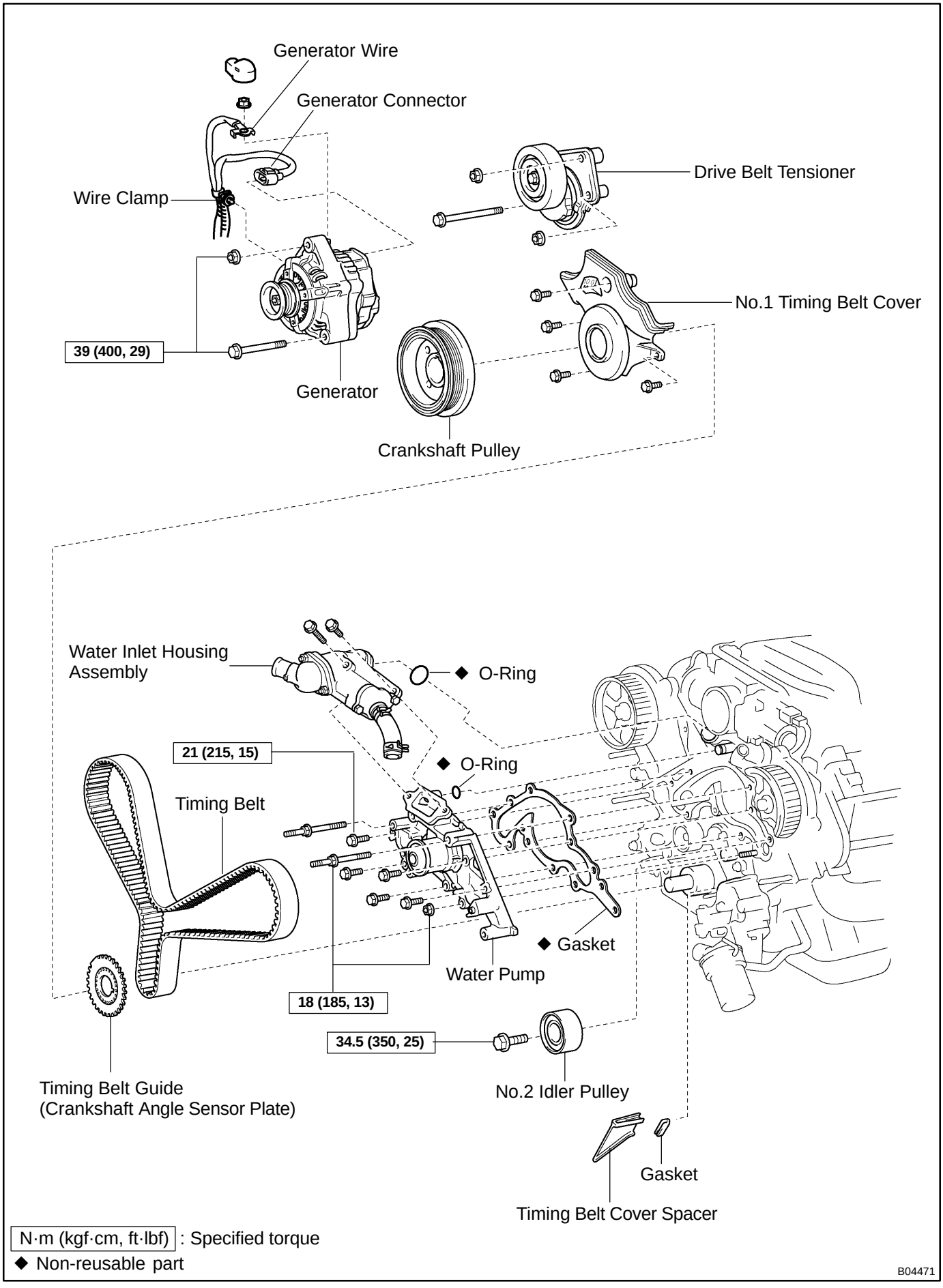
WATER PUMP

COMPONENTS

CO0IQ-06



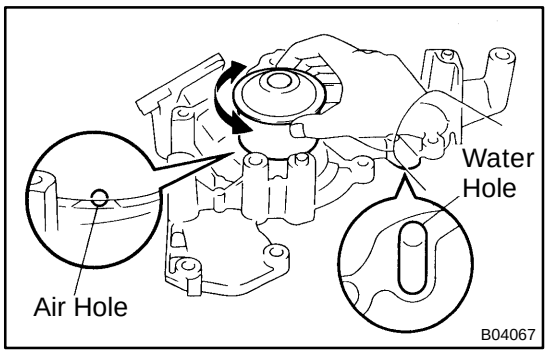

7.5 (80, 66 in.·lbf)
RH No.3 Timing Belt Cover
No.2 Timing Belt Cover
16 (160, 12)
LH No.3 Timing Belt Cover
7.5 (80, 66 in.·lbf)
Camshaft Position Sensor Connector
Water Bypass Hose
Engine Wire
Oil Cooler Pipe
Timing Belt
Drive Belt Timing Pulley
39 (400,29)
Cover Plate
16 (160, 12)
245 (2,500, 181)
Dust Boot
Fan Bracket
32 (330, 24)
Timing Belt Tensioner
N·m (kgf·cm, ft·lbf) : Specified torque
B04470



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

B04471

CO0IS-01



INSPECTION

1. INSPECT WATER PUMP

(a) Visually check the air hole and water hole for coolant leakage.

If leakage is found, replace the water pump and timing belt.

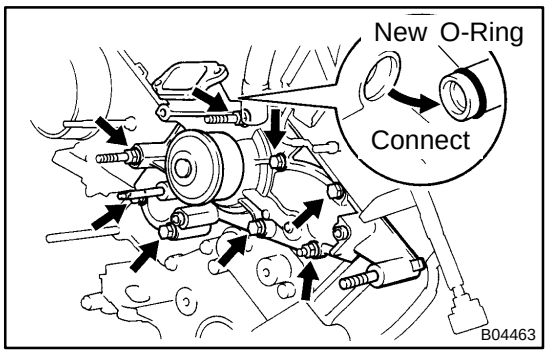
(b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

If necessary, replace the water pump.

2. INSPECT TIMING BELT COMPONENTS

(See page EM-20)

CO0IT-01



INSTALLATION

1. INSTALL WATER PUMP

(a) Install a new O-ring to the water bypass pipe end.

(b) Apply soapy water to the O-ring.

(c) Connect the water pump to the water bypass pipe end.

(d) Install the water pump and new gasket with the 5 bolts, 2 stud bolts and nut. Uniformly tighten the bolts, stud bolts and nut in several passes.

Torque:

Bolt: 21 N·m (215 kgf·cm, 15 ft·lbf)

Stud bolt and nut: 18 N·m (185 kgf·cm, 13 ft·lbf)

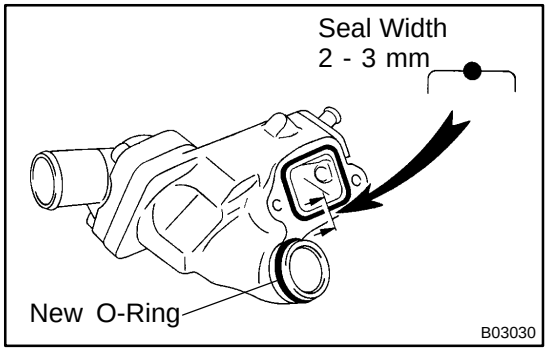
HINT:

Use bolts 35 mm (1.38 in.) in length.

2. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the water inlet housing and water pump.

- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- Thoroughly clean all components to remove all the loose material.
- Using a non-residue solvent, clean both sealing surfaces.



(b) Apply seal packing to the sealing groove of water inlet housing as shown in the illustration.

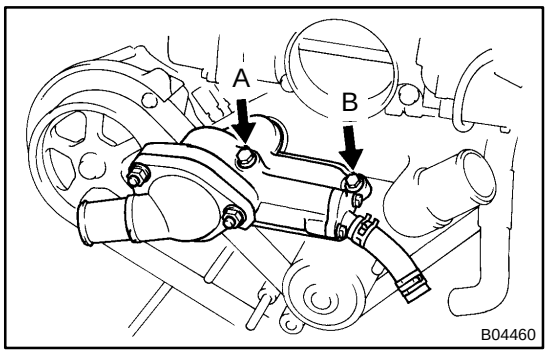
Seal packing: Part No. 08826-00100 or equivalent

- Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install a new O-ring to the water inlet housing.

(d) Apply soapy water on the O-ring.

(e) Attach the water inlet housing end to the front water bypass joint hole.



(f) Install the water inlet and housing assembly with the 2 bolts. Alternately tighten the bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

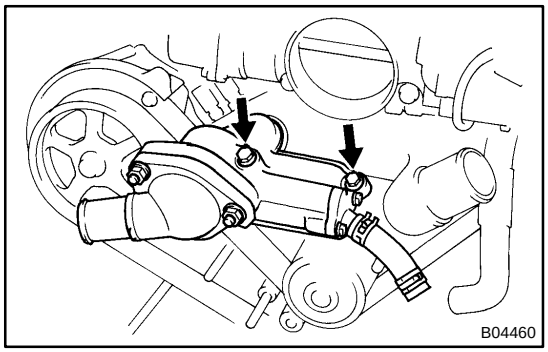
HINT:
Each bolt length is indicated in the illustration.
Bolt length:
76 mm (3.00 in.) for A
22 mm (0.87 in.) for B

3. INSTALL NO.2 IDLER PULLEY (See page EM-22)
4. INSTALL TIMING BELT (See page EM-22)
5. FILL WITH ENGINE COOLANT
6. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS
7. RECHECK ENGINE COOLANT LEVEL

CO0IR-01

REMOVAL

1. **DRAIN ENGINE COOLANT**
2. **REMOVE TIMING BELT (See page EM-15)**
3. **REMOVE NO.2 IDLER PULLEY (See page EM-15)**



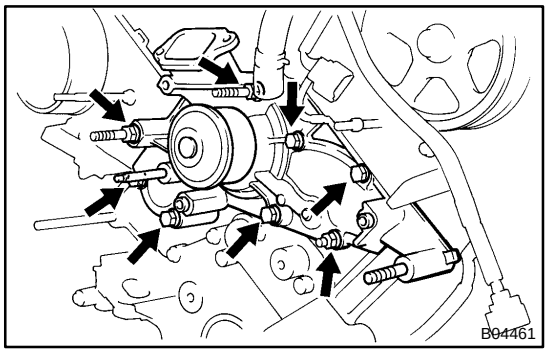
4. **REMOVE WATER INLET AND INLET HOUSING ASSEMBLY**

(a) Disconnect the water bypass hose from the water inlet housing.

(b) Remove the 2 bolts holding the water inlet housing to the water pump.

(c) Disconnect the water inlet housing from the front water bypass joint, and remove the water inlet and inlet housing assembly.

(d) Remove the O-ring from the water inlet housing.



5. **REMOVE WATER PUMP**

(a) Remove the 5 bolts, 2 stud bolts, nut, water pump and gasket.

(b) Remove the O-ring from the water bypass pipe.

DICA4-01

DTC	Always ON	Malfunction in ECU VSC TRAC Warning Light Circuit

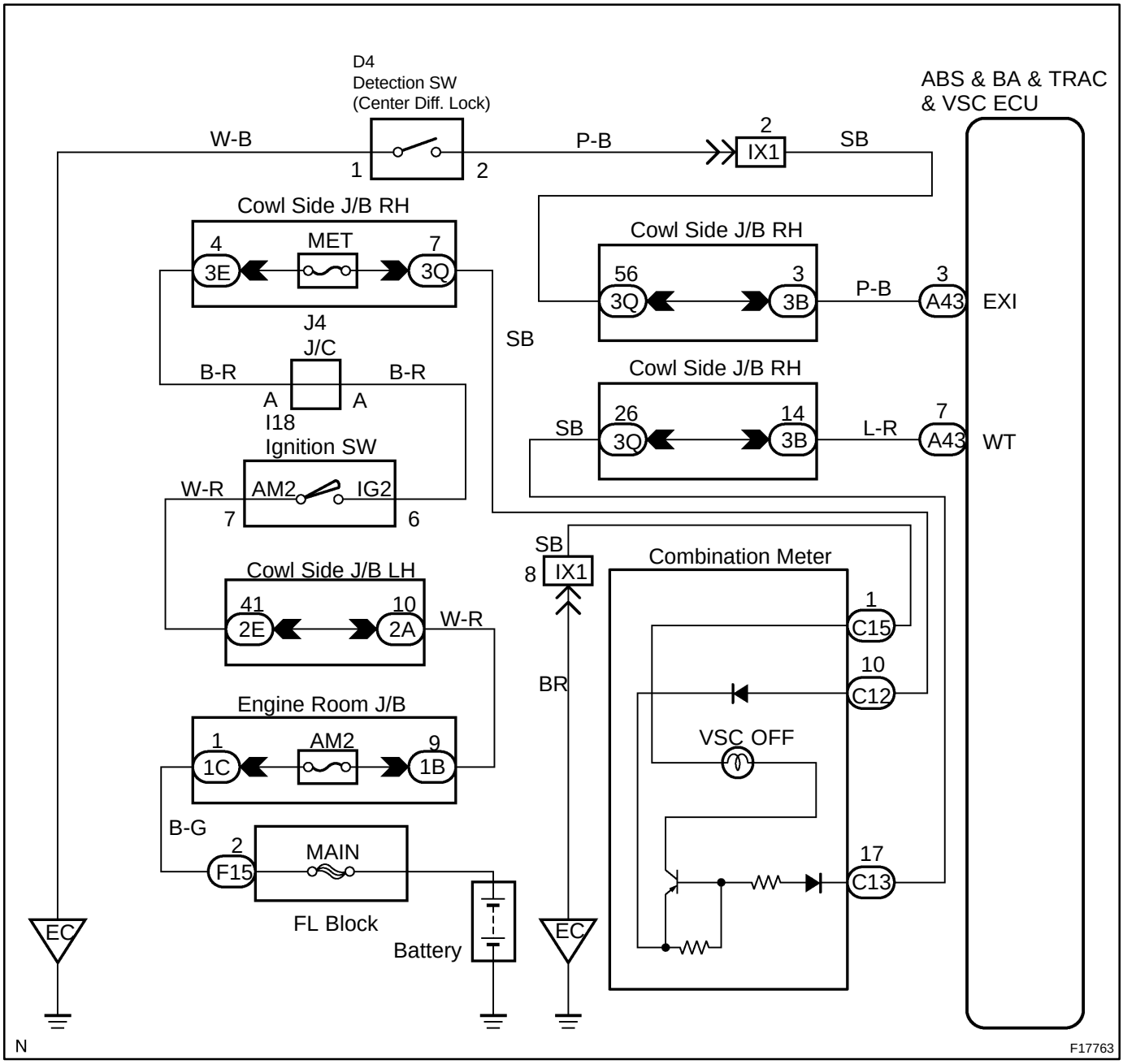
CIRCUIT DESCRIPTION

Always ON	There is a malfunction in the ECU internal circuit.	★Power source circuit ★Skid control ECU ★VSC TRAC warning light circuit

HINT:

If the fail safe function is activated in the VSC system, "VSC OFF" indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

2	**Is DTC output for VSC?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code.**

NO

3	**Does VSC TRAC warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU-IG fuse and ECU (See page IN-36).**

NO

4	**Check battery positive voltage.**

PREPARATION:
Start the engine.
CHECK:
Check the battery positive voltage.
OK:
Voltage: 10 to 16 V

NG → **Check and repair the charging system.**

OK

5	**Check operation of the VSC TRAC warning light.**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter on the hand-held tester.

In case of not using the hand-held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Turn the ignition switch ON.

CHECK:

Check that the VSC TRAC warning light goes off.

NG → **Check and replace combination meter (See page BE-2).**

OK

6	**Check for short circuit in harness and connector between combination meter and skid control ECU, combination meter and DLC1 (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

DICA5-02

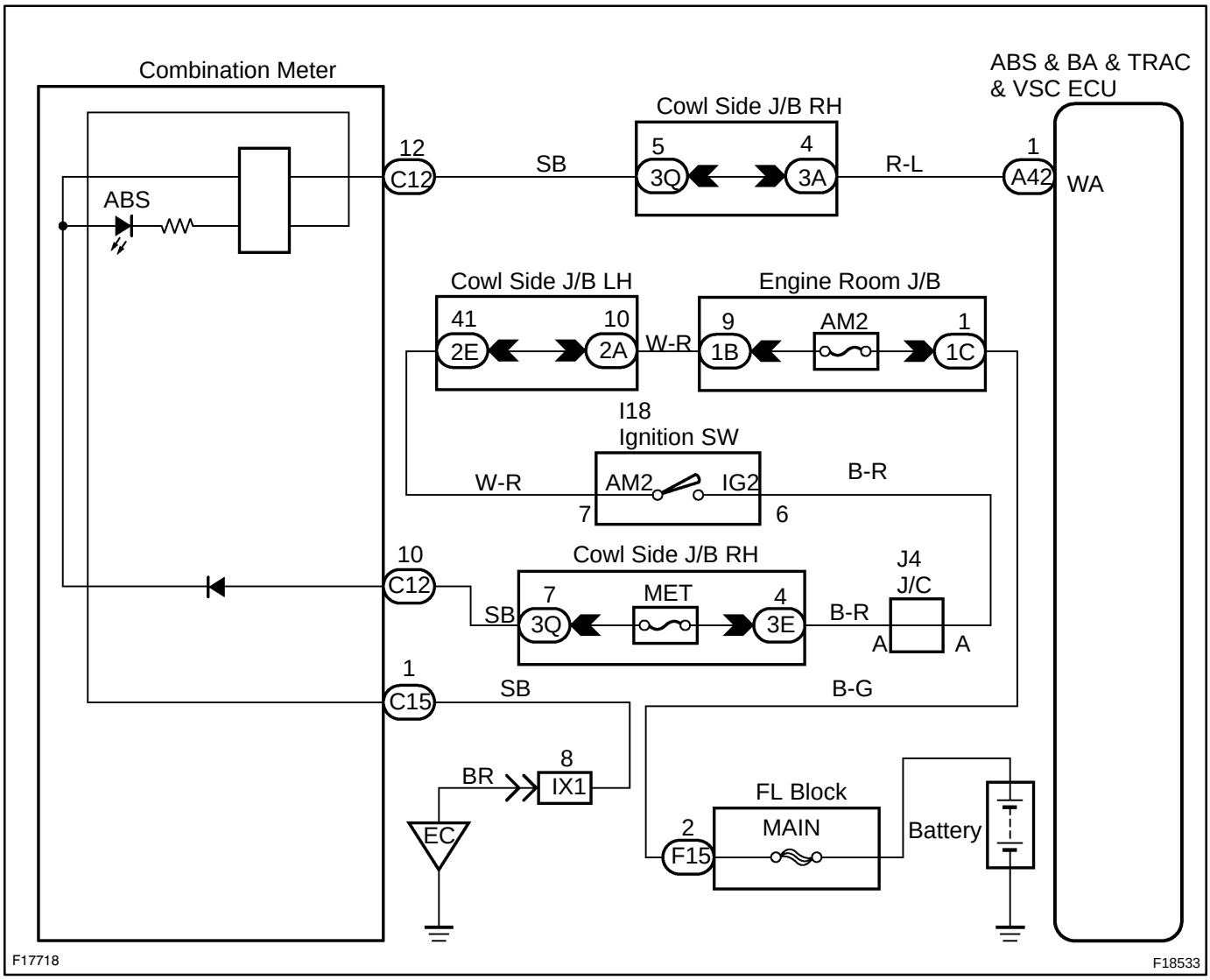
ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects trouble, it lights the ABS warning light while at the same time prohibiting ABS control. At this time, the ECU records a DTC in memory.

Connect terminals Tc and E_1 of the DLC1 or Tc and CG of DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the table below for each trouble symptom.

ABS warning light does not light up	*1
ABS warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

*2: After inspection with step 4, start the inspection from step 5 in case of using the hand-held tester and start from step 6 in case of not using hand-held tester.

1	**Check operation of the ABS warning light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter on the hand-held tester.

OK → **Check and replace skid control ECU.**

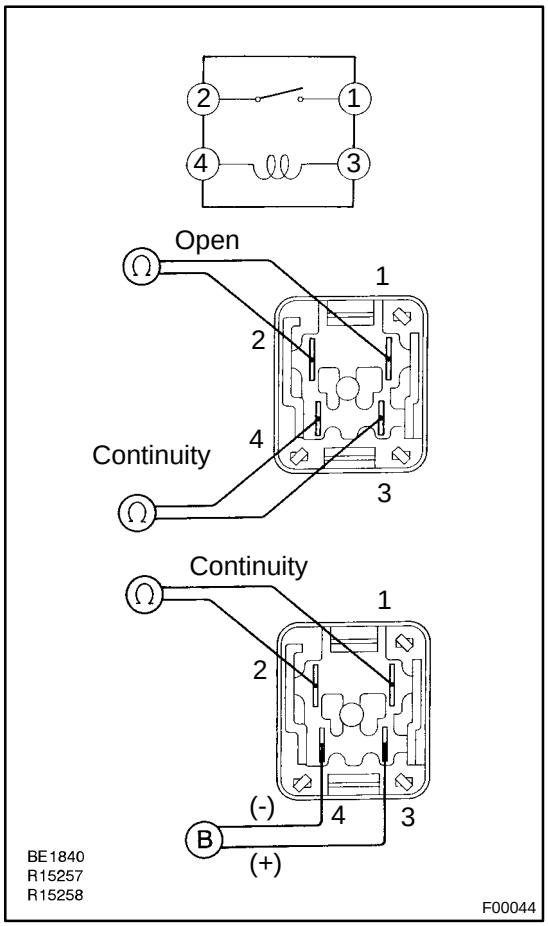
NG

2	**Does the warning lights other than ABS warning light come on?**

YES → **Repair ABS warning light bulb or combination meter assembly.**

NO

3	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

4	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

5	**Check operation of the ABS warning light (See step 1).**

OK → **Check and replace skid control ECU.**

NG

6	**Is DTC output?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code.**

NO

7	**Check for short circuit in harness and connector between ABS warning light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair skid control ECU.

DICA3-01

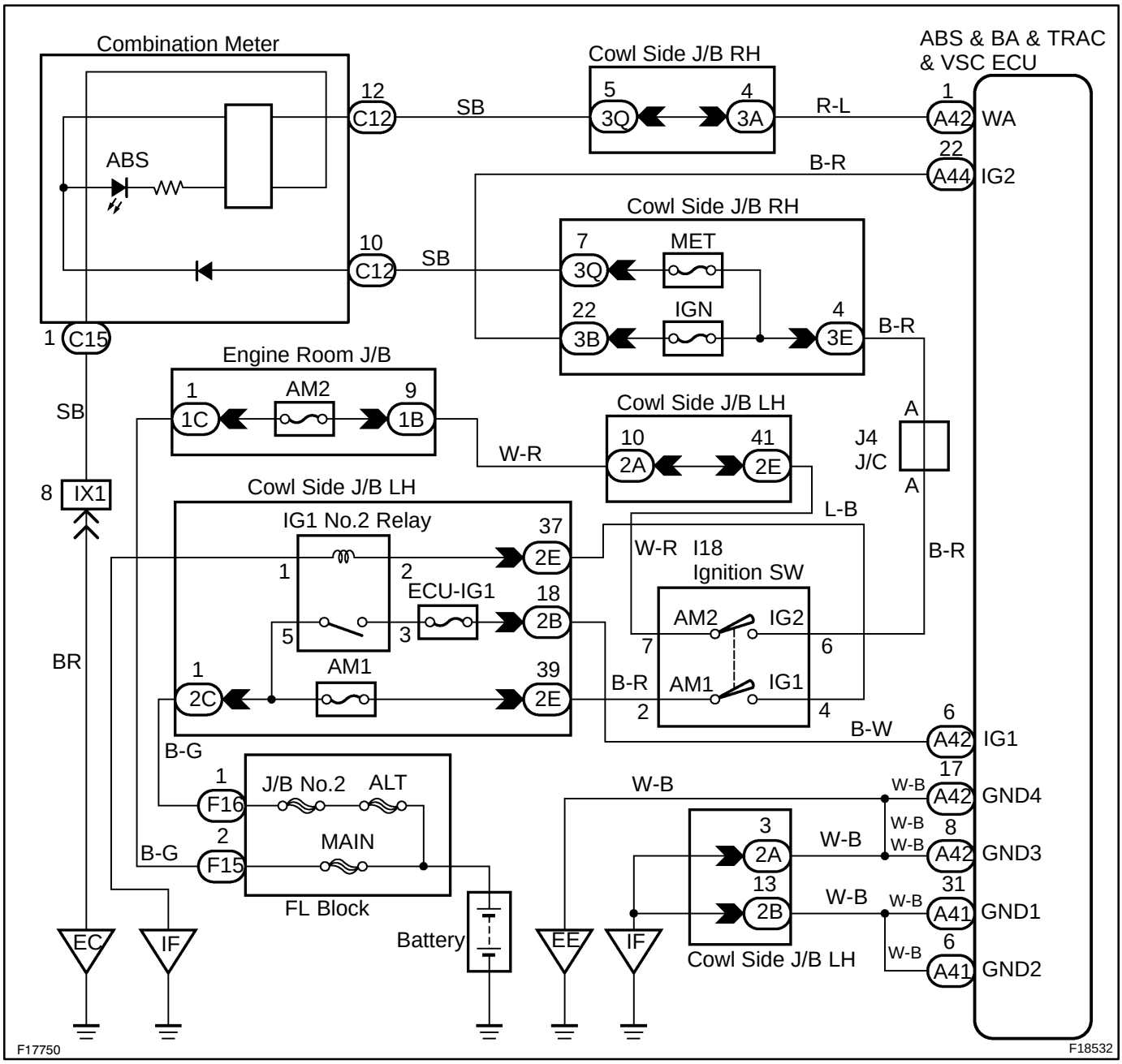
DTC	Always ON	Malfunction in ECU

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following 1. or 2. is detected: 1. The ECU connectors are disconnected from the ECU. 2. There is a malfunction in the ECU internal circuit.	★Battery ★IC regulator ★Power source circuit ★Skid control ECU

HINT:
The hand-held tester may not be used when the ECU is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

2	**Is DTC output?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code .**

NO

3	**Does ABS warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU-IG fuse and ECU (See page IN-36).**

NO

4	**Check battery positive voltage.**

PREPARATION:
Start the engine.
CHECK:
Check the battery positive voltage.
OK:
Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK

5	**Check operation of the ABS warning light.**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the hand-held tester.

In case of not using the hand-held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the skid control ECU.
(c) Using a service wire, connect terminal WA of the skid control ECU harness side connector and body ground.
(d) Turn the ignition switch ON.

CHECK:

Check that the ABS warning goes off.

OK → **Check and replace combination meter (See page BE-2).**

NG

6	**Check for short circuit in harness and connector between combination meter and skid control ECU, combination meter and DLC1 (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

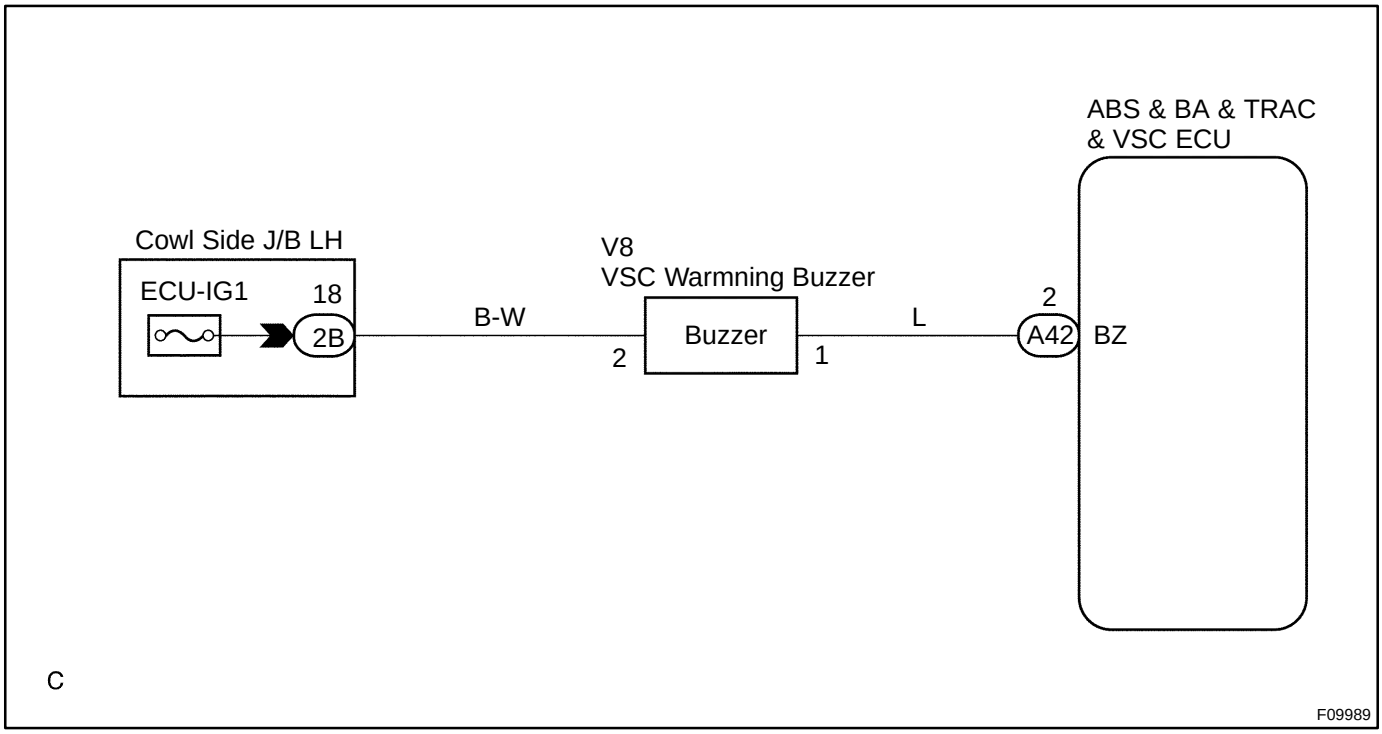
DICAB-01

Brake Warning and VSC Buzzer Circuit

CIRCUIT DESCRIPTION

The brake warning and VSC buzzer sounds while the accumulator pressure is abnormally low or an abnormality casing low fluid pressure occurs VSC is activated.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the brake warning and VSC buzzer.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

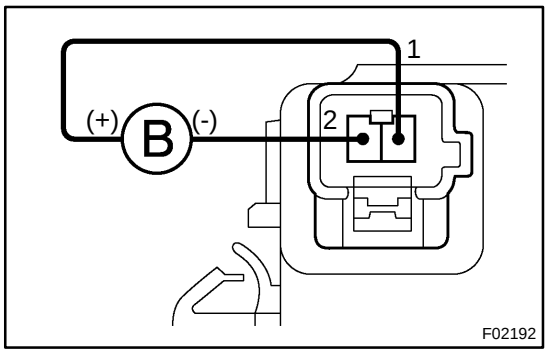
CHECK:

Check that brake warning and VSC buzzer sounds ”ON” and ”OFF” with the hand-held tester.

OK → **Check and replace skid control ECU.**

NG

2	**Check brake warning and VSC buzzer.**



PREPARATION:

Disconnect the brake warning and VSC buzzer connector.

CHECK:

Apply battery positive voltage to terminals 1 and 2 of the brake warning and VSC buzzer connector. Check that the brake warning light comes on and the VSC buzzer sounds.

NG → **Replace brake warning and VSC buzzer.**

OK

3	**Check for open and short circuit in harness and connector between skid control ECU and brake warning and VSC buzzer (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

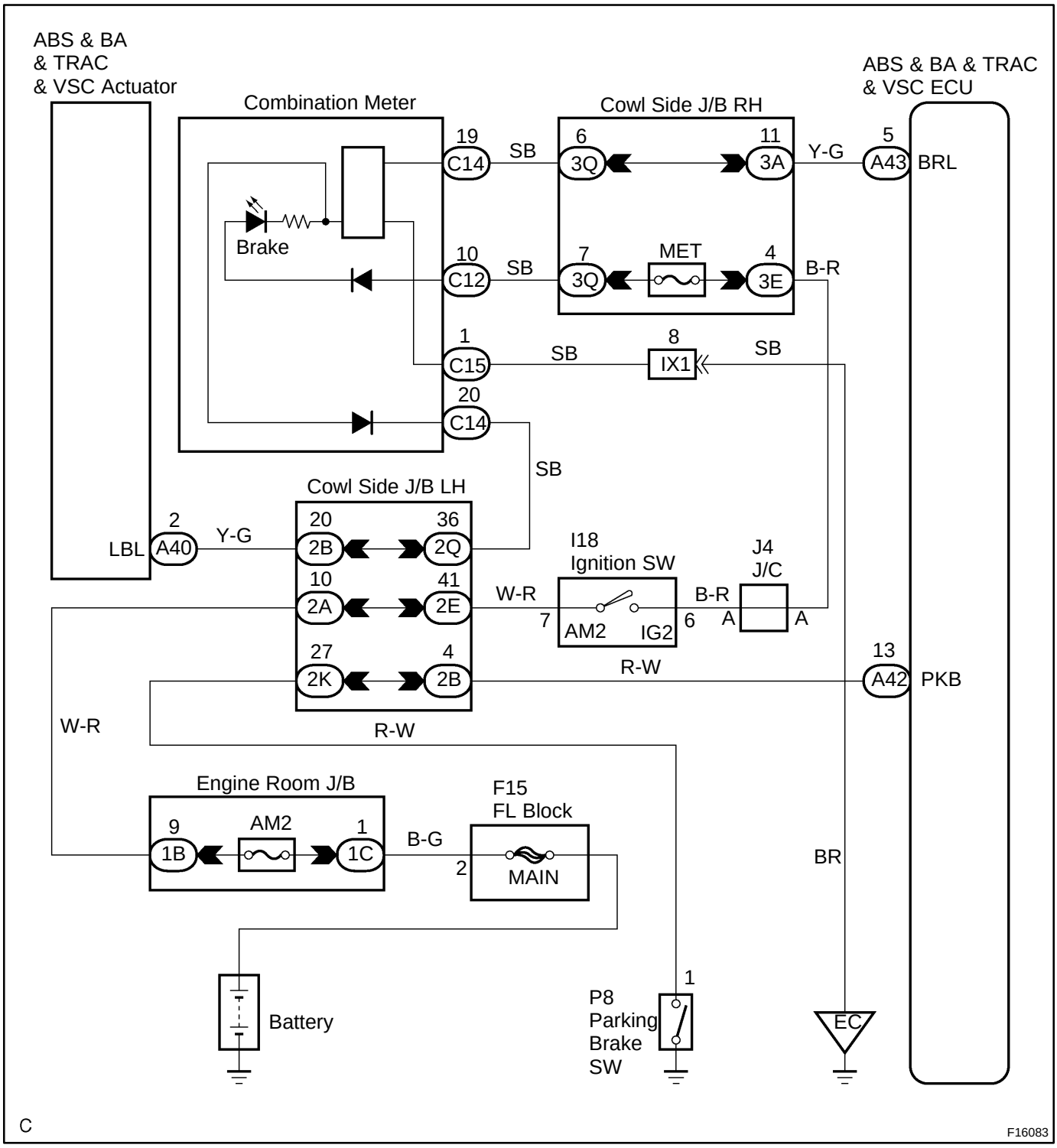
DICA7-02

BRAKE Warning Light Circuit

CIRCUIT DESCRIPTION

The BRAKE warning light lights up while the brake fluid is insufficient and EBD is abnormal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check parking brake switch circuit (See page BE-63).

NG → Repair or replace parking brake switch circuit.

OK

2	Check brake fluid level warning switch circuit (See page BE-63).

NG → Repair or replace brake fluid level warning switch circuit.

OK

3	Is DTC output for ABS?

YES → Repair circuit indicated by the output code.

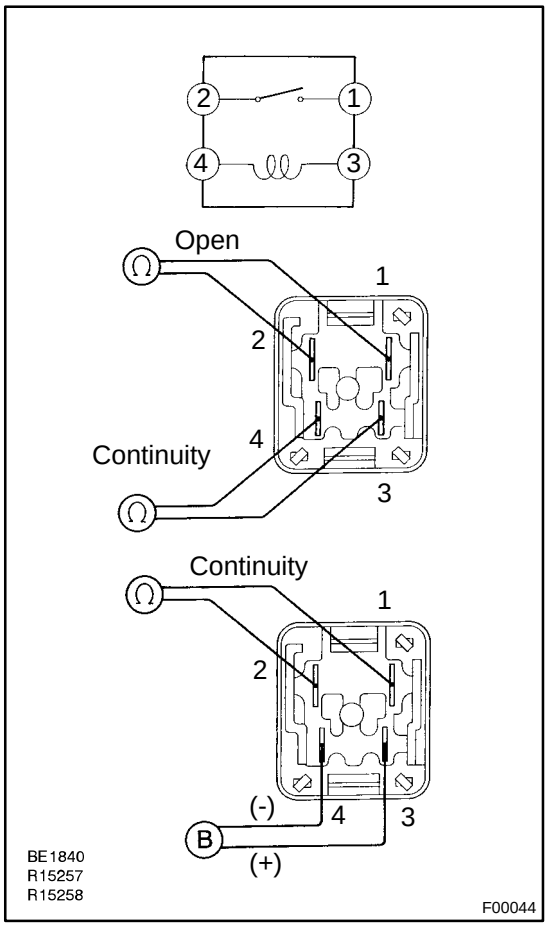
NO

4	Do the warning lights other than BRAKE warning light come on?

YES → Go to step 6.

NO

5	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

6	Check that the ECU connectors are securely connected to the ECU.

NO → **Connect the connector to the ECU.**

YES

7	**Check BRAKE warning light.**

Check if that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair brake warning light bulb or combination meter assembly.**

OK

8	**Check for short circuit in harness and connector between brake warning light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair skid control ECU.

DIC95-01

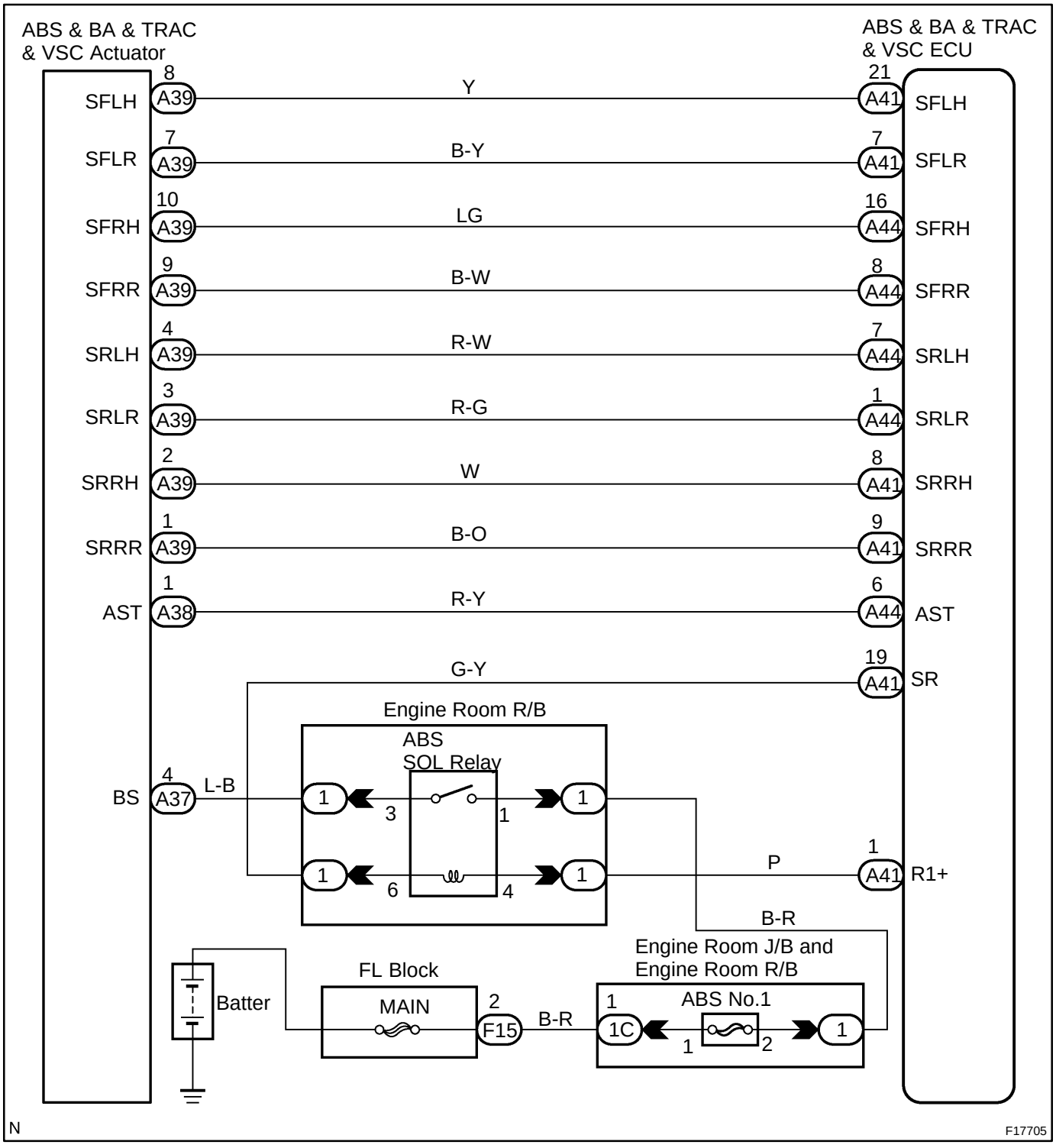
DTC	C0226 / 21 - C0256 / 24	ABS Solenoid Circuit

CIRCUIT DESCRIPTION

This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

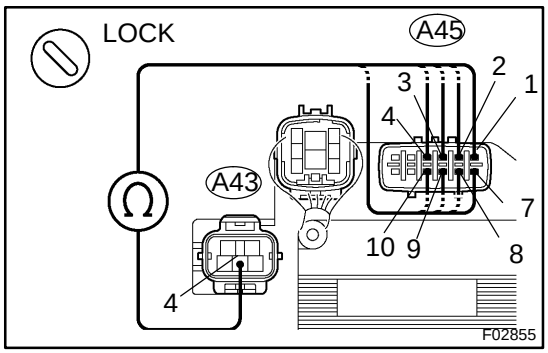
DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short in SFRH or SFRR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SFRH or SFRR circuit
C0236 / 22	Open or short in SFLH or SFLR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SFLH or SFLR circuit
C0246 / 23	Open or short in SRRH or SRRR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SRRH or SRRR circuit
C0256 / 24	Open or short in SRLH or SRLR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SRLH or SRLR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check hydraulic brake booster solenoid.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Check continuity between terminals A43 - 4 and A45 - 1, 2, 3, 4, 7, 8, 9 and 10 of the hydraulic brake booster connector.

OK:

Continuity

HINT:

Resistance of each solenoid at 20 °C (68 °F):

SFRH, SFLH, SRRH, SRLH: 6.95 to 7.45 Ω

SFRR, SFLR, SRRR, SRLR: 2.00 to 2.40 Ω

NG → **Replace hydraulic brake booster.**

OK ↓

2	**Check for open and short circuit in harness and connector between skid control ECU and actuator (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK ↓

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

DIC98-02

DTC	C0278 / 11, C0279 / 12	ABS Solenoid Relay Circuit

CIRCUIT DESCRIPTION

This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Conditions 1. and 2. continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.0 V and the solenoid relay is ON, however, the contact point of the solenoid relay is OFF. 2. With solenoid relay ON, ECU terminal IG1 voltage becomes 9.5 V or less and the contact point of the solenoid relay does not become ON.	★ABS solenoid relay ★ABS solenoid relay circuit
C0279 / 12	Immediately after ECU terminal IG1 becomes ON, and solenoid relay is OFF, however, when the condition that the solenoid relay due to the contact point is ON continues for 0.2 sec. or more.	

WIRING DIAGRAM

Refer to DTC C0226/21 on page DI-528 .

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the hand-held tester.

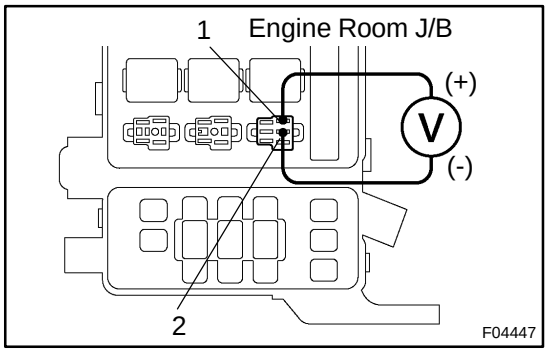
OK:

The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 6.**

NG

2	Check voltage between terminals 1 and 2 of engine room J/B (for ABS solenoid relay).



PREPARATION:

Remove the ABS solenoid relay from the engine room J/B.

CHECK:

Measure the voltage between terminals 1 and 2 of the engine room J/B (for ABS solenoid relay).

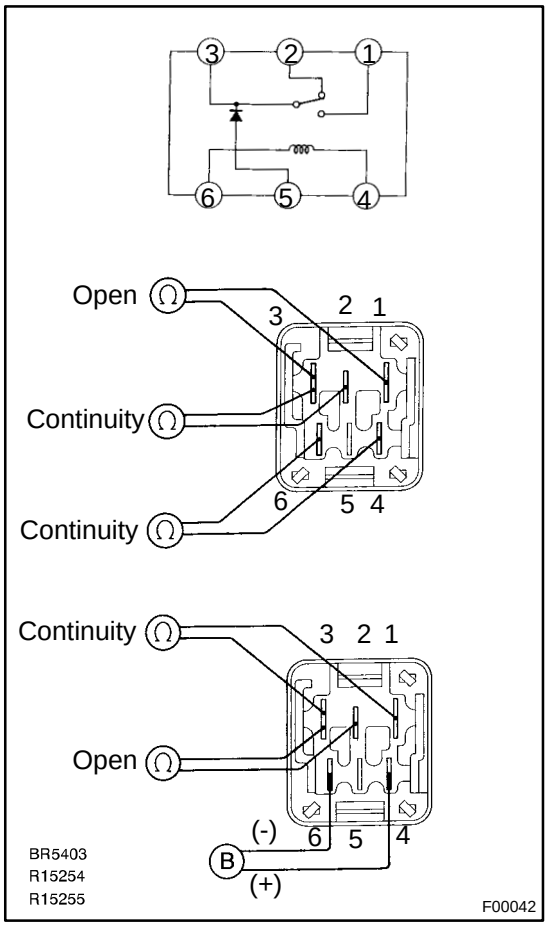
OK:

Voltage: 10 to 14 V

NG	Check and repair harness or connector.

OK

3	Check ABS solenoid relay.



CHECK:

Check continuity between each terminal of the ABS solenoid relay.

OK:

Terminals 4 and 6	Continuity (Reference value 80 Ω)
Terminals 2 and 3	Continuity
Terminals 1 and 3	Open

CHECK:

(a) Apply battery positive voltage between terminals 4 and 6.

(b) Check continuity between each terminal of the ABS solenoid relay.

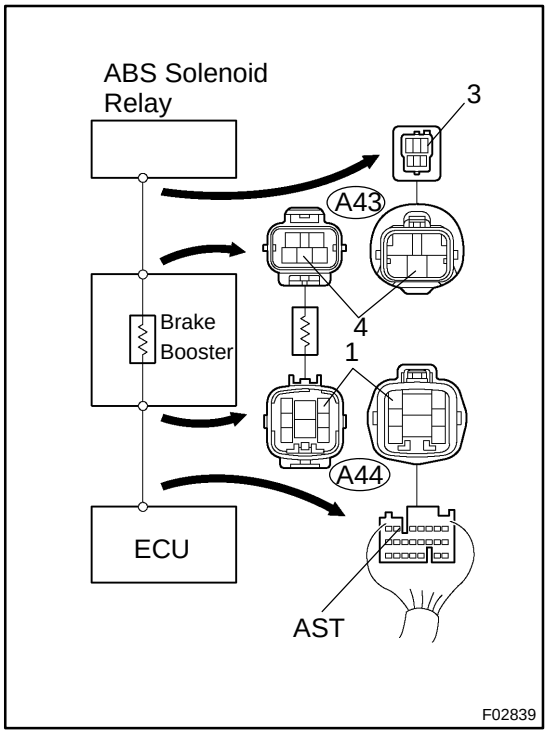
OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG	Replace ABS solenoid relay.

OK

4	Check continuity between terminals 3 of ABS solenoid relay and terminal AST of skid control ECU.



CHECK:

Check continuity between terminal 3 of the ABS solenoid relay and terminal AST of the skid control ECU.

OK:

Continuity

HINT:

There is resistance of 33 ± 3 Ω between terminals 4 of connector A43 and terminal 1 of connector A44.

NG → **Repair or replace harness, connector or hydraulic brake booster.**

OK

5	Check for open and short circuit in harness and connector between ABS solenoid relay and skid control ECU (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

6	**Check for open circuit in harness and connector between AST of hydraulic brake booster and AST of skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace hydraulic brake booster or skid control ECU.

DIC99-01

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If trouble occurs in the engine control system, the ECU prohibits TRAC and VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51	Conditions 1. and 2. continue for 5 sec.: 1. Engine speed: 500 rpm or more. 2. A trouble signal in the engine control system is input.	Engine control system

INSPECTION PROCEDURE

1	**Check the DTC for the engine (See page DI-3).**

*1

Repair engine control system according to the output code.

*2

Check for ECM connected to malfunction indicator light.

*1: Output NG code

*2: Malfunction indicator light remains ON

DIC9A-01

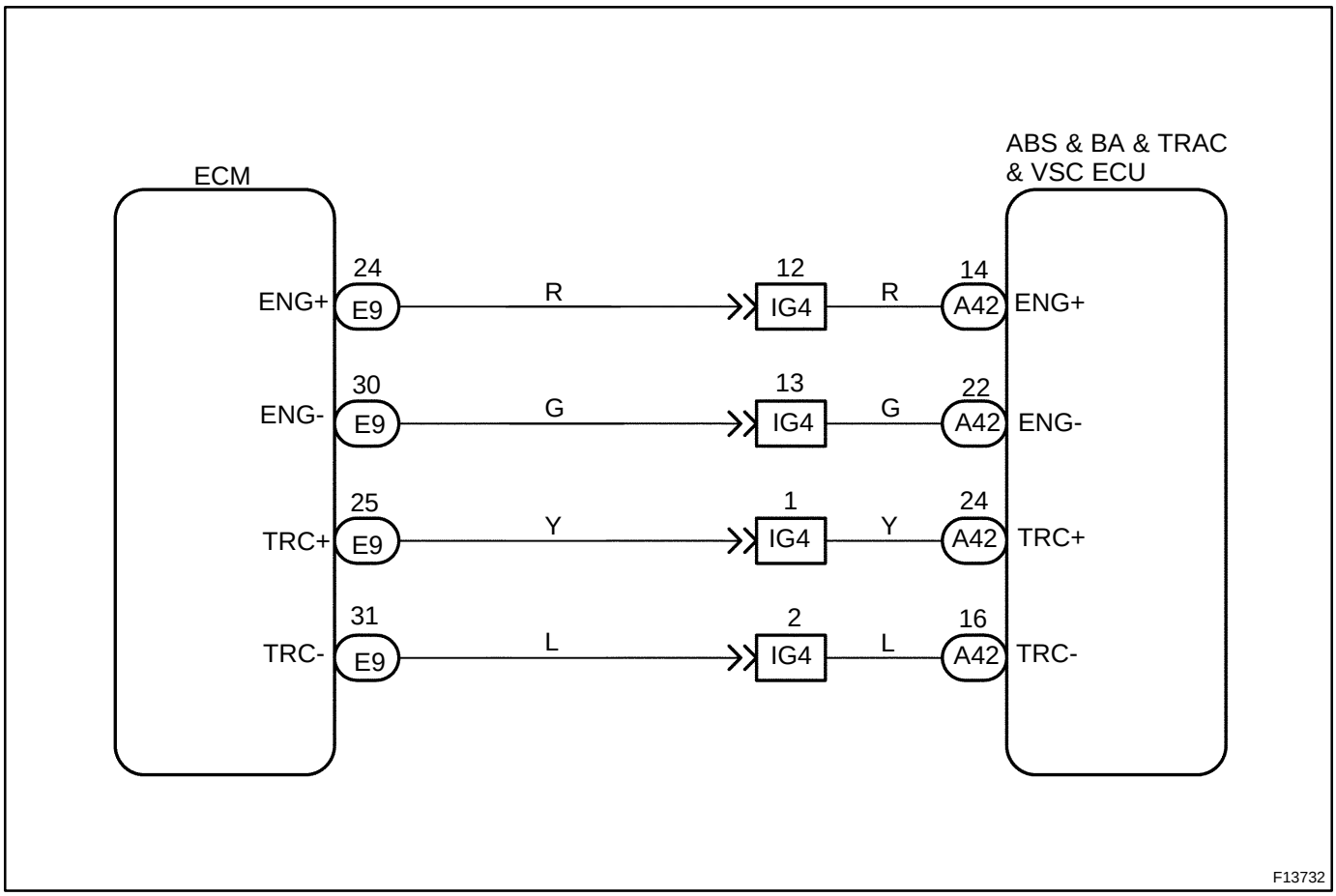
DTC	C1203 / 53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

The circuit is used to send TRAC & VSC control information from the skid control ECU to the ECM (TRC+, TRC-), and engine control information from the ECM to the skid control ECU (ENG+, ENG-).

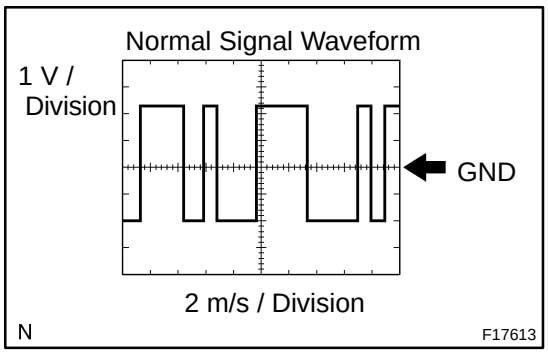
DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	Either of the following 1. or 2. continues for 5 sec.: 1. ECU IG1 terminal voltage is 9.5 V to 17.0 V and data transmission to the ECM is impossible. 2. ECU IG1 terminal voltage is 9.5 V to 17.0 V, engine speed is 500 rpm or more or vehicle speed is 60 km/h (36 mph) or more and data receiving from the ECM is impossible.	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check skid control ECU communication.**



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU.

(b) Connect the oscilloscope to each of terminal ENG+ or TRC+ and GND of the skid control ECU.

CHECK:

Start the engine, and check the signal waveform.

NG → **Check and replace skid control ECU.**

OK

2	**Check for open and short circuit in harness and connector between each of terminals ENG+, ENG-, TRC+, TRC- of skid control ECU and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM.

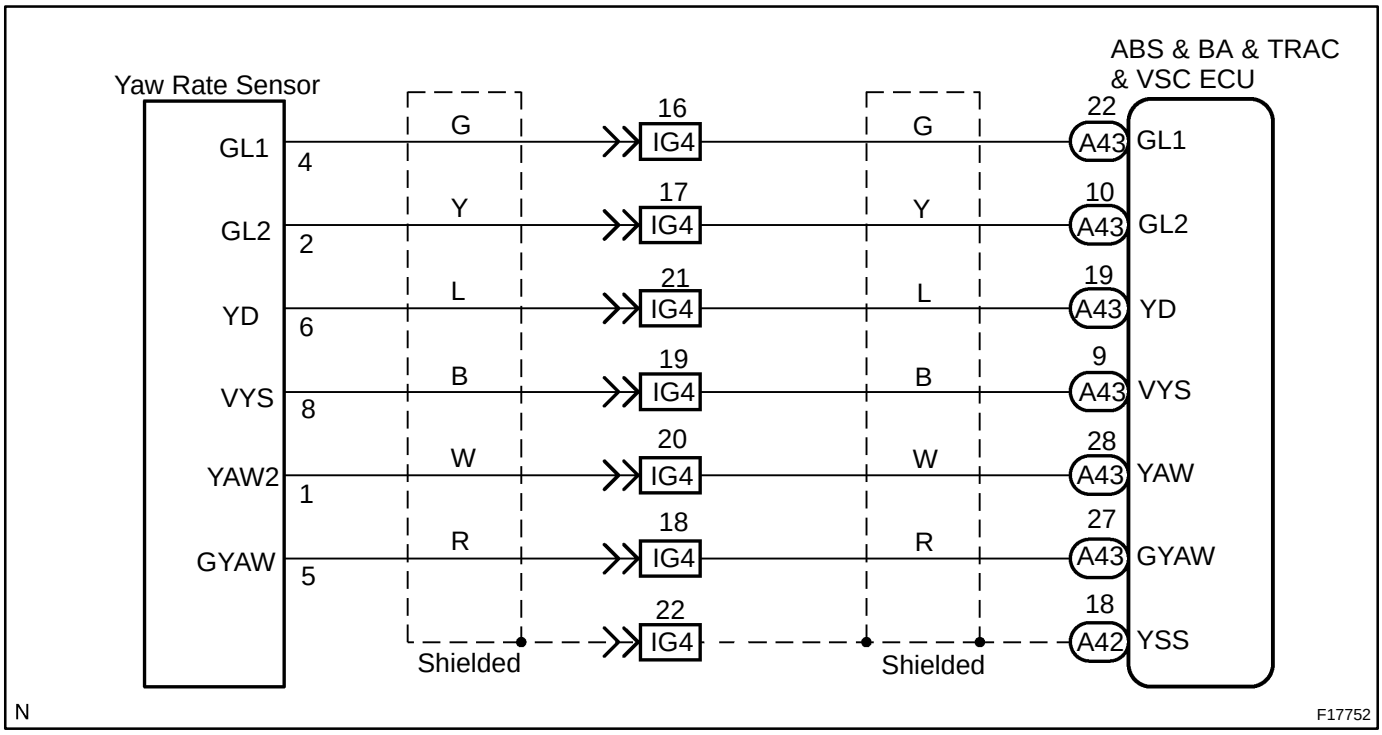
DIC9C-01

DTC	C1210 / 36	Zero Point Calibration of Yaw Rate Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1210 / 36	When either of the following 1. or 2. is detected: 1. After battery terminal was connected, when the shift lever was moved to other than P position within 15 sec. soon after ECU terminal IG1 becomes ON for the first time. 2. When the yaw rate sensor zero point recorded in ECU is deleted.	★Yaw rate sensor ★Yaw rate sensor circuit ★PNP switch circuit (P position)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check whether zero point calibration of yaw rate sensor has been done or not.**

PREPARATION:

Shift the shift lever in the P position and turn the ignition switch ON. Repeat connecting and releasing Ts and E_1 terminals of the DLC1 4 times or more for 8 sec. After that do not move the vehicle for 15 sec. or more.

CHECK:

Check that the"VSC TRAC" warning light and "VSC OFF" indicator light light up for 15 sec.

OK → **No problem.**

NG

2	**Check for open and short circuit in harness and connector between PNP switch (P position) and skid control ECU and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

3	**Check for open and short circuit in harness and connector between yaw rate sensor and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

4	**Check yaw rate sensor (See page DI-553).**

NG → **Replace yaw rate sensor.**

OK

Check and replace skid control ECU.

DIC9E-01

DTC	C1223 / 43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223 / 43	ABS control system is abnormal.	ABS control system

INSPECTION PROCEDURE

1	**Check the DTC for the ABS (See page DI-505).**

*1

Repair ABS control system according to the code output.

*2

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DIC9G-01

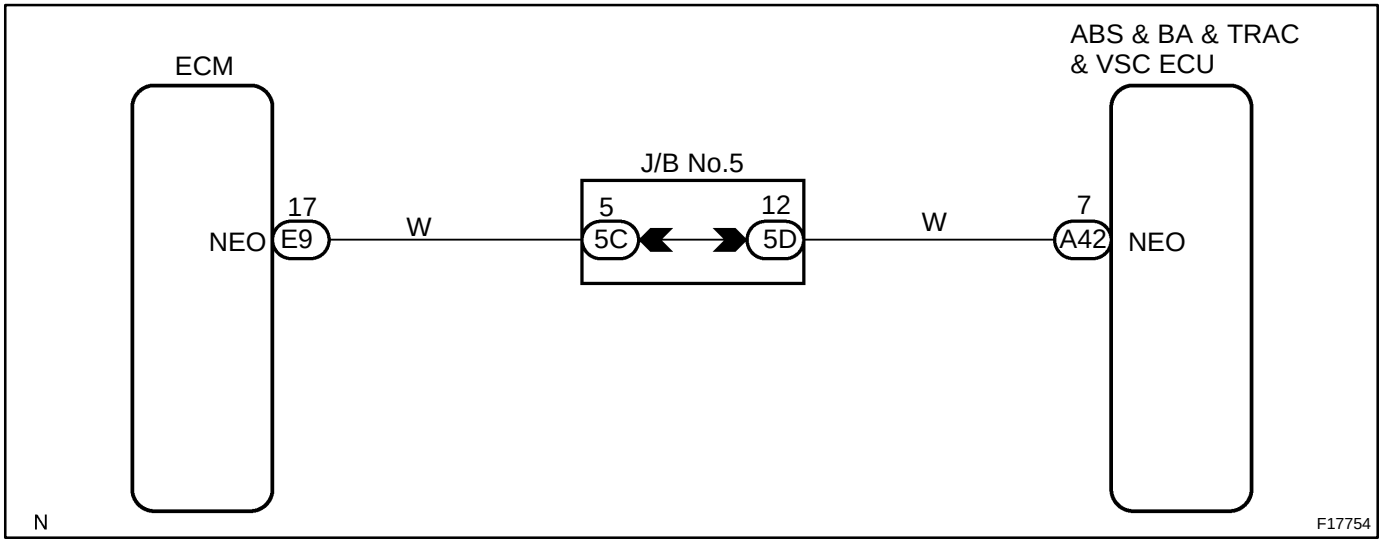
DTC	C1224 / 44	NE Signal Circuit

CIRCUIT DESCRIPTION

The skid control ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224 / 44	When either of the following 1. or 2. is detected: 1. At vehicle speed of 19 mph (30 km/h) or more, and when data received from the ECM is in normal condition, and open or short circuit for engine revolution signal circuit continues for 10 sec. or more. 2. While TRAC is operating, the conditions that open or short circuit in engine revolution signal circuit is detected, main throttle opening degree is 0 and IDL switch is OFF continue for 0.24 sec. or more.	★NEO circuit ★ECM ★Skid control ECU

WIRING DIAGRAM



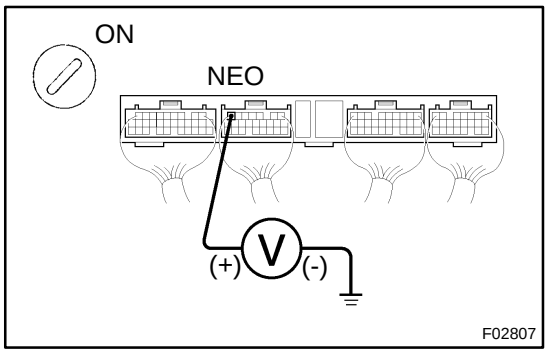
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminal NEO of skid control ECU and terminal NEO of ECM (See page IN-36).**

NG → **Repair or replace harness and connector.**

OK

2	**Check voltage between terminal NEO of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

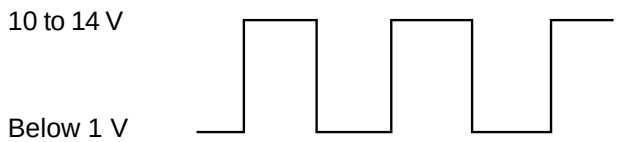
(a) Turn the ignition switch ON.

(b) Measure voltage between terminal NEO of the skid control ECU and body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	10 to 14 V or below 1 V
ON (Idling)	10 to 14 V ↔ below 1 V (Pulse)

(Reference)



NG → **Check and replace skid control ECU or ECM.**

OK

If the same codes are still output after the DTC is deleted, check the contact condition of each connection.

DIC9H-02

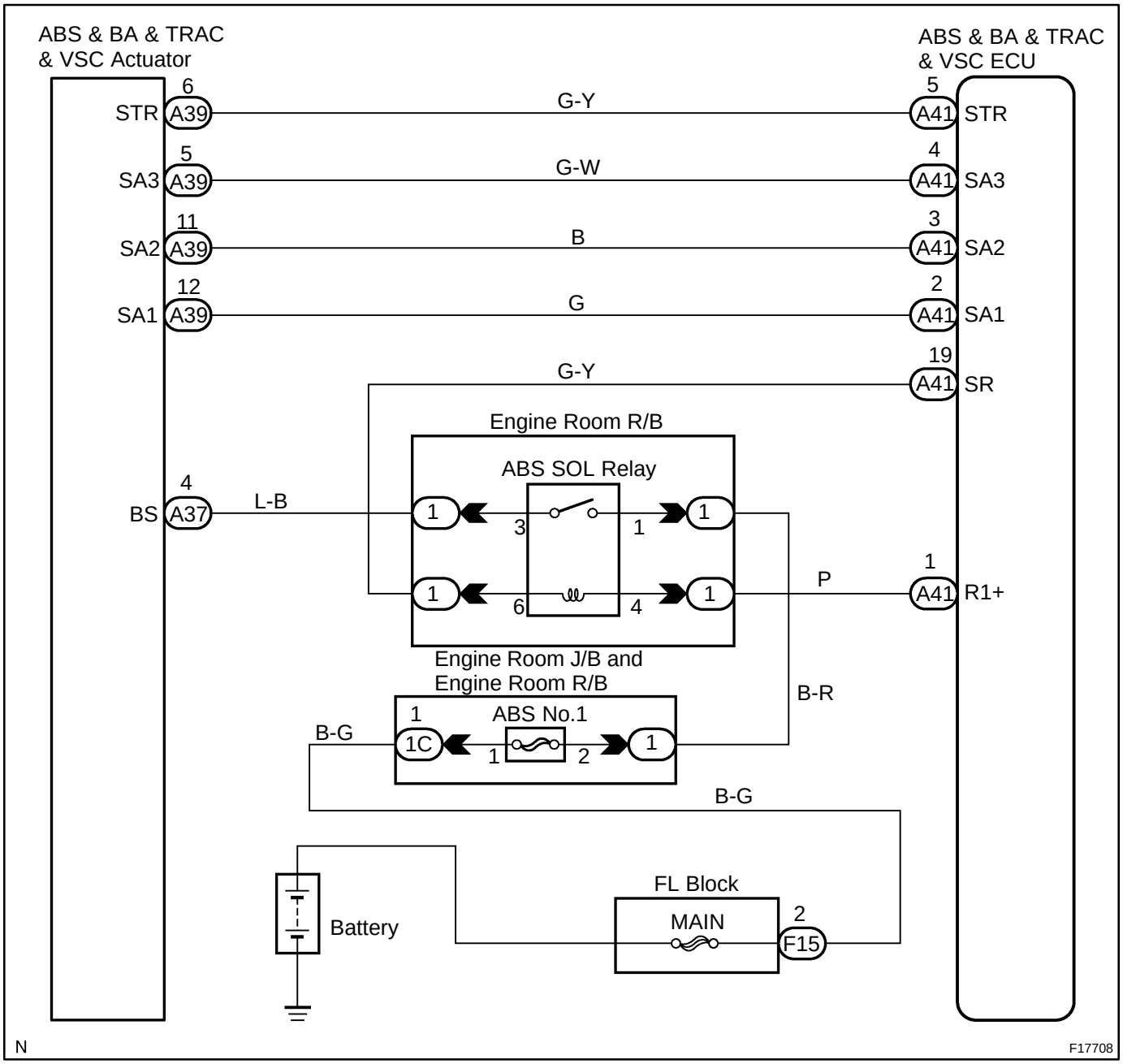
DTC	C1225 / 25 to C1228 / 28	TRAC & VSC Solenoid Circuit

CIRCUIT DESCRIPTION

The TRAC & VSC solenoid operates in accordance with signals from the ECU and raises the fluid pressure in and releases it from the brake cylinders.

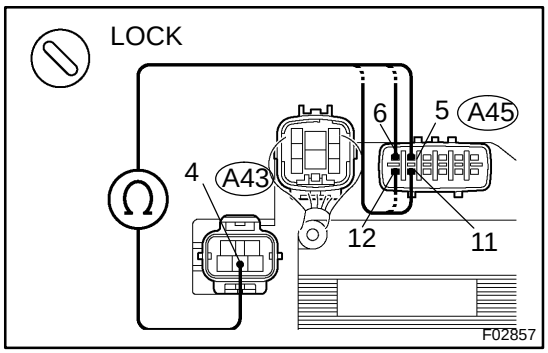
DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Open or short in SA1 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA1 circuit
C1226 / 26	Open or short in SA2 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA2 circuit
C1227 / 27	Open or short in SA3 circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★SA3 circuit
C1228 / 28	Open or short in STR circuit continues for 0.015 sec. or more.	★Hydraulic brake booster ★STR circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check TRAC & VSC solenoid.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Check continuity between terminals A43 - 4 and A45 - 5, 6, 11 and 12 of the hydraulic brake booster.

OK:

Continuity

HINT:

Resistance of each solenoid at 20 ˚C (68 ˚F):

SA1, SA2, STR: 4.05 to 4.55 Ω

SA3: 6.95 to 7.45 Ω

NG → **Replace hydraulic brake booster.**

OK ↓

2	Check for open and short circuit in harness and connector between skid control ECU and hydraulic brake booster (See page IN-36).

NG → **Repair or replace harness or connector.**

OK ↓

If the same code is still output after the DTC is deleted, check the contact condition of each connection. If the connections are normal, the ECU may be defective.

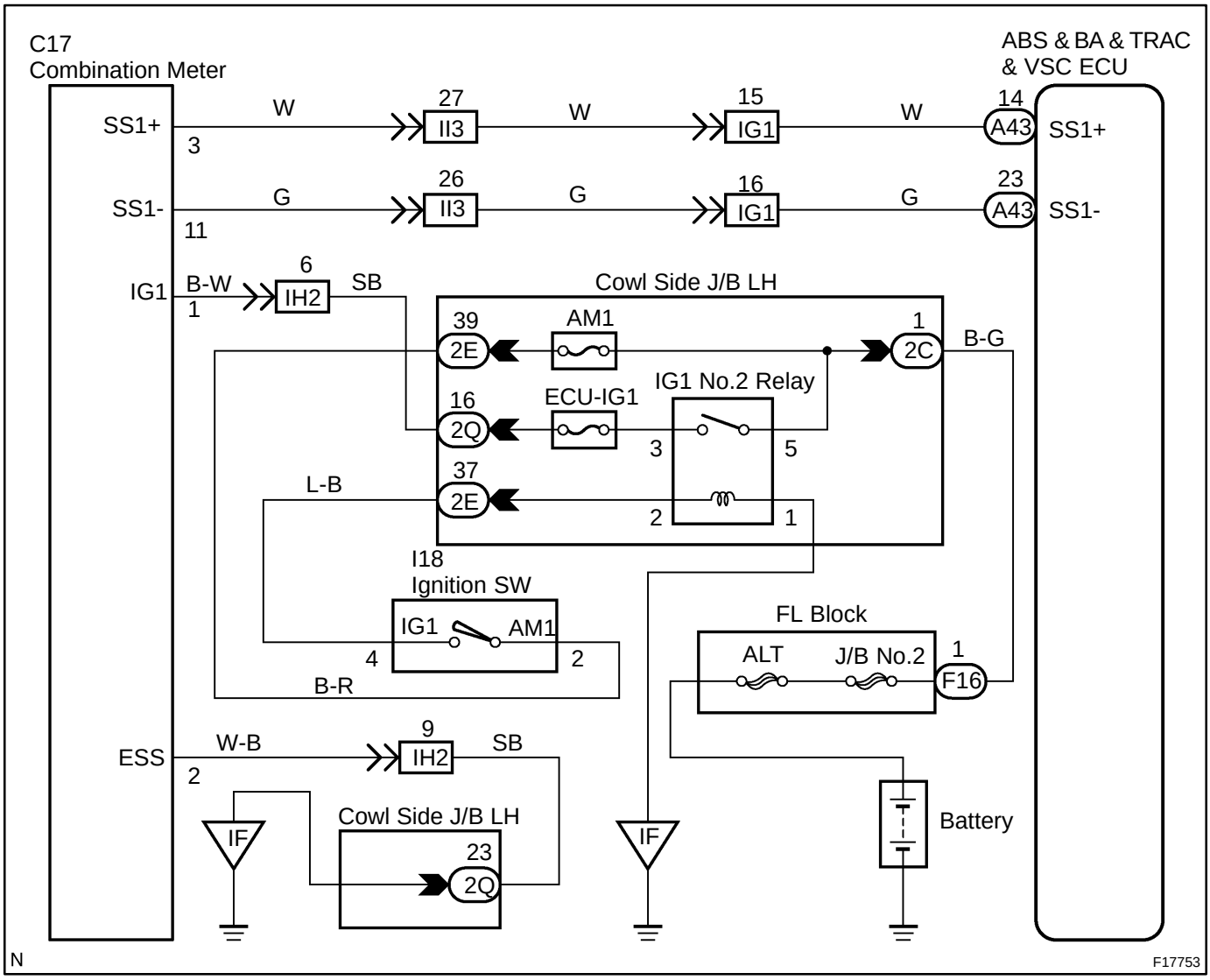
DIC9J-02

DTC	C1231 / 31, C1335 / 35	Steering Angle Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	Detection of any of the conditions 1. through 3.: 1. When the condition that ECU terminal IG1 voltage is 9.5 V or more, and does not receive data from steering angle sensor continues for 1 sec. or more. 2. When the steering angle sensor value changes by 360˚ or more with SSC signal from steering angle sensor remaining ON or OFF. 3. When the condition that difference between the steering angle value at edge occurring in SSC signal and the value at edge occurring in SSC signal after turning the steering wheel one-turn is out of the range from 355.5˚ - 364.5˚ occurs 10 times or more.	★Steering angle sensor ★Steering angle sensor circuit
C1335 / 35	When the ECU IG1 terminal voltage is 9.5 V or more, data transmission from the steering angle sensor is impossible for 1 sec. or more.	★Steering angle sensor ★Steering angle sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the steering angle sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the steering wheel turning angle value of the steering angle position sensor displayed on the hand-held tester is changing when turning the steering wheel.

HINT:

After certifying ”Zero” point calibration of the steering angle sensor (Speed: 21 mph (35 km/h), driving straight ahead for 10 sec. or more), the value will change.

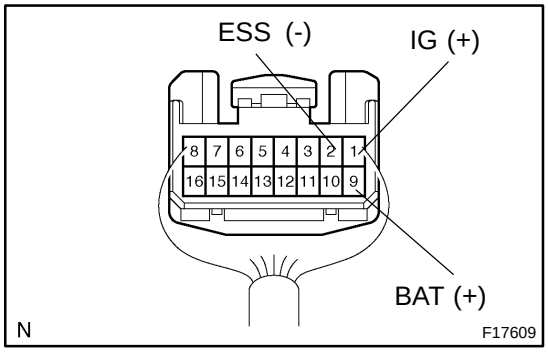
OK:

Steering wheel turning angle value must be changing.

OK → **Go to step 5.**

NG

2	**Check input voltage of the steering angle sensor.**



PREPARATION:

Remove the column lower cover.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals 1 and 2, 2 and 9 of the combination switch wire harness side connector.

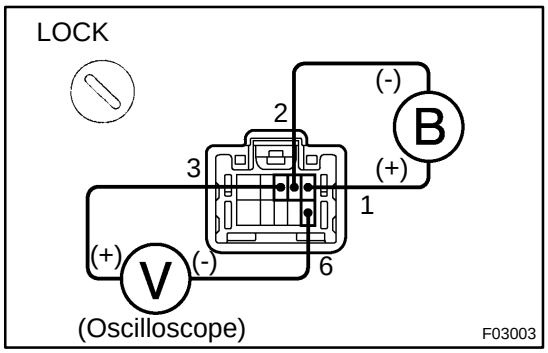
OK:

Voltage: 10 to 14 V

NG → **Check and replace harness and connector.**

OK

3	Check steering angle sensor.



PREPARATION:

(a) Remove the steering wheel lower No. 2 and No. 3 covers, steering wheel pad, steering wheel column upper and lower covers (See page SR-29).

(b) Disconnect the combination switch connector (for steering angle sensor).

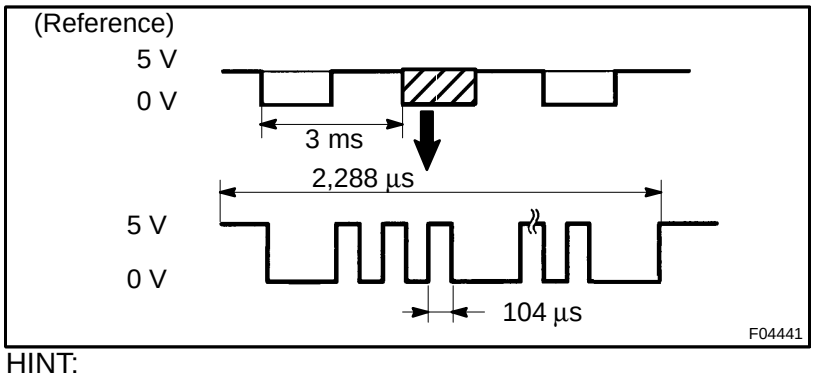
(c) Connect the oscilloscope to terminals 3 and 6 of the combination switch connector (for steering angle sensor).

(d) Apply battery positive voltage between terminals 1 and 2.

CHECK:

Turn the steering wheel slowly and check the signal waveform.

OK:



HINT:

The above signal waveform does not repeat ON and OFF regularly and this combination changes case by case according to the data.

NG	Replace steering angle sensor.

OK

4	Check that slits of the steering sensor disc are clogged up.

NG	Repair or replace steering sensor disc.

OK

5	**Check for open and short circuit in harness and connector between steering position sensor and ABS & BA & TRAC & VSC ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DIC9K-02

DTC	C1232 / 32	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1232 / 32	Detection of either of the conditions 1. or 2.: 1. At a vehicle speed of 6 mph (10 km/h) or more, when the condition that ECU terminal GL1 signal change range is less than 20 mV, and ECU terminal GL2 signal change range swings by 468 mV or more occurs for 30 sec. or more. 2. At a vehicle speed of 6 mph (10 km/h) or more, when the condition that ECU terminal GL2 signal change range is less than 20 mV, and ECU terminal GL1 signal change range swings by 468 mV or more occurs for 30 sec. or more.	★Deceleration sensor ★Deceleration sensor circuit

INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the yaw rate (deceleration) sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the deceleration value of the deceleration sensor displayed on the hand-held tester is changing when tilting the vehicle.

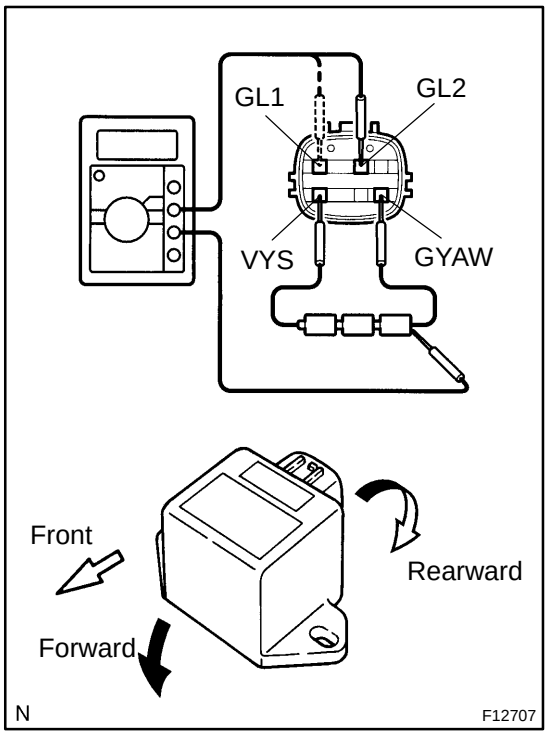
OK:

Deceleration value must be changing.

OK → **Check and replace ABS & BA & TRAC & VSC ECU.**

NG

2	Check yaw rate (deceleration) sensor.



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG	Replace yaw rate sensor.

OK

3	Check for open or short circuit in harness and connector between yaw rate (deceleration) sensor and ABS & BA & TRAC & BA & VSC ECU (See page IN-36).

NG	Repair or replace harness and connector.

OK

Check and replace ABS & BA & TRAC & VSC ECU.

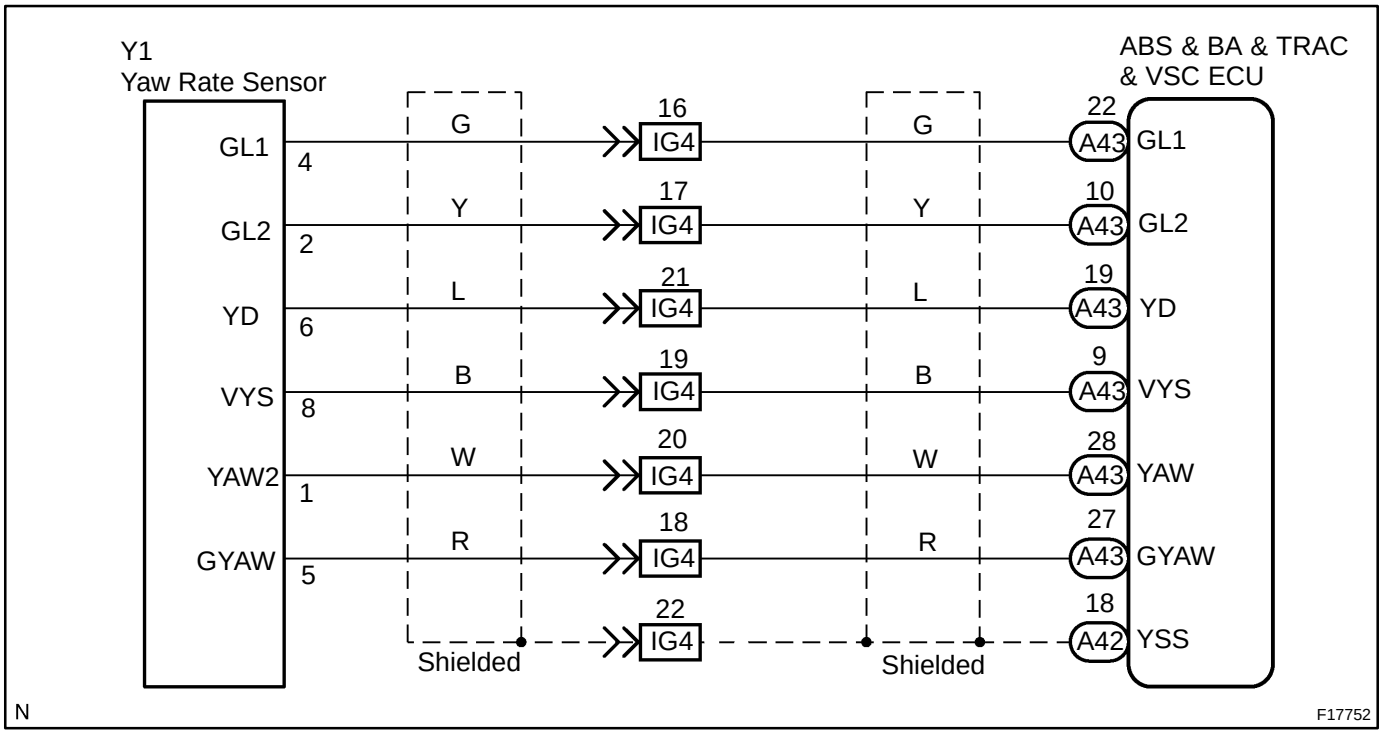
DIC9L-01

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	When any of the following 1. through 4. is detected: 1. ECU terminal IG1 voltage is 9.5 V to 17.0 V, and the condition that yaw rate sensor voltage is out of the range from 0.25 V to 4.75 V continues for 1 sec. or more. 2. The conditions that yaw rate sensor open detect circuit signal is ON and the voltage of ECU terminal IG1 is 9.5 V to 17 V continue for 1 sec. or more. 3. The conditions that yaw rate sensor power source voltage is out of the range from 4.4 V to 5.6 V and the voltage of ECU terminal IG1 is 9.5 V to 17 V continue for 1 sec. or more. 4. When the condition that yaw rate sensor signal is momentarily open occurs 10 times or more and the voltage of ECU terminal IG1 is 9.5 V to 17 V.	★Yaw rate sensor ★Yaw rate sensor circuit
C1234 / 34	Condition 1. or 2. is detected: 1. When the conditions that yaw rate sensor VYS terminal voltage is 4.75 V to 5.25 V and YD malfunction signal of yaw rate sensor is ON continue for 5 sec. or more. 2. Shift lever is in P position and output voltage of yaw rate sensor is out of the range from 2.4 V to 2.6 V or after the difference from zero point calibration voltage of yaw rate sensor becomes 0.08 V or more and when the condition that the vehicle speed exceeds more than 9 mph (15 km/h) while output condition of yaw rate sensor is repeated more than 3 times.	

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Perform zero point calibration of the yaw rate sensor (See page DI-505).**

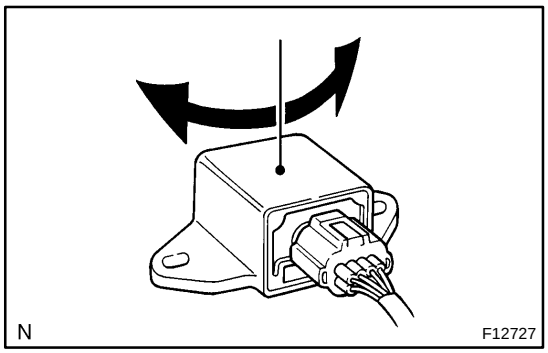
2	**Is DTC still output?**

Check the DTC on page DI-505 .

NO → **END.**

YES

3	Check output value of the yaw rate sensor.



In case of using the hand-held tester:

PREPARATION:

(a) Remove the 2 bolts and yaw rate sensor with connectors still connected.

(b) Connect the hand-held tester to the DLC3.

(c) Turn the ignition switch ON and push the hand-held tester main switch ON.

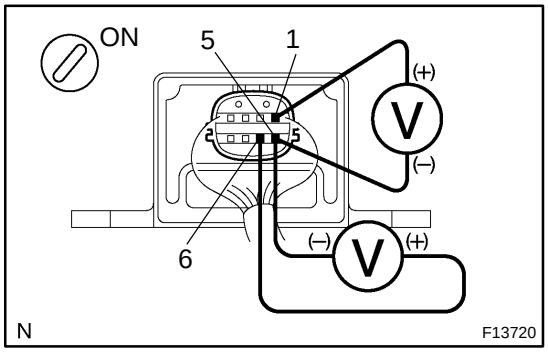
(d) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor displayed on the hand-held tester changes. Place the yaw rate sensor vertically to the ground and turn the sensor pivoted on its center.

OK:

Yaw rate value must be changing.



In case of not using the hand-held tester:

PREPARATION:

(a) Remove the yaw rate sensor with the connector still connected to it.

(b) Turn the ignition switch to ON.

CHECK:

Measure voltage between terminals YAW2 (1) - GYAW (5), and terminals YD (6) - GYAW (5) of the yaw rate sensor.

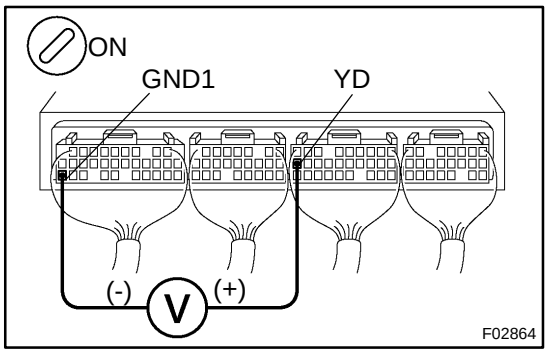
OK:

Terminals 1 and 5 (YAW2 - GYAW)	About 2.42 V to 2.58 V
Terminals 6 and 5 (YD - GYAW)	About 4.5 V to 5.3 V

NG → **Replace yaw rate sensor.**

OK

4	Check voltage between terminals YD and GND of ABS & BA & TRAC & VSC ECU.



PREPARATION:

Remove the ABS & BA & TRAC & VSC ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals YD and GND of the ABS & BA & TRAC & VSC ECU.

OK:

Voltage: 4.5 to 5.3 V

OK	Check and replace ABS & BA & TRAC & VSC ECU.

NG

5	Check for open and short circuit in harness and connector between yaw rate sensor and ABS & BA & TRAC & VSC ECU (See page IN-36).

NG	Repair or replace harness or connector.

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DIC9M-01

DTC	C1237 / 37	Tires of Different Size

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1237 / 37	Driving at more than 19 mph (30 km/h) for more than 20 seconds with 1 or 2 tires of different size 3 times continuously.	★Tire size ★Skid control ECU

INSPECTION PROCEDURE

1	Check tire size.

CHECK:

Check the size and condition of all 4 wheels.

NG → **Replace tires so that all 4 tires are of the same size.**

OK →

Check and replace skid control ECU.

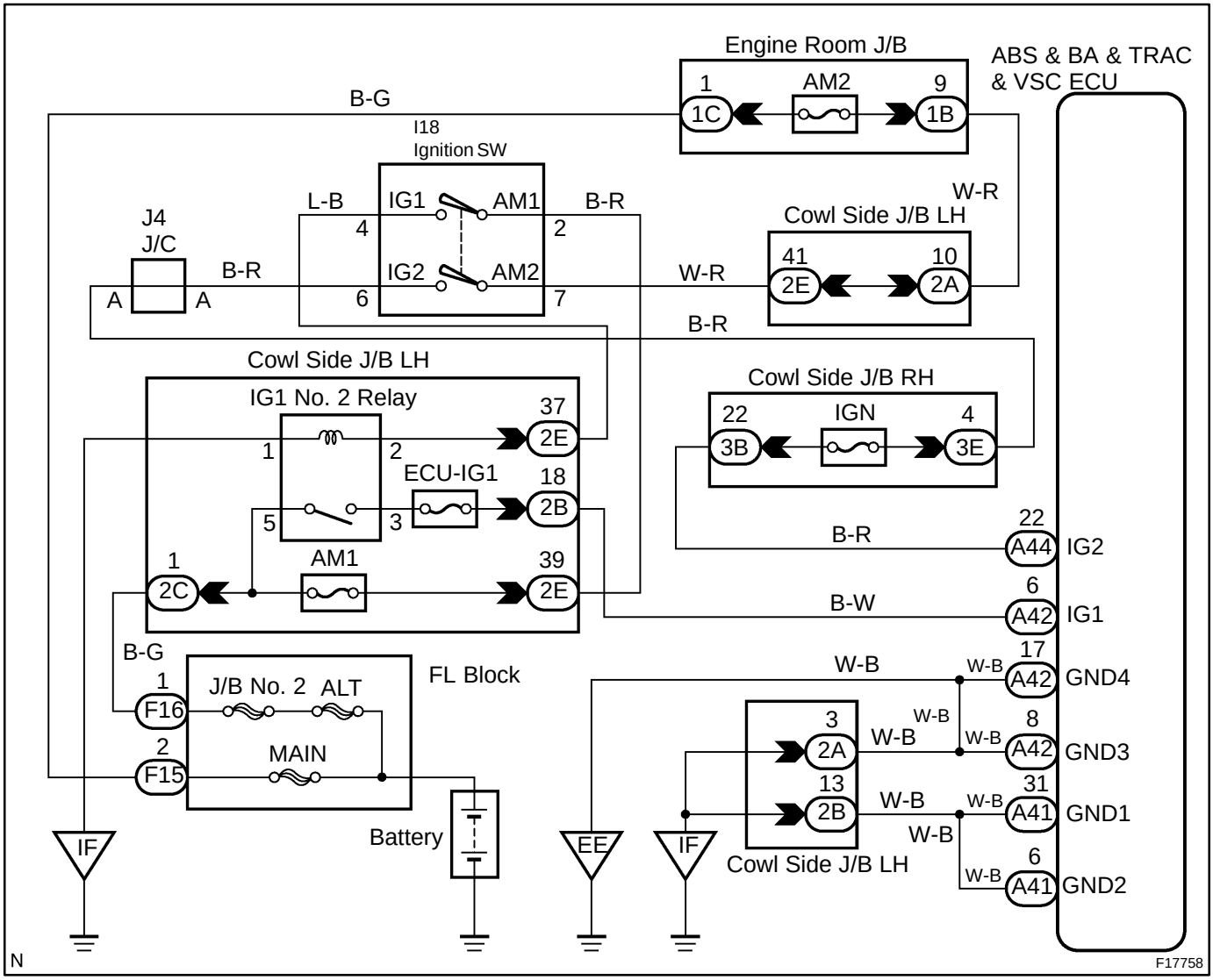
DIC9N-01

DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any of the conditions 1. through 4.: 1. Vehicle speed is 1.9 mph (3 km/h) or more and voltage of ECU terminal IG remains below 9.5 V for more than 10 sec. 2. While the condition that the solenoid relay is ON continues, ECU terminal IG1 voltage becomes 9.5 V or less, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more. 3. The condition that ECU terminal IG1 voltage is more than 17.0 V continues for 1.2 sec. or more. 4. While the solenoid relay outputs ON signal, ECU terminal IG1 voltage becomes more than 17.0 V, and the condition that the contact point of the solenoid relay is OFF continues for 0.2 sec. or more.	★Battery ★IC regulator ★Power source circuit

WIRING DIAGRAM



2004 LAND CRUISER (RM1071U)

INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

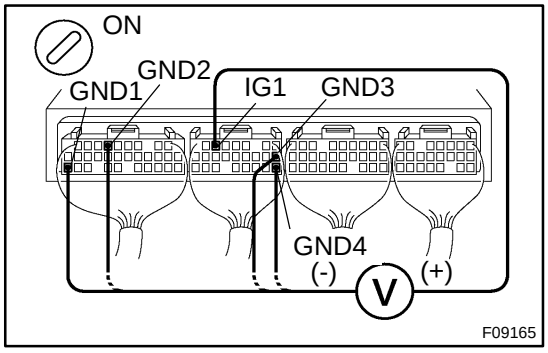
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

"Normal" is displayed.



In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals IG1 and GND of the skid control ECU connector.

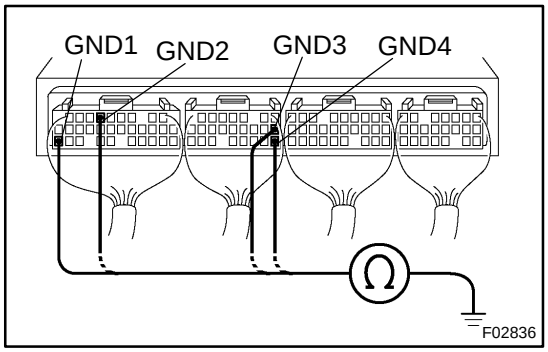
OK:

Voltage: 10 to 14 V

OK → **Turn ignition switch OFF, check and replace skid control ECU.**

NG

3	Check continuity between terminal GND of skid control ECU connector and body ground.



CHECK:

Measure resistance between terminal GND of the skid control ECU connector and body ground.

OK:

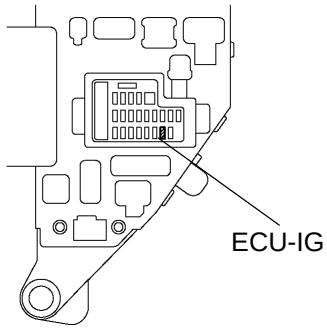
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

4	Check ECU-IG fuse.

Driver Side J/B



PREPARATION:

Remove the ECU-IG fuse from the driver side J/B.

CHECK:

Check continuity of the ECU-IG fuse.

OK:

Continuity

NG → **Check for short circuit in all the harness and components connected to ECU-IG fuse (See attached wiring diagram).**

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-36).

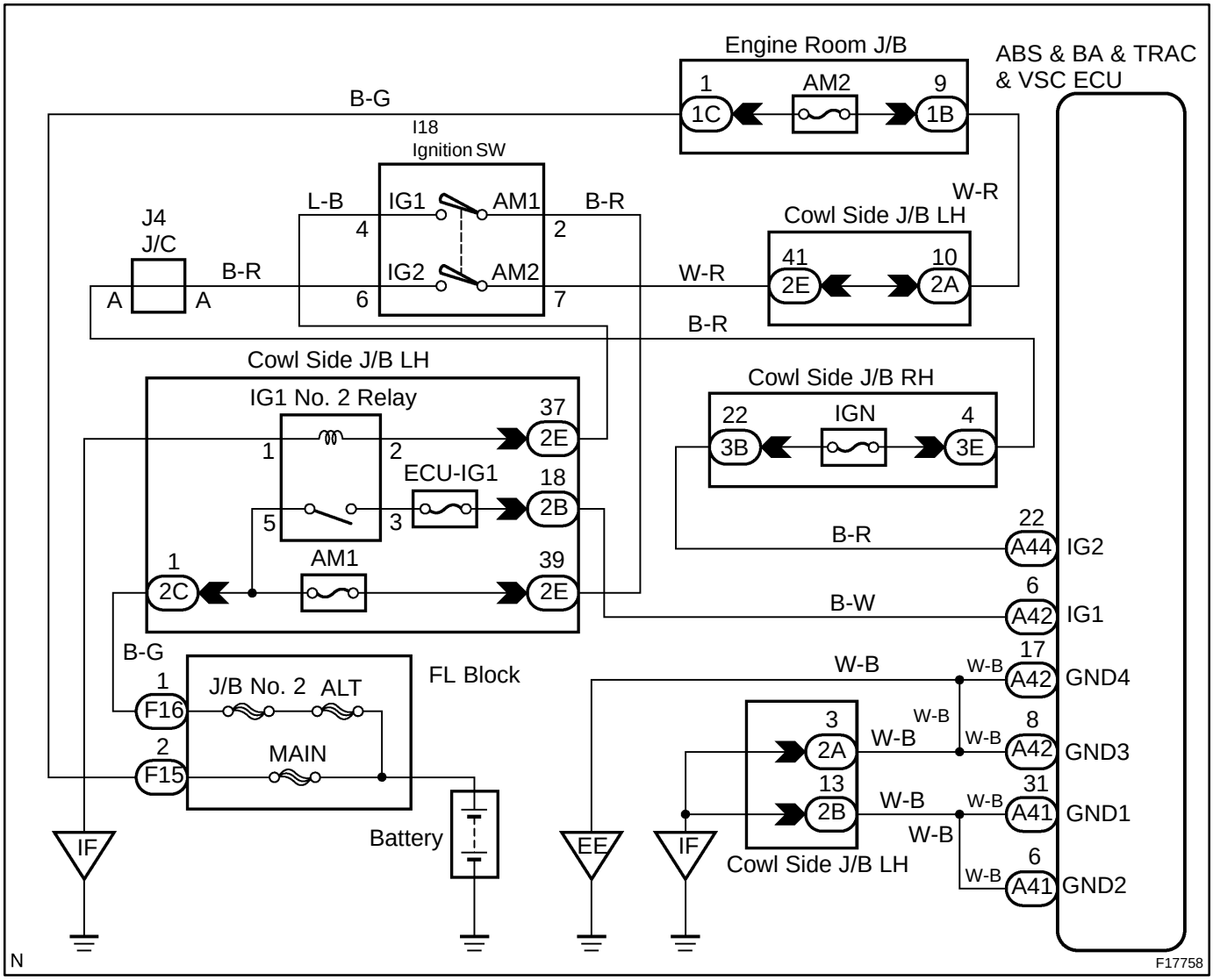
DIC9O-01

DTC	C1242 / 42	IG2 Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1242 / 42	With the vehicle running, open circuit in IG2 is detected for more than 7 sec.	★Battery ★IC regulator ★Power source circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

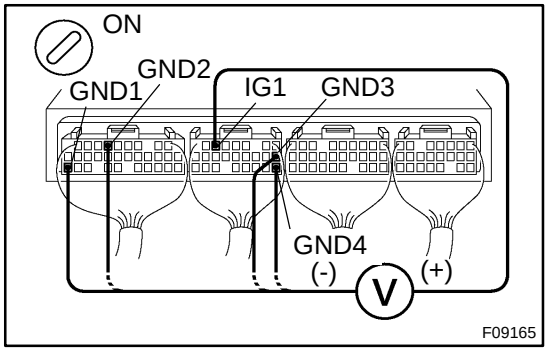
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

"Normal" is displayed.



In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG2 and GND of the skid control ECU connector.

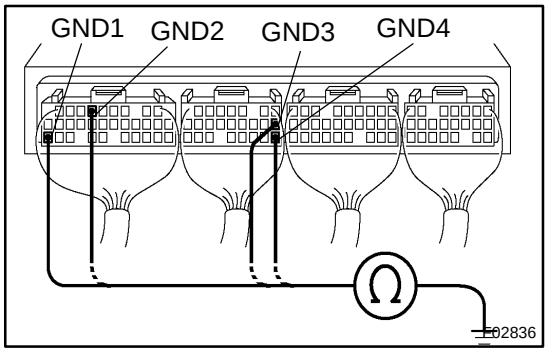
OK:

Voltage: 10 to 14 V

OK → **Turn ignition switch OFF, check and replace skid control ECU.**

NG

3	**Check continuity between terminal GND of skid control ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of the skid control ECU connector and body ground.

OK:

Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-36).

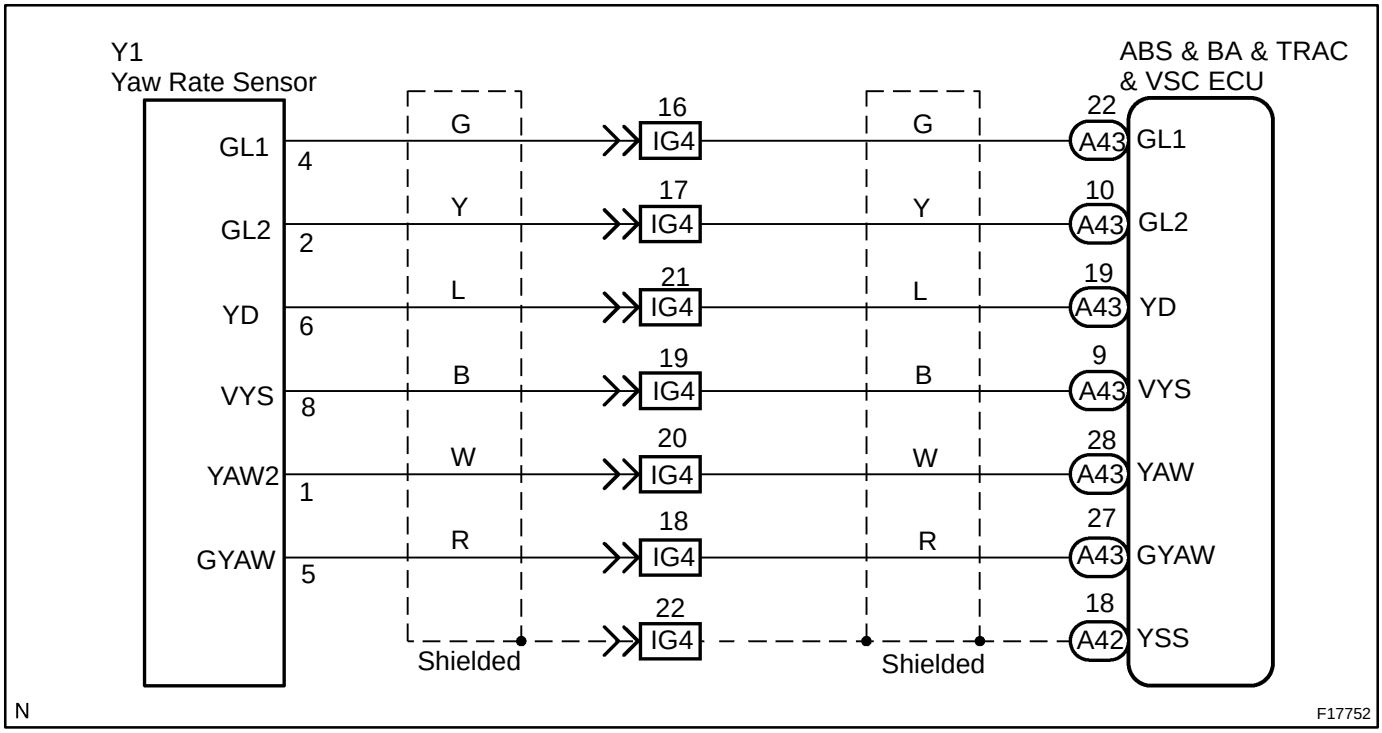
DIC9P-01

DTC	C1243 / 43, C1245 / 45	Malfunction in Deceleration Sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1243 / 43	While vehicle speed becomes 0 mph (0 km/h) from 30 km/h (18 mph), and the condition that GL1 and GL2 signals of ECU terminals did not change 40 mV or less continued in a sequence 16 times.	★Deceleration sensor ★Wire harness for deceleration sensor system
C1245 / 45	At the vehicle speed of 18 mph (30 km/h) or more, and 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 sec. or more.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the yaw rate (deceleration) sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that the deceleration value of the deceleration sensor displayed on the hand-held tester is changing when tilting the vehicle.

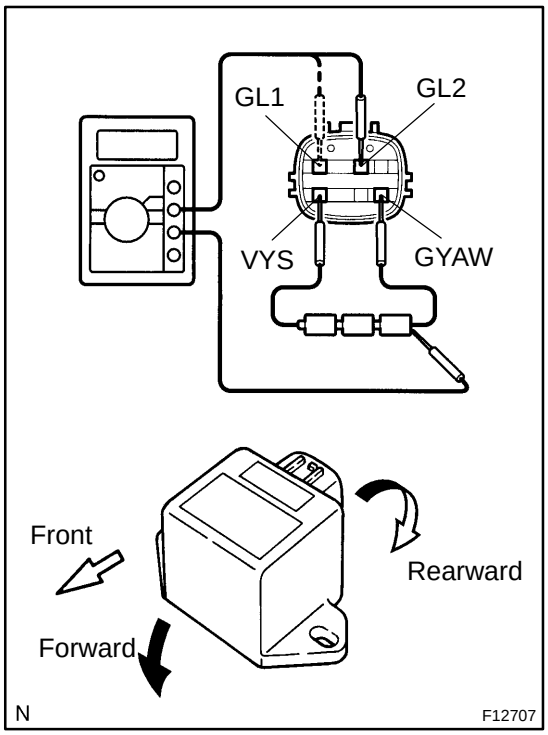
OK:

Deceleration value must be changing.

OK → **Check and replace skid control ECU.**

NG

2	Check yaw rate (deceleration) sensor.



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG → **Replace yaw rate sensor.**

OK

3	Check for open or short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

DIC9Q-01

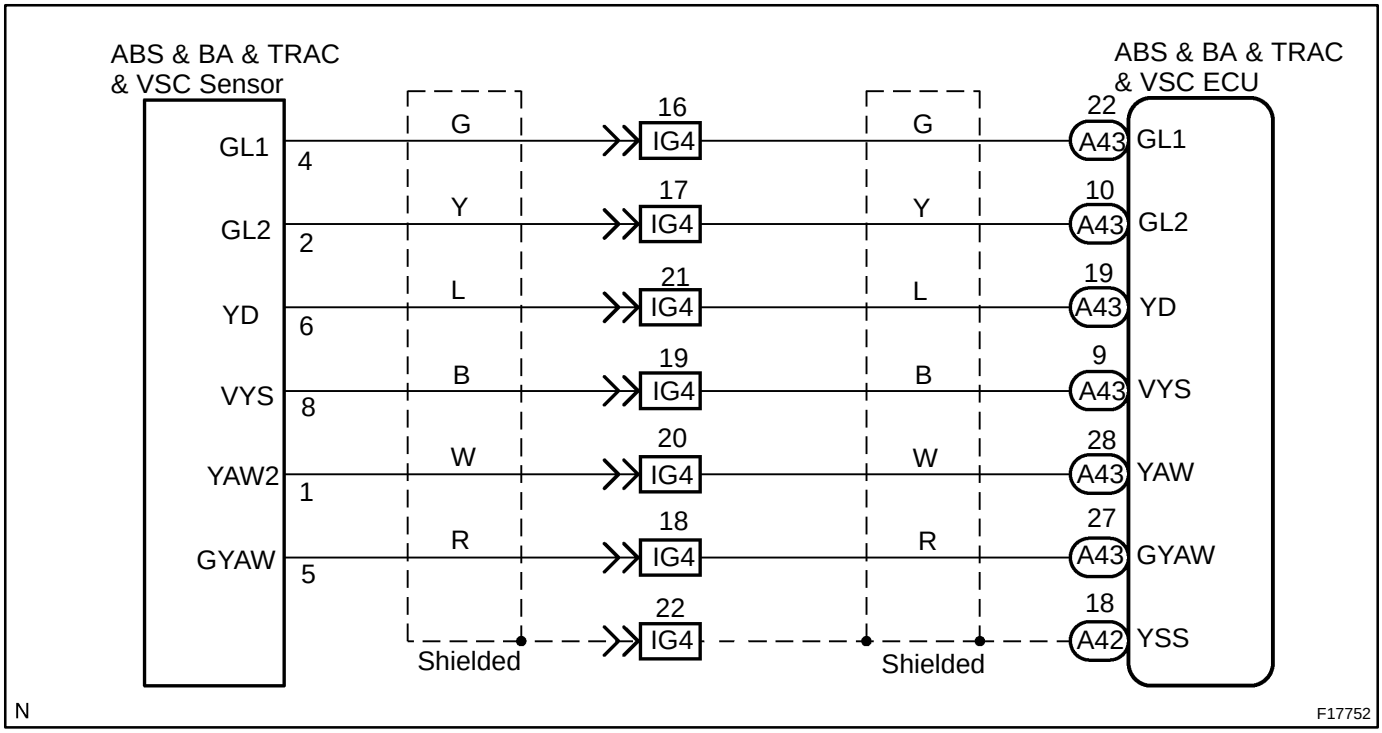
DTC	C1244 / 44	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects vehicle deceleration. The sensor signal is used in ABS & BA & TRAC & VSC control. If the sensor functions abnormally, the ABS warning light comes on.

DTC No.	DTC Detecting Condition	Trouble Area
C1244 / 44	Either of the following 1., 2., 3. or 4. is detected: 1. The condition that ECU terminals GL1 and GL2 values are -1.5 G or less or 1.5 G or more continues for 1.2 sec. or more. 2. The condition that the deceleration sensor terminal VGS voltage is 4.4 V or less or 5.6 V or more continues for 1.2 sec. or more. 3. At a vehicle speed of 0 mph (0 km/h), after the difference of output value between deceleration sensor terminals GL1 and GL2 becomes 0.6 G or more, and the condition that does not become 0.4 G or less continues for 60 sec. or more. 4. Deceleration sensor signal momentary open occurs for 7 times or more.	★Deceleration sensor ★Deceleration sensor circuit

WIRING DIAGRAM



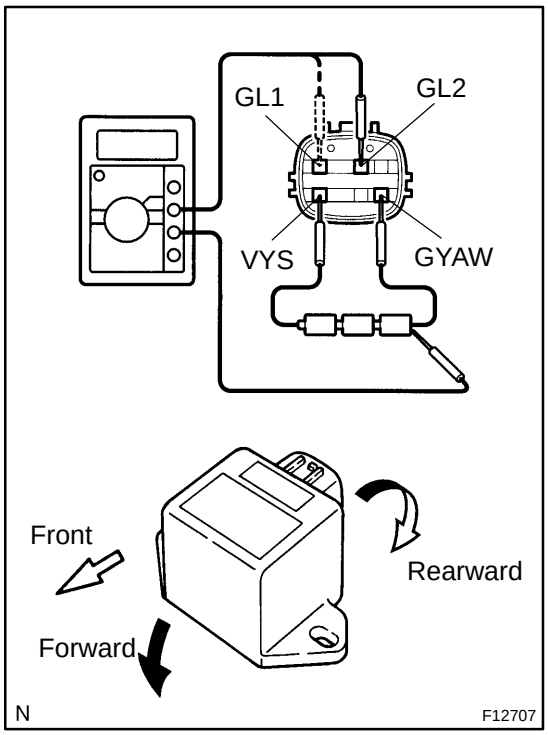
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

2	Check yaw rate (deceleration) sensor.



PREPARATION:

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VYS terminal to the batteries' positive (+) terminal, and GYAW terminal to the batteries' negative (-) terminal. Apply about 4.5 V between VYS and GYAW terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VYS and GYAW.

CHECK:

Check the output voltage of GL1 and GL2 terminals when the sensor is tilted forward and rearward.

OK:

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean rearward	1.0 V to about 2.3 V
GL1	Lean forward	About 2.3 V to 3.5 V
GL2	Horizontal	About 2.3 V
GL2	Lean rearward	About 2.3 V to 3.5 V
GL2	Lean forward	1.0 V to about 2.3 V

HINT:

★ If the sensor is tilted too much, it may show the wrong value.

★ If dropped, the sensor should be replaced with a new one.

★ The sensor removed from the vehicle should not be placed upside down.

NG → **Replace yaw rate sensor.**

OK →

Check and replace skid control ECU.

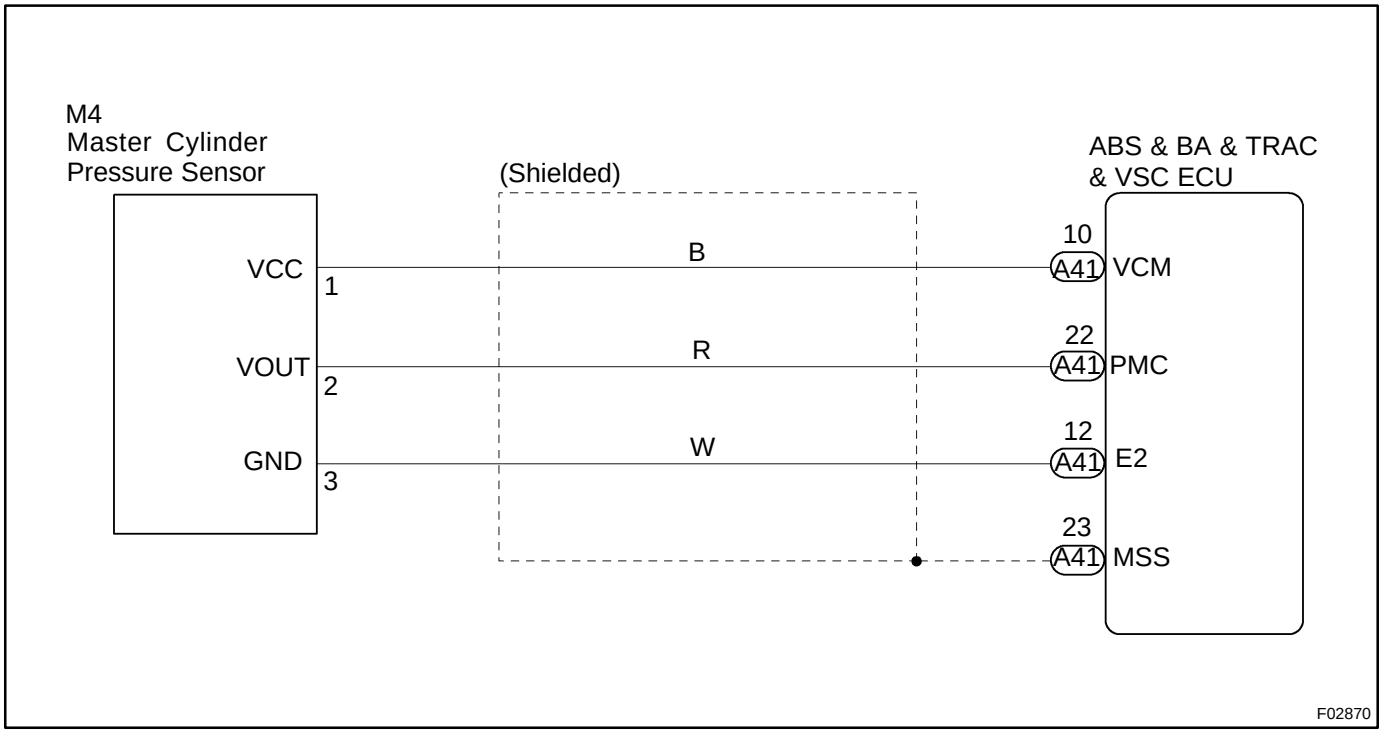
DIC9R-01

DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Either of the following 1., 2., 3., 4. or 5. is detected: 1. At a vehicle speed of 4 mph (7 km/h) or more, PMC terminal voltage does not change by more than 0.005 V once it exceeds 0.86 V continues for at least 30 secs. 2. Interference occurs to ECU terminal PMC 7 times or more for 5 sec. 3. ECU terminal STP is OFF, and the condition that terminal PMC voltage becomes more than 0.86 V or less than 0.3 V continues for 5 sec. or more. 4. The condition that ECU terminal IG1 voltage is 9.5 V to 17.0 V, and terminal VCM voltage other than the range from 4.4 V to 5.6 V continues for 1.2 sec. or more. 5. The condition that ECU terminal VCM voltage is 4.4 V to 5.6 V, and terminal PMC voltage other than the range from 0.14 V to 4.85 V continues for 1.2 sec. or more.	★Master cylinder pressure sensor ★Master cylinder pressure sensor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of the master cylinder pressure sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the hand-held tester is changing when depressing the brake pedal.

OK:

Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	**Check master cylinder pressure sensor.**

PREPARATION:

(a) Install the LSPV gauge to the front caliper bleeder plug portion, and bleed the LSPV gauge.
SST 09709-29018

(b) Remove the air cleaner inlet and battery clamp cover.

CHECK:

Start the engine and depress the brake pedal, then check the relation between the fluid pressure and voltage of PMC and E2 terminals of the skid control ECU with connectors still connected.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 Kgf/cm^2, 0 psi)	0.37 to 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 to 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 to 3.03 V

HINT:

Voltage between terminals VCM and E2: 4.7 to 5.3 V

NG → **Replace master cylinder pressure sensor.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and skid control ECU (See page IN-36).

NG → Repair or replace harness or connector.

OK →

Replace master cylinder pressure sensor.

4	Check whether or not the ECU terminal STP input voltage is changed when the stop light switch is turned on and off.

NO → Check the stop light switch circuit (See page DI-573).

YES →

Check and replace skid control ECU.

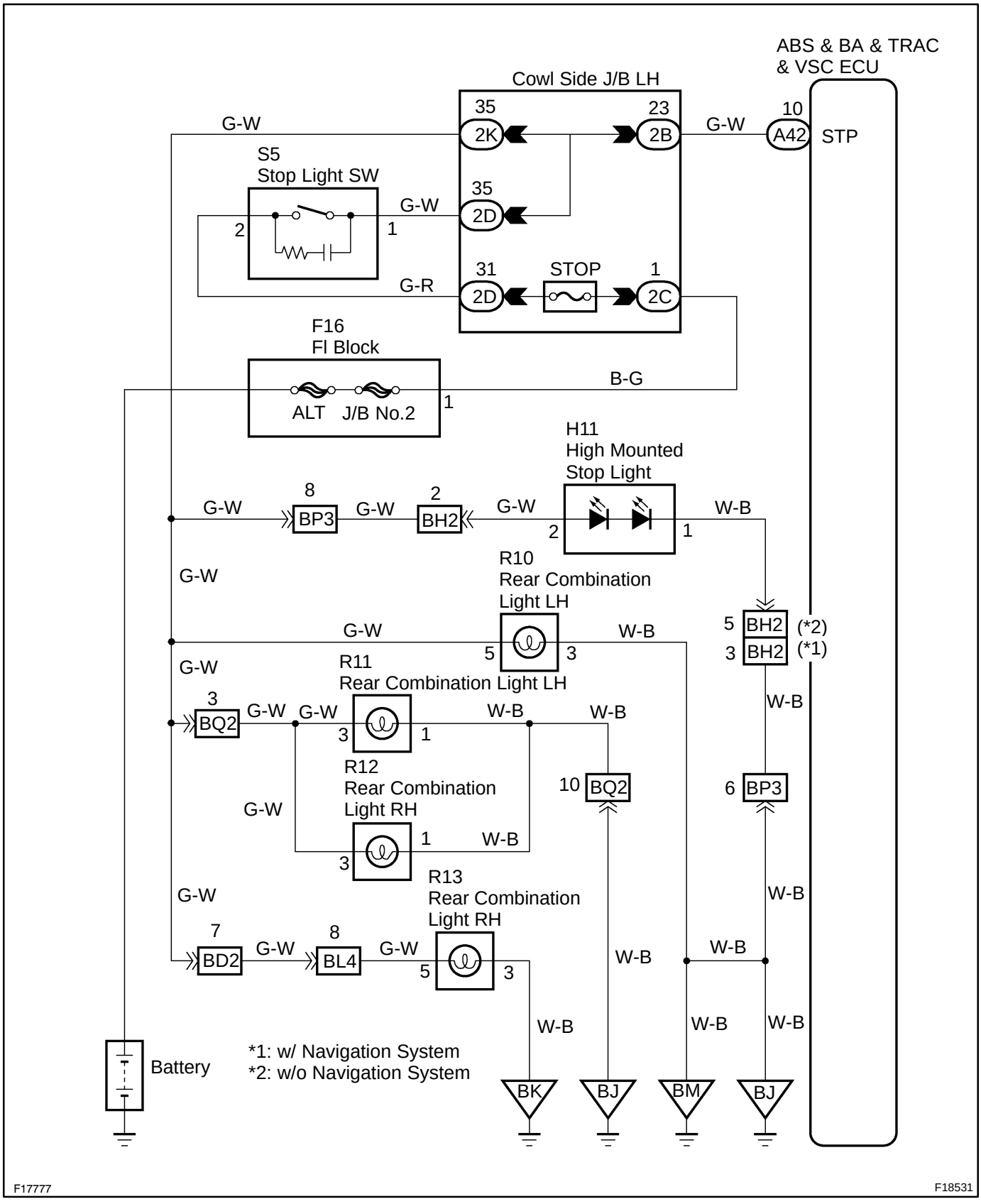
DIC9S-02

DTC	C1249 / 49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	ECU terminal IG1 voltage is 9.5 to 17.2 V, ABS is in non-operation, and an open in stop light switch circuit continues for 0.3 sec. or more.	★Stop light bulb ★Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of the stop light switch.**

CHECK:

Check that the stop light lights up when the brake pedal is depressed and goes OFF when the brake pedal is released.

OK → **Go to step 3.**

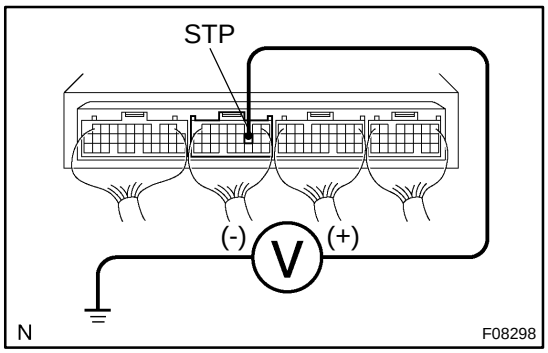
NG

2	**Check stop light circuit (See page BE-50).**

NG → **Check stop light bulb and repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

Measure voltage between terminal STP of the skid control ECU and body ground when the brake pedal is depressed.

OK:

Voltage: 10 to 14 V

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page IN-36).**

NG

4	**Check for open circuit in harness and connector between skid control ECU and stop light switch (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

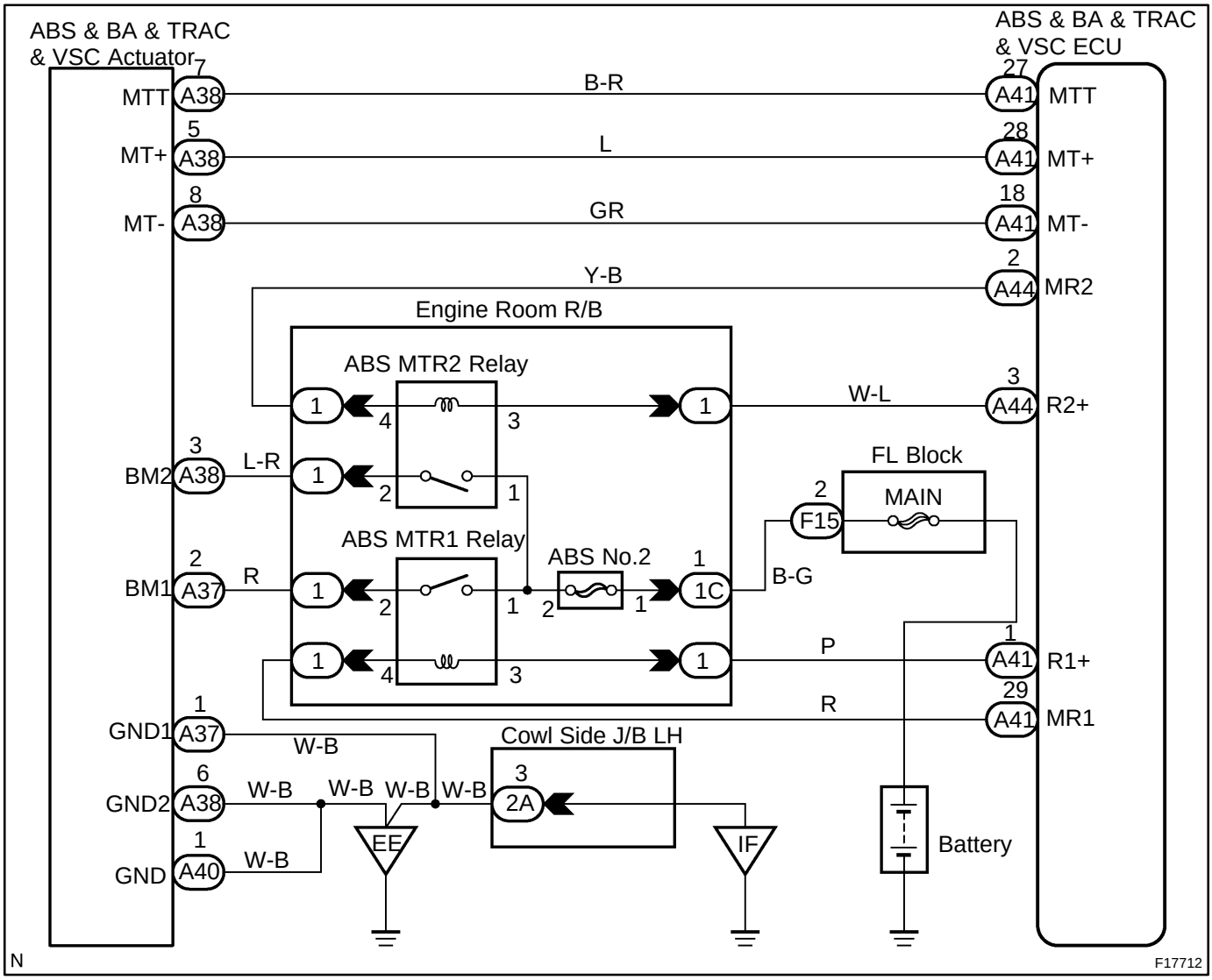
DIC9T-02

DTC	C1251 / 51	Hydraulic Brake Booster Pump Motor Malfunction

CIRCUIT DESCRIPTION

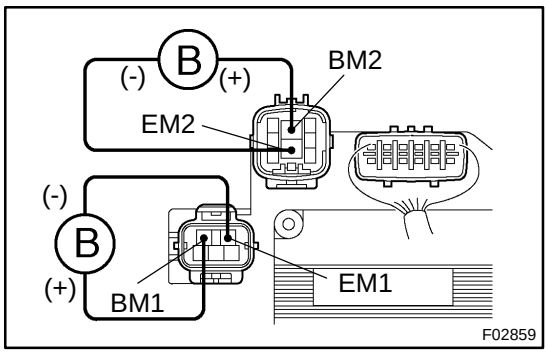
DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Either of the following 1. or 2. is detected: 1. After turning the ignition switch ON, the current of more than 30 A flows to the motor for more than 1 sec. 2. After turning the ignition switch ON, less than 7 A change in current is detected more than 3 times in a row when the motor is ON.	Hydraulic brake booster pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of hydraulic brake booster pump motor.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect the battery positive ± lead to terminal BM1 or BM2 and the battery negative ≧ lead to terminal EM1 or EM2 of the hydraulic brake booster (pump motor) connector.

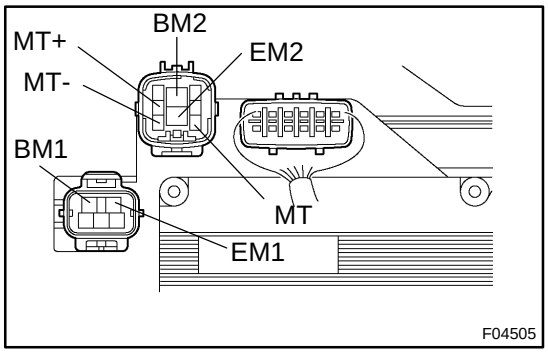
OK:

The operation sound of the pump motor should be heard.

NG	Go to step 4.

OK

2	Check hydraulic brake booster resistance.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Check resistance between terminals MT+ and MT-, BM1 and MT, BM2 and MT, EM1 and MT+, EM2 and MT+ of the hydraulic brake booster connector.

OK:

30 to 36 Ω

NG	Replace the hydraulic brake booster assembly.

OK

3	Check for open circuit in harness and connector between hydraulic brake booster (MT+, MT-) and skid control ECU (See page IN-36).

NG → Repair or replace harness or connector.

OK →

Check and replace skid control ECU.

4	Check for open or short circuit in harness and connector between hydraulic brake booster and skid control ECU (See page IN-36).

NG → Replace wire harness.

OK →

5	Check hydraulic brake booster pump motor (See page BR-64).

NG → Replace hydraulic brake booster pump motor.

OK →

Replace hydraulic brake booster.

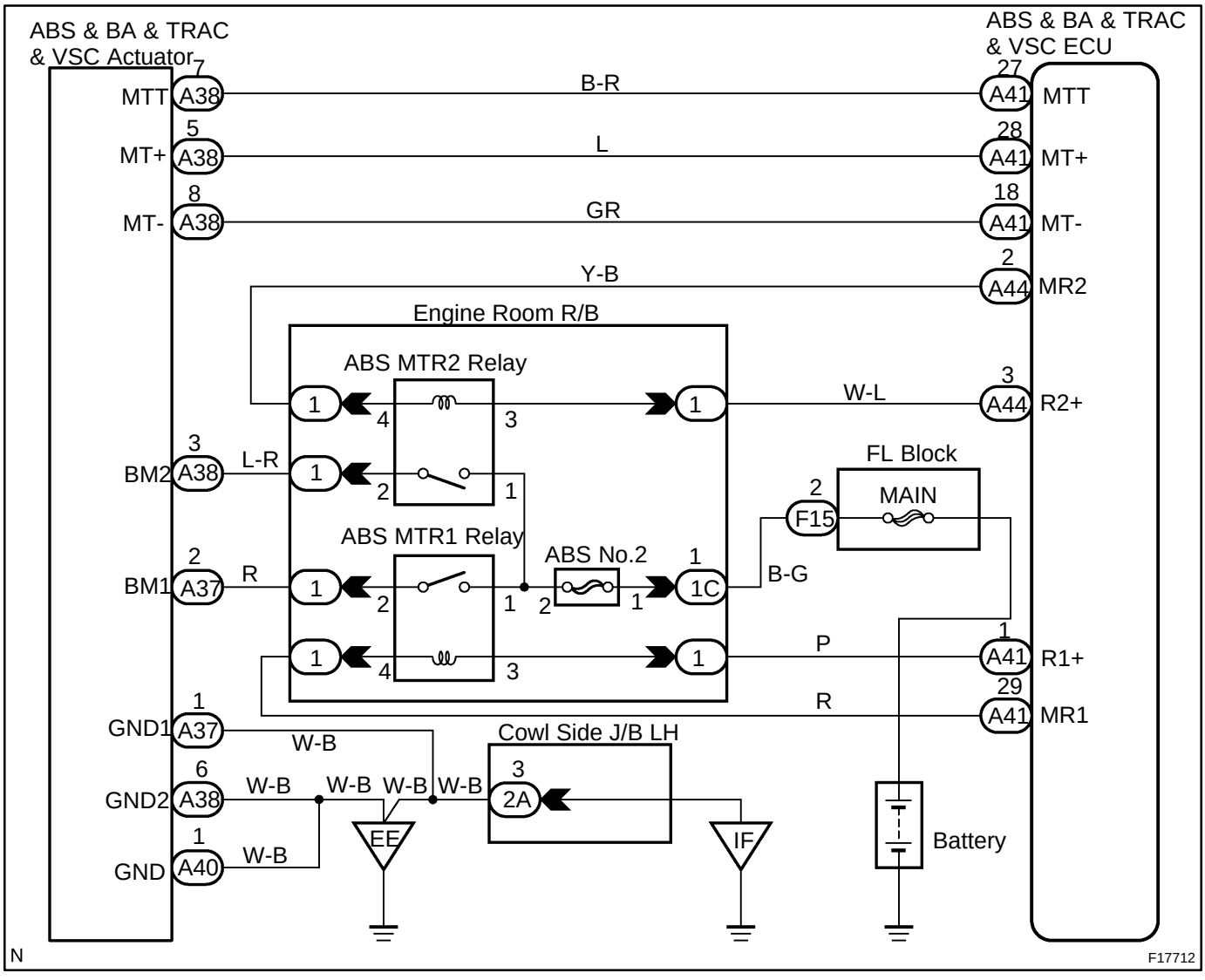
DIC9U-02

DTC	C1252 / 52	Hydraulic Brake Booster Pump Motor ON Time Abnormally Long

CIRCUIT DESCRIPTION

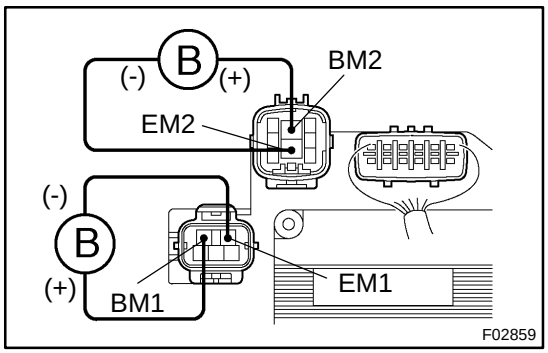
DTC No.	DTC Detecting Condition	Trouble Area
C1252 / 52	After the ignition switch is turned ON, the power is supplied to the pump motor for more than 5 minutes.	★Hydraulic brake booster pump motor ★Hydraulic brake booster pump motor circuit ★Pressure switch (PH or PL)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of hydraulic brake booster pump motor.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect the battery positive ± lead to terminal BM1 or BM2 and the battery negative ≧ lead to terminal EM1 or EM2 of the hydraulic brake booster (pump motor) connector.

OK:

The operation sound of the pump motor should be heard.

NG → **Go to step 9.**

OK

2	**Check for short circuit (to B+) in harness and connector between BM1 or BM2 of hydraulic brake booster and ABS motor 1 relay or ABS motor 2 relay (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

3	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

4	**Check pressure switch (PH).**

In case of using the hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF, then turn the ignition switch ON and check the pressure switch (PH) condition.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

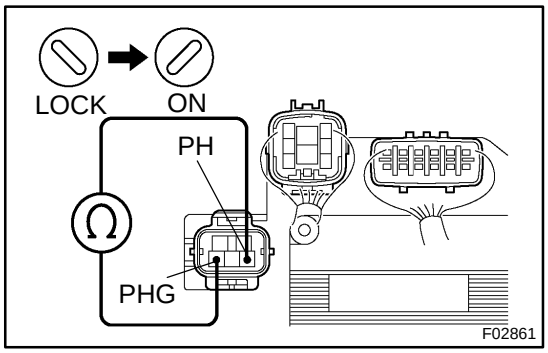
OK:

"OFF" turns to "ON".

HINT:

OFF: Low pressure

ON: High pressure



In case of not using the hand-held tester:

PREPARATION:

(a) Disconnect the connector (5P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

PREPARATION:

(a) Connect the connector (5P) to the hydraulic brake booster.

(b) Disconnect the connector (5P) after the ignition switch is turned ON and the pump motor is stopped.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 0 Ω

HINT:

After inspection, connect the connector and clear the DTC (See page DI-505).

NG	**Replace hydraulic brake booster assembly.**

OK

5	**Check pressure switch (PL).**

In case of using hand-held tester:

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Depress the brake pedal more than 40 times with the ignition switch OFF, then turn the ignition switch ON and check the pressure switch (PL) condition.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

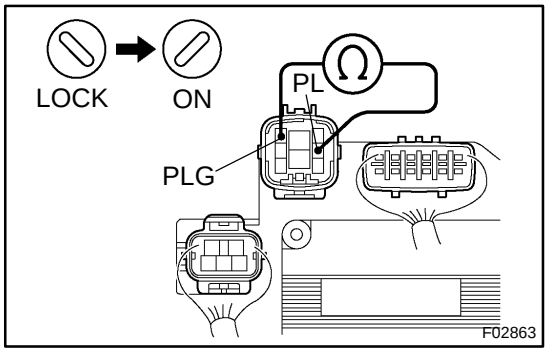
OK:

"OFF" turns to "ON".

HINT:

OFF: Low pressure

ON: High pressure



In case of not using hand-held tester:

PREPARATION:

(a) Disconnect the connector (8P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

Resistance: 5.7 kΩ

PREPARATION:

(a) Connect the connector (8P) to the hydraulic brake booster.

(b) Disconnect the connector (8P) after the ignition switch is turned ON and the pump motor is stopped.

CHECK:

Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

Resistance: 1.0 kΩ

HINT:
After inspection, connect the connector and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

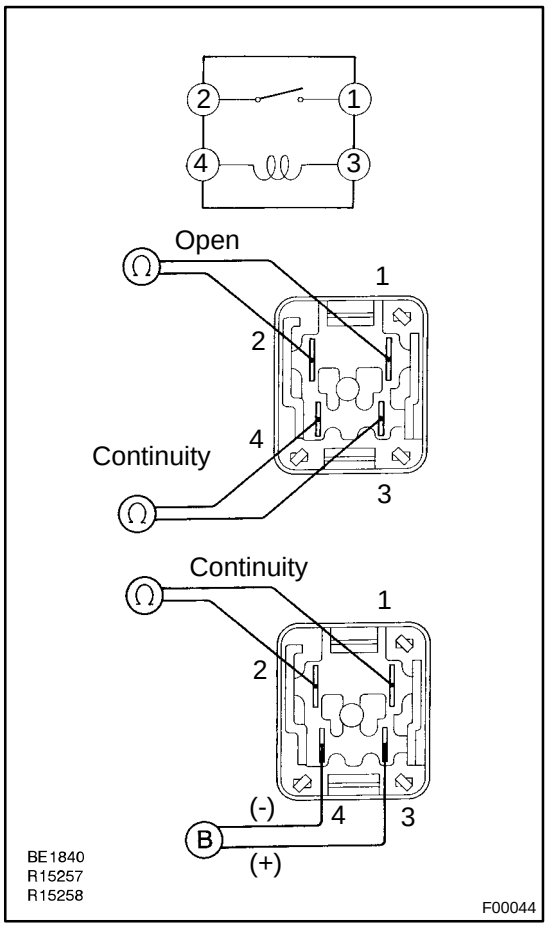
OK

6	**Check for short circuit (to B+) in harness and connector between pressure switch and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

7	**Check ABS motor 1 relay and ABS motor 2 relay.**



PREPARATION:
Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

CHECK:
Check continuity between the motor relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

*1: ABS motor 1 relay: 54 Ω
ABS motor 2 relay: 62 Ω

CHECK:
(a) Apply battery positive voltage between terminals 3 and 4.
(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → Replace ABS motor 1 relay or ABS motor 2 relay.

OK

8	Check for short circuit in harness and connector between ABS motor 1 relay or ABS motor 2 relay and skid control ECU (See page IN-36).

NG → Repair or replace harness or connector.

OK

Check and replace skid control ECU.

9	Check for open or short circuit in harness and connector between hydraulic brake booster and skid control ECU (See page IN-36).

NG → Replace wire harness.

OK

10	Check hydraulic brake booster pump motor (See page BR-64).

NG → Replace hydraulic brake booster pump motor.

OK

Replace hydraulic brake booster.

DIC9V-02

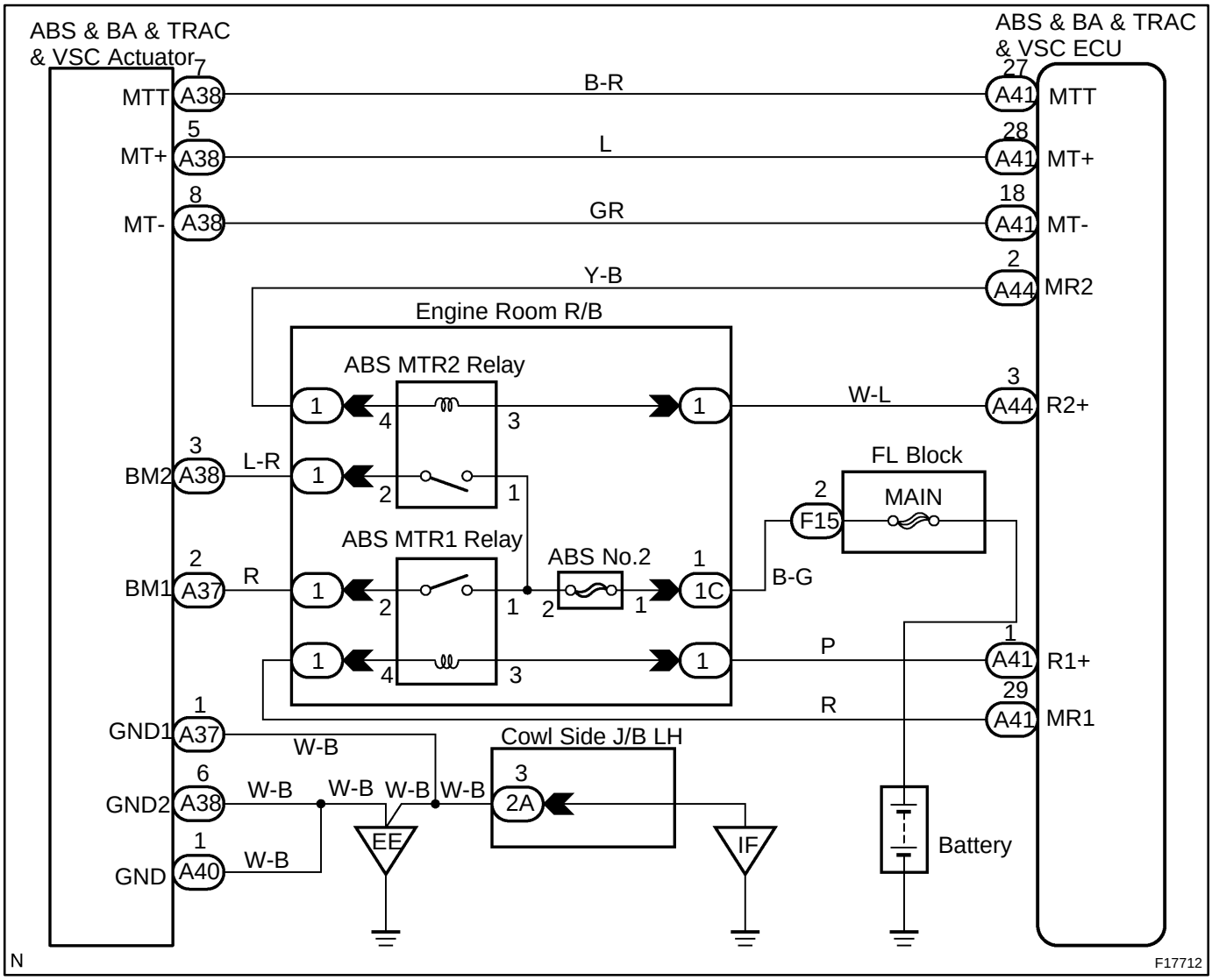
DTC	C1253 / 53	Motor Relay Circuit

CIRCUIT DESCRIPTION

The ABS motor 1 relay and ABS motor 2 relay supply power to the hydraulic brake booster pump motor. While the ABS & BA & TRAC & VSC are activated, the ECU switches the motor relay ON and operates the hydraulic brake booster pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C1253 / 53	When any of the following 1. through 4. is detected: 1. After turning the ignition switch ON, open in the relay coil is detected for more than 1 sec. 2. When the pressure switch does not control motor driving, the condition that the motor relay is always ON continues for more than 1 sec. due to short circuit. 3. When the pressure switch (PH) detects the low pressure or while the pump motor operates to increase the pressure, the condition that the motor relay does not turn ON continues for more than 0.2 sec. 4. When pressure switch does not control motor driving, the condition that the motor relay is always ON due to the welded contact continues for more than 2 sec.	★ABS motor 1 or ABS motor 2 relay ★ABS motor 1 or ABS motor 2 relay circuit ★Hydraulic brake booster pump motor circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1, in case of using the hand-held tester and start from step 3, in case of not using hand-held tester.

1	**Check ABS motor 1 and ABS motor 2 relay operation.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check the operation sound of the ABS motor relays individually when operating it with the hand-held tester.

OK:

The operation sound of the ABS motor 1 relay and ABS motor 2 relay should be heard.

NG → **Go to step 3.**

OK

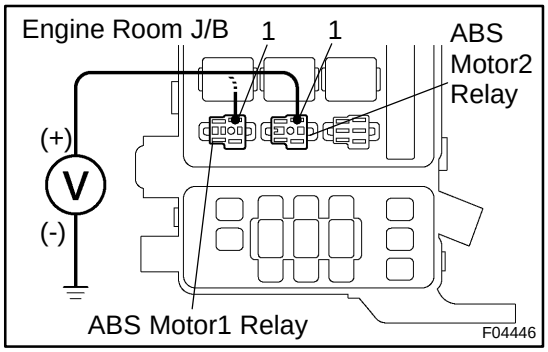
2	**Check for short circuit (to B+) in harness and connector between MT of hydraulic brake booster and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

3	**Check voltage between terminal 1 of engine room J/B (for ABS motor 1 relay and ABS motor 2 relay) and body ground.**



PREPARATION:

Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

CHECK:

Measure voltage between terminal 1 of the engine room J/B (for ABS motor 1 relay and ABS motor 2 relay) and body ground.

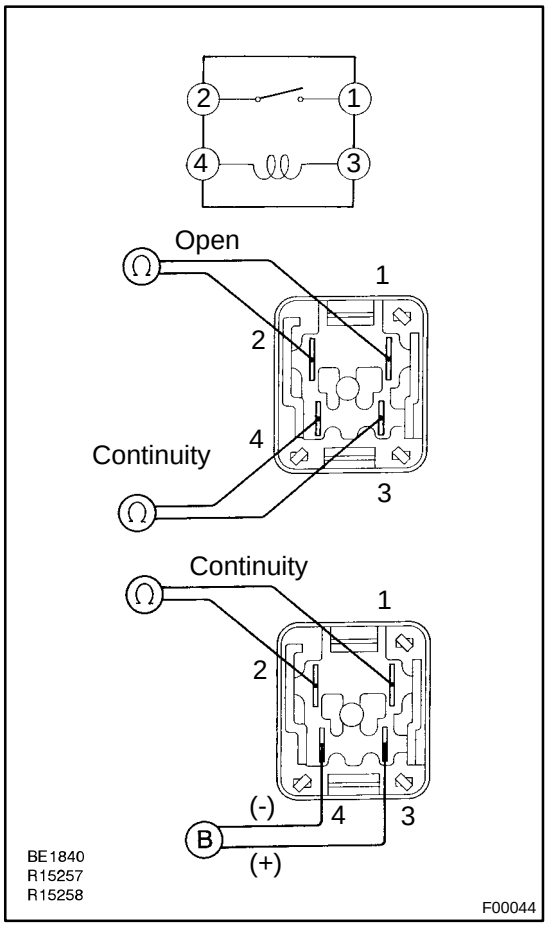
OK:

Voltage: 10 to 14 V

NG → **Check and repair harness or connector.**

OK

4	**Check ABS motor 1 relay and ABS motor 2 relay.**



PREPARATION:

Remove the ABS motor 1 relay and ABS motor 2 relay from the engine room J/B.

CHECK:

Check continuity between the motor relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity (Reference value *1)
Terminals 1 and 2	Open

*1: ABS motor 1 relay: 54 Ω
ABS motor 2 relay: 62 Ω

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

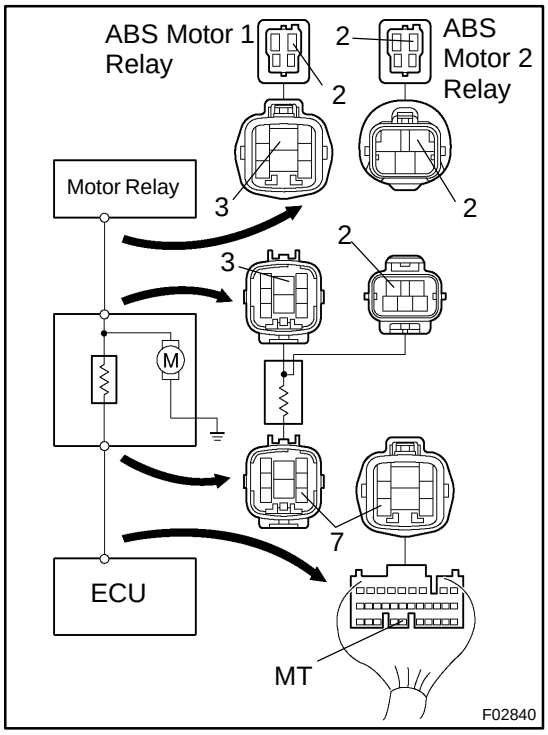
OK:

Terminals 1 and 2	Continuity

NG	**Replace ABS motor 1 relay or ABS motor 2 relay.**

OK

5	**Check continuity between terminal MT of the ABS & BA & TRAC & VSC ECU and terminals BM1 and BM2, respectively.**



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

(a) Check continuity between terminal BM1 of the ABS motor 2 relay and terminal MT of the ABS & BA & TRAC & VSC ECU.

(b) Check continuity between terminal BM2 of the ABS motor 1 relay and terminal MT of the ABS & BA & TRAC & VSC ECU.

OK:

Continuity

HINT:

There is resistance of 33 ± 3 Ω between terminal BM1or BM2 and MT of the hydraulic brake booster.

NG	**Repair or replace harness, connector or hydraulic brake booster.**

OK

6	**Check for open and short circuit in harness and connector between ABS motor1 and ABS motor2 relay and ABS & BA & TRAC & VSC ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

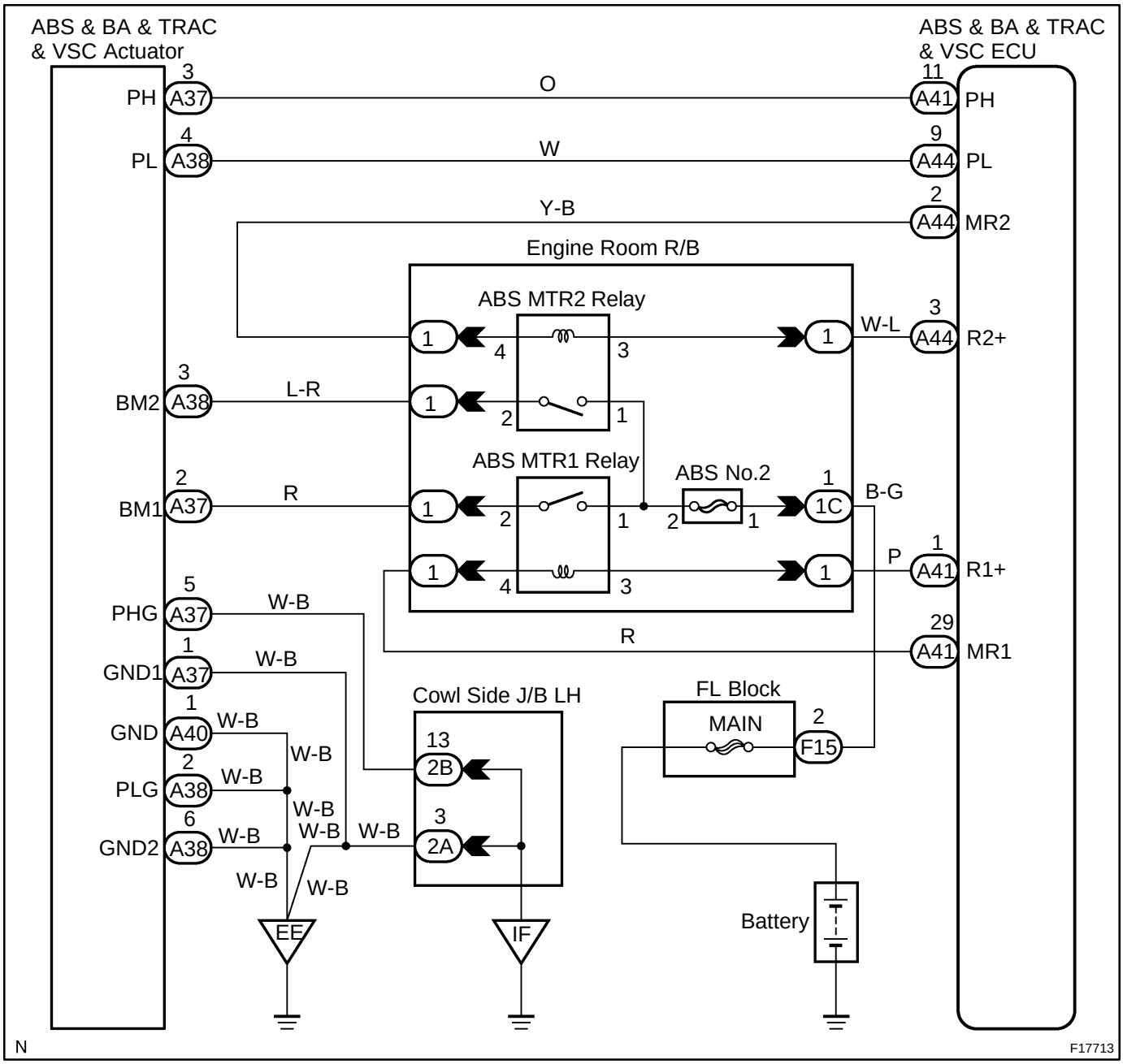
DIC9W-01

DTC	C1254 / 54	Pressure Switch Circuit

CIRCUIT DESCRIPTION

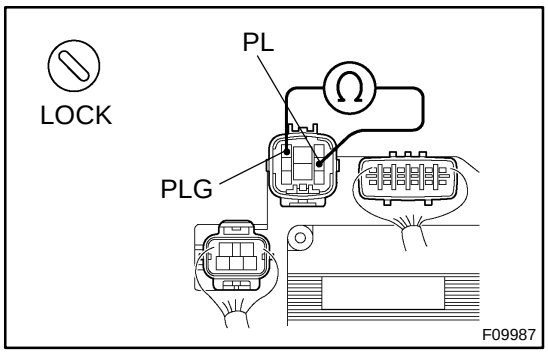
DTC No.	DTC Detecting Condition	Trouble Area
C1254 / 54	Either of the following 1. or 2. is detected: 1. After turning the ignition switch ON, short or open circuit in pressure switch (PL) continued for more than 1 sec. 2. After turning the ignition switch ON, open in pressure switch (PH) continued for more than 1 sec.	★Pressure switch (PH or PL) ★Pressure switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check pressure switch (PL) resistance.**



PREPARATION:

(a) Disconnect the connector (8P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PL and PLG of the hydraulic brake booster connector.

OK:

Resistance: 5.1 to 6.3 kΩ

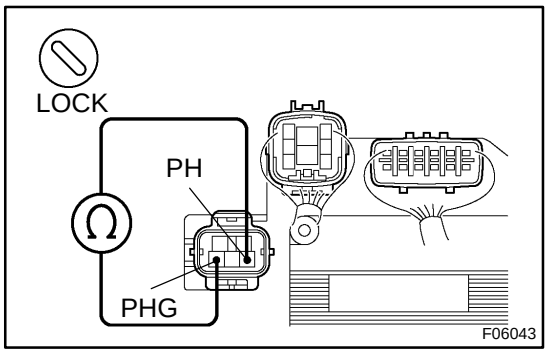
HINT:

After inspection, connect the connector and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

OK

2	Check pressure switch (PH) resistance.



PREPARATION:

(a) Disconnect the connector (5P) from the hydraulic brake booster.

(b) With the ignition switch OFF, depress the brake pedal more than 40 times to decrease the accumulator pressure.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

CHECK:

Measure resistance between terminals PH and PHG of the hydraulic brake booster connector.

OK:

Resistance: 0.9 to 1.1 kΩ

HINT:

After inspection, connect the connector and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

OK

3	Check for open and short circuit in harness and connector between pressure switch and skid control ECU (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

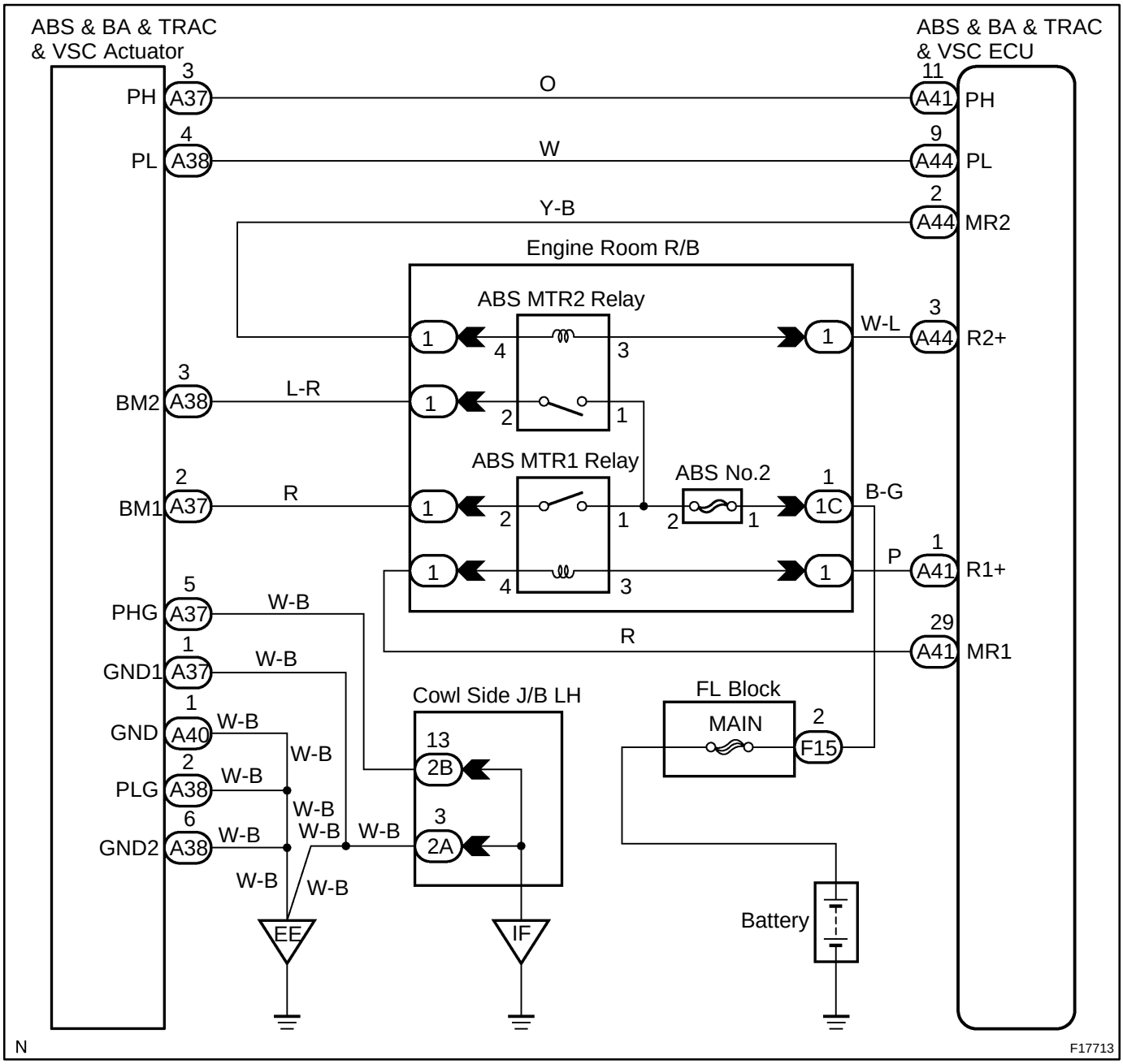
DIC9X-02

DTC	C1256 / 56	Accumulator Low Pressure Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1256 / 56	Any of the following 1. through 7. is detected: 1. With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS, TRAC or VSC does not control, the pressure switch (PL) detects low pressure for more than 1.4 sec. 2. With the vehicle running, when the pressure switch (PL) detects high pressure, although ABS, TRAC or VSC controls, the pressure switch (PL) detects low pressure for more than 0.2 sec. 3. After the ignition switch is turned ON, the pressure switch (PL) detects low pressure for more than 64 sec. 4. With the vehicle running, after ignition switch has been ON, the pressure switch (PL) detects low pressure for more than 0.2 sec. although ABS, TRAC, or VSC does not control and when the pressure switch is ON and stuck under high pressure. 5. With the vehicle running, after ignition switch is ON, the pressure switch (PL) detects low pressure for more than 0.2 sec. when ABS, TRAC or VSC controls, the pressure switch is ON and stuck under high pressure. 6. With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck to under low pressure although ABS, TRAC or VSC does not control for more than 1.4 sec. 7. With the vehicle running, after ignition switch is ON, the pressure switch (PL) is stuck under low pressure when ABS, TRAC or VSC controls for more than 0.2 sec.	★Accumulator ★Pressure switch (PH or PL) ★Hydraulic brake booster pump motor

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check accumulator operation.

PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

SST 09709-29018

CHECK:

Depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear brake caliper pressure when an increase of pressure changes from acutely to mildly.

OK:

5,099 to 8,924 kPa (52 to 91 kgf/cm^2, 740 to 1,294 psi) at 20˚C (68˚F)

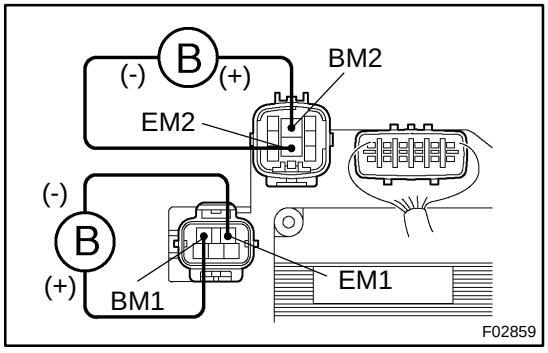
HINT:

If the value is not within the standard, cool the engine room and check it again.

NG → **Replace accumulator.**

OK

2	Check operation of hydraulic brake booster pump motor.



PREPARATION:

Disconnect the 2 connectors from the hydraulic brake booster.

CHECK:

Connect the battery positive ± lead to BM1 or BM2 terminal and the battery negative ≧ lead to EM1 or EM2 terminal of the hydraulic brake booster (pump motor) connector.

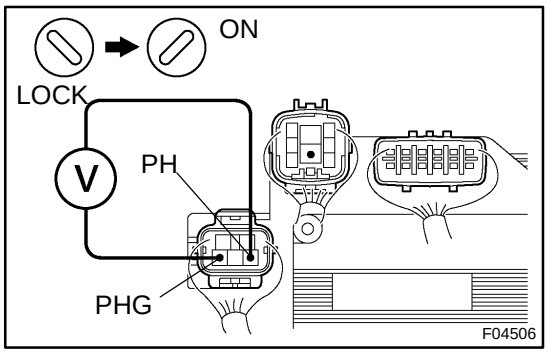
OK:

The operation sound of the pump motor should be heard.

NG → **Go to step 7.**

OK

3	Check pressure switch (PH) operation.



PREPARATION:

(a) Turn the ignition switch OFF, and depress the brake pedal 40 times or more.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

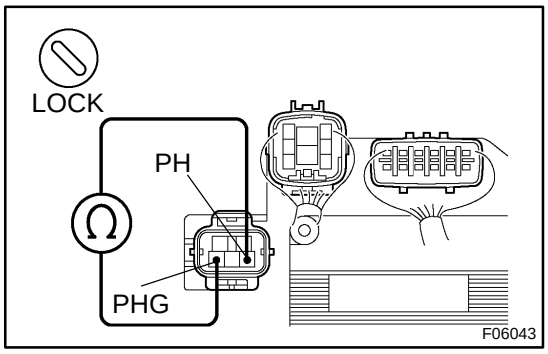
SST 09709-29018

CHECK:

While checking the voltage between terminals PH and PHG of the hydraulic brake booster, depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when voltage changes from 6 V to 0 V.

OK:

12,553 to 20,104 kpa (128 to 205 kgf·cm^2, 1,820 to 2,916 psi)



PREPARATION:

Turn the ignition switch OFF and disconnect the connector (5P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PH and PHG, depress the brake pedal changing the force in a range of 197 N (20 kgf, 44 lbf) to 294 N (30 kgf, 66 lbf) and check the rear wheel cylinder pressure when resistance changes from 0 kΩ to 1 kΩ between PH and PHG.

OK:

11,964 to 18,240 kpa (122 to 186 kgf·cm^2, 1,735 to 2,645 psi)

HINT:

After inspection, connect the connector, fill brake reservoir with brake fluid and clear the DTC (See page DI-505).

OK	Go to step 5.

NG

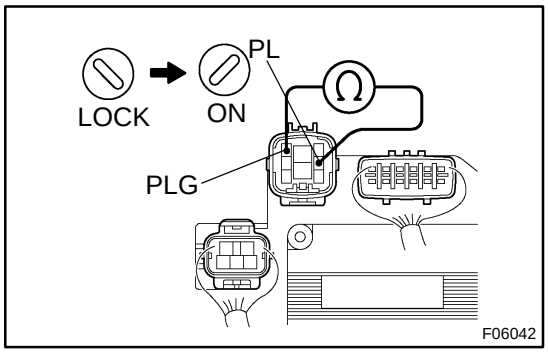
4	**Check for open circuit in harness and connector between pressure switch (PH) and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace hydraulic brake booster assembly.

5	**Check pressure switch (PL) operation.**



PREPARATION:

(a) Turn the motor switch OFF, and depress the brake pedal 40 times or more.

HINT:

When pressure in the power supply system is released, reaction force becomes light and stroke becomes longer.

(b) Install the LSPV gauge (SST) to the rear brake caliper and bleed air.

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(c) Disconnect the connector (8P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PL and PLG of the hydraulic brake booster, depress the brake pedal with a force of more than 294 N (30 kgf, 66 lbf) and turn the ignition switch ON, then check the rear wheel cylinder pressure when the resistance changes from 5.7 kΩ to 1.0 kΩ.

OK:

9,022 to 15,102 kpa (92 to 154 kgf·cm^2, 1,308 to 2,190 psi)

PREPARATION:

Turn the ignition switch OFF and disconnect the connector (8P) from the hydraulic brake booster.

CHECK:

While checking the resistance between terminals PL and PLG of the hydraulic brake booster, depress the brake pedal changing the force in a range of 197 N (20 kgf, 44 lbf) to 294 N (30 kgf, 66 lbf) and check the rear wheel cylinder pressure when resistance changes from 1.0 kΩ to 5.7 kΩ.

OK:

8,532 to 13,337 kpa (87 to 136 kgf·cm^2, 1,237 to 1,934 psi)

HINT:
After inspection, connect the connector, fill brake reservoir with brake fluid and clear the DTC (See page DI-505).

NG → **Replace hydraulic brake booster assembly.**

OK

6	**Check pressure switch (PH) and pressure switch (PL)**

CHECK:
Compare the pressure value of the rear wheel cylinder measured in check pressure switch (PL) operation with the one measured in check pressure switch (PH) operation.

OK:

★ **Pressure when the voltage between PH and PHG becomes 6 to 0 V > pressure when the resistance between PL and PLG becomes 5.7 kΩ to 1.0 kΩ.**

★ **Pressure when the resistance between PH and PHG becomes 0 kΩ to 1 kΩ > pressure when the resistance between PL and PLG becomes 1.0 kΩ to 5.7 kΩ.**

NG → **Replace hydraulic brake booster assembly.**

OK

Check and replace skid control ECU.

7	**Check for open or short circuit in harness and connector between hydraulic brake booster pump motor and hydraulic brake booster (See page IN-36).**

NG → **Replace wire harness.**

OK

8	**Check hydraulic brake booster pump motor (See page BR-64).**

NG → **Replace hydraulic brake booster pump motor.**

OK

Replace hydraulic brake booster.

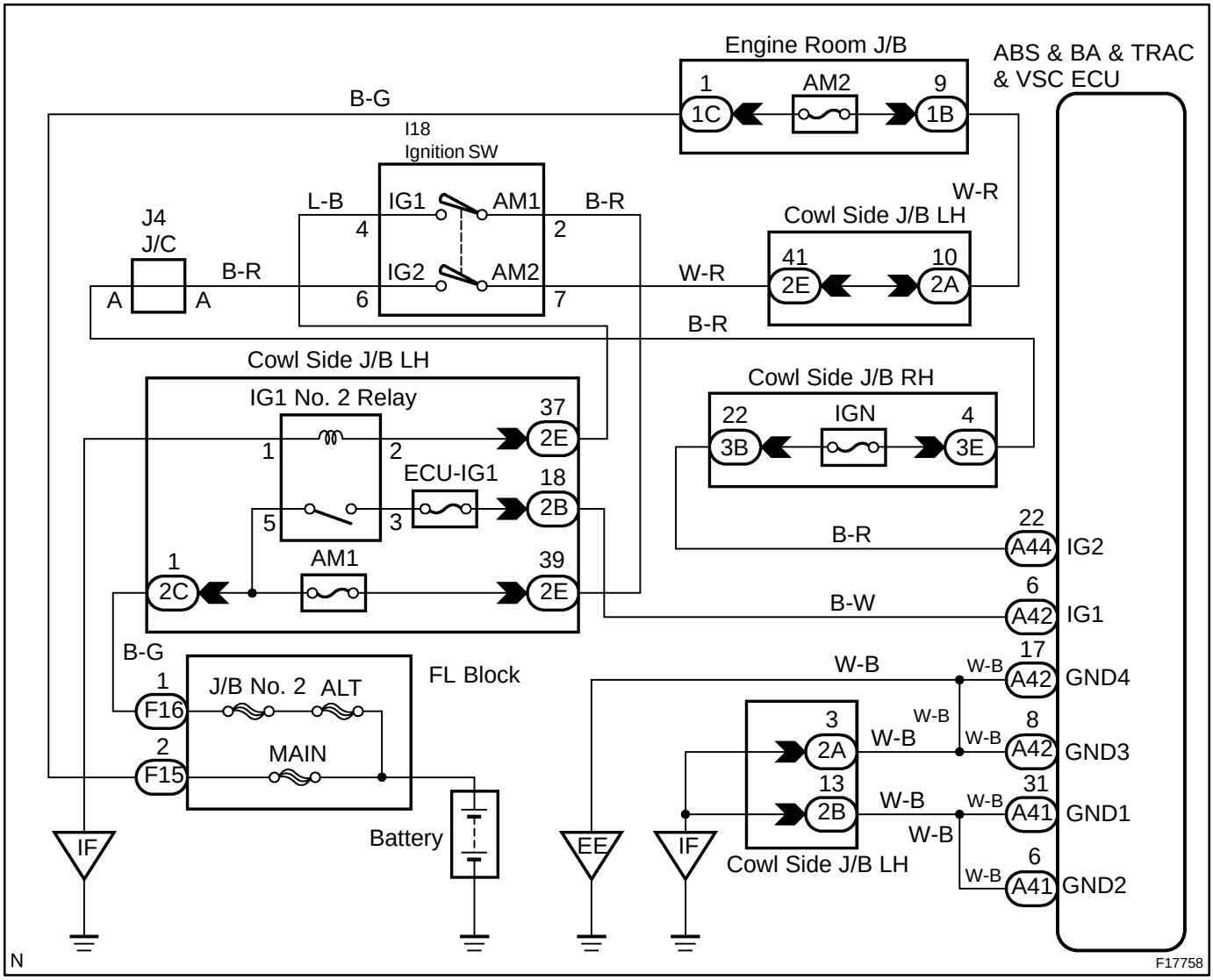
DIC9Y-01

DTC	C1257 / 57	Power Supply Drive Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1257 / 57	When a malfunction inside ECU is detected.	★Battery ★Power source circuit ★Skid control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

OK:

Voltage: 10 to 14 V

NG → **Check and repair the charging system.**

OK

2	**Check voltage of the ECU IG power source.**

In case of using the hand-held tester:

PREPARATION:

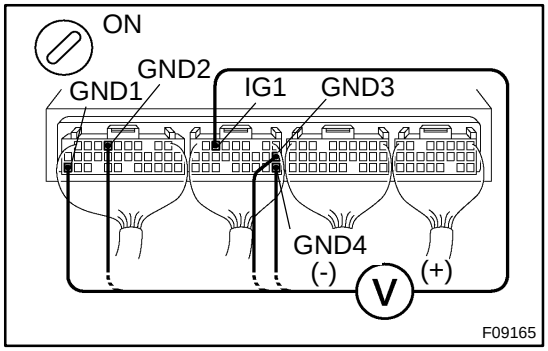
(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the DATA LIST mode on the hand-held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the hand-held tester.

OK:

"Normal" is displayed.



In case of not using the hand-held tester:

PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.
(b) Measure voltage between terminals IG1 and GND of the skid control ECU connector.

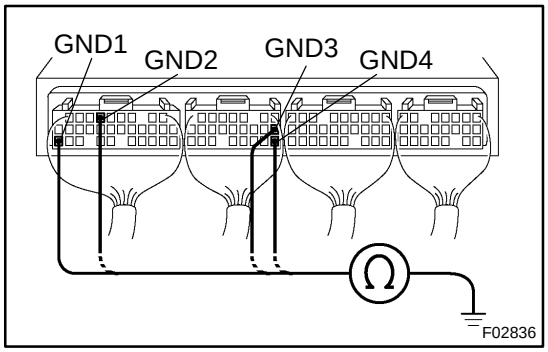
OK:

Voltage: 10 to 14 V

OK → **Turn ignition switch OFF, check and replace skid control ECU.**

NG

3	Check continuity between terminal GND of skid control ECU connector and body ground.



CHECK:

Measure resistance between terminal GND of the skid control ECU connector and body ground.

OK:

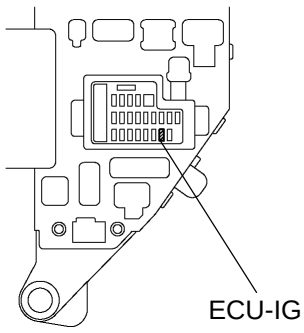
Resistance: 1 Ω or less

NG → **Repair or replace harness or connector.**

OK

4	Check ECU-IG fuse.

Driver Side J/B



PREPARATION:

Remove the ECU-IG fuse from the driver side J/B.

CHECK:

Check continuity of the ECU-IG fuse.

OK:

Continuity

NG → **Check for short circuit in all the harness and components connected to ECU-IG fuse (See attached wiring diagram).**

OK

Check for open circuit in harness and connector between skid control ECU and battery (See page IN-36).

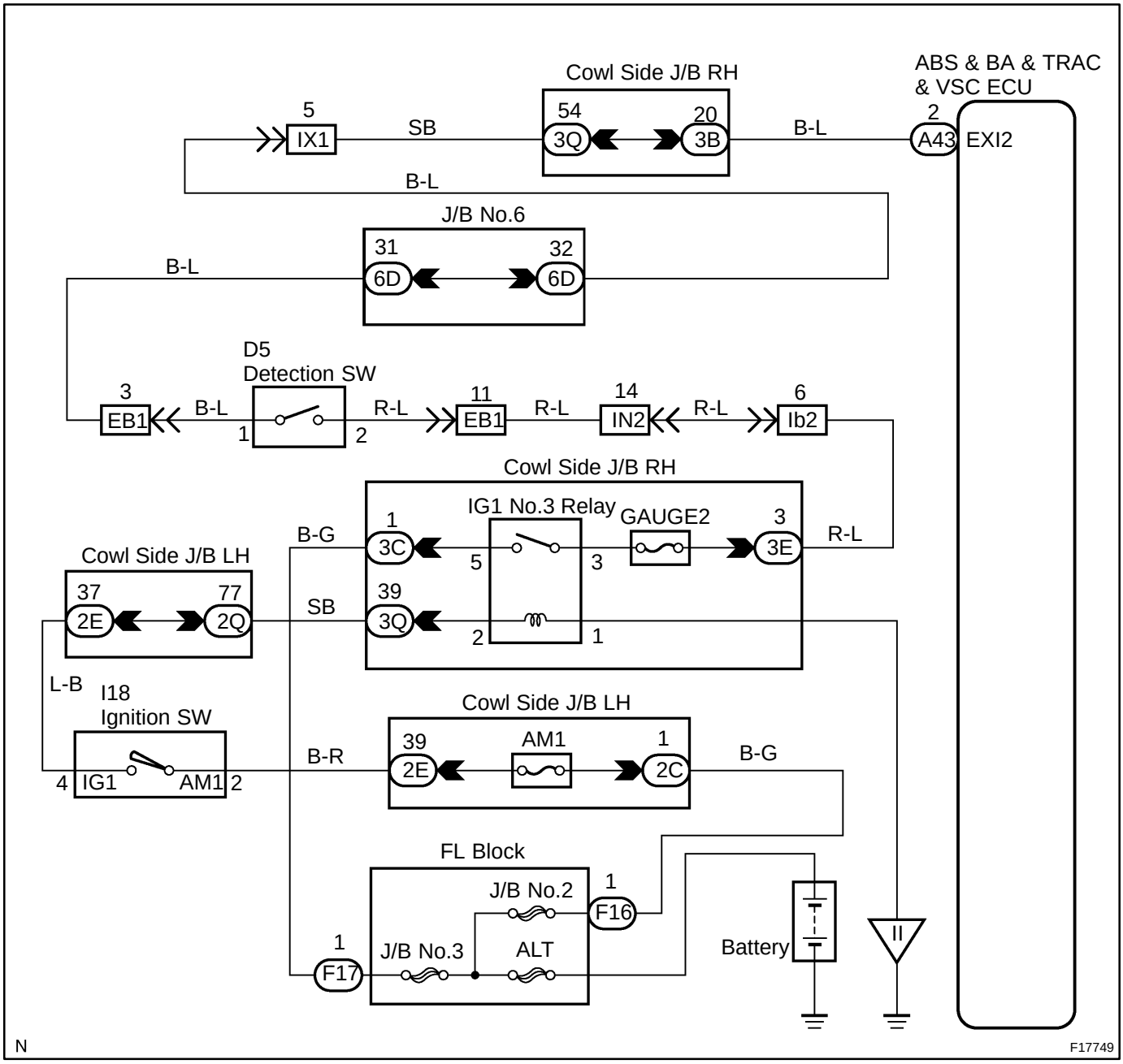
DIC9Z-01

DTC	C1268 / 68	Transfer L4 Position Switch Circuit

CIRCUIT DESCRIPTION

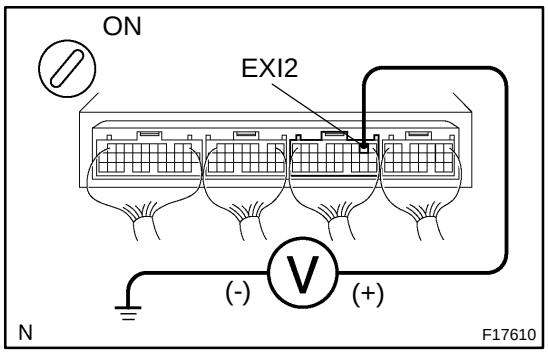
DTC No.	DTC Detecting Condition	Trouble Area
C1268 / 68	Open or short circuit in transfer L4 position switch.	★Transfer L4 position switch ★Transfer L4 position switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal EXI2 of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminal EXI2 of the skid control ECU and body ground when the transfer is in the L4 position.

OK:

Voltage: 10 to 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms chart (See page DI-526).**

NG

2	**Check transfer L4 position switch (See page TR-49).**

NG	**Replace transfer L4 position switch.**

OK

3	**Check for open or short circuit in harness and connector between transfer L4 position switch and skid control ECU (See page IN-36).**

NG	**Repair or replace harness or connector.**

OK

4	**Check for open or short circuit in harness and connector between skid control ECU and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

DICA0-01

DTC	C1290 / 66	Zero Point Calibration of Steering Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1290 / 66	The steering sensor zero point calibration position vastly differs from the recorded value. (The angle becomes larger)	★Yaw rate sensor zero point calibration undone ★Steering angle sensor zero point calibration undone

INSPECTION PROCEDURE

1	**Perform zero point calibration. (See page DI-505)**

HINT:
This code is output when a problem occurs in a zero point calibration of the steering angle sensor and yaw rate sensor.
Therefore, clear the stored zero point calibration data and correct the zero points.
(a) Clear the zero point calibration data.
(b) Perform a zero point calibration of the steering sensor and yaw rate sensor.

NEXT

2	**Is DTC output?**

(a) Clear the DTCs.
(b) Turn the ignition switch to the ON position.
(c) Are the same DTCs detected?

NO → **Proceed to next circuit inspection shown in problem symptoms table.**

YES

No problem.

HINT:
When the registered data is not equal to the input data, the DTC will be output.

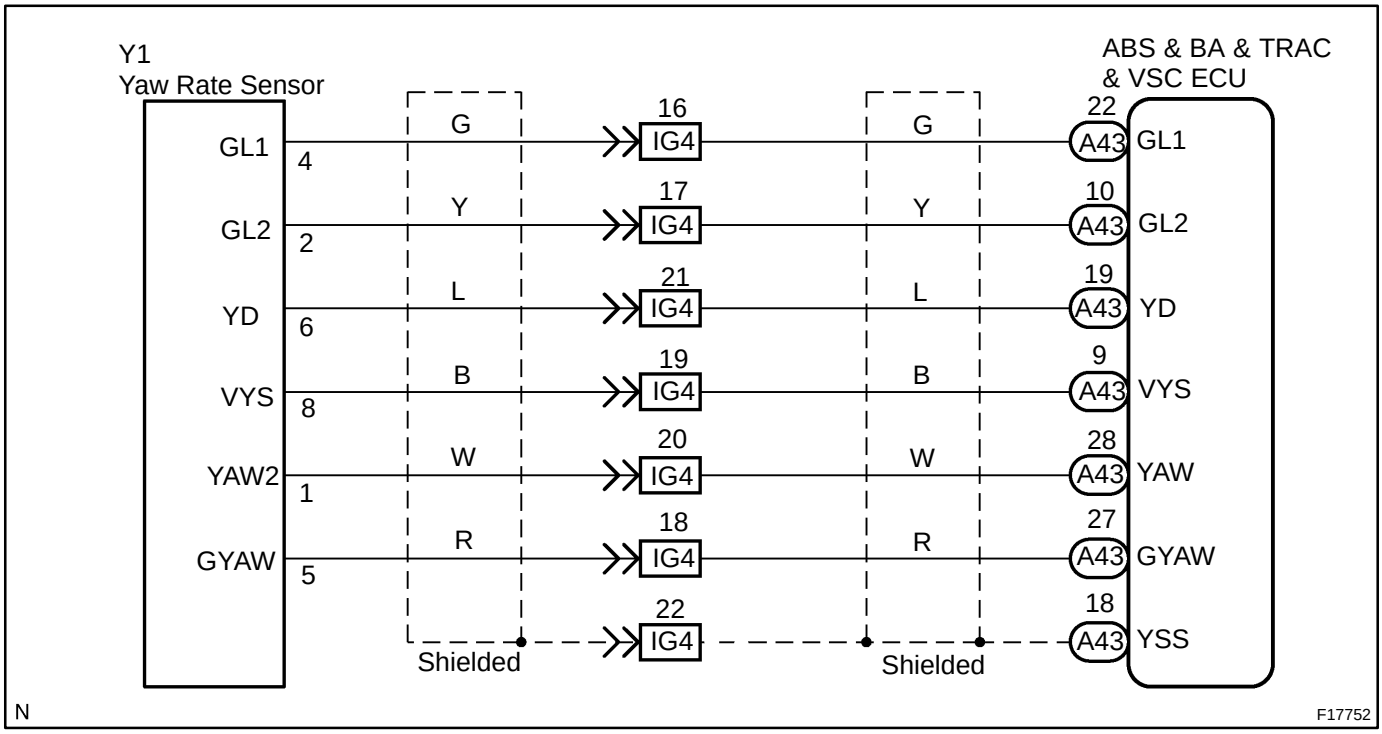
DICA1-01

DTC	C1336 / 39	Zero Point Calibration of Deceleration Sensor Undone

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1236 / 39	When either of the following 1. or 2. is detected: 1. In TEST mode, the shift lever is shifted to other than P position within 2 sec. after ECU terminal IG1 is turned ON for the first time. 2. When the deceleration sensor zero point recorded in ECU is deleted.	★Deceleration sensor ★Deceleration sensor circuit ★PNP switch circuit (R position)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check whether zero point calibration of yaw rate (deceleration) sensor has been done or not.**

PREPARATION:

Shift the shift lever in the P position and turn the ignition switch ON. Repeat connecting and releasing Ts and E_1 terminals of the DLC1 4 times or more for 8 sec. After this, turn the ignition switch OFF and after connecting terminals Ts and E_1, turn it ON again.

2	**Carry out yaw rate (deceleration) sensor zero point calibration and confirm it by VSC TRAC warning light.**

OK:

VSC TRAC warning light blinks

OK → **No problem.**

NG

3	**Check DTC for the VSC (See page DI-505).**

*1 :Other than DTC C1336 / 39 is output.

*2 :DTC C1336 / 39 only is output.

***1** → **Repair ABS control system according to the code output.**

***2**

4	**Check for open and short circuit in harness and connector between PNP switch (P position) and skid control ECU and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

5	**Check for open and short circuit in harness and connector between yaw rate (deceleration) sensor and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

6	Check yaw rate (deceleration) sensor (See page DI-505).

NG → Replace yaw rate sensor.

OK

Check and replace skid control ECU.

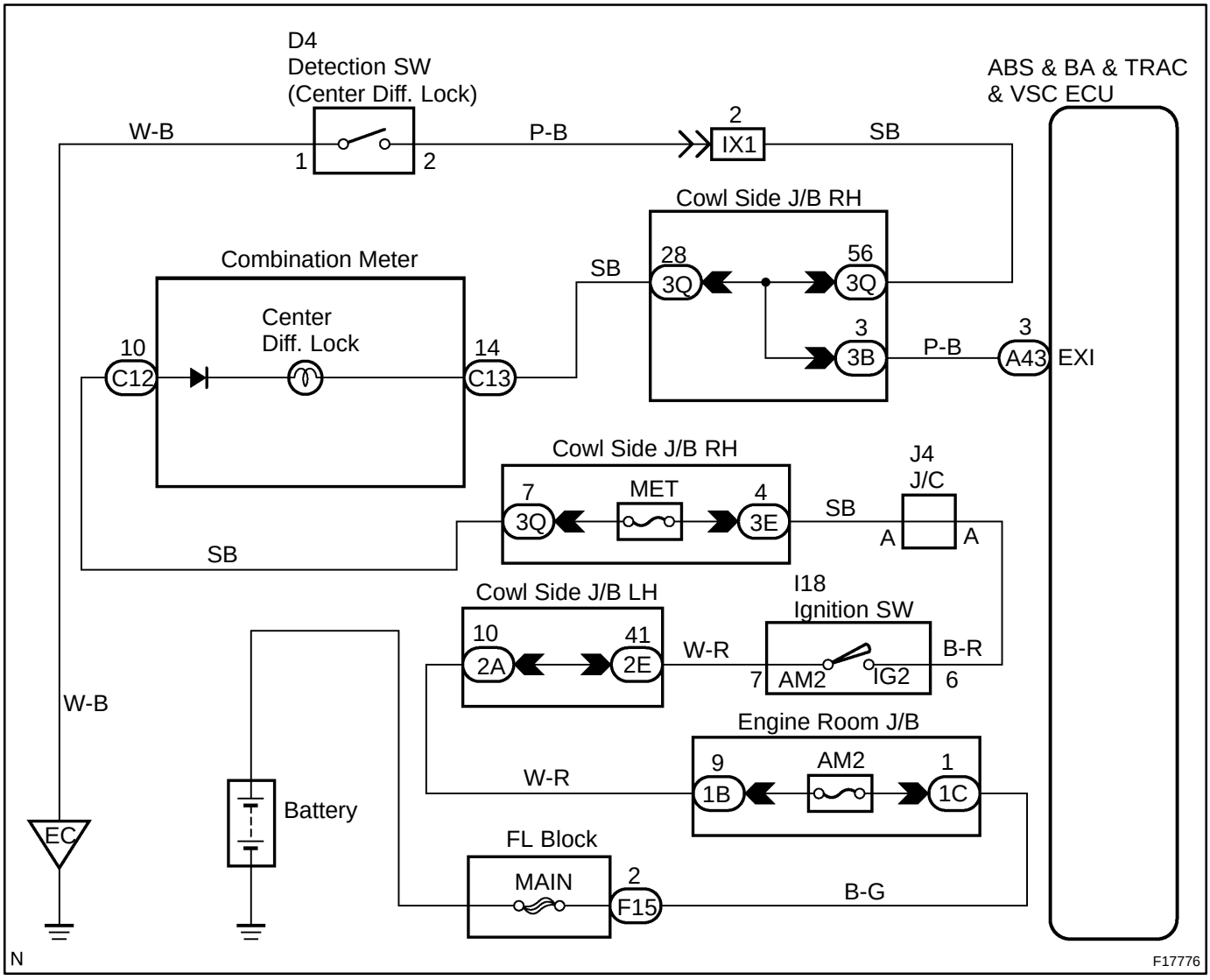
DICA2-01

DTC	C1340 / 47	Center Differential Lock Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1240 / 47	Open or short in center differential lock circuit.	★Center differential lock system ★Center differential lock circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that the center differential is free and center diff. lock switch is OFF.**

NG → **Repair the center differential lock system.**

OK

2	**Is DTC output?**

Check the DTC on page DI-505 .

NO → **END**

YES

3	**Check that bulb for center diff. lock indicator light is not burnt out.**

NG → **Replace indicator light.**

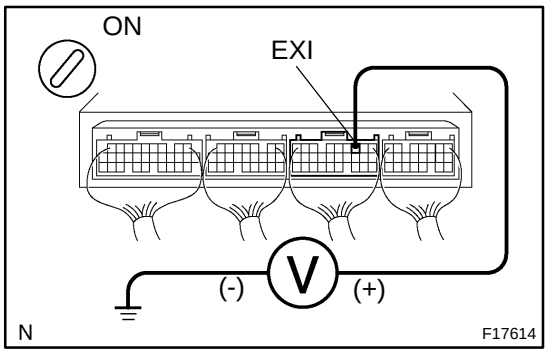
OK

4	**Check for open circuit in harness and connector between battery and center diff. lock indicator light, center diff. lock indicator light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

5	**Check voltage between terminal EXI of skid control ECU and body ground.**



PREPARATION:

Remove the skid control ECU with connectors still connected.

CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminal EXI of the skid control ECU and body ground when the transfer is in the L4 position.

OK:

Voltage: 10 to 14 V

NG	**Repair or replace harness or connector.**

OK

6	**Check transfer indicator switch (See page TR-49).**

NG	**Replace transfer indicator switch.**

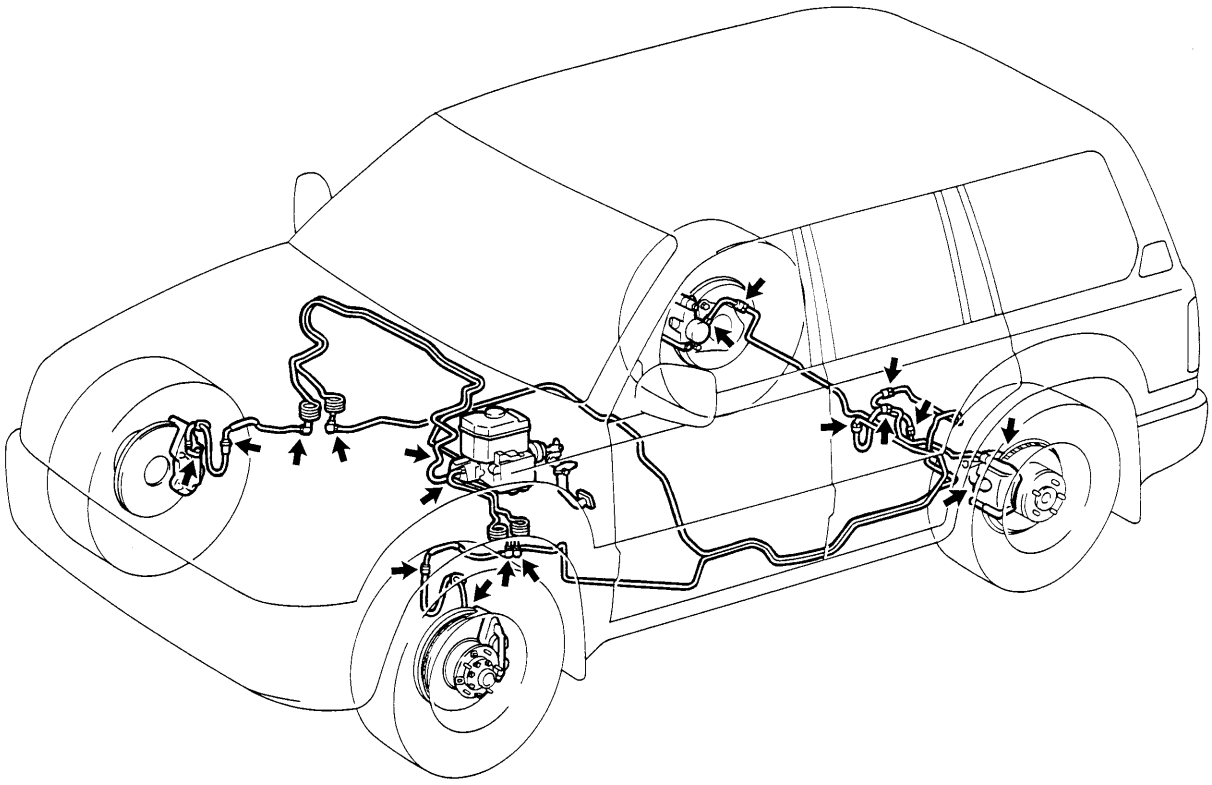
OK

Check and replace skid control ECU.

DICAE-01

Check for Fluid Leakage

Check for fluid leakage from the actuator or hydraulic lines.



N

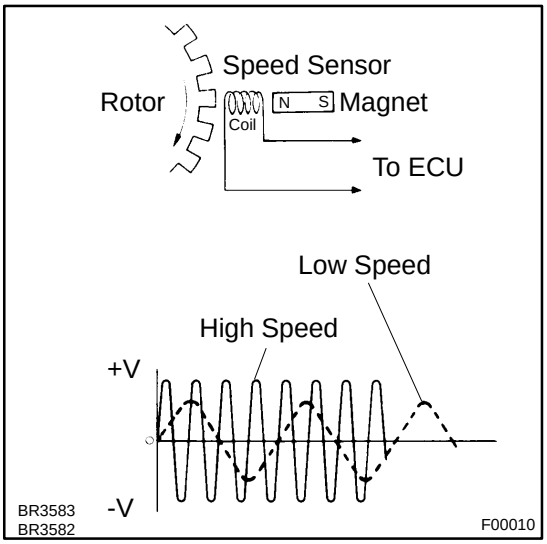
F09992

DIC94-02

CIRCUIT INSPECTION

DTC	C0200 / 31 - C1239 / 39	Speed Sensor Circuit

CIRCUIT DESCRIPTION



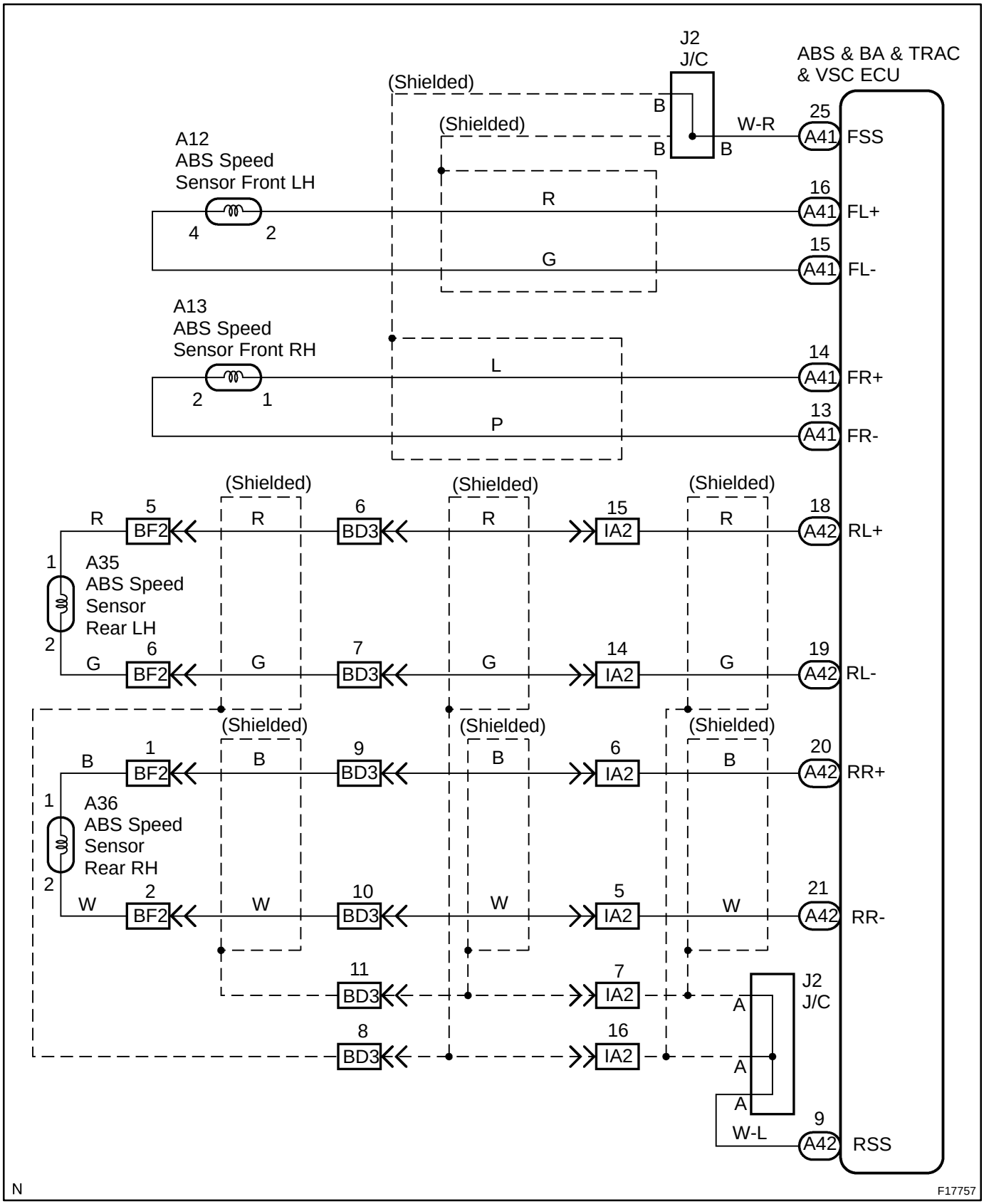
The speed sensor detects wheel speed and sends the appropriate signals to the ECU. These signals are used for control of the ABS & BA & TRAC & VSC control system. The front and rear rotors each have 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates 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.

DTC No.	DTC Detecting Condition	Trouble Area
C0200 / 31 C0205 / 32 C0210 / 33 C0215 / 34	Detection of any of the conditions 1. through 4.: 1. At a vehicle speed of 6 mph (10 km/h) or more, pulses are not input for 15 sec. 2. Momentary interruption of the speed sensor signal occurs at least 7 times in the time between switching the ignition switch ON and switching it OFF. 3. Continuous noise occurs into the speed sensor signals with a vehicle speed at 12 mph (20 km/h) or more. 4. The condition that the speed sensor signal circuit is open continues for 0.12 sec. or more. ★ABS does not function ★Brake pedal is not depressed ★Parking brake is not set ★Rear differential does not lock Under the above conditions, when the difference in velocity between the highest rotating and the second highest rotating wheels is within 1 mph (2 km/h), the slowest wheel rotates at 0 mph (0 km/h), and the second slowest wheel rotates at 7 mph (12 km/h) for 1 second or more.	★Right front, left front, right rear and left rear speed sensor ★Each speed sensor circuit ★Sensor rotor
C1235 / 35 C1236 / 36 C1238 / 38 C1239 / 39	Continuous noise occurs into the speed sensor signals with a vehicle speed at 12 mph (20 km/h) or more continues for 5 sec or more.	★Right front, left front, right rear, left rear speed sensor ★Speed sensor rotor

HINT:

★ DTC No. C0200 / 31 and C1235 / 35 are for the right front speed sensor.
★ DTC No. C0205 / 32 and C1236 / 36 are for the left front speed sensor.
★ DTC No. C0210 / 33 and C1238 / 38 are for the right rear speed sensor.
★ DTC No. C0215 / 34 and C1239 / 39 are for the left rear speed sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the DATALIST mode on the hand-held tester.

CHECK:

Check that there is no difference between the speed value output from the speed sensor displayed on the hand-held tester and the speed value displayed on the speedometer when driving the vehicle.

OK:

There is almost no difference from the displayed speed value.

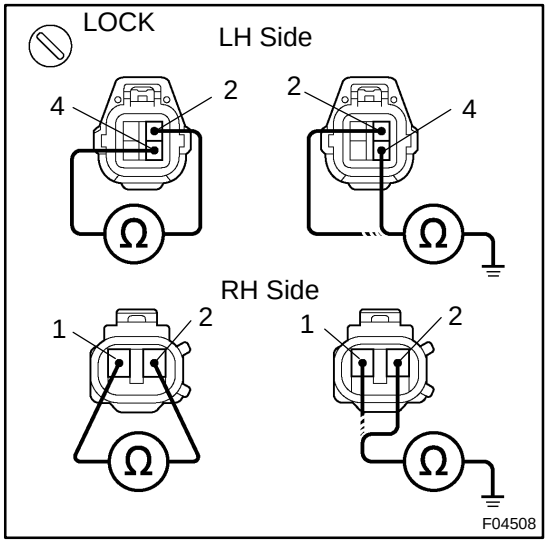
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Go to step 4.**

NG

2	**Check speed sensor.**



Front:

PREPARATION:

(a) Make sure that there is no looseness at the connector's locking part and connecting part of the connector.

(b) Disconnect the speed sensor connector.

CHECK:

★ LH side:
Measure resistance between terminals 2 and 4 of the speed sensor connector.

★ RH side:
Measure resistance between terminals 1 and 2 of the speed sensor connector.

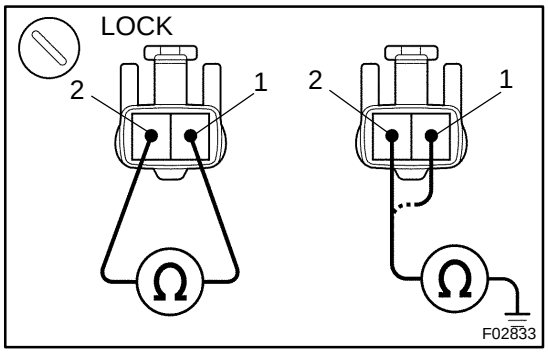
OK:

Resistance: 0.92 to 1.22 kΩ

CHECK:

★ LH side:
Measure resistance between terminals 2 and 4 of the speed sensor connector and body ground.

★ RH side:
Measure resistance between terminals 1 and 2 of the speed sensor connector and body ground.



OK:

Resistance: 1 MΩ or higher

Rear:

PREPARATION:

(a) Make sure that there is no looseness at the connector's locking part and connecting part of the connector.

(b) Disconnect the speed sensor connector.

CHECK:

Measure resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 1.0 to 1.4 kΩ

CHECK:

Measure resistance between terminal 1 or 2 of the speed sensor connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG	**Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI-505).

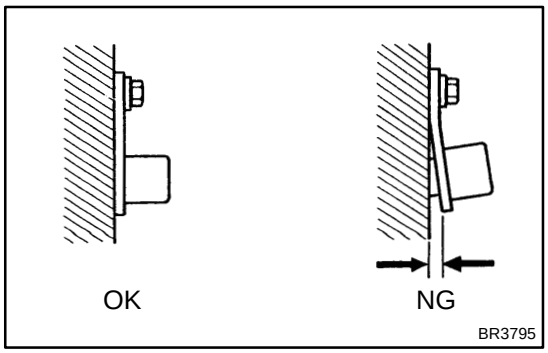
OK

3	**Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN-36).**

NG	**Repair or replace harness or connector.**

OK

4	Check sensor installation.



CHECK:

Check the speed sensor installation.

OK:

The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

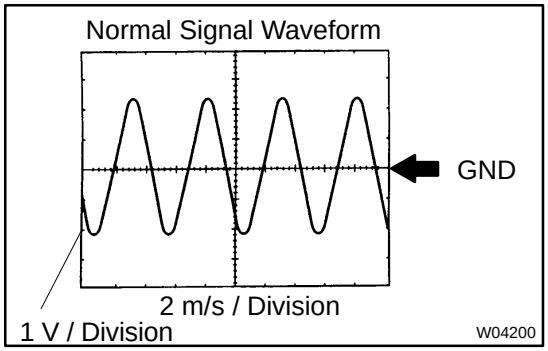
NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI-505).

OK

5	Check speed sensor and sensor rotor serrations.



(REFERENCE) INSPECTION USING OSCILLOSCOPE

PREPARATION:

(a) Remove the skid control ECU with connectors still connected.

(b) Connect the oscilloscope to each of terminals FR+ - FR-, FL+ - FL-, RR+ - RR- or RL+ - RL- of the skid control ECU.

CHECK:

Drive the vehicle at about 12 mph (20 km/h), and check the signal waveform.

HINT:

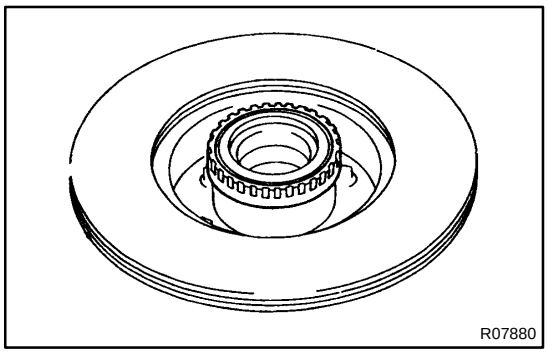
★ As vehicle speed (rpm of the wheels) increase, a cycle of the waveform narrows and the fluctuation in the output voltage becomes greater.

★ When noise is identified in the waveform on the oscilloscope, error signals are generated due to the speed sensor rotor's scratches, looseness or foreign matter deposited on it.

OK	Check and replace skid control ECU.

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front axle hub (See page SA-12).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter.

PREPARATION:

Remove the front speed sensor (See page BR-69).

CHECK:

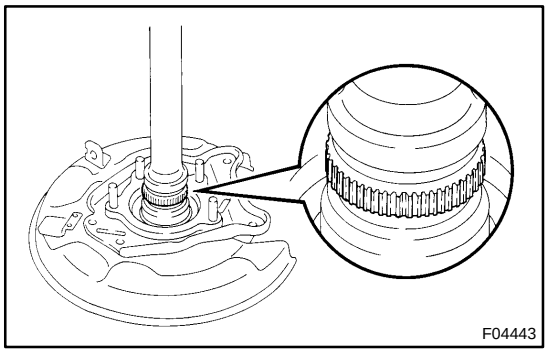
Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.



Rear:

PREPARATION:

Remove the rear axle shaft (See page SA-84).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, missing teeth or foreign matter.

PREPARATION:

Remove the rear speed sensor (See page BR-72).

CHECK:

Check the sensor tip.

OK:

No scratches or foreign matter on the sensor tip.

HINT:

If foreign matter (including that on the sensor rotor side) is identified, remove it and after reassembling, check the output waveform.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI-505).

OK

Check and replace skid control ECU.

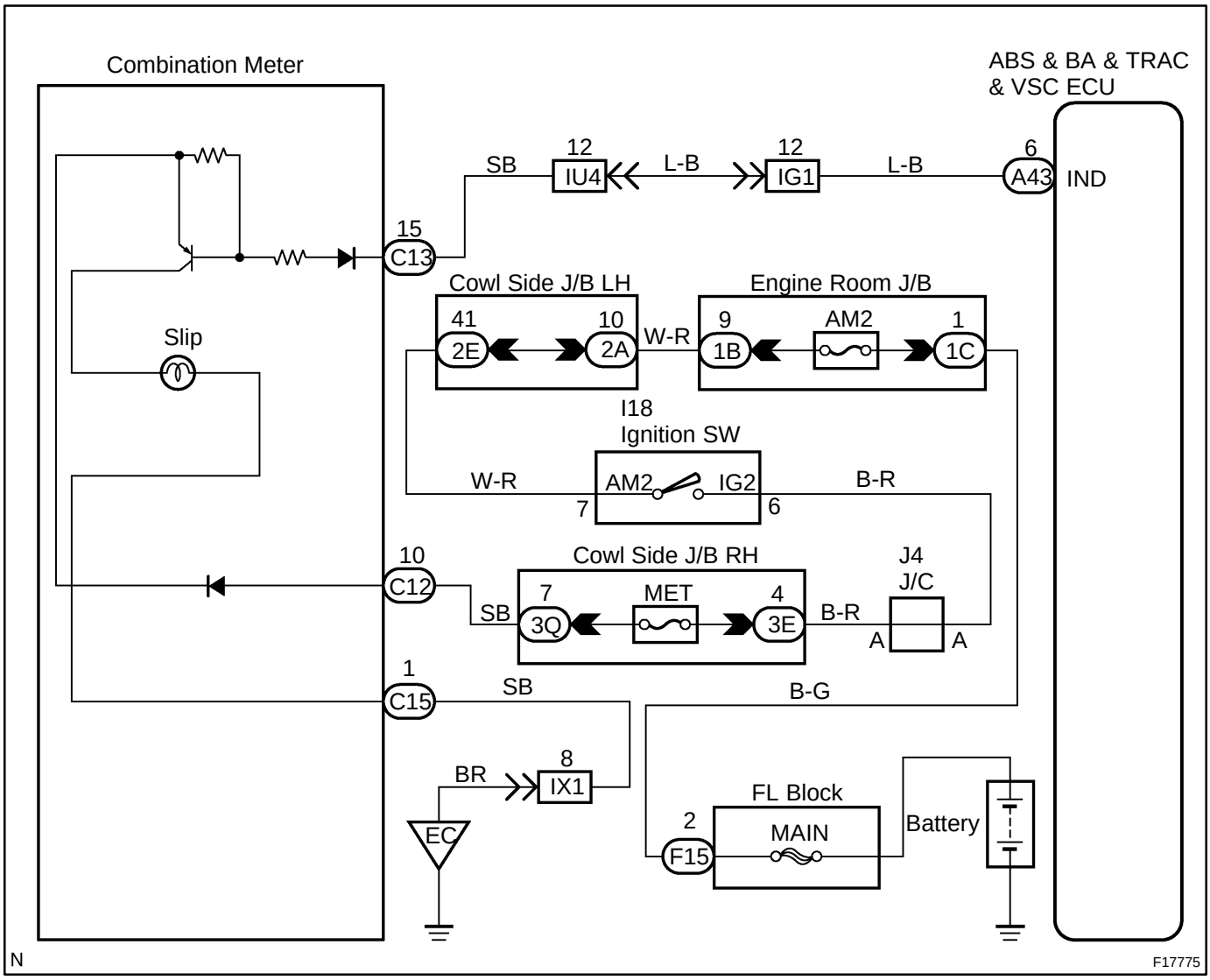
DICA8-02

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during VSC operation.

WIRING DIAGRAM



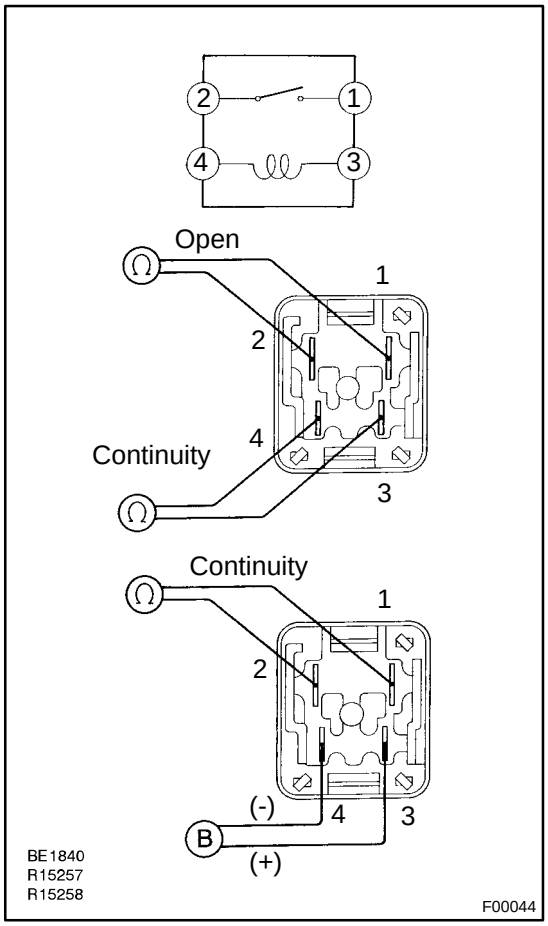
INSPECTION PROCEDURE

1	**Do the warning lights other than SLIP indicator light come on?**

YES → **Go to step 3.**

NO

2	**Check IG1 No. 1 relay.**



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

3	**Check SLIP indicator light.**

Check if that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair SLIP indicator light bulb or combination meter assembly.**

OK

4	**Check for short circuit in harness and connector between SLIP indicator light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair skid control ECU.

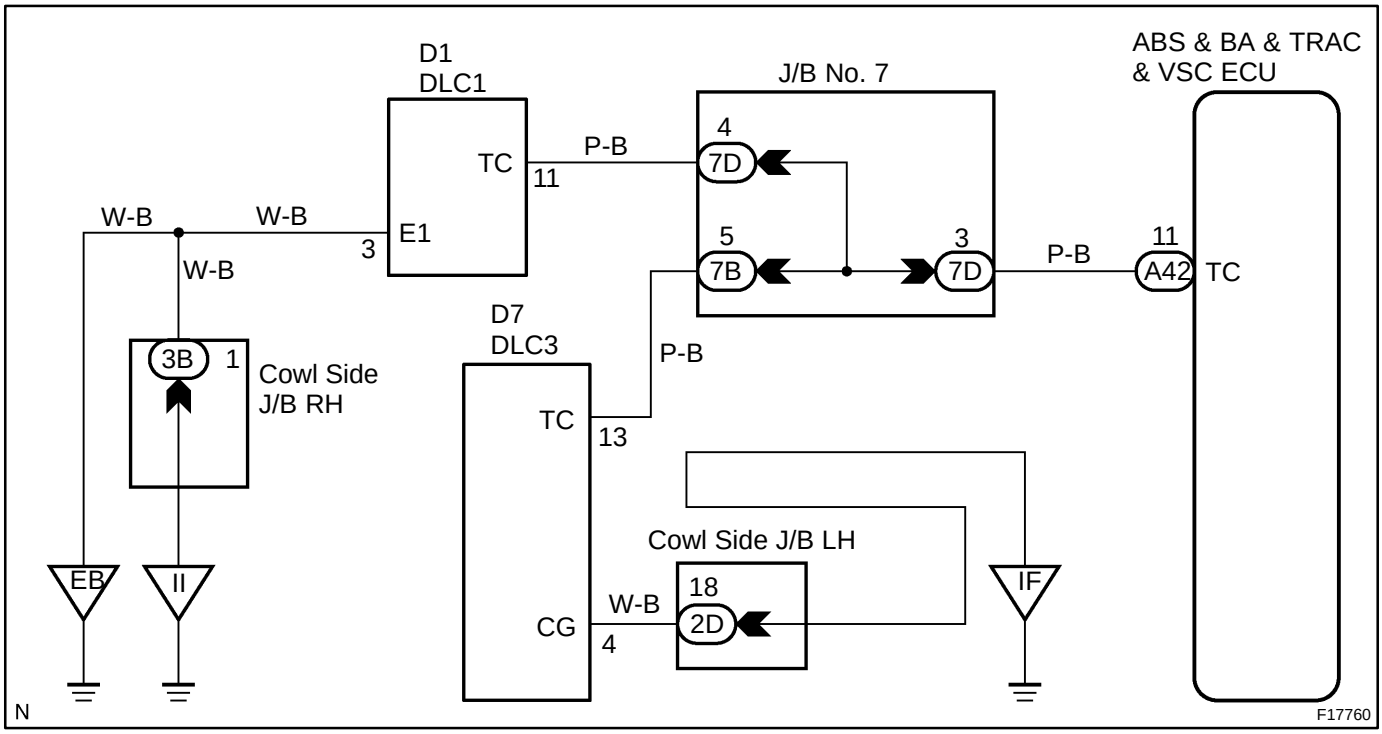
DICAC-01

Tc Terminal Circuit

CIRCUIT DESCRIPTION

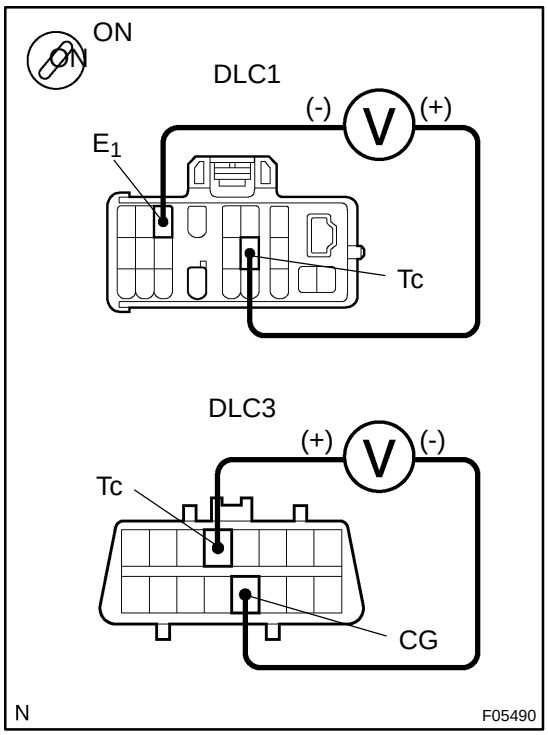
Connecting terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light and VSC TRAC warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC1 or Tc and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Tc and E1 of the DLC1 or Tc and CG of the DLC3.

OK:

Voltage: 10 to 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 are connected, the ECU may be defective.**

NG

2	**IG switch OFF, and check for open and short circuit in harness and connector between skid control ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN-36).**

NG	**Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

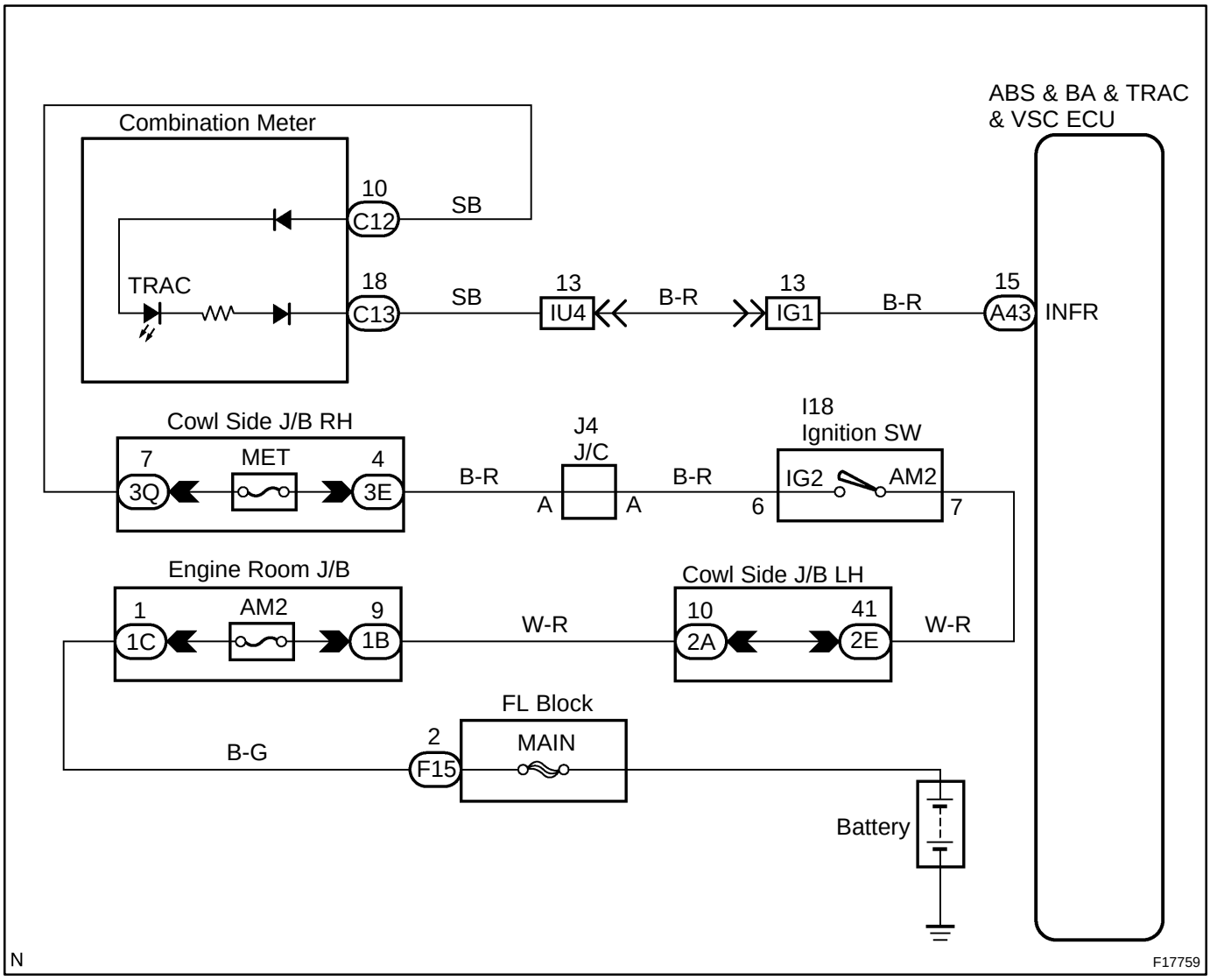
DICA9-02

TRAC Indicator Light Circuit

CIRCUIT DESCRIPTION

The TRAC indicator light blinks during TRAC operation.

WIRING DIAGRAM



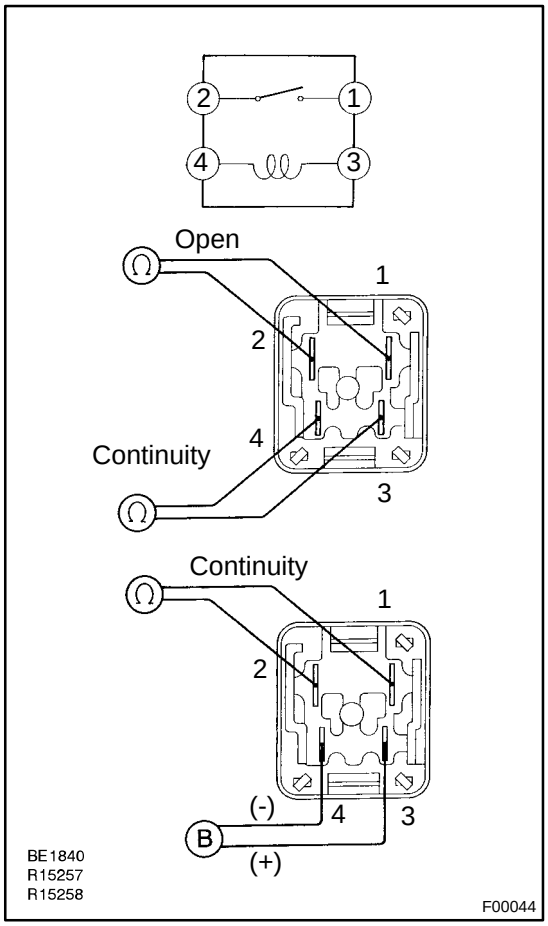
INSPECTION PROCEDURE

1	**Do the warning lights other than TRAC indicator light come on?**

YES → **Go to step 3.**

NO

2	**Check IG1 No. 1 relay.**



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

3	**Check TRAC indicator light.**

Check that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair TRAC indicator light bulb or combination meter assembly.**

OK

4	**Check for short circuit in harness and connector between TRAC indicator light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair skid control ECU.

DICAD-01

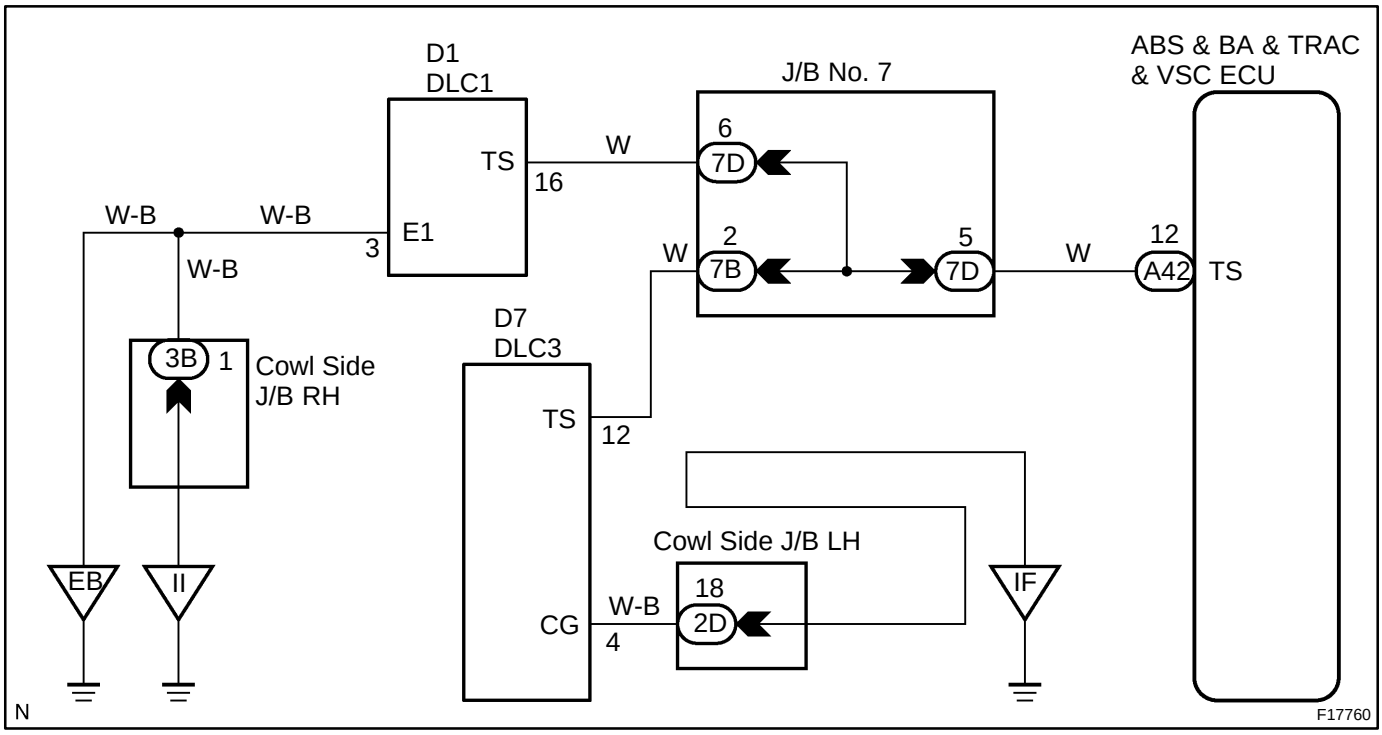
Ts Terminal Circuit

CIRCUIT DESCRIPTION

The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected by the DTC check.

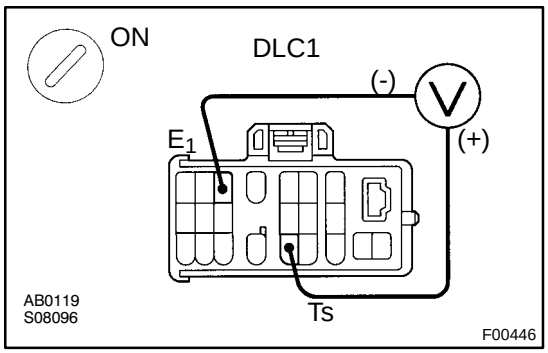
Connecting terminals Ts and E_1 of the DLC1 starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure voltage between terminals Ts and E_1 of the DLC1.

OK:

Voltage: 10 to 14 V

OK → **If ABS warning light does not blink even after Ts and E_1 are connected, the ECU may be defective.**

NG

2	**IG switch OFF, and check for open and short circuit in harness and connector between skid control ECU and DLC1, DLC1 and body ground (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and replace skid control ECU.

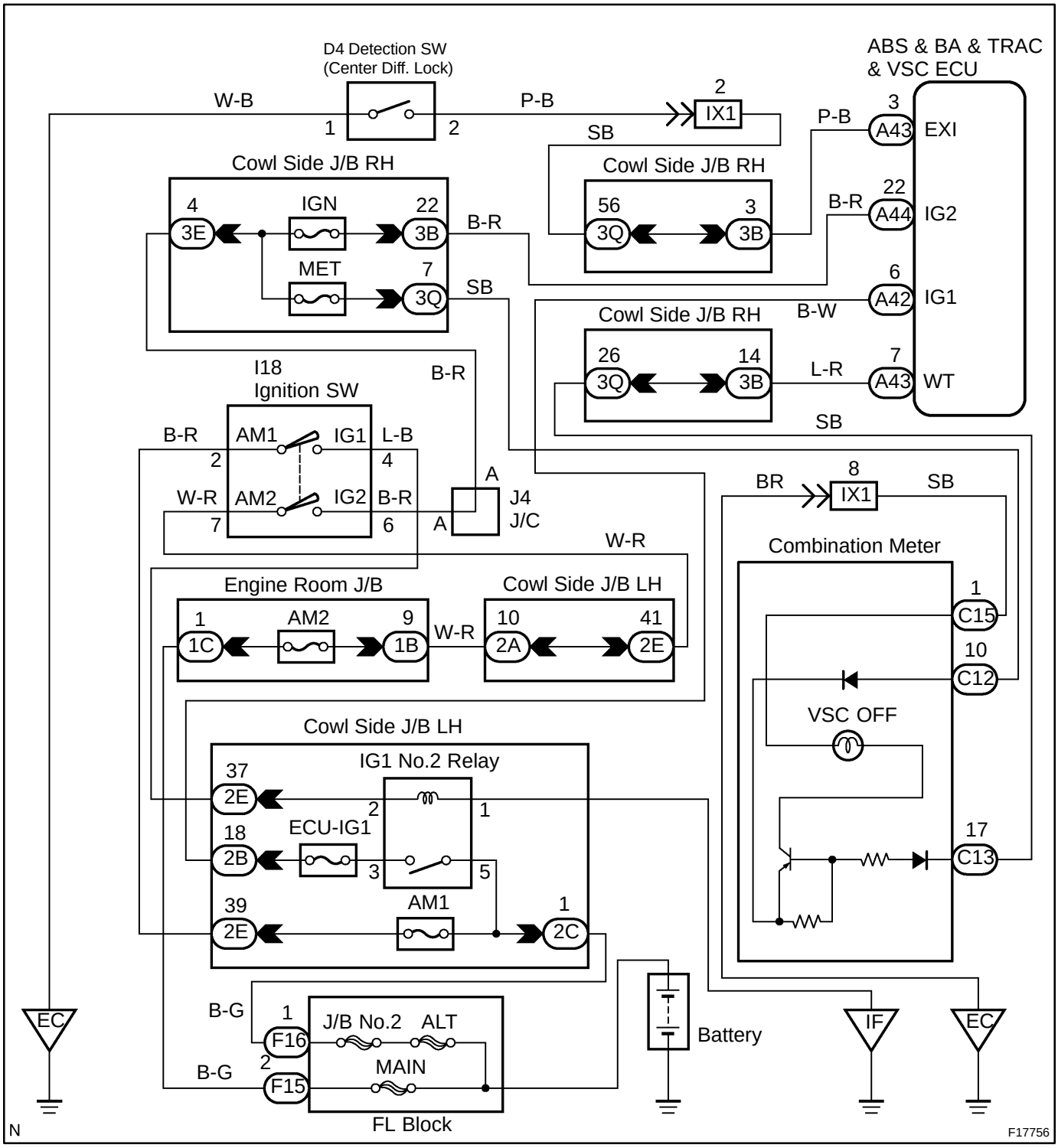
DICAA-02

VSC OFF Indicator Light, Center Diff Lock Switch Circuit

CIRCUIT DESCRIPTION

This is the VSC control main switch. When the center differential is locked, VSC control goes off and the VSC OFF indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

1	**Check operation of the VSC OFF indicator light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC OFF indicator light can be shown on the combination meter with the hand-held tester.

NG → **Go to step 3.**

OK

2	**Is DTC output for VSC?**

YES → **Repair circuit indicated by the output code.**

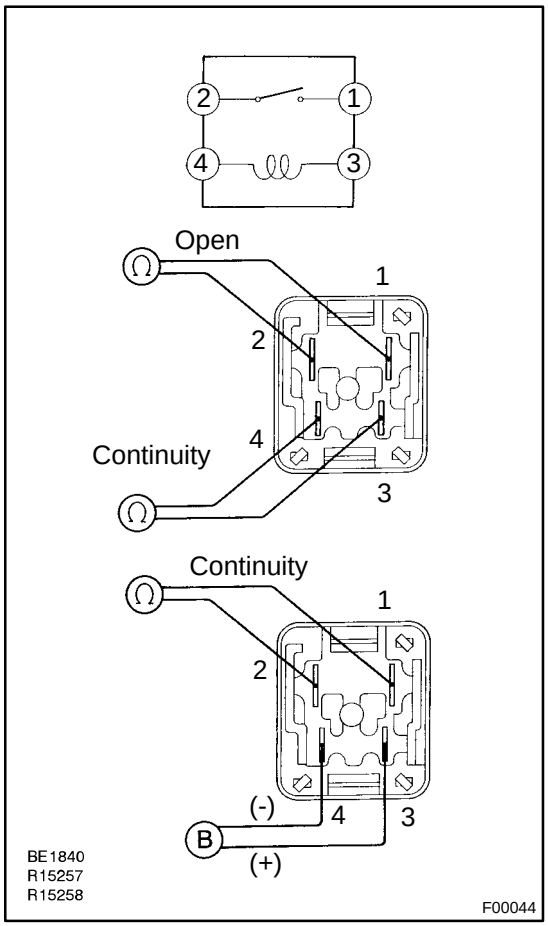
NO

3	**Does the warning lights other than VSC OFF indicator light come on?**

YES → **Go to step 5.**

NO

4	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

5	Check VSC OFF indicator light.

Check that the open circuit in the combination meter circuit (See page BE-58).

NG → **Repair VSC OFF indicator light bulb or combination meter assembly.**

OK

6	Check for short circuit in harness and connector between VSC OFF indicator light and skid control ECU (See page IN-36).

NG → Repair or replace harness or connector.

OK

7	Check if center diff. lock switch remains ON, or check wire harness between center diff. lock switch and body ground for short circuit.

NG → Repair center diff. lock switch or repair or replace wire harness.

OK

Check and repair skid control ECU.

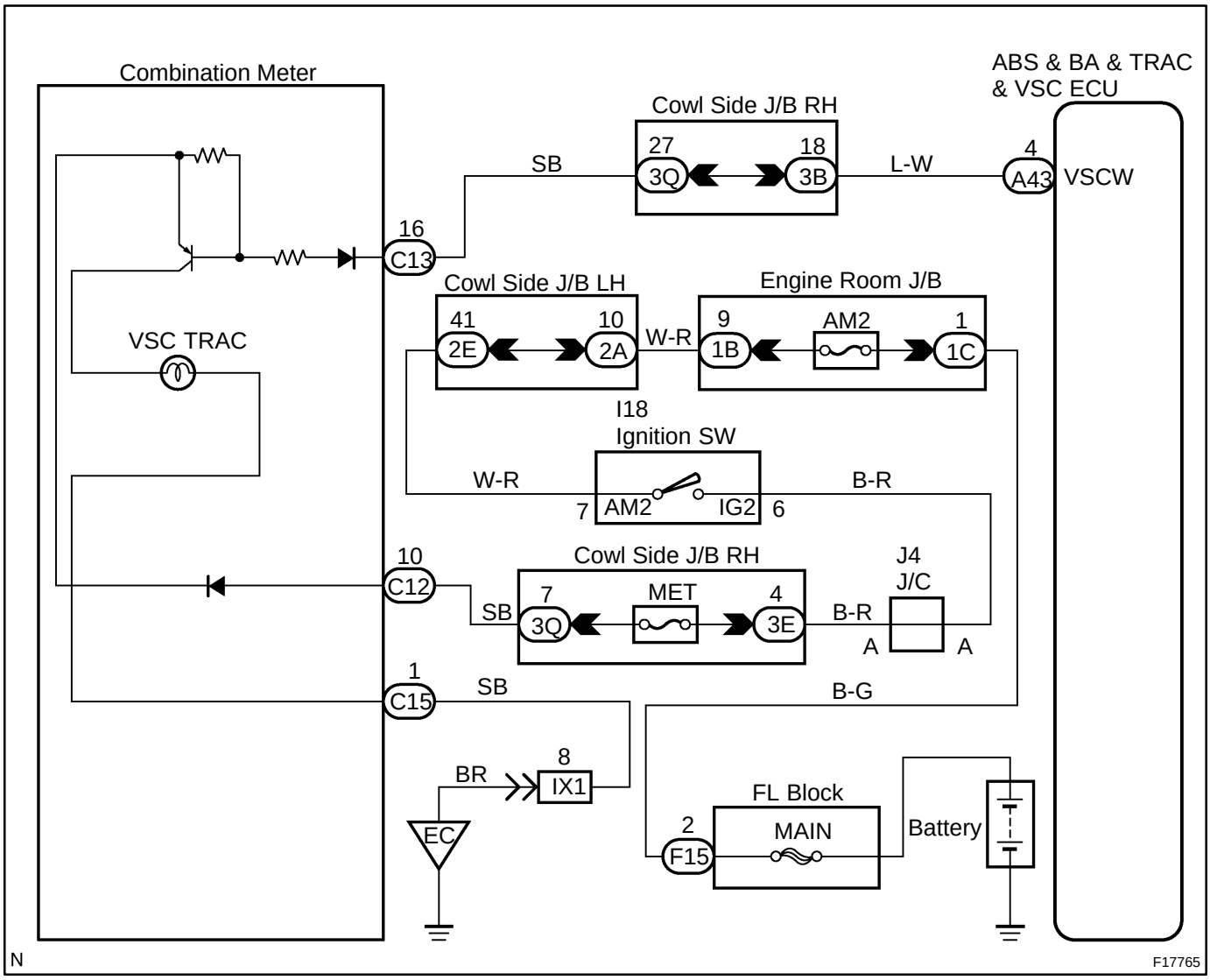
DICA6-02

VSC TRAC Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU stores DTC, the VSC TRAC warning light illuminates the combination meter.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot in accordance with the table below for each trouble symptom.

VSC TRAC warning light does not light up	*1
VSC TRAC warning light remains on	*2

*1: Start the inspection from step 1 in case of using the hand-held tester and start from step 2 in case of not using the hand-held tester.

*2: After inspection with step 4, start the inspection from step 5 in case of using the hand-held tester and start from step 6 in case of not using hand-held tester.

1	**Check operation of the VSC TRAC warning light.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Select the ACTIVE TEST mode on the hand-held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC TRAC warning light can be shown on the combination meter on the hand-held tester.

OK → **Check and replace skid control ECU.**

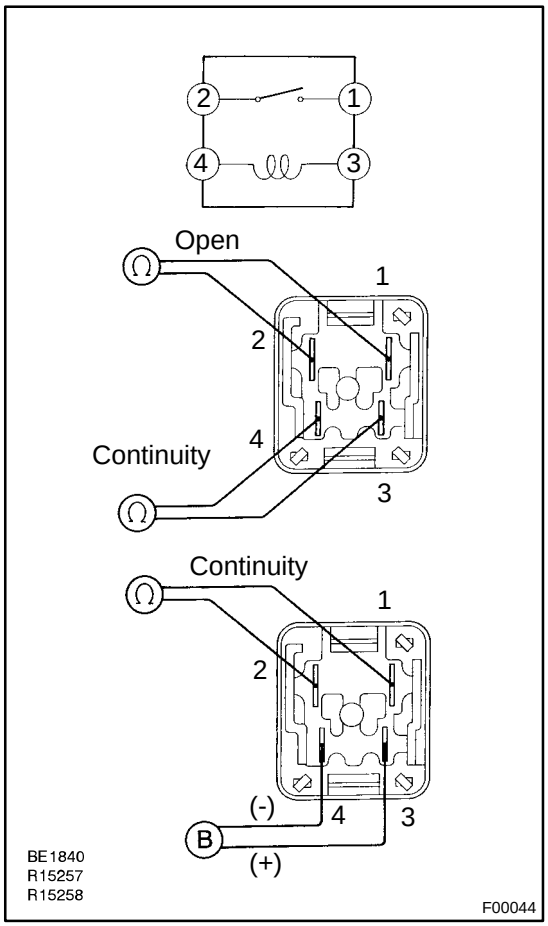
NG

2	**Does the warning lights other than VSC TRAC warning light come on?**

YES → **Repair VSC TRAC warning light bulb or combination meter assembly.**

NO

3	Check IG1 No. 1 relay.



PREPARATION:

Remove the IG1 No. 1 relay from the engine room J/B.

CHECK:

Check continuity between the IG1 No. 1 relay terminals listed in the table below.

OK:

Terminals 3 and 4	Continuity
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check continuity between terminals.

OK:

Terminals 1 and 2	Continuity

NG → **Replace IG1 No. 1 relay.**

OK

Check for open circuit in harness and connector between IG1 No. 1 relay and combination meter (See page IN-36).

4	**Check that the ECU connectors are securely connected to the ECU.**

NO → **Connect the connector to the ECU.**

YES

5	**Check operation of the VSC TRAC warning light (See step 1).**

OK → **Check and replace skid control ECU.**

NG

6	**Is DTC output?**

Check the DTC on page DI-505 .

YES → **Repair circuit indicated by the output code.**

NO

7	**Check for short circuit in harness and connector between VSC TRAC warning light and skid control ECU (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair skid control ECU.

DIC8P-01

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & EBD & BA Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Date	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ BA does not operate.	
	☐ EBD does not operate.	
	ABS Warning Light Abnormal	☐ Remains ON ☐ Does not light up
	Brake Warning Light Abnormal (PKB released)	☐ Remains ON ☐ Does not light up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

Freeze Frame Data	STOP LIGHT SW	☐ ON ☐ OFF
	SYSTEM	☐ NO SYS ☐ ABS ☐ BA ☐ FAIL SF
	#IG ON	
	VEHICLE SPD	km/h MPH

TRAC & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Date	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	☐ VSC does not operate. (Wheels sideslip at the time of sharp turning.)	
	TRAC OFF Indicator Light Abnormal	☐ Remains ON ☐ Does not light up
	VSC TRC Warning Indicator Abnormal	☐ Displays ☐ Does not display
	SLIP Indicator Light Abnormal	☐ Remains ON ☐ Does not light up
	Skid Control Buzzer Abnormal	☐ Sounds ☐ Does not sound

Check Item	**ABS Warning Light**	☐ Normal ☐ Malfunction Code (Code)
	Malfunction Indicator Light	☐ Normal ☐ Malfunction Code (Code)

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

Freeze Frame Data	VSC/TRC OFF SW	☐ ON ☐ OFF
	SYSTEM	☐ VSC/TRC
	SHIFT POSITION	☐ P,N ☐ 2 ☐ R ☐ 3 ☐ D ☐ 4 ☐ L ☐ FAIL
	STEERING ANG	deg
	YAW RAT	deg/s
	MAS CYL PRESS	V
	THROTTLE	deg
	MAS PRESS GRADE	MPa/s
	G (RIGHT&LEFT)	G
	G (BACK&FORTH)	G

DIC8V-01

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When removing the part, turn the ignition switch OFF.

HINT:

- ★ Using SST 09843-18020 or 09843-18040, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.
- ★ If any abnormality is not found when inspecting parts, inspect the ECU.
- ★ If a malfunction code is displayed during the DTC check, check the circuit listed that code. For details of each code, turn to the page referred to under the "See page" for respective "DTC No." in the DTC chart.

DTC chart of ABS:

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI-531)	Open or short in ABS solenoid relay circuit	★ABS solenoid relay ★ABS solenoid relay circuit
C0279 / 12 (DI-531)	B+ short in ABS solenoid relay circuit	
C0226 / 21 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SFR circuit)	★Hydraulic brake booster ★SFRR or SFRH circuit
C0236 / 22 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SFL circuit)	★Hydraulic brake booster ★SFLR or SFLH circuit
C0246 / 23 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SRR circuit)	★Hydraulic brake booster ★SRRR or SRRH circuit
C0256 / 24 (DI-528)	Open or short in hydraulic brake booster solenoid circuit (SRL circuit)	★Hydraulic brake booster ★SRLR or SRLH circuit
C1225 / 25 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA1 circuit)	★Hydraulic brake booster ★SA1 circuit
C1226 / 26 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA2 circuit)	★Hydraulic brake booster ★SA2 circuit
C1227 / 27 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (SA3 circuit)	★Hydraulic brake booster ★SA3 circuit
C1228 / 28 (DI-543)	Open or short in hydraulic brake booster solenoid circuit (STR circuit)	★Hydraulic brake booster ★STR circuit
C0200 / 31*1 (DI-615)	Right front wheel speed sensor signal malfunction	★Right front, left front, right rear and left rear speed sensor ★Each speed sensor circuit ★Sensor rotor
C0205 / 32*1 (DI-615)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI-615)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI-615)	Left rear wheel speed sensor signal malfunction	
C1235 / 35 (DI-615)	Foreign matter is attached on the tip of the right front sensor	★Right front, left front, right rear, left rear speed sensor ★Sensor rotor
C1236 / 36 (DI-615)	Foreign matter is attached on the tip of the left front sensor	
C1237 / 37 (DI-557)	Size of some tires is different from the other tires	Tire size

C1238 / 38 (DI-615)	Foreign matter is attached on the tip of the right rear sensor	★Right front, left front, right rear, left rear speed sensor ★Sensor rotor
C1239 / 39 (DI-615)	Foreign matter is attached on the tip of the left rear sensor	
C1241 / 41 (DI-558)	Low battery positive voltage or abnormally high battery positive voltage	★Battery ★IC regulator ★Power source circuit
C1242 / 42*2 (DI-561)	Open in IG2 circuit	★Battery ★IC regulator ★Power source circuit
C1243 / 43 (DI-564)	Malfunction in deceleration sensor (constant output)	★Deceleration sensor ★Wire harness for deceleration sensor system
C1244 / 44 (DI-567)	Open or short in deceleration sensor circuit	★Deceleration sensor ★Deceleration sensor circuit
C1245 / 45 (DI-564)	Malfunction in deceleration sensor	★Deceleration sensor ★Wire harness for deceleration sensor system
C1246 / 46 (DI-570)	Malfunction in master cylinder pressure sensor	★Master cylinder pressure sensor ★Master cylinder pressure sensor circuit
C1249 / 49 (DI-573)	Open in stop light switch circuit	★Stop light bulb ★Stop light switch circuit
C1251 / 51*2 (DI-577)	Pump motor is locked Open circuit in pump motor ground	Hydraulic brake booster pump motor
C1252 / 52*2 (DI-580)	Hydraulic brake booster pump motor malfunction	★Hydraulic brake booster pump motor ★Hydraulic brake booster pump motor circuit ★Pressure switch (PH or PL)
C1253 / 53*2 (DI-586)	Hydraulic brake booster pump motor relay malfunction	★ABS motor1 or ABS motor 2 relay ★ABS motor1 or ABS motor 2 relay circuit ★Hydraulic brake booster pump motor circuit
C1254 / 54*2 (DI-592)	Pressure switch malfunction	★Pressure switch (PH or PL) ★Pressure switch circuit
C1256 / 56*2 (DI-595)	Accumulator low pressure malfunction	★Accumulator ★Pressure switch (PH or PL) ★Hydraulic brake booster pump motor
C1257 / 57*2 (DI-602)	Power supply drive circuit malfunction	★Battery ★Power source circuit ★Skid control ECU
C1203 / 59 (DI-536)	ECM communication circuit malfunction	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM
C1268 / 68 (DI-605)	Transfer L4 position signal transmission failure	★Transfer L4 position switch ★Transfer L4 position switch circuit
Always ON (DI-621)	Malfunction in skid control ECU	★Battery ★IC regulator ★Power source circuit ★Skid control ECU

*1: As the DTC cannot be erased by replacing parts alone do either of the following operations.

(1) Clear the DTC (See page DI-505).

(2) At a speed of 20 km/h (12 mph), drive the vehicle for 30 sec. or more.

*2: Using the following table, troubled parts can be specified.

Table of Trouble Part and DTC:

DTC		C1242/42		C1251/51		C1252/52		C1253/53		C1254/54		C1256/56		C1257/57	
BRAKE warning light and buzzer		Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer	Light	Buzzer
Pressure switch	PH					☐	☐			☐		☐	☐		
	PL					☐	☐			☐		☐	☐		
Pump motor circuit	Pump motor			☐	☐	☐	☐					☐	☐		
	MTT wire harness					☐	☐	☐							
	MT+ wire harness			☐											
	MT- wire harness			☐											
Accumulator malfunction												☐	☐		
Motor relay circuit	MR1 open circuit							☐							
	MR2 open circuit							☐							
	MR1 welded contact					☐	☐	☐							
	MR2 welded contact					☐	☐	☐							
Hydraulic brake booster	Pressure leaks					☐	☐					☐	☐		
Power source*	IG2 open circuit	☐													
ECU	Power supply circuit													☐	

*: When IG1 circuit is open, the ABS warning light and BRAKE warning light come on.

DTC chart of VSC:

DTC No. (See Page)	Detection Item	Trouble Area
C1231 / 31 (DI-546)	Malfunction in steering angle sensor	★Steering angle sensor ★Steering angle sensor circuit
C1232 / 32 (DI-551)	Malfunction in deceleration sensor	★Deceleration sensor ★Deceleration sensor circuit
C1233 / 33 (DI-553)	Open or short in yaw rate sensor circuit	★Yaw rate sensor ★Yaw rate sensor circuit
C1234 / 34 (DI-553)	Malfunction in yaw rate sensor	★Yaw rate sensor ★Yaw rate sensor circuit
C1335 / 35 (DI-546)	Open circuit in steering angle sensor	★Steering angle sensor ★Steering angle sensor circuit
C1210 / 36 (DI-538)	Zero point calibration of yaw rate sensor undone	★Yaw rate sensor ★Yaw rate sensor circuit ★PNP switch circuit (P position)
C1336 / 39 (DI-609)	Zero point calibration of deceleration sensor undone	★Deceleration sensor ★Deceleration sensor circuit ★PNP switch (P position) circuit
C1223 / 43 (DI-540)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI-541)	Open or short in NE signal circuit	★NEO circuit ★ECM ★Skid control ECU
C1290 / 66 (DI-608)	Zero point calibration of steering sensor undone	★Steering angle sensor zero point calibration ★Yaw rate sensor zero point calibration
C1340 / 47 (DI-612)	Open circuit in center differential lock signal	★Center differential lock system ★Center differential lock circuit
C1201 / 51 (DI-535)	ECM system malfunction	Engine control system
C1203 / 53 (DI-536)	ECM communication circuit malfunction	★TRC+ or TRC- circuit ★ENG+ or ENG- circuit ★ECM
Always ON (DI-627)	Malfunction in skid control ECU Open in VSC TRAC warning light circuit	★Power source circuit ★VSC TRAC warning light circuit

HINT:

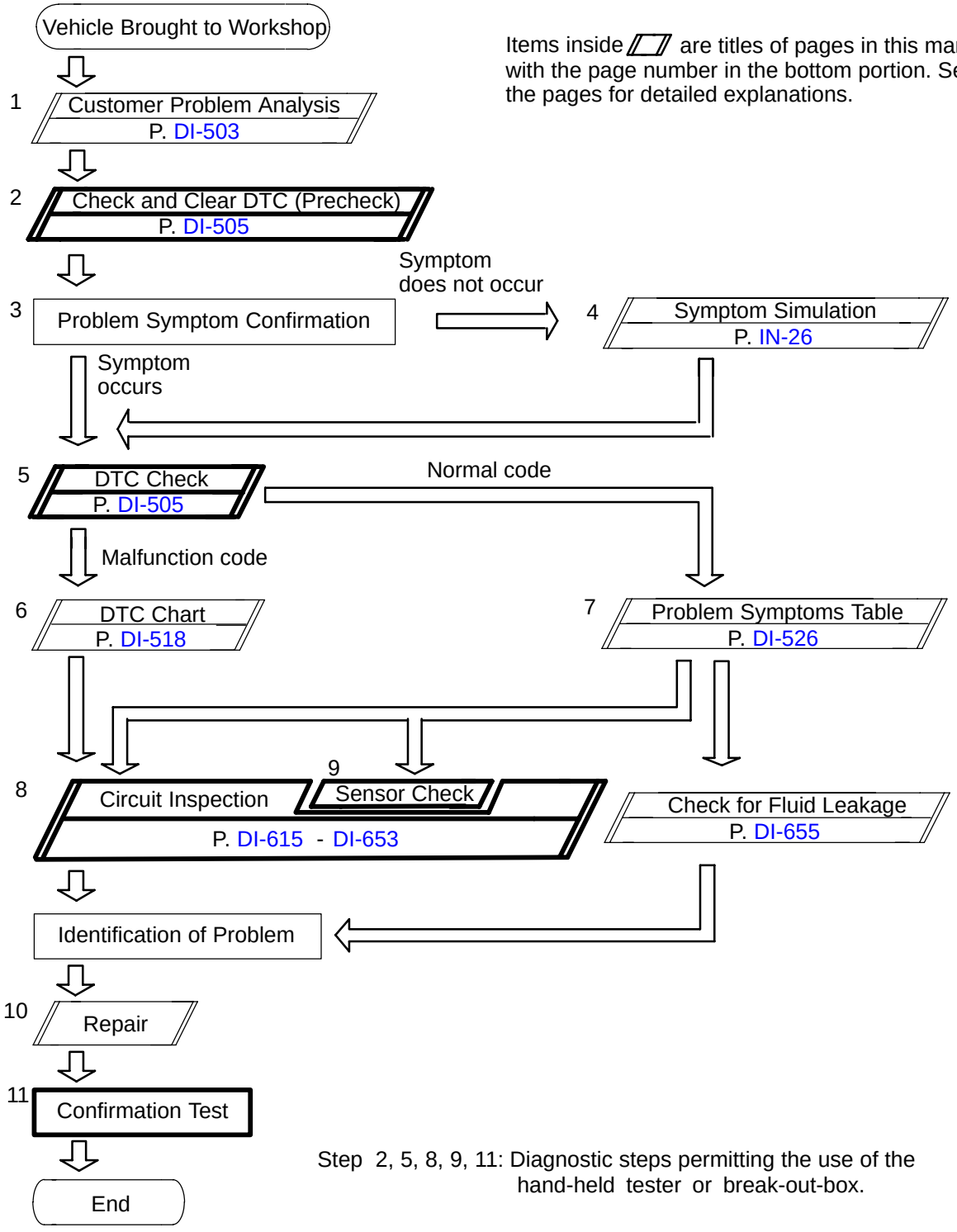
There is a case that TOYOTA hand-held tester cannot be used when the VSC TRAC warning light is always on.

ABS & VEHICLE STABILITY CONTROL (VSC) & BRAKE ASSIST (BA) SYSTEM

DIC8N-01

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.



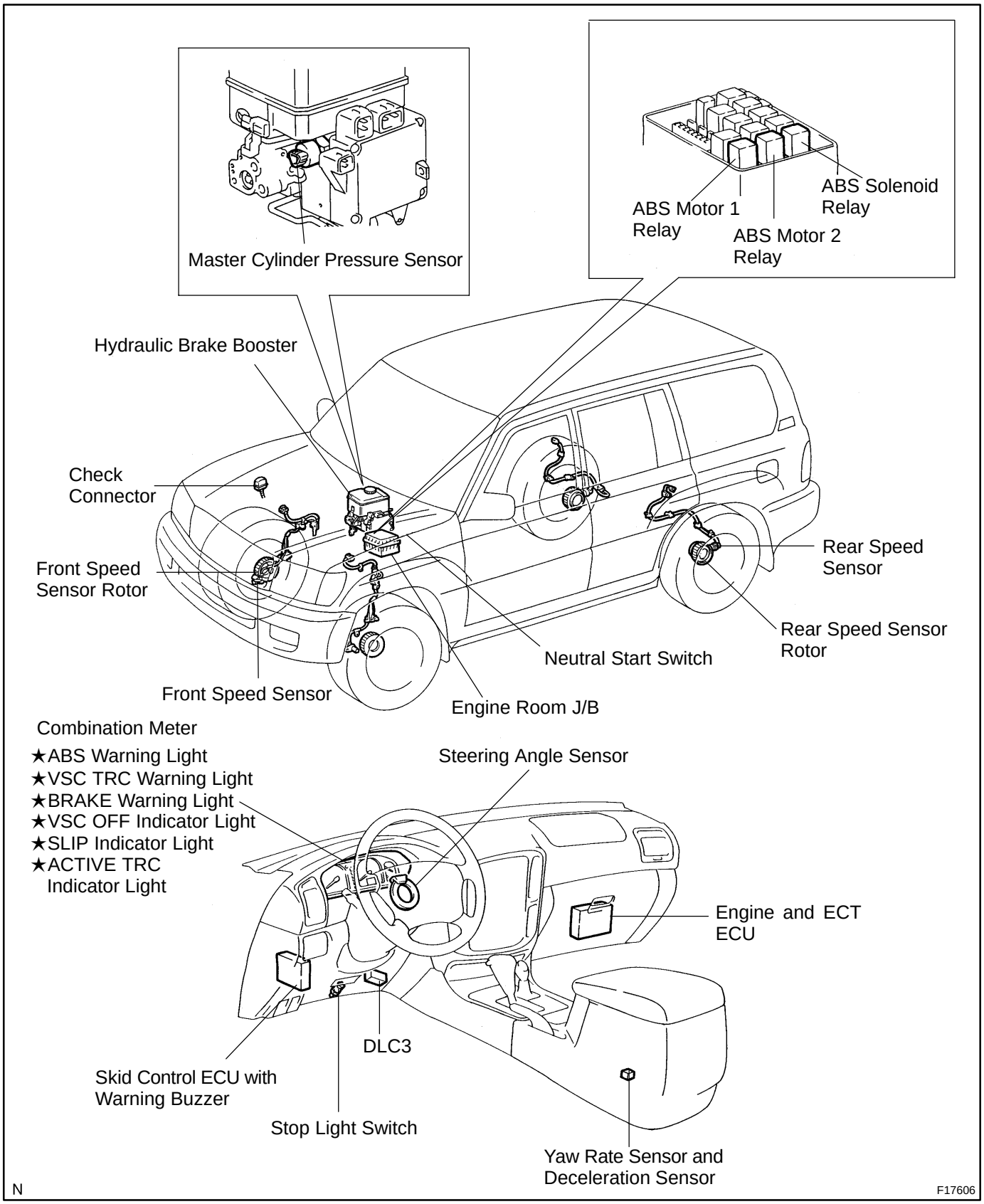
Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

Step 2, 5, 8, 9, 11: Diagnostic steps permitting the use of the hand-held tester or break-out-box.

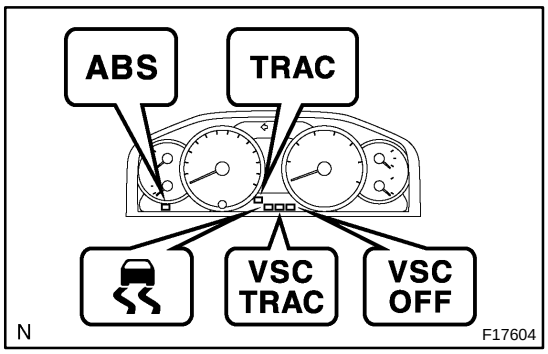
Fail safe function:
When a failure occurs in the ABS & BA & TRAC & VSC systems, the ABS and VSC warning lights are lit and ABS & BA & TRAC & VSC operation is prohibited. In addition to this, when the failure which disables EBD operation occurs, the BRAKE warning light is lit as well and EBD operation is prohibited.

DIC8X-01

PARTS LOCATION



DIC8S-02



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Check the warning lights and buzzer.

(1) Release the parking brake lever.

(2) When the ignition switch is turned ON, check that the ABS, VSC TRAC and BRAKE warning lights, VSC OFF, SLIP and TRAC indicator lights come on for 3 sec.

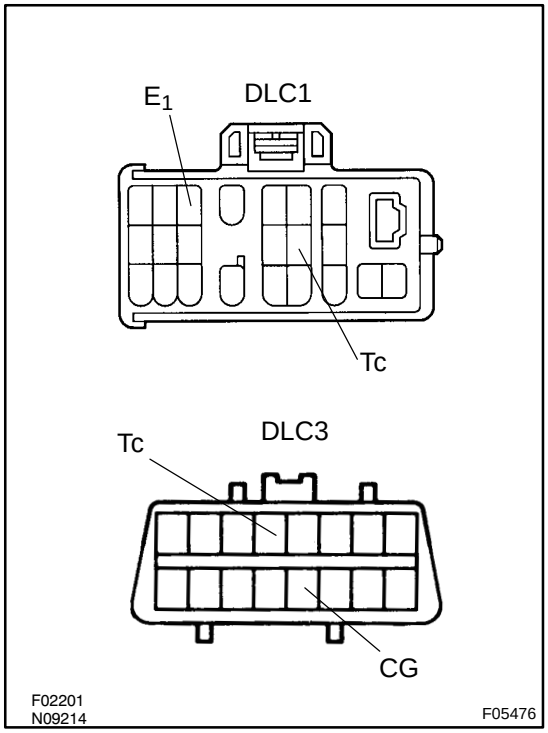
(3) When depressing the brake pedal repeatedly, it may turn on the ABS, VSC TRAC and BRAKE warning lights, VSC OFF indicator light and buzzer.

HINT:

★ If the ECU stores DTC, the ABS, VSC TRAC and BRAKE warning lights and VSC OFF indicator light come ON.

★ If the indicator check result is not normal, proceed to troubleshooting for the ABS warning light circuit, VSC TRAC warning light circuit, brake warning light circuit, VSC OFF indicator light circuit, SLIP indicator light circuit and ACTIVE TRAC indicator light circuit.

Trouble Area	See Page
ABS warning light circuit	DI-627
VSC TRAC warning light circuit	DI-631
BRAKE warning light circuit	DI-635
VSC OFF indicator light circuit	DI-645
SLIP indicator light circuit	DI-639
TRAC indicator light circuit	DI-642



(b) In case of not using hand-held tester:
Check the DTC.

(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

SST 09843-18020 or 09843-18040

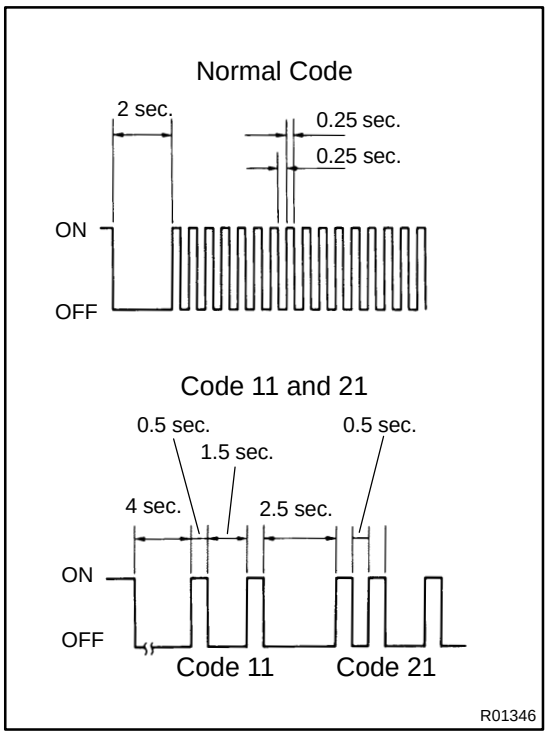
(2) Turn the ignition switch ON.

(3) Read the DTC from the ABS or VSC TRAC warning light on the combination meter.

HINT:

★ If no code appears, inspect the Tc circuit, ABS or VSC TRAC warning light circuit.

Trouble Area	See page
Tc circuit	DI-651
ABS warning light circuit	DI-627
VSC TRAC warning light circuit	DI-631

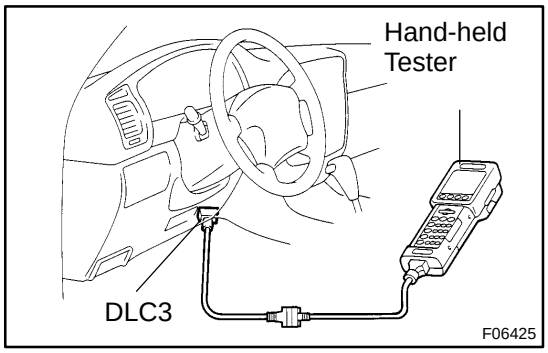


★ As an example, the blinking patterns for normal code and codes 11 and 21 are shown on the left.

(4) Codes are explained in the code table on page DI-518 .

(5) After completing the check, disconnect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 and turn off the display.

If 2 or more malfunctions are indicated at the same time the lowest numbered DTC will be displayed 1st.



(c) In case of using hand-held tester:

Check the DTC.

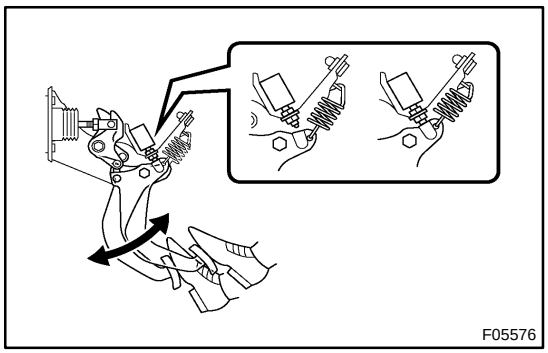
(1) Hook up the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Read the DTC by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.



(d) In case of not using hand-held tester:

Clear the DTC.

(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

SST 09843-18020 or 09843-18040

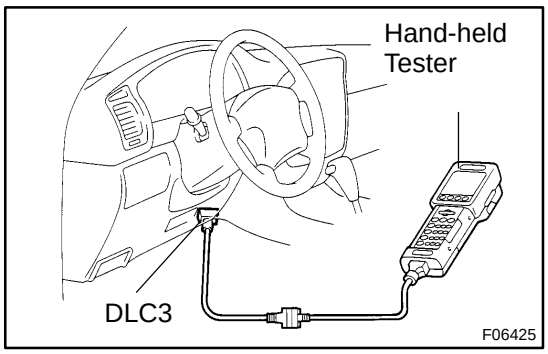
(2) Turn the ignition switch ON.

(3) Clear the DTC stored in the ECU by depressing the brake pedal 8 or more times within 5 sec.

(4) Check that the warning light shows the normal code.

(5) Remove the SST from the terminals of the DLC1 or DLC3.

SST 09843-18020 or 09843-18040



(e) In case of using hand-held tester:
Clear the DTC.
(1) Hook up the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the hand-held tester to erase the codes. (See the hand-held tester operator's manual.)

2. DATA LIST

HINT:

According to the DATA LIST displayed by the hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the methods to shorten labor time.

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON.
(c) According to the display on the tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
HB MOT RELAY	HB Motor relay status/ ON or OFF	-	-
ABS MOT RELAY	Motor relay status/ ON or OFF	-	-
SOL RELAY	Solenoid relay status/ ON or OFF	-	-
PRESS HIGH	HIGH Hydraulic brake boost pressure/ ON or OFF	-	-
PRESS LOW	LOW Hydraulic brake boost pressure/ ON or OFF	-	-
VSC/TRC OFF SW	VSC OFF switch/ ON or OFF	-	-
IDLE SW	Main idle switch/ ON or OFF	ON: Accelerator pedal released OFF: Accelerator pedal depressed	-
STOP LIGHT SW	Stop light switch/ ON or OFF	ON: Brake pedal released OFF: Brake pedal depressed	-
PKB SW	PKB sw/ ON or OFF	ON: Parking brake applied OFF: Parking brake released	-
ABS OPERT FR	Front Right wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (FR) OPERATE: During ABS operation (FR)	-
ABS OPERT FL	Front Left wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (FL) OPERATE: During ABS operation (FL)	-
ABS OPERT RR	Rear Right wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (RR) OPERATE: During ABS operation (RR)	-
ABS OPRET RL	Rear Left wheel operation/ BEFORE or OPERATE	BEFORE: No ABS operation (RL) OPERATE: During ABS operation (RL)	-
WHEEL SPD FR	Front Right wheel speed / Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer

WHEEL SPD FL	Front Left wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RR	Rear Right wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
WHEEL SPD RL	Rear Left wheel speed/ Min.: 0km/h, Max.: 326.4 km/h	Actual wheel speed	Speed indicated on speedometer
DECELERAT SENS	G sensor (GL1 filter)/ Min.: -1.869 G, Max.: 1.869	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
DECELERAT SENS2	G sensor (GL2 filter)/ Min.: -1.869 G, Max.: 1.869	Approximately 0 ± 0.13 G at still condition	Reading changes when vehicle is bounced
IG VOLTAGE	ECU IG power voltage/ UNDER or NORMAL or OVER	-	-
SFRR	SFRR/ ON or OFF	-	-
SFRH	SFRH/ ON or OFF	-	-
SFLR	SFLR/ ON or OFF	-	-
SFLH	SFLH/ ON or OFF	-	-
SRRR (SRR)	SRRR (SRR)/ ON or OFF	-	-
SRRH (SRH)	SRRH (SRH)/ ON or OFF	-	-
SRLR	SRLR/ ON or OFF	-	-
SRLH	SRLH/ ON or OFF	-	-
SRCF (SA1)	SRCF (SA1)/ ON or OFF	-	-
SRCR (SA2)	SRCR (SA2)/ ON or OFF	-	-
SRMF (SMCF, SA3)	SRMF (SMCF, SA3)/ ON or OFF	-	-
SRMR (SMCR, STR)	SRMR (SMCR, STR)/ ON or OFF	-	-
THROTTLE	Throttle position sensor/ Min.: 0 deg, Max.: 125 deg	-	-
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 6000 rpm	Actual engine speed	-
YAW RATE	Yaw rate sensor/ Min.: -128 deg/s, Max.: 128 deg/s	-	-
YAW ZERO VALUE	Memorized zero value/ Min.: -128 deg/s, Max.: 128 deg/s	-	-
STEERING ANG	Steering sensor/ Min.: -1682 deg, Max.: 1877 deg	-1682 to 1877 deg	Turning the steering wheel changes the value Left : Becomes grater Right : Becomes smaller
MAS CYL PRS 1	Master cylinder pressure 1/ Min.: 0 V, Max.: 5 V	When brake pedal is released: 0.3 - 0.9 V	Reading increases when brake pedal is depressed
AIR BLD SUPPORT	Air bleed support/ NOT SUP or SUPPORT	w/ BA: Supported w/ VSC: Not supported	-
TEST MODE	Test mode operation/ NORMAL or TEST	NORMAL: Normal mode TEST: During test mode	-
#CODES	Number of Trouble Code/ Min.: 0, Max.: 255	MIn.: 0, Max.: 45	-

3. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one of the methods to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on the tester, perform the ”ACTIVE TEST”.

HINT:

IG must be turned ON to proceed the ACTIVE TEST using a hand-held tester.

*1: For VSC equipped vehicles only

Item	Test Details	Diagnostic Note
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
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
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
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
SRCF (SA1)	Turns ABS solenoid (SRCF (SA1)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRCR (SA2)	Turns ABS solenoid (SRCR (SA2)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMF (SMCF, SA3)	Turns ABS solenoid (SMCF, SA3)) ON / OFF	Operation of solenoid (clicking sound) can be heard
SRMR (SMCR, STR)	Turns ABS solenoid (SRMR (SMCR, STR)) 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
SRH & SRR	Turns ABS solenoid SRRR & SRRH 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
SRCF & SRCR	Turns ABS solenoid SRCF & SRCR ON / OFF	Operation of solenoid (clicking sound) can be heard

SRMF & SRMR	Turns ABS solenoid SRMF & SRMR ON / OFF	Operation of solenoid (clicking sound) can be heard
SOL RELAY	Turns ABS solenoid relay ON/OFF	Operation of solenoid (clicking sound) can be heard
ABS MOT RELAY	Turns ABS motor relay ON/OFF	Operation of motor (clicking sound) can be heard
TRAC MOT RELAY	Turns TRC motor relay ON/OFF	Operation of motor (clicking sound) can be heard
ABS WARN 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 / TRC OFF indicator ON / OFF	Observe combination meter
SLIP INDI LIGHT	Turns SLIP indicator light ON / OFF	Observe combination meter
BRAKE WRN LIGHT	Turns BRAKE warning light ON / OFF	Observe combination meter
VSC/BR WARN BUZ	Turns VSC / BRAKE warning buzzer ON / OFF	Buzzer can be heard

4. FREEZE FRAME DATA

(a) The vehicle (sensor) status memorized during ABS and/or VSC operation or at the time of error code detection can be displayed by the hand-held tester.

(b) Only one record of freeze frame data is stored and the freeze frame data generated during ABS and/or VSC operation are constantly updated. Also, the number of the ignition switch's "ON" after the freeze frame data is stored can be memorized up to 31 and it can be displayed.

HINT:

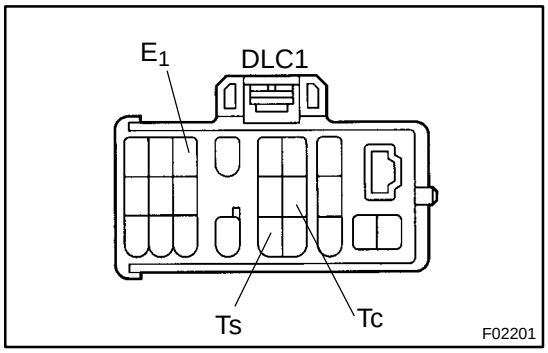
If the ignition switch "ON" operation exceeds 31 times, "31" appears on the display.

(c) If the diagnosis code abnormality occurs, the freeze frame data at the occurrence of the abnormality is stored but the ABS actuation data is deleted.

Hand-held tester display	Measurement Item	Reference Value*
VEHICLE SPD	Wheel speed sensor reading	Speed indicated on speedometer
STOP LIGHT SW	Stop light switch signal	Stop light switch ON: ON, OFF: OFF
# IG ON	Number of operations of ignition switch ON after memorizing freeze frame data	0 - 31
MAS CYL PRESS	Master cylinder pressure sensor reading	Brake pedal release : 0.3 to 0.9 V Brake pedal depress: 0.8 to 4.5 V
MASS PRESS GRADE	Master cylinder pressure sensor change	-30 to 200 MPa/s
SYSTEM	System status	ABS activated: ABS VSC/TRC activated: VSC/TRC BA activated: BA Fail safe mode activated: FAIL SF No system activated: NO SYS
YAW RATE	Yaw rate angle sensor reading	-100 to 100
STEERING ANG	Steering 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)	Right and left G	-1.869 to 1.869
G (BACK & FORTH)	Back and forth G	-1.869 to 1.869
VSC (TRC) OFF SW	VSC OFF switch signal	TRAC OFF SW ON: ON OFF: OFF

Hand-held tester display	Measurement Item	Reference Value*
SHIFT POSITION	Shift lever position	FAIL P,N R D 4 3 2 L
THROTTLE	Throttle sensor reading	0 to 125 deg.

*: If no conditions are specifically stated for "Idling", it means the shift lever is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.



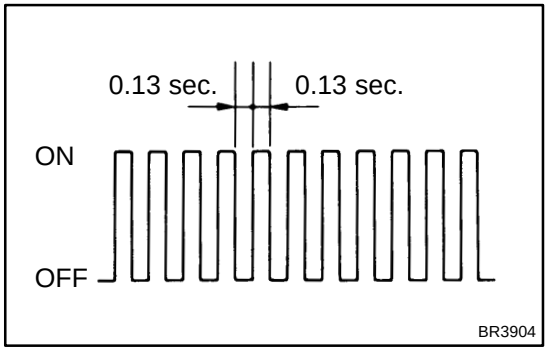
5. SPEED SENSOR SIGNAL CHECK (TEST MODE)

HINT:

★ When replacing the yaw rate sensor or ECU, make sure to perform a yaw rate sensor zero point calibration.

★ If the ignition switch is turned from the ON to the ACC or LOCK position during test mode, DTC will be erased.

(a) In case of not using hand-held tester:
Check the speed sensor signal.
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and E_1 of the DLC1.
SST 09843-18020
(3) Start the engine.



(4) Check that the ABS warning light blinks.

HINT:

If the ABS warning light does not blink, inspect the ABS warning light circuit and Ts circuit (See page DI-627 and DI-653).

(5) Keep the vehicle in the stationary condition on the flat place for 6 sec. or more.
(6) Shift the transfer lever in the L4 position and turn the center diff. lock switch ON.
(7) Shift the transfer lever back.

(8) Leaving the vehicle in the stationary condition and the brake pedal in a free condition for 1 sec. or more, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more for 1 sec. or more.

(9) Leaving the vehicle in the stationary condition, depress the brake pedal with a force of 980 N (100 kgf, 221 lbf) or more quickly.

HINT:

At this time, the ABS warning light comes on for 3 sec.

(10) Drive the vehicle straight forward.
When driving the vehicle with a speed faster than 28 mph (45 km/h) for several seconds, check that the ABS warning light goes off.

HINT:

There is a case that the sensor check is not completed if the vehicle has its wheels spun or its steering wheel turned during this check.

(11) Stop the vehicle.

(12) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.

SST 09843-18020 or 09843-18040

(13) Read the number of blinks of the ABS warning light.

HINT:

★ See the list of DTC on the next page.

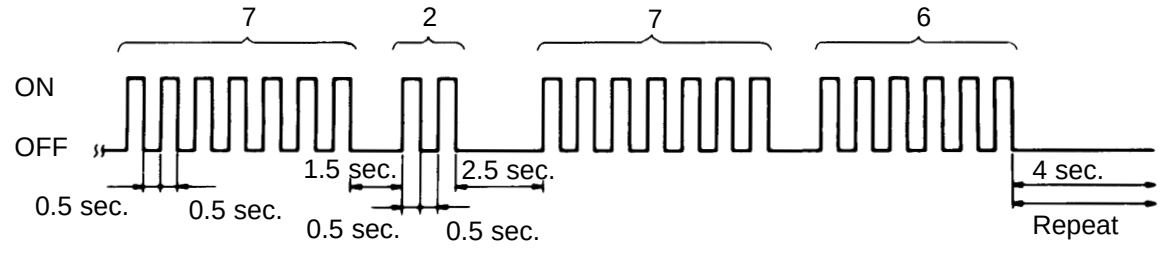
★ If every sensor is normal, a normal code is output (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated).

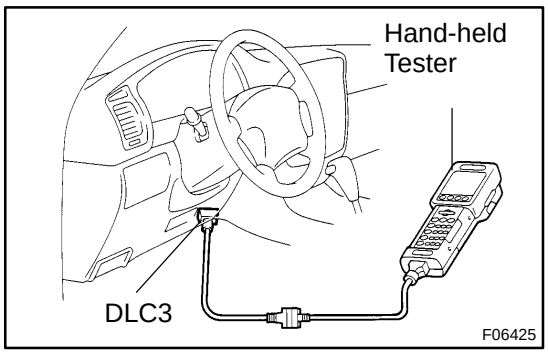
★ If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.

(14) After doing the check, disconnect the SST from terminals of the DLC1 or terminals of the DLC1 and DLC3, and turn the ignition switch OFF.

SST 09843-18020 or 09843-18040

Malfunction Code (Example Code 72, 76)





(b) In case of using hand-held tester:
Check the sensor signal.
(1) Hook up the hand-held tester to the DLC3.
(2) Do step (3) to (10) on the previous page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the hand-held tester operator's manual for further details.

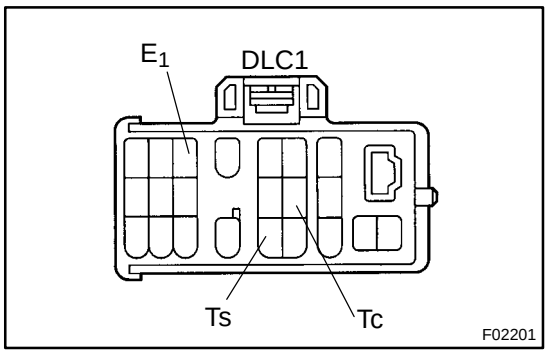
DTC of speed sensor signal check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage in right front speed sensor	★Right front speed sensor ★Sensor installation ★Sensor rotor
C1272 / 72	Low output voltage in left front speed sensor	★Left front speed sensor ★Sensor installation ★Sensor rotor
C1273 / 73	Low output voltage in right rear speed sensor	★Right rear speed sensor ★Sensor installation ★Sensor rotor
C1274 / 74	Low output voltage in left rear speed sensor	★Left rear speed sensor ★Sensor installation ★Sensor rotor
C1275 / 75	Abnormal change in output voltage of right front speed sensor	Right front speed sensor rotor
C1276 / 76	Abnormal change in output voltage of left front speed sensor	Left front speed sensor rotor
C1277 / 77	Abnormal change in output voltage of right rear speed sensor	Right rear speed sensor rotor
C1278 / 78	Abnormal change in output voltage of left rear speed sensor	Left rear speed sensor rotor
C1279 / 79	Deceleration sensor is faulty	★Deceleration sensor ★Sensor installation
C1281 / 81	Master cylinder pressure sensor output signal is faulty	Master cylinder pressure sensor
C1282 / 82	Transfer indicator (center diff. lock) switch malfunction	Transfer indicator (center diff. lock) switch
C1283 / 83	Transfer L4 position switch malfunction	Transfer L4 position switch

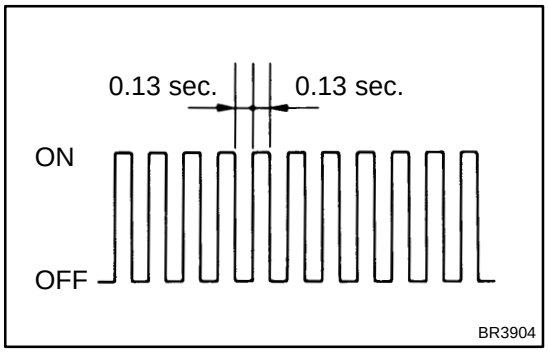
6. In case of not using hand-held tester:
VSC SENSOR CHECK (TEST MODE)

NOTICE:
When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform a zero point calibration of the yaw rate and deceleration sensors (See step 8.).

HINT:
If the ignition switch is turned from the ON to the ACC or LOCK during test mode, DTC will be erased.



(a) Procedures for test mode:
(1) Turn the ignition switch OFF.
(2) Check that the shift lever is in the P position, and turn the steering wheel to the neutral position.
(3) Using SST, connect terminals Ts and E_1 of the DLC1.
SST 09843-18020
(4) Start the engine.



(5) Check that the VSC TRAC warning light blinks.

HINT:

If the VSC TRAC warning light does not blink, inspect the VSC TRAC warning light circuit and Ts terminal circuit (See page DI-631 and DI-653).

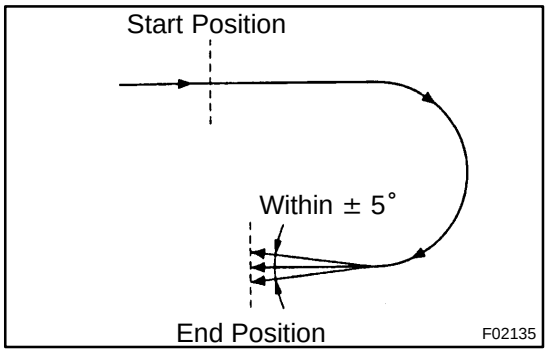
Turn the steering wheel either to the left or right 450˚ or more from the vehicle stationary condition, and turn back the steering wheel to the straight ahead position.

(b) Keep the vehicle stationary on a level place for 1 sec. or more.

(c) Check the yaw rate sensor.

Shift the shift lever to the D position and drive the vehicle at a vehicle speed of approx. 5 km/h (3 mph), turn the steering wheel either to the left or right 90˚ or more, and maintain this angle until the vehicle has turned 180˚.

Stop the vehicle and shift the shift lever to the P position. Check that the VSC buzzer sounds for 3 sec.



If the VSC buzzer sounds, the sensor check is in normal completion.

If the VSC buzzer does not sound, do the sensor check again.

If the VSC buzzer still does not sound, check the VSC buzzer circuit, then do the sensor check again.

Trouble Area	See page
VSC buzzer circuit	DI-649

HINT:

★ Make a 180˚ turn. 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.

(d) Read the DTC.

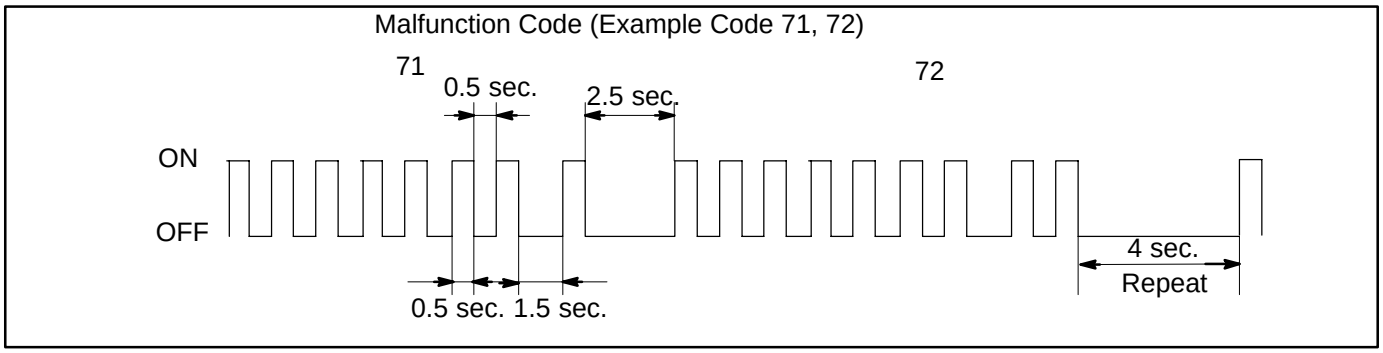
(1) Using SST, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3.
SST 09843-18020 or 09843-18040
(2) Read the number of times the VSC TRAC warning light blinks.

HINT:

★ See the list of DTC shown on the next page.

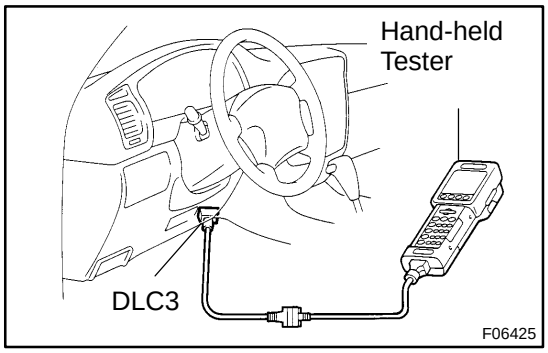
★ If every sensor is normal, a normal code is output. (A cycle of 0.25 sec. ON and 0.25 sec. OFF is repeated.)

★ If 2 or more malfunctions are indicated at the same time, the lowest numbered code will be displayed 1st.



(3) After doing the check, disconnect the SST from terminals of the DLC1 or terminals of the DLC1 and DLC3 and turn the ignition switch OFF.

SST 09843-18020 or 09843-18040



7. In case of using hand-held tester: CHECK VSC SENSOR SIGNAL

NOTICE:

When having replaced the yaw rate sensor, deceleration sensor and/or ECU, perform a zero point calibration of the yaw rate and deceleration sensors (See step 7.). Make sure that this operation should be done before starting the following.

(a) Hook up the hand-held tester to the DLC3.

(b) Do steps (a)-(2) and from (a)-(4) to (c) on the previous page.

(c) Read the DTC by following the prompts on the tester screen.

HINT:

Please refer to the hand-held tester operator's manual for further details.

DTC of the VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	★Yaw rate sensor ★Yaw rate sensor circuit

8. IF NECESSARY, PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS

HINT:

★ When having replaced the yaw rate sensor, deceleration sensor or/and the ECU, make sure to perform a yaw rate and deceleration sensors zero point calibration.

★ This operation is also required when the deceleration sensor or yaw rate sensor has been replaced since the calibrated zero point of both sensors will be erased.

NOTICE:

★ **While obtaining the zero point, do not vibrate the vehicle by tilting, moving or shaking it and keep it in a stationary condition. (Do not start the engine.)**

★ **Be sure to do this on a level surface (within an inclination of 1 %).**

(a) Clear the zero point of the yaw rate and deceleration sensors.

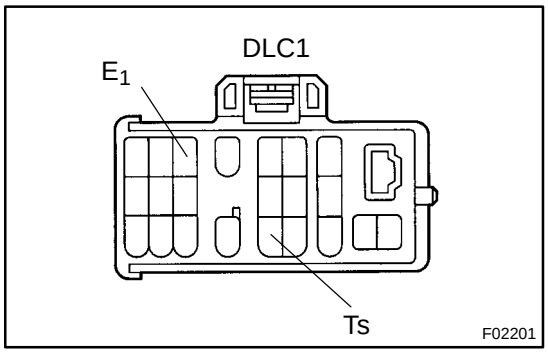
(1) Shift the shift lever to P range.

(2) Turn the ignition switch ON in a stationary condition.

(3) With the ignition switch ON, using SST, repeat a cycle of short and open between terminals Ts and E_1 of the DLC1 4 times or more within 8 sec. Check that the VSC warning light is lit indicating the recorded zero point is erased.

SST 09843-18020

(4) Turn the ignition switch OFF.



(b) Obtain the zero point of the yaw rate sensor.

(1) Disconnect terminals Ts and E_1 of the DLC1.

(2) Turn the ignition switch ON.

HINT:

The vehicle should be in a stationary condition with the shift lever in the P position.

(3) Check that the lighted VSC warning light goes off about 15 sec. after the ignition switch is turned ON.

HINT:

Even if the ignition is not turned OFF in step (a)-(4) and remains ON, a yaw rate sensor zero point calibration can be completed. In this case, the VSC warning light is lit about 15 sec. and starts blinking. (Normal code)

(4) After ensuring that the VSC warning light remains OFF for 2 sec., turn the ignition switch OFF.

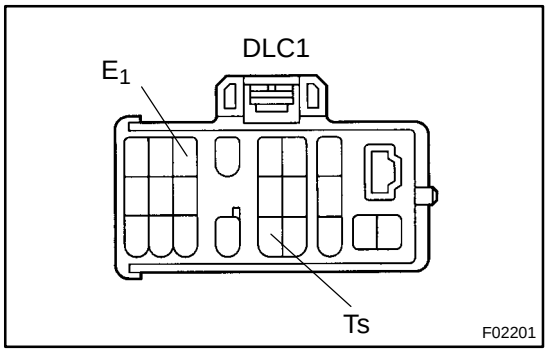
HINT:

If the ignition switch is not turned OFF in step (a)-(4), ensure the blinking of the VSC warning light for 2 sec. and turn the ignition switch OFF.

(c) Perform a deceleration sensor zero point calibration.

NOTICE:

After step (b) (a yaw rate sensor zero point calibration), the VSC warning light goes off. At this time, if the vehicle is driven without performing step (c) (a deceleration sensor zero point calibration), deceleration sensor zero point calibration malfunction will be detected and the VSC warning light will light up. Therefore, perform step (c) right after step (b).



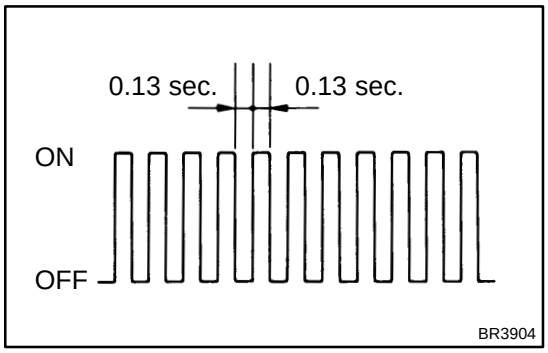
(1) Using SST, connect terminals Ts and E_1 of the DLC1.

SST 09843-18020

(2) Turn the ignition switch ON.

HINT:

Keep the vehicle in a stationary condition with the shift lever in the P position.



(3) After turning the ignition switch ON, check that the VSC warning light is lit for about 4 sec. and then starts quick blinking at 0.13 sec. intervals.

(4) After ensuring the blinking of the VSC warning light for 2 sec., turn the ignition switch OFF.

(5) Remove the SST and disconnect terminals Ts and E1 of the DLC1.

SST 09843-18020

DIC91-01

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:

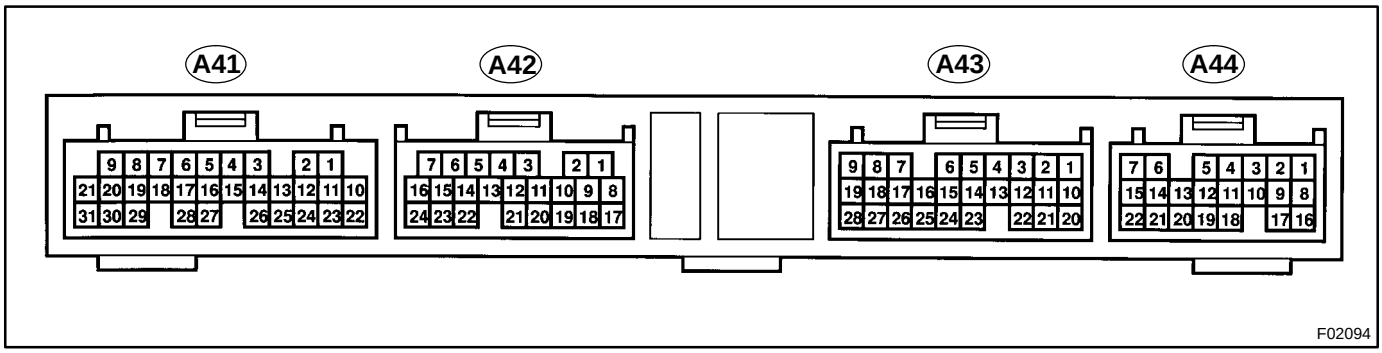
When replacing the skid control ECU, sensor, etc., turn the ignition switch OFF.

Symptom	Suspected Area	See page
ABS does not operate BA does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Reconfirm the DTC and check that the normal code is output. 2. IG power source circuit 3. Speed sensor circuit 4. Check the hydraulic brake booster with a checker or hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-655).	 DI-505 DI-558 DI-615 BR-40
ABS does not operate efficiently BA does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Reconfirm the DTC and check that the normal code is output. 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the hydraulic brake booster with a checker or hand-held tester. If abnormal, check the hydraulic circuit for leakage (See page DI-655).	 DI-505 DI-615 DI-573 BR-40
ABS warning light abnormal	1. ABS warning light circuit 2. Skid control ECU	DI-627 IN-36
DTC check cannot be done	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. ABS warning light circuit 2. VSC OFF indicator light, center diff. lock indicator switch circuit 3. Center diff. lock indicator switch circuit 4. Tc terminal circuit	 DI-627 DI-645 DI-612 DI-651
Speed sensor signal check cannot be done	1. Ts terminal circuit 2. Skid control ECU	DI-653 IN-36
TRAC does not operate	Only when 1. to 4. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit	 DI-505 DI-558 DI-655 DI-615
VSC does not operate	Only when 1. to 7. are all normal and the problem is still occurring, replace the skid control ECU. 1. Check the DTC, reconfirming that the normal code is output. 2. IG power source circuit 3. Check the hydraulic circuit for leakage. 4. Speed sensor circuit 5. Deceleration sensor circuit 6. Yaw rate sensor circuit 7. Steering angle sensor circuit	 DI-505 DI-558 DI-655 DI-615 DI-570 DI-553 DI-605

VSC TRAC warning light abnormal	1. VSC TRAC warning light circuit 2. Skid control ECU	DI-631 IN-36
BRAKE warning light abnormal	1. BRAKE warning light circuit 2. Skid control ECU	DI-635 IN-36
SLIP indicator light abnormal	1. SLIP indicator light circuit 2. Skid control ECU	DI-639 IN-36
VSC OFF indicator abnormal	1. VSC OFF indicator light, center diff. lock switch circuit 2. Skid control ECU	DI-645 IN-36
TRAC indicator light abnormal	1. TRAC indicator light circuit 2. Skid control ECU	DI-642 IN-36

DIC8Z-01

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
SA1 (A41 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	G - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SA2 (A41 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	B - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SA3 (A41 - 4) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
STR (A41 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	G-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SFLR (A41 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	B-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRRH (A41 - 8) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRRR (A41 - 9) - GND (A41 - 6, 31, A42 - 8, 17)	B-O - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
VCM (A41 - 10) - GND (A41 - 6, 31, A42 - 8, 17)	B - W-B	IG switch ON	4.5 to 5.5 V
PH (A41 - 11) - GND (A41 - 6, 31, A42 - 8, 17)	O - W-B	IG switch ON, pressure switch (PH) ON	Below 0.9 V
		IG switch ON, pressure switch (PH) OFF	5 to 8 V
FR+ (A41 - 14) - FR- (A41 - 13)	L - P	IG switch ON, slowly turn right front wheel	AC generation
FL+ (A41 - 16) - FL- (A41 - 15)	R - G	IG switch ON, slowly turn left front wheel	AC generation
SR (A41 - 19) - R1+ (A41 - 1)	G-Y - P	IG switch ON, ABS warning light OFF	10 to 14 V
SFLH (A41 - 21) - GND (A41 - 6, 31, A42 - 8, 17)	Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
PMC (A41 - 22) - E2 (A41 - 12)	R - W	IG switch ON, stop light switch OFF	0.3 to 0.7 V
E2 (A41 - 12) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch OFF	Continuity
MTT (A41 - 27) - GND (A41 - 6, 31, A42 - 8, 17)	B-R - W-B	IG switch ON (Motor relay is OFF)	Below 1.5 V
MT+ (A41 - 28) - MT- (A41 - 18)	L - GR	IG switch ON (Motor relay is ON)	Below 1.5 V
MR1 (A41 - 29) - R1+ (A41 - 1)	R - P	IG switch ON, hydraulic brake booster pump motor running	10 to 14 V
WA (A42 - 1) - GND (A41 - 6, 31, A42 - 8, 17)	R-L - W-B	IG switch ON, ABS warning light OFF	Below 2.0 V

BZ (A42 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	L - W-B	IG switch ON, VSC buzzer sound can be heard	Below 1.5 V
D/G (A42 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	V-W - W-B	IG switch ON	10 to 14 V
P (A42 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	IG switch ON, shift lever is in P position	10 to 14 V
IG1 (A42 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON	10 to 14 V
NEO (A42 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	Engine idling	Pulse generation
STP (A42 - 10) - GND (A41 - 6, 31, A42 - 8, 17)	G-W - W-B	Stop light switch pushed in	10 to 14 V
		Stop light switch released	2 to 5 V
Tc (A42 - 11) - GND (A41 - 6, 31, A42 - 8, 17)	P-B - W-B	IG switch ON and terminals Tc-E $_1$ of DLC1 connected	Below 1.0 V
		IG switch ON and terminals Tc-E $_1$ of DLC1 not connected	10 to 14 V
Ts (A42 - 12) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON and terminals Ts-E $_1$ of DLC1 connected	Below 1.0 V
		IG switch ON and terminals Ts-E $_1$ of DLC1 not connected	10 to 14 V
PKB (A42 - 13) - GND (A41 - 6, 31, A42 - 8, 17)	R-W - W-B	IG switch ON, parking brake switch ON	Below 1.5 V
		IG switch ON, parking brake switch OFF	10 to 14 V
ENG+ (A42 - 14) - ENG - (A42 - 22)	R - G	IG switch ON	Pulse generation
RL+ (A42 - 18) - RL- (A42 - 19)	R - G	IG switch ON, slowly turn left rear wheel	AC generation
RR+ (A42 - 20) - RR- (A42 - 21)	B - W	IG switch ON, slowly turn right rear wheel	AC generation
TRC+ (A42 - 24) - TRC- (A42 - 16)	Y - L	IG switch ON	Pulse generation
EXI2 (A43 - 2) - GND (A41 - 6, 31, A42 - 8, 17)	B-L - W-B	IG switch ON, transfer in L4 position	8 to 14 V
		IG switch ON, transfer in any position except L4	Below 1.5 V
EXI (A43 - 3) - GND (A41 - 6, 31, A42 - 8, 17)	P-B - W-B	IG switch ON, center diff. lock switch ON	Below 2.0 V
		IG switch ON, center diff. lock switch OFF	10 to 14 V
VSCW (A43 - 4) - GND (A41 - 6, 31, A42 - 8, 17)	L-W - W-B	IG switch ON, VSC TRAC warning light ON	Below 2.0 V
		IG switch ON, VSC TRAC warning light OFF	10 to 14 V
BRL (A43 - 5) - GND (A41 - 6, 31, A42 - 8, 17)	Y-G - W-B	IG switch ON, BRAKE warning light ON	10 to 14 V
		IG switch ON, BRAKE warning light OFF	Below 2.0 V
IND (A43 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	L-B - W-B	IG switch ON, SLIP indicator light ON	Below 2.0 V
		IG switch ON, SLIP indicator light OFF	10 to 14 V
WT (A43 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	L-R - W-B	IG switch ON, VSC OFF indicator light ON	Below 2.0 V
		IG switch ON, VSC OFF indicator light OFF	10 to 14 V
VYS (A43 - 9) - GYAW (A43 - 27)	B - W-R	IG switch ON	4.5 to 5.5 V
GL2 (A43 - 10) - GYAW (A43 - 27)	Y - P	IG switch ON, vehicle is placed on the horizontal surface	2.0 to 3.0 V
SS1+ (A43 - 14) - SS1- (A43 - 23)	W - G	Engine idling, slowly turn steering wheel	Pulse generation (See page DI-546)
INFR (A43 - 15) - GND (A41 - 6, 31, A42 - 8, 17)	B-R - W-B	IG switch ON, ACTIVE TRAC indicator light ON	Below 1.5 V
		IG switch ON, ACTIVE TRAC indicator light OFF	10 to 14 V
YD (A43 - 19) - GND (A41 - 6, 31, A42 - 8, 17)	L - W-B	Approx. 1 sec. after IG switch ON	4.5 to 5.3 V

GL1 (A43 - 22) - GYAW (A43 - 27)	G-R	IG switch ON, vehicle is placed on the horizontal surface	2.0 to 3.0 V
GYAW (A43 - 27) - GND (A41 - 6, 31, A42 - 8, 17)	R - W-B	IG switch OFF	Continuity
YAW (A43 - 28) - GYAW (A43 - 27)	W - R	IG switch ON, vehicle is in stationary condition	2 to 3 V
SRLR (A44 - 1) - GND (A41 - 6, 31, A42 - 8, 17)	R-G - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
MR2 (A44 - 2) - R2+ (A44 - 3)	Y-B - W-L	IG switch ON, hydraulic brake booster pump motor running	10 to 14 V
AST (A44 - 6) - GND (A41 - 6, 31, A42 - 8, 17)	R-Y - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SRLH (A44 - 7) - GND (A41 - 6, 31, A42 - 8, 17)	R-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
SFRR (A44 - 8) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
PL (A44 - 9) - GND (A41 - 6, 31, A42 - 8, 17)	W - W-B	IG switch ON, pressure switch ON	3 to 5 V
		IG switch ON, pressure switch OFF	7 to 11 V
TRIG (A44 - 20) - GND (A41 - 6, 31, A42 - 8, 17)	L - R	IG switch ON, ABS warning light OFF	10 to 14 V
+BO (A44 - 21) - GND (A41 - 6, 31, A42 - 8, 17)	LG - L	IG switch ON	10 to 14 V
SFRH (A44 - 16) - GND (A41 - 6, 31, A42 - 8, 17)	LG - W-B	IG switch ON, ABS warning light OFF	10 to 14 V
IG2 (A44 - 22) - GND (A41 - 6, 31, A42 - 8, 17)	B-W - W-B	IG switch ON	10 to 14 V

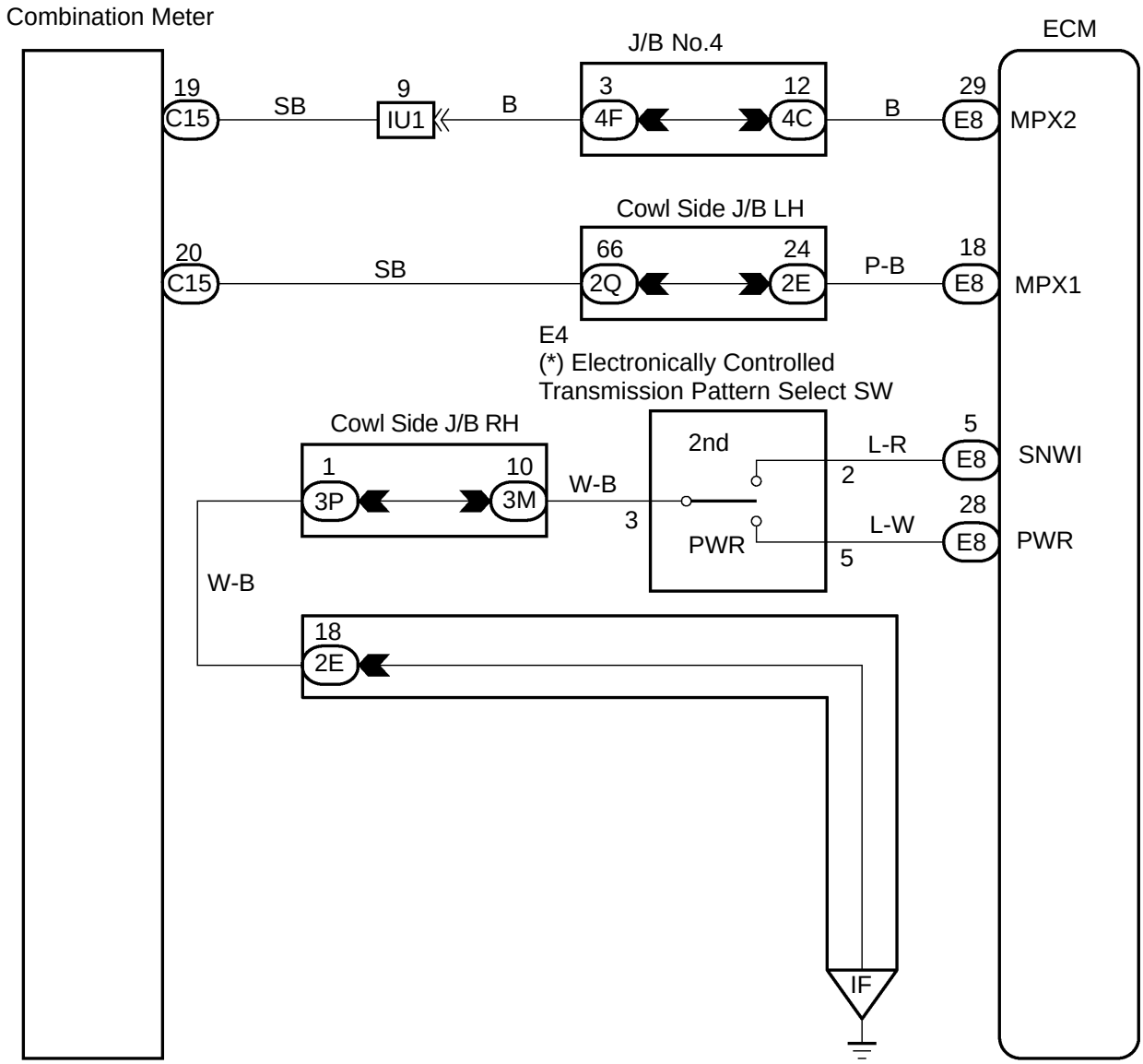
DIB3N-02

Pattern Select Switch Circuit (2nd Start Switch)

CIRCUIT DESCRIPTION

When 2nd start mode is selected with the pattern select switch, the ECM controls the solenoid valves and the transmission starts from 2nd gear.
In D position, the transmission automatically shifts up through 3rd to 5th as usual.
In 2nd position, the transmission is held in 2nd gear.

WIRING DIAGRAM



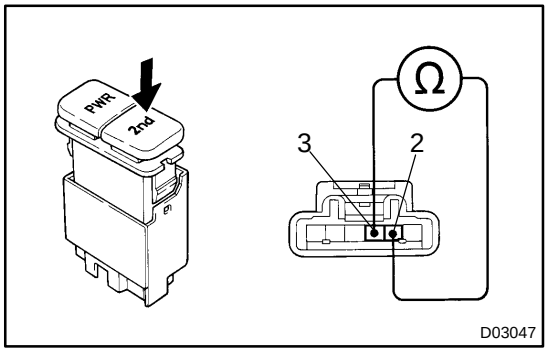
(*) Pattern Select Switch (2nd Start Switch)
When the 2nd start switch is pushed, the switch contact is made and the 2nd mode is selected.
To cancel the 2nd start, push the 2nd start switch once again. The 2nd start is automatically cancelled out when the ignition switch is turned OFF.

C

D12771

INSPECTION PROCEDURE

1	Check pattern select switch (2nd start switch).



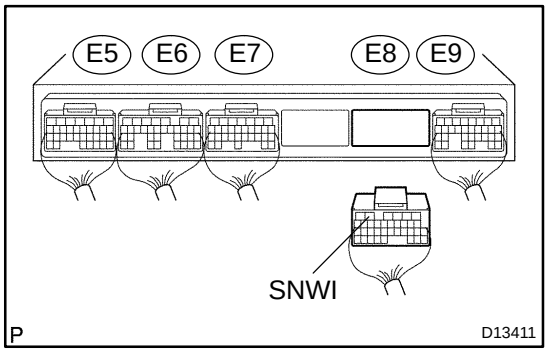
PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between terminals 2 and 3 of pattern select switch connector when pattern select switch is set to 2nd start switch ON and OFF.
OK:

2nd start switch	Specified condition
Press continuously "2nd" switch	Continuity
Release "2nd" switch	No continuity

NG → **Replace the pattern select switch.**

OK ↓

2	Check harness and connector between terminal SNWI of ECM and body ground.



PREPARATION:
(a) Connect the pattern select switch connector.
(b) Disconnect the connector of ECM.
CHECK:
Check continuity between terminal SNWI of ECM and body ground when the pattern select switch is set to 2nd start switch ON and OFF.
OK:

2nd start switch	Specified condition
Press contnuously "2nd" switch	Continuity
Release "2nd" switch	No Continuity

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI-396).**

NG ↓

Repair or replace harness or connector (See page IN-36).

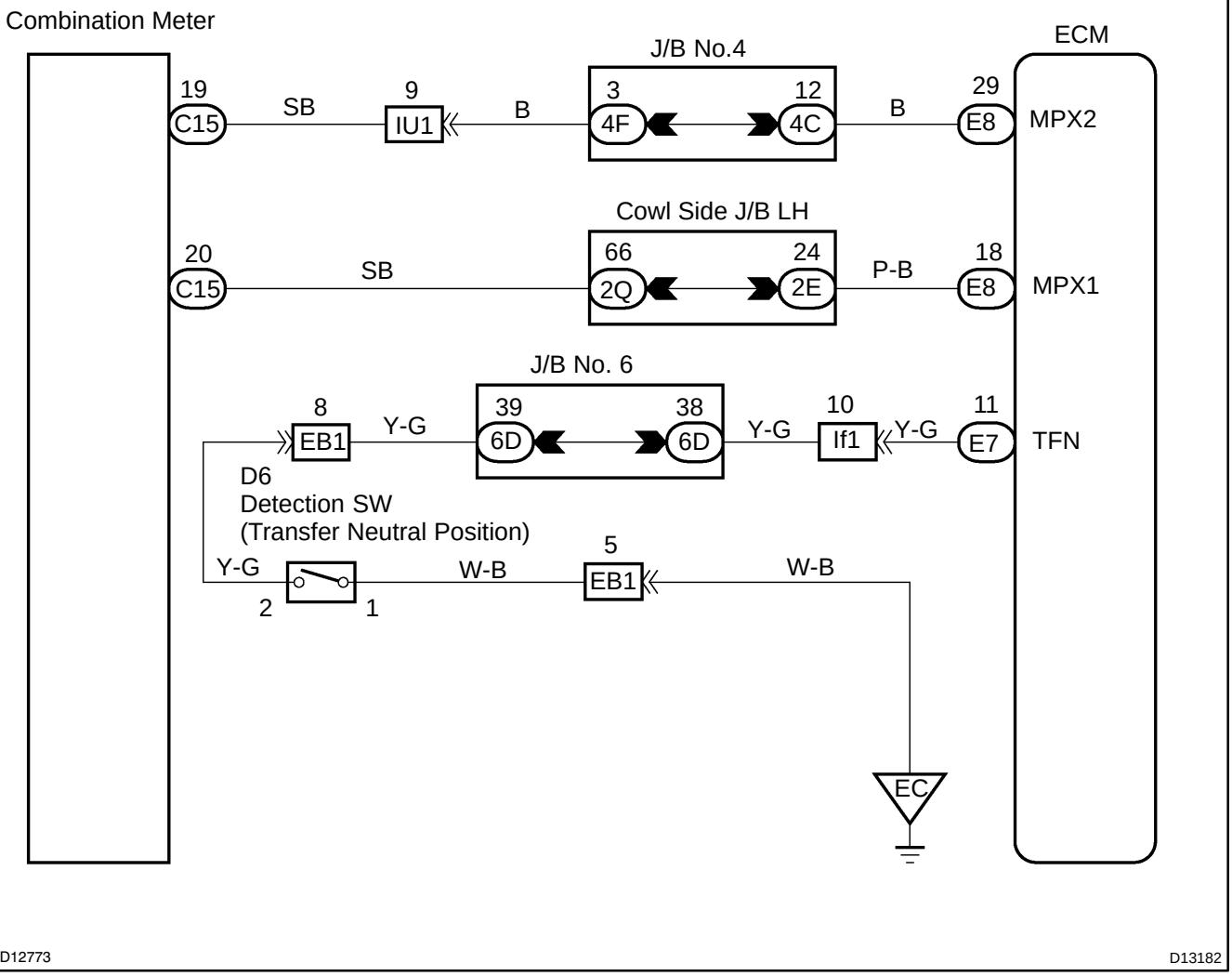
DI3C7-07

A/T. P. (Automatic Transmission Parking) Indicator Circuit

CIRCUIT DESCRIPTION

The propeller shaft and wheels are free even when the transmission shift lever is set to P as long as the transfer shift lever is in Neutral position. The A/T.P. indicator light lights up to warn the driver that the propeller shaft and wheels are not locked.
If the A/T.P. indicator light goes on, the transfer shift lever should be shifted to the positions other than N position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check park/neutral position switch (See page DI-402).

NG → Replace the park/neutral position switch.

OK

2	Check transfer neutral position switch (See page DI-457).

NG → Replace the transfer neutral position switch.

OK

3	Check harness and connector between ECM and transfer neutral position switch, transfer neutral position switch and body ground (See page IN-36).

NG → Repair or replace the harness or connector.

OK

Proceed to next circuit inspection shown on matrix chart (See page DI-396).

DIC2Y-01

CIRCUIT INSPECTION

DTC	P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)

DTC	P0850	Park/Neutral Switch Input Circuit

CIRCUIT 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-trip detection logic) ★All switches are OFF simultaneously for P, R, N, D, 3 and 2 positions. ★2 or more switches are ON simultaneously for P, R, N, (D 4), 3 and (2 L) positions.	★Short in park/neutral position switch circuit ★Park/neutral position switch ★ECM
P0850	Park/neutral position switch remaines ON (P, N position) during driving under conditions (a) and (b) for 30 sec. (2-trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 - 2,500 rpm	

MONITOR DESCRIPTION

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 engine can be started only when the vehicle is in P or N shift position.
When the park/neutral position switch sends more than one signal at a time from switch positions P, R, N or D, the ECM interprets this as a fault in the switch. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

P0705:

Related DTCs	P0705	Park/neutral position switch/Verify switch input
Required sensors/Components	Park/neutral position switch	
Frequency of operation	Continuous	
Duration	Condition (A), (B) and (D)	2 sec.
	Condition (C)	60 sec.
MIL operation	2 driving cycle	
Sequence of operation	None	

P0850:

Related DTCs	P0850	Park/neutral position switch/Verify switch cycling
Required sensors/Components	Main	Park/neutral position switch
	Sub	Crankshaft position sensor (NE), MAF meter
Frequency of operation	Continuous	
Duration	30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0705:

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Ignition switch	ON	
Battery voltage	10.5 V or more	

P0850:

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed	70 km/h (43 mph) or more	-
Engine speed	1,500 rpm or more	2,500 rpm or less
Intake air amount per revolution	0.9 g/rev. or more	-

TYPICAL MALFUNCTION THRESHOLDS

P0705:

Detection criteria	Threshold
One of the following conditions is met: Condition (A), (B), (C) or (D)	
Condition (A)	
Number of the following signal input at the same time	2 or more
P switch	ON
N switch	
R switch	
D switch	
3 switch	
2 switch	
Condition (B)	
Number of the following signal input at the same time	2 or more
NSW switch	ON
R switch	
D switch	
3 switch	
2 switch	
Condition (C)	
All of following conditions are met	
P switch	OFF
N switch	
NSW switch	
R switch	
D switch	
3 switch	
2 switch	
Condition (D)	
Both (i) and (ii) are met	
(i) One of followings is met	
NSW switch	ON
P switch	
N switch	
R switch	
(ii) One of followings is met	
4 switch	ON
L switch	

P0850:

Detection criteria	Threshold
NSW signal	ON

COMPONENT OPERATING RANGE

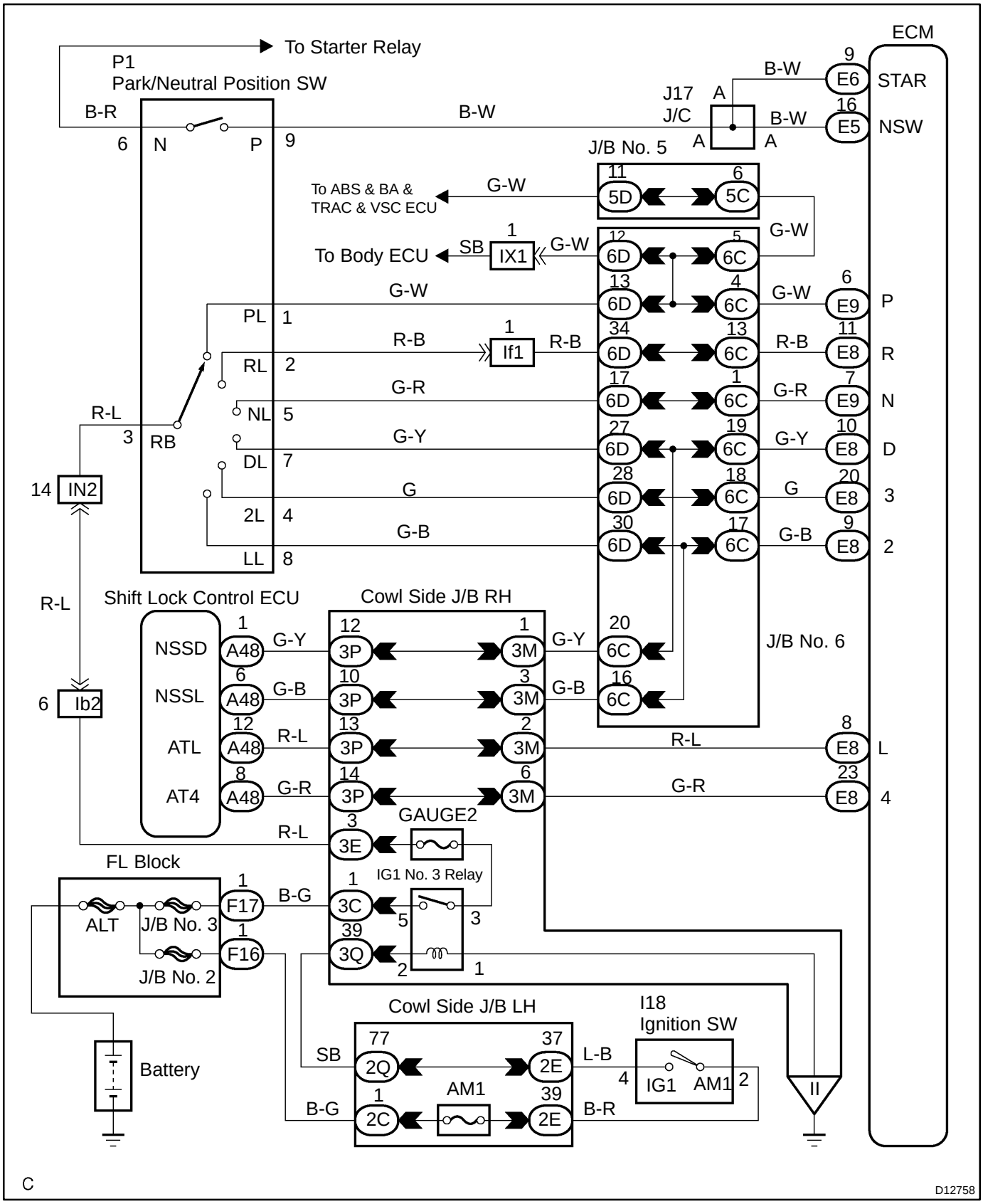
P0705:

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch sends only one signal to the ECM.

P0850:

Parameter	Standard value
Park/neutral position switch	The park/neutral position switch is OFF when avobe condition.

WIRING DIAGRAM



INSPECTION PROCEDURE

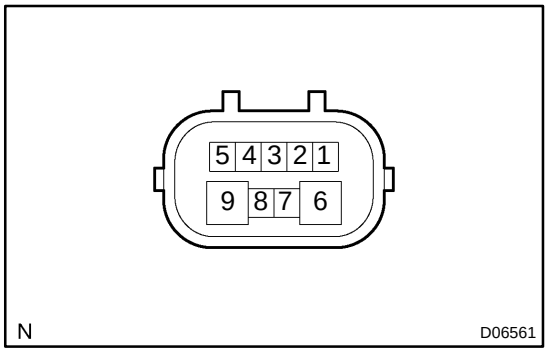
HINT:

According to the DATA LIST displayed by the OBD ll scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD ll scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD ll scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD ll/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	The shift lever position and these values are different, there are failures of the PNP switch or shift cable adjustment.
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D and 4: ON Except D and 4: OFF	

1 **Check park/neutral position switch.**



PREPARATION:

(a) Jack up the vehicle.
(b) Disconnect the park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each position.

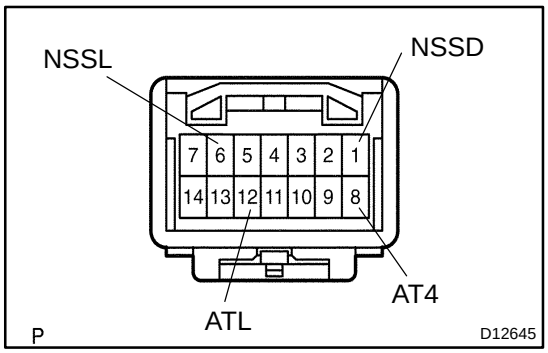
OK:

Shift position	Terminal No. to continuity	Terminal No. to continuity
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D, 4	3 - 7	-
3	3 - 4	-
2, L	3 - 8	-

NG → **Replace park/neutral position switch (See page AT-7).**

OK

2	Check transmission control switch.



PREPARATION:

(a) Connect the park/neutral position switch connector.

(b) Disconnect the shift lock control computer connector (transmission control switch).

CHECK:

Check continuity between each terminal of shift lock control computer (transmission control switch).

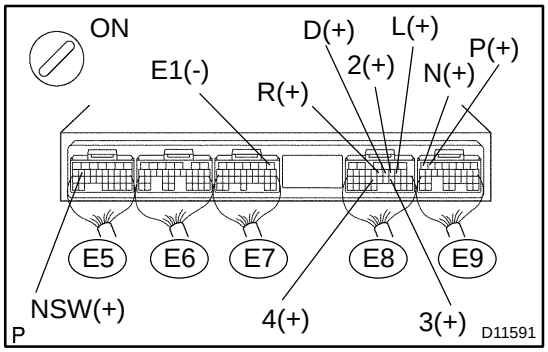
OK:

Shift position	Tester connection	Specified valve
D	1 - 8 (NSSD - AT4)	No continuity
4		Continuity
2	6 - 12 (NSSL - ATL)	No continuity
L		Continuity

NG → **Replace the transmission control switch (See page AT-20).**

OK →

3	**Measure voltage between each terminals of NSW, P, R, N, D, 4, 3, 2, L and E1 of ECM.**



PREPARATION:

(a) Connect the shift lock control computer connector (transmission control switch).

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between each terminals NSW, P, R, N, D, 4, 3, 2, L and E1 of ECM when the shift lever is shifted to the following positions.

OK:

Tester connection	Condition	Specified condition
NSW - Body ground	Shift lever position: P and N	Below 1 V
	Shift lever position: Except P and N	Battery voltage
P- Body ground	Shift lever position: P	Battery voltage
R - Body ground	Shift lever position: R	Battery voltage*
N - Body ground	Shift lever position: N	Battery voltage
D - Body ground	Shift lever position: D and 4	Battery voltage
4 - Body ground	Shift lever position: 4	Battery voltage
3 - Body ground	Shift lever position: 3	Battery voltage
2 - Body ground	Shift lever position: 2 and L	Battery voltage
L - Body ground	Shift lever position: L	Battery voltage

HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

OK → **Check and replace the ECM (See page IN-36).**

NG

Repair or replace the harness or connector (See page IN-36).

DIC2Z-01

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

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0710	(a) and (b) is detected momentary within 0.5 sec. when neither P0712 or P0713 is 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. HINT: Within 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	★Open or short in ATF temperature sensor No. 1 circuit ★ATF temperature sensor No. 1 ★ECM
P0712	ATF temperature sensor resistance is less than 79 Ω. for 0.5 sec. or more (1-trip detection logic)	
P0713	ATF temperature sensor resistance is more than 156 kΩ. 15 minutes or more after the engine start DTC is detected for 0.5 sec. or more (1-trip detection logic)	

MONITOR DESCRIPTION

The automatic transmission fluid (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 opens or shorts 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 turn on the MIL and store the DTC.

*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.

HINT:

The ATF temperature can be checked on the OBD II scan tool or hand-held tester display.

MONITOR STRATEGY

Related DTCs	P0710	ATF temperature sensor/Range check (Fluttering)
	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

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

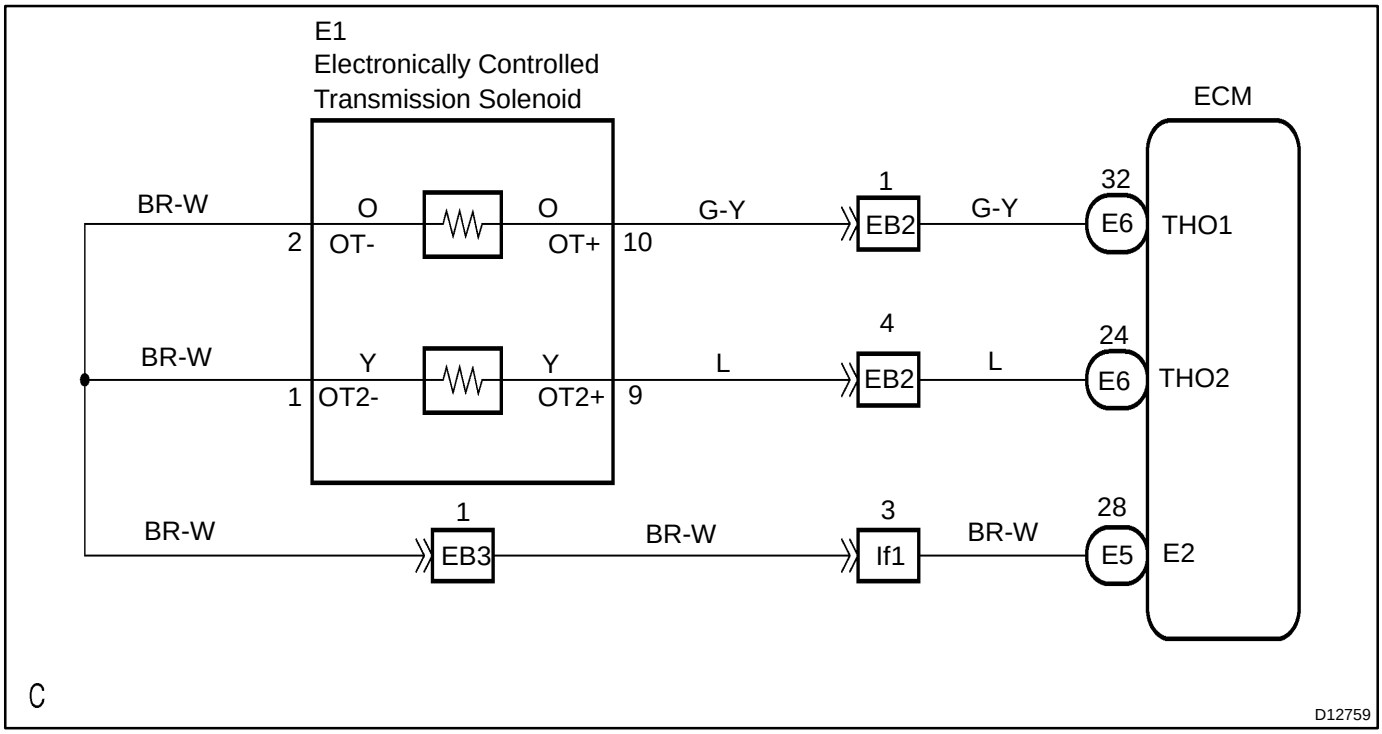
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 79 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 79 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor resistance	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

According to the DATA LIST displayed by the OBD ll scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD ll scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD ll scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD ll/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
AT FLUID TEMP	ATF Temp. Sensor No.1 Value/ min.: -40˚C (-40˚F) max.: 215˚C (419˚F)	80˚C (176˚F) (After Stall Test)	If the value is "-40˚C (-40˚F)" or "215˚C (419˚F)", ATF temp. sensor No. 1 circuit is opened or shorted.

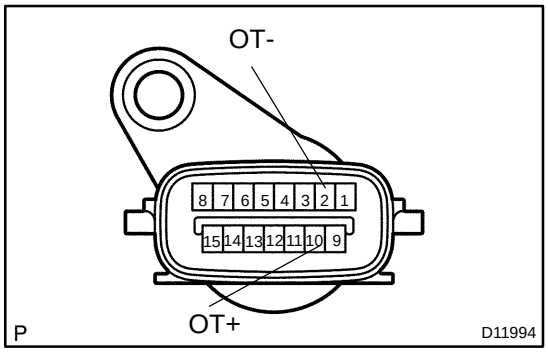
HINT:

When DTC P0712 is output and OBD ll scan tool or hand-held tester output is 150˚C (302˚F), there is a short circuit.

Measure the resistance between THO1 (THO) and body ground.

Temperature Displayed	Malfunction
-40 ˚C (-40˚F)	Open circuit
150˚C (302˚F) or more	Short circuit

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector from the transmission.

CHECK:

Measure the resistance between terminals OT+ and OT-.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals OT+ and OT- of the transmission wire connector and body ground.

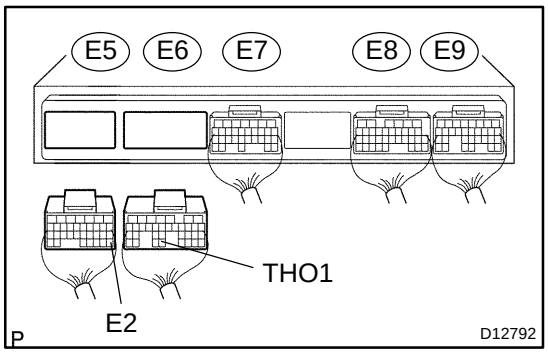
OK:

Resistance: 1 MΩ or higher

NG → **Replace the transmission wire (ATF temperature sensor).**

OK

2	Measure resistance between terminal THO1 and E2 of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance between terminals THO1 and E2.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals THO1 and E2 of the ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

DIC30-01

DTC	P0711	Transmission Fluid Temperature Sensor ”A” Performance

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P0711	(A) Both (a) and (b) are detected: (2-trip detection logic) (a) Intake air and engine coolant temps. are more than -10˚C (14˚F) at engine start (b) After normal driving for over 20 min. and 9 km (6 mile) or more, ATF temp. is less than 20˚C (68˚F) (B) After 17 min. of engine start, the ATF temp. is 110˚C (230˚F) or more (2−trip detection logic).	★Open or short in ATF temperature sensor No. 1 circuit ★ATF temperature sensor No. 1 ★ECM

MONITOR DESCRIPTION

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 an opens or shorts in the ATF temperature circuit or a fault of 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 turns on the MIL.
When the ATF temperature is 110□C (230□F) or more after 17 minutes of engine cold start, the ECM also determines this as a fault, turns on the MIL, and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0711	ATF temperature sensor/Rationality check
Required sensors/Components	ATF temperature sensor	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
ATF Temperature sensor ”A” circuit	There is no malfunction in the circuit shown on the left.	
ECT (Engine coolant temperature) sensor circuit		
IAT (Intake air temperature) sensor circuit		
Time after engine start	18 min. and 20 sec. or more	-
ECT	-15 ˚C (5˚F) or more	-
Driving distance after engine start	9 km (6 mile) or more	-
IAT (12 sec. after engine start)	-20 ˚C (-4˚F) or more	-
ECT (12 sec. after engine start)	-20 ˚C (-4˚F) or more	-

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
ATF Temperature	Less than 10˚C (50˚F) (ATF temperature = -10˚C (14˚F) at engine start) (Conditions vary with ATF temperature at engine start)

COMPONENT OPERATING RANGE

Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM

See page DI-410 .

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0711).**

PREPARATION:

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD II scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD II scan tool or the hand-held tester.
(f) Select the item ”DIAGNOSIS/ENHANCED OBD II/DTC INFO/CURRENT CODES”.

CHECK:

Read the DTCs using the OBD II scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0711” is output	A
”P0711” and other DTCs	B

HINT:

If any other codes besides ”P0711” is output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-389).**

A

2	Check transmission fluid level (See page DI-361).

NG → Add fluid.

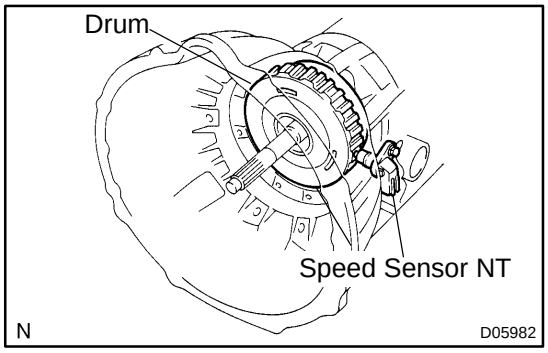
OK →

Replace the transmission wire (ATF temperature sensor).

DIB35-02

DTC	P0717	Input Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



The speed sensor NT detects the rotation speed of the input shaft from the rotation of the drum. Its construction is the same as that of the speed sensor SP2.
By comparing the speed sensor NT signal and speed sensor SP2 signal, the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus providing smooth gear shift.

DTC No.	DTC Detection Condition	Trouble Area
P0717	All conditions below are detected for 5 secs. or more (1-trip detection logic) (a) Gear change not being performed (b) Gear position: 1st, 2nd, 3rd, 4th or 5th (c) T/M input shaft rpm: 300 rpm or less (d) T/M output shaft rpm: 1,000 rpm or more (e) Park/neutral position switch: OFF (f) Shift solenoid valves, park/neutral posotion switch and vehicle speed sensor are in normal operation	★Open or short in speed sensor NT circuit ★Speed sensor NT ★ECM ★Automatic transmission assembly

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 then the expected value and the input shaft speed is 300 rpm or less while running with the shift in the D position, the ECM will conclude that there is malfunction of the input turbine speed sensor (NT). The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0717	Speed sensor (NT)/Verify pulse input
Required sensors/Components	Main	Speed sensor (NT)
	Sub	Speed sensor (NO)
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Shift change	Shift change is completed and before starting next shift change operation	
Transmission Shift position	4th or 5th	
Output shaft rpm	1,000 rpm or more	-
NSW switch	OFF	
R switch	OFF	
L switch	OFF	
Engine	Running	

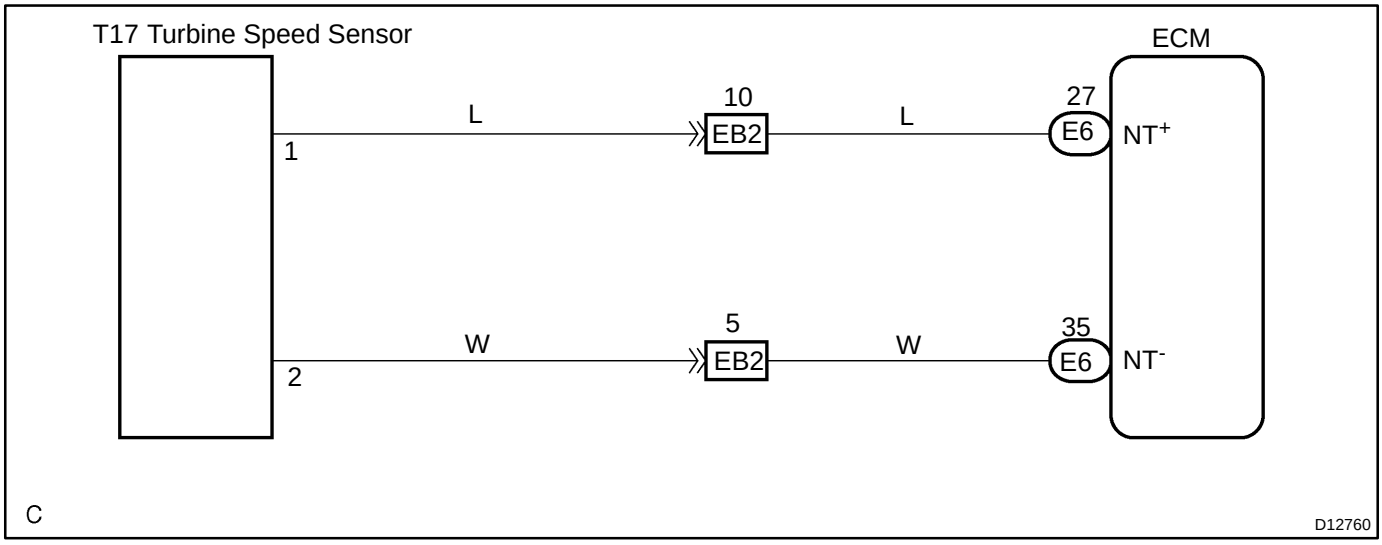
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Sensor signal rpm	Less than 300 rpm

COMPONENT OPERATING RANGE

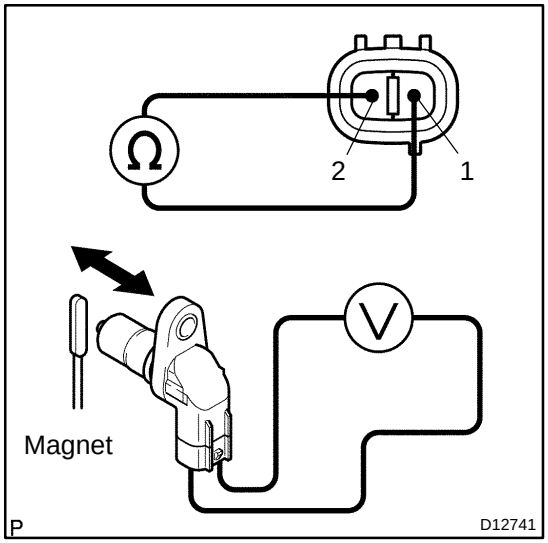
Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor NT.**



PREPARATION:
Remove the speed sensor NT.
CHECK:
(a) Measure the resistance between the sensor terminals.
Standard: 560 to 680 Ω at 20˚C (68˚F)
(b) Measure the voltage between the sensor terminals when a magnet is put close to the front end of the sensor then moved away quickly.
Standard: Sensor generates voltage intermittently
HINT:
The generated voltage is extremely low.
OK:
Standard

NG	**Replace speed sensor NT.**

OK

2	**Check harness and connector between ECM and speed sensor NT (See page IN-36).**

NG	**Repair or replace harness and connector.**

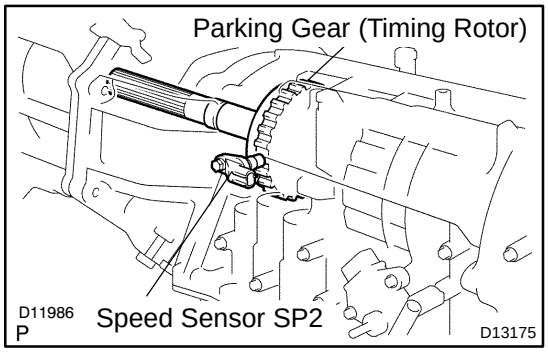
OK

Check and replace the ECM (See page IN-36).

DIB36-02

DTC	P0722	Output Speed Sensor Circuit No Signal

CIRCUIT DESCRIPTION



The speed sensor SP2 detects the rotation speed of the transmission output shaft and sends signals to the ECM. The ECM determines the vehicle speed based on these signals. An AC voltage is generated in the speed sensor SP2 coil as the parking gear mounted on the rear planetary gear assy rotates, and this voltage is sent to the ECM. The parking gear on the rear planetary gear is used as the timing rotor for this sensor.
The gear shift point and lock-up timing are controlled by the ECM based on the signals from this vehicle speed sensor and the throttle position sensor signal. If the speed sensor SP2 malfunctions, the ECM uses input signals from the speed sensor NT as a back-up signal.

DTC No.	DTC Detection Condition	Trouble Area
P0722	All conditions below are detected 500 times or more continuously (1-trip detection logic) (a) No signal from speed sensor SP2 is input to ECM while 4 pulses of No. 1 vehicle speed sensor signal are sent (b) Vehicle speed is 9 km/h (6 mph) or more for at least 4 sec. (c) Park/neutral position switch is OFF. (d) Transfer position is except neutral (4WD).	★Open or short in speed sensor SP2 circuit ★Speed sensor SP2 ★ECM

MONITOR DESCRIPTION

The output speed sensor monitors the output shaft speed. The ECM controls the gearshift point and the lock up timing based on the signals from the output speed sensor and throttle position sensor.
If the ECM detects no signal from the output shaft speed sensor even while the vehicle is moving, it will conclude that is a malfunction of the output speed sensor. The ECM will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0722	Speed sensor SP2/Verify pulse input
Required sensors/Components	Speed sensor SP2	
Frequency of operation	Continuous	
Duration	500 output shaft revolution	
MIL operation	Immediate	
Sequence of operation	None	

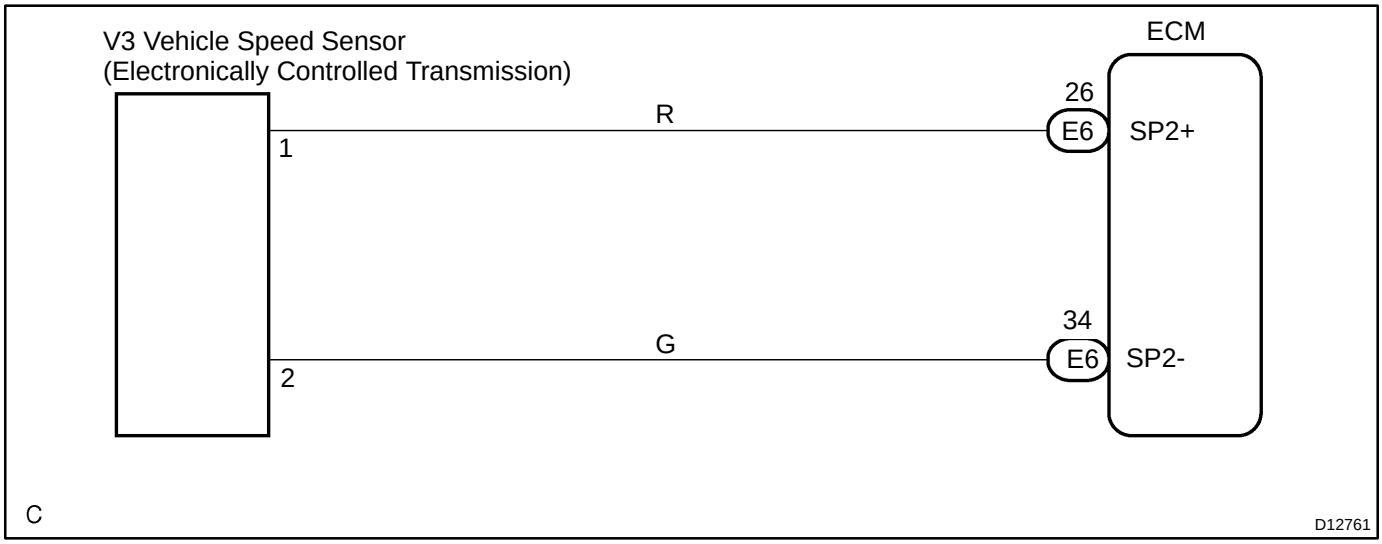
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed range (4 sec. or more)	9 km/h (6 mph) or more	-
NSW switch	OFF	
Transfer neutral switch	OFF	

TYPICAL MALFUNCTION THRESHOLDS

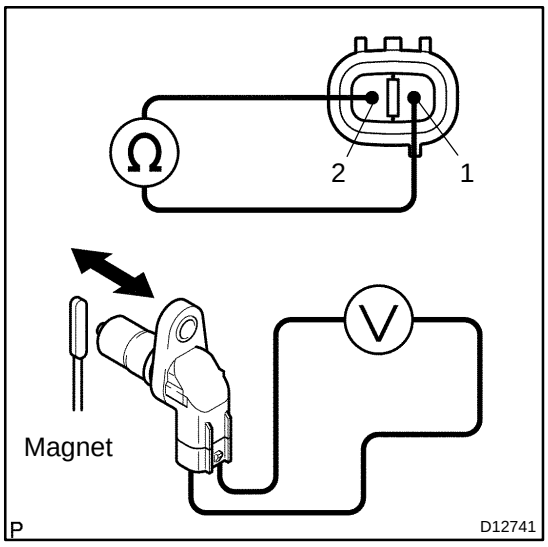
Detection criteria	Threshold
No pulse input during 4 vehicle speed sensor pulse input	500 times or more

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor SP2.**



PREPARATION:
Remove the speed sensor SP2.
CHECK:
(a) Measure the resistance between the sensor terminals.
Standard: 560 to 680 Ω at 20˚C (68˚F)
(b) Measure the voltage between the sensor terminals when a magnet is put close to the front end of the sensor then moved away quickly.
Standard: Sensor generates voltage intermittently.
HINT:
The generated voltage is extremely low.
OK:
Standard

NG → **Replace speed sensor SP2.**

OK

2	**Check harness and connector between ECM and speed sensor SP2 (See page IN-36).**

NG → **Repair or replace harness and connector.**

OK

Check and replace the ECM (See page IN-36).

DIB37-02

DTC	P0724	Brake Switch ”B” Circuit High

CIRCUIT DESCRIPTION

The purpose of this circuit is to prevent the engine from stalling, while driving in lock-up condition, when brakes are suddenly applied.
When the brake pedal is operated, this switch sends a signal to ECM. Then the ECM cancels operation of the lock-up clutch while braking is in progress.

DTC No.	DTC Detection Condition	Trouble Area
P0724	Stop light switch always turn on even vehicle is driver Go and Stop 10 times. (2-trip detection logic)	★Short in stop light switch signal circuit ★Stop light switch ★ECM

MONITOR DESCRIPTION

When the stop light switch remains ON during ”stop and go” driving, the ECM interprets this as a fault in the stop light switch and the MIL comes on and the ECM stores the DTC. The vehicle must stop and go (3 km/h (2 mph) to 30 km/h (19 mph)) ten times for two driving cycles in order to detect malfunction.

MONITOR STRATEGY

Related DTCs	P0724	Stop light switch/Range check/Rationality
Required sensors/Components	Main	Stop light switch
	Sub	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	GO and STOP 10 times	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
The stop light switch remains on during GO and STOP 10 times.		
GO and STOP are defined as follows;		
GO: Vehicle speed	30 km/h (19 mph) or more	-
STOP: Vehicle speed	-	Less than 3 km/h (2 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Brake switch status	ON stuck

WIRING DIAGRAM

See page DI-278 .

INSPECTION PROCEDURE

1	Check stop light switch (See page BE-50).

NG → Replace stop light switch.

OK

2	Check harness and connector between ECM and stop light switch (See page IN-36).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN-36).

DIB38-02

DTC	P0748	Pressure Control Solenoid ”A” Electrical (Shift Solenoid Valve SL1)

CIRCUIT DESCRIPTION

Shifting from 1st to 5th is performed in combination with ON and OFF of the shift solenoid valves S1, S2, SR, SL1 and SL2, controlled by ECM. If an open or short circuit occurs in either of the shift solenoid valves, the ECM controls the remaining normal shift solenoid valve to allow the vehicle to be operated smoothly (Fail safe function).

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 to shift to the gear positions shown in the table below.
Manual shifting as shown in the following table must be done (In the case of a short circuit, the ECM stops sending current to the short circuited solenoid).

: ON X: OFF

Position	NORMAL						S1 OFF						S2 OFF						SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	○	×	×	×	○	R	×	×	×	×	○	R	○	×	×	×	○	R	○	×	×	×	○
"D"	1 st	○	×	×	×	○	4 th ↓ 3 rd	×	× → ○	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd	×	○	×	×	○	1 st ↓ 4 th	○ → ×	×	×	×	○	2 nd	○	○	×	×	○
	3 rd	×	○	×	×	○	3 rd	×	○	×	×	○	4 th	×	×	×	×	○	3 rd	×	○	×	×	○
	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○	4 th	×	×	×	×	○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	4 th	×	×	×	○	×
"3"	1 st	○	×	×	×	○	3 rd ↓ 3 rd E/B	×	× → ○	×	×	○ → ×	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd	○	○	×	×	○	3 rd ↓ 3 rd E/B	×	○	×	×	○ → ×	1 st ↓ 3 rd E/B	○ → ×	×	×	×	○ → ×	2 nd	○	○	×	×	○
	3 rd E/B	×	○	×	×	×	3 rd E/B	×	○	×	×	×	3 rd E/B	×	×	×	×	×	3 rd E/B ↓ 3 rd	×	○	×	×	× → ○
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	3 rd	×	× → ○	×	×	○ → ○
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	3 rd E/B ↓ 3 rd	×	× → ○	×	○ → ×	× → ○
"2"	1 st	○	×	×	×	○	1 st	×	×	×	×	○	1 st	○	×	×	×	○	1 st	○	×	×	×	○
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B ↓ 4 th	○ → ×	×	○	×	× → ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4th	×	×	○	×	× → ○	2 nd	× → ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st ↓ 2 nd	× → ○	× → ○	×	×	○ → ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B ↓ 2 nd	× → ○	○	×	○ → ×	×
"L"	1 st E/B	○	×	×	×	×	1 st E/B	×	×	×	×	×	1 st E/B	○	×	×	×	×	1 st E/B	○	×	×	×	×
	2 nd E/B	○	○	○	×	×	3 rd E/B	×	○	○	×	×	2 nd E/B ↓ 4 th	○ → ×	×	○	×	× → ○	2 nd	○	○	×	×	×
	3 rd E/B	×	○	○	×	×	3 rd E/B	×	○	○	×	×	Fail 4 th	×	×	○	×	× → ○	2 nd	× → ○	○	×	×	×
	4 th	×	×	○	×	○	4 th	×	×	○	×	○	4 th	×	×	○	×	○	1 st ↓ 2 nd	× → ○	× → ○	×	×	○ → ×
	5 th	×	×	○	○	×	5 th	×	×	○	○	×	5 th	×	×	○	○	×	1 st E/B ↓ 2 nd	× → ○	× → ○	×	○ → ×	×

: ON X: OFF

Position	S1 S2 OFF						S2 SR OFF						S1 SR OFF						S1 S2 SR OFF					
	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2	Gear	S1	S2	SR	SL1	SL2
"R"	R	X	X	X	X	O	R	O	X	X	X	O	R	X	X	X	X	O	R	X	X	X	X	O
"D"	4 th	X	X	X	X	O	1 st	O	X	X	X	O	4 th ↓ 3 rd	X	X→O	X	X	O	4 th	X	X	X	X	O
	4 th	X	X	X	X	O	1 st ↓ 4 th	O→X	X	X	X	O	3 rd	X	O	X	X	O	4 th	X	X	X	X	O
	4 th	X	X	X	X	O	4 th	X	X	X	X	O	3 rd	X	O	X	X	O	4 th	X	X	X	X	O
	4 th	X	X	X	X	O	4 th	X	X	X	X	O	4 th	X	X	X	X	O	4 th	X	X	X	X	O
	5 th	X	X	O	O	X	4 th	X	X	X	O→X	X→O	4 th	X	X	X	O→X	X→O	4 th	X	X	X	O→X	X→O
"3"	3 rd ↓ 3 rd E/B	X	X	X	X	O→X	1 st	O	X	X	X	O	3 rd	X	X→O	X	X	O→O	3 rd	X	X	X	X	O→O
	3 rd ↓ 3 rd E/B	X	X	X	X	O→X	1 st ↓ 3 rd	O→X	X	X	X	O→O	3 rd	X	O	X	X	O→O	3 rd	X	X	X	X	O→O
	3 rd E/B	X	X	X	X	X	3 rd E/B ↓ 3 rd	X	X	X	X	X→O	3 rd E/B ↓ 3 rd	X	O	X	X	X→O	3 rd E/B ↓ 3 rd	X	X	X	X	X→O
	4 th	X	X	O	X	O	3 rd	X	X	X	X	O→O	3 rd	X	X→O	X	X	O→O	3 rd	X	X	X	X	O→O
	5 th	X	X	O	O	X	1 st E/B ↓ 3 rd	X	X	X	O→X	X→O	3 rd E/B ↓ 3 rd	X	X→O	X	O→X	X→O	3 rd E/B ↓ 3 rd	X	X	X	O→X	X→O
"2"	1 st	X	X	X	X	O	1 st	O	X	X	X	O	1 st	X	X	X	X	O	1 st	X	X	X	X	O
	Fail 4 th	X	X	O	X	X→O	1 st E/B ↓ 1 st	O	X	X	X	X→O	2 nd	X	O	X	X	X	1 st E/B ↓ 1 st	X	X	X	X	X→O
	Fail 4 th	X	X	O	X	X→O	1 st E/B ↓ 1 st	X→O	X	X	X	X→O	2 nd	X	O	X	X	X	1 st E/B ↓ 1 st	X	X	X	X	X→O
	4 th	X	X	O	X	O	1 st	X→O	X	X	X	O	1 st ↓ 2nd	X	X→O	X	X	O→X	1 st	X	X	X	X	O
	5 th	X	X	O	O	X	1 st E/B ↓ 1 st	X→O	X	X	O→X	X→O	1 st E/B ↓ 2nd	X	X→O	X	O→X	X	1 st E/B ↓ 1 st	X	X	X	O→X	X→O
"L"	1 st E/B	X	X	X	X	X	1 st E/B	O	X	X	X	X	1 st E/B	X	X	X	X	X	1 st E/B	X	X	X	X	X
	Fail 4 th	X	X	O	X	X→O	1 st E/B ↓ 1 st	O	X	X	X	X→O	2 nd	X	O	X	X	X	1 st E/B ↓ 1 st	X	X	X	X	X→O
	Fail 4 th	X	X	O	X	X→O	1 st E/B ↓ 1 st	X→O	X	X	X	X→O	2 nd	X	O	X	X	X	1 st E/B ↓ 1 st	X	X	X	X	X→O
	4 th	X	X	O	X	O	1 st	X→O	X	X	X	O	1 st ↓ 2nd	X	X→O	X	X	O→X	1 st	X	X	X	X	O
	5 th	X	X	O	O	X	1 st E/B ↓ 1 st	X→O	X	X	O→X	X→O	1 st E/B ↓ 2nd	X	X→O	X	O→X	X	1 st E/B ↓ 1 st	X	X	X	O→X	X→O

DTC No.	DTC Detection Condition	Trouble Area
P0748	ECM checks for an open or short circuit in shift solenoid valves SL1 (1-trip detection logic) (a) When solenoid, duty ratio equal to 100% (b) When solenoid is not energized, duty ratio is less than 3%	□Open or short in shift solenoid valve SL1 circuit □Shift solenoid valve SL1 □ECM

MONITOR DESCRIPTION

The ECM commands gearshift 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 and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

MONITOR STRATEGY

Related DTCs	P0748	Shift solenoid valve SL1/Range check
Required sensors/Components	Shift solenoid valve SL1	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

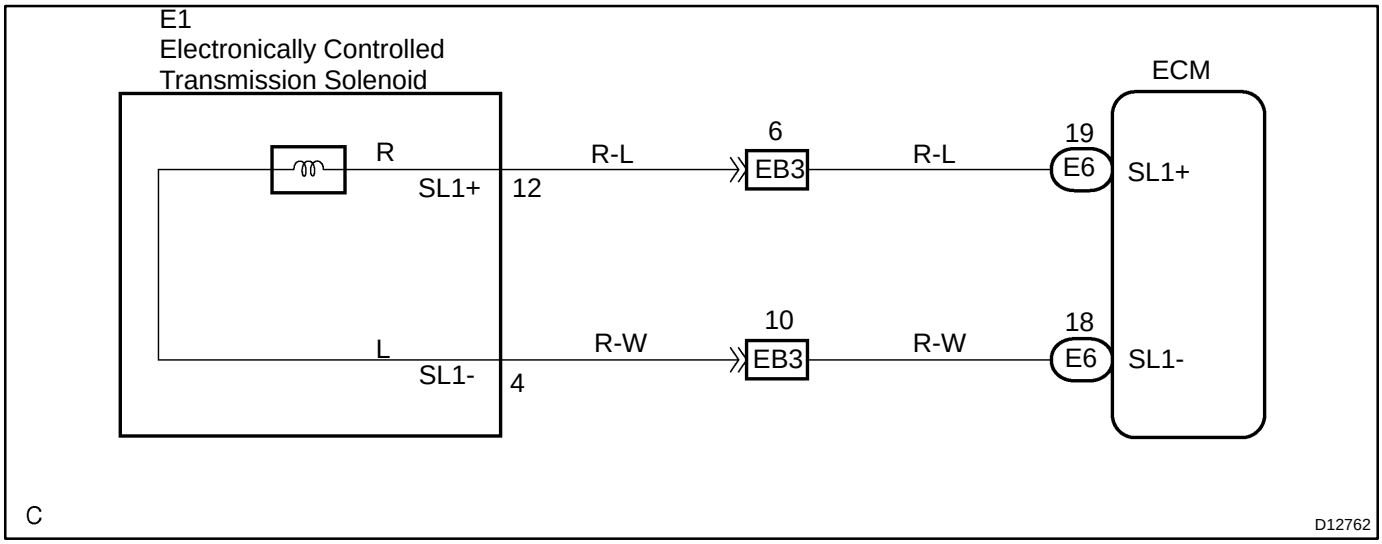
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

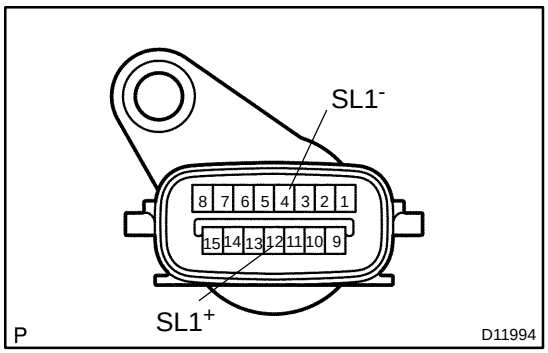
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**

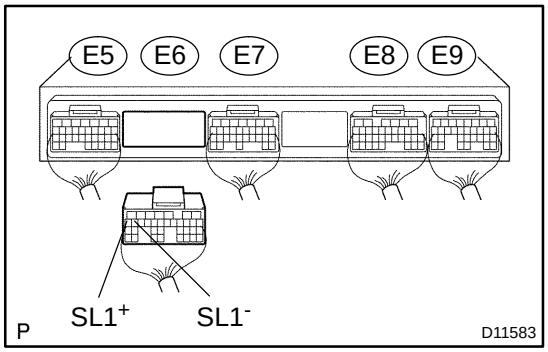


PREPARATION:
Disconnect the trasmission wire connector.
CHECK:
Measure resistance between $SL1^+$ and $SL1^-$ of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals $SL1^+$ and $SL1^-$ of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG → **Go to step 3.**

OK

2	**Measure resistance between terminal $SL1^+$ and $SL1^-$ of ECM connector.**



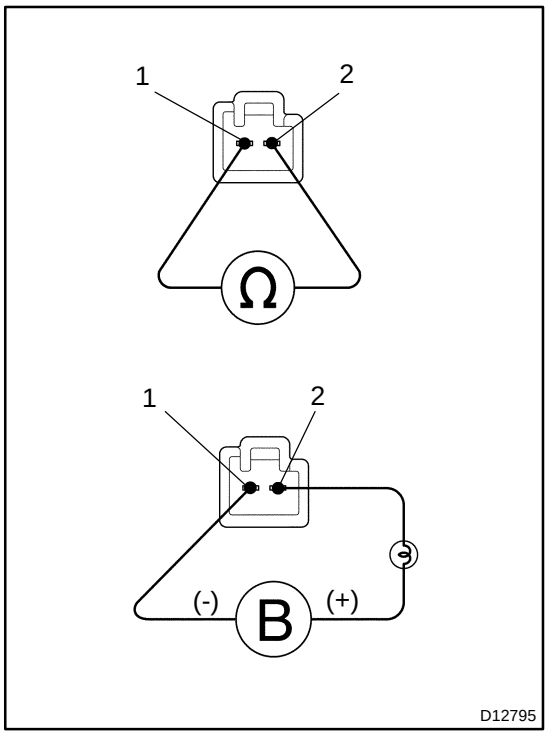
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals $SL1^+$ and $SL1^-$ of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals $SL1^+$ and $SL1^-$ of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SL1.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SL1.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SL1 (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIC31-01

DTC	P0751	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th 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, valve body or automatic transmission (clutch, brake or 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 is stuck open or closed ★Valve body is blocked up or stuck ★Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves "ON/OFF". According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position. When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0751	Shift solenoid valve S1/OFF malfunction
		Shift solenoid valve S1/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S1
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A) and (B)	0.4 sec.
	OFF malfunction (C)	Immediate
	ON malfunction (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following conditions are common to all conditions below: Off malfunction (A), (B), (C) and ON malfunction (A), (B), (C), (D), (E)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40˚C (104˚F) or more	-
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	8% or more and 6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-

Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

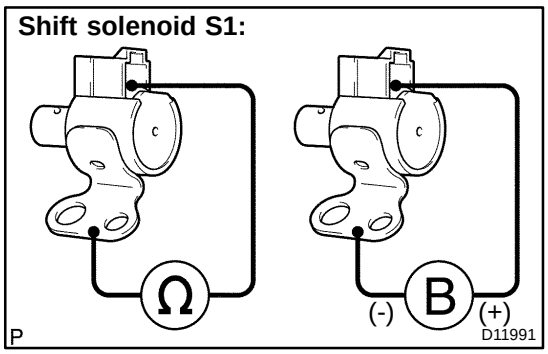
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Condition (A), (B) and (C)	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
OFF malfunction (B)	
Turbine speed/Output speed (NT/NO)	0.65 or more and 0.79 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Either of the following conditions is met: **★ON malfunction (A) and (B)** **★ON malfunction (B) or (C), and ON malfunction (D) or (E)**	
ON malfunction (A) and (B)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
ON malfunction (C)	
Turbine speed/Output speed (NT/NO)	1.91 or more and 2.35 or less
ON malfunction (D)	

Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve S1 operation.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S1.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace shift solenoid valve S1 (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT-30).

DIC32-01

DTC	P0756	Shift Solenoid ”B” Performance (Shift Solenoid Valve S2)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th 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, valve body or automatic transmission (clutch, brake or 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 is stuck open or closed ★Valve body is blocked up or stuck ★Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL.

MONITOR STRATEGY

Related DTCs	P0756	Shift solenoid valve S2/OFF malfunction
		Shift solenoid valve S2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve S2
	Sub	Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction (A), (B), (C)	0.4 sec.
	OFF malfunction (D)	Immediate
	ON malfunction (A) and (B)	0.4 sec.
	ON malfunction (C)	3 sec.
	ON malfunction (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following conditions are common to all conditions below: OFF malfunction (A), (B), (C), (D) and ON malfunction (A), (B), (C), (D)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40˚C (104˚F) or more	-
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Output speed	2nd → 1st down shift point or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
Actual gear when ECM selected 4th gear	4th	
OFF malfunction (D)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)

Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (D)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

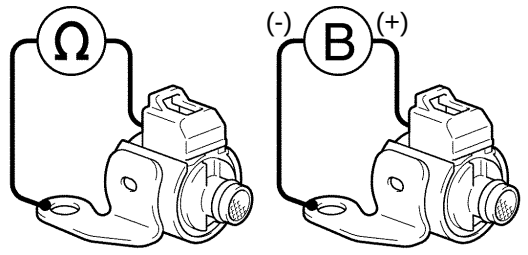
Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: Condition (A), (B), (C) and (D)	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
OFF malfunction (A) and (B)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
OFF malfunction (C)	
Turbine speed/Output speed (NT/NO)	0.65 or more and 0.79 or less
OFF malfunction (D)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
Both of the following conditions are met: ON malfunction (A) or (B), and ON malfunction (C) or (D)	
ON malfunction (A)	
Turbine speed/Output speed (NT/NO)	1.91 or more and 2.35 or less
ON malfunction (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
ON malfunction (C)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more

ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	Check shift solenoid valve S2 operation.

Shift solenoid S2:



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S2.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace shift solenoid valve S2 (See page AT-8).**

OK

2	Check valve body (See page DI-396).

NG → **Repair or replace valve body.**

OK

Repair or replace transmission (See page AT-30).

DIB3A-02

DTC	P0771	Shift Solenoid ”E” Performance (Shift Solenoid Valve SR)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th 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, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0771	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	★Shift solenoid valve SR is stuck open or closed ★Shift solenoid valve SL1 is stuck open or closed ★Valve body is blocked up or stuck ★Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0771	Shift solenoid valve SR/Rationality check
Required sensors/Components	Main	Shift solenoid valve SR
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	OFF malfunction (A)	0.4 sec.
	OFF malfunction (B) and (C)	Immediate
	ON malfunction	0.15 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all condition below: OFF malfunction (A), (B), (C) and ON malfunction		
The monitor will run whenever the following DTCs are not present.	See page DI-361	

Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40˚C (104˚F) or more	-
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction (A)		
ECM selected gear	5th	
Vehicle speed	2 km/h (1 mph)	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
OFF malfunction (B)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Continuous time for ECM selecting 4th gear	2 sec. or more	-
OFF malfunction (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
ON malfunction		
Current ECM selected gear	2th	
Last ECM selected gear	1st	
Throttle valve opening angle (During transition from 1st to 2nd gear)	4.5% or more at 2,000 rpm (conditions vary with turbine speed)	-

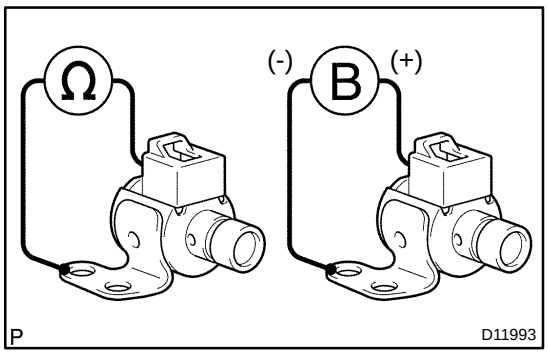
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
[OFF malfunction]	
All of the following conditions are met: OFF malfunction (A), (B) and (C)	

It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
OFF malfunction (A)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
OFF malfunction (B)	
Turbine speed/Output speed (NT/NO)	Not change as follow 0.93 or more and 1.07 or less ↓ 0.65 or more and 0.79 or less
OFF malfunction (C)	
Output record from ECM for 4th → 5th upshifting	Recorded
[ON malfunction]	
It is necessary 2 detections/one drive cycle 1st detection; temporary flag ON 2nd detection; temporary pending fault code ON	
Turbine speed - Output speed x 1st gear ratio (NT - NO x 1st gear ratio)	150 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve SR operation.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SR.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

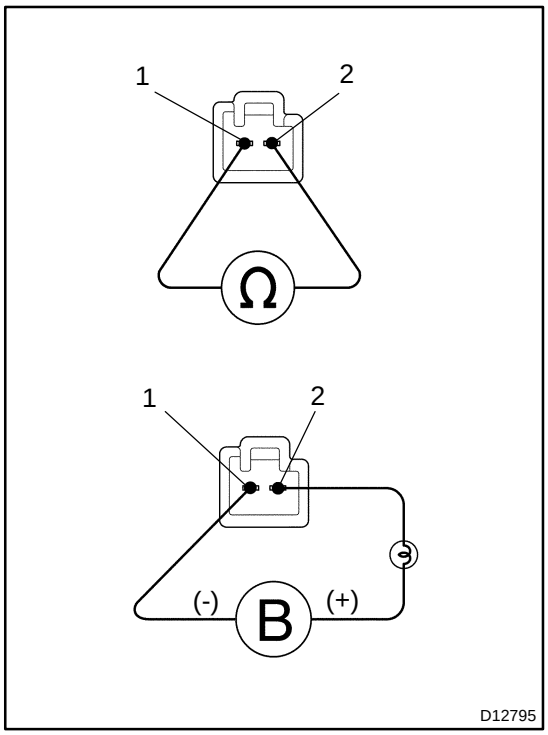
OK:

Solenoid sounds operation noise.

NG → **Replace shift solenoid valve SR (See page AT-8).**

OK

2	Check shift solenoid valve SL1 operation.



PREPARATION:
Remove the shift solenoid valve SL1.
CHECK:
(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.
OK:
Standard

NG → **Replace shift solenoid valve SL1 (See page AT-8).**

OK

3	Check valve body (See page DI-396).

NG → **Repair or replace valve body (See page AT-8).**

OK

Repair or replace transmission (See page AT-30).

DIB3B-02

DTC	P0776	Pressure Control Solenoid ”B” Performance (Shift Solenoid Valve SL2)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th 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, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0776	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	□Shift solenoid valve SL2 is stuck open or closed □Valve body is blocked up or stuck □Automatic transmission (clutch, brake or gear etc.)

MONITOR DESCRIPTION

The ECM commands gear shifts by turning the shift solenoid valves ”ON/OFF”. According to the input shaft revolution and output shaft revolution, the ECM detects the actual gear position (1st, 2nd, 3rd, 4th or 5th gear position). When the gear position commanded by the ECM and the actual gear position are not same, the ECM illuminates the MIL and stores the DTC.

MONITOR STRATEGY

Related DTCs	P0776	Shift solenoid valve SL2/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SL2
	Sub	Speed sensor (NT), Speed sensor (NO), Crankshaft position sensor (NE)
Frequency of operation	Continuous	
Duration	ON malfunction (A), (B) and (C)	0.4 sec.
	ON malfunction (D)	3 sec.
	ON malfunction (E)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all condition below: ON malfunction (A), (B), (C), (D) and (E)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (N) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
ON malfunction (A)		
ECM selected gear	1st	
Vehicle speed	2 km/h (1 mph) or more	Less than 40 km/h (25 mph)
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (B)		
ECM selected gear	3rd	
Vehicle speed	2 km/h (1 mph)	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (C)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
ON malfunction (D)		
Current ECM selected gear	5th	

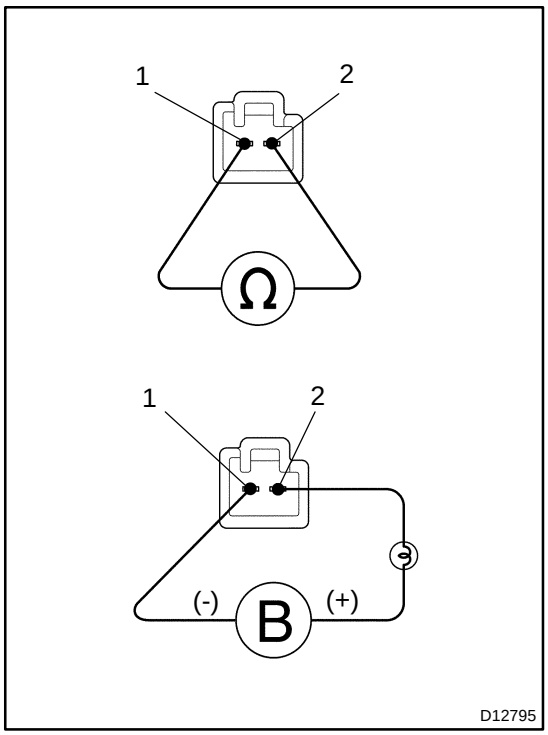
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
ON malfunction (E)		
ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: □ **ON malfunction (A) and (B), or ON malfunction (C)** □ **ON malfunction (D) or (E)**	
ON malfunction (A)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
ON malfunction (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
ON malfunction (C)	
Turbine speed/Output speed (NT/NO)	0.93 or more and 1.07 or less
ON malfunction (D)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
ON malfunction (E)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check shift solenoid valve SL2 operation.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SL2.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG	**Replace shift solenoid valve SL2 (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

NG	**Repair or replace valve body (See page AT-8).**

OK

Repair or replace transmission (See page AT-30).

DIB3C-02

DTC	P0778	Pressure Control Solenoid ”B” Electrical (Shift Solenoid Valve SL2)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0778	ECM checks for an open or short circuit in shift solenoid valves SL2 (1-trip detection logic) (a) When solenoid is energized, duty ratio exceed 75% (b) When solenoid is not energized, duty ratio is less than 3%	★Open or short in shift solenoid valve SL2 circuit ★Shift solenoid valve SL2 ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift 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 and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page DI-426).

MONITOR STRATEGY

Related DTCs	P0778	Shift solenoid valve SL2/Range check
Required sensors/Components	Shift solenoid valve SL2	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

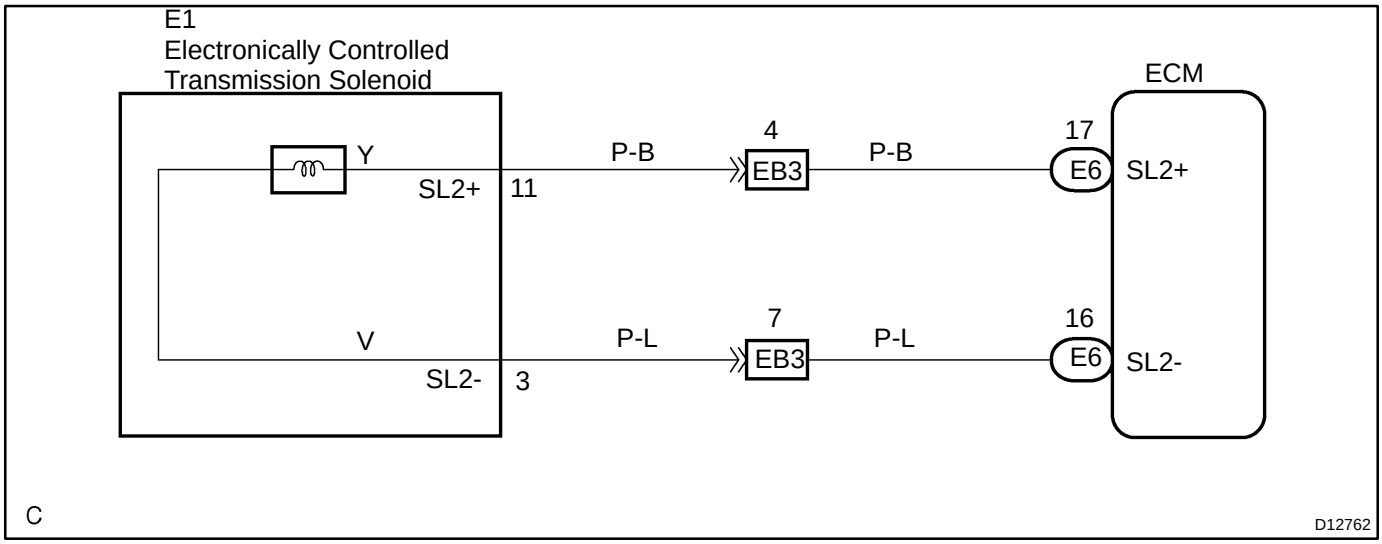
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

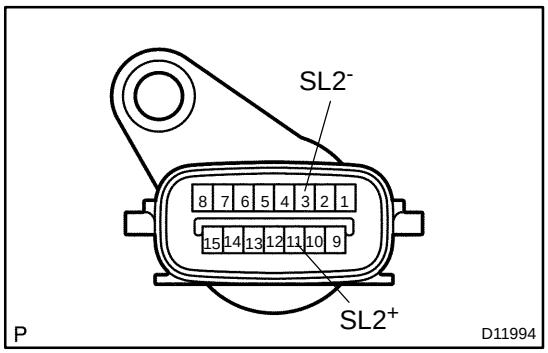
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:
Disconnect the transmission wire connector.

CHECK:
Measure resistance between $SL2^+$ and $SL2^-$ of transmission wire.

OK:

Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)

CHECK:
Measure resistance between terminals $SL2^+$ and $SL2^-$ of the transmission wire connector and body ground.

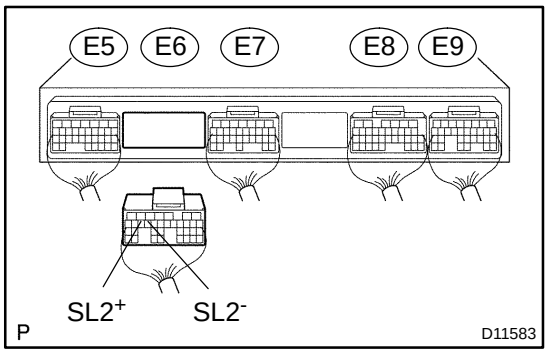
OK:

Resistance: 1 MΩ or higher

NG → **Go to step 3.**

OK

2	Measure resistance between terminal SL2+ and SL2- of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure resistance between terminals SL2+ and SL2- of ECM connector.

OK:

Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)

CHECK:

Measure resistance between terminals SL2+ and SL2- of the ECM connector and body ground.

OK:

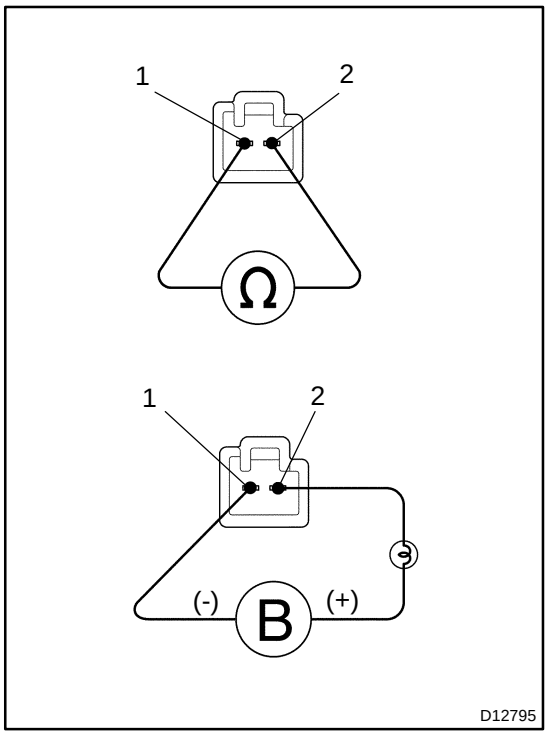
Resistance: 1 MΩ or higher

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SL2.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SL2.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SL2 (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIB3D-02

DTC	P0781	1-2 Shift

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor and direct clutch speed sensor to detect the actual gear position (1st, 2nd, 3rd, 4th or 5th 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, valve body or automatic transmission (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P0781	The gear required by the ECM does not match the actual gear when driving (2-trip detection logic)	★Valve body is blocked up or stuck (1-2 shift) ★Automatic transmission assembly ★ECM

MONITOR DESCRIPTION

The ECM calculates the ”actual” transmission gear by comparing the signals from the input speed sensor and the output speed sensor. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0781	Valve body/Rationality check
Required sensors/Components	Main	Valve body
	Sub	Automatic transmission assembly, Speed sensor (NT), Speed sensor (NO), Vehicle speed sensor, Throttle speed sensor
Frequency of operation	Continuous	
Duration	Condition (A) and (B)	0.4 sec.
	Condition (C)	3 sec.
	Condition (D)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The Following items are common to all conditions below: Condition (A), (B), (C) and (D)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Pressure control solenoid "A" (SL1) circuit		
Pressure control solenoid "B" (SL2) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
Condition (A)		
ECM selected gear	2nd	
Vehicle speed	2 km/h (1 mph) or more	-
Output speed	2nd → 1st down shift point or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
Condition (B)		
ECM selected gear	4th	
Vehicle speed	2 km/h (1 mph) or more	-
Throttle valve opening angle	6.5% or more at 2,000 rpm (conditions vary with engine speed)	-
Condition (C)		
Current ECM selected gear	5th	
Last ECM selected gear	4th	
Vehicle speed (During transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)
Condition (D)		

ECM selected gear	5th	
Engine speed - Turbine speed (NE - NT) (After transition from 4th to 5th gear)	-	Less than 150 rpm
Vehicle speed (After transition from 4th to 5th gear)	-	Less than 100 km/h (62 mph)

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Both of the following conditions are met: Condition (A), and Condition (B), (C) or (D)	
Condition (A)	
Turbine speed/Output speed (NT/NO)	3.30 or more and 7.50 or less
Condition (B)	
Turbine speed/Output speed (NT/NO)	1.28 or more and 1.53 or less
Condition (C)	
Turbine speed - Output speed x 4th gear ratio (NT - NO x 4th gear ratio)	1,000 rpm or more
Condition (D)	
Turbine speed - Output speed x 5th gear ratio (NT - NO x 5th gear ratio)	1,000 rpm or more

INSPECTION PROCEDURE

1	**Check other DTCs output (in addition to DTC P0781).**

PREPARATION:

(a) Warm up the engine.
(b) Turn the ignition switch off.
(c) Connect the OBD ll scan tool or hand-held tester to the DLC3.
(d) Turn the ignition switch to the ON position.
(e) Push the ”ON” button of the OBD ll scan tool or the hand-held tester.
(f) Select the item ”DIAGNOSIS/ENHANCED OBD ll/DTC INFO/CURRENT CODES”.

CHECK:

Read the DTCs using the OBD ll scan tool or the hand-held tester.

RESULT:

Display (DTC output)	Proceed to
Only ”P0781” is output	A
”P0781” and other DTCs	B

HINT:

If any other codes besides ”P0781” is output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-389)**

A

2	**Clear the DTC and running test (See page DI-361).**

CHECK:
Clear the DTC again, and check DTC again after conducting the running test.
OK:
Normal code

OK → **END**

NG

Repair or replace valve body (See page AT-8).

DIB3E-02

DTC	P0818	Driveline Disconnect Switch Input Circuit

CIRCUIT DESCRIPTION

The ECM detects the signal from the transfer neutral position switch.
This DTC indicates that the transfer neutral position switch remains ON.

DTC No.	DTC Detecting Condition	Trouble Area
P0818	Transfer neutral position switch remains ON while vehicle running under conditions for 30 sec. (2-trip detection logic) ★Vehicle speed is 25 km/h or more ★Transfer shift position is H	★Short in transfer neutral position switch circuit ★Transfer neutral position switch ★ECM

MONITOR DESCRIPTION

The ECM detects whether or not the transfer gear is in the neutral position by monitoring the signal from the transfer neutral position switch.
If the ECM detects that the transfer-case is in neutral under the following conditions, the ECM will conclude that there is a malfunction of the transfer-case neutral position switch:

- ★ Transfer-case neutral position switch indicates that the transfer-case is in neutral.
- ★ Transfer-case shifter is in the ”H” position.
- ★ The vehicle is traveling at 25 km/h (16 mph) or more.
- ★ The neutral switch has been ON for more than thirty seconds.

If all of the above conditions are detected, the ECM will conclude that there is a malfunction of the transfer-case neutral position switch, illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P0818	Transfer neutral position switch/Verify switch cycling
Required sensors/Components	Main	Transfer neutral position switch
	Sub	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	30 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

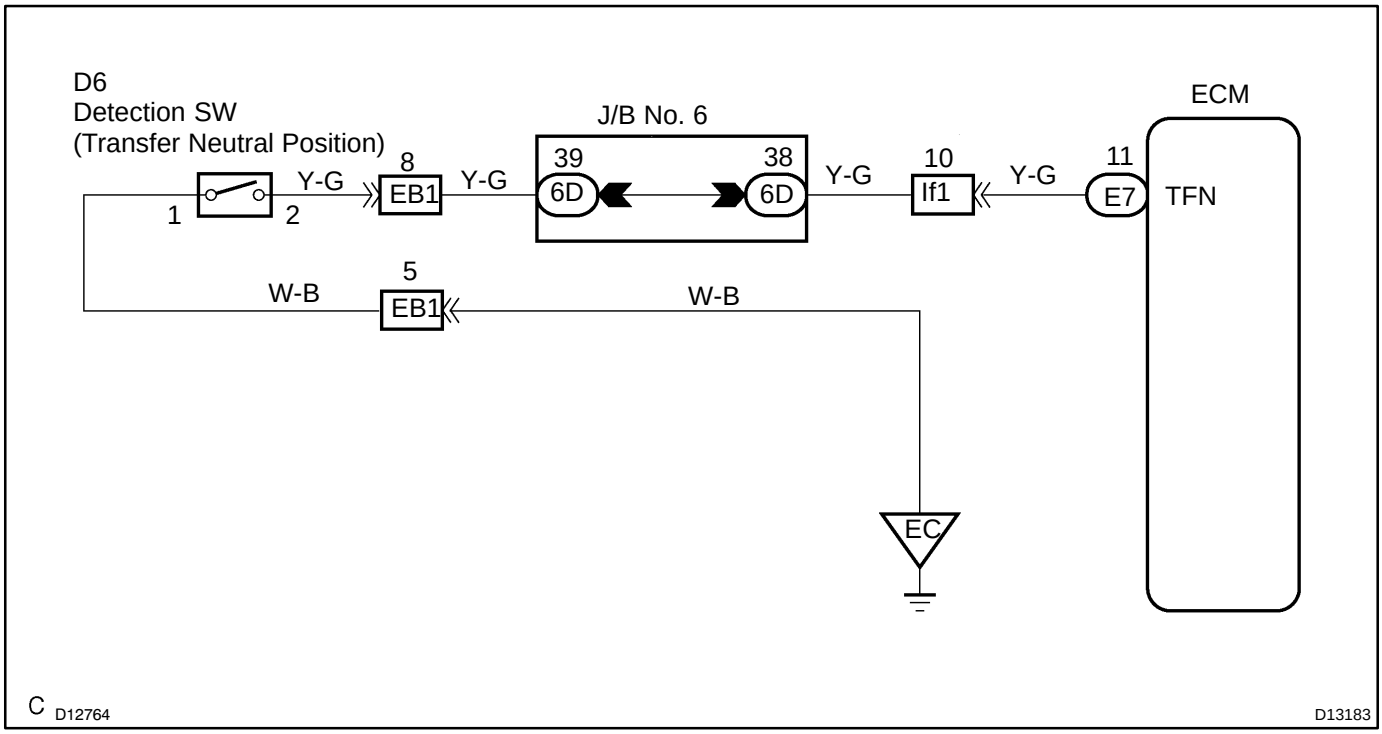
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Vehicle speed	25 km/h (16 mph) or more	-
Transfer position	High	
Ignition switch ON and time after OFF to ON	0.5 sec. or more	-

TYPICAL MALFUNCTION THRESHOLDS

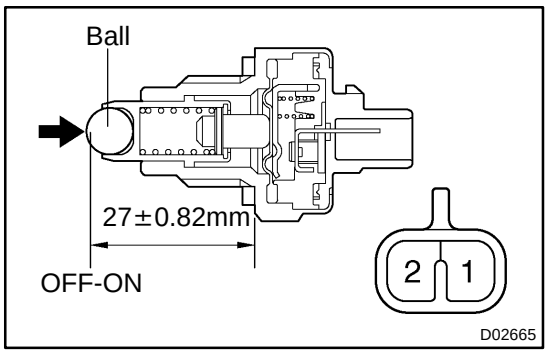
Detection criteria	Threshold
Transfer neutral switch signal	ON

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transfer neutral position switch.**



PREPARATION:
Remove the transfer neutral position switch.
CHECK:
Check the continuity between the switch terminals when pushing the ball at the tip of the switch.
OK:

Switch	Specified condition
Push	Continuity
Free	No continuity

NG → **Replace transfer neutral position switch.**

OK

2	**Check harness and connector between ECM and transfer neutral position switch, transfer neutral position switch and body ground (See page IN-36).**

NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN-36).

DIB3F-02

DTC	P0973	Shift Solenoid ”A” Control Circuit Low (Shift Solenoid Valve S1)

DTC	P0974	Shift Solenoid ”A” Control Circuit High (Shift Solenoid Valve S1)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0973	ECM detects short in solenoid valve S1 circuit 4 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 4 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 gearshift 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 and illuminates the MIL and stored the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

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	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

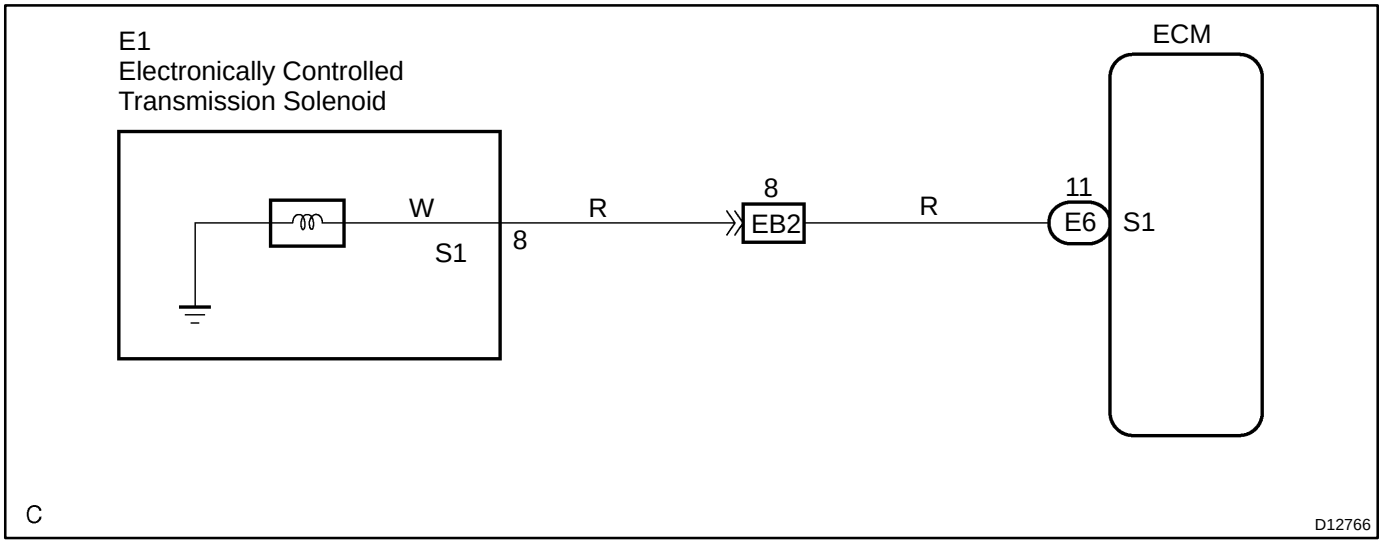
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
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

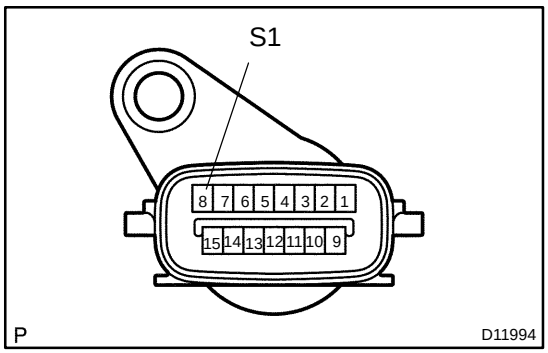
Parameter	Standard value
Shift solenoid valve S1	Resistance: 11 to 15 Ω at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

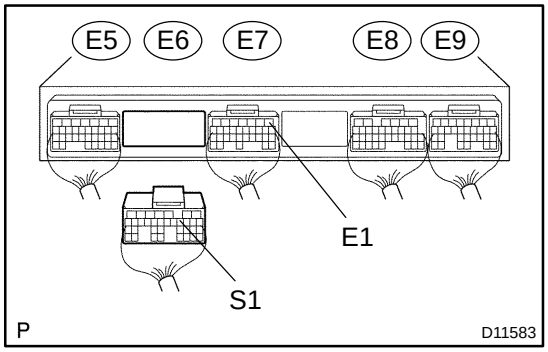


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S1 of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal S1 and E1 of ECM connector.



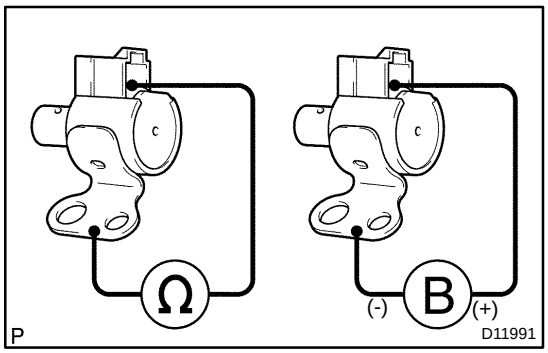
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals S1 and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve S1.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S1.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace the shift solenoid valve S1 (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIB3G-02

DTC	P0976	Shift Solenoid ”B” Control Circuit Low (Shift Solenoid Valve S2)

DTC	P0977	Shift Solenoid ”B” Control Circuit High (Shift Solenoid Valve S2)

CIRCUIT DESCRIPTION

See page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0976	ECM detects short in solenoid valve S2 circuit 4 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 4 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 gearshift 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 and illuminates the MIL and stored the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.).

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	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

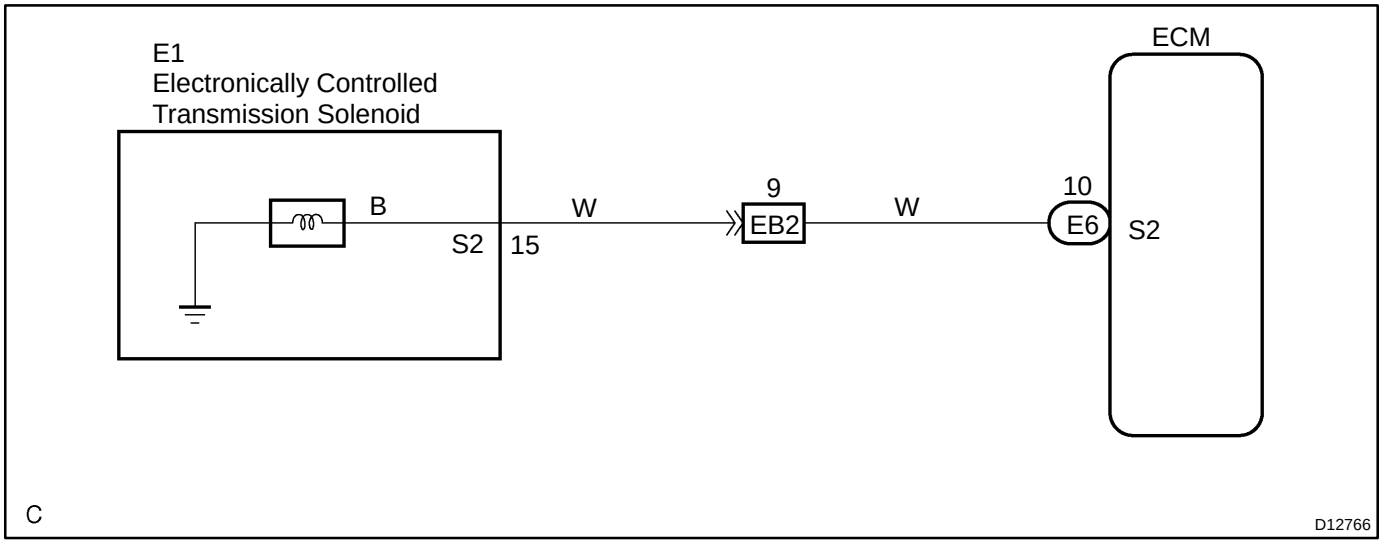
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signal detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
Range check (High resistance)	
Intelligent power MOS diagnosis fail signal detected while the solenoid is not operated	Fail at solenoid resistance: 100 kΩ or more

COMPONENT OPERATING RANGE

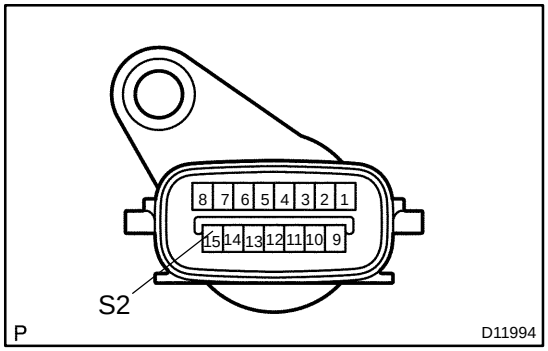
Parameter	Standard value
Shift solenoid valve S2	Resistance: 11 to 15 Ω at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**

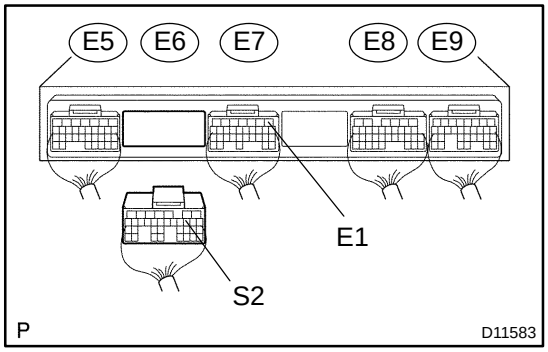


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between S2 of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Go to step 3.**

OK

2	**Measure resistance between terminal S2 and E1 of ECM connector.**



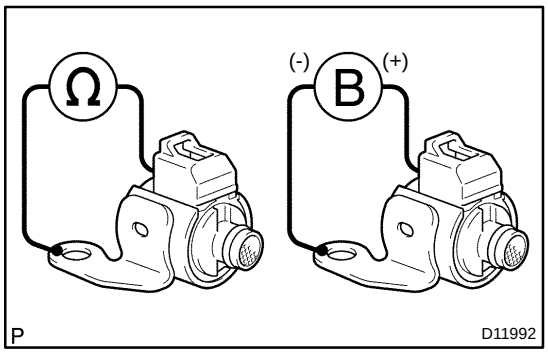
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals S2 and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve S2.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve S2.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace the shift solenoid valve S2 (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIB3H-02

DTC	P0985	Shift Solenoid ”E” Control Circuit Low (Shift Solenoid Valve SR)

DTC	P0986	Shift Solenoid ”E” Control Circuit High (Shift Solenoid Valve SR)

CIRCUIT DESCRIPTION

see page DI-426 .

DTC No.	DTC Detection Condition	Trouble Area
P0985	ECM detects short in solenoid valve SR circuit 4 times when solenoid valve SR is operated (1-trip detection logic)	★Short in shift solenoid valve SR circuit ★Shift solenoid valve SR ★ECM
P0986	ECM detects open in solenoid valve SR circuit 4 times when solenoid valve SR is not operated (1-trip detection logic)	★Open in shift solenoid valve SR circuit ★Shift solenoid valve SR ★ECM

MONITOR DESCRIPTION

The ECM commands gearshift 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 and illuminates the MIL and stores the DTC. And the ECM performs the fail-safe function and turns the other shift solenoid valves in good condition ”ON/OFF” (In case of an open or short circuit, the ECM stops sending current to the circuit.) (see page DI-426).

MONITOR STRATEGY

Related DTCs	P0985	Shift solenoid valve SR/Range check (Low resistance)
	P0986	Shift solenoid valve SR/Range check (High resistance)
Required sensors/Components	Shift solenoid valve SR	
Frequency of operation	Continuous	
Duration	0.1 sec. x 2 (times) or more	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Low resistance)		
Solenoid	ON	
Range check (High resistance)		
Solenoid	OFF	

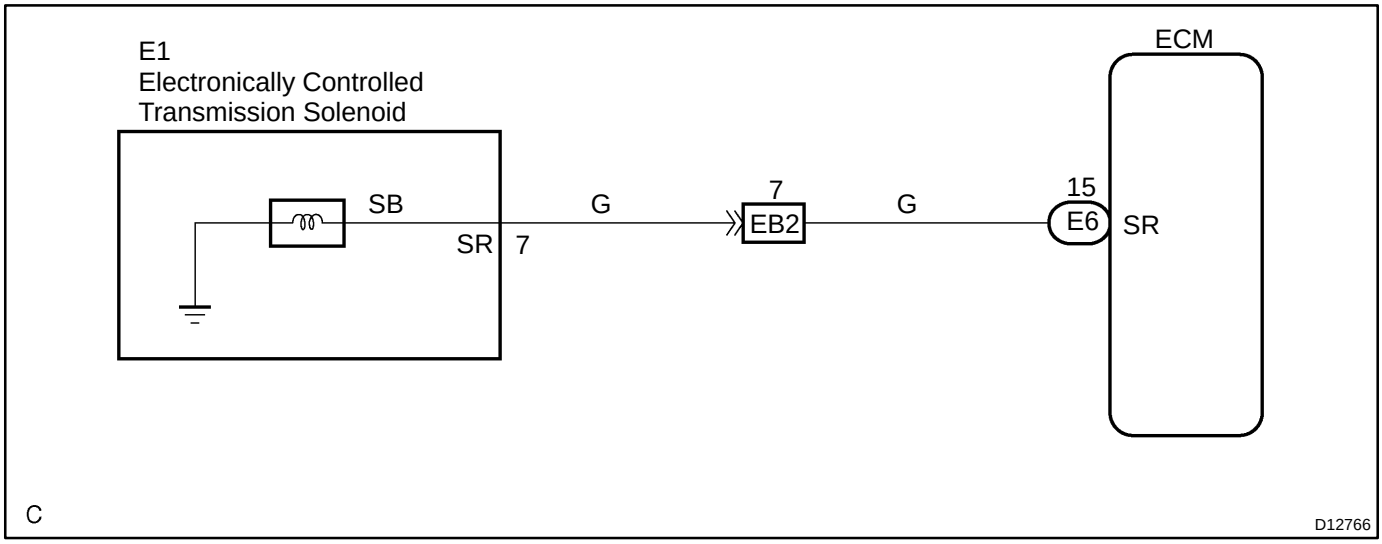
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Low resistance)	
Intelligent power MOS diagnosis fail signals detected while the solenoid is operated	Fail at solenoid resistance: 8 Ω or less
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

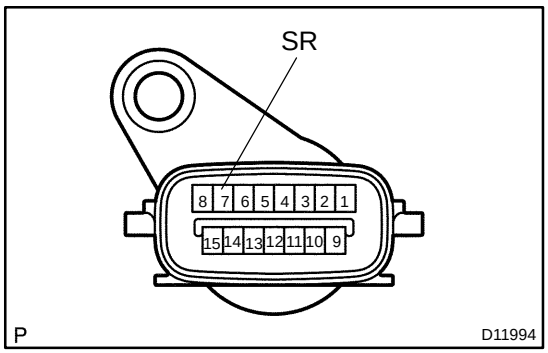
Parameter	Standard value
Shift solenoid valve SR	Resistance: 11 to 15 at 20˚C (68˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

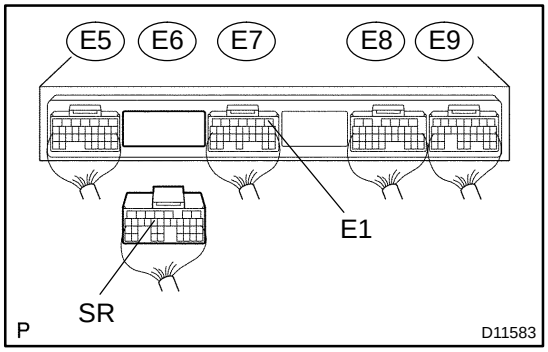


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SR of transmission wire connector and body ground.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Go to step 3.**

OK

2	Measure resistance between terminal SR and E1 of ECM connector.



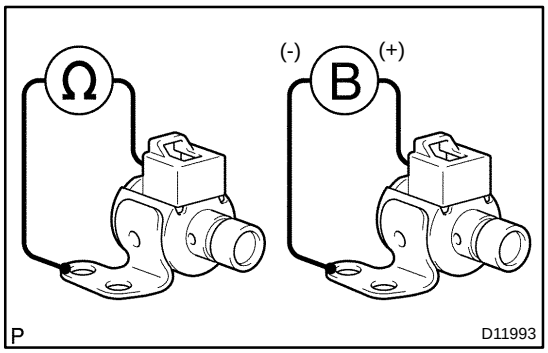
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SR and E1 of ECM connector.
OK:
Resistance: 11 to 15 Ω at 20˚C (68˚F)

NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SR.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SR.

CHECK:

Measure the resistance between the solenoid connector terminal and the body ground.

OK:

Resistance: 11 to 15 Ω at 20˚C (68˚F)

CHECK:

Connect the battery positive lead to the solenoid connector terminal and the battery negative lead to the solenoid body ground.

OK:

Solenoid sounds operation noise.

NG → **Replace the shift solenoid valve SR (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DICEA-01

DTC	P1782	T/F L4 Range Position Switch Performance

CIRCUIT DESCRIPTION

The ECM detects the signal from the transfer L4 position switch.
This DTC indicates that the transfer L4 position switch remains ON.

DTC No.	DTC Detecting Condition	Trouble Area
P1782	Transfer L4 position switch remains ON while vehicle running under conditions for 18 seconds or more (1-trip detection logic) (a) Output shaft speed 3000 rpm or less (b) Transfer shift position is H	★Short in transfer L4 position switch circuit ★Transfer L4 position switch ★ECM

MONITOR DESCRIPTION

The ECM monitors the transfer-case L4 position switch to determine when the transfer-case L4 gear is engaged. If the transfer-case L4 gears remain engaged under the following conditions, the ECM will conclude that there is a malfunction of the L4 position switch:

- ★ L4 switch indicated that the L4 transfer-case gears are engaged.
- ★ Transfer-case shifter is in the ”H” position.
- ★ Transfer-case output shaft rpm is between 750 and 3,000 rpm.
- ★ The specified time period has elapsed.

If all of the above conditions are detected, the ECM will conclude that there is a malfunction of the L4 switch, illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P1782	Transfer L4 position switch/ON malfunction
Required sensors/Components	Transfer L4 position switch	
Frequency of operation	Continuous	
Duration	ON malfunction (A)	1.8 sec.
	ON malfunction (B)	0.5 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

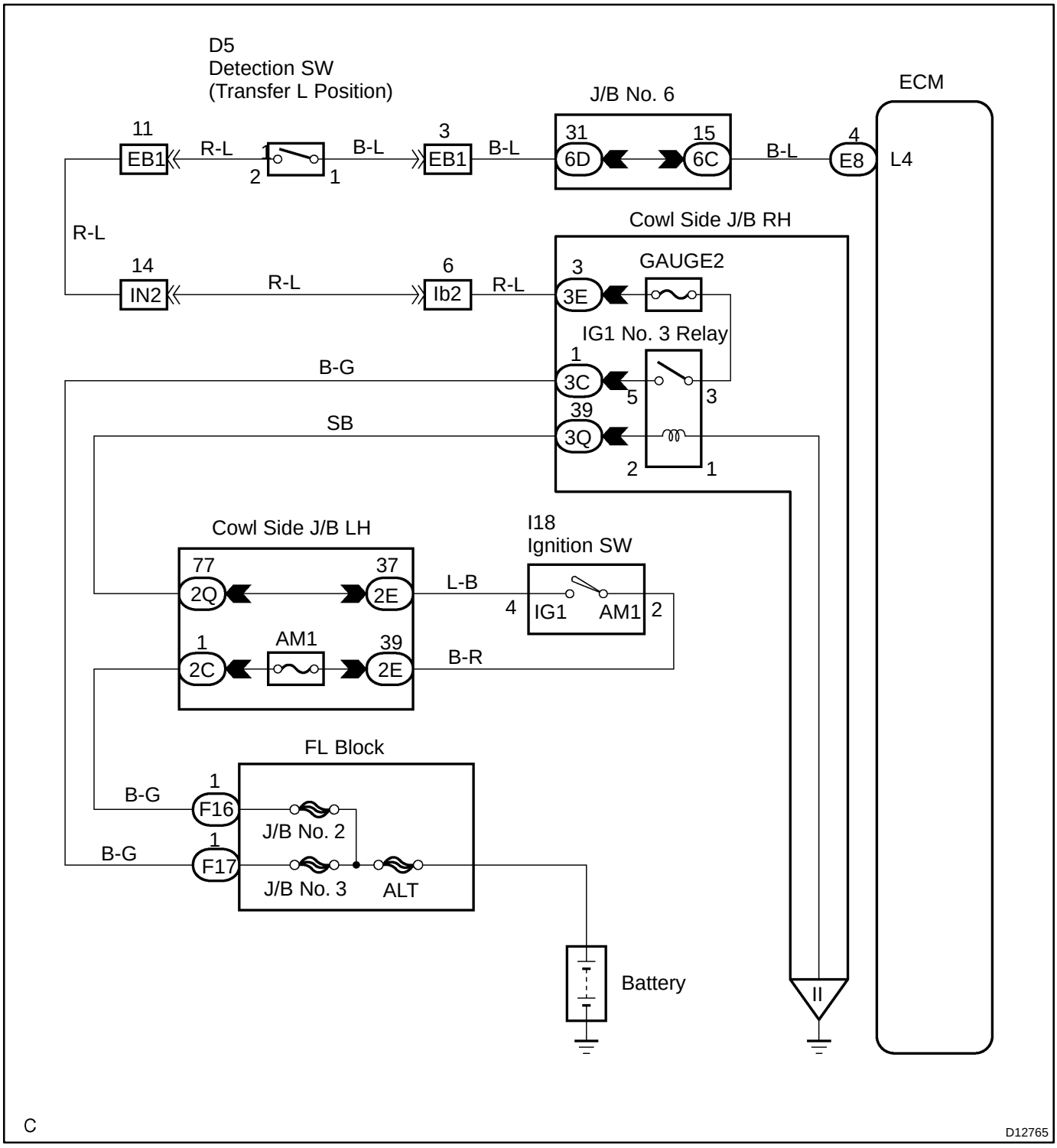
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below: ON malfunction (A) and (B)		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Output speed sensor circuit	There is no malfunction in the circuits shown on the left.	
Vehicle speed sensor ”A” circuit		
Transfer neutral position switch	OFF	
ON malfunction (A)		
Output speed (Transfer output speed)	1,000 rpm or more	Less than 3,000 rpm
ON malfunction (B)		
Output speed (Transfer output speed)	143 rpm or more	-

TYPICAL MALFUNCTION THRESHOLDS

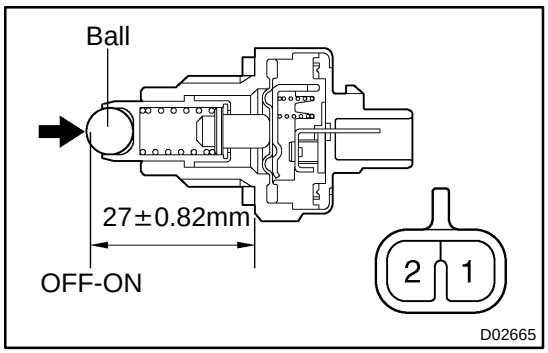
Detection criteria	Threshold
Both of the following conditions is met: ON malfunction (A) and (B)	
ON malfunction (A)	
L4 switch	ON
ON malfunction (B)	
Actual Transfer gear ratio Transfer input speed/Transfer output speed (NO/NOtf)	0.9 or more and Less than 1.1

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transfer L4 position switch.**



PREPARATION:

Remove the transfer L4 position switch.

CHECK:

Check the continuity between the switch terminals when pushing the ball at the tip of the switch.

OK:

Switch	Specified condition
Push	Continuity
Free	No continuity

NG → **Replace transfer L4 position switch.**

OK

2	**Check harness and connector between battery and transfer L4 position switch, transfer L4 position switch and ECM (See page IN-36).**

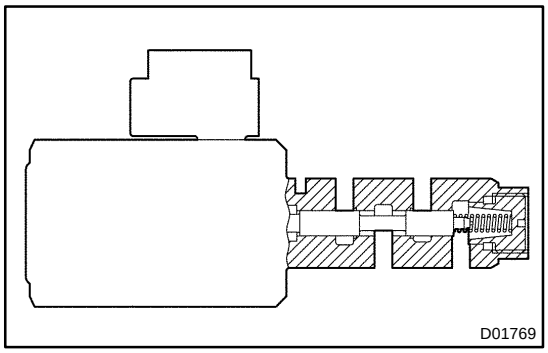
NG → **Repair or replace the harness or connector.**

OK

Check and replace the ECM (See page IN-36).

DIB3J-02

DTC	P2714	Pressure Control Solenoid ”D” Performance (Shift Solenoid Valve SLT)



SYSTEM DESCRIPTION

The ECM calculates the shifting condition by using the signals from the vehicle speed sensor, throttle position sensor, etc.. And compares this result with the signal that ECM sends to SLT to detect mechanical trouble of the shift solenoid valve SLT, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2714	ECM detects a malfunction on SLT (ON side) according to the revolution difference of the turbine and the output shaft, and also by the oil pressure.	★Shift solenoid valve SLT is stuck open or closed ★Valve body blocked up or stuck ★Automatic transmission assembly

MONITOR DESCRIPTION

The ECM sends (ED: delete ”the”) signals (Duty Ratio) to the shift solenoid valve SLT based on the information such as the signal from throttle position sensor and the vehicle speed sensor.
Based on the signal’s duty-ratio, the shift solenoid valve SLT adjusts the hydraulic pressure to the primary regulator valve to an appropriate level. This function enables a smooth vehicle operation by adjusting the line hydraulic pressure to match the engine output and running condition.
The ECM calculates the ”actual” transmission gear by comparing the signals from the input speed sensor and the output speed sensor. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the actual gear position and the commanded gear position are different, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2714	Shift solenoid valve SLT/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLT
	Sub	Valve body, ATF temperature sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	Immediate	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

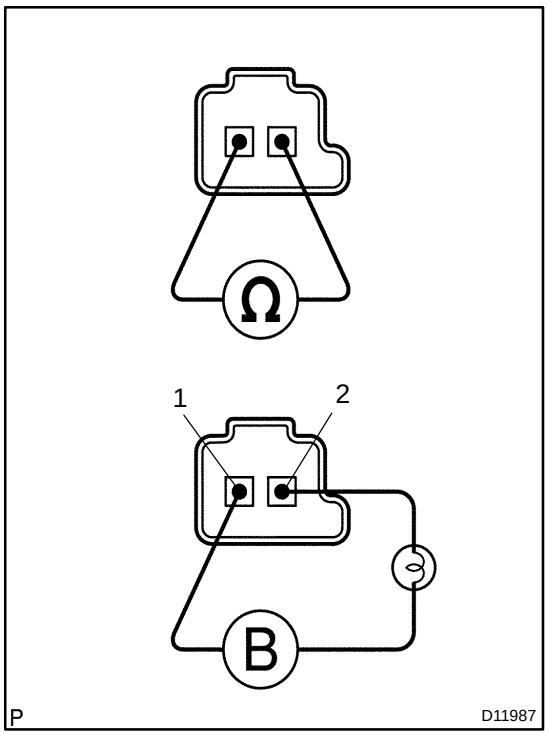
Item	Specification	
	Minimum	Maximum
[The following items are common to all conditions below: OFF malfunction (A) and (B)]		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Transmission Fluid Temperature Sensor ”A” circuit		
Shift solenoid ”A” (S1) circuit		
Shift solenoid ”B” (S2) circuit		
Shift solenoid ”E” (SR) circuit		
Pressure control solenoid ”A” (SL1) circuit		
Pressure control solenoid ”B” (SL2) circuit		
Pressure control solenoid ”D” (SLT) circuit		
ECT (Engine coolant temperature) sensor circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	”D”	
ECT	40˚C (104˚F) or more	-
Spark advance from Max. retard timing by KCS control	0˚ CA or more	-
Engine	Running	
Transfer range	”HIGH”*1	
ATF temperature	10˚C or more	-
Transfer range ”HIGH” *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor ”A” circuit	There is no malfunction in the circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1

TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Summation of C1 clutch heat generations = ∑ (Turbine speed - Output speed x Temporary ratio)	Specified value

INSPECTION PROCEDURE

1	**Check shift solenoid valve SLT operation.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLT.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG	**Replace the shift solenoid valve SLT (See page AT-8).**

OK

2	**Check valve body (See page DI-396).**

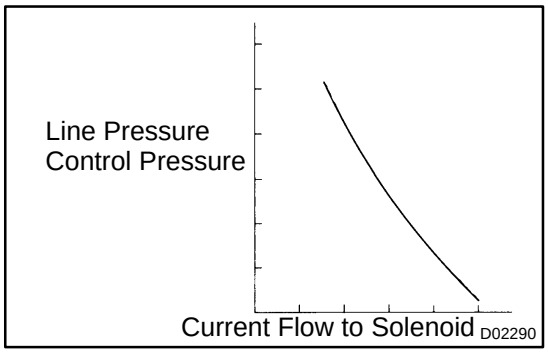
NG	**Replace the valve body (See page AT-8).**

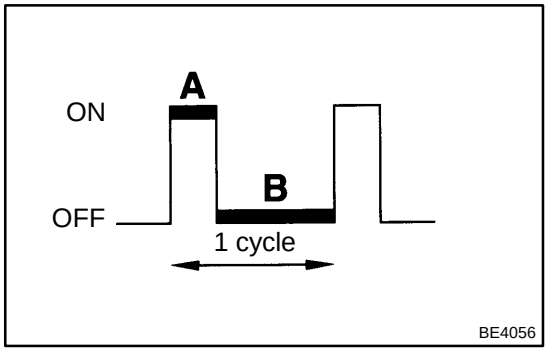
OK

Repair or replace transmission (See page AT-30).

DIB3K-02

DTC P2716 Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)





CIRCUIT DESCRIPTION

The throttle pressure that is applied to the primary regulator valve (which modulates line pressure) causes the solenoid valve SLT, under electronic control, to precisely and minutely modulate and generate line pressure according to the accelerator pedal effort, or the detected engine power output.
This controls the line pressure and provides smooth shifting characteristics.
Upon receiving the throttle valve opening angle signal, ECM controls the line pressure by sending a predetermined (*) duty ratio to the solenoid valve, modulating the line pressure, and generating throttle pressure.
(*) Duty Ratio
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detection Condition	Trouble Area
P2716	ECM detects solenoid SLT circuit open or short malfunction for 1 sec. or more (1-trip detection logic)	★Open or short in shift solenoid valve SLT circuit ★Shift solenoid valve SLT ★ECM

MONITOR DESCRIPTION

When an open or short in the linear solenoid valve (SLT) circuit is detected, the ECM interprets this as a fault. The ECM will turn ON the MIL and store the DTC.

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	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Solenoid current cut status	Not cut	
Battery voltage	11 V or more	-
CPU command duty ratio to SLT	19% or more	-

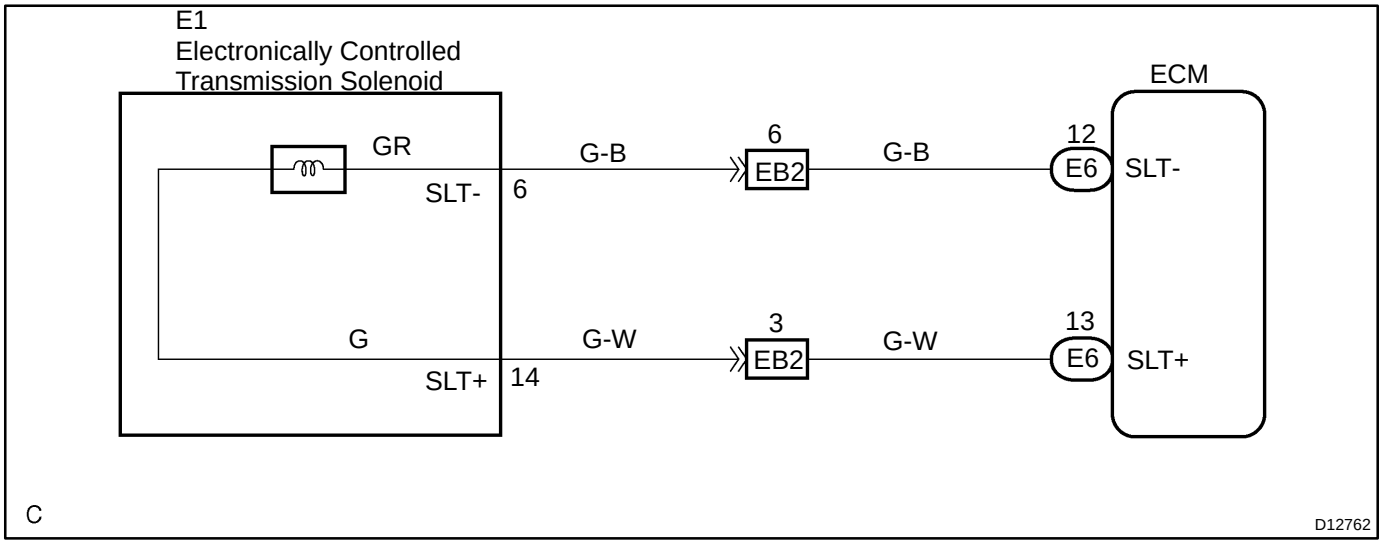
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Solenoid status from IC	Fail (Open or short)

COMPONENT OPERATING RANGE

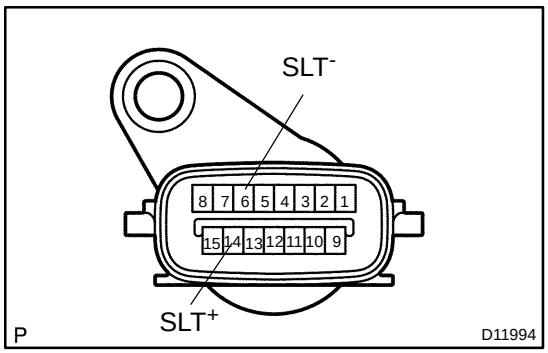
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**

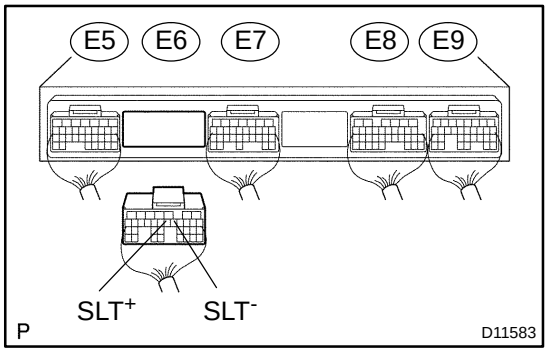


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLT^+ and SLT^- of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals SLT^+ and SLT^- of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	**Go to step 3.**

OK

2	**Measure resistance between terminal SLT^+ and SLT^- of ECM connector.**



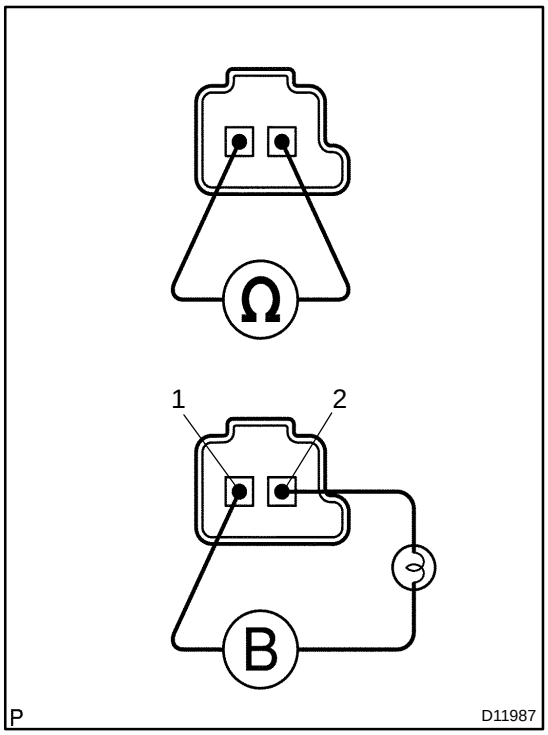
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SLT^+ and SLT^- of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals SLT^+ and SLT^- of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	**Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SLT.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLT.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SLT (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

DIC33-01

DTC	P2740	Transmission Fluid Temperature Sensor ”B” Circuit

DTC	P2742	Transmission Fluid Temperature Sensor ”B” Circuit Low Input

DTC	P2743	Transmission Fluid Temperature Sensor ”B” Circuit High Input

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input in to the ECM. ATF temperature sensor No.2 is on the transmission and just before the oil cooler inlet pipeline.
If ECM detects the abnormally high temperature of ATF by this sensor, it draws driver’s attention by illuminating the warning lamp.
HINT:

- ★ The temperature of ATF easily raises when towing, climbing hills and in traffic, etc.
- ★ If the ATF temperature sensor No.2 shorts, the signal that indicates the ATF temperature is 150□C (302□F) or higher is input in ECM.

Vehicle conditions when sensor is in normal and when the vehicle is in short are indicated in the table below.

ATF temperature No.2 Sensor State	Detection Condition	Symptom	Recovery Condition
Sensor is normal	★AT fluid temp. more than 150□C (302□F).	★AT Oil Temp. warning light remains on	★AT fluid temp. less than 135□C (275□F). *1
	★AT fluid temp. more than 130□C (266□F).	★Shift point too high.	★AT fluid temp. less than 110□C (230□F).
Sensor is in short	★Any conditions.	★AT Oil Temp. warning light remains on ★Shift point too high.	★Symptoms still occur

HINT:
*1: When AT fluid temperature is in normal range, it decreases to less than 135□C within 5 minutes with the shift lever in P or N position in a idling state.

DTC No.	DTC Detecting Condition	Trouble Area
P2740	(a) and (b) is detected momentary within 0.5 sec. when neither P2742 or P2743 is 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. HINT: Wthin 0.5 sec. the malfunction switches from (a) to (b) or from (b) to (a)	★Open or short in ATF temperature sensor No. 2 circuit ★ATF temperature sensor No. 2 ★ECM
P2742	ATF temperature sensor resistance is less than 79 Ω. for 0.5 sec. or more (1-trip detection logic)	
P2743	DTC is detected for 0.5 sec. or more (1-trip detection logic) ATF temperature sensor resistance is more than 156 kΩ. after started engine for 15 minutes or more	

MONITOR DESCRIPTION

The automatic transmission fluid (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 opens or shorts in the ATF temperature circuit. If the resistance value of the ATF temperature is less than 79 Ω or more than 156 kΩ, the ECM interprets this as a fault in the ATF sensor or wiring. The ECM will turn on the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2740	ATF temperature sensor/Range check (Fluttering)
	P2742	ATF temperature sensor/Range check (Low resistance)
	P2743	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

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Range check (Fluttering, Low resistance)		
The typical enabling condition is not available.	-	
Range check (High resistance)		
Time after engine start	15 min. or more	-

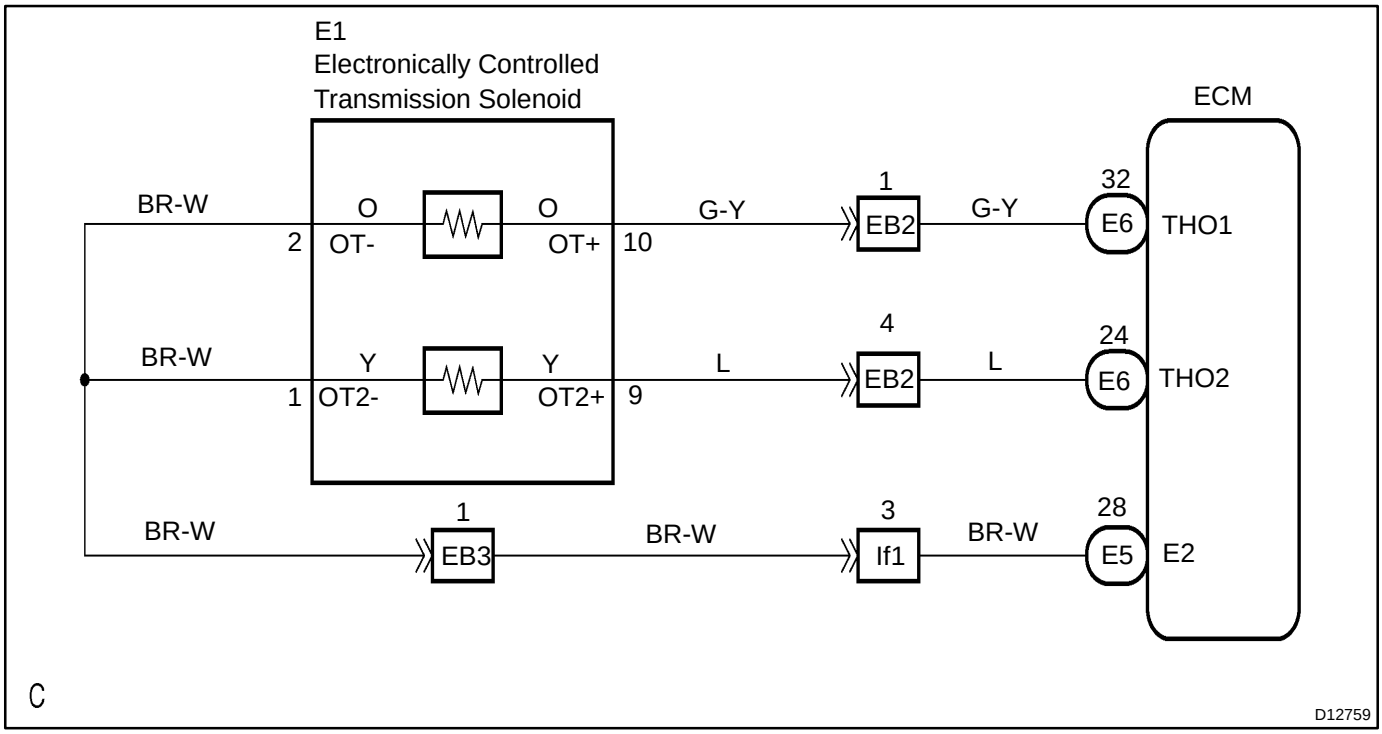
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Range check (Fluttering)	
ATF temperature sensor resistance	Less than 25 Ω or More than 156 kΩ
Range check (Low resistance)	
ATF temperature sensor resistance	Less than 25 Ω
Range check (High resistance)	
ATF temperature sensor resistance	More than 156 kΩ

COMPONENT OPERATING RANGE

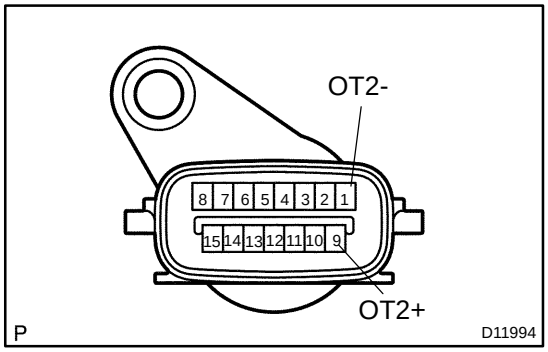
Parameter	Standard value
ATF temperature sensor	Atmospheric temperature to approx. 130˚C (266˚F)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check transmission wire.**



PREPARATION:

Disconnect the transmission wire connector from the transmission.

CHECK:

Measure the resistance between terminals OT2+ and OT2-.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals OT2+ and OT2- of the transmission wire connector and body ground.

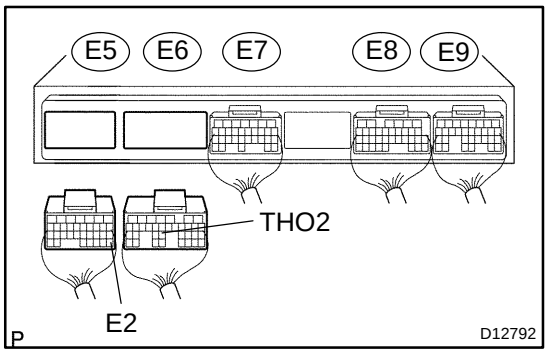
OK:

Resistance: 1 MΩ or higher

NG	**Replace the transmission wire (ATF temperature sensor).**

OK

2	Measure resistance between terminal THO2 and E2 of ECM connector.



PREPARATION:

(a) Connect the transmission wire connector.

(b) Disconnect the connector of the ECM.

CHECK:

Measure the resistance between terminals THO2 and E2.

OK:

79 Ω to 156 kΩ

CHECK:

Measure resistance between terminals THO2 and E2 of the ECM connector and body ground.

OK:

Resistance: 1 MΩ or higher

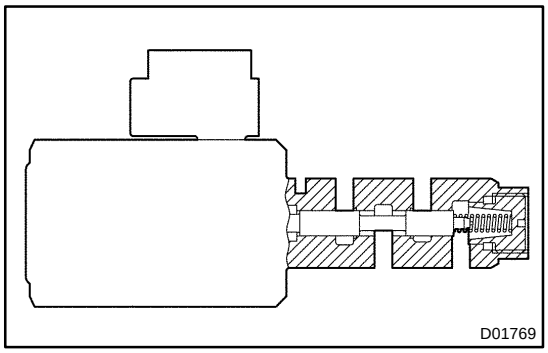
NG → **Repair or replace the harness or connector (See page IN-36).**

OK

Check and replace the ECM (See page IN-36).

DIB3L-02

DTC	P2757	Torque Converter Clutch Pressure Control Solenoid Performance(Shift Solenoid Valve SLU)



SYSTEM DESCRIPTION

The ECM uses the signals from the Throttle Position Sensor and Air-flow Meter to monitor the engagement condition of the lock-up clutch.

Then the ECM compares the engagement condition of the lock-up clutch with the lock-up schedule in the ECM memory to detect mechanical trouble of the shift solenoid valve SLU, valve body, torque converter clutch and automatic transmission assembly (clutch, brake or gear etc.).

DTC No.	DTC Detecting Condition	Trouble Area
P2757	Lock-up does not occur when driving in the lock-up range (normal driving at 80 km/h [50 mph]), or lock-up remains ON in the lock-up OFF range. (2-trip detection logic)	★Shift solenoid valve SLU is stuck open or closed ★Valve body blocked up or stuck ★Lock-up clutch ★Automatic transmission assembly

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and causes lock-up or flexible lock-up of the torque converter clutch.

To monitor the condition of the lock up clutch, the ECM monitors the signals from the input speed sensor, crank position sensor, the throttle position sensor, and air flow meter. The ECM uses this information to determine when the vehicle's torque converter clutch should be locked-up. The ECM can detect many mechanical problems in the shift solenoids, valve body, and the transmission clutches, brakes, and gears. If the ECM detects that the torque converter clutch locked below the minimum lock-up speed, it will illuminate the MIL and store the DTC.

MONITOR STRATEGY

Related DTCs	P2757	Shift solenoid valve SLU/OFF malfunction
		Shift solenoid valve SLU/ON malfunction
Required sensors/Components	Main	Shift solenoid valve SLU
	Sub	Valve body, Vehicle speed sensor, Throttle position sensor, Speed sensor (NT), Speed sensor (NO)
Frequency of operation	Continuous	
Duration	OFF malfunction	2 sec.
	ON malfunction	1.8 sec.
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The following items are common to all conditions below: OFF malfunction and ON malfunction		
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Turbine speed sensor (NT) circuit	There is no malfunction in the circuits shown on the left.	
Output speed sensor (NO) circuit		
Shift solenoid "A" (S1) circuit		
Shift solenoid "B" (S2) circuit		
Shift solenoid "E" (SR) circuit		
Torque converter clutch pressure control solenoid circuit		
KCS sensor circuit		
ETCS (Electric throttle control system)	Not system down	
Transmission shift position	"D"	
ECT (Engine coolant temperature)	40°C (104°F) or more	-
Spark advance from Max. retard timing by KCS control	0° CA or more	-
Engine	Running	
ECM selected gear	4th or 5th	
Vehicle speed	25 km/h or more	-
Shift solenoid "A" (S1) circuit	There is no malfunction in the circuits shown on the left.	
Shift solenoid "B" (S2) circuit		
Pressure control solenoid "B" (SL2) circuit		
1-2 Shift valve		
Transfer neutral position switch	OFF	
Transfer range	"HIGH"*1	
Transfer range "HIGH" *1 (This condition is applied only 4WD)		
*1 Following conditions met		
Vehicle speed sensor "A" circuit	There is no malfunction in the sensor circuits shown on the left.	
Output shaft speed sensor circuit		
Transfer output speed	143 rpm or more	-
NO/NOtf (Transfer input speed/Transfer output speed)	0.9 or more	Less than 1.1
OFF malfunction		
ECM lock-up command	ON (SLU pressure: 513kpa or more)	
Vehicle speed	-	Less than 100 km/h (62 mph)
ON malfunction		
ECM lock-up command	OFF (SLU pressure: less than 4kpa)	
Throttle valve opening angle	9% or more	-
Vehicle speed	-	Less than 60 km/h (38 mph)

TYPICAL MALFUNCTION THRESHOLDS

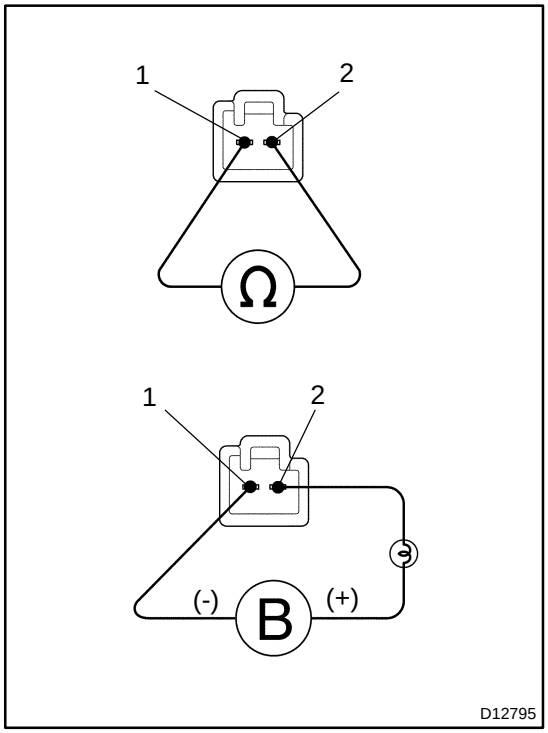
Detection criteria	Threshold
OFF malfunction	
Engine speed - Turbine speed	70 rpm or more
ON malfunction	
It is necessary 2 detections/one driving cycle 1st detection; temporary flag ON 2nd detection; pending fault code ON	
Vehicle speed must be under 10 km/h (6 mph) once before 2nd detection	
|Engine speed - Turbine speed|	Less then 35 rpm

COMPONENT OPERATING RANGE

Parameter	Standard value
Speed sensor (NT)	Input speed is equal to engine speed when lock-up ON.

INSPECTION PROCEDURE

1	**Check shift solenoid valve SLU operation.**



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLU.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SLU (See page AT-8).**

OK

2	Check valve body (See page DI-396).

NG → Replace the valve body (See page AT-8).

OK

3	Check torque converter clutch (See page AT-34).

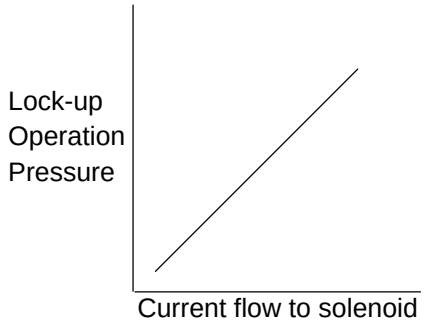
OK → Repair or replace transmission (See page AT-30).

NG

Replace the torque converter clutch (See page AT-30).

DIB3M-02

DTC	P2759	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical(Shift Solenoid Valve SLU)

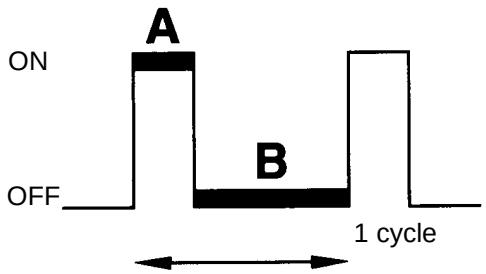


CIRCUIT DESCRIPTION

The amount of current flow to the solenoid is controlled by the (*) duty ratio of the ECM output signal. The higher the duty ratio becomes, the higher the lock-up hydraulic pressure becomes during the lock-up operation.

(*) Duty Ratio

The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non-continuity, then



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(*)

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

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DTC No.	DTC detection condition	Trouble Area
P2759	The following condition is detected. (1-trip detection logic) SLU output signal's duty ON of 3.3 msec. or more with duty ratio of least 95% lasts for 1 second.	★Open or short in shift solenoid valve SLU circuit ★Shift solenoid valve SLU ★ECM

MONITOR DESCRIPTION

The ECM controls the oil pressure to the lock-up clutch based on engine-load information from the throttle position sensor, crankshaft position sensor, input speed sensor, and the oil pressure sensor for shift-solenoid SLU. The ECM commands the shift-solenoid SLU using a duty-cycle control signal. In turn, the shift solenoid operates the lock-up control valve and cause lock-up or flexible lock-up of the torque converter clutch. The ECM illuminates the MIL and store the DTC when ECM detects an open or a short circuit malfunction in the shift solenoid valve SLU.

MONITOR STRATEGY

Related DTCs	P2759	Shift solenoid valve SLU/Range check
Required sensors/Components	Shift solenoid valve SLU	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present.	See page DI-361	
Battery voltage	10 V or more	-

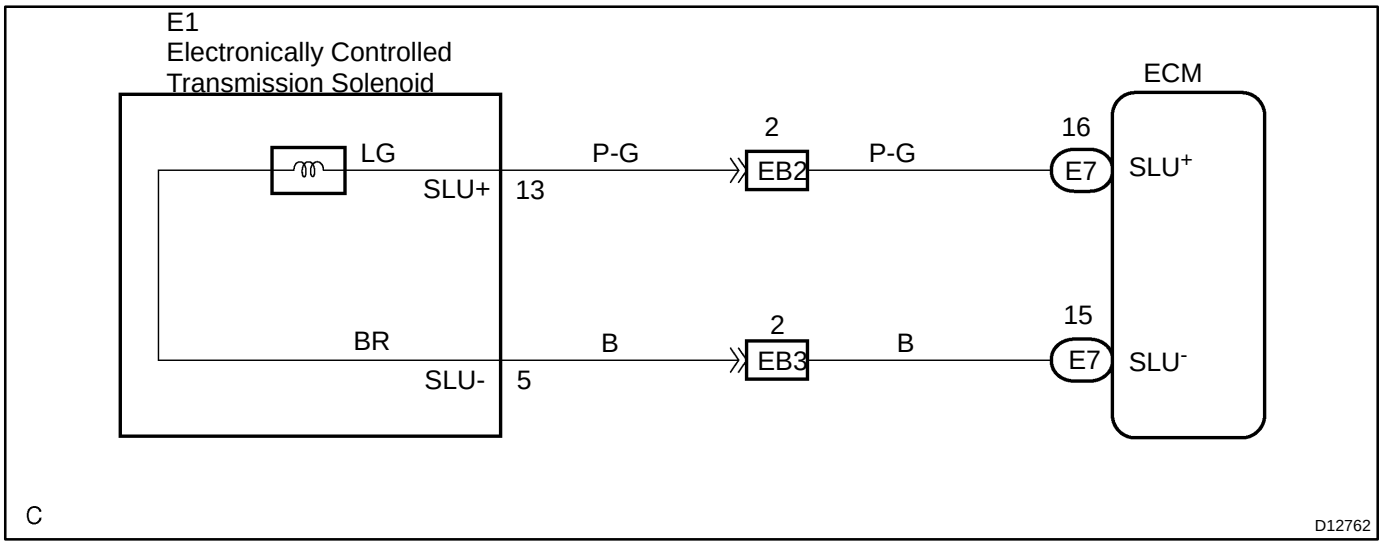
TYPICAL MALFUNCTION THRESHOLDS

Detection criteria	Threshold
Output signal duty	100%

COMPONENT OPERATING RANGE

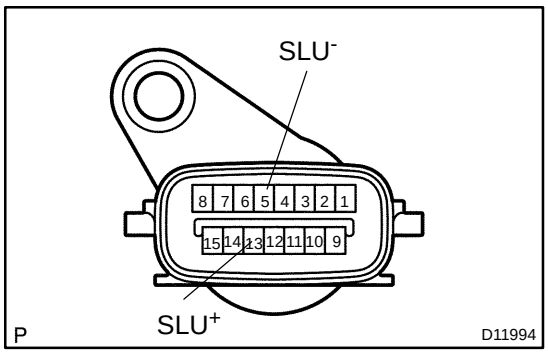
Parameter	Standard value
Output signal duty	Less than 100%

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transmission wire.

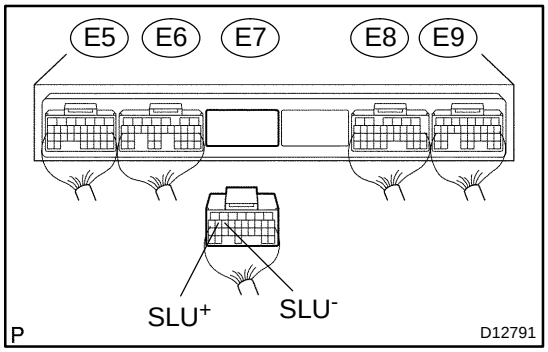


PREPARATION:
Disconnect the transmission wire connector.
CHECK:
Measure resistance between SLU^+ and SLU^- of transmission wire.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals SLU^+ and SLU^- of the transmission wire connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Go to step 3.

OK

2	Measure resistance between terminal SLU^+ and SLU^- of ECM connector.



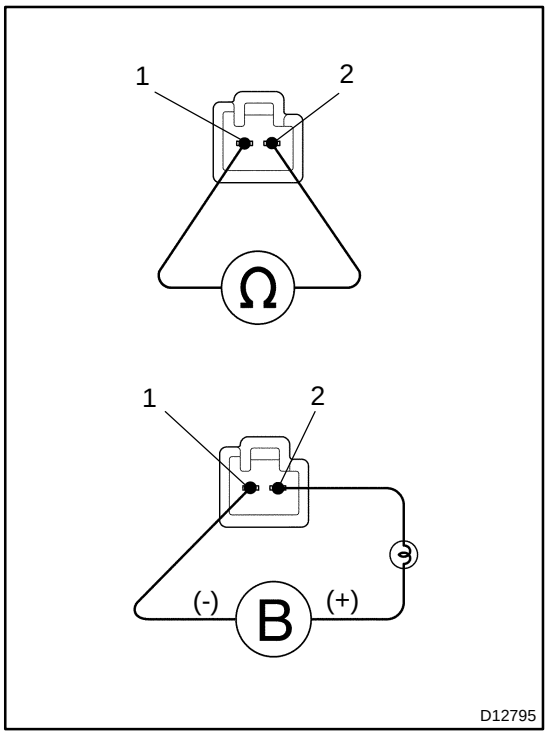
PREPARATION:
(a) Connect the transmission wire connector.
(b) Disconnect the connector of the ECM.
CHECK:
Measure resistance between terminals SLU^+ and SLU^- of ECM connector.
OK:
Resistance: 5.0 to 5.6 Ω at 20˚C (68˚F)
CHECK:
Measure resistance between terminals SLU^+ and SLU^- of the ECM connector and body ground.
OK:
Resistance: 1 MΩ or higher

NG	Repair or replace the harness or connector (See page IN-36).

OK

Check and replace the ECM (See page IN-36).

3	Check shift solenoid valve SLU.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan.
(c) Remove the shift solenoid valve SLU.

CHECK:

(a) Measure the resistance between terminals 1 and 2 of solenoid connector.
Standard: 5.0 to 5.6 Ω at 20˚C (68˚F)
(b) Connect the positive (+) lead with an 21 W bulb to terminal 2 of solenoid connector and negative (-) lead to terminal 1 of the solenoid valve connector, then check the movement of the valve.
Standard: Solenoid sounds operation noise.

OK:

Standard

NG → **Replace the shift solenoid valve SLU (See page AT-8).**

OK

Repair or replace the transmission wire (See page AT-6).

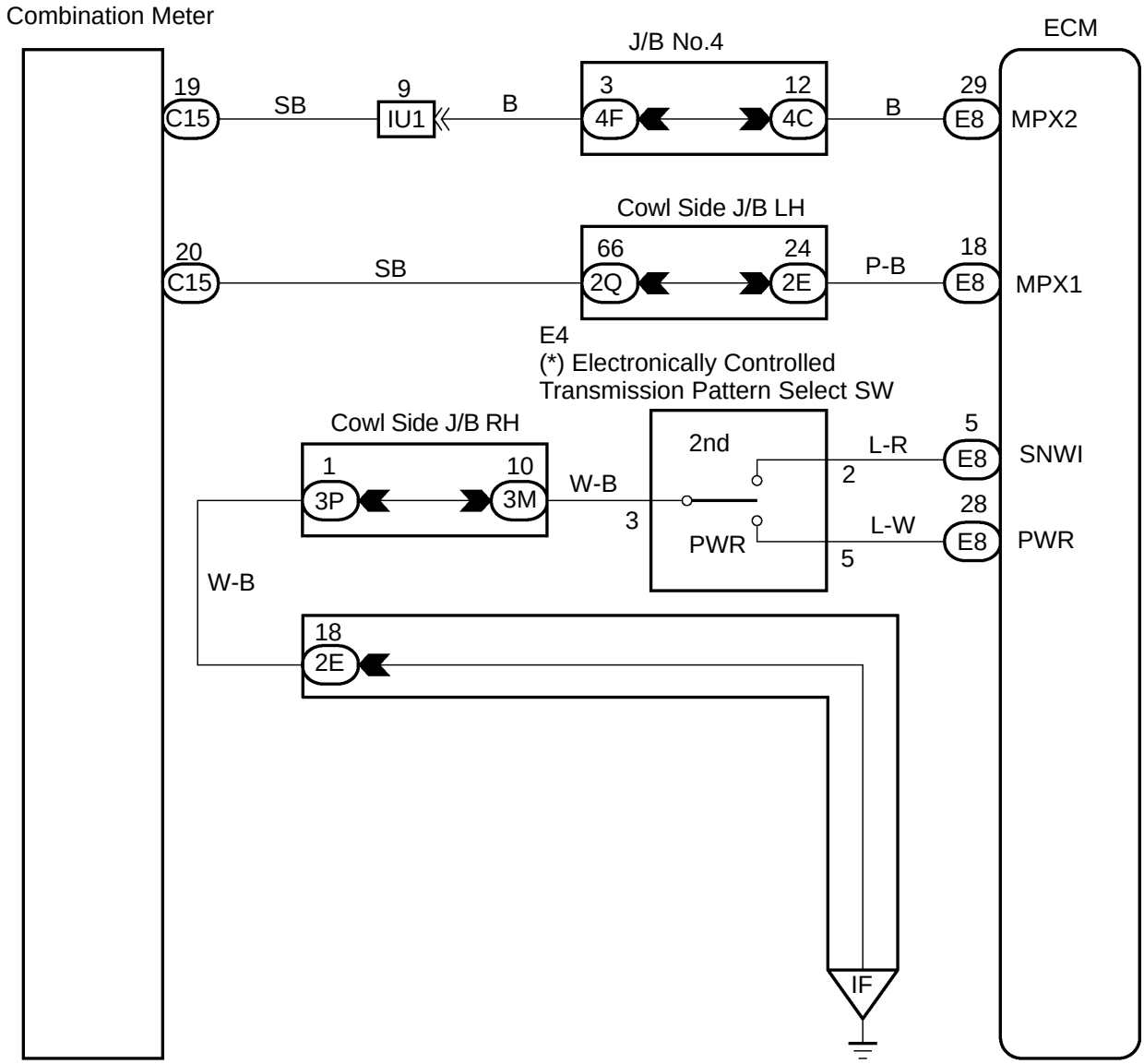
DI3C5-07

Pattern Select Switch Circuit (PWR Mode Switch)

CIRCUIT DESCRIPTION

The ECM memory contains the shift programs for the NORMAL and POWER patterns, 2 position, L position and the lock-up patterns. Following the programs corresponding to the signals from the pattern select switch, the park/neutral position and other various sensors, the ECM switches the solenoid valves ON and OFF, and controls the transmission gear change and the lock-up clutch operation.

WIRING DIAGRAM



(*) Pattern Select Switch (PWR Mode Switch)
When the PWR mode switch is pushed in, the switch contact is made and the PWR mode is selected.
To cancel the PWR mode, push the PWR mode switch once again.

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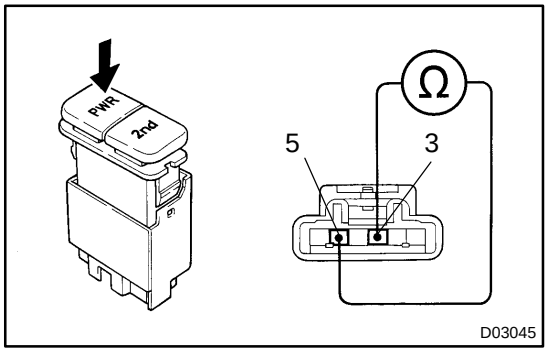
INSPECTION PROCEDURE

1	Check pattern select switch (PWR mode switch).



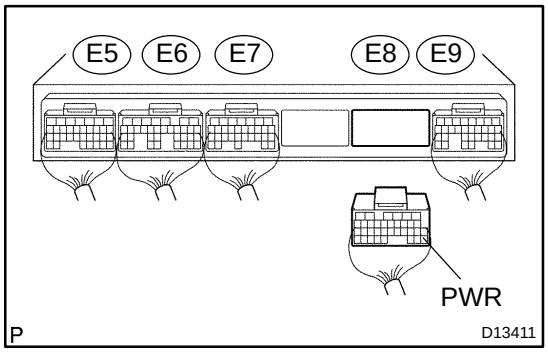
PREPARATION:
Disconnect the pattern select switch connector.
CHECK:
Check continuity between terminals 3 and 5 of pattern select switch connector when the select switch is set to PWR and NORM positions.
OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No continuity

NG → **Replace the pattern select switch.**

OK ↓

2	Check harness and connector between terminal PWR of ECM and body ground.



PREPARATION:
(a) Connect the pattern select switch connector.
(b) Disconnect the connector of ECM.
CHECK:
Check continuity between terminal PWR of ECM and body ground when the pattern select switch is set to the PWR (POWER) position and NORM (NORMAL) position.
OK:

Pattern select switch	Specified condition
PWR	Continuity
NORM	No Continuity

HINT:
The ECM uses the normal pattern signal if the PWR signal is not input.

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI-396).**

NG ↓

Repair or replace harness or connector (See page IN-36).

DI3BO-03

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transmission System Check Sheet	Inspector's Name :

Customer's Name		VIN	
		Production Date	/ /
		Licence Plate No.	
Date Vehicle Brought In	/ /	Odometer Reading	km mile

Date Problem Occurred	/ /
How Often Does Problem Occur?	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Vehicle does not move (☐ Any position ☐ particular position)
	☐ No up-shift (☐ 1st → 2nd ☐ 2nd → 3rd ☐ 3rd → 4th ☐ 4th → 5th)
	☐ No down-shift (☐ 5th → 4th ☐ 4th → 3rd ☐ 3rd → 2nd ☐ 2nd → 1st)
	☐ Lock-up malfunction
	☐ Shift point too high or too low
	☐ Harsh engagement (☐ N → D ☐ Lock-up ☐ Any drive position)
	☐ Slip or shudder
	☐ No kick-down
	☐ Others ( )

Check Item	Malfunction Indicator Lamp	☐ Normal ☐ Remains ON

DTC Check	1st Time	☐ Normal code ☐ Malfunction code (DTC)
	2nd Time	☐ Normal code ☐ Malfunction code (DTC)

DI3BQ-04

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the page given.

*1: ★...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *1	Memory
P0500 (DI-274)	Vehicle Speed Sensor "A"	□Open or short in No. 1 vehicle speed sensor circuit □No. 1 vehicle speed sensor □Combination meter □ECM	★	
P0705 (DI-402)	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	□Short in park/neutral position switch circuit □Park/neutral position switch □ECM	★	
P0710 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit	□Open or short in ATF temperature sensor No.1 circuit □ATF temperature sensor No.1 □ECM	★	
P0711 (DI-415)	Transmission Fluid Temperature Sensor "A" Performance	□ATF temperature sensor No.1 □ECM	★	
P0712 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit Low Input	□Short in ATF temperature sensor No.1 circuit □ATF temperature sensor No.1 □ECM	★	
P0713 (DI-410)	Transmission Fluid Temperature Sensor "A" Circuit High Input	□Open in ATF temperature sensor No.1 circuit □ATF temperature sensor No.1 □ECM	★	
P0717 (DI-418)	Input Speed Sensor Circuit No Signal	□Open or short in speed sensor NT circuit □Speed sensor NT □ECM	★	
P0722 (DI-421)	Output Speed Sensor	□Open or short in speed sensor SP2 circuit □Speed sensor SP2 □ECM	★	
P0724 (DI-424)	Brake Switch "B" Circuit High	□Short in stop light switch circuit □Stop light switch □ECM	★	
P0748 (DI-426)	Pressure Control Solenoid "A" Electrical (Shift Solenoid Valve SL1)	□Open or short in shift solenoid valve SL1 circuit □Shift solenoid valve SL1 □ECM	★	
P0751 (DI-433)	Shift Solenoid "A" Performance (Shift Solenoid Valve S1)	□Shift solenoid valve S1 is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve S1 □Automatic transmission assembly □ECM	★	
P0756 (DI-437)	Shift Solenoid "B" Performance (Shift Solenoid Valve S2)	□Shift solenoid valve S2 is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve S2 □Automatic transmission assembly □ECM	★	
P0771 (DI-441)	Shift Solenoid "E" Performance (Shift Solenoid Valve SR)	□Shift solenoid valve SR is stuck open or closed □Shift solenoid valve SL1 is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve SR □Shift solenoid valve SL1 □Automatic transmission assembly □ECM	★	

P0776 (DI-445)	Pressure Control Solenoid "B" Performance (Shift Solenoid Valve SL2)	□Shift solenoid valve SL2 is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve SL2 □Automatic transmission assembly □ECM	★	
P0778 (DI-449)	Pressure Control Solenoid "B" Electrical (Shift Solenoid Valve SL2)	□Open or short in shift solenoid valve SL2 circuit □Shift solenoid valve SL2 □ECM	★	
P0781 (DI-453)	1-2 Shift	□Valve body is blocked up or stuck (1-2 shift valve) □Automatic transmission assembly □ECM	★	
P0818 (DI-457)	Driveline Disconnect Switch Input Circuit	□Short in transfer neutral position switch circuit □Transfer neutral position switch □ECM	★	
P0850 (DI-402)	Park/Neutral Switch Input Circuit	□Short in park/neutral position switch circuit □Park/neutral position switch □ECM	★	
P0973 (DI-460)	Shift Solenoid "A" Control Circuit Low (Shift Solenoid Valve S1)	□Open or short in shift solenoid valve S1 circuit □Shift solenoid valve S1 □ECM	★	
P0974 (DI-460)	Shift Solenoid "A" Control Circuit High (Shift Solenoid Valve S1)		★	
P0976 (DI-464)	Shift Solenoid "B" Control Circuit Low (Shift Solenoid Valve S2)	□Open or short in shift solenoid valve S2 circuit □Shift solenoid valve S2 □ECM	★	
P0977 (DI-464)	Shift Solenoid "B" Control Circuit High (Shift Solenoid Valve S2)		★	
P0985 (DI-468)	Shift Solenoid "E" Control Circuit Low (Shift Solenoid Valve SR)	□Open or short in shift solenoid valve SR circuit □Shift solenoid valve SR □ECM	★	
P0986 (DI-468)	Shift Solenoid "E" Control Circuit High (Shift Solenoid Valve SR)		★	
P1782 (DI-472)	T/F L4 Range Position Switch Performance	□Short in transfer L4 position switch circuit □Transfer L4 position switch □ECM	★	
P2714 (DI-476)	Pressure Control Solenoid "D" Performance (Shift Solenoid Valve SLT)	□Shift solenoid valve SLT is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve SLT □Automatic transmission assembly □ECM	★	
P2716 (DI-479)	Pressure Control Solenoid "D" Electrical (Shift Solenoid Valve SLT)	□Open or short in shift solenoid valve SLT circuit □Shift solenoid valve SLT □ECM	★	
P2740 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit	□Open or short in ATF temperature sensor No. 2 circuit □ATF temperature sensor No. 2 □ECM	★	
P2742 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit Low	□Short in ATF temperature sensor No. 2 circuit □ATF temperature sensor No. 2 □ECM	★	
P2743 (DI-483)	Transmission Fluid Temperature Sensor "B" Circuit High	□Open in ATF temperature sensor No. 2 circuit □ATF temperature sensor No. 2 □ECM	★	

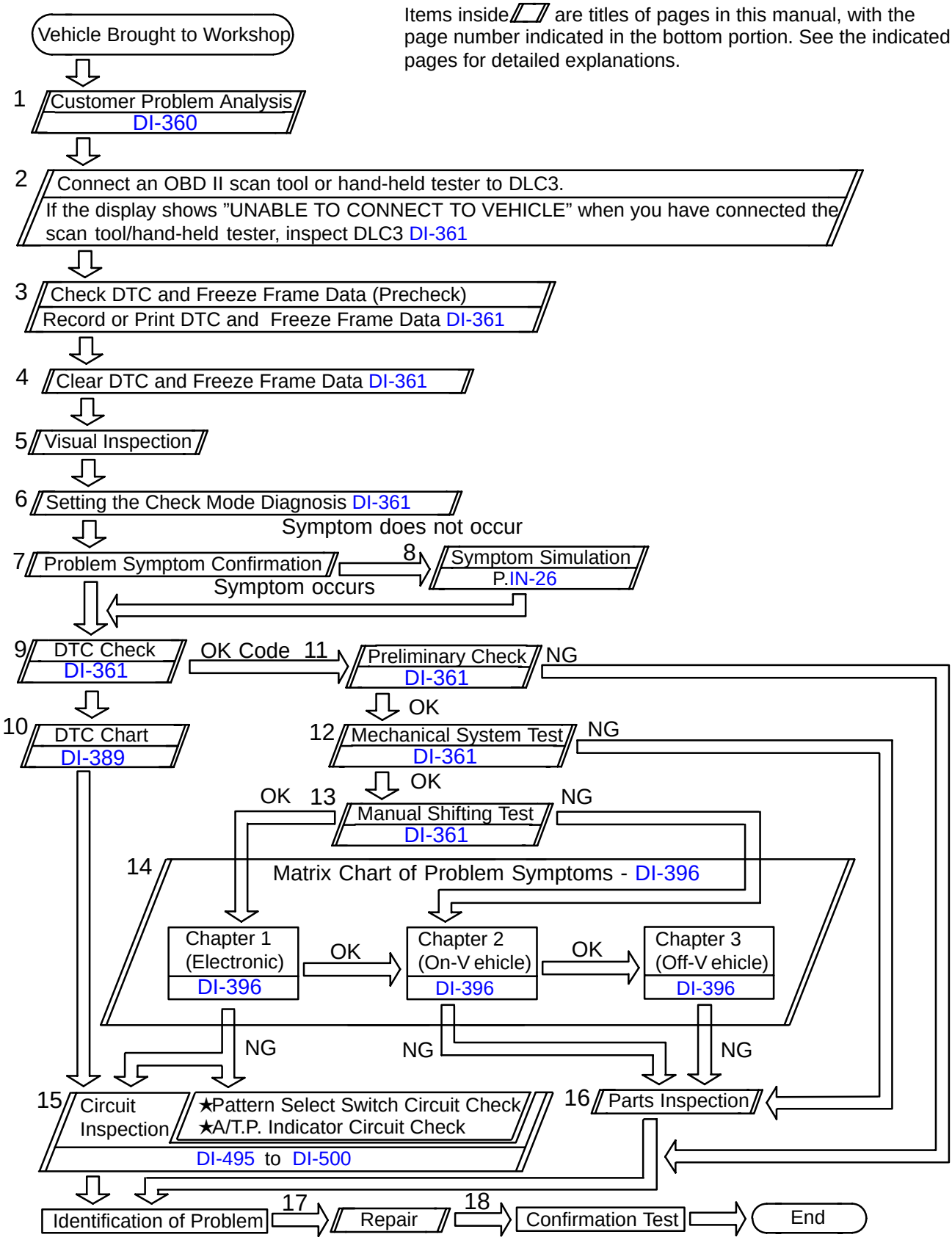
P2757 (DI-487)	Torque Converter Clutch Pressure Control Solenoid Performance (Shift Solenoid Valve SLU)	□Shift solenoid valve SLU is stuck open or closed □Valve body is blocked up or stuck □Shift solenoid valve SLU □Automatic transmission assembly □ECM	★	
P2759 (DI-491)	Torque Converter Clutch Pressure Control Solenoid Control Circuit Electrical (Shift Solenoid Valve SLU)	□Open or short in shift solenoid valve SLU circuit □Shift solenoid valve SLU □ECM	★	

AUTOMATIC TRANSMISSION

DI3BN-04

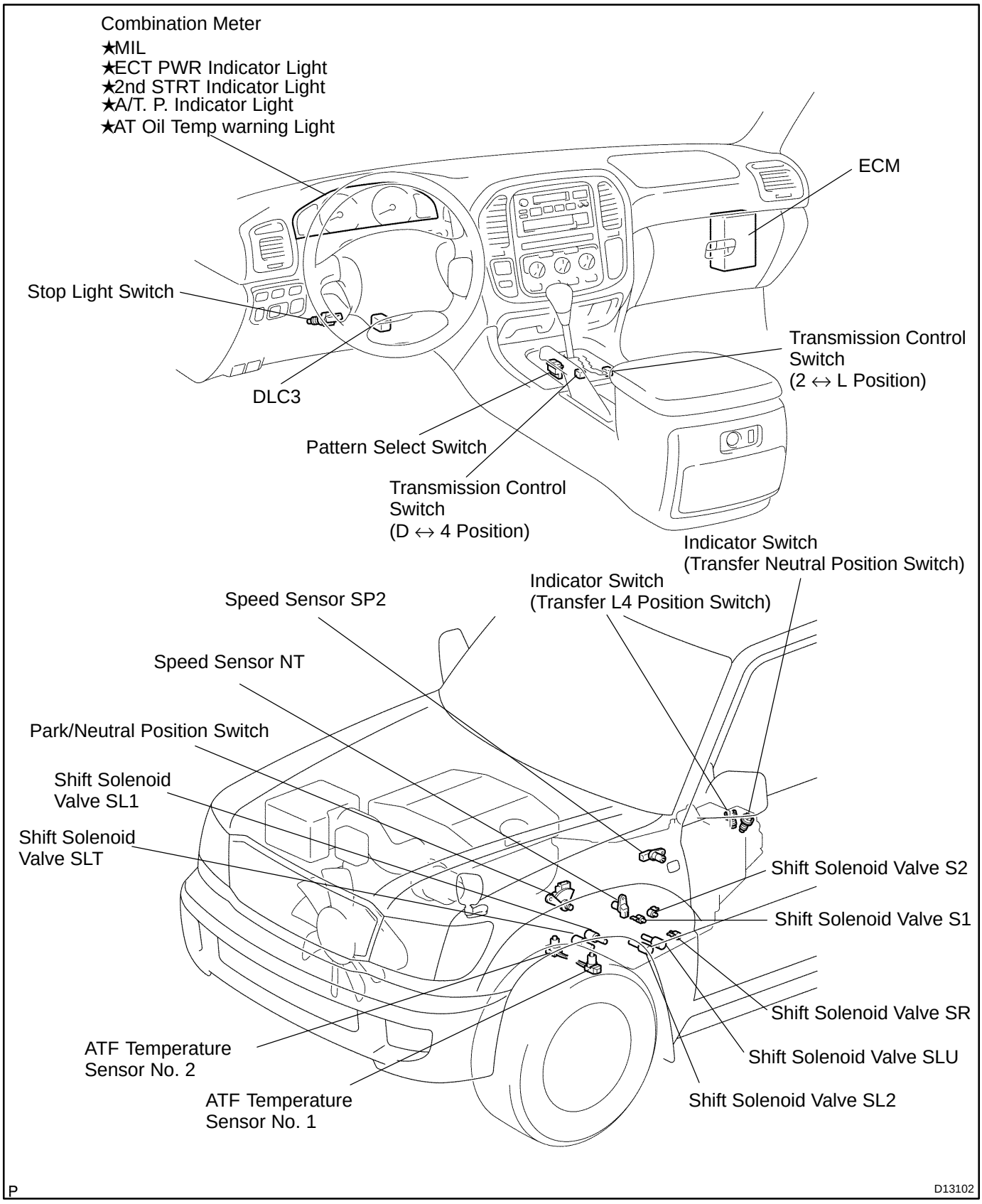
HOW TO PROCEED WITH TROUBLESHOOTING

Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.



DI3BR-05

PARTS LOCATION



DIC2W-01

PRECAUTION

NOTICE:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM (See page DI-361).

HINT:

Initialization can not be completed by only disconnecting the battery terminal.

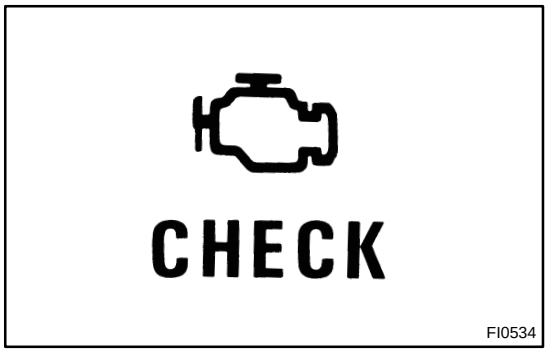
DIDYQ-01

PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

(1) When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect an OBD II scan tool complying with SAE J1987 or a hand-held tester to the vehicle, and read off various data output from the vehicle's ECM.



(2) 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 the computer itself or in the drive system components which affect the vehicle emissions. In addition to the MIL illuminating when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI-381).

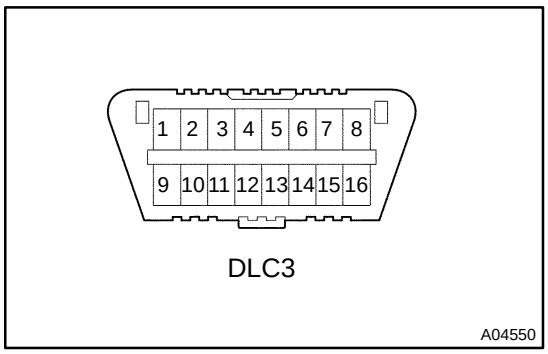
If the malfunction does not occur in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.

(3) To check the DTCs, connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle. The OBD II scan tool or hand-held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).

(4) 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 the DTC chart on page DI-381).

(5) The diagnosis system operates in the normal mode during the normal vehicle use, and also has a check mode for technicians to simulate malfunction symptoms and perform troubleshooting. Most DTCs use 2 trip detection logic(*) to prevent erroneous detection. By switching the ECM to the check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily. (hand-held tester).

(6) *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. If the same malfunction is detected again during the second test drive, this second detection causes the MIL to illuminate.



(b) Inspect the DLC3.
The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Tester connection	Condition	Specified condition
7 (Bus ± Line) - 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) - Body	Always	1 Ω or less
5 (Signal Ground) - Body	Always	1 Ω or less
16 (B+) - Body	Always	9 to 14 V

HINT:
If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or hand-held tester to the DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

★ If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

★ If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.
(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE-63).

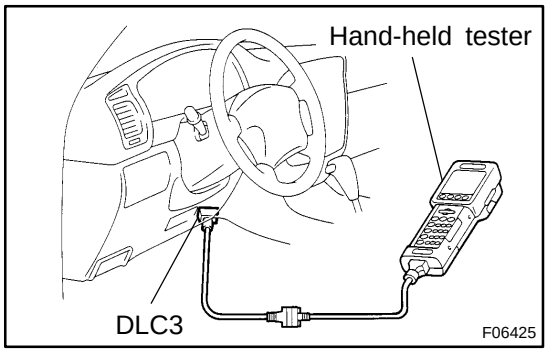
(2) When the engine is started, the MIL should go off. If the lamp remains on, it means that the diagnosis system has detected a malfunction or abnormality in the system.

2. Normal Mode:
DTC CHECK

NOTICE:

Hand-held tester only:

When the diagnostic system is switched from the normal mode to the check mode, all the DTCs and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTCs and freeze frame data, and note them down.



(a) Checking DTCs using the OBD II scan tool or hand-held tester.
  (1) Connect the OBD II scan tool or hand-held tester to DLC3.
  (2) Turn the ignition switch ON.
  (3) Use the OBD II scan tool or hand-held tester to check the DTCs and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book).
  (4) See page DI-381 to confirm the details of the DTCs.

NOTICE:

When simulating symptoms with an OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For codes on the DTCs chart subject to "2 trip detection logic", turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL is indicated on the instrument panel and DTCs are recorded in the ECM.

(b) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to DLC3.
  (2) Turn the ignition switch ON.
  (3) When operating an OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

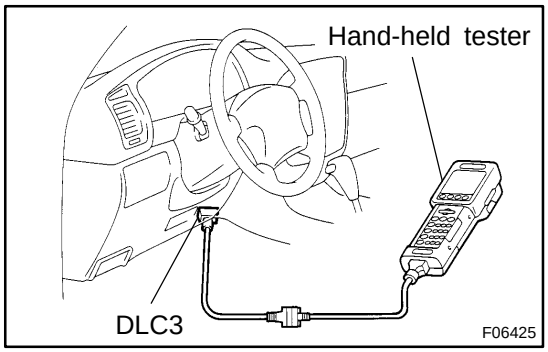
(c) When not using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Disconnecting the battery terminal or remove the EFI and ETCS fuse from engine room J/B for 60 seconds or more.

3. Check Mode:
DTC CHECK

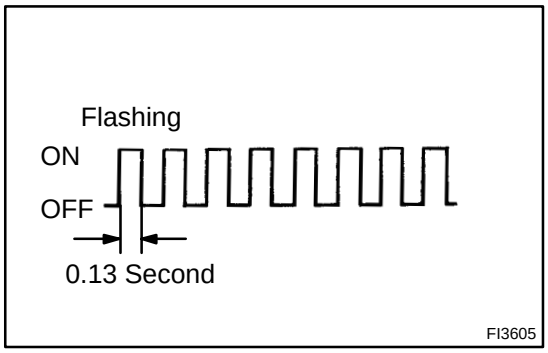
HINT:

Hand-held tester only:

Compared to the normal mode, the check mode has more sensing ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.



(a) Procedure for Check Mode using the hand-held tester.
  (1) Check the initial conditions.
    ★ Battery positive voltage 11 V or more
    ★ Throttle valve fully closed
    ★ Transmission in P or N position
    ★ A/C switched OFF
  (2) Turn the ignition switch OFF.
  (3) Connect the hand-held tester to the DLC3.
  (4) Turn the ignition switch ON.



  (5) Switch the hand-held tester from the normal mode to the check mode (Check that the MIL flashes).

NOTICE:

If the hand-held tester switches the ECM from the normal mode to the check mode or vice-versa, or if the ignition switch is turned from ON to ACC or OFF during the check mode, the DTC and freeze frame data will be erased.

  (6) Start the engine (MIL goes off after the engine starts).
  (7) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

  (8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Be sure not to turn the ignition switch OFF, as turning it OFF switches the diagnosis system from the check mode to the normal mode, which erases all the DTCs, etc.

  (9) After checking the DTC, inspect the applicable circuit.

(b) When using the OBD II scan tool or hand-held tester:
Clearing the DTCs.
  (1) Connect the OBD II scan tool or hand-held tester to DLC3.
  (2) Turn the ignition switch ON.

(3) When operating an OBD II scan tool (complying with SAE J1978) or hand-held tester to erase the codes, the DTCs and freeze frame data will be erased. (See the OBD II scan tool's instruction book for operating instructions.)

(c) When not using the OBD II scan tool or hand-held tester: Clearing the DTCs.

(1) Disconnecting the battery terminal or remove the EFI and ETCS fuse from engine room J/B for 60 seconds or more.

4. DATA LIST

HINT:

According to the DATA LIST displayed by the OBD II scan tool or Hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one method to shorten labor time.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the OBD II scan tool or Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of OBD ll scan tool or Hand-held tester.
(f) Select the item "/DIAGNOSIS/ENHANCED OBD ll/DATA LIST/ALL (or ATM)".
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/ Display (Range)	Normal Condition	Diagnostic Note
STOP LIGHT SW	Stop light SW Status/ ON or OFF	★Brake Pedal is depressed: ON ★Brake Pedal is released: OFF	←
SHIFT	Actual Gear Position/ 1st, 2nd, 3rd, 4th or 5th	Shift Lever Position is; ★L: 1st ★2: 1st or 2nd ★3: 1st, 2nd or 3rd ★4: 1st, 2nd, 3rd or 4th ★D: 1st, 2nd, 3rd, 4th or 5th	←
PNP SW [NSW]	PNP SW Status/ ON or OFF	Shift lever position is; P or N: ON Except P or N: OFF	The shift lever position and these values are different, there are failures of the PNP switch or shift cable adjustment.
REVERSE	PNP SW Status/ ON or OFF	Shift lever position is; R: ON Except R: OFF	
DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; D and 4: ON Except D and 4: OFF	
4th/DRIVE	PNP SW Status/ ON or OFF	Shift lever position is; 4: ON Except 4: OFF	
3RD	PNP SW Status/ ON or OFF	Shift lever position is; 3: ON Except 3: OFF	
2ND	PNP SW Status/ ON or OFF	Shift lever position is; 2 and L: ON Except 2 and L: OFF	
LOW	PNP SW Status/ ON or OFF	Shift lever position is; L: ON Except L: OFF	
LOCK UP SOL	Lock Up Solenoid Status/ ON or OFF	★Lock Up: ON ★Except Lock Up: OFF	←

PATTERN SW (M)	Pattern SW (PWR) Status/ ON or OFF	Pattern SW (PWR) is; Pushed in: ON Pushed once again: OFF	←
SNOW SW	Pattern SW (2nd) Status/ ON or OFF	★IG SW ON: OFF ↓ ★Pattern SW (2nd) Push: ON ↓ ★Pattern SW (2nd) Push: OFF	←
SOLENOID (SLT)	Shift Solenoid SLT Status/ ON or OFF	IG SW ON: ON	←
SOLENOID (SLU)	Shift Solenoid SLU Status/ ON or OFF	★Lock Up: ON ★Except Lock Up: OFF	←
SPD (SP2)	Counter Gear Speed display/ min.: 0 km/h (0 mph) max.: 255 km/h (158 mph)	Vehicle stopped: 0 km/h (0 mph)	←
AT FLUID TEMP	ATF Temp. Sensor No. 1 Value/ min.: -40□C (-40□F) max.: 215□C (419□F)	80□C (176□F) (After Stall Test)	If the value is ”-40□C (-40□F)” or ”215□C (419□F)”, ATF temp. sensor No. 1 circuit is opened or shorted.

5. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the Hand-held tester allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten labor time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the Hand-held tester to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the ”ON” button of Hand-held tester.
(f) Select the item ”/DIAGNOSIS/ENHANCED OBD ll/ACTIVE TEST”.
(g) According to the display on tester, perform the ”ACTIVE TEST”.

Item	Test Details	Diagnostic Note
SHIFT	[Test Details] Operate the shift solenoid valve and set the each shift position by yourself. [Vehicle Condition] Less than 50 km/h (31 mph) [Others] ★Press → button: Shift up ★Press ← button: Shift down	Possible to check the operation of the shift solenoid values. HINT: Shifting to the 5th gear is possible only when the vehicle stops or idle is ON.
LOCK UP	[Test Details] Control the shift solenoid SLU to set the ATM to the lock-up condition. [Vehicle Condition] Vehicle Speed: 58 km/h (36 mph) or more	Possible to check the SLU operation.
LINE PRESS UP	[Test Details] Operate the shift solenoid SLT and raise the line pressure. [Vehicle Condition] ★Vehicle Stopped. ★IDL: ON [Others] ON: Line pressure up. OFF: No action (normal operation)	-

6. 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 until the previous monitoring has concluded.
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 one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time when 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. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

7. TOYOTA/LEXUS 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, Hydrocarbon 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, VVTL	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
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 VAV, 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-boad 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
O2 sensor	Heater 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 press 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 skid 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
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
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 immobilizer system, Immobilizer system	Vehicle anti-theft system

8. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction

DTC	Component/System	Monitor disablement (X : disabled)																																		
		P0010,P0020	P0031-0052	P0031-0052	P0037-0058	P0043-P0064	P0100-P0103	P0101	P0110-P0113	P0115-P0118	P0116	P0120-P2135	P0125	P0128	P0130-P0153	P0134-P0154	P0136,P0156	P0142,P0162	P0171-P0175	P0300,P0308	P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450,P0453
		VVT VVS1,2	FrO2S heater sensor 1	A/F sensor heater sensor 1	FrO2S heater sensor 2	FrO2S heater sensor 3	MAF sensor	MAF sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for CL	Thermostat	O2S Sensor 1	FrO2S,A/F sensor (No Activity)	O2S Sensor 2	O2S Sensor 3	Fuel system	Misfire	Knock sensor	CKP sensor	CMP sensor	VVT sensor 1,2	Ignitor	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor
P0010,P0020	VVT VVS1,2													×					×																	
P0031-0052	FrO2S heater sensor 1													×	×	×	×	×	×							×	×			×		
P0031-0052	A/F sensor heater sensor 1													×			×	×	×							×	×			×		
P0037-0058	FrO2S heater sensor 2																×	×												×		
P0043-0064	FrO2S heater sensor 3																	×														
P0100-P0103	MAF sensor										×		×	×	×	×	×	×	×	×						×	×			×	×	
P0110-P0113	IAT sensor												×	×	×	×	×	×		×						×	×				×	
P0115-P0118	ECT sensor							×					×	×	×	×	×	×	×	×						×	×		×	×	×	
P0120-P2135	TP sensor							×							×	×	×	×	×	×						×	×			×	×	
P0125	ECT sensor							×						×	×	×	×	×	×	×						×	×		×	×	×	
P0128	Thermostat																															
P0130-P0153	O2S Sensor 1													×		×	×	×								×	×			×		
P0134,P0154	Closed Loop			×										×	×		×	×	×							×	×			×	×	
P0136,P0156	O2S Sensor 2																													×		
P0142,P0162	O2S Sensor 3																															
P0171-P0172	Fuel system													×	×	×	×	×								×	×			×	×	
P0300-P0308	Misfire		×											×	×	×	×	×												×	×	
P0325-P0333	Knock sensor																			×						×	×					
P0335	CKP sensor							×						×	×	×	×	×	×	×						×	×			×	×	
P0340,P0341	CMP sensor							×						×	×	×	×	×	×	×						×	×			×	×	
P0340-P0346	VVT sensor 1,2													×																		
P0351-P0358	Ignitor													×					×							×	×			×	×	
P0401	EGR system (closed)													×					×											×		
P0402	EGR system (open)													×	×	×	×	×	×											×	×	
P0405,P0409	Lift sensor																															
P0420,P0430	Catalyst																															
P0442-P0456	EVAP system														×	×	×	×														
P0450,P0451	EVAP press sensor																														×	

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D13631

	DTC	Component/System	Monitor disablement (X : disabled)																														
			P0010,P0020	P0031-0052	P0031-0052	P0037-0058	P0043-P0064	P0100-P0103	P0101	P0110-P0113	P0115-P0118	P0116	P0120-P2135	P0125	P0128	P0130-P0153	P0134-P0154	P0136,P0156	P0142,P0162	P0171-P0175	P0300,P0308	P0325-P0333	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0401	P0402	P0405	P0409	P0420,P0430	P0440-P0446	P0450-P0453
			VVT VVS1,2	FrO2S heater sensor 1	A/F sensor heater sensor 1	FrO2S heater sensor 2	FrO2S heater sensor 3	MAF sensor	MAF sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for CL	Thermostat	O2S Sensor 1	FrO2S,A/F sensor (No Activity)	O2S Sensor 2	O2S Sensor 3	Fuel system	Misfire	Knock sensor	CKP sensor	CMP sensor	VVT sensor 1,2	Ignitor	EGR system (closed)	EGR system (open)	EGR Lift sensor	EGR Lift sensor	Catalyst	EVAP system	EVAP press sensor
Monitor detected malfunction	P0500	VVS													X	X	X	X	X	X	X						X	X			X	X	
	P0505,P0511	ISC valve														X																	
	P0560	Battery																															
	P0617	Starter signal																															
	P0705	Shift lever position switch																															
	P0710	Trans fluid temp sensor																															
	P0715-P0717	Output speed sensor																															
	P0715-P0717	Input speed sensor																															
	P0724	Stop lamp switch																															
	P0741-P0796	Trans solenoid (function)																															
	P0748-P0798	Trans solenoid (range)																															
	P0850	PNP switch																			X												
	P1010	OCV for VVTL													X					X													
	P2120-P2138	Accel position sensor																															
	P2120,P2103	Throttle motor																															
	P1126	Electronic magenet clutch																															
	P1129	Electronic throttle system																															
	P0011,P0012	VVT system 1,2													X					X							X	X			X	X	
	P1011,P1012	VVTL System													X					X							X	X			X	X	
	P1430	Pressure sensor (HC adsorber)																														X	X
	P2004,P2006	Intake manifold runner conrtol																															
	P2009,P2010	Intake manifold runner circuit																															
	P2014,16,17	Intake manifold runner sensor																															
	P2196,P2198	A/F sensor (rationality)													X			X	X								X	X			X		
	P2237,P2240	A/F sensor (open)													X			X	X								X	X			X		
	P2423,P2424	HC adsorption catalyst																															
	P2714-P2759	Trans solenoid (SLU-SLD)																															
	P2A00,P2A03	A/F sensor (slow response)													X			X	X								X	X			X		

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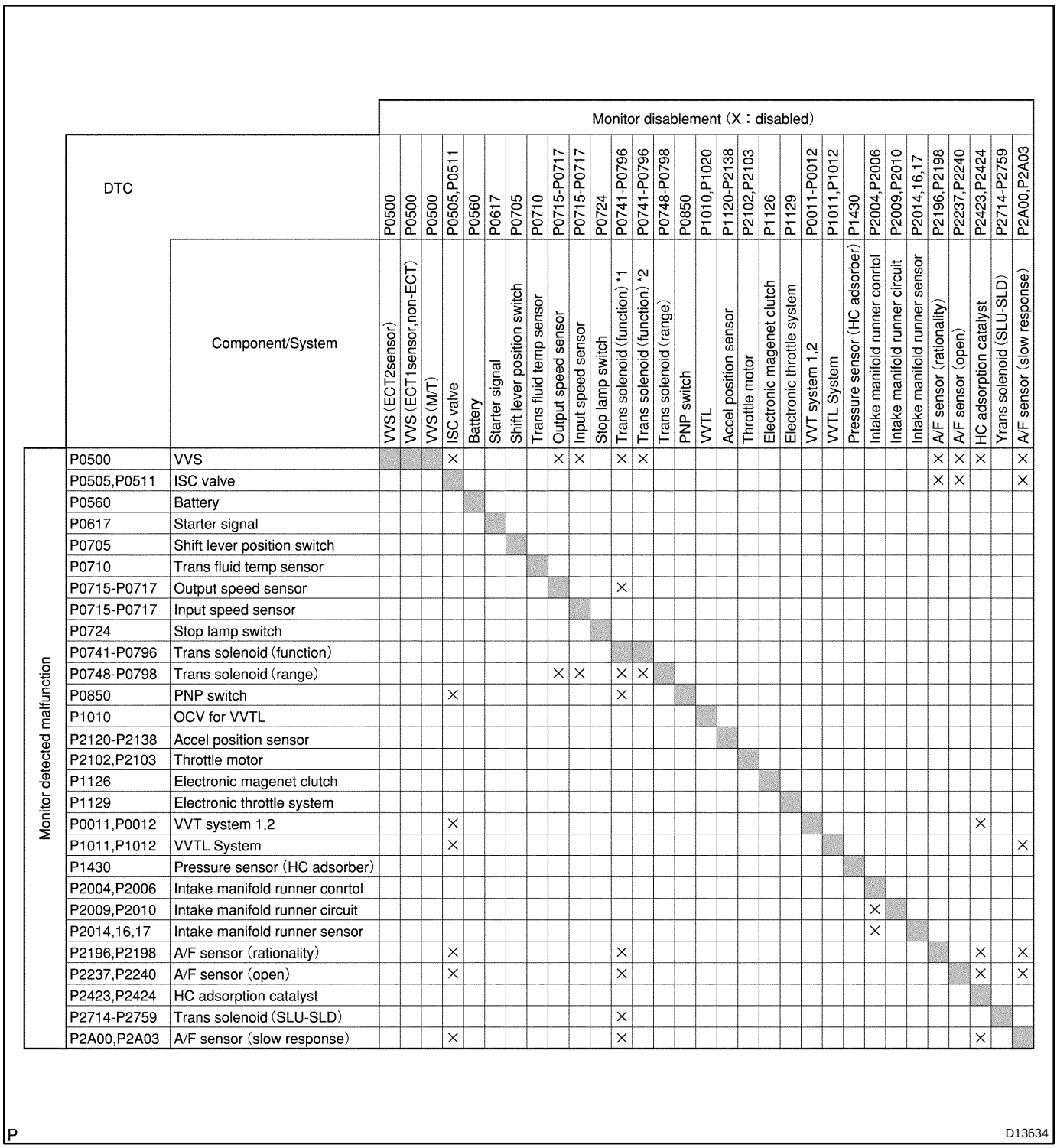
D13632

Monitor detected malfunction

DTC	Component/System	Monitor disablement (X : disabled)																												
		P0500	P0500	P0500	P0505,P0511	P0560	P0617	P0705	P0710	P0715-P0717	P0715-P0717	P0724	P0741-P0796	P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1120-P2138	P2120,P2103	P1126	P1129	P0011-P0012	P1011,P1012	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2196,P2198	P2237,P2240	P2423,P2424	P2714-P2759	P2A00,P2A03
		VVS (ECT2sensor)	VVS (ECT1sensor,non-ECT)	VVS (M/T)	ISC valve	Battery	Starter signal	Shift lever position switch	Trans fluid temp sensor	Output speed sensor	Input speed sensor	Stop lamp switch	Trans solenoid (function) *1	Trans solenoid (function) *2	Trans solenoid (range)	PNP switch	VVTL	Accel position sensor	Throttle motor	Electronic magenet clutch	Electronic throttle system	VVT system 1,2	VVTL System	Pressure sensor (HC adsorber)	Intake manifold runner conrtol	Intake manifold runner circuit	Intake manifold runner sensor	A/F sensor (rationality)	A/F sensor (open)	HC adsorption catalyst	Yrans solenoid (SLU-SLD)	A/F sensor (slow response)
P0010,P0020	VVT VVS1,2												X																			
P0031-0052	FrO2S heater sensor 1				X								X																	X		
P0031-0052	A/F sensor heater sensor 1				X																						X	X	X		X
P0037-0058	FrO2S heater sensor 2																										X		X		
P0043-0064	FrO2S heater sensor 3																												X		
P0100-P0103	MAF sensor			X	X								X				X					X	X				X	X	X		X
P0110-P0113	IAT sensor												X												X		X	X			X
P0115-P0118	ECT sensor			X	X								X	X			X					X	X		X		X	X	X		X
P0120-P2135	TP sensor		X		X								X														X	X	X		X
P0125	ECT sensor			X	X								X	X			X					X					X	X	X		X
P0128	Thermostat																															
P0130-P0153	O2S Sensor 1				X								X																	X		
P0134,P0154	Closed Loop				X								X														X	X	X		X
P0136,P0156	O2S Sensor 2																										X		X		
P0142,P0162	O2S Sensor 3																												X		
P0171-P0172	Fuel system				X								X														X	X	X		X
P0300-P0308	Misfire				X								X														X	X	X		X
P0325-P0333	Knock sensor												X																		
P0335	CKP sensor				X								X				X					X	X				X	X	X		X
P0340,P0341	CMP sensor				X								X				X					X	X				X	X	X		X
P0340-P0346	VVT sensor 1,2																															
P0351-P0358	Ignitor				X								X																	X		
P0401	EGR system (closed)												X																	X		
P0402	EGR system (open)				X								X														X	X	X		X
P0405,P0409	Lift sensor																															
P0420,P0430	Catalyst																															
P0442-P0456	EVAP system				X																						X	X			X
P0450,P0451	EVAP press sensor																															

P

D13633


Monitor disablement (X : disabled)
DTC
Component/System
Monitor detected malfunction
P0500 VVS (ECT2sensor)
P0500 VVS (ECT1sensor,non-ECT)
P0500 VVS (M/T)
P0505,P0511 ISC valve
P0560 Battery
P0617 Starter signal
P0705 Shift lever position switch
P0710 Trans fluid temp sensor
P0715-P0717 Output speed sensor
P0715-P0717 Input speed sensor
P0724 Stop lamp switch
P0741-P0796 Trans solenoid (function) *1
P0741-P0796 Trans solenoid (function) *2
P0748-P0798 Trans solenoid (range)
P0850 PNP switch
P1010,P1020 VVTL
P1120-P2138 Accel position sensor
P2102,P2103 Throttle motor
P1126 Electronic magenet clutch
P1129 Electronic throttle system
P0011-P0012 VVT system 1,2
P1011,P1012 VVTL System
P1430 Pressure sensor (HC adsorber)
P2004,P2006 Intake manifold runner conrtol
P2009,P2010 Intake manifold runner circuit
P2014,16,17 Intake manifold runner sensor
P2196,P2198 A/F sensor (rationality)
P2237,P2240 A/F sensor (open)
P2423,P2424 HC adsorption catalyst
P2714-P2759 Yrans solenoid (SLU-SLD)
P2A00,P2A03 A/F sensor (slow response)
P
D13634

9. PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms. If the problem is that the transmission 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.

10. ROAD TEST

NOTICE:

Perform the test at normal operating ATF temperature 50 to 80˚C (122 to 176˚F).

(a) D position test (NORM and PWR pattern):

Shift into the D position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts take place, and that the shift points conform to the automatic shift schedule (See page SS-23).

HINT:

★ 5th Gear Up-shift Prohibition Control (1. Coolant temp. is 55˚C (131˚F) or less. 2. Vehicle speed is 51 km/h (32 mph) or less.)

★ 4th Gear Up-shift Prohibition Control (1. Coolant temp. is 40˚C (104˚F) or less. 2. Vehicle speed is 45 km/h (28 mph) or less.)

★ 5th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60˚C (140˚F) or less.)

★ When the 2nd start switch is on, there is no 1→2 up-shift and 2→1 down-shift.

(2) Check for shift shock and slip.

Check for shock and slip at the 1 → 2, 2 → 3, 3 → 4 and 4 → 5th up-shifts.

(3) Check for abnormal noises and vibration.

Drive in the D position lock-up or 5th gear and check for abnormal noises and vibration.

HINT:

The check for the cause of abnormal noises and vibration must be done very thoroughly as it could also be due to loss of balance in the differential, torque converter clutch, etc.

(4) Check kick-down operation.

While running in the D position, 2nd, 3rd, 4th and 5th gears, check that the possible kick-down vehicle speed limits for 2 → 1, 3 → 2, 4 → 3 and 5th → 4 kick-downs conform to those indicated on the automatic shift schedule (See page SS-23).

(5) Check abnormal shock and slip at kick-down.

(6) Check the lock-up mechanism.

★ Drive in D position 5th gear, at a steady speed (lock-up ON) of about 70 km/h (43 mph).

★ Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

(b) 4 position test:

Shift into the 4 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.

Check that the 1 → 2, 2 → 3 and 3 → 4 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

HINT:

★ There is no 5th up-shift in the 4 position.

★ 4th Gear Lock-up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60˚C (140˚F) or less.)

(2) Check engine braking.
While driving in the 4 position and 4th gear, 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.

(4) Check the lock-up mechanism.
★ Drive in 4 position 4th gear, at a steady speed (lock-up ON) of about 64 km/h (40 mph).
★ Lightly depress the accelerator pedal and check that the engine speed does not change abruptly.

If there is a big jump in engine speed, there is no lock-up.

(c) 3 position test:
Shift into the 3 position and fully depress the accelerator pedal and check the following points.

(1) Check up-shift operation.
Check that the 1 → 2 and 2 → 3 up-shift takes place and that the shift point conforms to the automatic shift schedule (See page SS-23).

(2) Check engine braking.
While running in the 3 position and 3rd gear, 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.

(d) 2 position test:
Shift into the 2 position and fully depress the accelerator pedal and check the following points.

(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-23).

HINT:
When the 2nd start switch is ON, there is no 1 → 2 up-shift and 2 → 1 down-shift.

(2) Check engine braking.
While running in the 2 position and 2nd gear, 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.

(e) L position test:
Shift into the L position and fully depress the accelerator pedal and check the following points.

(1) Check no up-shift.
While running in the L position, check that there is no up-shift to 2nd gear.

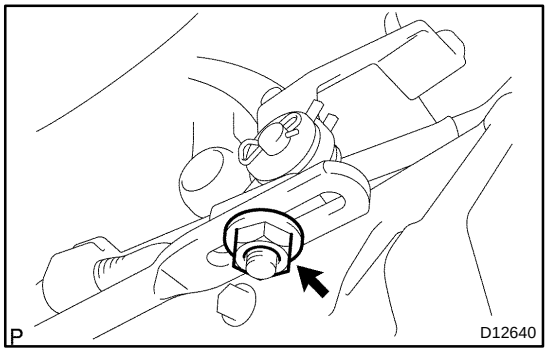
(2) Check engine braking.
While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noises during acceleration and deceleration.

(f) R position test:
Shift into the R position, lightly depress the accelerator pedal, and check that the vehicle moves backward without any abnormal noise or vibration.

CAUTION:
Before conducting this test ensure that the test area is free from people and obstruction.

(g) P position test:
Stop the vehicle on a grade (more than 5°) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.



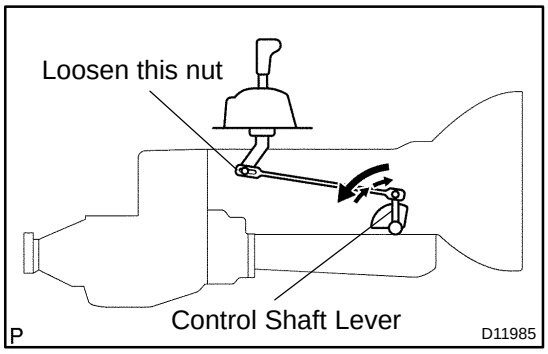
11. ADJUST SHIFT LEVER POSITION

When shifting the shift lever from the N position to other positions, check that the lever can be shifted smoothly and accurately to each position and that the position indicator is not aligned with the correct position.

If the indicator is not aligned with the correct position, carry out the following adjustment procedures.

(a) Loosen the nut on the shift lever.

(b) Push the control shaft fully rearward.

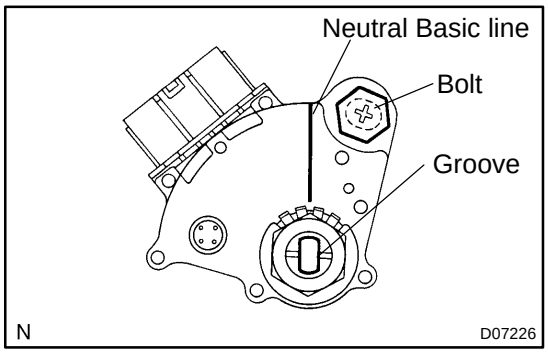


(c) Return the control shaft lever 2 notches to N position.

(d) Set the shift lever to N position.

(e) While holding the shift lever lightly toward the R position side, tighten the shift lever nut.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

(f) Start the engine and make sure that the vehicle moves forward when shifting the lever from the N to D position and reverses when shifting it to the R position.



12. ADJUST PARK/NEUTRAL POSITION SWITCH

★ Check that the engine can be started with the shift lever only in the N or P position, but not in other positions.

If it is not as stated above, carry out the following adjustment procedures.

★ Loosen the park/neutral position switch bolt and set the shift lever to the N position.

★ Align the groove with neutral basic line.

★ Hold in position and tighten the bolt.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

★ For continuity inspection of the park/neutral position switch, see page DI-394 .

13. CHECK IDLE SPEED

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm

14. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.

The object of this test is to check the overall performance of the transmission and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- ★ **Do the test at normal operating fluid temperature 70 to 80 ˚C (158 to 176 ˚F).**
- ★ **Do not continuously run this test longer than 5 seconds.**
- ★ **To ensure safety, conduct this test in a wide, clear level area which provides good traction.**
- ★ **The stall test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**

(1) Chock all 4 wheels.

(2) Connect an OBD II scan tool or hand-held tester to DLC3.

(3) Fully apply the parking brake.

(4) Keep your left foot pressing firmly on the brake pedal.

(5) Start the engine.

(6) Shift into the D position. Press all the way down on the accelerator pedal with your right foot. Quickly read the stall speed at this time.

Stall speed: 2,150 ± 150 rpm

(7) Do the same test in R position.

Stall speed: 2,150 ± 150 rpm

Evaluation:

Problem	Possible cause
(a) Engine stall speed low in D and R positions	★Engine output may be insufficient ★Stator one-way clutch is not operating properly HINT: If the value is less than the specified value by 600 rpm or more, the torque converter could be faulty.
(b) Engine stall speed high in D position	★Line pressure too low ★Clutch No. 1 (C_1) slipping ★One-way clutch No.3 (F_3) not operating properly
(c) Engine stall speed high in R position	★Line pressure too low ★Brake No. 4 (B_4) slipping ★Clutch No. 3 (C_3) slipping ★One-way clutch No.1 (F_1) not operating properly
(d) Engine stall speed high in D and R positions	★Line pressure too low ★Improper fluid level

(b) Measure the time lag.

When the shift lever is shifted while the engine is idling, there will be a certain time lapse or lag before the shock can be felt. This is used for checking the condition of the clutch and brake.

NOTICE:

- ★ **Do the test at normal operating fluid temperature 70 to 80 ˚C (158 to 176 ˚F).**
- ★ **Be sure to allow 1 minute interval between tests.**
- ★ **Take 3 measurements and take the average value.**

(1) Fully apply the parking brake.

(2) Start the engine and check idle speed.

Idle speed (In N position and air conditioner OFF): 700 ± 50 rpm.

(3) Shift the shift lever from N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

Time lag:

N → D Less than 1.2 seconds

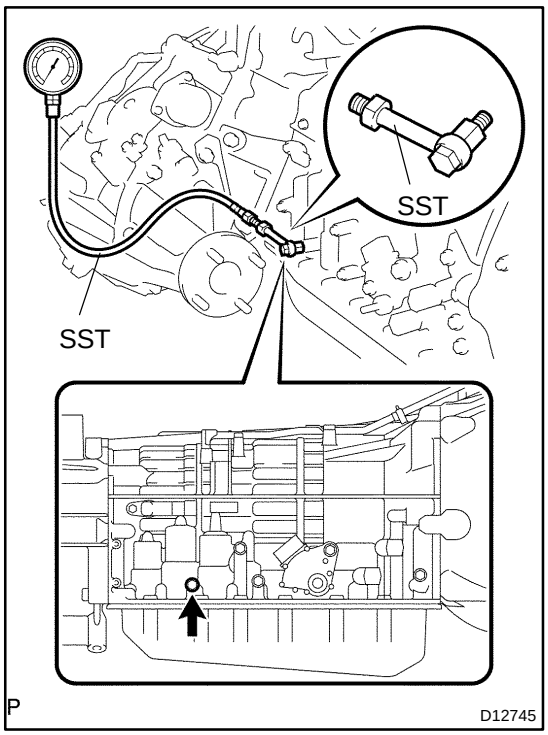
(4) In the same manner, measure the time lag for N → R.

Time lag:

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than the specified):

Problem	Possible cause
N → D time lag is longer	★Line pressure too low ★Clutch No. 1 (C_1) worn ★One-way clutch No.3 (F_3) not operating properly
N → R time lag is longer	★Line pressure too low ★Clutch No. 3 (C_3) worn ★Brake No. 4 (B_4) worn ★One-way clutch No.1 (F_1) not operating properly



15. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- ★ **Do the test at normal operation fluid temperature 70 to 80˚C (158 to 176˚F).**
- ★ **The line pressure test should always be carried out in pairs. One technician should observe the conditions of wheels or wheel stoppers outside the vehicle while the other is doing the test.**
- ★ **Be careful to prevent SST's hose from interfering with the exhaust pipe.**
- ★ **This check must be conducted after checking and adjusting engine.**
- ★ **Perform under condition that A/C is OFF.**
- ★ **When conducting stall test, do not continue more than 10 seconds.**

(1) Warm up the ATF.

(2) Remove the test plug on the transmission case center right side and connect SST.

SST 09992-00095 (09992-00231, 09992-00271)

(3) Fully apply the parking brake and chock the 4 wheels.

(4) Start the engine and check idling speed.

(5) Keep your left foot pressing firmly on the brake pedal and shift into D position.

(6) Measure the line pressure when the engine is idling.

(7) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when engine speed reaches stall speed.

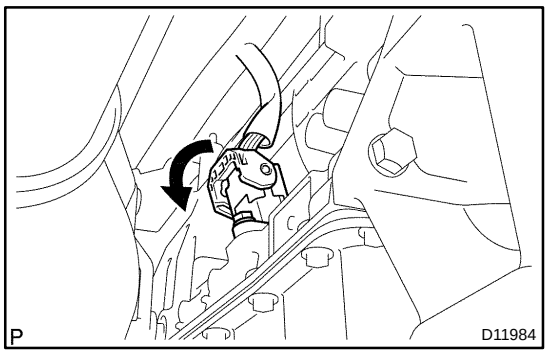
(8) In the same manner, do the test in R position.

Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	362 to 420 (3.7 to 4.2, 53 to 59)	500 to 580 (5.1 to 5.9, 73 to 84)
Stall	1,360 to 1,460 (13.8 to 14.9, 196 to 212)	1,295 to 1,415 (13.2 to 14.4, 188 to 205)

Evaluation

Problem	Possible cause
If the measured value at all positions are higher	★Shift solenoid valve SLT defective ★Regulator valve defective
If the measured value at all positions are lower	★Shift solenoid valve SLT defective ★Regulator valve defective ★Oil pump defective
If pressure is low in the D position only	★D position circuit fluid leakage ★Clutch No. 1 (C_1) defective
If pressure is low in the R position only	★R position circuit fluid leakage ★Clutch No. 3 (C_3) defective ★Brake No. 4 (B_4) defective



16. MANUAL SHIFTING TEST

HINT:

By this test, it can be determined whether the trouble is within the electrical circuit or is a mechanical problem in the transmission.

(a) Disconnect the transmission wire.

(b) Inspect the manual driving operation.

Check that the shift and gear positions correspond with the table below.

While driving, shift through the L, 2, 3, 4 and D positions.

Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
D	4th
4	4th
3	3rd
2	1st
L	1st
R	Reverse
P	Pawl Lock

HINT:

If the gear positions of the L, 2, 3, 4 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 transmission itself.

(c) Connect the transmission wire.

(d) Cancel out DTC.

17. RESET MEMORY

CAUTION:

Perform the RESET MEMORY (AT initialization) when replacing the automatic transmission assy, engine assy or the ECM.

NOTICE:

Hand-held tester only

HINT:

The ECM memorizes the condition that the ECT controls the automatic transmission assy and engine assy according to those characteristics. Therefore, when the automatic transmission assy, engine assy, or ECM has been replaced, it is necessary to reset the memory so that the ECM can memorize the new information.

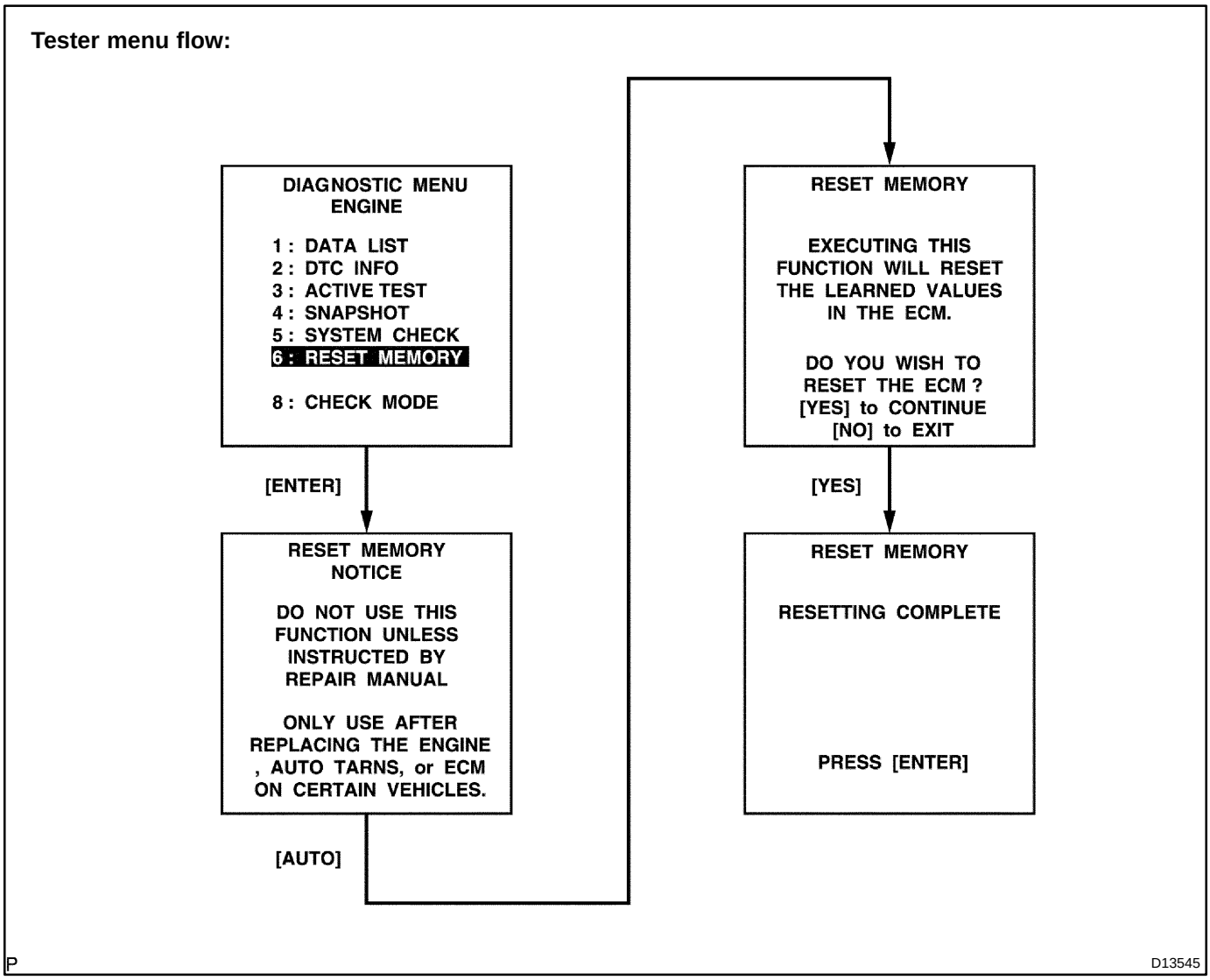
Reset procedure is as follows.

(a) Turn the ignition switch off.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch to the ON position and push the hand-held tester main switch on.
(d) Select the item "DIAGNOSIS/ENHANCED OBD II".
(e) Perform the reset memory procedure from the ENGINE menu.

CAUTION:

After performing the RESET MEMORY, be sure to perform the ROAD TEST described earlier.

Tester menu flow:



MEMO

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DI3BT-04

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the electrical circuits for each symptom in the order given in the charts on the following pages and proceed to the page given for troubleshooting.

The Matrix Chart is divided into 3 chapters.

Chapter 1: Electronic Circuit Matrix Chart

Chapter 2: On-vehicle Repair Matrix Chart

Chapter 3: Off-vehicle Repair Matrix Chart

- ☐ If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- ☐ If the trouble still occurs even though there are no abnormalities in any of the other circuits, then check and replace the ECM.

Chapter 1: Electronic Circuit Matrix Chart

HINT:

*1: When a malfunction is on the circuit *1 mark is attached, DTC is output.

Symptom	Suspect Area	See page
No up-shift (A particular gear, from 1st to 4th gear, is not up-shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-460 DI-464 IN-36
No up-shift (4th → 5th)	1. Transmission control switch circuit (D - 4) *1 2. Engine coolant temp. sensor circuit *1 3. Speed sensor NT circuit *1 4. Shift solenoid valve (SL1) circuit *1 5. Shift solenoid valve (SL2) circuit *1 6. Shift solenoid valve (SR) circuit *1 7. ECM	DI-402 DI-36 DI-418 DI-426 DI-449 DI-468 IN-36
No up-shift (3rd → 4th)	1. Engine coolant temp. sensor circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-36 DI-464 IN-36
No up-shift (1st → 2nd)	1. Transmission control switch circuit (2 - L) *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-402 DI-464 IN-36
No down-shift (5th → 4th)	1. Transmission control switch circuit (D - 4) *1 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SL2) circuit *1 4. Shift solenoid valve (SR) circuit *1 5. ECM	DI-402 DI-426 DI-449 DI-468 IN-36
No down-shift (2nd → 1st)	1. Transmission control switch circuit (2 - L) *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-402 DI-464 IN-36
No down-shift (A particular gear, from 1st to 4th gear, is not down-shifted)	1. Shift solenoid valve (S1) circuit *1 2. Shift solenoid valve (S2) circuit *1 3. ECM	DI-460 DI-464 IN-36
No lock-up	1. ATF temperature sensor circuit *1 2. Transfer L4 position switch circuit *1 3. Stop light switch circuit *1 4. Speed sensor NT circuit *1 5. Shift solenoid valve (SLU) circuit *1 6. ECM	DI-410 DI-472 DI-424 DI-418 DI-491 IN-36
No lock-up off	ECM	IN-36

Shift point too high or too low	1. Shift solenoid valve (SLT) circuit *1 2. Speed sensor NT circuit *1 3. Speed sensor SP2 circuit *1 4. Throttle position sensor circuit *1 5. ATF temperature sensor circuit *1 6. Pattern select switch circuit (PWR mode switch) 7. Transfer L4 position switch circuit *1 8. ECM	DI-479 DI-418 DI-421 DI-36 DI-410 DI-495 DI-472 IN-36
Up-shift to 5th from 4th while shift lever is 4 position	1. Transmission control switch circuit (D - 4) *1 2. ECM	DI-402 IN-36
Up-shift to 5th from 4th while engine is cold	1. Engine coolant temp. sensor circuit *1 2. ECM	DI-36 IN-36
Up-shift to 4th from 3rd while shift lever is 3 position	1. Park/neutral position switch circuit *1 2. ECM	DI-402 IN-36
Up-shift to 3rd from 2nd while shift lever is 2 position	1. Park/neutral position switch circuit *1 2. ECM	DI-402 IN-36
Up-shift to 2nd from 1st while shift lever is L position	1. Transmission control switch circuit (2 - L) *1 2. ECM	DI-402 IN-36
Harsh engagement (N → D)	1. Speed sensor NT circuit *1 2. Shift solenoid valve (SL1) circuit *1 3. Shift solenoid valve (SLT) circuit *1 4. ECM	DI-418 DI-426 DI-479 IN-36
Harsh engagement (Lock-up)	1. Speed sensor NT circuit *1 2. Speed sensor SP2 circuit *1 3. Shift solenoid valve (SLU) circuit *1 4. ECM	DI-418 DI-421 DI-491 IN-36
Harsh engagement (Any driving position)	ECM	IN-36
Poor acceleration	1. ATF temperature sensor No.2 circuit *1 2. ECM	DI-483 IN-36
No engine braking	ECM	IN-36
No kick-down	ECM	IN-36
Engine stalls when starting off or stopping	ECM	IN-36
No pattern select (PWR)	1. Pattern select switch circuit (PWR mode switch) 2. ECM	DI-495 IN-36
No 2nd start	1. Pattern select switch circuit (2nd start switch) 2. Transmission control switch circuit (2 - L) *1 3. ECM	DI-497 DI-402 IN-36
AT Oil Temp. warning light remains on Lock-up at 3rd gear Shift point too high	1. ATF temperature sensor No.2 circuit *1 2. ECM	DI-483 IN-36
A/T.P. indicator light does not light up	1. A/T.P. indicator light circuit 2. Combination meter circuit 3. ECM	DI-500 BE-58 IN-36

Chapter 2: On-Vehicle Repair
(★: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse positions	1. Transmission control rod 2. Manual valve 3. Parking lock pawl 4. Off-vehicle repair matrix chart	DI-361 ★ ★ -
Vehicle does not move in R position	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (1st → 2nd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (2nd → 3rd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (3rd → 4th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No up-shift (4th → 5th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (5th → 4th)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (4th → 3rd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (3rd → 2nd)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No down-shift (2nd → 1st)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No lock-up or No lock-up off	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off-vehicle repair matrix chart	DI-487 AT-8 -
Harsh engagement (N → D)	1. Shift solenoid valve (SL1) 2. Valve body assy 3. C_1 accumulator 4. Off-vehicle repair matrix chart	DI-441 AT-8 ★ -
Harsh engagement (Lock-up)	1. Shift solenoid valve (SLU) 2. Valve body assy 3. Off-vehicle repair matrix chart	DI-487 AT-8 -
Harsh engagement (N → R)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SLU) 3. Valve body assy 4. C_3 accumulator 5. Off-vehicle repair matrix chart	DI-476 DI-487 AT-8 ★ -
Harsh engagement (1st →2nd → 3rd → 4th → 5th)	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI-476 DI-441 AT-8
Harsh engagement (1st → 2nd)	1. Valve body assy 2. B_3 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -
Harsh engagement (2nd → 3rd)	1. Valve body assy 2. C_3 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -
Harsh engagement (3rd → 4th)	1. Valve body assy 2. C_2 accumulator 3. Off-vehicle repair matrix chart	AT-8 ★ -

Harsh engagement (4th → 5th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off-vehicle repair matrix chart	DI-441 DI-445 AT-8 -
Harsh engagement (5th → 4th)	1. Shift solenoid valve (SL1) 2. Shift solenoid valve (SL2) 3. Valve body assy 4. Off-vehicle repair matrix chart	DI-441 DI-445 AT-8 -
Slip or shudder (Forward and reverse)	1. Transmission control rod 2. Valve body assy 3. Oil strainer 4. Off-vehicle repair matrix chart	DI-361 AT-8 AT-8 -
No engine braking (1st: L position)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No engine braking (2nd: 2 position)	1. Valve body assy 2. Off-vehicle repair matrix chart	AT-8 -
No kick-down	Valve body assy	AT-8
Shift point too high or too low	1. Shift solenoid valve (SLT) 2. Shift solenoid valve (SL1) 3. Valve body assy	DI-476 DI-441 AT-8
Poor acceleration	1. Shift solenoid valve (SLT) 2. Valve body assy	DI-476 AT-8
Engine stalls when starting off or stopping	1. Shift solenoid valve (SLU) 2. Valve body assy	DI-487 AT-8

Chapter 3: Off-Vehicle Repair
(★: A750E, A750F AUTOMATIC TRANSMISSION Repair Manual Pub. No. RM999U)

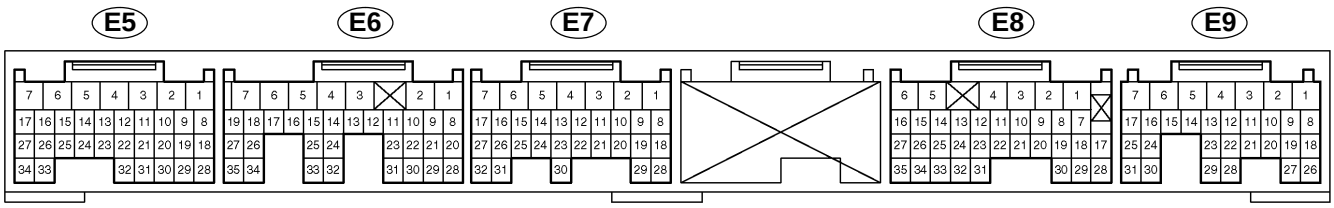
Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse positions	1. Rear planetary gear unit 2. Torque converter clutch	★ AT-34
Vehicle does not move in R position	1. Brake No. 4 (B_4) 2. Clutch No. 3 (C_3) 3. One-way clutch No.4 (F_1)	★ ★ ★
No up-shift (1st → 2nd)	1. Brake No. 3 (B_3) 2. One-way clutch No.1 (F_1) 3. One-way clutch No. 2 (F_2)	★ ★ ★
No up-shift (2nd → 3rd)	Clutch No. 3 (C_3)	★
No up-shift (3rd → 4th)	Clutch No. 2 (C_2)	★
No up-shift (4th → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	★ ★
No lock-up or No lock-up off	Torque converter clutch	AT-34
Harsh engagement (N → D)	1. Clutch No. 1 (C_1) 2. One-way clutch No.3 (F_3)	★ ★
Harsh engagement (N → R)	1. Clutch No. 3 (C_3) 2. Brake No. 4 (B_4) 3. One-way clutch No.1 (F_1)	★ ★ ★
Harsh engagement (1 → 2)	1. Brake No. 3 (B_3) 2. One-way clutch No.1 (F_1) 3. One-way clutch No. 2 (F_2)	★ ★ ★
Harsh engagement (2 → 3)	Clutch No. 3 (C_3)	★
Harsh engagement (3 → 4)	Clutch No. 2 (C_2)	★
Harsh engagement (4 → 5th)	1. Brake No. 1 (B_1) 2. Clutch No. 1 (C_1)	★ ★
Harsh engagement (Lock-up)	Torque converter clutch	AT-34
Slip or shudder (Forward and reverse: After warm-up)	1. One-way clutch No.1 (F_1) 2. Clutch No. 3 (C_3) 3. Torque converter clutch clutch	★ ★ ★
Slip or shudder (Particular position: Just after engine starts)	Torque converter clutch	AT-34
Slip or shudder (R position)	1. Brake No. 4 (B_4) 2. One-way clutch No.1 (F_1) 3. Clutch No. 3 (C_3)	★ ★ ★
Slip or shudder (1st)	1. Clutch No. 1 (C_1) 2. One-way clutch No.3 (F_3)	★ ★
Slip or shudder (2nd)	1. Clutch No. 1 (C_1) 2. Brake No. 3 (B_3) 3. One-way clutch No.1 (F_1) 4. One-way clutch No.2 (F_2)	★ ★ ★ ★
Slip or shudder (3rd)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. One-way clutch No.1 (F_1)	★ ★ ★
Slip or shudder (4th)	1. Clutch No. 1 (C_1) 2. Clutch No. 2 (C_2)	★ ★
Slip or shudder (5th)	1. Clutch No. 2 (C_2) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1)	★ ★ ★
No engine braking (1st – 4th: D position)	Clutch No. 1 (C_1)	★

No engine braking (1st: L position)	Brake No. 4 (B_4)	★
No engine braking (2nd: 2 position)	Brake No. 2 (B_2)	★
No engine braking (3rd: 3 position)	Brake No. 1 (B_1)	★
Poor acceleration (All positions)	Torque converter clutch	AT-34
Poor acceleration (5th)	1. Clutch No. 1 (C_1) 2. Clutch No. 3 (C_3) 3. Brake No. 1 (B_1) 4. Front planetary gear unit	★ ★ ★ ★
Engine stalls when starting off or stopping	Torque converter clutch	AT-34

DIB31-02

TERMINALS OF ECM

ECM Terminals

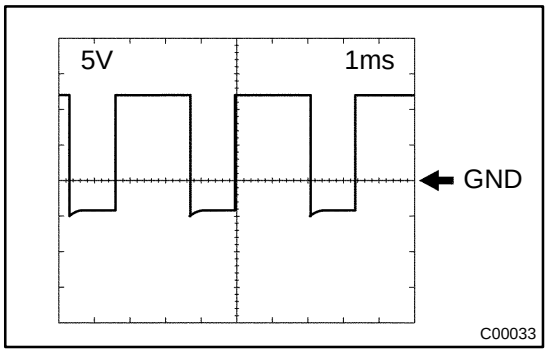


Y

A14471

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
P (E9-6) - E1 (E7-1)	G-W - BR	IG switch ON and shift lever P position	10 to 14
		IG switch ON and shift lever other than P position	Below 1
N (E9-7) - E1 (E7-1)	G-R - BR	IG switch ON and shift lever N position	10 to 14
		IG switch ON and shift lever other than N position	Below 1
L4 (E8-4) - E1 (E7-1)	B-L - BR	IG switch ON and Transfer shift lever L position	9 to 14
		IG switch ON and Transfer shift lever other than L position	Below 1.5
SNWI (E8-5) - E1 (E7-1)	L-R - BR	IG switch ON	9 to 14
		IG switch ON and Press continuously 2nd start switch	Below 1
L (E8-8) - E1 (E7-1)	R-L - BR	IG switch ON and shift lever L position	9 to 14
		IG switch ON and shift lever other than L position	Below 1.5
2 (E8-9) - E1 (E7-1)	G-B - BR	IG switch ON and shift lever 2 and L position	9 to 14
		IG switch ON and shift lever other than 2 and L position	Below 1.5
D (E8-10) - E1 (E7-1)	G-Y - BR	IG switch ON and shift lever D and 4 position	9 to 14
		IG switch ON and shift lever other than D and 4 position	Below 1.5
R (E8-11) - E1 (E7-1)	R-B - BR	IG switch ON and shift lever R position	9 to 14
		IG switch ON and shift lever other than R position	Below 1.5
STP (E8-19) - E1 (E7-1)	G-W - BR	Brake pedal is depressed	7.5 to 14
		Brake pedal is released	Below 1.5
3 (E8-20) - E1 (E7-1)	G - BR	IG switch ON and shift lever 3 position	9 to 14
		IG switch ON and shift lever other than 3 position	Below 1.5
4 (E8-23) - E1 (E7-1)	G-R - BR	IG switch ON and shift lever 4 position	9 to 14
		IG switch ON and shift lever other than 4 position	Below 1.5
PWR (E8-28) - E1 (E7-1)	L-W - BR	IG switch ON and Pattern select switch ” PWR” OFF	9 to 14
		IG switch ON and Pattern select switch ”PWR” ON	Below 1
TFN (E7-11) - E1 (E7-1)	Y-G - BR	IG switch ON and Transfer shift lever N position	Below 1.5
		IG switch ON and Transfer shift lever other than N position	9 to 14
SLU+ (E7-16) - SLU- (E7-15)	P-G - B	Engine idle speed	Pulse generation 2 reference
S2 (E6-10) - E1 (E7-1)	W - BR	IG switch ON	Below 1.5
		2nd or 3rd gear	9 to 14
		1st, 4th or 5th gear	Below 1.5
S1 (E6-11) - E1 (E7-1)	R - BR	IG switch ON	9 to 14
		1st or 2nd gear	9 to 14
		3rd, 4th or 5th gear	Below 1.5

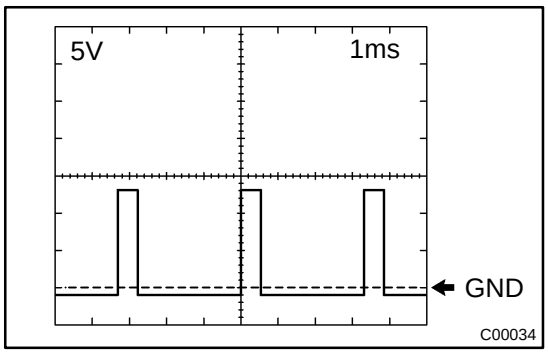
SLT^+ (E6-13) - SLT^- (E6-12)	G-W - G-B	Engine idle speed	Pulse generation 1 reference
SR (E6-15) - E1 (E7-1)	G - BR	IG switch ON	Below 1.5
		5th gear	9 to 14
		1st gear	Below 1
SL2+ (E6-17) - SL2- (E6-16)	P-B - P-L	Engine idle speed	Pulse generation 3 reference
SL1+ (E6-19) - SL1- (E6-18)	R-L - R-W	Engine idle speed	Pulse generation 4 reference
THO2 (E6-24) - E2 (E5-28)	L - BR-W	ATF temperature: 115˚C (239˚F) or more	Below 1.5
$SP2^+$ (E6-26) - $SP2^-$ (E6-34)	R - G	Vehicle speed 20 km/h (12 mph)	Pulse generation 6 reference
NT^+ (E6-27) - NT^- (E6-35)	L - W	Engine idle speed	Pulse generation 5 reference
THO1 (E6-32) - E2 (E5-28)	G-Y - BR-W	ATF temperature: 115˚C (239˚F) or more	Below 1.5
NSW (E5-16) - E1 (E7-1)	B-W - BR	IG switch ON and shift lever P and N position	Below 1.5
		IG switch ON and shift lever other than P and N position	9 to 14



Pulse generation 1

Reference:

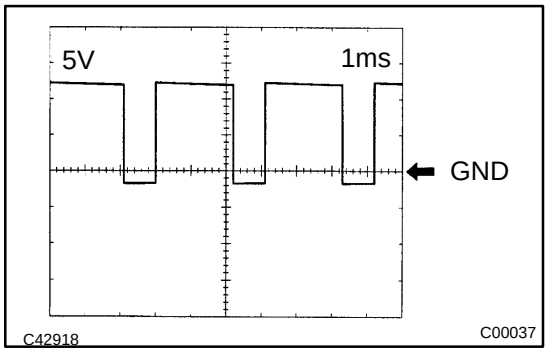
Item	Condition
Terminal	SLT+ - SLT-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 2

Reference:

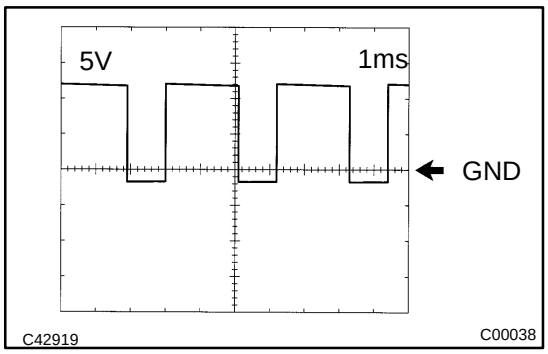
Item	Condition
Terminal	SLU+ - SLU-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 3

Reference:

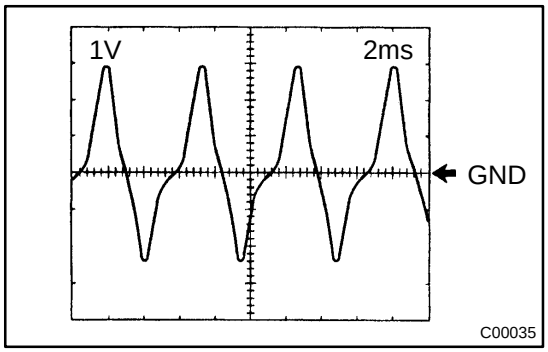
Item	Condition
Terminal	SL2+ - SL2-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 4

Reference:

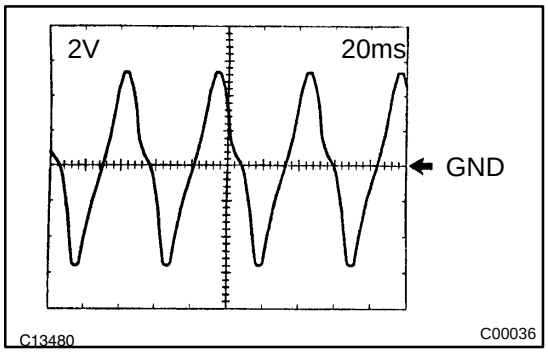
Item	Condition
Terminal	SL1+ - SL1-
Tool setting	5V/DIV, 1ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 5

Reference:

Item	Condition
Terminal	NT+ - NT-
Tool setting	1V/DIV, 2ms/DIV
Vehicle condition	Engine idle speed



Pulse generation 6

Reference:

Item	Condition
Terminal	SP2+ - SP2-
Tool setting	2V/DIV, 20ms/DIV
Vehicle condition	Vehicle speed 20 km/h (12 mph)

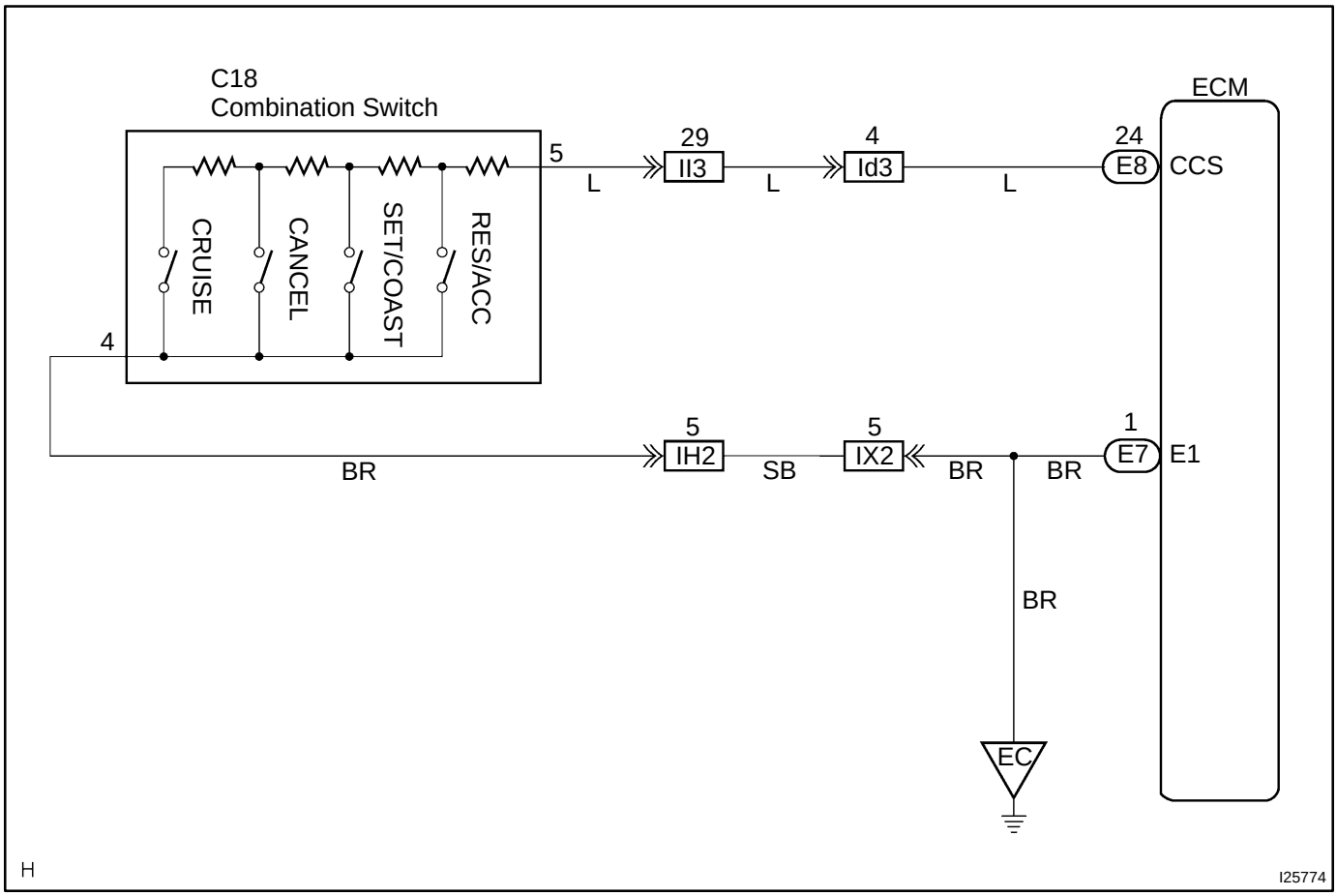
DIB6C-01

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

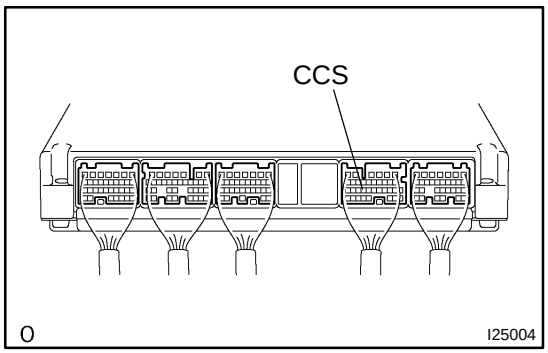
This circuit carries the -/SET, +/RESUME and Cancel signals (each voltage) to the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal CCS of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CCS of ECM connector and body ground, when each of the -/SET, +RES and CANCEL is turned ON.

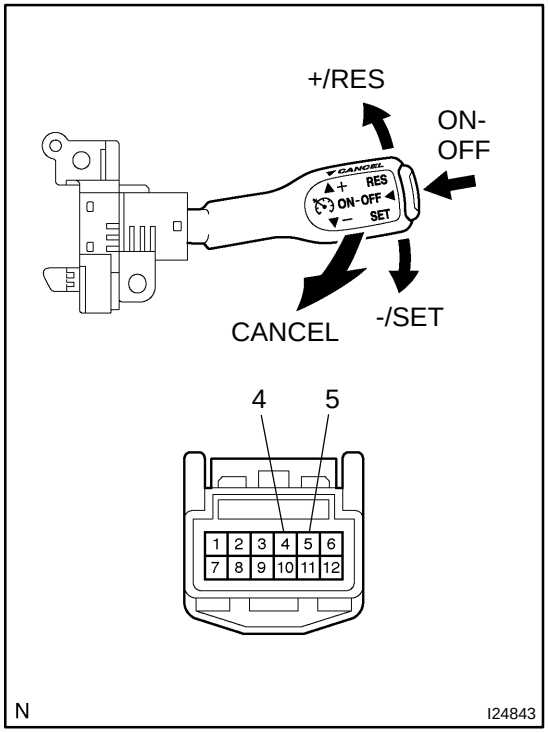
OK:

Switch Position	Voltage
Neutral	9 - 14 V
+/RES	2.1 - 4 V
-/SET	4 - 7.1 V
CANCEL	6 - 10.1 V

OK	Proceed to next circuit inspection shown on problem symptom table (See page DI-991).

NG

2	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad (See page SR-9).

(b) Disconnect the control switch connector.

CHECK:

(a) Measure resistance between terminals 4 and 5 of cruise control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
+/RES	210 - 270
-/SET	560 - 700
CANCEL	1380 - 1700

(b) Check continuity between terminals 4 and 5 of control switch connector when main switch is held on and off.

OK:

Switch position	Tester connection	Specified condition
OFF	4 - 5	No continuity
ON	4 - 5	Continuity

NG	Replace control switch.

OK

3	Check harness and connector between ECM and cruise control switch, cruise control switch and body ground (See page IN-26).

NG	Repair or replace harness or connector.

OK

4	Check cruise control indicator light (See combination meter.)

NG	Replace combination meter.

OK

Check and replace ECM (See page IN-36).

DI3CI-14

CIRCUIT INSPECTION

DTC	P0500/21	Vehicle Speed Sensor ”A”

DTC	P0503/23	Vehicle Speed Sensor ”A” Intermittent/Erratic/High

CIRCUIT DESCRIPTION

See page .DI-274

DTC No.	DTC Detection Condition	Trouble Area
P0500/21 P0503/23	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (2 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM

WIRING DIAGRAM

See page .DI-274

INSPECTION PROCEDURE

See page .DI-274

DIB6A-01

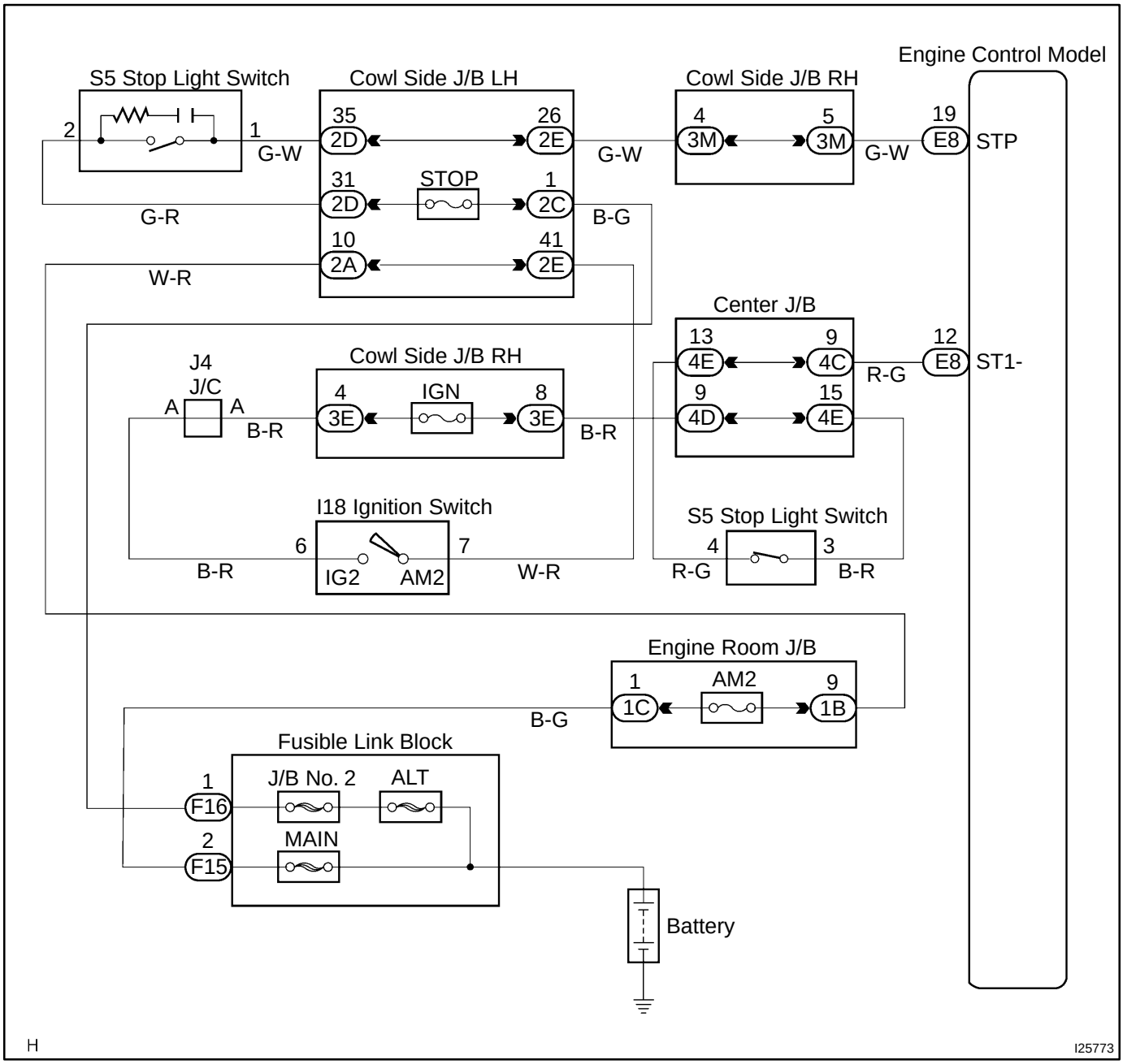
DTC	P0571/52	Brake Switch ”A” Circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECM. When the ECM receives this signal, it cancels the cruise control.
A fail-safe function is provided so that the cancel functions normally, even if there is a malfunction in the stop light signal circuit.
The cancel condition is that battery positive voltage is supplied to terminal STP.
When the brake is on, battery positive voltage is normally applied through the STOP fuse and stop light switch to terminal STP of the ECM, and the ECM turns the cruise control OFF.
If the harness connected to terminal STP has an open circuit, terminal STP will have battery positive voltage and the cruise control will be turned OFF.

DTC No.	Detection Item	Trouble Area
P0571/52	Stop light switch circuit.	★Stop light switch ★Harness or connector between ECM and stop light switch circuit ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check stop light switch using hand-held tester.**

PREPARATION:

Connect the hand-held tester to the DLC3.

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main SW ON.

CHECK:

Select the item ”STOP LIGHT SW” in the DATA LIST and read its valve displayed.

OK:

Brake pedal depressed: ON

Brake pedal released: OFF

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI-991).**

NG

2	**Check operation of stop light.**

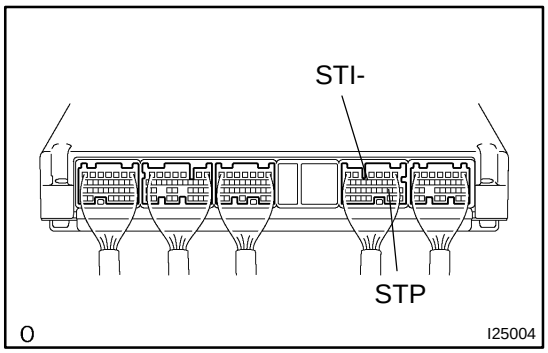
CHECK:

Check that stop light comes on when brake pedal is depressed, and turns off when brake pedal is released.

NG → **Check stop light system (See page BE-49).**

OK

3	Check voltage between terminal STP/STI- of ECM connector and body ground.



PREPARATION:

(a) Remove the ECM with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP/STI- of ECM connector and body ground when the brake pedal is depressed and released.

OK:

Depressed	10 - 14 V
Released	Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI-991).**

NG

4	Check wire harness and connector between terminal STP of ECM and stop light switch, and terminal STI- of ECM and stop light switch (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN-36).

DIB6B-01

DTC	P0607/54	Control Module Performance

CIRCUIT INSPECTION

This DTC expresses the internal abnormalities of ECM.

DTC No.	Detection Item	Trouble Area
P0607/54	★Cruise control input signal abnormal. ★Stop light switch input signal abnormal.	★ECM

INSPECTION PROCEDURE

Check and replace ECM (See page IN-36).

DIB6D-01

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

INSPECTION PROCEDURE

1	**Perform Active Test of hand-held tester.**

PREPARATION:

Connect the hand-held tester to the DLC3.

CHECK:

Check the cruise indicator of the combination meter using Active Test.

OK:

Description	Tester display	Check condition
CRUISE Indicator light	CRUISE INDIC	ON/OFF

OK → **Proceed to next circuit inspection shown on problem symptom table (See page DI-991).**

NG

Check and replace combination meter. (See page IN-36).

DI26S-20

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	Frequency Problem Occurs?	☑ Continuous ☑ Intermittent (Times a day)
	Vehicle Speed when Problem Occurred	**km Mile**

Symptoms	☑ Auto cancel occurs	★Driving condition ☐ City driving ☐ Freeway ☐ Up hill ☐ Down hill ★After cancel occurred, did the driver activate cruise control again? ☐ Yes ☐ No
	☐ Cancel does not occur	☐ With brake ON ☐ Except D position shift ☐ When control SW turns to CANCEL position
	☐ Cruise control malfunction	☐ Slip to acceleration side ☐ Slip to deceleration side ☐ Hunting occurs ☐ O/D cut off does not occur ☐ O/D does not return
	☐ Switch malfunction	☐ SET ☐ ACCEL ☐ COAST ☐ RESUME ☐ CANCEL
	☐ Cruise main indicator light	☐ Remains ON ☐ Does not light up ☐ Blinks

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI26U-32

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

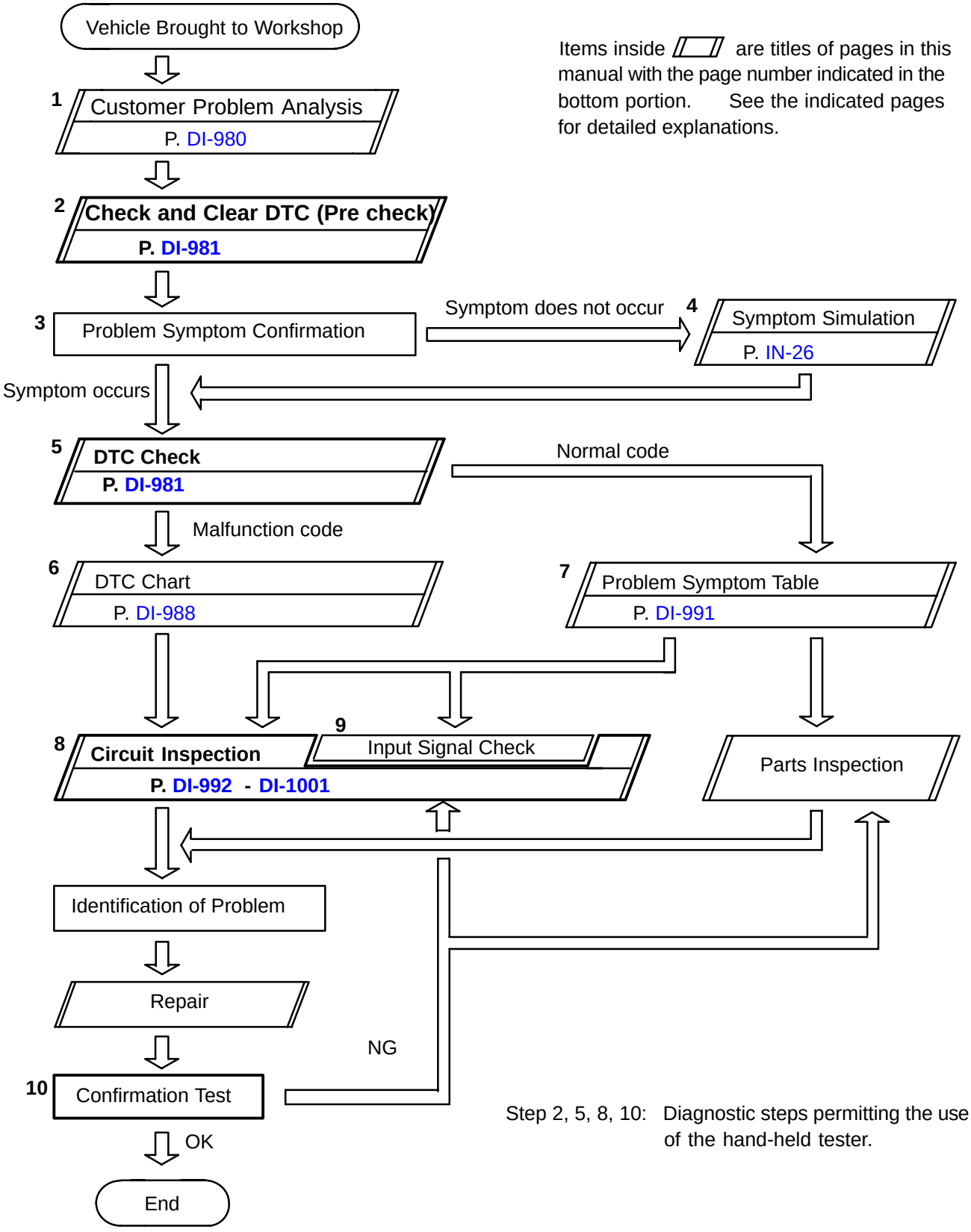
DTC No. (See Page)	Circuit Inspection	Trouble Area
P0500/21 (DI-992)	Vehicle Speed Sensor ”A”	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM
P0503/23 (DI-992)	Vehicle Speed Sensor ”A” Intermittent/Erratic/High	
P0571/52 (DI-993)	Brake Switch ”A” Circuit	★Short in stop light switch circuit ★Stop light switch ★ECM
P0607/54 (DI-997)	Control Module Performance	★ECM

CRUISE CONTROL SYSTEM

DI26R-35

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.

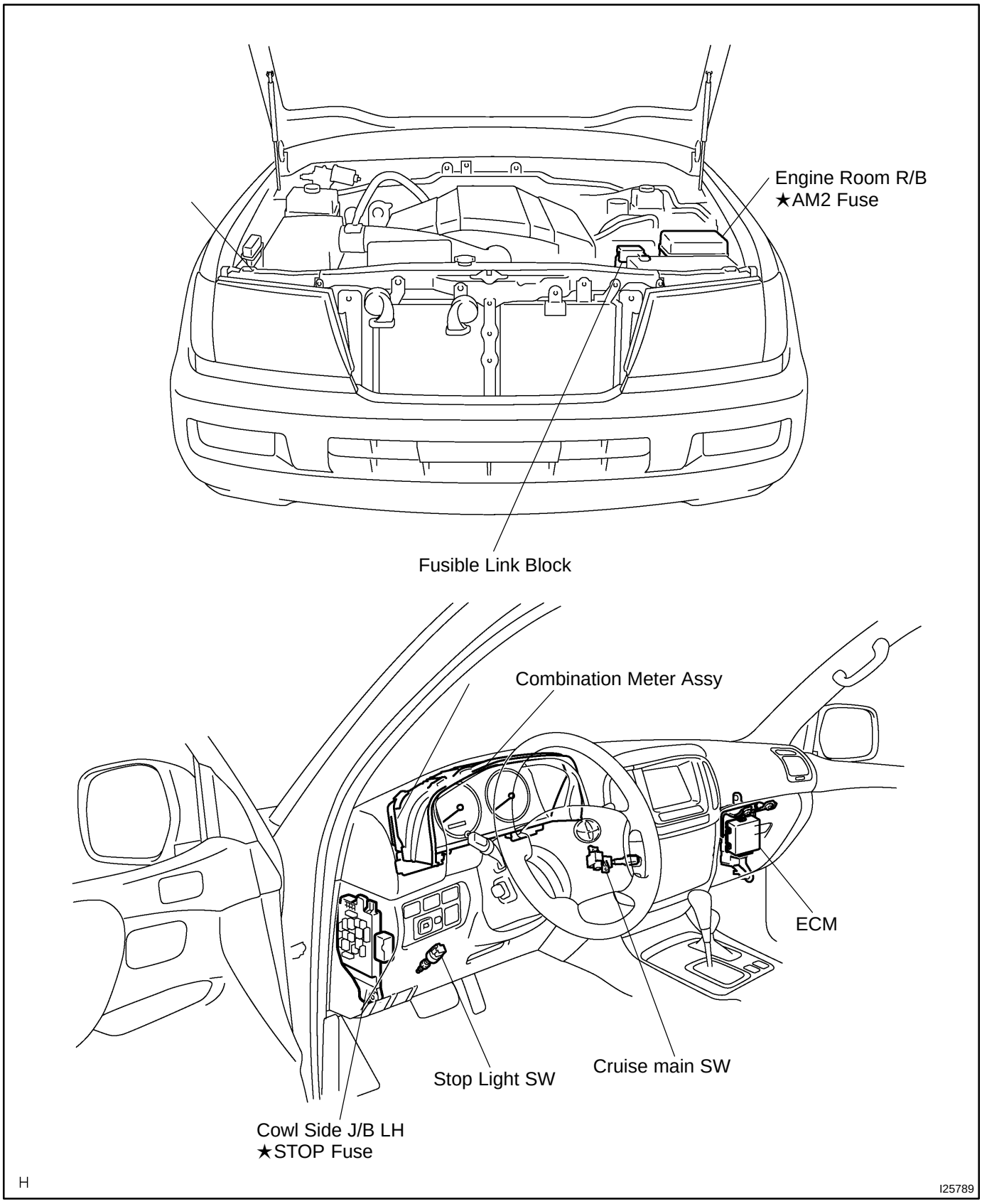


Items inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

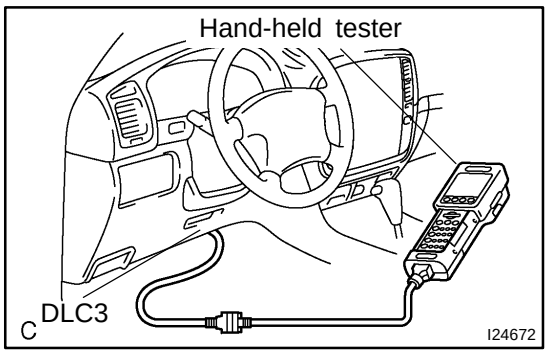
Step 2, 5, 8, 10: Diagnostic steps permitting the use of the hand-held tester.

DI3CG-08

PARTS LOCATION



DIB69-01



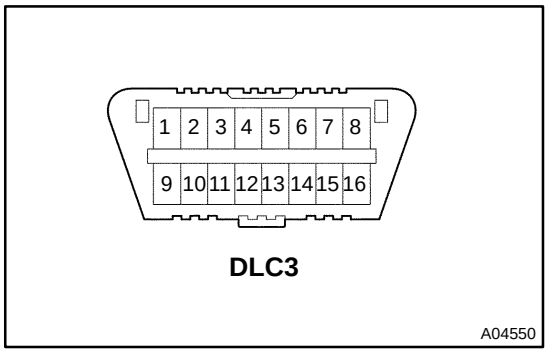
PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of cruise control on this vehicle. Data of the cruise control or DTC can be read from DLC3 of the vehicle. When a trouble occurs on cruise control, Check CRUISE MAIN indicator does not light up but DTC inspection is performed.

Therefore when there seems to be a trouble on cruise control, use hand-held tester or SST to check and troubleshoot it.



(b) Check the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

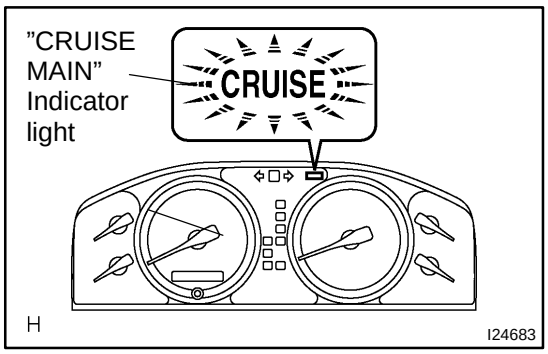
Terminal No.	Connection/Specified Condition	Condition
4	Chassis Ground ↔ Body Ground/1 or less	Always
13	TC ↔ Body Ground/9 - 14 V	Always

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of the hand-held tester to DLC3, turned the ignition switch ON and operated the hand-held tester, there is a problem on the vehicle side or tool side.

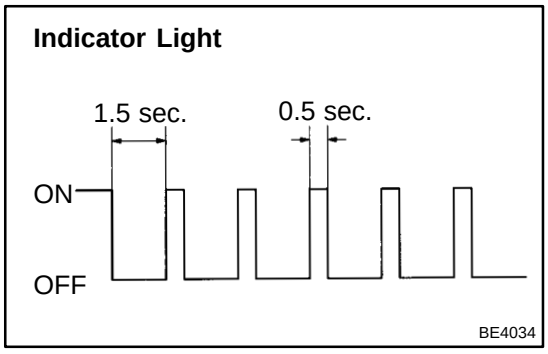
★ If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.

★ If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



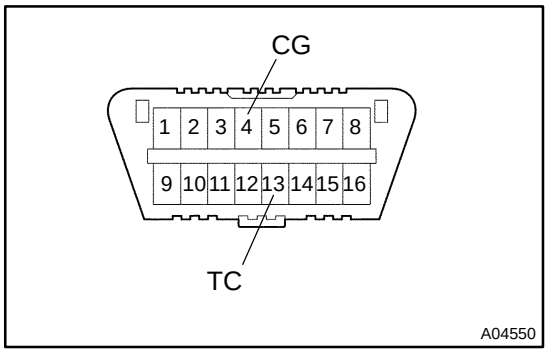
(c) Check the indicator.
(1) Turn the ignition switch to ON.
(2) Check that the CRUISE MAIN indicator light comes on when the cruise control main switch is turned ON, and that the indicator light goes off when the main switch is turned OFF.

HINT:
If the indicator check result is not normal, proceed to trouble-shooting (See page BE-2) for the combination meter section.

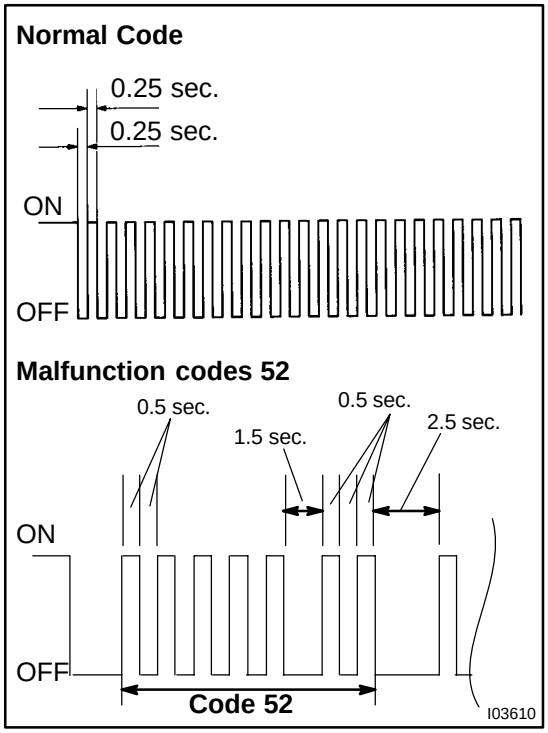


(d) Check the DTC.

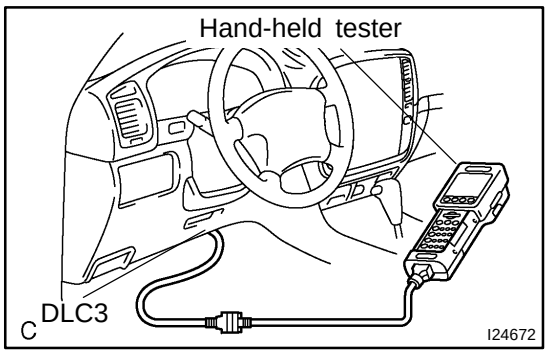
HINT:
If a malfunction occurs in the speed sensor or stop light switch, etc. during cruise control driving, the ECM actuates AUTO CANCEL of the cruise control and turns ON and OFF the CRUISE MAIN indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a diagnostic trouble code.



(e) Output DTC using diagnosis check wire.
(1) Turn the ignition switch ON.
(2) Using SST, connect terminals Tc and CG of DLC3.
SST 09843-18040
(3) Read the DTC on the CRUISE MAIN indicator light.



HINT:
★ If the DTC is not output, inspect the diagnosis circuit.
★ As an example, the blinking patterns for codes; normal 52 are shown in the illustration.



2. USING HAND-HELD TESTER

(a) Hook up the hand-held tester to the DLC3.

(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:

Hand-held tester has a "Snapshot" function which records the monitored data.

Please refer to the hand-held tester operator's manual for further details.

3. DTC CLEARANCE

(a) The following actions will erase the DTCs and freeze frame data.

(1) Operating the hand-held tester to erase the codes (See the hand-held tester instruction book for operating instructions.).

(2) Disconnecting the battery terminals or EFI fuse.

(b) After completing repairs, the DTC retained in memory can be cleared by removing the EFI fuse for 10 seconds or more with the ignition switch off.

(c) Check that the normal code is displayed after connecting the fuse.

4. DATA LIST

HINT:

According to the DATA LIST displayed by the hand-held tester, you can read the value of the switch, sensor, actuator and so on without parts removal. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

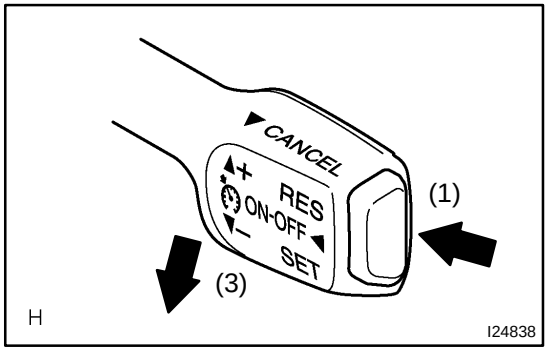
(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON.

(c) According to the display on tester, read the "DATA LIST".

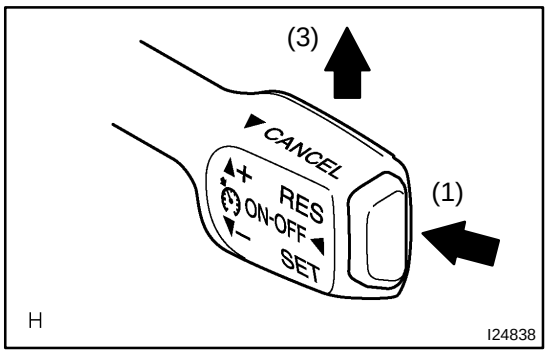
Item	Measurement Item/Display (Range)	Normal Condition	Diagnostic Note
VEHICLE SPD	Vehicle speed/ min.: 0 km/h (0 mph)max.: 255 km/h (158 mph)	Actual vehicle speed	-
MEMORY SPD	Vehicle speed/ min.: 0 km/h (0 mph)max.: 255 km/h (158 mph)	Actual vehicle speed	-
THROTTLE	Throttle operating angle/ min.: 0 km/h (0 mph)max.: 125 km/h (mph)	Actual vehicle speed	-
CRUISE CONTROL	Cruise control	ON: Cruise control is SET OFF: Cruise control is UNSET	-
MAIN SW (MAIN)	Main switch (Main CPU)	ON: Main switch (Main CPU) is SET OFF: Main switch (Main CPU) is UNSET	-

MAIN SW (SUB)	Main switch (Sub CPU)	ON: Main switch (Sub CPU) is SET OFF: Main switch (Sub CPU) is UNSET	-
CCS READY M	Switch ready (Main CPU)	ON: Switch ready (Main CPU) is SET OFF: Switch ready (Main CPU) is UNSET	-
CCS READY S	Switch ready (Sub CPU)	ON: Switch ready (Sub CPU) is SET OFF: Switch ready (Sub CPU) is UNSET	-
CCS INDICATOR M	Switch indicator (Main CPU)	ON: Switch indicator (Main CPU) is ON OFF: Switch indicator (Main CPU) is OFF	-
CCS INDICATOR S	Switch indicator (Sub CPU)	ON: Switch indicator (Sub CPU) is ON OFF: Switch indicator (Sub CPU) is OFF	-
CANCEL SW	CANCEL switch	ON: CANCEL switch is SET OFF: CANCEL switch is UNSET	-
SET/COAST SW	SET/COAST switch	ON: SET/COAST switch is SET OFF: SET/COAST switch is UNSET	-
RES/ACC SW	RES/ACC switch	ON: RES/ACC switch is SET OFF: RES/ACC switch is UNSET	-
STP LIGHT SW2-M	Stop light SW signal (Main CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW2-S	Stop light SW signal (Sub CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
STP LIGHT SW1-M	Stop light SW signal (Sub CPU)	ON: Brake pedal depressed OFF: Brake pedal released	-
SHIFT D POS	Shift D position	ON: Shift is D position OFF: Shift is except D position	-

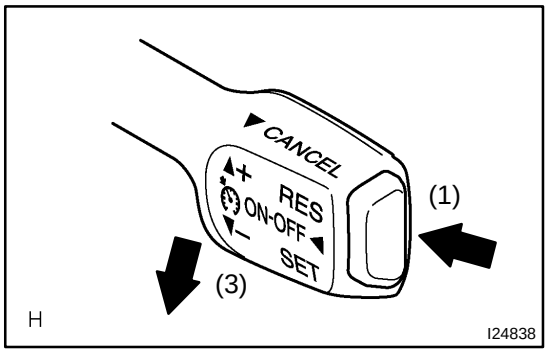


5. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)

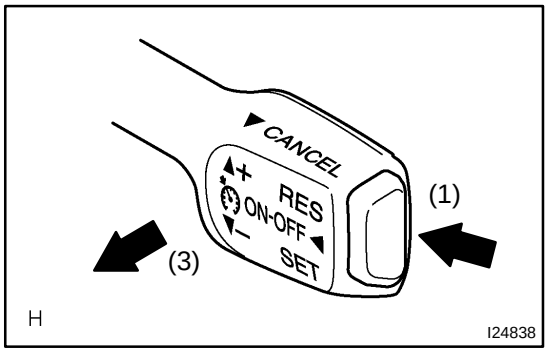
(a) Inspect the SET switch.
  (1) Push the main switch ON.
  (2) Drive at a desired speed [40 km/h (25 mph) or higher].
  (3) Press the control switch to the -/SET.
  (4) After releasing the switch, check that the vehicle cruises at the desired speed.



(b) Inspect the ACCEL switch.
(1) Push the main switch button to ON.
(2) Drive at a desired speed [40 km/h (25 mph) or higher].
(3) Check that the vehicle speed increases while the control switch is pulled up to +/RES, and that the vehicle cruises at the set speed when the switch is released.
(4) Momentarily press the control switch upward to the +/RES and then immediately release it. Check that the vehicle speed increases by about 1.5 km/h (Tap-up function).

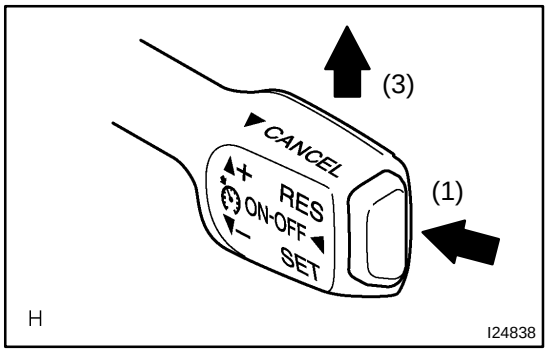


(c) Inspect the COAST switch.
(1) Push the main switch button to ON.
(2) Drive at a desired speed [40 km/h (25 mph) or higher].
(3) Check that the vehicle speed decreases while the control switch is push down to -/SET, and the vehicle cruises at the set speed when the switch is released.
(4) Momentarily press the control switch downward to -/SET , and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap-down function).

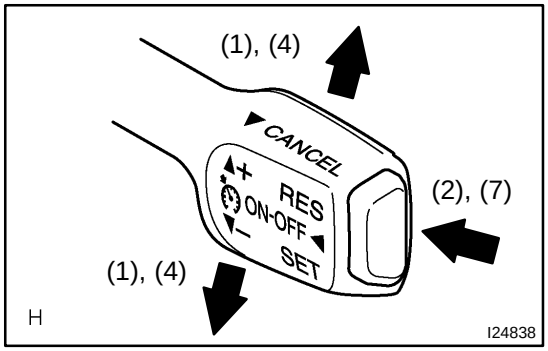


(d) Inspect the CANCEL switch.
(1) Push the main button to ON.
(2) Drive at a desired speed [40 km/h (25 mph) or higher].
(3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
★ Depress the brake pedal
★ Shift to except D position
★ Push the main switch button to OFF

★ Pull the cruise control switch to CANCEL



(e) Inspect the RESUME switch.
(1) Push the main switch button to ON.
(2) Drive at a desired speed [40 km/h (25 mph) or higher].
(3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
★ Depress the brake pedal
★ Shift to except D position
★ Press the main switch button to OFF
(4) After the control switch is pulled up to +/RES at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed before the cancellation.



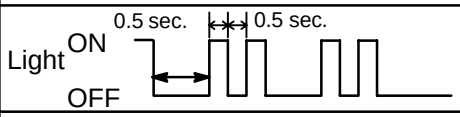
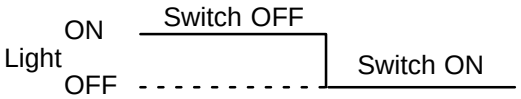
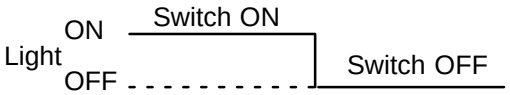
6. INPUT SIGNAL CHECK

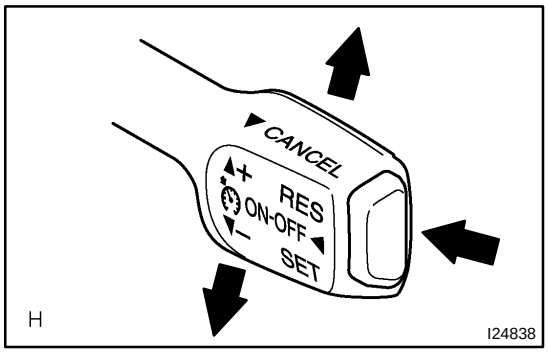
HINT:

★ For check No.1 - No. 3
Turn the ignition switch to ON.
★ For check No. 4
Jack up the vehicle.
Start the engine.
Shift to D position

(a) Check the input signal
(1) Keep the main switch to -/SET or +/RES position and hold it down or hold it up.
(2) Press the switch button to ON.
(3) Check that the CRUISE mainindicator light blinks twice or 3 times repeatedly after 3 seconds.
(4) Turn the -/SET or +/RES switch to OFF.
(5) Operate each switch as listed in the table below.
(6) Read the blinking pattern of the CRUISE main indicator light.
(7) After performing the check, turn the main switch button to OFF.

HINT:
When 2 or more signals are input to the ECM, the lowest numbered code will be displayed first.

No.	Operation Method	CRUISE Main Indicator Light Blinking Pattern	Diagnosis
1	Turn -/SET switch ON		-/SET switch circuit is normal
2	Turn +/RES switch ON		+/RES switch circuit is normal
3	Turn CANCEL switch ON		CANCEL switch circuit is normal
	Depress brake pedal (Turn stop lamp switch assy ON)		Stop light switch circuit is normal
	Shift to except D position (Turn PNP switch OFF)		PNP switch circuit is normal



7. INPUT SIGNAL CHECK
(Using hand-held tester)

(a) Connect the hand-held tester to DLC3.
(b) Check the control switch (MAIN, CANCEL, SET/COAST, RES/ACC).

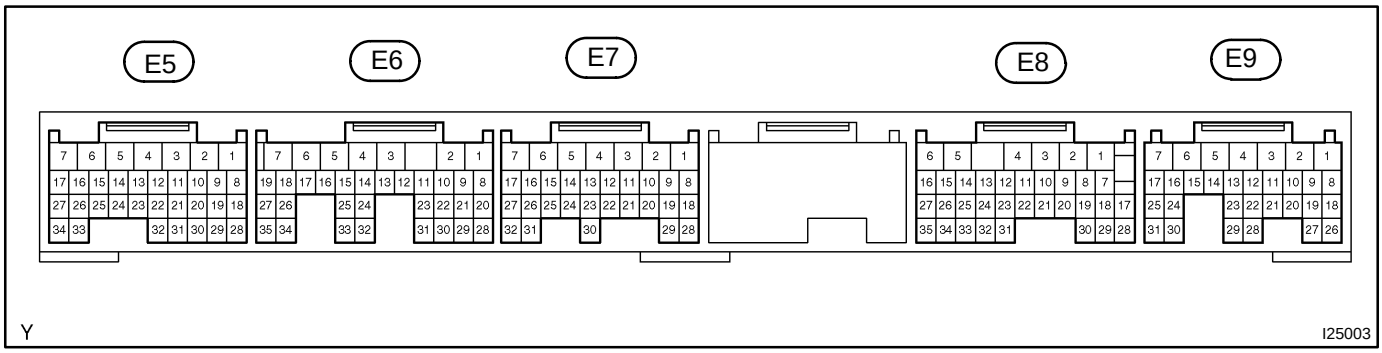
DI26X-37

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Input Signal Circuit 2. Vehicle Speed Sensor Circuit 3. Stop Light Switch Circuit 4. Park/Neutral Position Switch Circuit 5. ECM	DI-997 DI-992 DI-993 IN-36
SET not occurring or CANCEL occurring. (DTC is not output)	1. ECM	IN-36
Actual vehicle speed deviates above or below the set speed.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Gear shifting occurs frequently between 3rd and O/D when driving on uphill road. (Hurting)	1. ECM	IN-36
Cruise control not cancelled, even when brake pedal is de-pressed.	1. Stop Light Switch Circuit 2. ECM	DI-993 IN-36
Cruise control not cancelled, even when transmission is shifted to ”N” position.	1. Park/Neutral Position Switch Circuit 2. ECM	 IN-36
Control switch does not operate. (+/SET, +/RES, CANCEL not possible)	1. Cruise Control Switch Circuit 2. ECM	DI-998 IN-36
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Poor response is ACCEL and RESUME modes.	1. ECM	IN-36
O/D does not resume, even though the road is not uphill.	1. ECM	IN-36
DTC memory is erased.	1. ECM	IN-36
DTC is not output, or is output when should not be.	1. Diagnosis Circuit 2. ECM	- IN-36
Cruise MAIN indicator light remains ON or falls to light up.	1. Input Signal Circuit 2. ECM	DI-997 IN-36
Cruise MAIN indicator light does not light up.	1. Cruise MAIN indicator Light Circuit	DI-1001

DI3CH-17

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	Specified condition
STP ↔ E1 (E8-19 ↔ E7-1)	G-W ↔ BR	Depress brake pedal	10 - 16 V
		Release brake pedal	Below 1 V
CCS ↔ E1 (E8-24 ↔ E7-1)	L ↔ BR	Ignition switch ON	10 - 16 V
		Ignition switch ON CANCEL switch hold ON	3.6 - 7.2 V
		Ignition switch ON -/SET switch hold ON	2.1 - 4.9 V
		Ignition switch ON +/RES switch hold ON	0.7 - 2.6 V
		Ignition switch ON Main switch OFF	Below 1 V
		Ignition switch ON Main switch ON	10 - 14 V
ST1- ↔ E1 (E8-12 ↔ E7-1)	R-G ↔ BR	Depress brake pedal	Below 1 V
		Release brake pedal	10 - 14 V

DIB2X-02

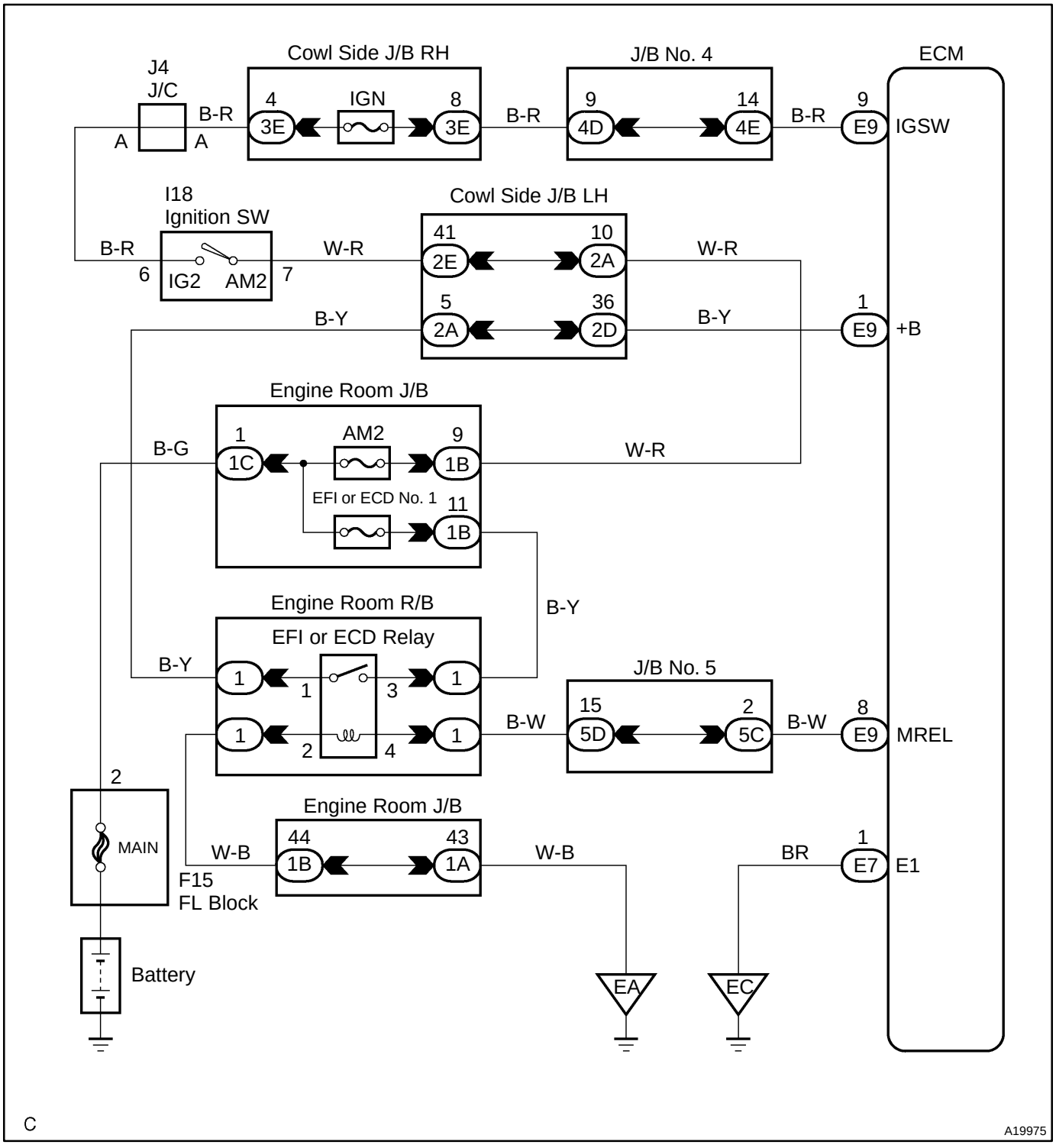
ECM Power Source Circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI or ECD relay control circuit in the ECM sends a signal to terminal MREL of the ECM switching on the EFI or ECD relay.

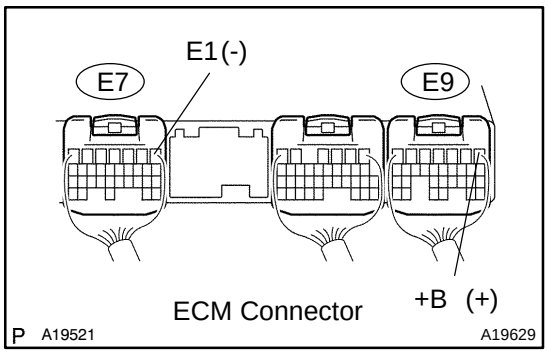
This signal causes current to flow to the coil, closing the contacts of the EFI or ECD relay and supplying power to terminal +B of the ECM.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and E1 of ECM connectors.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals +B and E1 of the ECM connectors.
OK:
Voltage: 9 to 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page BE-2).**

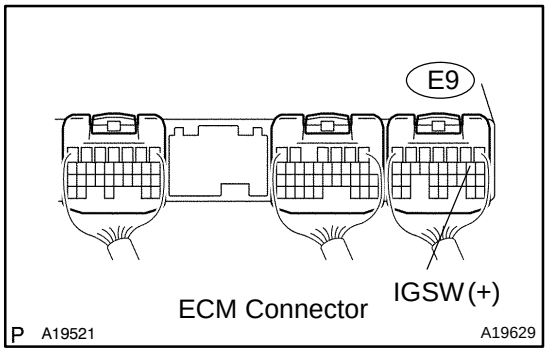
NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN-36).**

NG	**Repair or replace harness or connector.**

OK

3	**Check voltage between terminal IGSW of ECM connector and body ground.**

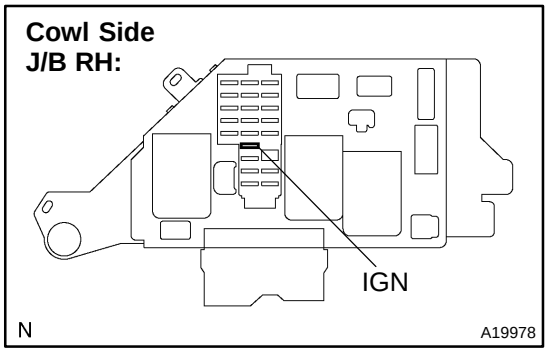


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal IGSW of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

OK	**Go to step 6.**

NG

4	**Check IGN fuse.**



PREPARATION:
Remove the IGN fuse from the cowl side J/B RH.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all harness and components connected to IGN fuse.**

OK

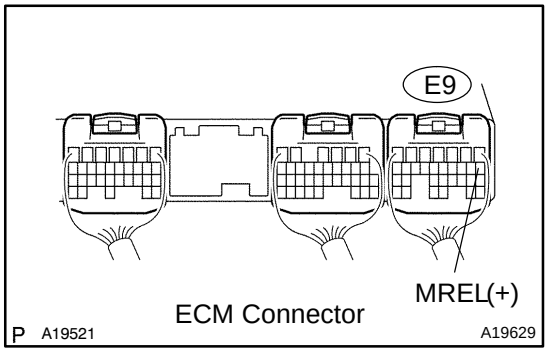
5	**Check ignition switch (See page BE-29).**

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM (See page IN-36).

6	**Check voltage between terminal MREL of ECM connector and body ground.**



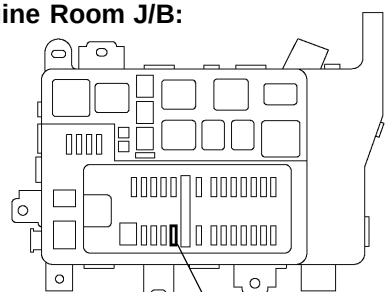
PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Replace ECM (See page SF-60).**

OK

7	**Check EFI or ECD No. 1 fuse of engine room J/B.**

Engine Room J/B:



PREPARATION:

Remove the EFI or ECD No. 1 fuse from the engine room J/B.

CHECK:

Check continuity of EFI or ECD No. 1 fuse.

OK:

Continuity

NG → **Check for short in all harness and components connected to EFI or ECD No. 1 fuse.**

OK

8	**Check EFI or ECD relay (See page SF-38).**

NG → **Replace EFI or ECD relay.**

OK

9	**Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Check and repair harness or connector between EFI or ECD No. 1 fuse and battery (See page IN-36).

DIB2Y-02

Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

Refer to DTC P0230 on page DI-162 .

WIRING DIAGRAM

Refer to DTC P0230 on page DI-162 .

INSPECTION PROCEDURE

Hand-held tester:

1	**Check fuel pump operation (See page SF-7).**

OK → **Go to step 8.**

NG

2	**Connect hand-held tester, and check operation of fuel pump relay.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / FUEL PUMP / SPD.

CHECK:

Check the operation of the fuel pump relay when it is switched ON and OFF by the hand-held tester.

OK:

Operating noise can be heard from the relay.

OK → **Go to step 4.**

NG

3	**Check operation of fuel pump relay (See page SF-40).**

NG → **Replace fuel pump relay.**

OK

4	Check fuel pump (See page SF-7).

NG → Repair or replace fuel pump.

OK

5	Check circuit opening relay (See page SF-39).

NG → Replace circuit opening relay.

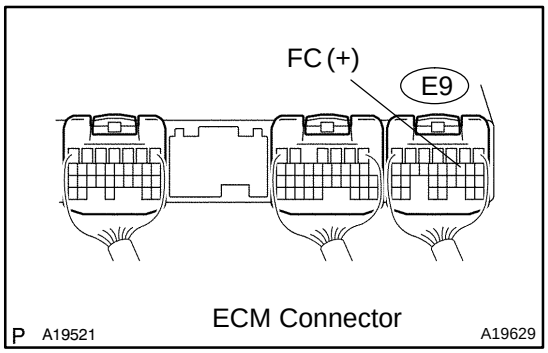
OK

6	Check for open in harness and connector between EFI or ECD relay and fuel pump, and fuel pump and body ground (See page IN-36).

NG → Repair or replace harness or connector.

OK

7	**Check voltage between terminal FC and E1 of ECM connector.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal FC of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Check for open in harness and connector between battery and FC terminal of ECM (See page IN-36).**

OK

Proceed to problem symptoms table (See page DI-48).

8	**Check fuel pump resistor (See page SF-42).**

NG → **Replace fuel pump resistor.**

OK

Check for open in harness and connector between circuit opening relay and fuel pump resistor, and fuel pump resistor and fuel pump (See page IN-36).

OBD II scan tool (excluding hand-held tester):

1	Check operation of fuel pump (See page SF-7).

OK → Go to step 7.

NG

2	Check operation of fuel pump relay (See page SF-40).

NG → Replace fuel pump relay.

OK

3	Check fuel pump (See page SF-7).

NG → Repair or replace fuel pump.

OK

4	Check circuit opening relay (See page SF-39).

NG → Replace circuit opening relay.

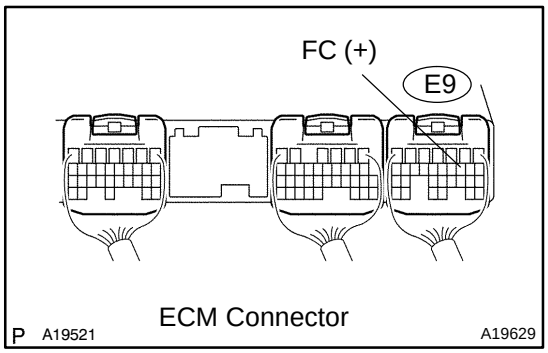
OK

5	Check for open in harness and connector between EFI or ECD relay and fuel pump, and fuel pump and body ground (See page IN-36).

NG → Repair or replace harness or connector.

OK

6	**Check voltage between terminal FC of ECM connector and body ground.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal FC of the ECM connector and body ground.
OK:
Voltage: 9 to 14 V

NG → **Check for open in harness and connector between battery and FC terminal of ECM (See page IN-36).**

OK

Proceed to problem symptoms table (See page DI-48).

7	**Check fuel pump resistor (See page SF-42).**

NG → **Replace fuel pump resistor.**

OK

Check for open in harness and connector between circuit opening relay and fuel pump resistor, fuel pump resistor and fuel pump (See page IN-36).

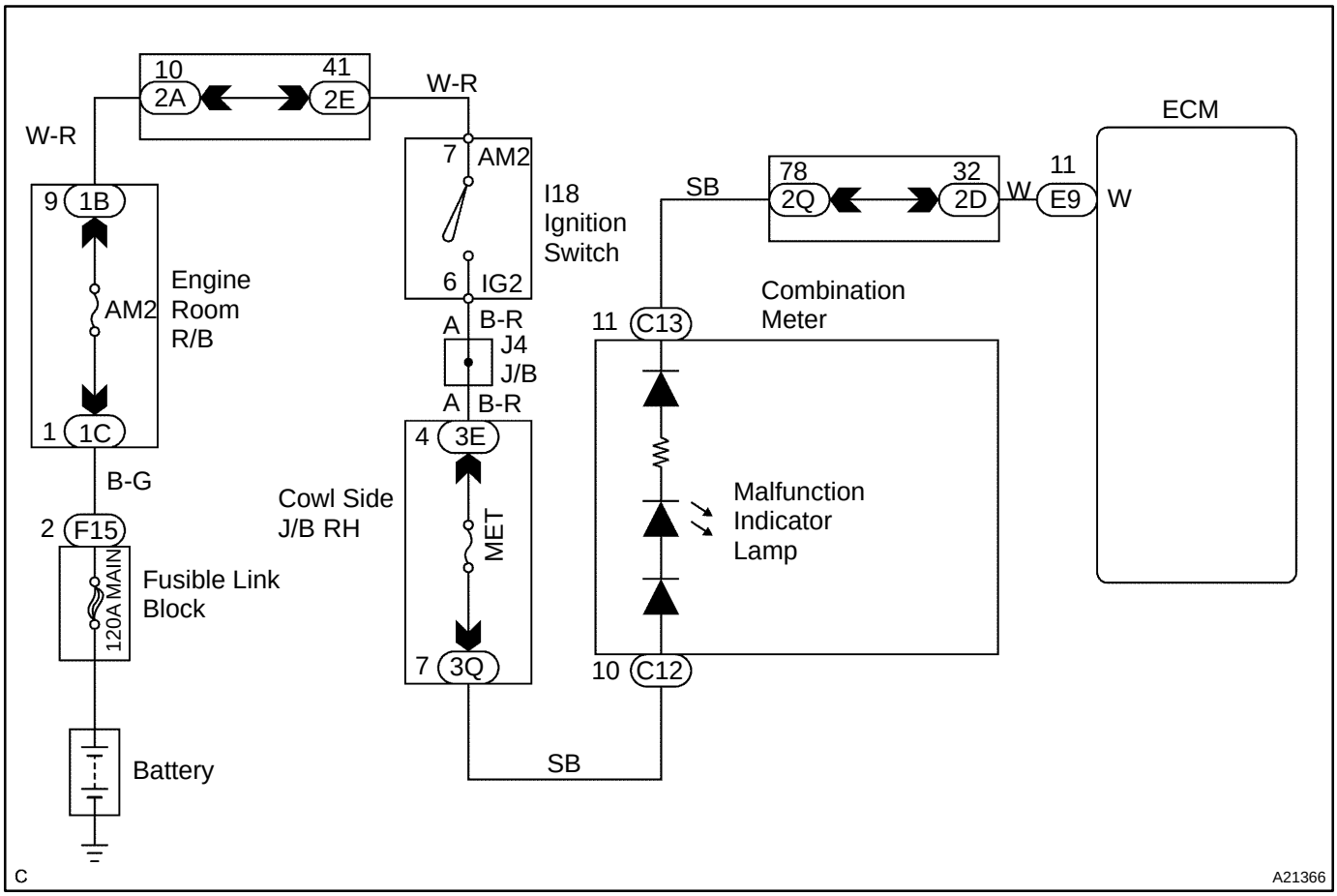
DIC2V-01

MIL Circuit

CIRCUIT DESCRIPTION

If the ECM detects a trouble, the MIL lights up. At this time, the ECM records a DTC in the memory.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshoot each trouble symptom in accordance with the chart below .

MIL remains on	Start inspection from step 1
MIL does not light up	Start inspection from step 3

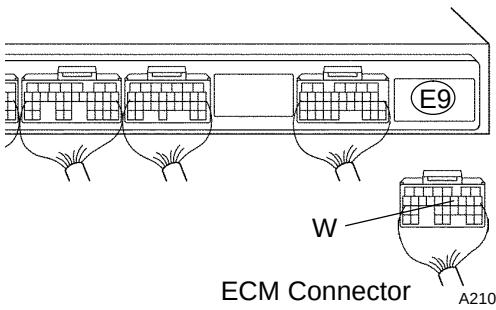
1	**Clear DTC.**

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Read the DTC (See page DI-3).
(d) Clear the DTC (See page DI-3).
(e) Check that MIL does not light up.
Standard: MIL does not light up

OK → **Repair circuit indicated by output code (See page DI-36).**

NG

2	**Check harness and connector (Check for short in wire harness).**



ECM Connector

(a) Disconnect the E9 ECM connector.
(b) Turn the ignition switch ON.
(c) Check that MIL does not light up.
Standard: MIL does not light up

OK → **Replace ECM (See page SF-60).**

NG

Check and repair harness and connector between combination meter and ECM (See page IN-36).

3	**Check that MIL lights up.**

Check that MIL lights up when turning the ignition switch ON.

Standard: MIL lights up

OK → **System OK.**

NG

4	**Inspect combination meter assy (MIL circuit).**

See the combination meter troubleshooting on page BE-63 .

NG → **Repair or replace bulb or combination meter assembly.**

OK

Check and repair harness and connector between combination meter and ECM (See page IN-36).

DIC22-01

CIRCUIT INSPECTION

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)

DTC	P0051	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)

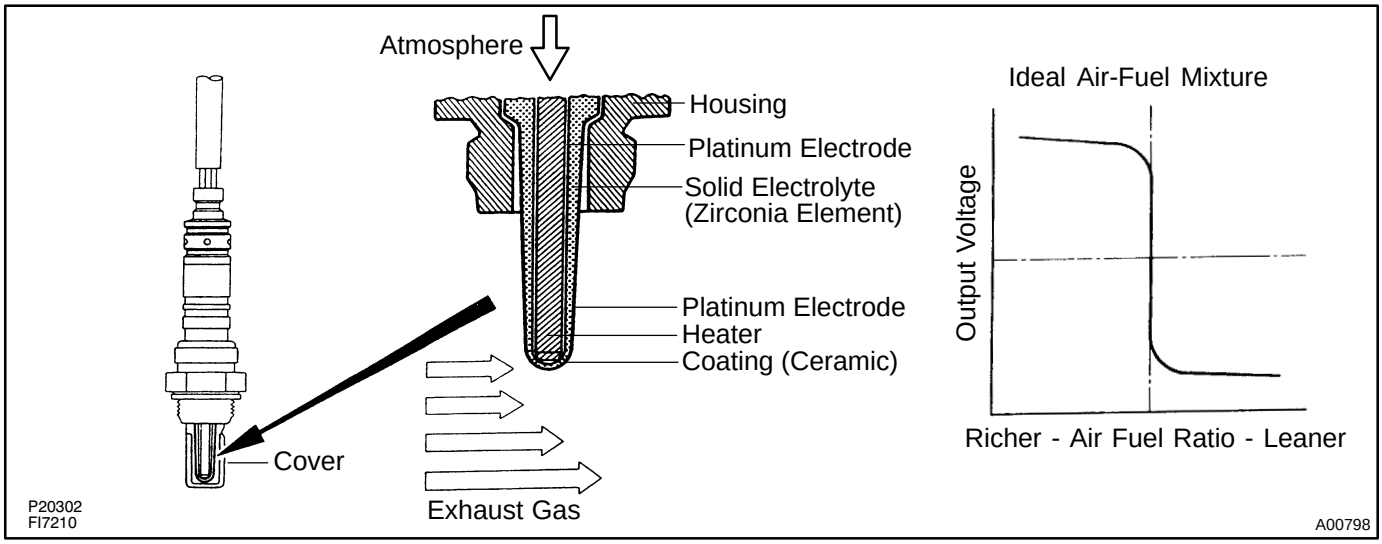
DTC	P0052	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)

DTC	P0057	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)

DTC	P0058	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)

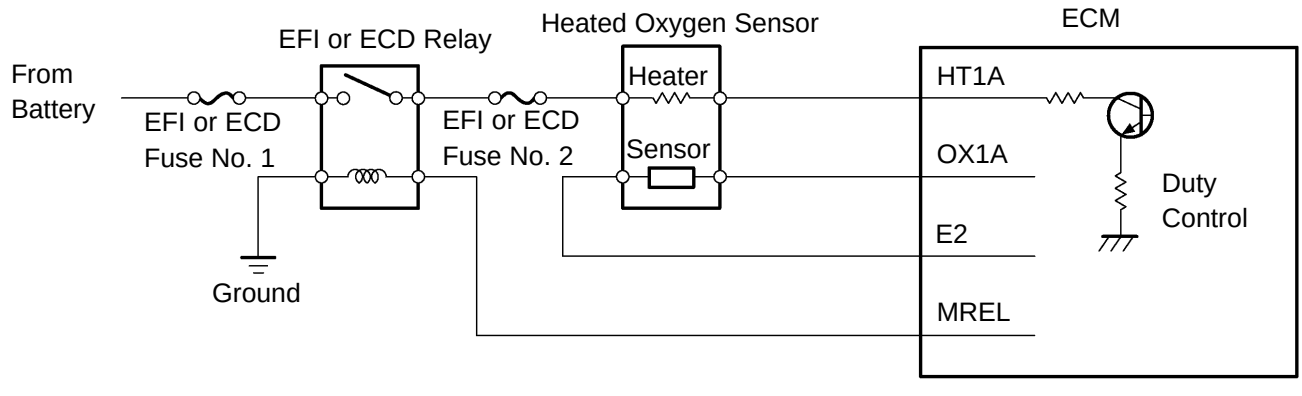
CIRCUIT DESCRIPTION

To obtain a high purification rate for the CO, HC and NOx components of the exhaust gas, a three-way catalytic converter is used, but for the most efficient use of the three-way catalytic converter, the air-fuel ratio must be precisely controlled so that it is always close to the stoichiometric air-fuel ratio.
The heated oxygen sensor has the characteristic which its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. This characteristic is used to detect the oxygen concentration in the exhaust gas and provide the ECM with feedback to control the air-fuel ratio.
When the air-fuel ratio becomes LEAN, the oxygen concentration in the exhaust increases and the heated oxygen sensor informs the ECM of the LEAN condition (low voltage, i.e. less than 0.45 V).
When the air-fuel ratio is RICHER than the stoichiometric air-fuel ratio, the oxygen concentration in the exhaust gas is reduced and the heated oxygen sensor informs the ECM of the RICH condition (high voltage, i.e. more than 0.45 V). The ECM judges by the voltage output from the heated oxygen sensor whether the air-fuel ratio is RICH or LEAN and controls the injection time accordingly. However, if malfunction of the heated oxygen sensor causes output of abnormal voltage, this disables the ECM for performing an accurate air-fuel ratio control. The heated oxygen sensors include a heater which heats the zirconia element. The heater is controlled by the ECM. When the intake air volume is low (the temperature of the exhaust gas is low) current flows to the heater to heat the sensor for accurate oxygen concentration detection.



HINT:
The ECM provides a pulse width modulated control circuit to adjust current through the heater. The heated oxygen sensor heater circuit uses a relay on the B+ side of the circuit.

Reference (Bank 1 Sensor 1 System Drawing) :



DTC No.	DTC Detecting Condition	Trouble Area
P0031 P0037 P0051 P0057	Heater current is 0.25 A or less when the heater operates with more than 10.5 V positive battery voltage	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM
P0032 P0038 P0052 P0058	When heater operates, heater current exceeds 2.0 A	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM

HINT:

- ★ Bank 1 refers to bank the includes cylinder No. 1.
- ★ Bank 2 refers to bank that does not includes cylinder No. 1.
- ★ Sensor 1 refers to the sensor closer to the engine assembly.
- ★ Sensor 2 refers to the sensor farther away from the engine assembly.

MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect oxygen concentration in the exhaust. If the zirconia element is at the proper temperature and difference of the oxygen concentration between the inside and outside surface of sensor is large, the zirconia element will generate voltage signals. In order to increase the oxygen concentration detecting capacity in the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor. When current in the sensor is out of the standard operating range, the ECM interprets this as a fault in the heated oxygen sensor and sets a DTC.

Example:

The ECM will set a high current DTC if the current in the sensor is more than 2.0 A when the heater is OFF. Similarly, the ECM will set a low current DTC if the current is less than 0.25 A when the heater is ON.

MONITOR STRATEGY

Related DTCs	P0031	Heated oxygen sensor heater current bank 1 sensor 1 (Low current)
	P0032	Heated oxygen sensor heater current bank 1 sensor 1 (High current)
	P0037	Heated oxygen sensor heater current bank 1 sensor 2 (Low current)
	P0038	Heated oxygen sensor heater current bank 1 sensor 2 (High current)
	P0051	Heated oxygen sensor heater current bank 2 sensor 1 (Low current)
	P0052	Heated oxygen sensor heater current bank 2 sensor 1 (High current)
	P0057	Heated oxygen sensor heater current bank 2 sensor 2 (Low current)
	P0058	Heated oxygen sensor heater current bank 2 sensor 2 (High current)
Required sensors/components	Main sensors/components	Heated oxygen sensor
	Related sensors/components	Vehicle speed sensor
Frequency of operation	Continuous	
Duration	0.3 sec.	
MIL operation	P0031, P0037, P0051, P0057: 1 driving cycle	
	P0032, P0038, P0052, P0058: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0031, P0037, P0051, P0057 (Low current):		
Either of the following conditions is met:	A or B	
A. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	250 sec.	500 sec.
2. Battery voltage	10.5 V	-
3. Vehicle speed	-	90 km/h (56 mph)
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
B. Following conditions are met:	1, 2, 3, 4 and 5	
1. Time after engine start	500 sec.	-
2. Battery voltage	10.5 V	-
3. Vehicle speed	40 km/h (25 mph)	-
4. Misfire	Not detected	
5. Pass/Fail detection in this driving cycle	Not detected	
P0032, P0038, P0052, P0058 (High current):		
Intrusive heating is OFF		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0031, P0037, P0051, P0057 (Low current):	
Heated oxygen sensor heater current	Less than 0.25 A (at 0.3 sec. after heater "ON")
P0032, P0038, P0052, P0058 (High current):	
Heated oxygen sensor heater current	More than 2.0 A (while intrusive heating is OFF)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor heater current under the following conditions: (a) Engine has been warmed up (b) Engine is idling (c) Battery voltage is 11 to 14 V	0.4 to 1.0 A

MONITOR RESULT

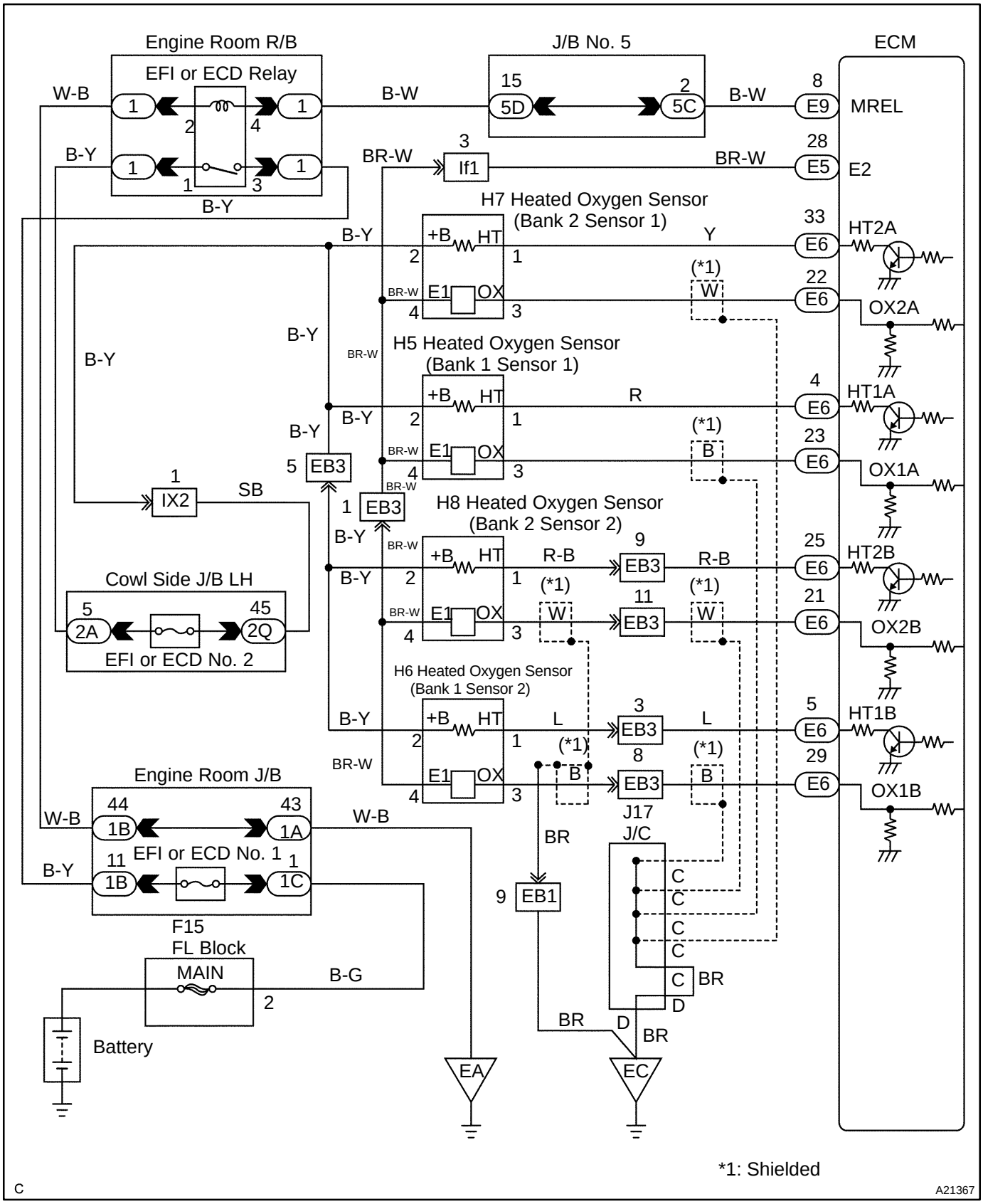
The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $04: HO2S Heater

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 1)	Malfunction criterion
1	$02	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 1 sensor 2)	Malfunction criterion
1	$10	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 1)	Malfunction criterion
1	$20	Multiply by 0.000076 (A)	Maximum HO2S heater current (bank 2 sensor 2)	Malfunction criterion

WIRING DIAGRAM



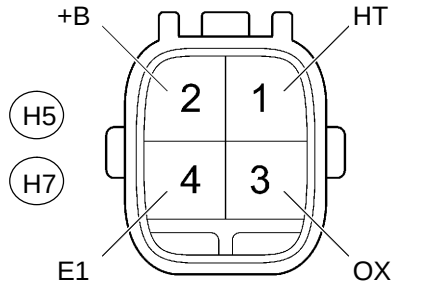
INSPECTION PROCEDURE

HINT:

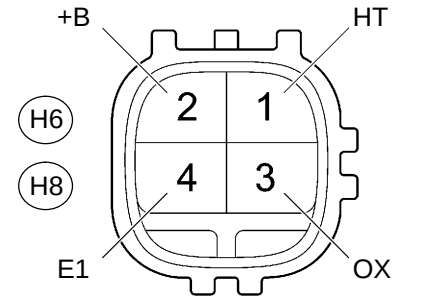
Read freeze frame data using hand-held tester or OBD II scan tool. Because freeze frame records the engine conditions when the malfunction is detected. When troubleshooting, it is useful to determine whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Check resistance of heated oxygen sensor heater.**

Components Side:



Bank1 Sensor1, Bank2 Sensor1



Bank1 Sensor2, Bank2 Sensor2 A20870

C

PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

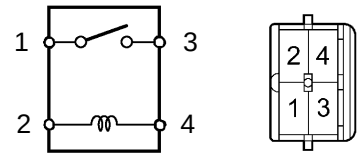
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

2	Check EFI or ECD relay.

EFI or ECD Relay



A21543

PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

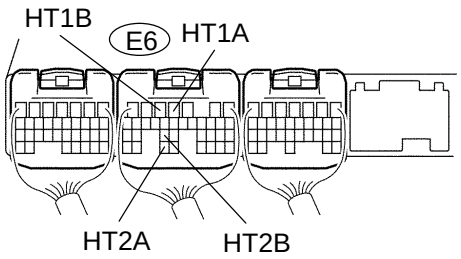
OK:

Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

3	Check voltage between terminals HT1A, HT2A, HT1B, HT2B of ECM connectors and body ground.



P A19522 ECM Connector A19630

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals of the ECM connectors and body ground.

HINT:

★ Connect terminal HT1A to the bank 1 sensor 1.
★ Connect terminal HT1B to the bank 1 sensor 2.
★ Connect terminal HT2A to the bank 2 sensor 1.
★ Connect terminal HT2B to the bank 2 sensor 2.

OK:

Tester Connection	Specified Condition
HT1A (E6-4) - Body ground	9 to 14 V
HT1B (E6-5) - Body ground	9 to 14 V
HT2A (E6-33) - Body ground	9 to 14 V
HT2B (E6-25) - Body ground	9 to 14 V

OK → **Replace ECM (See page SF-60).**

NG

Check and repair harness or connector between EFI or ECD relay and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN-36).

DIC23-01

DTC	P0100	Mass or Volume Air Flow Circuit

DTC	P0102	Mass or Volume Air Flow Circuit Low Input

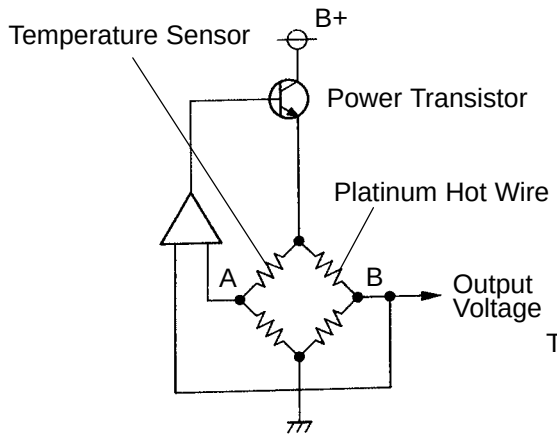
DTC	P0103	Mass or Volume Air Flow Circuit High Input

CIRCUIT DESCRIPTION

The Mass Air Flow (MAF) meter measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air.

By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools 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. The ECM interprets this voltage as the intake air amount.

The circuit is constructed so that the platinum hot wire and temperature sensor provide a bridge circuit, with the power transistor controlled so that the potential of A and B remains equal to maintain the set temperature.



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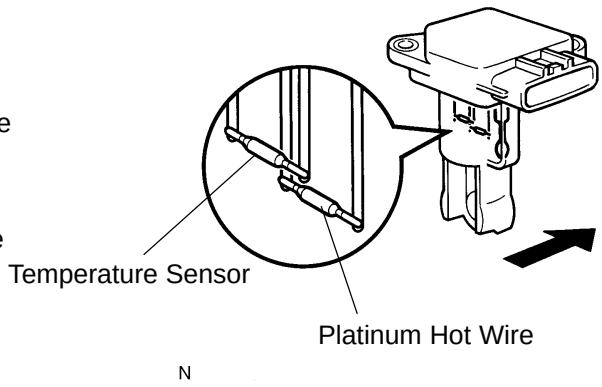


N

A09707

DTC No.	DTC Detection Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit for more than 3 sec.	★Open or short in mass air flow meter circuit ★Mass air flow meter ★ECM
P0102	Open or short in mass air flow meter circuit for more than 3 sec.	
P0103	Open in mass air flow meter circuit for more than 3 sec. (EVG circuit) Short in mass air flow meter circuit for more than 3 sec. (+B circuit)	

HINT:
After confirming DTC P0100, P0102 or P0103, use the hand-held tester or the OBD II scan tool to confirm the MAF ratio from the ALL menu (to reach the ALL menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL).

Mass Air Flow Value (gm/sec.)	Malfunction
Approx. 0.0	★Mass air flow meter power source circuit open ★VG circuit open or short
271.0 or more	★EVG circuit open

MONITOR DESCRIPTION

If there is a defect in the MAF (Mass Air Flow) meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.
Example:
When the MAF meter voltage output is less than 0.2 V, or more than 4.9 V, and if either the condition continues for more than 3 sec.

MONITOR STRATEGY

Related DTCs	P0100	Mass air flow meter circuit range check (Fluttering)
	P0102	Mass air flow meter circuit range check (Low voltage)
	P0103	Mass air flow meter circuit range check (High voltage)
Required sensors/components	Mass air flow meter	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (When engine speed is at less than 4,000 rpm) 2 driving cycles (When engine speed is at 4,000 rpm or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)
The typical enabling condition is not available	-

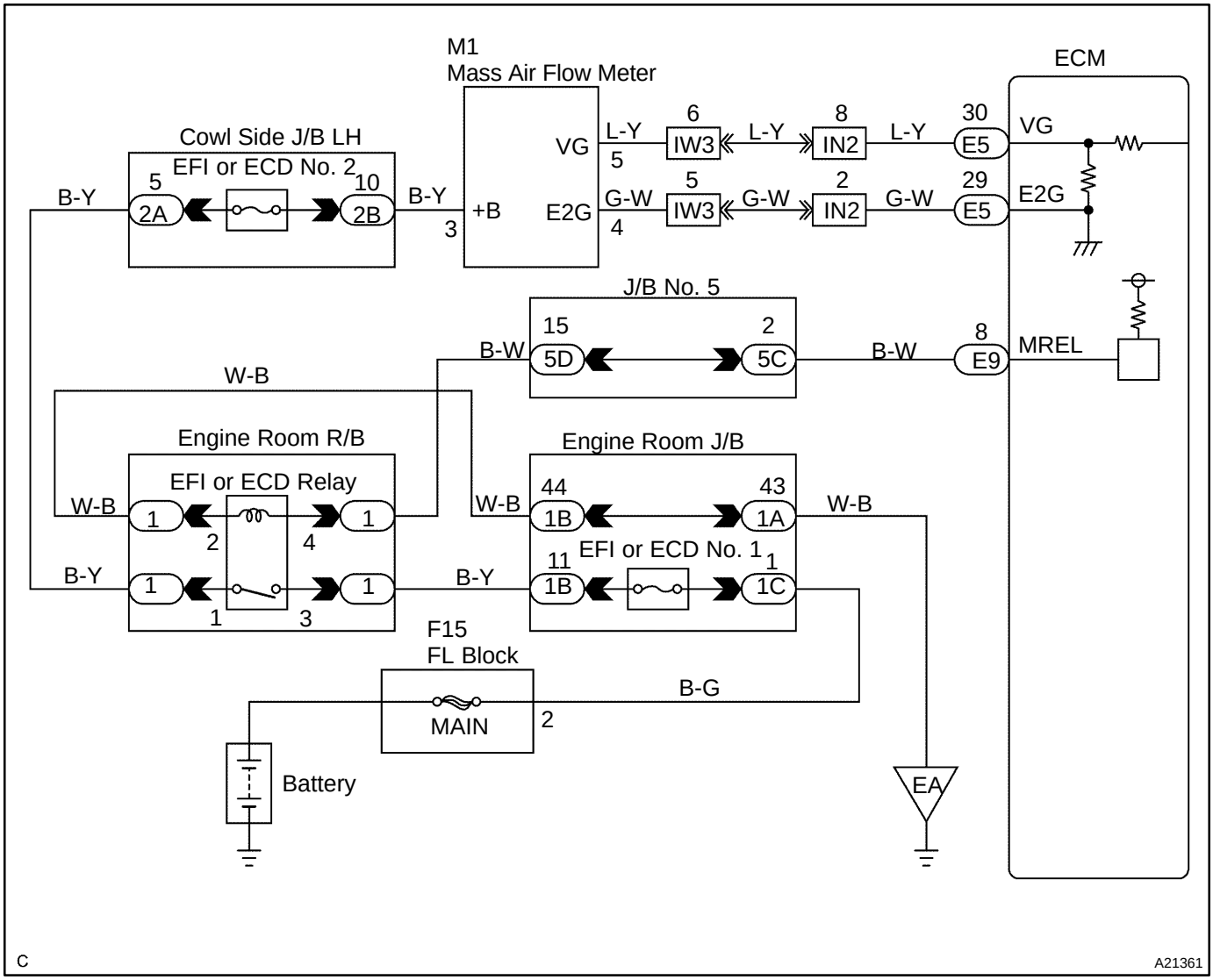
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
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

Parameter	Standard Value
Mass air flow meter voltage	0.4 to 2.2 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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	**Connect OBD II scan tool or hand-held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or the hand-held tester main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / MAF.

CHECK:

Read the mass air flow rate on the OBD II scan tool or the hand-held tester.

RESULT:

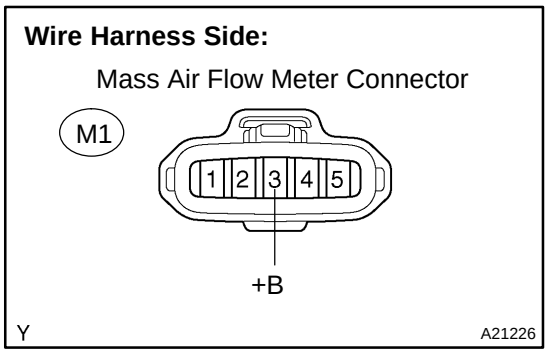
Air Flow Rate (gm/s)	Proceed to
0.0	A
271.0 or more	B
Between 1 and 270.0 (*1)	C

*1: The value must be changed when the throttle valve is opened or closed.

B	**Go to step 6.**
C	**Check for intermittent problems (See page DI-3).**

A

2	Check voltage of mass air flow meter power source.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure voltage between terminal of the mass air flow meter connector and body ground.

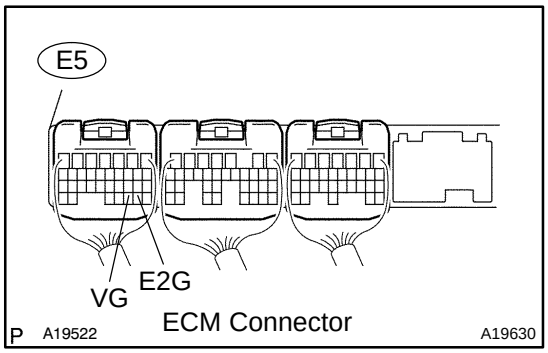
OK:

Tester Connection	Specified Condition
+B (M1-3) - Body ground	9 to 14 V

NG → **Go to step 5.**

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:

Start the engine.

CHECK:

Measure the voltage between the specified terminal of the E5 ECM connector.

HINT:

The shift position should be P or N and the A/C switch should be turned OFF.

OK:

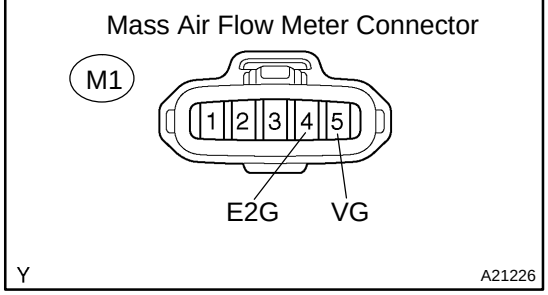
Tester Connection	Condition	Specified Condition
VG (E5-30) - E2G (E5-29)	Engine is idling	0.5 to 3.0 V

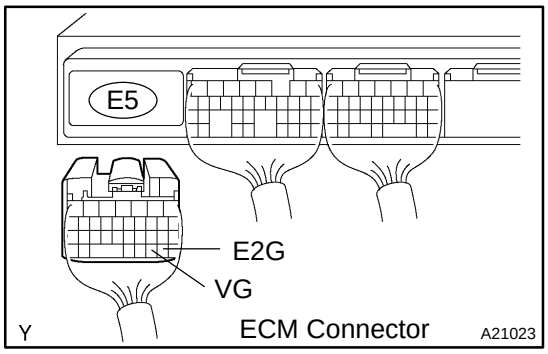
OK → **Replace ECM (See page SF-60).**

NG

4	**Check for open and short in harness and connector between mass air flow meter and ECM.**

Wire Harness Side:





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
VG (M1-5) - VG (E5-30)	Below 1 Ω
E2G (M1-4) - E2G (E5-29)	Below 1 Ω
VG (M1-5) or VG (E5-30) - Body ground	10 kΩ or higher

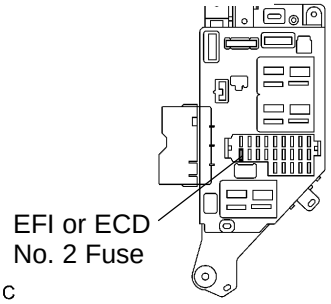
NG → **Repair or replace harness or connector.**

OK

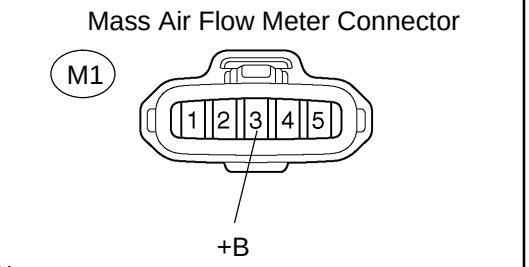
Replace mass air flow meter.

5	**Check for open and short in harness and connector between mass air flow meter and EFI or ECD relay.**

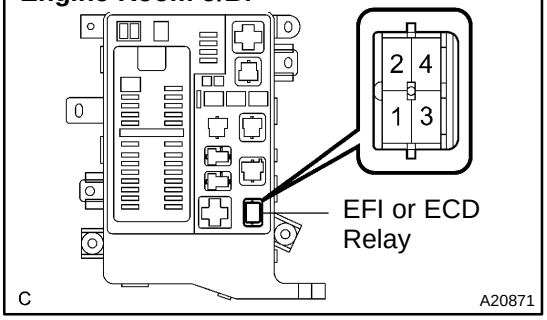
Cowl Side J/B LH:



Wire Harness Side:



Engine Room J/B:



Check EFI or ECD No. 2 fuse:

PREPARATION:

Remove the EFI or ECD No. 2 fuse from the cowl side J/B LH.

CHECK:

Check for continuity in the EFI or ECD No. 2 fuse.

OK:

Continuity

Check harness and connector:

PREPARATION:

(a) Install the EFI or ECD No. 2 fuse.
(b) Disconnect the M1 mass air flow meter connector.
(c) Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

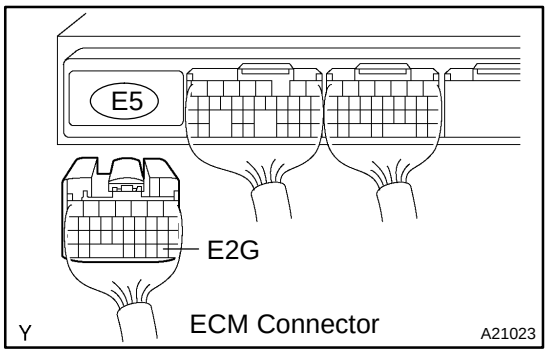
Tester Connection	Specified Condition
+B (M1-3) - Engine Room J/B (EFI or ECD relay terminal 1)	Below 1 Ω
+B (M1-3) or Engine room J/B (EFI or ECD relay terminal 1) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check ECM power source circuit (See page DI-345).

6	Check continuity between terminal E2G of ECM connector and body ground.



CHECK:

Check the resistance between terminal of the E5 ECM connector and body ground.

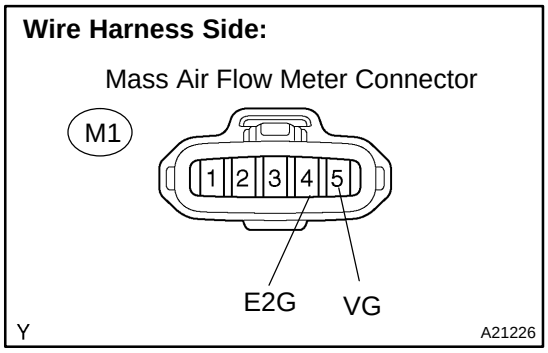
OK:

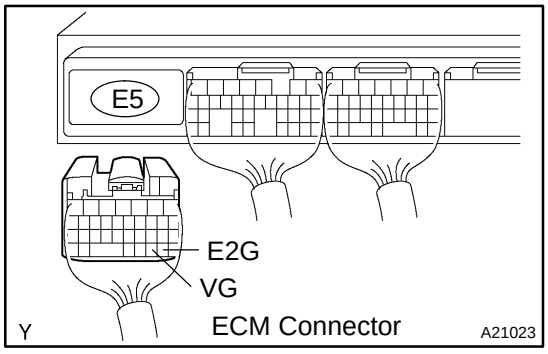
Tester Connection	Specified Condition
E2G (E5-29) - Body ground	Below 1 Ω

NG → **Replace ECM (See page SF-60).**

OK

7	Check for open in harness and connector between mass air flow meter and ECM.





PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
VG (M1-5) - VG (E5-30)	Below 1 Ω
E2G (M1-4) - E2G (E5-29)	Below 1 Ω
VG (M1-5) or VG (E5-30) - Body ground	10 kΩ or higher
E2G (M1-4) or E2G (E5-29) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

DTC	P0101	Mass or Volume Air Flow Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100, P0102 and P0103 on page DI-57 .

DTC No.	DTC Detecting Condition	Trouble Area
P0101	After engine is warmed up, conditions (a), (b), (c) and (d) continue for more than 10 seconds: (2 trip detection logic) (a) Throttle valve fully closed (b) Voltage output of the mass air flow meter is more than 2.2 V. (c) Engine coolant temperature is more than 70 °C (158 °F). (d) Engine speed is less than 900 rpm.	★Mass air flow meter
	Conditions (a), (b) and (c) continue for more than 6 seconds with engine speed: (2 trip detection logic) (a) Engine speed is more than 0 rpm. (b) VTA is more than 0.1 V. (c) Voltage output of the mass air flow meter is less than 0.25 V.	

MONITOR DESCRIPTION

The MAF (Mass Air Flow) meter helps the ECM calculate the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and provide a proper air fuel ratio. Inside the MAF meter, there is a heated platinum wire exposed to the flow of intake air. By applying a specific current to the wire, the ECM heats this wire to a given temperature. The flow of incoming air cools 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 air flow through the MAF meter. The ECM interprets this voltage as the intake air amount. If there is a defect in the MAF meter or an open or short circuit, the voltage level will deviate outside the normal operating range. The ECM interprets this deviation as a defect in the MAF meter and sets a DTC.

Example:

If the voltage is more than 2.2 V at idle or less than 0.25 V at idle OFF, the ECM interprets this as a defect in the MAF meter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0101	Mass air flow meter rationality
Required sensors/components	Main sensors/components	Mass air flow meter
	Related sensors/components	Engine speed sensor, Engine coolant temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	10 sec. (High voltage) 6 sec. (Low voltage)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
High voltage:		
Engine speed	-	900 rpm
Idle	ON	
Engine coolant temperature	70°C (158°F)	-
Low voltage:		
Engine speed	0 rpm	-
Throttle position	0.1 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Mass air flow meter voltage (High voltage)	More than 2.2 V
Mass air flow meter voltage (Low voltage)	Less than 0.25 V

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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	**Are there any other codes (besides DTC P0101) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC output)	Proceed to
”P0101” and other DTCs	A
Only P0101	B

HINT:

If any other codes besides P0101 are output, perform the troubleshooting for those codes first.

B → **Replace mass air flow meter.**

A

Go to relevant DTC chart (See page DI-36).

DI1LE-13

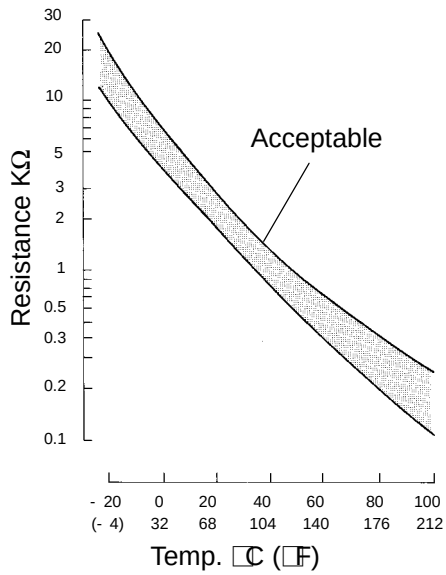
DTC	P0110	Intake Air Temperature Circuit

DTC	P0112	Intake Air Temperature Circuit Low Input

DTC	P0113	Intake Air Temperature Circuit High Input

CIRCUIT DESCRIPTION

(Fig.1)



The intake air temperature (IAT) sensor, mounted on the mass air flow (MAF) meter, monitors the intake air temperature. The IAT sensor has a thermistor that varies its resistance depending on the temperature of the intake air. When the air temperature is low, the resistance in the thermistor increases. When the temperature is high, the resistance drops. The variations in resistance are reflected as voltage changes to the ECM terminal. (See Fig. 1).

The intake air temperature sensor is connected to the ECM (See below). The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA (THAR) via resistor R.

That is, the resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in accordance with changes in the intake air temperature, the voltage at terminal THA (THAR) also changes. Based on this signal, the ECM increases the fuel injection volume to improve the driveability during cold engine operation.

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0110	Step 1	Open or short in intake air temperature sensor circuit for 0.5 sec.	★Open or short in intake air temperature sensor circuit ★Intake air temperature sensor (built in mass air flow meter) ★ECM
P0112	Step 4	Short in intake air temperature sensor circuit for 0.5 sec.	
P0113	Step 2	Open in intake air temperature sensor circuit for 0.5 sec.	

HINT:

After confirming DTC "P0110, P0112 or P0113", use the hand-held tester or the OBD II scan tool to confirm the intake air temperature in the "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL".

Temperature Displayed	Malfunction
-40 ˚C (-40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the IAT (Intake Air Temperature) sensor and sets a DTC.
Example:
When the sensor voltage output equal to -40□C (-40□F), or more than 140□C (284□F).

MONITOR STRATEGY

Related DTCs	P0110	Intake air temperature sensor range check (Fluttering)
	P0112	Intake air temperature sensor range check (Low resistance)
	P0113	Intake air temperature sensor range check (High resistance)
Required sensors/components	Intake air temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

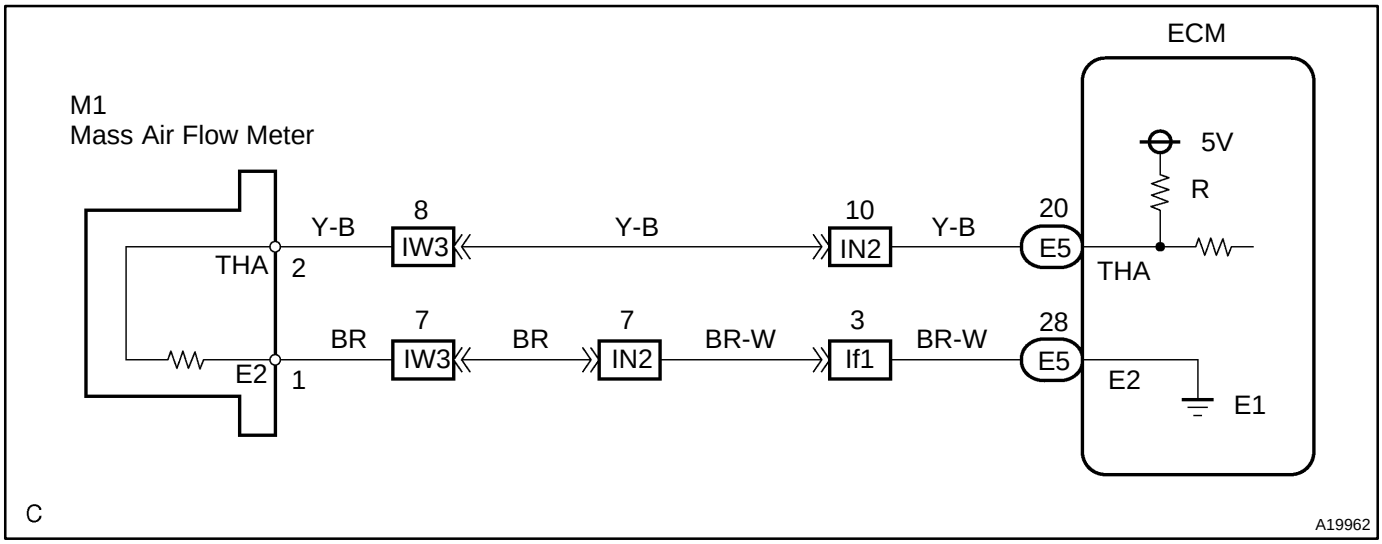
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0110:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω, or more than 156 kΩ (More than 140□C (284□F), or less than -40□C (-40□F)
P0112:	
Intake air temperature sensor resistance (Intake air temperature)	Less than 98.5 Ω (More than 140□C (284□F))
P0113:	
Intake air temperature sensor resistance (Intake air temperature)	More than 156 kΩ (Less than -40□C (-40□F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Intake air temperature sensor resistance	98.5 Ω (140□C (284□F)) to 156 kΩ (-40 □C (-40□F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTCs related 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 hand−held tester or the OBD II scan tool. 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	**Connect OBD II scan tool or hand-held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or the hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

Same as actual intake air temperature.

RESULT:

Temperature Displayed	Proceed to
-40 °C (-40°F)	A
140°C (284°F) or more	B
OK (Same as present temperature)	C

HINT:

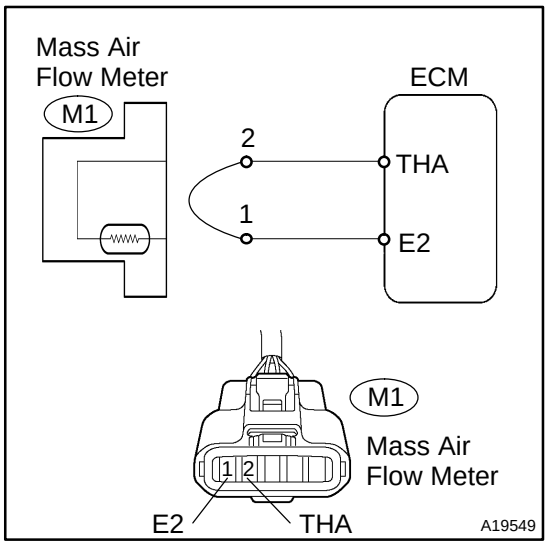
★ If there is an open circuit, the OBD II scan tool or the hand-held tester indicates -40°C (-40 °F).
★ If there is a short circuit, the OBD II scan tool or the hand-held tester indicates 140°C (284°F) or more.

B → **Go to step 4.**

C → **Check for intermittent problems (See page DI-3).**

A

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.
(b) Connect terminals 1 and 2 of the mass air flow meter wire harness side connector.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

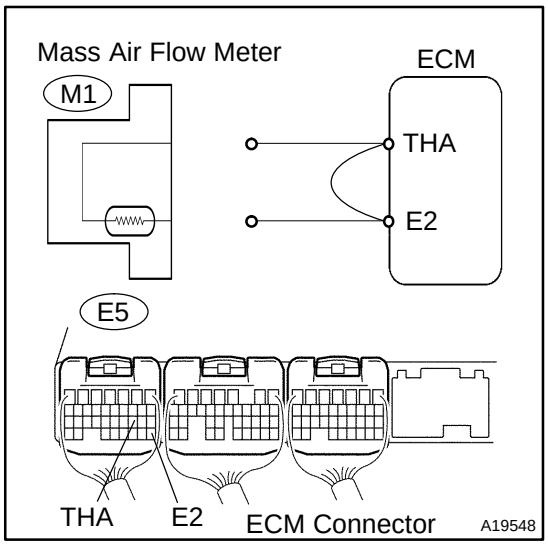
OK:

Temperature value: 140°C (284°F) or more

OK	**Confirm good connection at sensor. If OK, replace mass air flow meter.**

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Connect terminals THA and E2 of the E5 ECM connector.

HINT:

Before checking, do a visual and contact pressure checks for the ECM connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

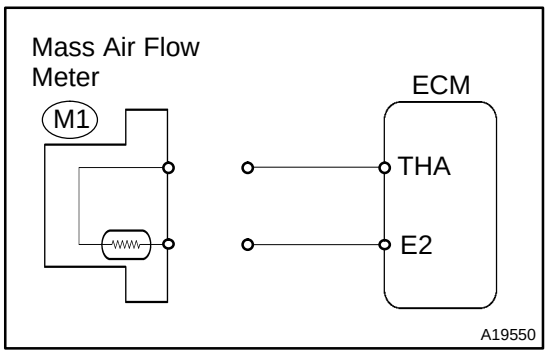
Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page SF-60).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the M1 mass air flow meter connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

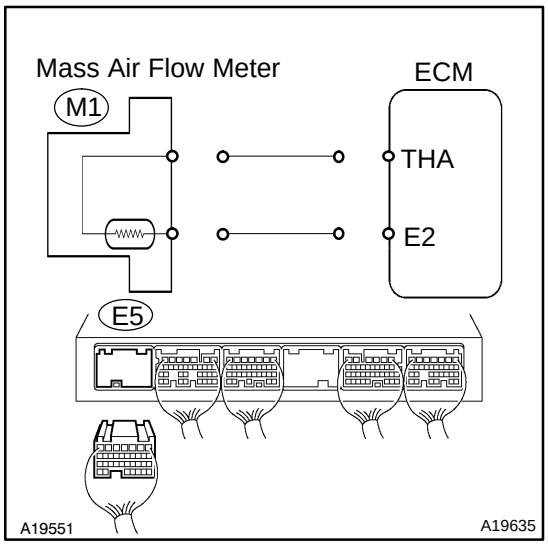
OK:

Temperature value: -40°C (-40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Disconnect the E5 ECM connector.
(b) Turn the ignition switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / INTAKE AIR.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK → **Repair or replace harness or connector.**

NG

Replace ECM (See page SF-60).

DI1LF-13

DTC	P0115	Engine Coolant Temperature Circuit

DTC	P0117	Engine Coolant Temperature Circuit Low Input

DTC	P0118	Engine Coolant Temperature Circuit High Input

CIRCUIT DESCRIPTION

A thermistor is built in the Engine Coolant Temperature (ECT) sensor and changes the resistance value according to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same the Intake Air Temperature (IAT) sensor.
HINT:
If the ECM detects the DTC "P0115, P0117 or P0118", it operates the fail-safe function in which the ECT is assumed to be 80 □C (176 □F).

DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0115	Step 1	Open or short in engine coolant temperature sensor circuit for 0.5 sec.	★Open or short in engine coolant temperature sensor circuit ★Engine coolant temperature sensor ★ECM
P0117	Step 4	Short in engine coolant temperature sensor circuit for 0.5 sec.	
P0118	Step 2	Open in engine coolant temperature sensor circuit for 0.5 sec.	

HINT:
After confirming DTC "P0115, P0117 or P0118," use the OBD II scan tool or the hand-held tester to confirm the engine coolant temperature from the DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL.

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

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on 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. The variations in resistance are reflected in the voltage output from the sensor.
The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. 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:
When the ECM calculates that the ECT is less than -40□C (-40□F), or more than 140□C (284□F), and if either the condition continues for 0.5 sec. or more, the ECM will set a DTC.

MONITOR STRATEGY

Related DTCs	P0115	Engine coolant temperature sensor range check (Fluttering)
	P0117	Engine coolant temperature sensor range check (Low resistance)
	P0118	Engine coolant temperature sensor range check (High resistance)
Required sensors/components	Engine coolant temperature sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)
The typical enabling condition is not available	-

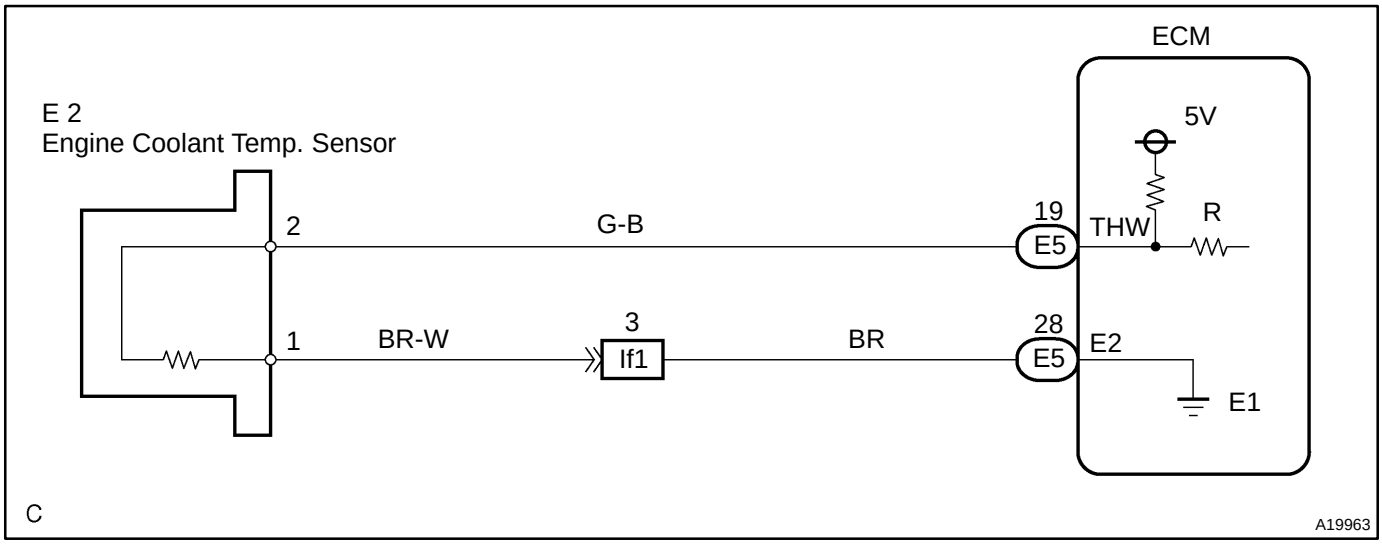
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0115:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω or more than 156 kΩ (More than 140□C (284□F) or less than -40□C (-40□F))
P0117:	
Engine coolant temperature sensor resistance (Coolant temperature)	Less than 79 Ω (More than 140□C (284□F))
P0118:	
Engine coolant temperature sensor resistance (Coolant temperature)	More than 156 kΩ (Less than -40□C (-40□F))

COMPONENT OPERATING RANGE

Parameter	Standard Value
Engine coolant temperature sensor resistance	79 Ω (140□C (284□F)) to 156 kΩ (-40 □C (-40□F))

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- ★ If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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	**Connect OBD II scan tool or hand-held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

Same value as actual engine coolant temperature.

RESULT:

Temperature Displayed	Proceed to
-40 ˚C (-40˚F)	A
140˚C (284˚F) or more	B
OK (Same as present temperature)	C

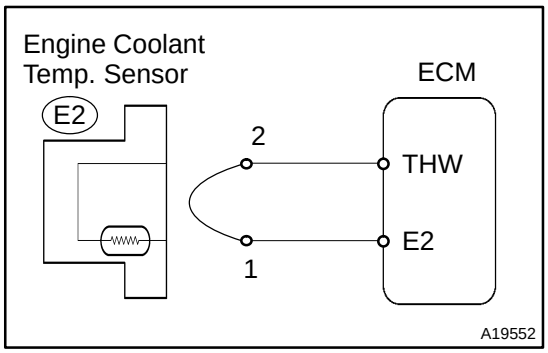
HINT:

★ If there is an open circuit, OBD II scan tool or hand-held tester indicates -40˚C (-40˚F).
★ If there is a short circuit, OBD II scan tool or hand-held tester indicates 140˚C (284˚F) or more.

B	**Go to step 4.**
C	**Check for intermittent problems (See page DI-3).**

A

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature (ECT) sensor connector.
(b) Connect terminals 1 and 2 of the engine coolant temperature sensor wire harness side connector.
(c) Turn the ignition switch ON.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

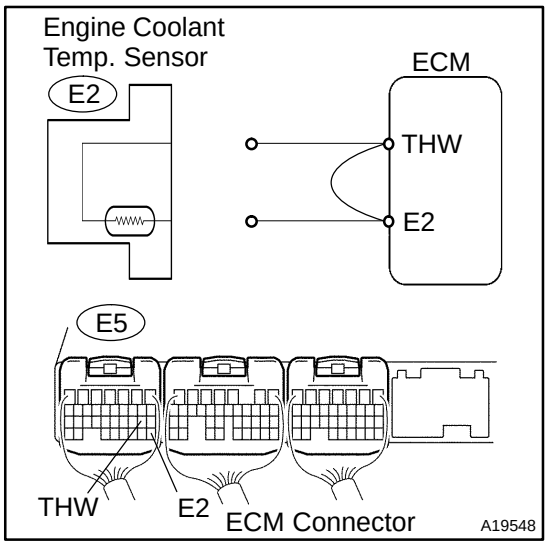
OK:

Temperature value: 140°C (284°F) or more

OK	Confirm good connection at sensor. If OK, replace engine coolant temperature sensor.

NG

3	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Connect terminals THW and E2 of the E5 ECM connector.

HINT:

Before checking, do a visual and contact pressure checks for the ECM connector.

(c) Turn the ignition switch ON.

(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

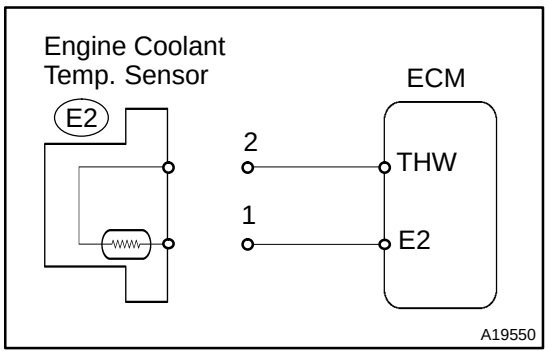
Temperature value: 140°C (284°F) or more

OK	Repair or replace harness or connector.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page SF-60).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the E2 engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

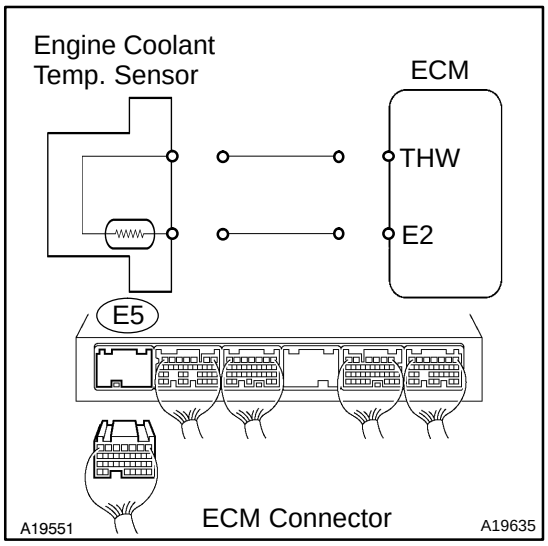
OK:

Temperature value: -40°C (-40°F)

OK	Replace engine coolant temperature sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Disconnect the E5 ECM connector.
(b) Turn the ignition switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / COOLANT TEMP.

CHECK:

Read the temperature value on the OBD II scan tool or the hand-held tester.

OK:

Temperature value: -40°C (-40°F)

OK → **Repair or replace harness or connector.**

NG

Replace ECM (See page SF-60).

DI1LG-15

DTC	P0116	Engine Coolant Temperature Circuit Range/ Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI−75.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If the engine coolant temperature was 35˚C (95˚F) or more but less than 60˚C (140˚F) when the engine is started, and if conditions (a) and (b) are met: (a) Vehicle has accelerated and decelerated. (b) Engine coolant temperature remains within 3˚C (5.4˚F) of the initial engine coolant temperature (2 trip detection logic)	★Engine coolant temperature sensor
	★If the engine coolant temperature is more than 60˚C (140˚F) when the engine is started and the vehicle has accelerated and decelerated ★If the engine coolant temperature sensor records a temperature variation below 1˚C (1.8˚F) successively 6 times (6 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the engine coolant temperature. The ECT sensor has a thermistor that varies its resistance depending on 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. The variations in resistance are reflected in the voltage output from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. 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.

Examples:

(1) Upon starting the engine, the ECT is between 35˚C (95˚F) and 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 3˚C (5.4˚F) of the starting temperature, a DTC will be set (2 trip detection logic).

(2) Upon starting the engine, the ECT is over 60˚C (140˚F). If after driving for 250 sec., the ECT still remains within 1˚C (1.8˚F) of the starting temperature, a DTC will be set (6 trip detection logic).

MONITOR STRATEGY

Related DTCs	P0116	Engine coolant temperature sensor range check (Stuck)
Required sensors/components	Main sensors/components	Engine coolant temperature sensor
	Related sensors/components	Intake air temperature sensor, Crankshaft position sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	250 sec.	
MIL operation	2 driving cycles (When temperature is fixed between 35□C (95□F) and 60□C (140□F)) 6 driving cycles (When temperature is fixed at 60□C (140□F) or more)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):		
Cumulative idle off period	250 sec.	-
Speed increase 30 km/h (19 mph) or more	10 times	-
Engine coolant temperature	35°C (95°F)	60°C (140°F)
Intake air temperature	-6.7 °C (20°F)	-
Case 2 (When temperature is fixed at 60°C (140°F) or more):		
Engine coolant temperature at engine start	60°C (140°F)	-
Intake air temperature	-6.7 °C (20°F)	-
Stop and go	Once or more (Stop for 20 sec. or more and accelerate to more than 70 km/h (43 mph) with in 40 sec.)	
Steady driving and stop *	Once or more	

*: Vehicle is driven by 65 km/h (40 mph) or more for 30 sec. or more and the vehicle speed reaches 70 km/h (44 mph). The vehicle is decelerated from 65 km/h (40 mph) to 3 km/h (2 mph) or less within 35 sec. and stopped for 10 sec.

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case1 (When temperature is fixed between 35°C (95°F) and 60°C (140°F)):	
Change of engine coolant temperature value	Less than 3°C (5.4°F)
Case2 (When temperature is fixed at 60°C (140°F) or more):	
Change of engine coolant temperature value	1°C (1.8°F) or less

COMPONENT OPERATING RANGE

Standard Value
Engine coolant temperature changes with the actual engine coolant temperature.

INSPECTION PROCEDURE

HINT:

★ If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, ECT sensor circuit may be open or shorted. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Replace engine coolant temperature sensor.

DIC24-01

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

DTC	P0220	Throttle/Pedal Position Sensor/Switch ”B” Circuit

DTC	P0222	Throttle/Pedal Position Sensor/Switch ”B” Circuit Low Input

DTC	P0223	Throttle/Pedal Position Sensor/Switch ”B” Circuit High Input

DTC	P2135	Throttle/Pedal Position Sensor/Switch ”A”/”B” Voltage Correction

HINT:
This is the purpose for the ”throttle position sensor”.

CIRCUIT DESCRIPTION

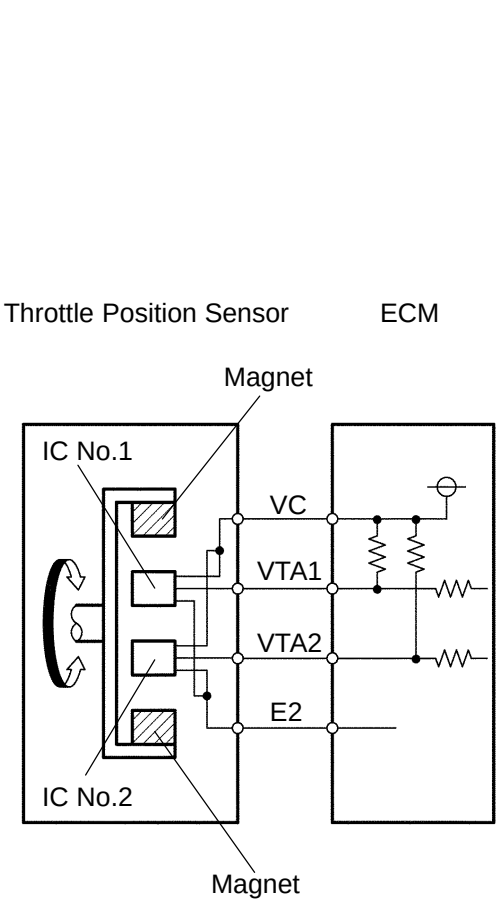
HINT:

★ This Electrical Throttle Control System (ETCS) does not use a throttle cable.

★ This throttle position sensor is a non-contact type.

The throttle position sensor is mounted on the throttle body and it detects the opening angle of the throttle valve. This sensor is electronically controlled and uses Hall-effect elements, so that accurate control and reliability can be obtained. The throttle position sensor has 2 sensor elements / signal outputs: VTA1 and VTA2. VTA1 used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. Voltage applied to VTA1 and VTA2 change between 0V and 5V in proportion to the opening angle of the throttle valve. There are several checks that the ECM performs to confirm proper operation of the throttle position sensor and VTA1.

The ECM judges the current opening angle of the throttle valve from these signals input from terminals VTA1 and VTA2, and the ECM controls the throttle motor to make the throttle valve angle properly in response to driver inputs.



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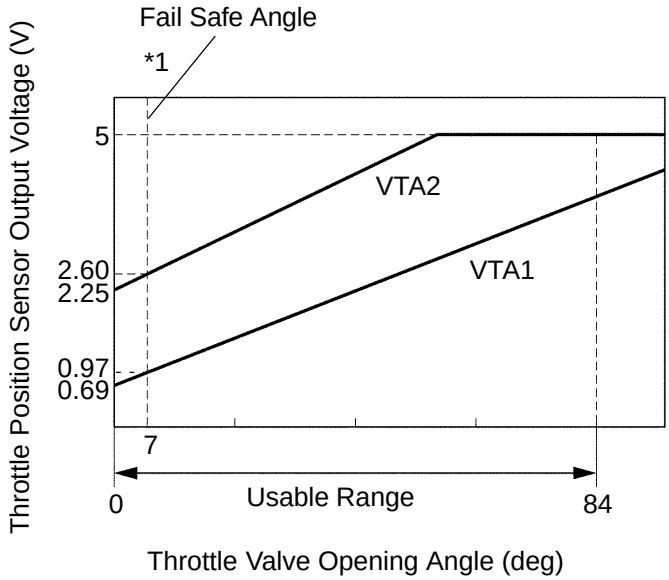

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Throttle Valve Fully Closed
(Throttle Position expressed as percentage
(VTA1) 10 to 20%)

Throttle Valve Fully Opened
(Throttle Position expressed as percentage
(VTA1) 64 to 96%)

*1: Fail Safe Angle 7°
(Throttle Position expressed as percentage
(VTA1) about 10 to 24%)

DTC No.	DTC Detection Condition	Trouble Area
Condition (a) of DTC P0120, P0122, P0123, P0220, P0222 or P0223 continues for 2 sec. (Open or short in the throttle control motor and sensor circuit)		
P0120	Detection conditions for DTCs P0122 and P0123 are not satisfied but condition (a) is satisfied (a) VTA1 is "0.2 V or less" or VTA1 is "4.8 V or more"	★Throttle control motor and sensor ★ECM
P0122	(a) VTA1 is 0.2 V or less	★Throttle control motor and sensor ★Short in VTA1 circuit ★Open in VC circuit ★ECM
P0123	(a) VTA1 is 4.8 V or more	★Throttle control motor and sensor ★Open in VTA1 circuit ★Open in E2 circuit ★VC and VTA1 circuit are short-circuited ★ECM
P0220	Detection conditions for DTCs P0222 and P0223 are not satisfied but condition (a) is satisfied (a) VTA2 is "0.5 V or less" or VTA2 is "4.8 V or more" and VTA1 is "0.2 V or more" and VTA1 is "1.8 V or less"	★Throttle control motor and sensor ★ECM
P0222	(a) VTA2 is 0.5 V or less	★Throttle control motor and sensor ★Short in VTA2 circuit ★Open in VC circuit ★ECM
P0223	(a) VTA2 is "4.8 V or more" and VTA1 is "0.2 V or more" and VTA1 is "1.8 V or less"	★Throttle control motor and sensor ★Open in VTA2 circuit ★Open in E2 circuit ★VC and VTA2 circuit are short-circuited ★ECM
P2135	Condition (a) continues for 0.5 sec. or more, or condition (b) continues for 0.4 sec. or more: (a) Difference between VTA1 and VTA2 is 0.02 V or less (b) VTA1 is "0.2 V or less" and VTA2 is "0.5 V or less"	★VTA1 and VTA2 circuit are short-circuited ★Throttle control motor and sensor ★ECM

HINT:

★ After confirming DTCs, use the hand-held tester or the OBD II scan tool to confirm the throttle valve opening percentage and closed throttle position switch condition.

★ THROTTLE POS means VTA1 signal as well as the THROTTLE POS #2 for the VTA2 signal.

Reference (Normal condition):

Tester display	Accelerator pedal fully released	Accelerator pedal fully depressed
THROTTLE POS	10 to 24 %	66 to 98%
THROTTLE POS #2	2.1 to 3.1 V	4.5 to 5.5 V

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.

(a) There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle.

★ If the difference between VTA1 and VTA2 is incorrect the ECM interprets this as a fault and will set a DTC.

(b) VTA1 and VTA2 each have a specific voltage operating range.

★ If VTA1 or VTA2 is out of the normal operating range the ECM interprets this as a fault and will set a DTC.

(c) VTA1 and VTA2 should never be close to the same voltage levels.

★ If VTA1 is within 0.02 V of VTA2 the ECM interprets this as a short circuit in the throttle position sensor system and will set a DTC.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0120	Throttle position sensor (sensor 1) range check (Fluttering)
	P0122	Throttle position sensor (sensor 1) range check (Low voltage)
	P0123	Throttle position sensor (sensor 1) range check (High voltage)
	P0220	Throttle position sensor (sensor 2) range check (Fluttering)
	P0222	Throttle position sensor (sensor 2) range check (Low voltage)
	P0223	Throttle position sensor (sensor 2) range check (High voltage)
	P2135	Throttle position sensor range check (Correlation)
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3).
Throttle control motor power	ON

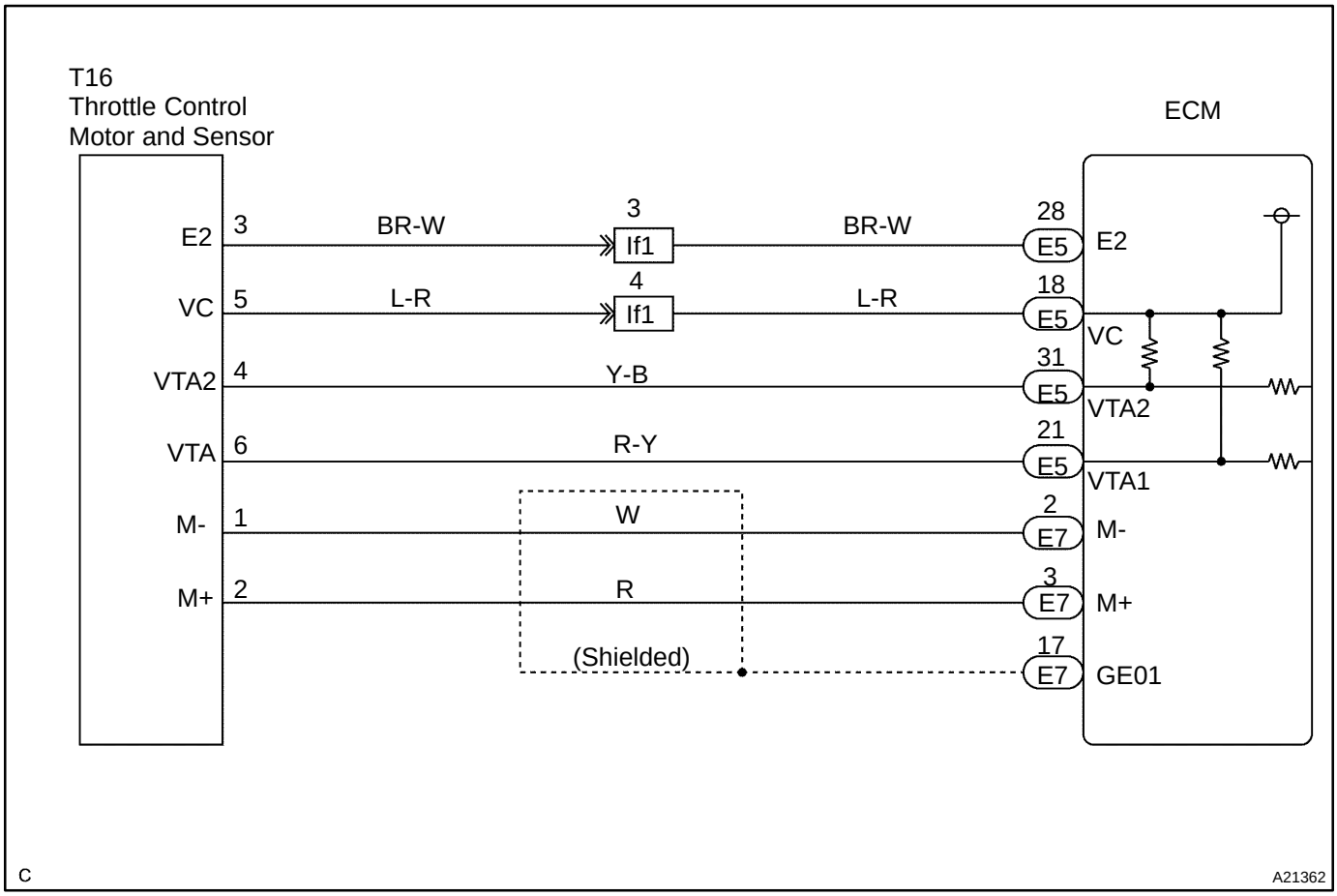
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0120:	
VTA1 voltage	0.2 V or less or 4.8 V or more (2 sec. or more)
P0122:	
VTA1 voltage	0.2 V or less (2 sec. or more)
P0123:	
VTA1 voltage	4.8 V or more (2 sec. or more)
P0220:	
VTA2 voltage	0.5 V or less or 4.8 V or more (2 sec. or more)
P0222:	
VTA2 voltage	0.5 V or less (2 sec. or more)
P0223:	
Both of the following conditions are met for 2 sec. or more:	A and B
A. VTA1 voltage	0.2 V or more and 1.8 V or less
B. VTA2 voltage	4.8 V or more
P2135:	
Different between VTA1 and VTA2 voltage	0.02 V or less
Both of the following conditions are met:	A and B
A. VTA1 voltage	0.2 V or less
B. VTA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle position sensor VTA1 voltage	0.6 to 3.96 V
Throttle position sensor VTA2 voltage	2.25 to 5.0 V

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ If DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may have an open circuit.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for throttle position sensor data.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / THROTTLE POS and THROTTLE POS #2.

CHECK:

Read voltage value displayed on the hand-held tester.

OK:

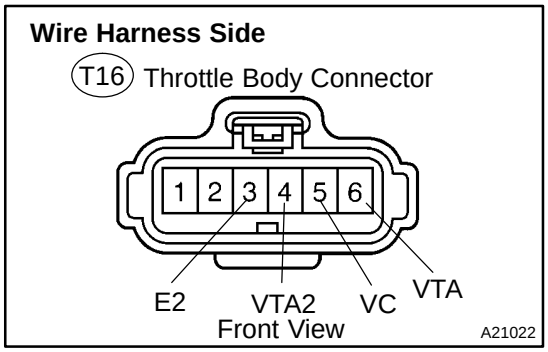
RESULT:

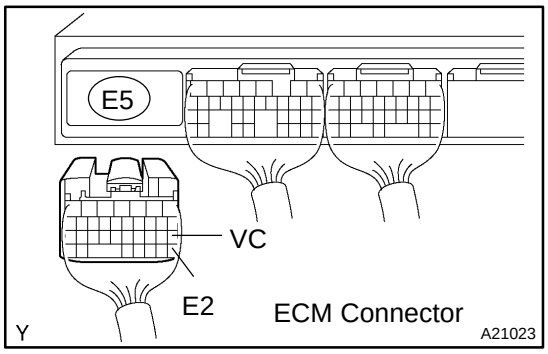
Throttle position expressed as percentage and voltage				Trouble area	Proceed to
Accelerator pedal released		Accelerator pedal depressed			
THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)	THROTTLE POS (VTA1)	THROTTLE POS #2 (VTA2)		
0 %	0 to 0.2 V	0 %	0 to 0.2 V	VC circuit open	A
100 %	4.5 to 5.5 V	100 %	4.5 to 5.5 V	E2 circuit open	
0 % or 100 %	2.1 to 3.1 V (Fail safe)	0 % or 100 %	2.1 to 3.1 V (Fail safe)	VTA1 circuit open or ground short	
about 16 % (Fail safe)	0 to 0.2 or 4.5 to 5.5 V	about 16 % (Fail safe)	0 to 0.2 or 4.5 to 5.5 V	VTA2 circuit open or ground short	
10 to 24 %	2.15 to 3.05 V	64 to 96 % (Does not fail safe)	4.5 to 5.5 V (Does not fail safe)	Throttle position sensor circuit is normal	B

B	**Go to step 5.**

A

2	**Check for open and short in harness and connector between ECM and throttle position sensor.**





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

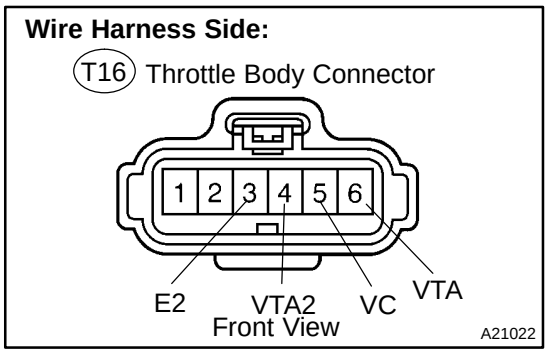
OK:

Tester Connection	Specified Condition
VC (T16-5) - VC (E5-18)	Below 1 Ω
VTA (T16-6) - VTA1 (E5-21)	
VTA2 (T16-4) - VTA2 (E5-31)	
E2 (T16-3) - E2 (E5-28)	
VC (T16-5) or VC (E5-18) - Body ground	10 kΩ or higher
VTA (T16-6) or VTA1 (E5-21) - Body ground	
VTA2 (T16-4) or VTA2 (E5-31) - Body ground	

NG → **Repair or replace harness or connector.**

OK →

3	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

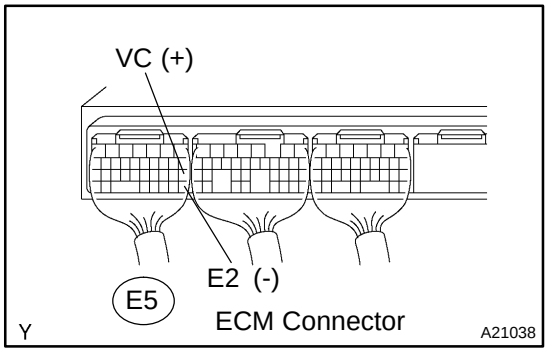
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V



NG → **Replace ECM (See page SF-60).**

OK

4	**Replace throttle body (See page SF-36).**

Go

5	**Check if DTC output recur.**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

Read the DTC (See page DI-3).

RESULT:

Display (DTC Output)	Proceed to
”P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135” are output again	A
No DTC output	B

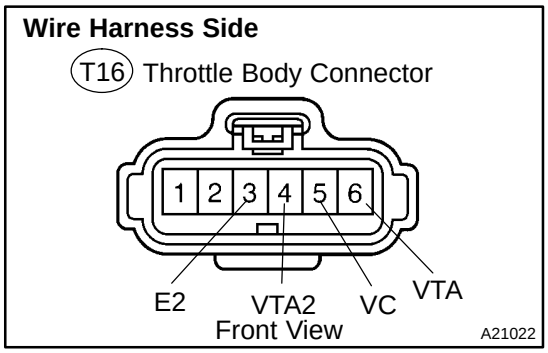
B → **System is OK.**

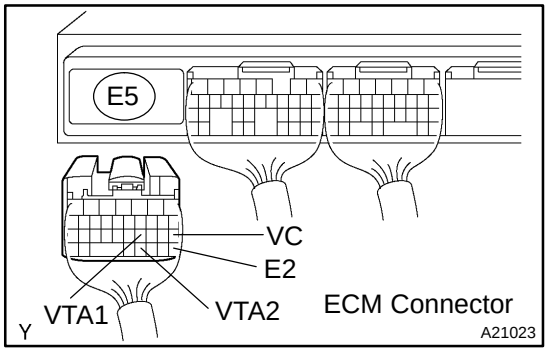
A

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check for open and short in harness and connector between ECM and throttle position sensor.**





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

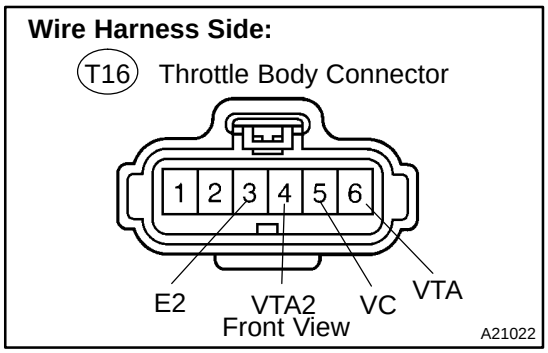
OK:

Tester Connection	Specified Condition
VC (T16-5) - VC (E5-18)	Below 1 Ω
VTA (T16-6) - VTA1 (E5-21)	
VTA2 (T16-4) - VTA2 (E5-31)	
E2 (T16-3) - E2 (E5-28)	
VC (T16-5) or VC (E5-18) - Body ground	10 kΩ or higher
VTA (T16-6) or VTA1 (E5-21) - Body ground	
VTA2 (T16-4) or VTA2 (E5-31) - Body ground	

NG → **Repair or replace harness or connector.**

OK

2	Check voltage between terminals VC and E2 of ECM connector.



PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

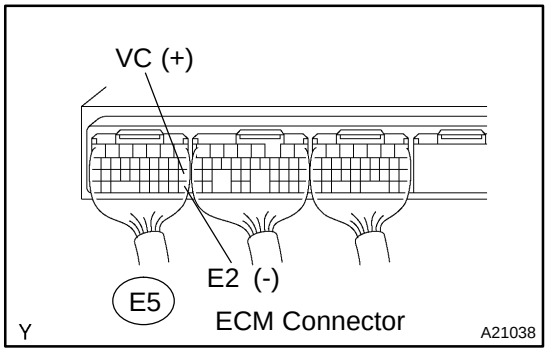
(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E5 ECM connector.

OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V



NG → **Replace ECM (See page SF-60).**

OK

3	Replace throttle body (See page SF-36).

Go

4	**Check if DTC output recur.**

PREPARATION:

(a) Clear the DTC (See page DI-3).

(b) Start the engine.

(c) Run the engine at idle for 15 seconds or more.

CHECK:

Read the DTC (See page DI-3).

RESULT:

Display (DTC Output)	Proceed to
”P0120, P0122, P0123, P0220, P0222, P0223 and/or P2135” are output again	A
No DTC output	B

B → **System is OK.**

A

Replace ECM (See page SF-60).

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

HINT:
This is the purpose of the ”throttle position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI-84 .

DTC No.	DTC Detecting Condition	Trouble Area
P0121	Condition (a) continues for 2.0 sec.: (a) Difference between VTA1 and VTA2 deviates from the threshold	Throttle control motor and sensor

MONITOR DESCRIPTION

The ECM uses throttle position sensor to monitor the throttle valve opening angle.
This sensor including two signals, VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. There are several checks that the ECM performs confirm proper operation of the throttle position sensor and VTA1.
There is a specific voltage difference expected between VTA1 and VTA2 for each throttle opening angle. If the voltage output difference of the VTA1 and VTA2 deviates from the normal operating range, the ECM interprets this as a malfunction of the throttle position sensor. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P0121	Throttle position sensor rationality
Required sensors/components	Throttle position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3).	
VTA2 voltage	-	4.6 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Different between VTA1 and VTA2 |VTA1 - (VTA2 × 0.8 to 1.2)|* * Corrected by learning value	Less than 0.1 V and more than 0.4 V

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Replace throttle control motor and sensor (See page SF-36).

DIBSS-02

DTC P0125 Insufficient Coolant Temperature for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI-75 .

DTC No.	DTC Detection Condition	Trouble Area
P0125	If THW or THA is less than -6.6°C (20°F) at engine start and 20 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	★Cooling system ★Engine coolant temperature sensor ★Thermostat
	If THW and THA is between -6.6°C (20°F) and 10°C (50°F) at engine start, 5 min. or more after starting engine and engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	
	If THW and THA greater than 10°C (50°F) at engine start and 2 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	

MONITOR DESCRIPTION

The ECT (Engine Coolant Temperature) sensor is used to monitor the temperature of the engine coolant. The resistance of the sensor varies with the actual coolant temperature. The ECM applies a voltage to the sensor and the varying resistance of the sensor causes the signal voltage to vary. The ECM monitors the ECT signal voltage after engine start-up. If, after sufficient time has passed, the sensor still reports that the engine is not warmed up enough for closed-loop fuel control after sufficient time has passed, the ECM interprets this as a fault in the sensor or cooling system and sets a DTC.

Example:

The engine coolant temperature was 0□C (32□F) at engine start. After 5 min. running time, the ECT sensor still indicates that the engine is not warmed up enough to begin air fuel ratio feedback control of the air-fuel ratio. The ECM interprets this as a fault in the sensor or cooling system and will set a DTC.

MONITOR STRATEGY

Related DTCs	P0125	Insufficient coolant temperature for closed loop fuel control
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Cooling system, Thermostat
	Related sensors/components	Mass air flow meter
Frequency of operation	Continuous	
Duration	2 min. (at engine start, engine coolant or intake air temperature of 10°C (50°F) or more) 5 min. (at engine start, engine coolant or intake air temperature of -6.6°C (20°F) to 10°C (50°F)) 20 min. (at engine start, engine coolant or intake air temperature of less than -6.6°C (20°F))	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of Disable a Monitor" table (on page DI-3)	
Fuel cut	OFF	
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Time until "engine coolant temperature" detection temperature reaches feedback start temperature	
When the temperature at the time of engine starting is 10˚C (50˚F) or more	Engine coolant temperature is less than "closed-loop enable temperature" when 2 min. or more after engine start
When the temperature at the time of engine starting is "-6.6 ˚C (20˚F)" to "10˚C (50˚F)"	Engine coolant temperature is less than "closed-loop enable temperature" when 5 min. or more after engine start
When the temperature at the time of engine starting is -6.6 ˚C (20˚F) or less	Engine coolant temperature is less than "closed-loop enable temperature" when 20 min. or more after engine start

INSPECTION PROCEDURE

HINT:

★ If DTC P0115, P0116, P0117, P0118 and P0125 are output simultaneously, engine coolant temperature sensor circuit may be open or short. Perform the troubleshooting of DTC P0115, P0117 or P0118 first.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0125) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTCs using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC output)	Proceed to
P0125	A
"P0125" and other DTCs	B

HINT:

If any other codes besides "P0125" are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Inspect thermostat (See page CO-12).**

NG → **Replace thermostat (See page CO-1 1).**

OK

3	**Check cooling system.**

CHECK:

Check that there is detect cooling system which causes overcool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

Replace engine coolant temperature sensor.

DIC25-01

DTC	P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

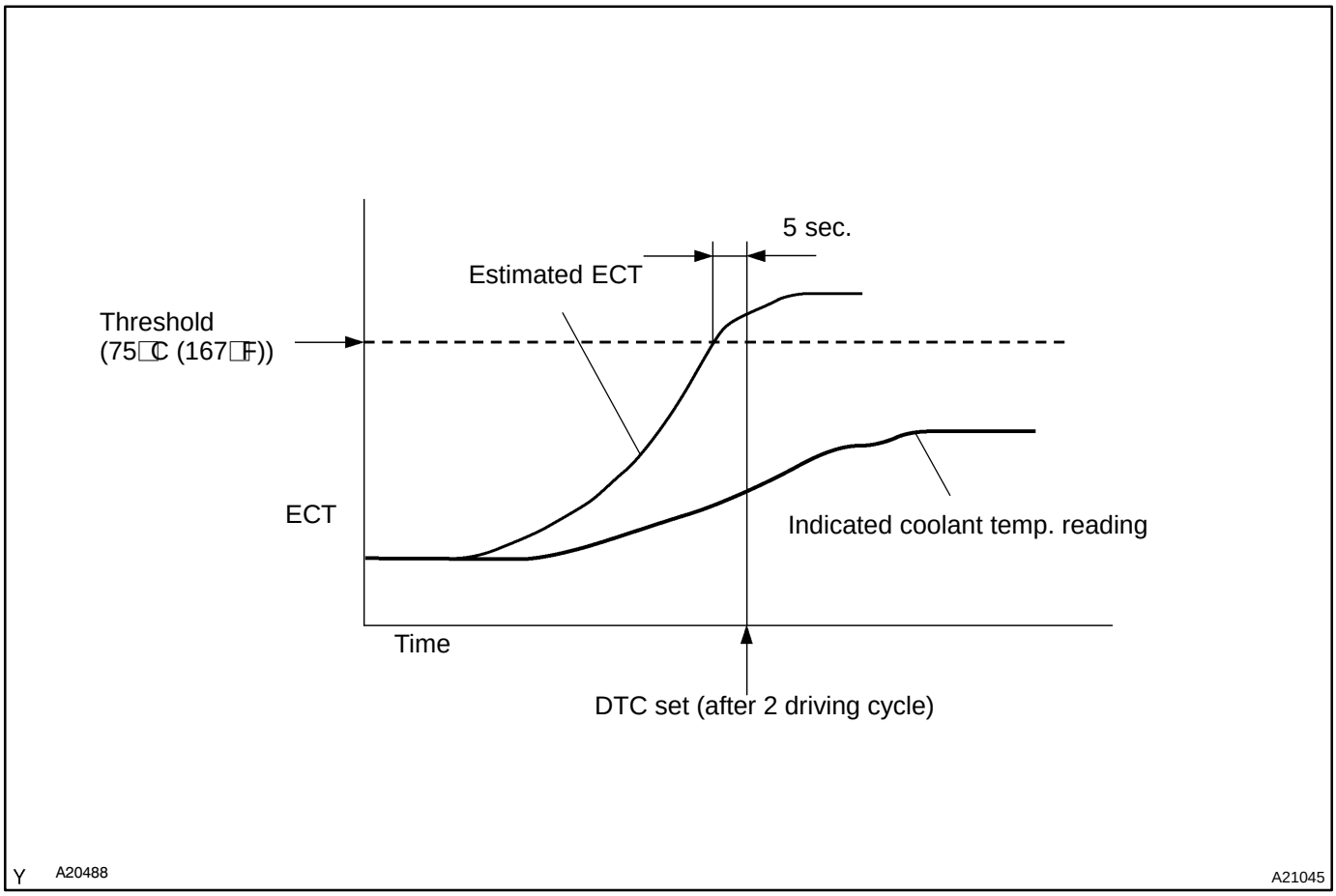
HINT:
This is the purpose of ”thermostat” malfunction detection.

CIRCUIT DESCRIPTION

If the engine coolant temperature does not reach 75˚C (167˚F) despite sufficient warm-up time has elapsed.

DTC No.	DTC Detection condition	Trouble Area
P0128	Condition (a), (b) and (c) are met: (a) Cold start (b) After sufficient warm-up time has elapsed (c) Engine coolant temperature greater than 75˚C (167˚F)	★Thermostat ★Cooling system ★Engine coolant temperature sensor ★ECM

MONITOR DESCRIPTION



The ECM estimates the coolant temperature based on starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual ECT (Engine Coolant Temperature). When the estimated coolant temperature 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 fault in the thermostat or engine cooling system and set a DTC.

MONITOR STRATEGY

Related DTCs	P0128	Thermostat
Required sensors/components	Main sensors/components	Engine coolant temperature sensor, Engine cooling system, Thermostat
	Related sensors/components	Intake air temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	15 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11.0 V	-
Intake air temperature (at engine start)	-10 □C (14□F)	35□C (95□F)
Engine coolant temperature (at engine start)	-10 □C (14□F)	35□C (95□F)
Difference between intake air temperature and engine coolant temperature (at engine start)	-15 □C (-27□F)	7□C (12.6□F)

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Duration period of both A and B	5 sec. or more
A Estimated engine coolant temperature	75□C (167□F) or more
B Engine coolant temperature sensor output value	Less than 75□C (167□F)

MONITOR RESULT

The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $08: Thermostat

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.625 and subtract 40 (□C)	ECT sensor output when estimated ECT reaches malfunction criterion	Malfunction criterion

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0128) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0128	A
P0128 and other DTCs	B

HINT:

If any other codes besides P0128 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI−36).**

A

2	**Check cooling system.**

CHECK:

Check that there is a defect in the cooling system which causes over-cool, such as abnormal radiator fan operation, modified cooling system and so on.

NG → **Repair or replace cooling system.**

OK

3	Check thermostat (See page CO-12).

NG → Replace thermostat.

OK →

Replace ECM (See page SF-60).

DIC26-01

DTC	P0130	Oxygen Sensor Circuit (Bank 1 Sensor 1)

DTC	P0150	Oxygen Sensor Circuit (Bank 2 Sensor 1)

DTC	P2195	Oxygen Sensor Signal Stack Lean (Bank 1 Sensor 1)

DTC	P2196	Oxygen Sensor Signal Stack Rich (Bank 1 Sensor 1)

DTC	P2197	Oxygen Sensor Signal Stack Lean (Bank 2 Sensor 1)

DTC	P2198	Oxygen Sensor Signal Stack Rich (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

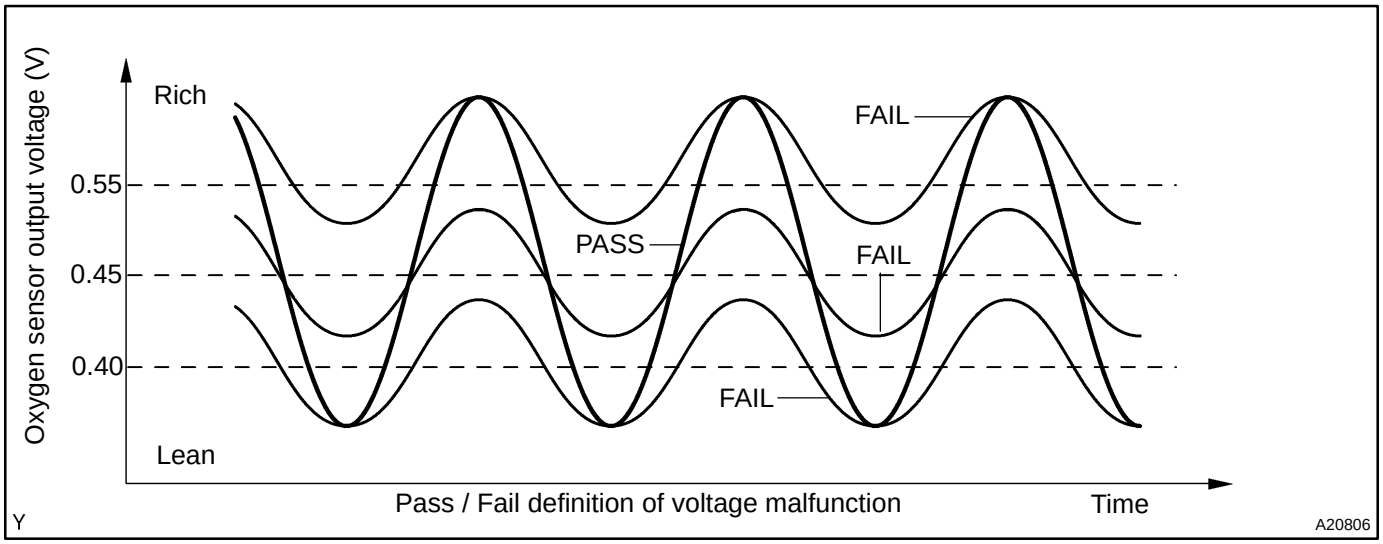
Refer to DTC P0031 on page DI-49 .

DTC No.	Detection Item	Trouble Area
P0130 P0150	Output voltage of heated oxygen 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 heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM
P2195 P2197	Output voltage of heated oxygen sensor remains at 0.55 V or less, during idling after engine is warmed up (2 trip detection logic)	
P2196 P2198	Output voltage of heated oxygen sensor remains at 0.4 V or more, during idling after engine is warmed up (2 trip detection logic)	

HINT:

- ★ Bank 1 refers to bank that includes cylinder No. 1.
- ★ Bank 2 refers to bank that does not includes cylinder No. 2.
- ★ Sensor 1 refers to the sensor closer to the engine assembly.
- ★ The heated oxygen sensor's output voltage and the short−term fuel trim value can be read using the OBD II scan tool or hand−held tester.

MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gas. The sensor detects oxygen levels in the exhaust gas and sends this signal 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 exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates output voltage between 0 V and 1.0 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.4 V or less, the ECM judges that the air-fuel ratio is LEAN.

Under normal condition, the output voltage from the heated oxygen sensor alternates RICH and LEAN sides periodically. If the heated oxygen sensor outputs RICH signal (or LEAN signal) constantly, or if the heated oxygen sensor cannot output enough voltage to reach the minimum specification, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0130	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 1)
	P0150	Front heated oxygen sensor voltage is constant at lean side or rich side (Bank 2)
	P2195	Front heated oxygen sensor voltage is constant at lean side (Bank 1)
	P2196	Front heated oxygen sensor voltage is constant at rich side (Bank 1)
	P2197	Front heated oxygen sensor voltage is constant at lean side (Bank 2)
	P2198	Front heated oxygen sensor voltage is constant at rich side (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen senor
	Related sensors/components	Crank position sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	20 to 36 sec. x (3 times)	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
There is history that the following conditions A and B were met:	20 sec. (Continuously)	-
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0130, P0150:	
Either of the following conditions A or B is met:	3 times or more
A. Front oxygen sensor voltage is 0.55 V or less	For 18 sec. or more
B. Front oxygen sensor voltage is 0.4 V or more	For 18 sec. or more
P2195, P2197:	
Front heated oxygen sensor voltage	Constant 0.55 V or less
P2196, P2198:	
Front heated oxygen sensor voltage	Constant 0.4 V or more

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S voltage monitor

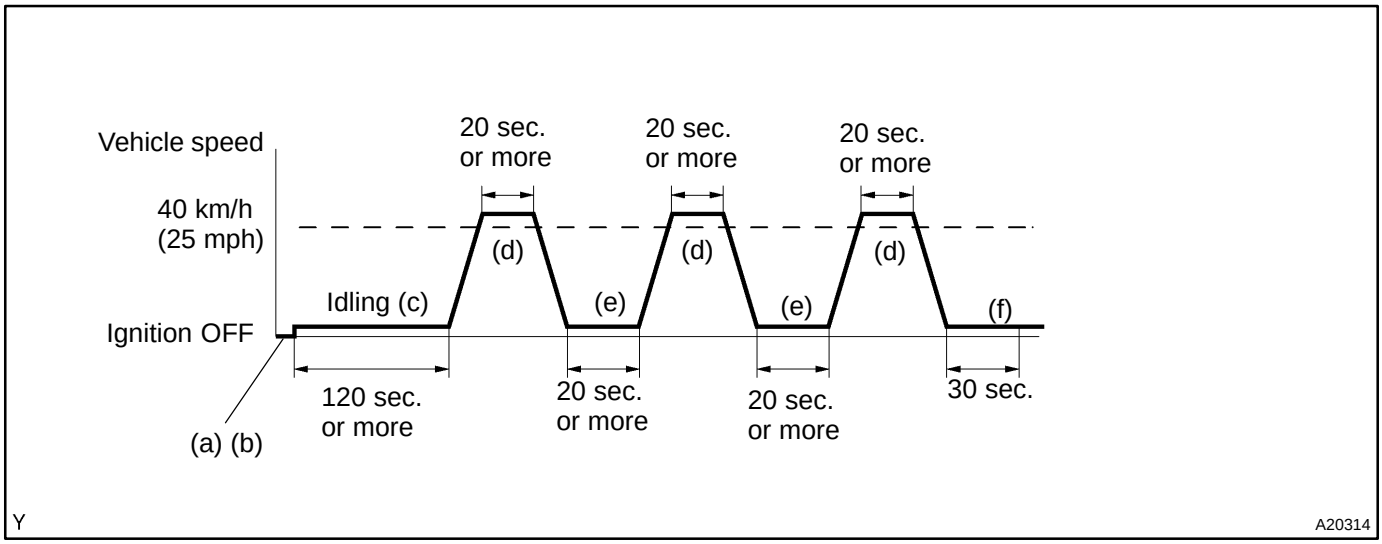
If the HO2S voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum front HO2S voltage	N/A	V
$08	Maximum front HO2S voltage	N/A	V

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

CONFIRMATION DRIVING PATTERN



(a) Connect the hand-held tester to the DLC3.
(b) Switch the hand-held tester from the ”normal mode” to the ”check mode” (See page DI-3).
(c) Start the engine and let the engine idle for 120 seconds or more.
(d) Drive the vehicle at 25 mph (40 km/h) or more for 20 seconds or more.
(e) Let the engine idle for 20 seconds or more. Perform steps (d) and (e) at 3 times.
(f) Let the engine idle for 30 seconds.

HINT:

If a malfunction exists, the MIL will light up during step (f).

NOTICE:

If the conditions in this test are not strictly followed, detection of the malfunction will not be possible. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (c) to (f), then perform steps (c) to (f) again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

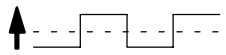
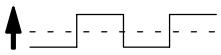
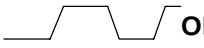
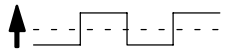
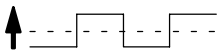
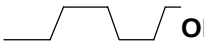
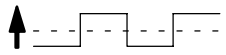
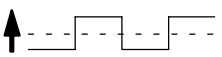
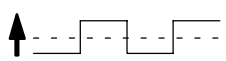
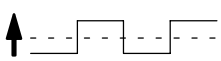
”A/F CONTROL” is an ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25% → rich output: More than 0.5 V
-12.5% → lean output: Less than 0.4 V

NOTICE:
However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
NOTICE:
If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and heated oxygen sensor DTCs will be recorded, and the MIL then comes on.
HINT:

- ★ If different DTCs related to different systems that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 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 heated oxygen 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	**Are there any other codes (besides DTC P0130, P0150, P2195, P2197, P2196 or P2198) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0130, P0150, P2195, P2196, P2197 and/or P2198”	A
”P0130, P0150 P2195, P2196, P2197 or P2198” and other DTCs	B

HINT:

If any other codes besides ”P0130, P0150, P2195, P2196, P2197 and/or P2198” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:

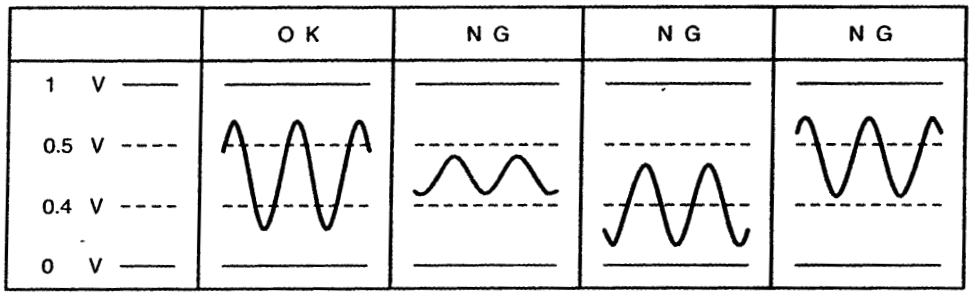
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor during idling the OBD II scan tool or hand-held tester.

OK:

Heated oxygen sensor output voltage:
Alternates repeatedly between less than 0.4 V and more than 0.5 V (See the following table).

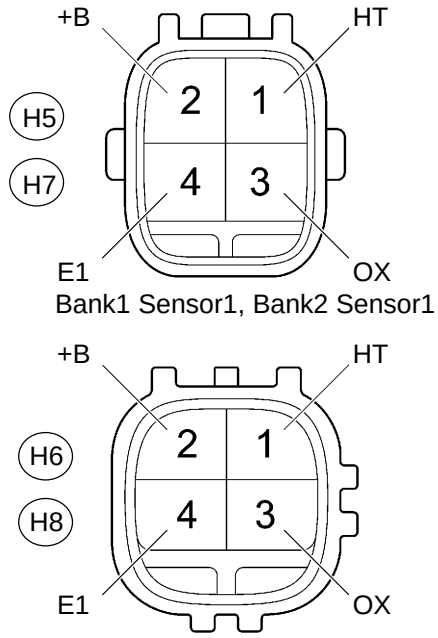


OK → **Go to step 9.**

NG

3	Check resistance of heated oxygen sensor heater.

Components Side:



PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

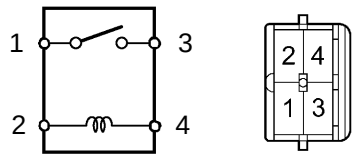
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

4	Check EFI or ECD relay.

EFI or ECD Relay



PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

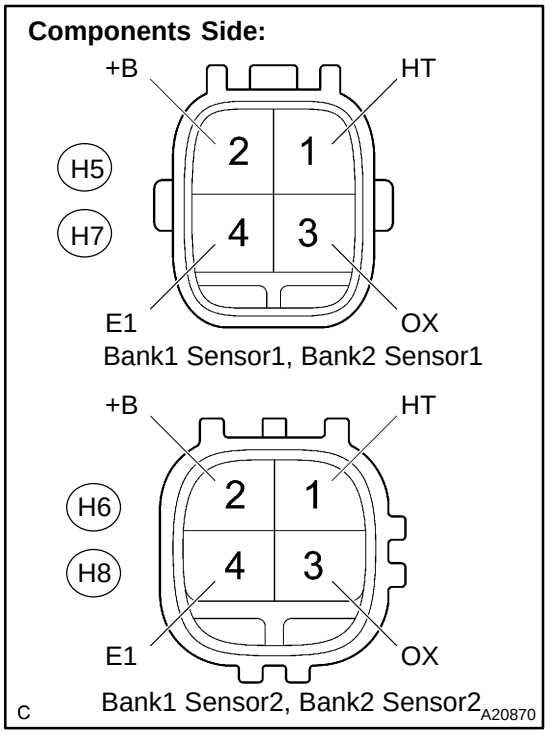
OK:

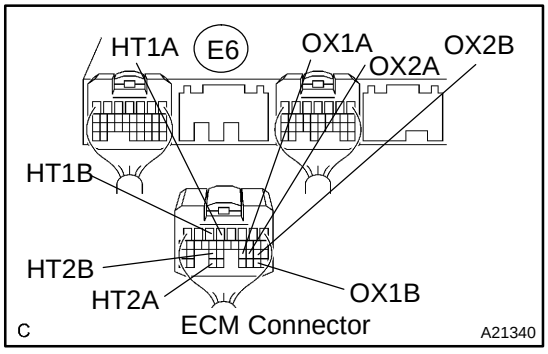
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

5	**Check for open and short in harness and connector between ECM and heated oxygen sensor.**





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

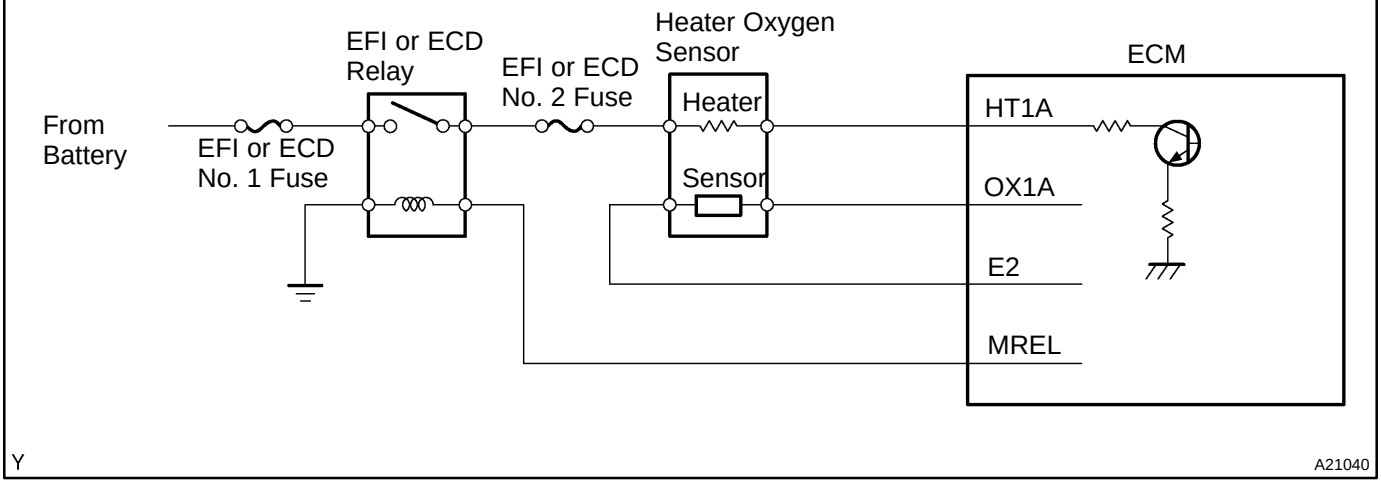
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG	**Repair or replace harness or connector.**

OK

6	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG	**Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-7).**

CHECK:

Check the fuel pressure (high or low pressure).

NG	**Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	Check injector injection (See page SF-24).

NG → Replace injector.

OK →

Replace heated oxygen sensor.

9	Perform confirmation driving pattern.

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go →

10	Is there DTC P0130, P0150, P2195, P2196, P2197 or P2198 being output again?

NO → Check for intermittent problems (See page DI-3).

YES →

Replace ECM (See page SF-60).

DIC27-01

DTC	P0133	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)

DTC	P0153	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

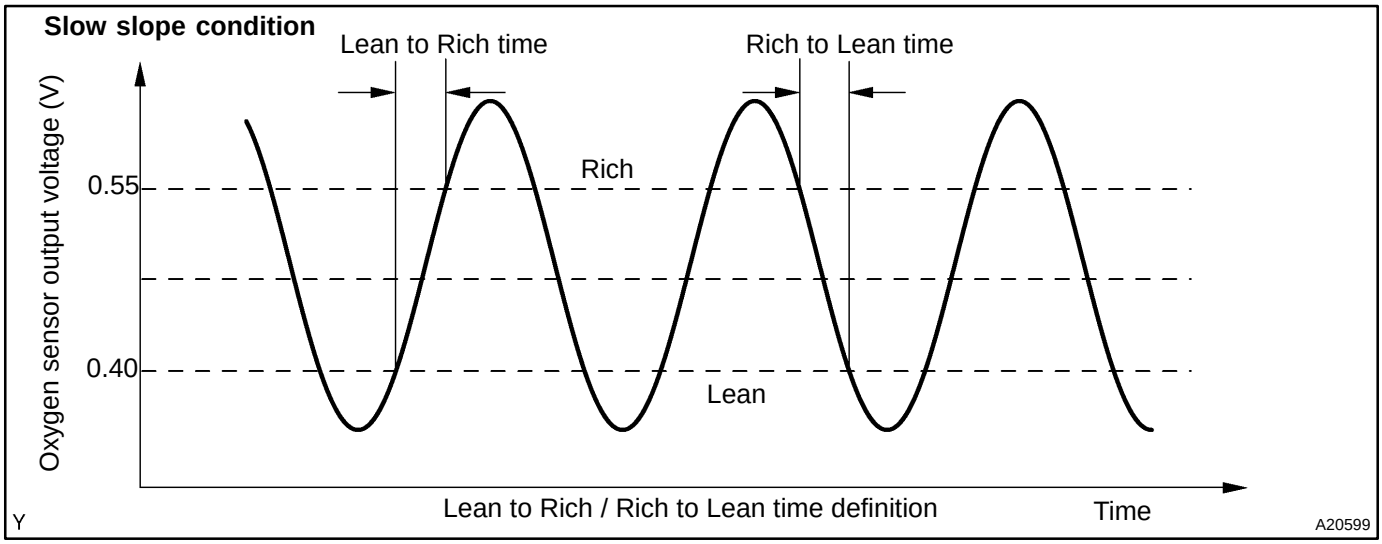
Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0133 P0153	After engine has been warmed up, if response time that heated oxygen sensor's output voltage reaches from RICH to LEAN, or from LEAN to RICH, is 0.6 seconds or more during idling. (2 trip detection logic)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM
	If response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle is 5.6 seconds or more during idling. (2 trip detection logic)	

HINT:

★ Bank 1 refers to bank that includes cylinder No. 1.
★ Bank 2 refers to bank that does not includes cylinder No. 1.
★ Sensor 1 refers to the sensor closer to the engine assembly.

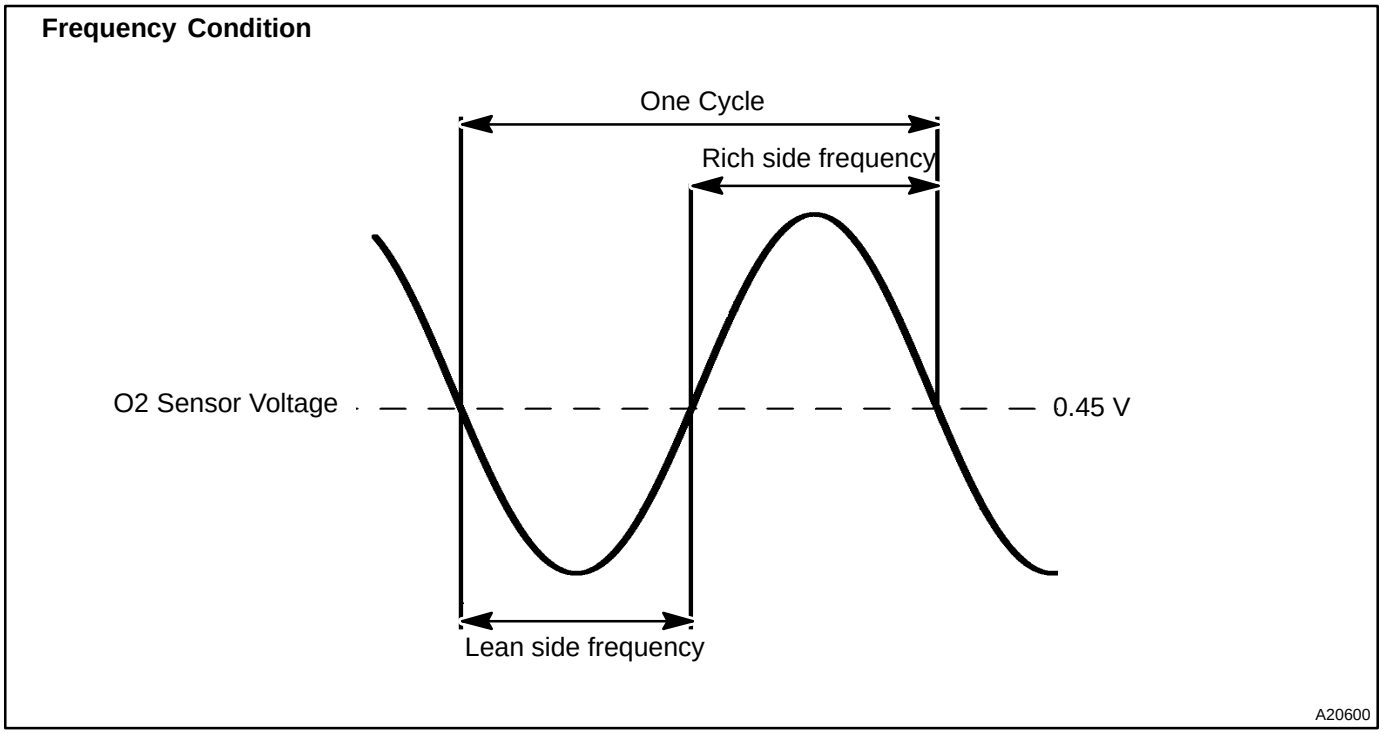
MONITOR DESCRIPTION



The ECM uses the heated oxygen sensor information to regulate the air-fuel ratio close to a stoichiometric ratio. This maximizes the catalytic converter's ability to purify the exhaust gases. The sensor detects oxygen levels in the exhaust gas and sends this signal 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 exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element. The heated oxygen sensor has the characteristic whereby its output voltage changes suddenly in the vicinity of the stoichiometric air-fuel ratio. The heated oxygen sensor generates waveforms of a voltage between 0 V and 1 V in response to the oxygen concentration in exhaust gas. When the output voltage of the heated oxygen sensor is 0.55 V or more, the ECM judges that the air-fuel ratio is RICH. When it is 0.40 V or less, the ECM judges that the air-fuel ratio is LEAN.

The ECM monitors the response feature of the heated oxygen sensor. If the response time of the heated oxygen sensor output status change from RICH to LEAN or vice versa becomes longer, the ECM interprets this as a malfunction in the heated oxygen sensor and sets a DTC.



MONITOR STRATEGY

Related DTCs	P0133	Front heated oxygen sensor response monitor (Bank 1)
	P0153	Front heated oxygen sensor response monitor (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Vehicle speed sensor, Mass air flow meter
Frequency of operation	Once per drive cycle	
Duration	Within 60 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Frequency idle condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)
Fuel system status	Closed loop	
Time after engine start	120 sec.	-
Engine coolant temperature	40˚C (104˚F)	-
Frequency cruise condition:		
There is history that the following conditions were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Intake air amount	3 g/sec.	13 g/sec.
Time after engine start	120 sec.	-
Idle	OFF	
Fuel system status	Closed loop	
Engine speed	1,000 rpm	3,500 rpm
Engine coolant temperature	70˚C (158˚F)	-
Slow slope condition:		
Both of the following condition were met for 20 sec.	A and B	
A. Vehicle speed	40 km/h (25 mph)	-
B. Engine speed	900 rpm	-
Time after engine start	120 sec.	-
Idle	ON	
Vehicle speed	-	5 km/h (3 mph)

Fuel system status	Closed loop	
Engine coolant temperature	40˚C (104˚F)	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Frequency idle condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	5.6 sec. or more
Frequency cruise condition	
Time required by the sensor's output voltage to change in one RICH-LEAN cycle	a specific time or more
Slow slope condition	
Both of the following conditions were met	A and B
A. Number of judgment made	3 times
B. Following conditions were met	(a) or (b)
(a) Average lean to rich response time	0.9 sec. or more
(b) Average rich to lean response time	0.9 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard value
Voltage output from heated oxygen sensor	Quickly fluctuates between 0.4 and 0.55 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Front HO2S slow slope monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$03	(Test constant) Low sensor voltage for response time calculation	N/A	V
$04	(Test constant) High sensor voltage for response time calculation	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (±0.4 V) to Rich (≧0.55 V)	N/A	sec.
$32	Time to change from Rich (≧0.55 V) to Lean (±0.4 V)	N/A	sec.

Front HO2S frequency monitor (idling)

If the $38 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$38	Response time of heated oxygen sensor's output voltage in one RICH-LEAN cycle	N/A	sec.

Front HO2S frequency monitor (cruse)

If the $90 is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$90	Remained value of that average of switching frequency is subtracted from average of switching frequency threshold	Multiply by 0.04096 plus 5.2	sec.

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

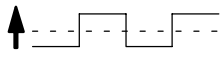
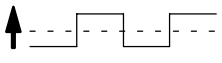
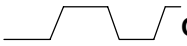
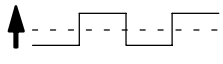
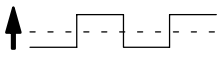
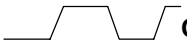
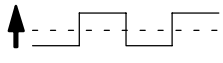
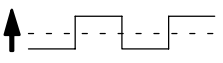
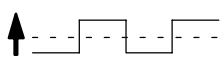
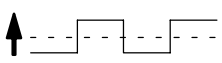
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.

NOTICE:

If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- ★ If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 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 heated oxygen 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	**Are there any other codes (besides DTC P0133 or P0153) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0133 and/or P0153”	A
”P0133 or P0153” and other DTCs	B

HINT:

If any other codes besides ”P0133 and/or P0153” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Check output voltage of heated oxygen sensor during idling.**

PREPARATION:

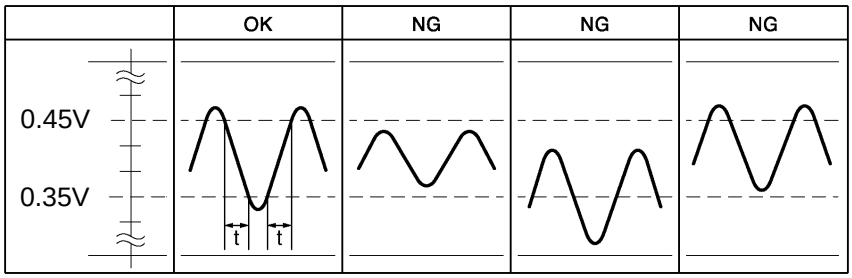
(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor while idling the OBD II scan tool or hand-held tester.

OK:

Heated oxygen sensor output voltage:
Alternates between less than 0.35 V and more than 0.45 V, and period of "t" must exist less than 0.6 seconds (See the following table).



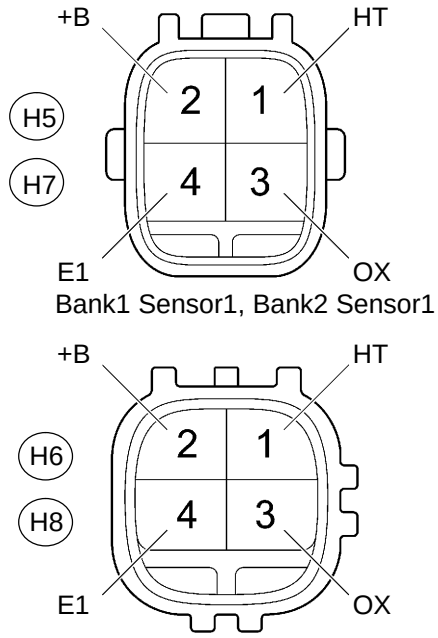
N A20315

OK	**Go to step 9.**

NG

3	Check resistance of heated oxygen sensor heater.

Components Side:



PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

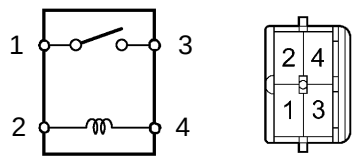
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

4	Check EFI or ECD relay.

EFI or ECD Relay



PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

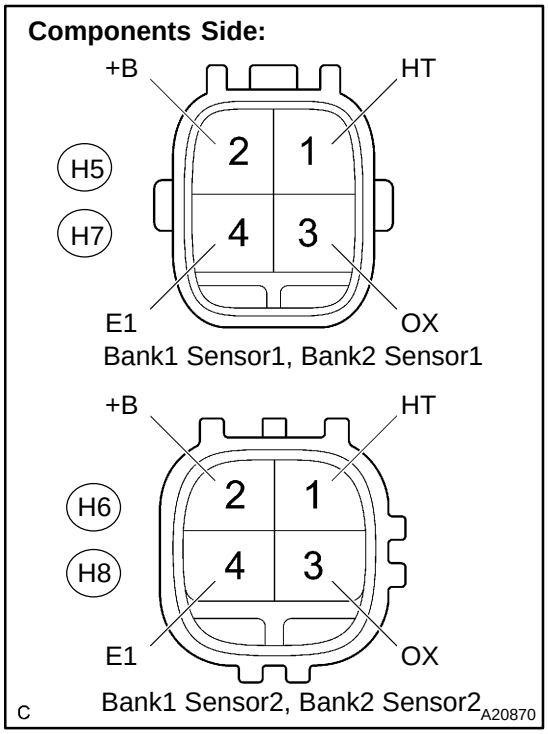
OK:

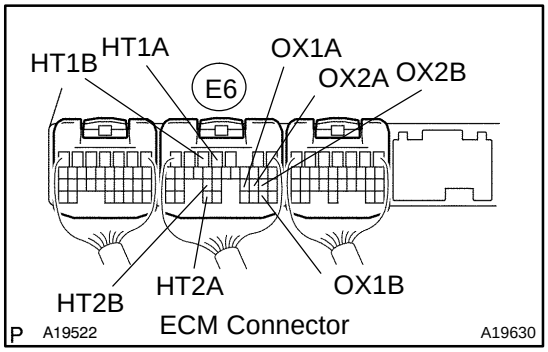
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

5	**Check for open and short in harness and connector between ECM and heated oxygen sensor.**





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

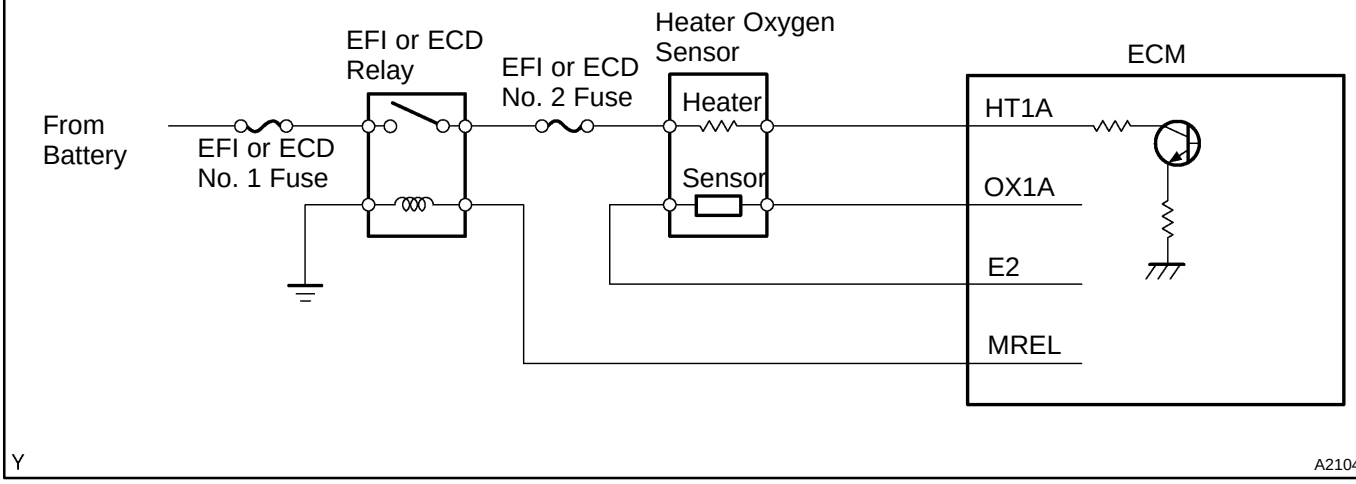
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG	**Repair or replace harness or connector.**

OK

6	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG	**Repair or replace air induction system.**

OK

7	**Check fuel pressure (See page SF-7).**

CHECK:

Check the fuel pressure (high or low pressure).

NG	**Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

8	**Check injector injection (See page SF-24).**

NG → **Replace injector.**

OK

Replace heated oxygen sensor.

9	**Perform confirmation driving pattern (See page DI-106).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

10	**Is there DTC P0133 or P0153 being output again?**

NO → **Check for intermittent problems (See page DI-3).**

YES

Replace heated oxygen sensor.

DIC28-01

DTC	P0134	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)

DTC	P0154	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0134 P0154	After the engine is warmed up, heated oxygen sensor (bank 1, sensor 1) output does not indicate RICH (more than 0.45 V) even once when the following conditions continue for 65 sec. or more: (a) Engine speed: 1,400 rpm or more (b) Vehicle speed: 25 to 81 mph (40 to 130 km/h) or more (c) Throttle valve does not fully closed (d) 180 sec. or more after starting engine (e) Engine coolant temperature more than 40˚C (104˚F)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM

HINT:

- ★ Bank 1 refers to bank that includes cylinder No. 1.
- ★ Bank 2 refers to bank that does not includes cylinder No. 1.
- ★ Sensor 1 refers to the sensor closer to the engine assembly.
- ★ After confirming DTC P0134 and P0154, check the output voltage of the heated oxygen sensor in the ”DIAGNOSIS / ENHANCE OBD II / DATA LIST / ALL” using the OBD II scan tool or the hand−held tester. If output voltage of the heated oxygen sensor is always less than 0.1 V, heated oxygen sensor circuit may be open or short.

MONITOR DESCRIPTION

The ECM uses the heated oxygen sensor to optimize the air-fuel mixture in closed-loop fuel control. This control helps decrease exhaust emissions by providing the catalyst with a nearly stoichiometric mixture. The sensor detects the oxygen level in the exhaust gas and the ECM uses this data to control the air-fuel ratio. The sensor output voltage ranges from 0 V to 1 V. If the signal voltage is less than 0.4 V, the air-fuel ratio is LEAN. If the signal voltage is more than 0.55 V, the air-fuel ratio is RICH. If the conditions for the closed-loop fuel control are met and after a specified time-period, the sensor’s output signal never indicates RICH, the ECM will conclude that the closed-loop fuel control is malfunctioning. The ECM will illuminate the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0134	Excessive time to enter closed loop (Bank 1)
	P0154	Excessive time to enter closed loop (Bank 2)
Required sensors/components	Main sensors/components	Front heated oxygen sensor
	Related sensors/components	Crank position sensor, Engine coolant temperature sensor, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	65 sec.	
MIL operation	1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Both of the following conditions were met	A and B	
A. Time after following conditions met for 50 sec.	(a), (b), (c), (d), (e) and (f)	
(a) Engine coolant temperature	40°C (104°F)	-
(b) Engine speed	1,400 rpm	-
(c) Vehicle speed	40 km/h (25 mph)	-
(d) Idle	OFF	
(e) Time after engine start	180 sec.	-
(f) Fuel enrichment correction factor	1	63.998
B. Neither fail nor pass is determined yet in the present drive cycle		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Front heated oxygen sensor voltage	Less than 0.45 V

COMPONENT OPERATING RANGE

Parameter	Standard value
In the normal condition, the front heated oxygen sensor voltage	0 to 1 V

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

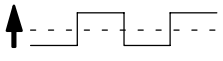
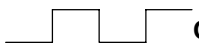
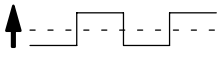
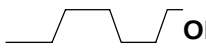
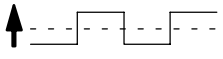
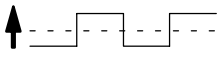
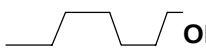
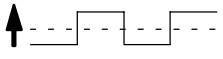
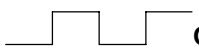
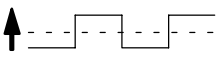
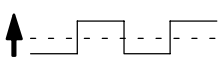
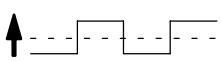
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- ★ If different DTCs related to different systems terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 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 heated oxygen 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	**Are there any other codes (besides DTCs P0134 and P0154) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0134 and/or P0154”	A
”P0134 or P0154” and other DTCs	B

HINT:
If any other codes besides P0134 and/or P0154 are output, perform the troubleshooting for those codes first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Connect OBD II scan tool or hand-held tester, and read value for voltage output of heated oxygen sensor (bank 1, 2 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) Warm up the engine to the normal operating temperature.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Read the voltage output of the heated oxygen sensors when the engine speed is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 times by using the accelerator pedal.

OK:

Heated oxygen sensor output a RICH signal (0.45 V or more) at least once.

OK → **Go to step 12.**

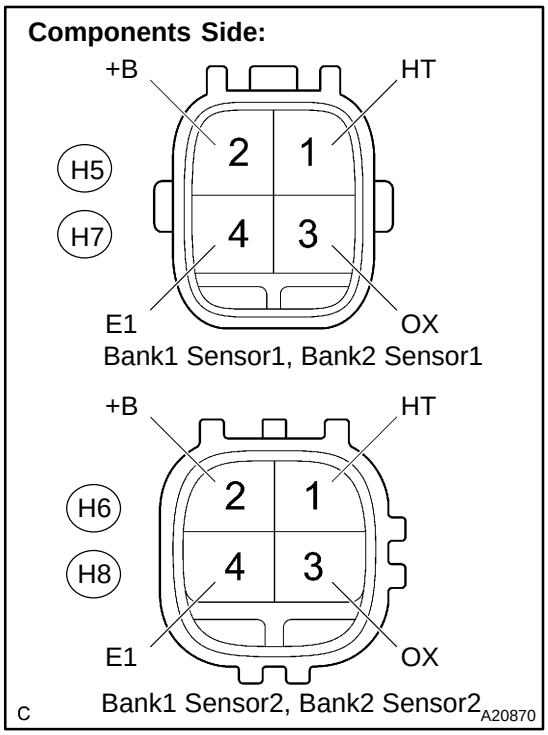
NG

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	Check resistance of heated oxygen sensor heater.



PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

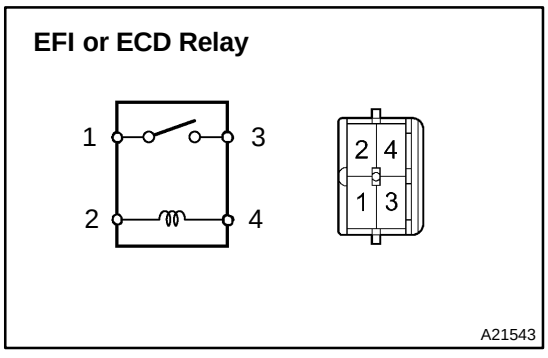
OK:

Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

5	Check EFI or ECD relay.



PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

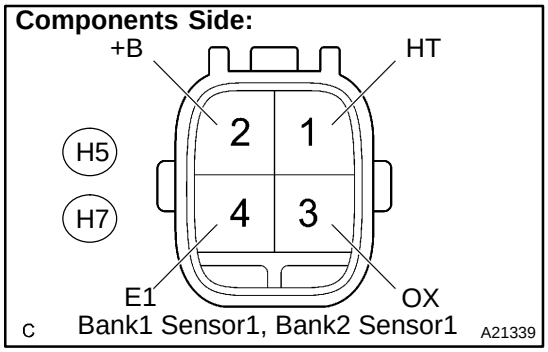
OK:

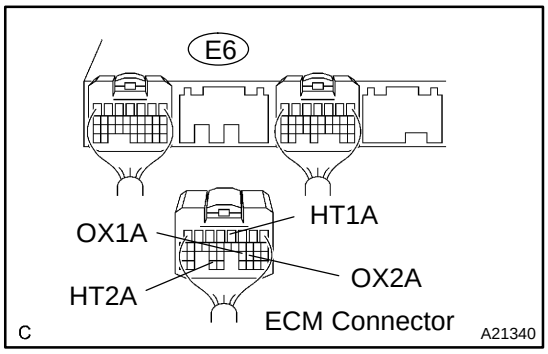
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

6	**Check for open and short in harness and connector between ECM and heated oxygen sensor (bank 1, 2 sensor 1).**





PREPARATION:

(a) Disconnect the H5 or H7 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

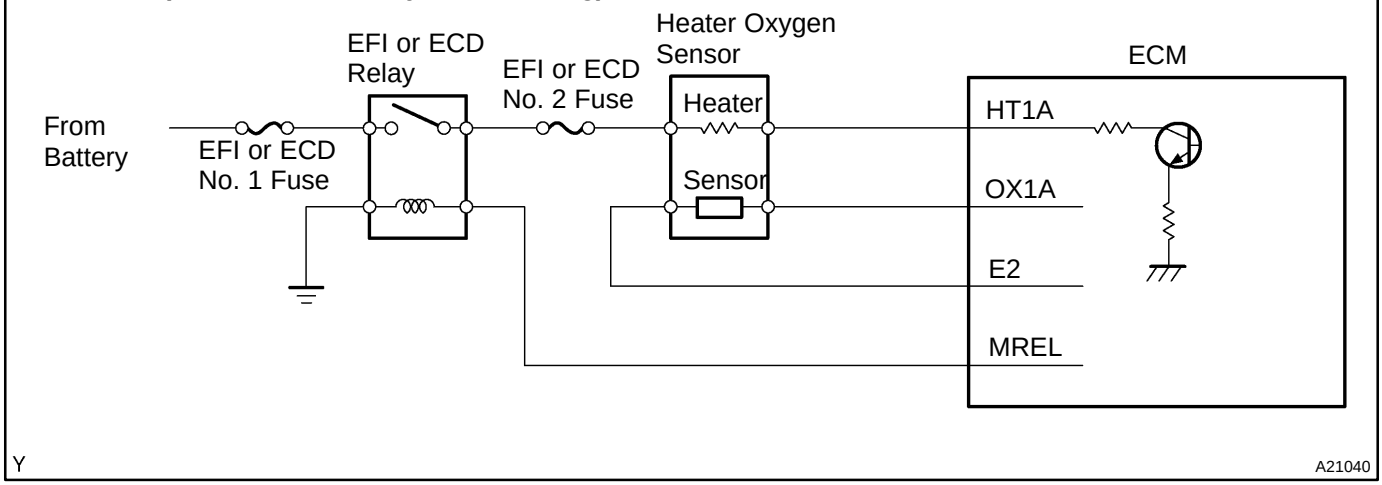
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **Repair or replace harness or connector.**

OK

7	**Check whether misfire is occurred or not by monitoring DTC and data list.**

NG → **Perform troubleshooting for misfire (See page DI-167).**

OK

8	**Check air induction system (See page SF-1).**

CHECK:

Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

9	**Check fuel pressure (See page SF-7).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK

10	**Check injector injection (See page SF-24)**

NG → **Replace injector.**

OK

11	**Check exhaust system for gas leakage.**

NG → **Repair or replace exhaust gas leakage point.**

OK

Replace heated oxygen sensor (bank 1, 2 sensor 1).

12	**Perform confirmation driving pattern (See page DI-106).**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

13	**Are there DTCs P0134 and P0154 being output again?**

YES → **Replace ECM (See page SF-60).**

NO

14	**Confirm if vehicle has run out of fuel in past.**

NO → **Check for intermittent problems (See page DI-3).**

YES

DTCs P0134 and P0154 are caused by running out of fuel.

DIC29-01

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

DTC	P0156	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0031 on page DI-49 .

DTC No.	DTC Detecting Condition	Trouble Area
P0136 P0156	The following condition (a) or (b) continues 300 sec. or more. (a) During driving with the engine warmed up, heated oxygen sensor output does not change. (b) Heated oxygen sensor output is very low most of the time.	□ Open or short in heated oxygen sensor circuit □ Heated oxygen sensor □ Heated oxygen sensor heater □ EFI or ECD relay

HINT:

- □ Bank 1 refers to bank that includes cylinder No. 1.
- □ Bank 2 refers to bank that does not includes cylinder No. 1.
- □ Sensor 2 refers to the sensor farther away from the engine assembly.

MONITOR DESCRIPTION

The ECM monitors the rear heated oxygen sensor in the following 3 items:

(1) If the rear heated oxygen sensor voltage changes between Rich and Lean while the vehicle is running (repeating acceleration and deceleration). If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(2) If the rear heated oxygen sensor voltage does not remain at less than 0.05 V for a long time while the vehicle is running. If not, the ECM interprets this as a malfunction, illuminates the MIL, and then sets DTC.

(3) If the sensor's voltage drops to below 0.2 V (extremely Lean status) immediately when the vehicle decelerates and the fuel cut is working. if not, the ECM interprets this to mean the sensor's response feature has deteriorated, illuminates the MIL, and then sets DTC.

MONITOR STRATEGY

Related DTCs	P0136	Heated rear oxygen sensor output voltage (Crack) (Bank 1)
		Heated rear oxygen sensor output voltage (Bank 1)
		Heated rear oxygen sensor slow response (Bank 1)
	P0156	Heated rear oxygen sensor output voltage (Crack) (Bank 2)
		Heated rear oxygen sensor output voltage (Bank 2)
		Heated rear oxygen sensor slow response (Bank 2)
Required sensors/components	Main sensors/components	Heated rear oxygen sensor
	Related sensors/components	Mass air flow meter, Vehicle speed sensor
Frequency of operation	Once per drive cycle	
Duration	300 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1 (Output voltage (crack)):		
Vehicle speed	3 km/h (2 mph)	-
Idle	OFF	
Fuel cut	OFF	
Time after fuel cut ON to OFF	40 sec.	-
Intake air amount per revolution	0.7 g/rev	-
Case 2 (Output voltage):		
All of the following conditions are met:	A, B, C and D	
A. Pass/fail detection in this driving cycle	Not detected	
B. Engine	Running	
C. Time after engine start	0 sec.	-
D. Either of the following conditions is met:	(a) or (b)	
(a) Cumulative time while heated oxygen sensor heater is ON	22 sec.	-
(b) At once more heated oxygen sensor voltage	0.2 V	-
Case 3 (Slow response):		
Rear oxygen sensor voltage before the fuel cut	0.2 V or more	-
Catalyst condition	Warmed up	
Engine coolant temperature	75˚C (167˚F)	-

Fuel cut	Operating	
Time after engine start	200 sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1 (Output voltage (crack)):	
Following conditions are met:	A, B and C
A. Cumulative rear heated oxygen sensor monitor time	300 sec. or more
B. Time while rear heated oxygen sensor voltage is less than 0.05 V	180 sec. or more
C. Maximum rear heated oxygen sensor rich time (0.45 V or more)	Less than 20 sec.
Case 2 (Output voltage):	
Number of heated oxygen sensor voltage ”switching”	0 time or less
”Switching” is counted when the sensor signal crosses the minimum or maximum voltage	
Minimum voltage	Less than 0.4 V
Maximum voltage	0.5 V or more
Case 3 (Slow response):	
Time until the rear oxygen sensor voltage drops to 0.2 V after fuel cut starts operating	6 sec. or more

COMPONENT OPERATING RANGE

Parameter	Standard Value
Heated oxygen sensor voltage	0 to 1 V

O2S TEST RESULT

Refer to page DI-3 for detailed information.

Rear HO2S voltage monitor

If the HO2S sensor voltage is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$07	Minimum rear HO2S voltage	N/A	V
$08	Maximum rear HO2S voltage	N/A	V

If the time required to change is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$31	Time to change from Lean (<0.4 V) to Rich (±0.5 V)	N/A	sec.
$32	Time to change from Rich (±0.5 V) to Lean (<0.4 V)	N/A	sec.

Rear HO2S slow response monitor

If the elapsed time is out of the standard value, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$37	Until rear HO2S voltage drops to 0.2 V after fuel-cut starting	N/A	sec.

Rear HO2S element monitor

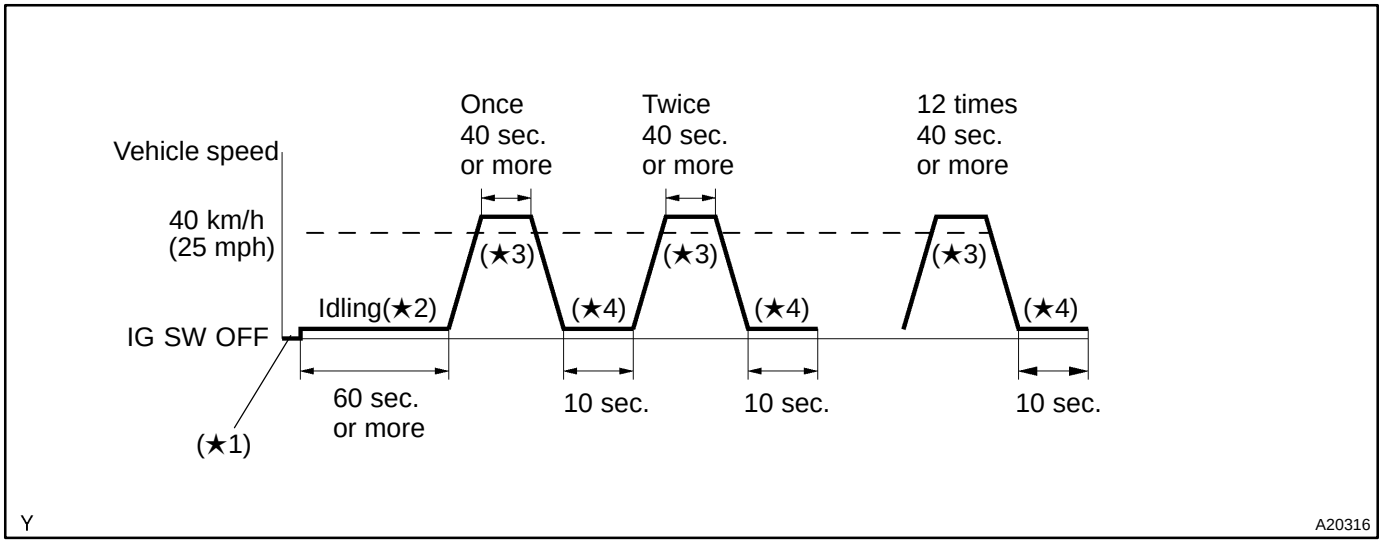
If all the values ($81, $84, $85 and $87) are out of the standard values, the ECM interprets this as a malfunction.

TEST ID	Description of TEST DATA	Conversion Factor	Unit
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05 V	Multiply 0.3906	%
$84	Percentage of monitoring time when the HO2S voltage is more than 0.7 V	Multiply 0.3906	%
$85	Time when the HO2S voltage is 0.45 V or more	Multiply 0.2621	sec.
$87	Percentage of monitoring time when the HO2S voltage is 0.45 V or more	Multiply 0.3906	%

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

CONFIRMATION DRIVING PATTERN



1. **Connect the hand-held tester to the DLC3. (★1)**
2. **Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (★1)**
3. **Start the engine and let the engine idle for 60 seconds or more. (★2)**
4. **Drive the vehicle at 40 km/h (25 mph) or more for 40 seconds or more. (★3)**
5. **Let the engine idle for 10 seconds or more. (★4)**
6. **Perform steps 4. and 5. for 12 times.**

HINT:

If a malfunction exists, the MIL will light up on the multi-information display during step 6.

NOTICE:

If the conditions in this test are not strictly followed, a malfunction detection will not occur. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps from 3 to 6, then perform steps from 3 to 6 again.

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

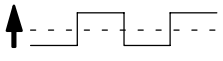
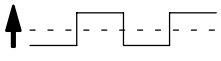
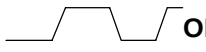
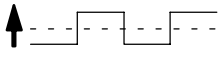
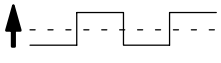
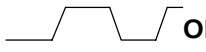
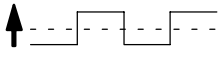
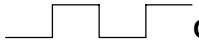
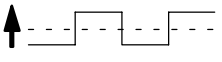
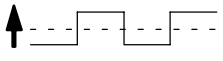
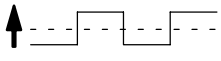
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors.
For displaying the graph indication, first enter ”ACTIVE TEST / A/F CONTROL / USER DATA,” then select ”02S B1S1and O2S B1S2” by pressing ”YES” button, and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs that are related to different system are output simultaneously while terminal E2 is used as a ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.

1	**Are there any other codes (besides DTC P0136 or P0156) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0136	A
”P0136” and other DTCs	B

HINT:
If any other codes besides P0136 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check output voltage of heated oxygen sensor.

PREPARATION:

(a) Connect the OBD II scan tool or the hand-held tester to the DLC3.
(b) After warming up the engine, run the engine at 2,500 rpm for 3 minutes.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B2 S1 or B2 S2.

CHECK:

Read the voltage output of the heated oxygen sensor when the engine speed is suddenly increased.
HINT:
Quickly accelerate the engine to 4,000 rpm 3 minutes by using the accelerator pedal.

OK:

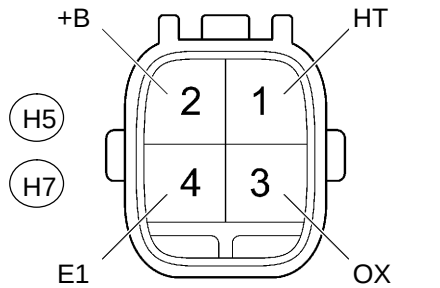
Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.5 V or more.

OK	Go to step 6.

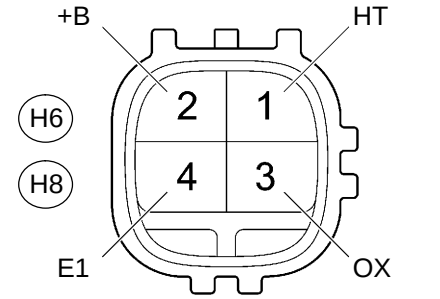
NG

3	Check resistance of heated oxygen sensor heater.

Components Side:



Bank1 Sensor1, Bank2 Sensor1



Bank1 Sensor2, Bank2 Sensor2

C A20870

PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

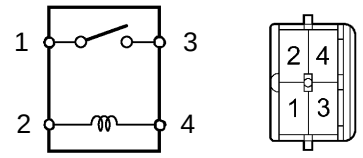
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG	Replace heated oxygen sensor.

OK

4	Check EFI or ECD relay.

EFI or ECD Relay



A21543

PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

OK:

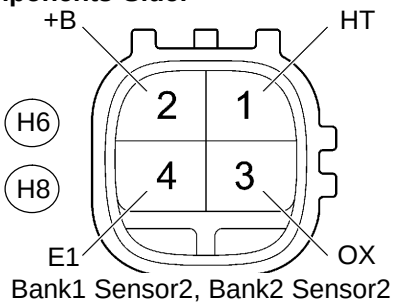
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

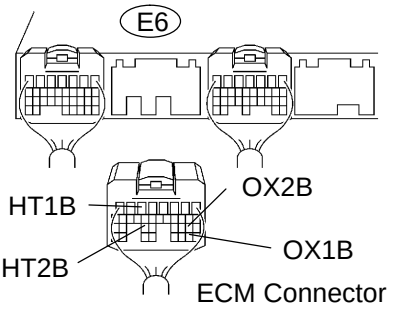
OK

5	Check for open and short in harness and connector between ECM and heated oxygen sensor.

Components Side:



A21341



A21340

PREPARATION:

(a) Disconnect the H6 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

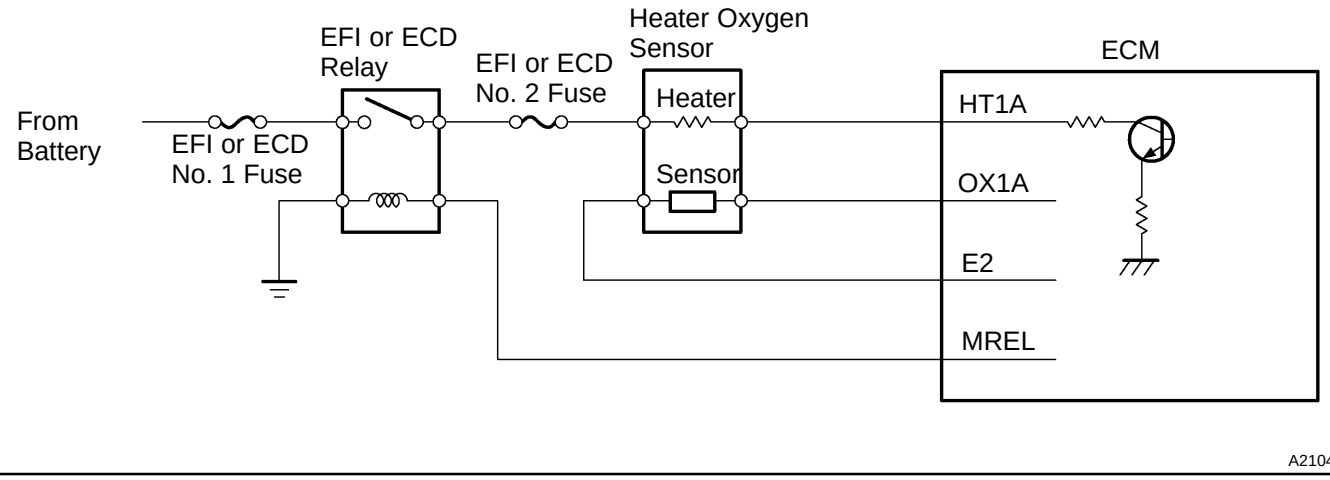
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



NG → **Repair or replace harness or connector.**

OK

Replace heated oxygen sensor.

6	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern.

Go

7	**Is the DTC P0136 or P0156 being output again?**

NO → **Check for intermittent problems.**

YES

Replace heated oxygen sensor.

DIC2A-01

DTC	P0171	System too Lean (Bank 1)

DTC	P0172	System too Rich (Bank 1)

DTC	P0174	System too Lean (Bank 2)

DTC	P0175	System too Rich (Bank 2)

CIRCUIT DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection time. The fuel trim includes the short-term fuel trim and the long-term fuel trim.

The short-term fuel trim is the short-term fuel compensation used to maintain the air-fuel ratio at stoichiometric air-fuel ratio. The signal from the heated oxygen sensor indicates whether the air-fuel ratio is RICH or LEAN compared to the stoichiometric air-fuel ratio. This variance triggers a reduction in the fuel volume if the air-fuel ratio is RICH, and an increase in the fuel volume if it is LEAN.

The long-term fuel trim is the overall fuel compensation carried out in long-term to compensate for a continual deviation of the short-term fuel trim from the central value, due to individual engine differences, wear overtime and changes in the operating environment.

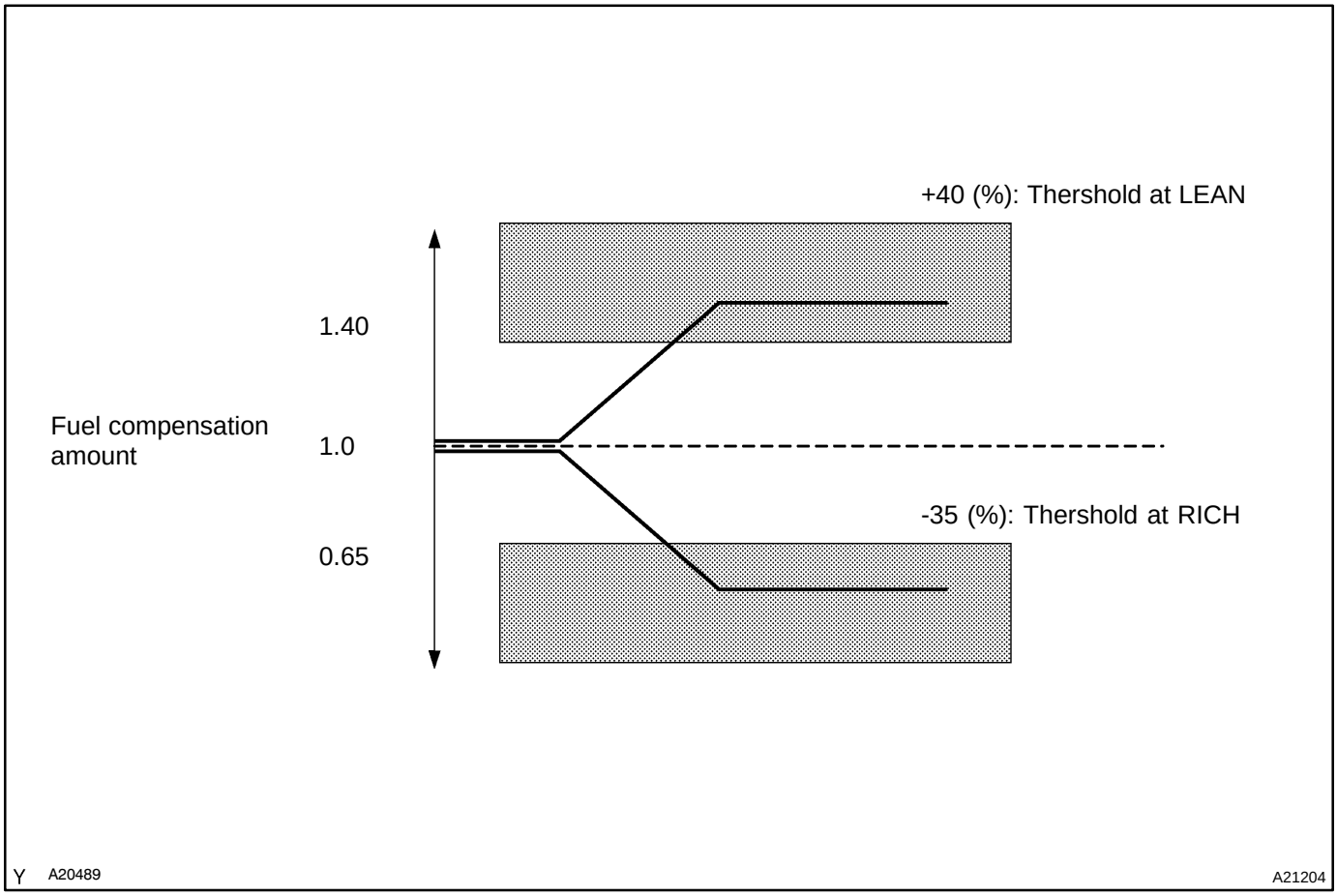
If both the short-term fuel trim and the long-term fuel trim are LEAN or RICH beyond a certain value, it is detected as a malfunction and the MIL is illuminated and a DTC is set.

DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on LEAN side (2 trip detection logic)	□ Air induction system □ Injector blockage □ Mass air flow meter □ Engine coolant temperature sensor □ Fuel pressure □ Gas leakage in exhaust system □ Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit □ Heated oxygen sensor (bank 1, 2 sensor 1) □ Heated oxygen sensor heater (bank 1, 2 sensor 1) □ EFI or ECD relay □ PCV piping □ ECM
P0172 P0175	When air-fuel ratio feedback is stable after warming up engine, fuel trim is considerably in error on RICH side (2 trip detection logic)	□ Injector leak, blockage □ Mass air flow meter □ Engine coolant temperature sensor □ Ignition system □ Fuel pressure □ Gas leakage in exhaust system □ Open or short in heated oxygen sensor (bank 1, 2 sensor 1) circuit □ Heated oxygen sensor (bank 1, 2 sensor 1) □ ECM

HINT:

- When DTC P0171 or P0174 is recorded, the actual air-fuel ratio is on the LEAN side. When DTC P0172 or P0175 is recorded, 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 or P0174 may be recorded. The MIL then comes on.
- If the total of the short-term fuel trim value and long-term fuel trim value is within ± 35 % (engine coolant temperature is more than 75 C (167 F)), the system is functioning normally.

MONITOR DESCRIPTION



Under closed-loop fuel control, fuel injection amounts that deviate from the ECM's estimated fuel amount will cause a change in the long-term fuel trim compensation value. This long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim values. And the deviation from a simulated fuel injection amount by the ECM affects a smoothed fuel trim learning value. The smoothed fuel trim learning value is the combination of smoothed short term fuel trim (fuel feedback compensation value) and smoothed long term fuel trim (learning value of the air-fuel ratio). When the smoothed fuel trim learning value exceeds the DTC threshold, the ECM interprets this as a fault in the fuel system and sets a DTC.

Example:

If the smoothed fuel trim learning value is more than +40% or less than -35% the ECM interprets this as a malfunction in the fuel system.

MONITOR STRATEGY

Related DTCs	P0171	Fuel system lean (Bank 1)
	P0172	Fuel system rich (Bank 1)
	P0174	Fuel system lean (Bank 2)
	P0175	Fuel system rich (Bank 2)
Required sensors/components	Main sensors/components	Front oxygen sensor
	Related sensors/components	Engine coolant temperature sensor, Mass air flow meter, Crankshaft position sensor
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Fuel system: Closed loop	13 sec.	-
One of the following conditions is met:	A or B	
A. Engine speed	-	1,000 rpm
B. Intake air amount per revolution	0.26 g/sec.	-
Warm up condition to enable air fuel ratio learning control	Conditions are met	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Following condition is continue for 3 sec.	A or B
A. Smoothed fuel trim learning value (Lean)	40% or more
B. Smoothed fuel trim learning value (Rich)	-35% or less

WIRING DIAGRAM

Refer to DTC P0031 on page DI-49 .

INSPECTION PROCEDURE

HINT:

Hand-held tester only:

The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).

(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).

HINT:

”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.

(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:

However, there is a few seconds delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	—
Case 2	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % / -12.5 % → Output voltage: More than 0.5 V / Less than 0.4 V **OK**	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Injection volume +25 % / -12.5 % → Output voltage: Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
HINT:

- If different DTCs related to different systems that have terminal E2 as the ground terminal, terminal E2 may be open.
- Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- A high heated oxygen sensor (sensor 1) voltage (0.5 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 heated oxygen 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 air induction system (See page SF-1).**

CHECK:
Check the air induction system for vacuum leaks.

NG → **Repair or replace air induction system.**

OK

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

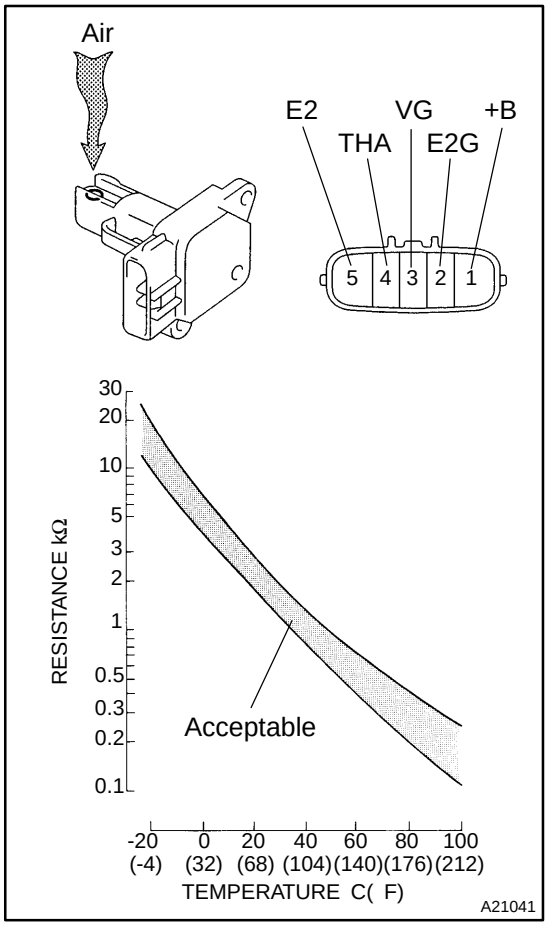
OK

3	**Check injector injection (See page SF-24).**

NG → **Replace injector.**

OK

4	Check mass air flow meter.



PREPARATION:

Remove the mass air flow meter.

CHECK:

(a) Inspect output voltage.
  (1) Apply battery voltage across terminals +B and E2G.
  (2) Connect the positive (+) tester prove to terminal VG, and negative (-) tester prove to terminal E2G.
  (3) Blow air into the mass air flow sensor, and check that the voltage fluctuates.

(b) Inspect resistance.
  (1) Measure the resistance between terminals of the intake air temperature sensor.

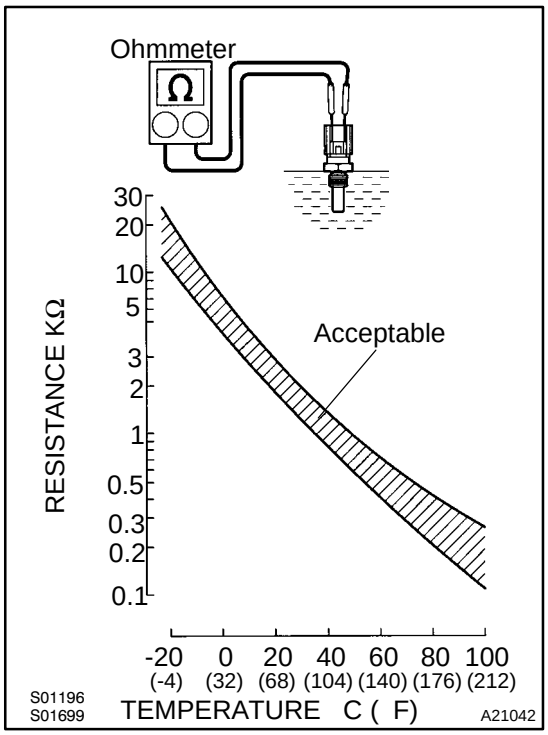
Resistance:

Tester Connection	Temperature	Specified Condition
THA (4) - E2 (5)	-20 C (-4 F)	13.6 to 18.4 kΩ
	20 C (68 F)	2.21 to 2.69 kΩ
	60 C (140 F)	0.49 to 0.67 kΩ

NG → **Replace mass air flow meter.**

OK

5	Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

(a) Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20 C (68 F))
	0.310 to 0.326 kΩ (80 C (176 F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

(b) Reinstall the engine coolant temperature sensor.

NG → **Repair or replace engine coolant temperature sensor.**

OK

6	Check for spark and ignition (See page IG-1).

NG → **Repair or replace ignition system.**

OK

7	**Check fuel pressure (See page SF-7).**

CHECK:

Check the fuel pressure (high or low pressure).

NG → **Check and replace fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).**

OK ↓

8	**Check exhaust system for gas leakage.**

NG → **Repair or replace exhaust gas leakage point.**

OK ↓

9	**Check output voltage of heated oxygen sensor (bank 1, 2 sensor 1) during idling.**

PREPARATION:

(a) Warm up the heated oxygen sensor with the engine speed at 2,500 rpm for approximately 90 seconds.
(b) Connect the hand-held tester or OBD II scan tool to the DLC3.
(c) When using hand-held tester, enter the following menu: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / O2S B1 S1 or B2 S1.

CHECK:

Check the output voltage of the heated oxygen sensor during idling using the OBD II scan tool or hand-held tester.

OK:

Heated oxygen sensor output voltage:
Alternates between less than 0.4 V and more than 0.55 V (See the following table).

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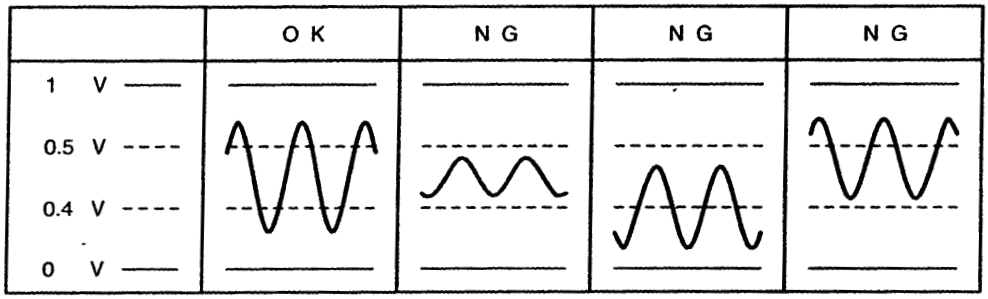


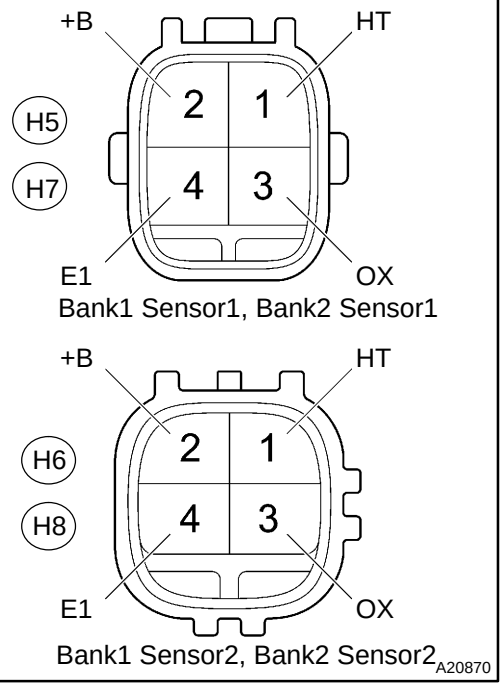
Q30018

OK	**Go to step 17.**

NG

10	Check resistance of heated oxygen sensor heater.

Components Side:



PREPARATION:

Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

CHECK:

Measure resistance between terminals of the heated oxygen sensor.

OK:

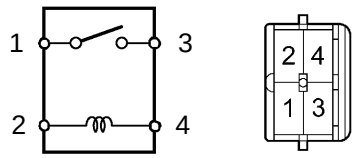
Tester Connection	Specified Condition
HT (H5-1) - +B (H5-2)	11 to 16 Ω (20˚C)
HT (H6-1) - +B (H6-2)	11 to 16 Ω (20˚C)
HT (H7-1) - +B (H7-2)	11 to 16 Ω (20˚C)
HT (H8-1) - +B (H8-2)	11 to 16 Ω (20˚C)

NG → **Replace heated oxygen sensor.**

OK

11	Check EFI or ECD relay.

EFI or ECD Relay



PREPARATION:

Remove the EFI or ECD relay from the engine room R/B.

CHECK:

Inspect the EFI or ECD relay.

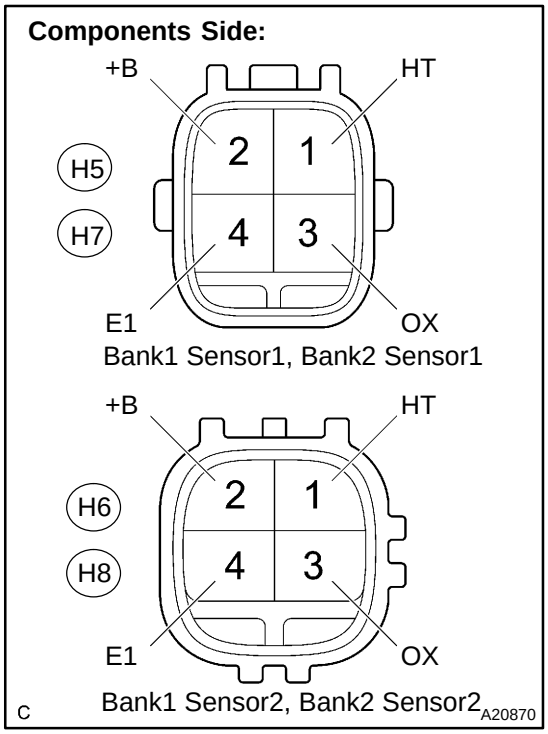
OK:

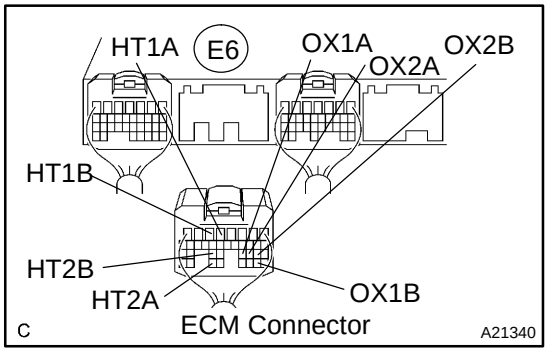
Terminal No.	Condition	Specified Condition
2 - 4	Constant	Continuity
1 - 3	Usually	No Continuity
	Apply B+ between terminals 2 and 4	Continuity

NG → **Replace EFI or ECD relay.**

OK

12	Check for open and short in harness and connector between ECM and heated oxygen sensor.





PREPARATION:

(a) Disconnect the H5, H6, H7 or H8 heated oxygen sensor connector.

(b) Disconnect the E6 ECM connector.

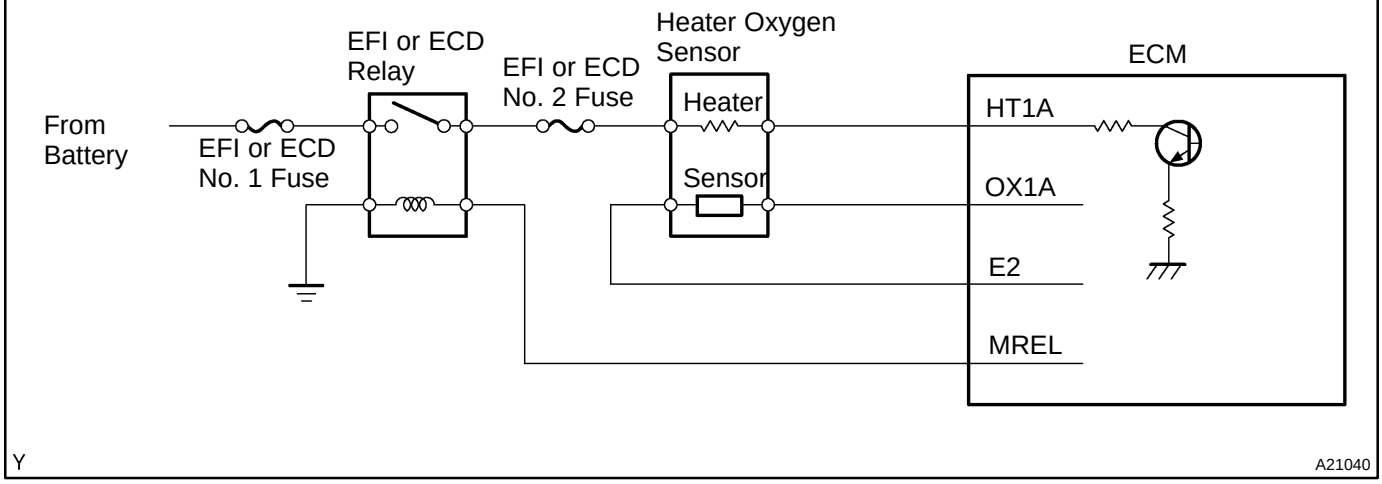
CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
OX (H5-3) - OX1A (E6-23)	Below 1 Ω
HT (H5-1) - HT1A (E6-4)	Below 1 Ω
OX (H6-3) - OX1B (E6-29)	Below 1 Ω
HT (H6-1) - HT1B (E6-5)	Below 1 Ω
OX (H7-3) - OX2A (E6-22)	Below 1 Ω
HT (H7-1) - HT2A (E6-33)	Below 1 Ω
OX (H8-3) - OX2B (E6-21)	Below 1 Ω
HT (H8-1) - HT2B (E6-25)	Below 1 Ω
OX (H5-3) or OX1A (E6-23) - Body ground	10 kΩ or higher
HT (H5-1) or HT1A (E6-4) - Body ground	10 kΩ or higher
OX (H6-3) or OX1B (E6-29) - Body ground	10 kΩ or higher
HT (H6-1) or HT1B (E6-5) - Body ground	10 kΩ or higher
OX (H7-3) or OX2A (E6-22) - Body ground	10 kΩ or higher
HT (H7-1) or HT2A (E6-33) - Body ground	10 kΩ or higher
OX (H8-3) or OX2B (E6-21) - Body ground	10 kΩ or higher
HT (H8-1) or HT2B (E6-25) - Body ground	10 kΩ or higher

Reference (Bank 1 Sensor 1 System Drawing)



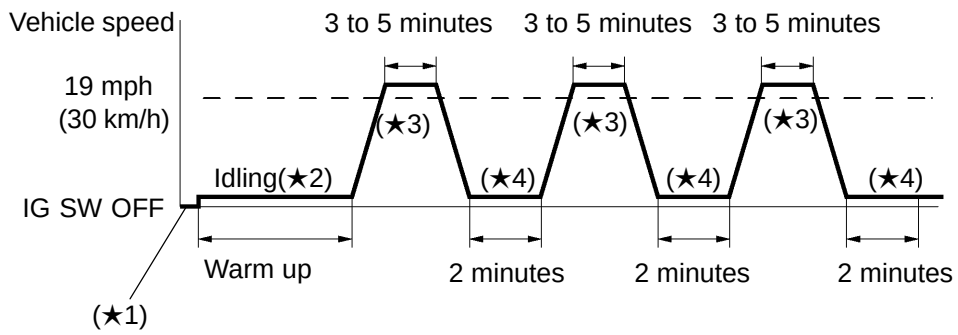
NG	**Replace or replace harness or connector.**

OK

13	**Replace heated oxygen sensor.**

Go

14	Perform confirmation driving pattern.



(a) Disconnect the battery terminal and wait for a minute (clear learning value of the air fuel ratio). (★1)
(b) Connect the hand-held tester to the DLC3. (★1)
(c) Switch the hand-held tester from the normal mode to the check mode (See page DI-3). (★1)
(d) Start the engine and let it idle until engine coolant temperature is 75 ˚C (167 ˚F) or more. (★2)
(e) Drive the vehicle at 19 mph (30 km/h) or more for 3 minutes or more. (★3)
(f) Let the engine idle for approx. 2 minutes. (★4)
(g) Perform steps (e) and (g) at least 3 times.

HINT:

If a malfunction exists, the MIL will be illuminated during step (f).

NOTICE:

If the conditions in this test are not strictly followed, detecting a malfunction may be difficult. If you do not have a hand-held tester, turn the ignition switch OFF after performing steps (e) to (f), and then do step (f) again.

GO

15	Is there DTC P0171, P0172, P0174 or P0175 being output again?

YES → **Replace ECM (See page SF-60) and perform confirmation driving pattern (Refer to step 14).**

NO

16	**Confirm if vehicle has run out of fuel in past.**

NO → **Check for intermittent problems (See page DI-3).**

YES

DTC P0171, P0172, P0174 or P0175 is caused by running out of fuel.

17	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

18	**Is there DTC P0171, P0172 P0174 and/or P0175 being output again?**

NO → **Go to step 22.**

YES

19	**Replace heated oxygen sensor.**

Go

20	**Perform confirmation driving pattern.**

HINT:
Clear all DTCs prior to performing the confirmation driving pattern (Refer to step 14).

Go

21	Is the DTC P0171, P0172, P0174 and/or P0175 being output again?

YES → Replace ECM (See page SF-60) and perform confirmation driving pattern (Refer to step 14).

No

22	Confirm if vehicle has run out of fuel in past.

NO → Check for intermittent problems. (See page DI-3).

YES

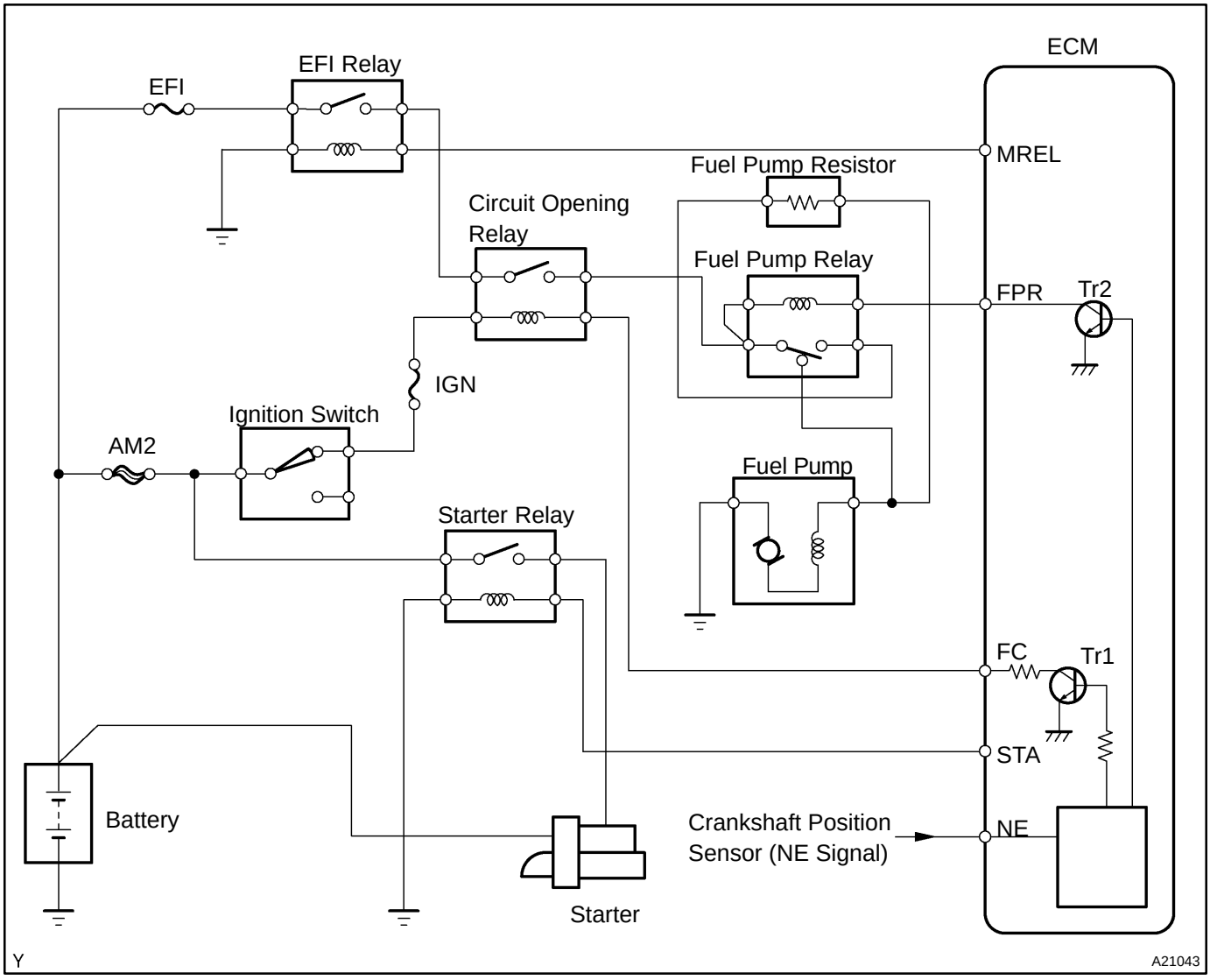
DTC is caused by running out of fuel (DTCs P0171, P0172 P0174 and/or P0175).

DIC2B-01

DTC	P0230	Fuel Pump Primary Circuit

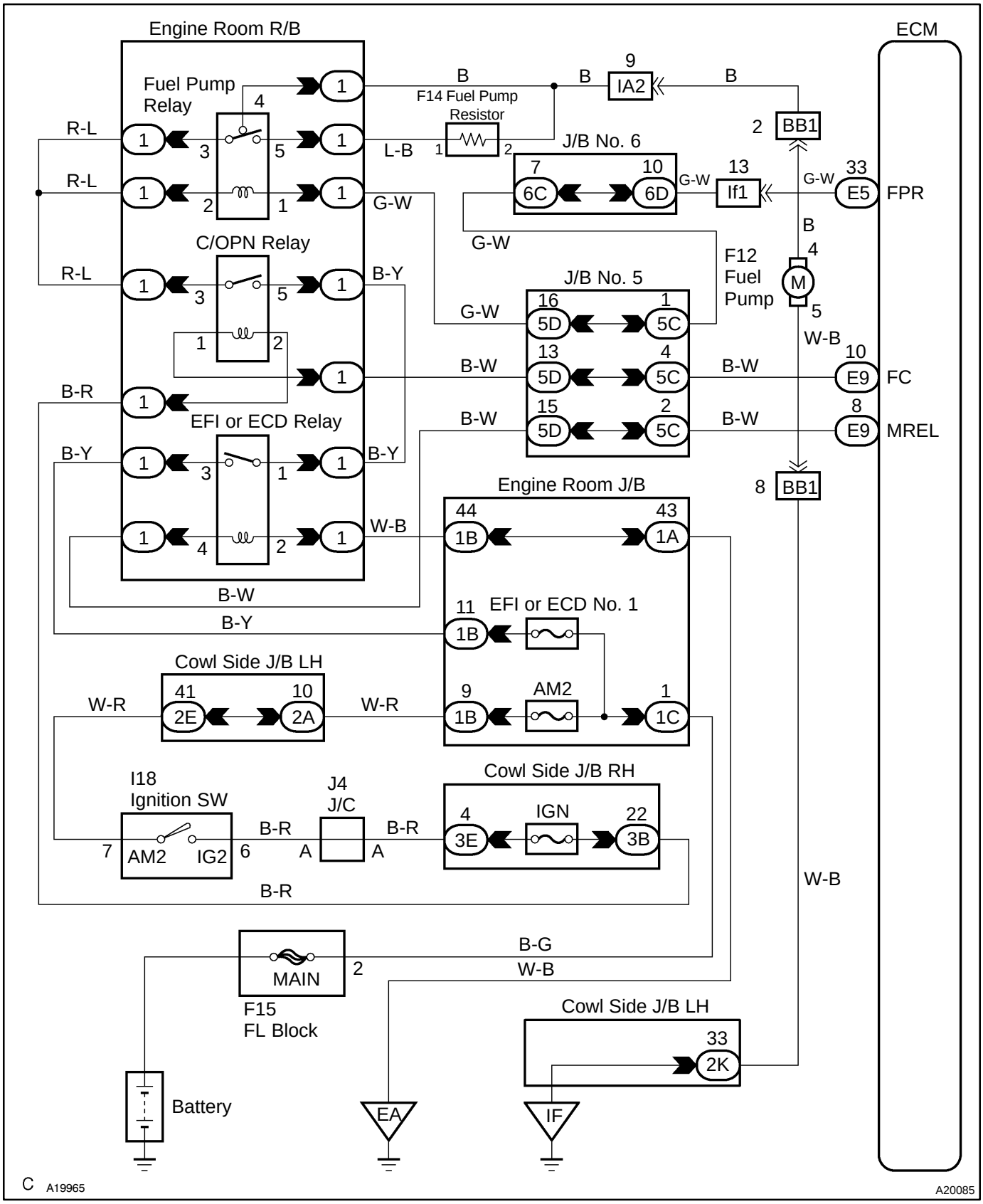
CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal STAR of the ECM to the starter relay coil and also current flows to terminal STA of the ECM (STA signal).
When the STA signal and NE signal are input to the ECM, the Tr1 is turned ON, current flows to the coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump, and the fuel pump operates.
While the NE signal is generated (engine running), the ECM keeps the Tr1 ON (circuit opening relay ON) and the fuel pump also keeps operating.
The fuel pump speed is controlled at two levels (high speed or low speed) by the condition of the engine (starting, light load, heavy load). When the engine starts (STA ON), the Tr2 in the ECM is OFF, so the fuel pump relay closes and battery positive voltage is applied directly to the fuel pump. The fuel pump operates at high speed.
After the engine starts during idling or light loads, since the Tr2 goes ON, power is supplied to the fuel pump via the fuel pump resistor. The fuel pump operates at low speed.



DTC No.	DTC Detecting Condition	Trouble Area
P0230	Open or short in fuel pump relay circuit	★Open or short in fuel pump relay circuit ★Fuel pump relay ★Circuit opening relay ★Fuel pump ★ECM

WIRING DIAGRAM



HINT:

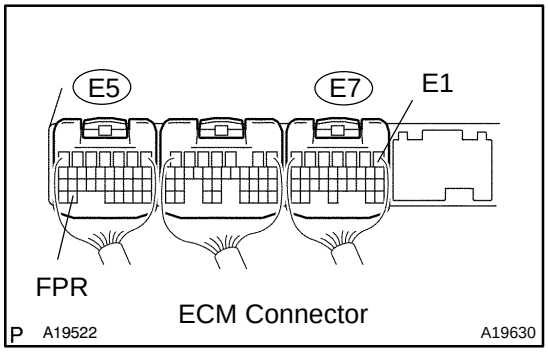
This diagnostic chart is based on premise that engine is started. If the engine is not started, proceed to problem symptoms table on DI-48 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Check voltage between terminal FPR and E1 of ECM.**



CHECK:

Measure the voltage between terminals of E5 and E7 ECM connectors.

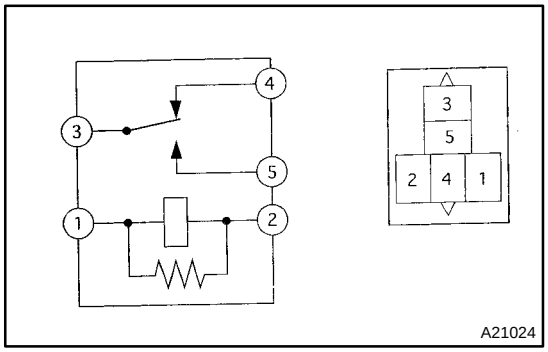
OK:

Tester Connection	Condition	Specified Condition
FPR (E5-33) - E1 (E7-1)	STA signal ON	9 to 14 V
FPR (E5-33) - E1 (E7-1)	STA signal OFF	0 to 3 V

OK	**Replace ECM (See page SF-60).**

NG

2	**Check fuel pump relay.**



PREPARATION:

Remove the fuel pump relay from the engine room R/B.

CHECK:

Inspect the fuel pump relay.

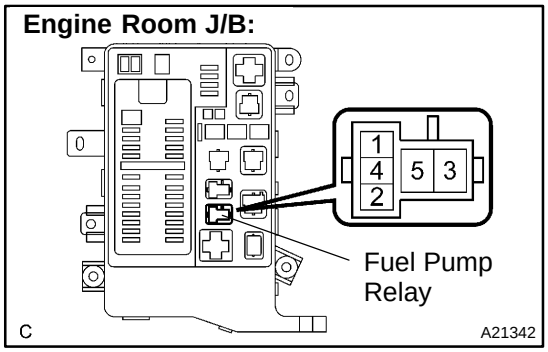
OK:

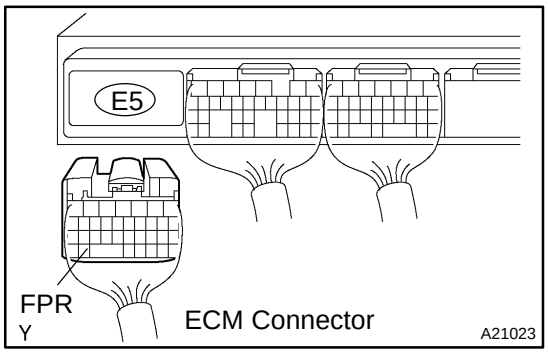
Tester Connection	Specified Condition
1 - 2	Continuity
3 - 4	Continuity
3 - 5	No continuity
3 - 5	Continuity (Apply battery voltage terminal 1 and 2)

NG	**Replace fuel pump relay.**

OK

3	Check for open and short in harness and connector between fuel pump relay and ECM.





PREPARATION:

(a) Remove the fuel pump relay from the engine room J/B.

(b) Disconnect the E5 ECM connector.

CHECK:

Measure the resistance between wire harness side connectors.

OK:

Tester Connection	Specified Condition
Engine Room J/B (Fuel pump relay terminal 1) - FPR (E5-33)	Below 1 Ω
Engine Room J/B (Fuel pump relay terminal 1) or FPR (E5-33) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace ECM (See page SF-60).

DIC2C-01

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
DTC	P0305	Cylinder 5 Misfire Detected
DTC	P0306	Cylinder 6 Misfire Detected
DTC	P0307	Cylinder 7 Misfire Detected
DTC	P0308	Cylinder 8 Misfire Detected

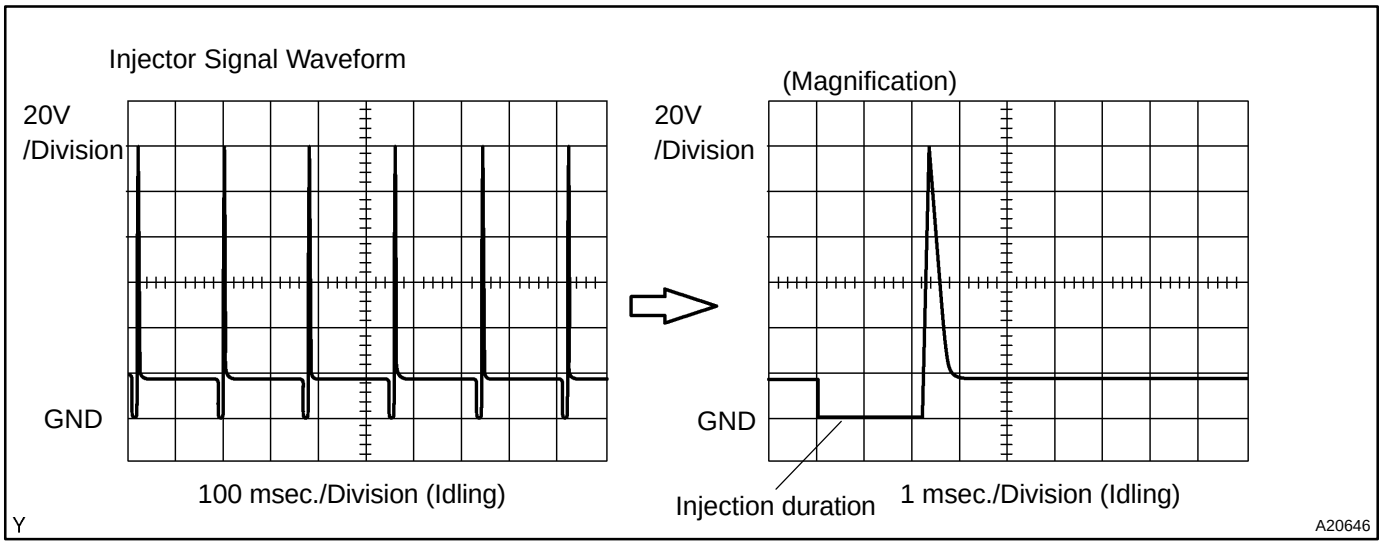
CIRCUIT DESCRIPTION

When a misfire occurs in the engine, hydrocarbons (HC) enter the exhaust in high concentrations. If this HC concentration is high enough, there could be an increase in exhaust emissions levels. High concentrations of HC can also cause to temperature of the catalyst to increase, possibly damaging the catalyst. To prevent this increase in emissions and limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the catalyst reaches a point of thermal degradation, the ECM will blink the MIL. For monitoring misfire, the ECM uses both the camshaft position sensor and the crankshaft position sensor. The camshaft position sensor is used to identify misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. The misfire counter increments when crankshaft rotation speed variations exceed threshold values.

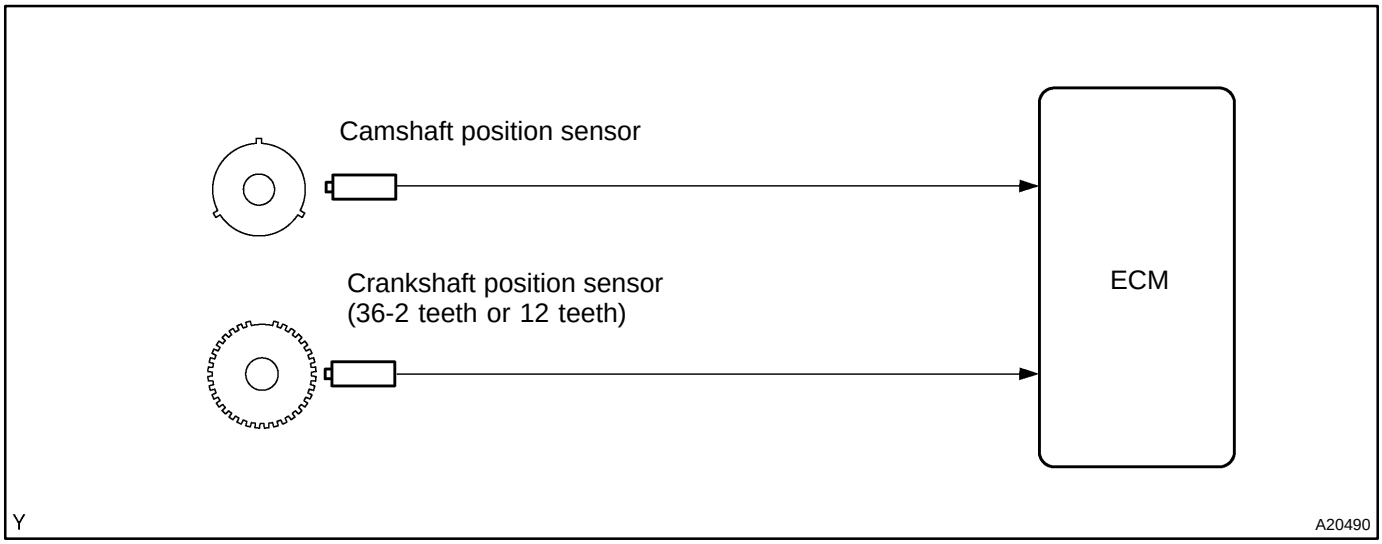
If the misfiring rate exceeds the threshold value and could cause emissions deterioration, the ECM illuminates the MIL.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfiring of random cylinders is detected	★Open or short in engine wire ★Connector connection ★Vacuum hose connection ★Ignition system ★Injector ★Fuel pressure ★Mass air flow meter ★Engine coolant temperature sensor ★Compression pressure ★Valve clearance ★Valve timing ★PCV piping ★ECM
P0301 P0302 P0303 P0304 P0305 P0306 P0307 P0308	Misfiring of each cylinder is detected	

HINT:
When several codes for a misfiring cylinder are recorded repeatedly but no random misfire code is recorded, it indicates that the misfires have been detected and recorded at different times.
Reference: Inspection using the oscilloscope.
With the engine idling, check the waveform between terminals #1 to #8 and E01 of the ECM connectors.
HINT:
The correct waveform is as shown.



MONITOR DESCRIPTION



The ECM illuminates the MIL (2 trip detection logic) if:
The ECM will illuminate the MIL when the percent misfire exceeds the specified limit per 1,000 engine revolutions. One occurrence of excessive misfire during engine start will set the MIL. Four occurrences are required to set the MIL 1,000 revolutions after engine start.
The ECM blinks the MIL (MIL blinks immediately) if:

- ★ Within 200 engine revolutions at a high rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 1 time.
- ★ Within 200 engine revolutions at a normal rpm, the threshold for ”percent of misfire causing catalyst damage” is reached 3 time.

MONITOR STRATEGY

Related DTCs	P0300	Random/Multiple cylinder misfire detected
	P0301	Cylinder 1 misfire detected
	P0302	Cylinder 2 misfire detected
	P0303	Cylinder 3 misfire detected
	P0304	Cylinder 4 misfire detected
	P0305	Cylinder 5 misfire detected
	P0306	Cylinder 6 misfire detected
	P0307	Cylinder 7 misfire detected
	P0308	Cylinder 8 misfire detected
Required sensors/components	Main sensors/components	Camshaft position sensor, Crankshaft position sensor
	Related sensors/components	Engine coolant temperature sensor, Intake air temperature sensor, Throttle position sensor
Frequency of operation	Continuous	
Duration	Every 1,000 revolutions (soon after engine is started: 1 time, other 4 times) (emission related misfire) Every 200 revolutions (1 or 3 times) (catalyst deteriorating misfire)	
MIL operation	2 driving cycles MIL ON Immediate MIL blinking (Catalyst deteriorating misfire)	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

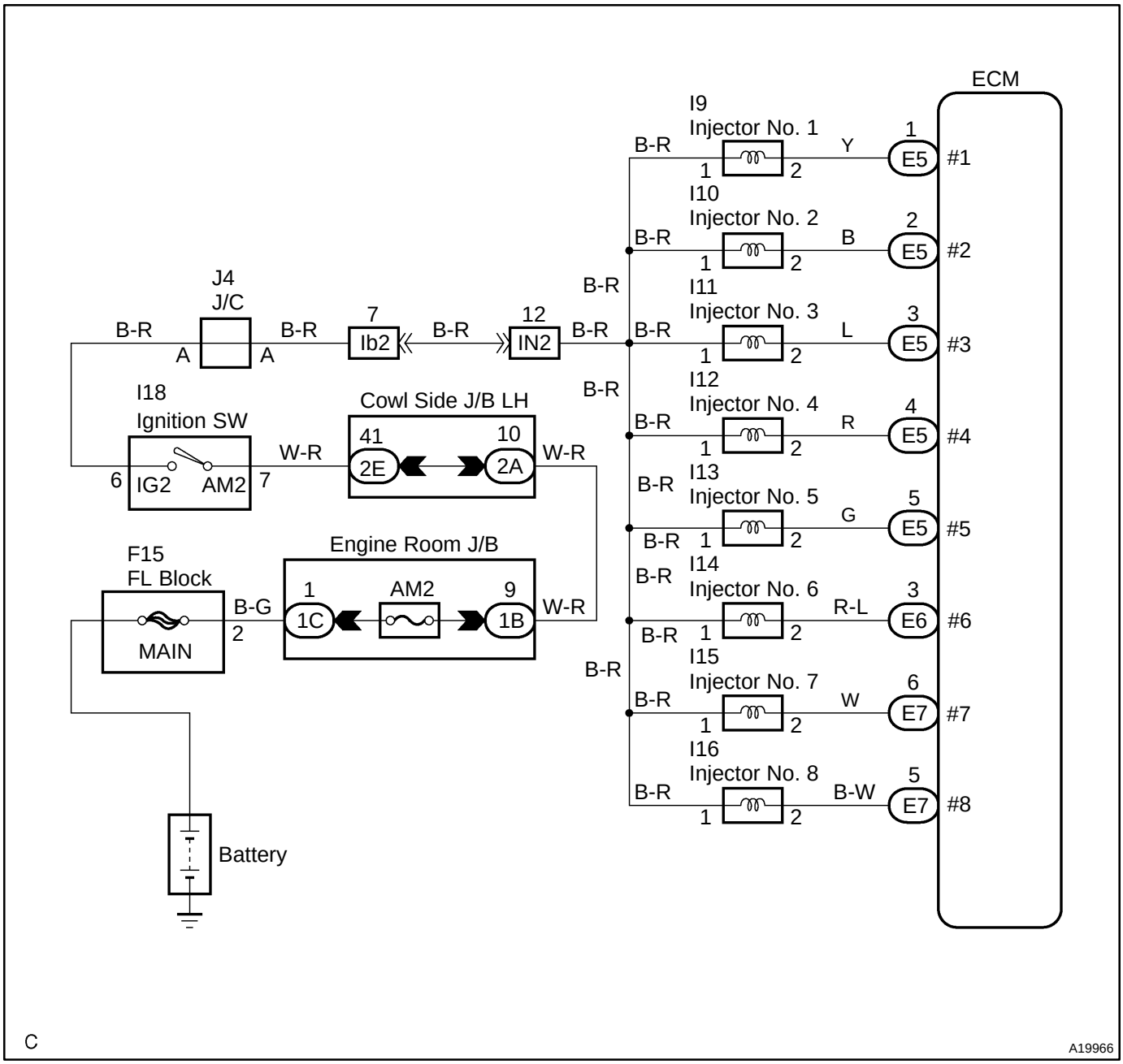
Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	8 V	-
VVT	Normal operation (i. e. not under scan-tool control)	
Engine speed fluctuation	Engine speed should not have changed rapidly	
Engine speed (Two full revolutions (2 rev.) after engine has started)	400 rpm	5,300 rpm
All of the following conditions are met:	A, B and C	
A. Engine coolant temperature	-10 °C (14 °F)	-
B. Either of the following conditions is met:	(a) or (b)	
(a) Intake air temperature	-10 °C (14 °F)	-
(b) Engine coolant temperature	75 °C (167 °F)	-
C. Either of the following conditions is met:	(a) or (b)	
(a) Engine coolant temperature at engine started	-7 °C (19 °F)	-
(b) Engine coolant temperature	20 °C (68 °F)	-
Intake air amount per revolution (varies with engine speed)	0.4 g/rev.	-
Throttle position learning	Completed	
Throttle position	Rapid throttle opening or closing operation has not occurred	
	-	Changing value of throttle position Less than 0.5 ° per 0.008 sec.
Rough road counter	-	14 times/1,000 revolutions (Not running on rough road)
For paired cylinder misfire (6 or 8 cylinders):		
When ECT is between -10 °C (14 °F) and 75 °C (167 °F), the following conditions are met:	A and B	
A. Engine speed	-	3,000 rpm
B. Intake air amount per revolution at 1,800 rpm (varies with engine speed)	0.7 g/sec.	-
When ECT is over 75 °C (167 °F), the following conditions are met:	A or (B and C)	
A. NE signal plate tooth width learning was not completed		
B. Engine speed	-	3,000 rpm
C. Intake air amount per revolution at 1,800 rpm (varies with engine speed)	0.7 g/sec.	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Emission related misfire rate: 1. During the first 1,000 revolutions after engine start (MIL is set when misfire is detected 1 time) 2. After the first 1,000 revolutions have occurred (MIL is set when misfire is detected 4 times)	3 %/1,000 revolutions
Catalyst damage misfire count: 1. Low engine rpm area (ex. less than 3,000 rpm): 200 revolutions (MIL is set when misfire is detected 3 times) 2. High engine rpm area: Every 200 revolutions	96 count/200 revolutions (Threshold varies with engine speed and intake air amount per revolution)

WIRING DIAGRAM

Refer to DTC P0351 on page DI-202 for the wiring diagram of the ignition system.



CONFIRMATION DRIVING PATTERN

(a) Connect the hand-held tester to the DLC3.
(b) Record DTC and the freeze frame data.
(c) Use the hand-held tester to set to the check mode (See page DI-3).
(d) Read the value on the misfire counter for each cylinder when idling. If the value is displayed on the misfire counter, skip the following procedure of confirmation driving.
(e) Drive the vehicle several times with the engine speed, load and its surrounding range shown with ENGINE SPD, CALC LOAD in the freeze frame data or MISFIRE RPM, MISFIRE LOAD in the DATA LIST.

If you have no hand-held tester, turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again.

HINT:

In order to memorize the DTC of misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the DATA LIST for the following period of time. Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from check mode to normal mode. So all DTCs, etc., are erased.

Engine Speed	Time
Idling	3 minutes 30 seconds or more
1,000 rpm	3 minutes or more
2,000 rpm	1 minute 30 seconds or more
3,000 rpm	1 minute or more

(f) Check if there is misfire and DTC and the freeze frame data. Record the DTC's, freeze frame data and misfire counter data.
(g) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

★ If DTCs besides misfire DTCs are memorized simultaneously, troubleshoot the non-misfire DTCs first.
★ If the misfire does not occur when the vehicle is brought to the workshop, the misfire can be confirmed by reproducing the condition of the freeze frame data. Also, after finishing the repair, confirm that there is no misfire (See confirmation driving pattern).
★ On 6 and 8 cylinder engines, misfiring cylinder identification is disabled at high engine speed and only a general misfire fault code P0300 is stored instead of a cylinder specific misfire fault code (P0301 to P0308).
If the misfire starts in a high engine speed area or the misfire occurs only in a high engine speed area, only code P0300 may be stored.

When only a general misfire fault code like P0300 is stored:

★ Erase the general misfire fault code from the hand-held tester or OBD II scan tool.
★ Start the engine and drive the confirmation patten.
★ Read the value of the misfire ratio for each cylinder. Or read the DTC.
★ Perform repairs on the cylinder that has a high misfire ratio. Or repair the cylinder indicated by the DTC.
★ After finishing repairs, drive the confirmation pattern again and confirm that no misfire occurs.
★ When either of SHORT FT #1, LONG FT #1, SHORT FT #2 or LONG FT #2 in the freeze frame data is over the range of ±20 %, there is a possibility that the air-fuel ratio is becoming RICH (-20 % or less) or LEAN (+20 % or more).
★ When COOLANT TEMP in the freeze frame data is less than 80˚C (176˚F), there is a possibility of misfire only during engine warm-up.
★ If the misfire cannot be reproduced, the following reasons may apply: 1) the vehicle has low fuel, 2) improper fuel is being used, and 3) the ignition plug is contaminated.

★ Be sure to check the value on the misfire counter after the repair.

1	**Are there any other codes (besides DTC P0300, P0301, P0302, P0303, P0304 P0305, P0306, P0307 or P0308) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 and/or P0308”	A
”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308” and other DTCs	B

HINT:

If any other codes besides ”P0300, P0301, P0302, P0303, P0304, P0305, P0306, P0307 or P0308” are output, perform the troubleshooting for those DTC.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Check wire harness, connector and vacuum hose in engine room.**

CHECK:

(a) Check the connection conditions of the wire harness and connector.
(b) Check for the disconnection, piping and brake of the vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See confirmation driving pattern).**

OK

3	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

4	**Connect hand-held tester, and read the number of misfire.**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or the OBD II scan tool main switch ON.
(c) Start the engine.
(d) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / CYL#1 to CYL#8.

CHECK:

Read the number of misfire on the hand-held tester or the OBD II scan tool.
HINT:
When a misfire is not reproduced, be sure to branch below based on the stored DTC.

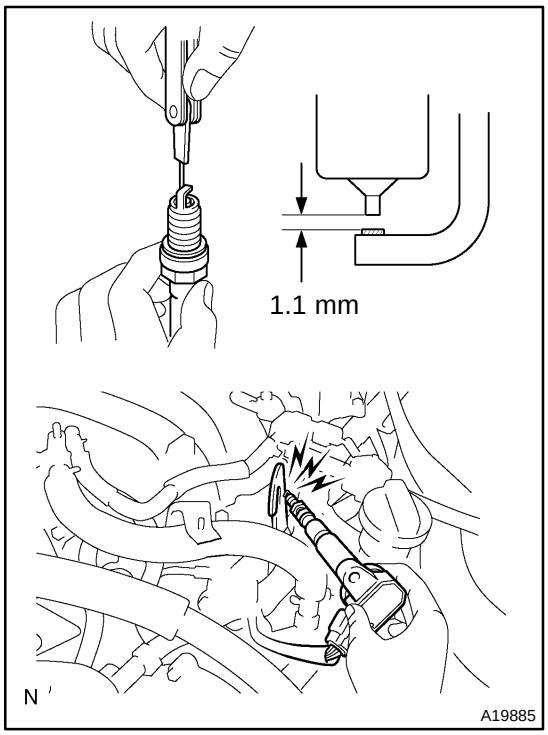
RESULT:

High Misfire Rate Cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 15.**

A

5	Check spark plug and spark of misfiring cylinder.



PREPARATION:

(a) Remove the ignition coil assembly.

(b) Remove the spark plug.

CHECK:

(a) Check the electrode for carbon deposits.

(b) Check the spark plug type (See page IG-1).

(c) Check electrode gap.

OK:

No large carbon deposit present.

Not wet with gasoline or oil.

Electrode gap: 1.0 to 1.3 mm (0.039 to 0.051 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only "the base / ground" electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.

PREPARATION:

(a) Install the spark plug to the ignition coil assembly.

(b) Disconnect the injector connector.

(c) Ground spark plug.

CHECK:

Check if spark occurs while engine is being cracked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

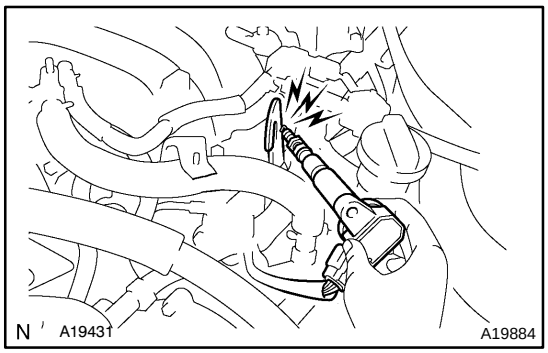
OK:

Spark occurs across electrode gap.

OK	Go to step 8.

NG

6	**Change normal spark plug and check spark of misfiring cylinder.**



PREPARATION:

(a) Change to the normal spark plug.
  (1) Remove the spark plug that may be faulty from the ignition coil assembly.
  (2) Install the spark plug to the ignition coil assembly.
(b) Disconnect the injector connector.
(c) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

CAUTION:

Always disconnect each injector connector.

NOTICE:

Do not crank the engine for more than 2 seconds.

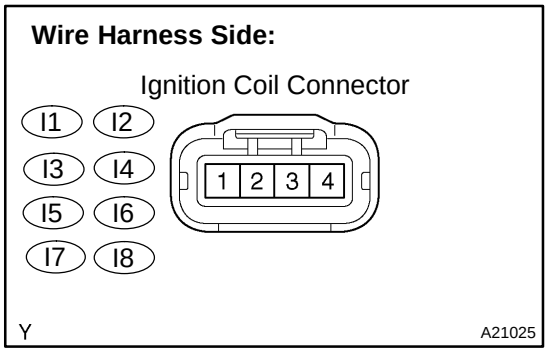
OK:

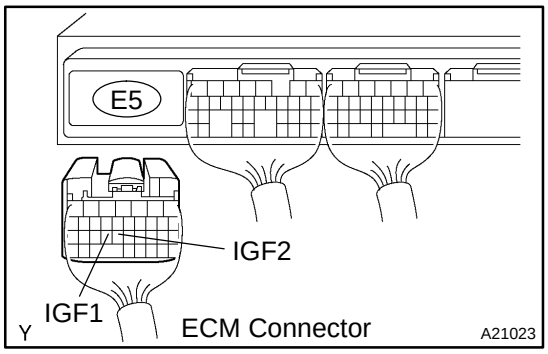
Spark jumps across electrode gap.

OK	**Replace spark plug.**

NG

7	Check for open and short in harness and connector between ignition coil and ECM.





Check the harness and connector between the ignition coil and the ECM (IGF terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

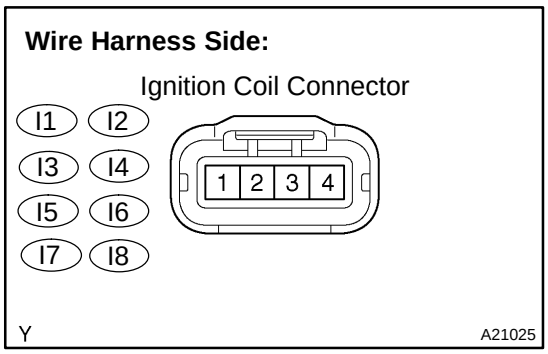
(b) Disconnect the E5 ECM connector.

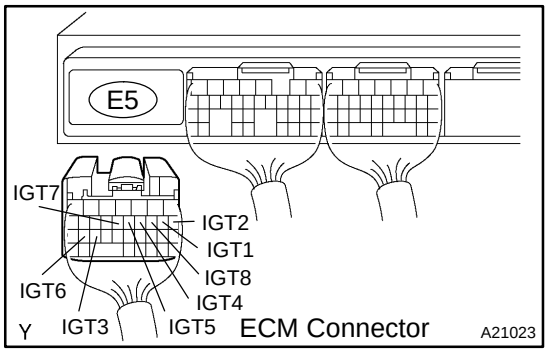
CHECK:

Check the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I2-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I3-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I4-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I5-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I6-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I7-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I8-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I1-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher





Check the harness and connector between the ignition coil and the ECM (IGT terminal) connectors:

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

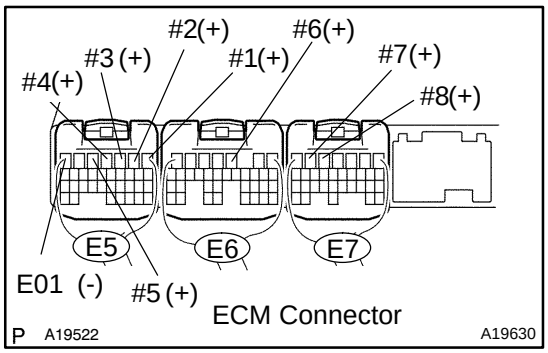
OK:

Tester Connection	Specified Condition
Ignition coil (I1-3) - IGT1 (E5-9)	Below 1 Ω
Ignition coil (I2-3) - IGT2 (E5-8)	Below 1 Ω
Ignition coil (I3-3) - IGT3 (E5-25)	Below 1 Ω
Ignition coil (I4-3) - IGT4 (E5-11)	Below 1 Ω
Ignition coil (I5-3) - IGT5 (E5-12)	Below 1 Ω
Ignition coil (I6-3) - IGT6 (E5-26)	Below 1 Ω
Ignition coil (I7-3) - IGT7 (E5-13)	Below 1 Ω
Ignition coil (I8-3) - IGT8 (E5-10)	Below 1 Ω
Ignition coil (I1-3) or IGT1 (E5-9) - Body ground	10 kΩ or higher
Ignition coil (I2-3) or IGT2 (E5-8) - Body ground	10 kΩ or higher
Ignition coil (I3-3) or IGT3 (E5-25) - Body ground	10 kΩ or higher
Ignition coil (I4-3) or IGT4 (E5-11) - Body ground	10 kΩ or higher
Ignition coil (I5-3) or IGT5 (E5-12) - Body ground	10 kΩ or higher
Ignition coil (I6-3) or IGT6 (E5-26) - Body ground	10 kΩ or higher
Ignition coil (I7-3) or IGT7 (E5-13) - Body ground	10 kΩ or higher
Ignition coil (I8-3) or IGT8 (E5-10) - Body ground	10 kΩ or higher

OK → **Replace ignition coil with igniter, then confirm that there is no misfire.**

NG → **Repair or replace harness or connector.**

8	Check ECM terminal of misfiring cylinder.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between the terminals of the E5, E6 and E7 ECM connectors.

OK:

Tester Connection	Specified Condition
#1 (E5-1) - E01 (E5-7)	9 to 14 V
#2 (E5-2) - E01 (E5-7)	9 to 14 V
#3 (E5-3) - E01 (E5-7)	9 to 14 V
#4 (E5-4) - E01 (E5-7)	9 to 14 V
#5 (E5-5) - E01 (E5-7)	9 to 14 V
#6 (E6-3) - E01 (E5-7)	9 to 14 V
#7 (E7-6) - E01 (E5-7)	9 to 14 V
#8 (E7-5) - E01 (E5-7)	9 to 14 V

OK → **Go to step 11.**

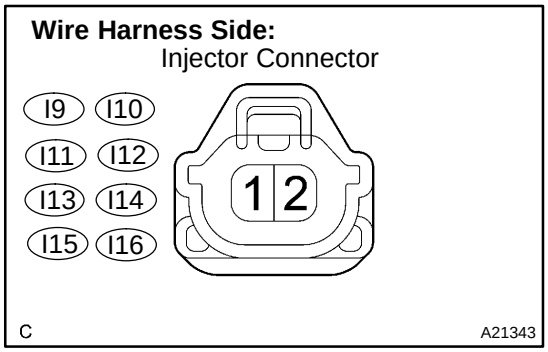
NG

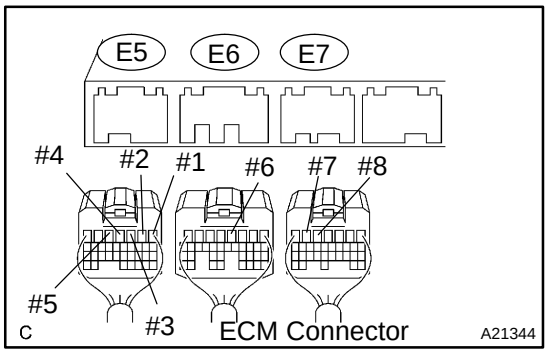
9	Check injector resistance of misfiring cylinder (See page SF-19).

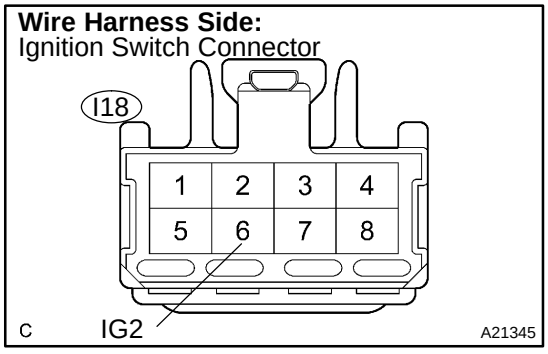
NG → **Replace injector.**

OK

10	**Check for open and short in harness and connector between ignition SW and injector, injector and ECM of misfiring cylinder.**







Check the harness and the connector between the injector connector and the ECM connector:

PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the E5, E6 or E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Injector (I9-2) - #1 (E5-1)	Below 1 Ω
Injector (I10-2) - #2 (E5-2)	Below 1 Ω
Injector (I11-2) - #3 (E5-3)	Below 1 Ω
Injector (I12-2) - #4 (E5-4)	Below 1 Ω
Injector (I13-2) - #5 (E5-5)	Below 1 Ω
Injector (I14-2) - #6 (E6-3)	Below 1 Ω
Injector (I15-2) - #7 (E7-6)	Below 1 Ω
Injector (I16-2) - #8 (E7-5)	Below 1 Ω
Injector (I9-2) or #1 (E5-1) - Body ground	10 kΩ or higher
Injector (I10-2) or #2 (E5-2) - Body ground	10 kΩ or higher
Injector (I11-2) or #3 (E5-3) - Body ground	10 kΩ or higher
Injector (I12-2) or #4 (E5-4) - Body ground	10 kΩ or higher
Injector (I13-2) or #5 (E5-5) - Body ground	10 kΩ or higher
Injector (I14-2) or #6 (E6-3) - Body ground	10 kΩ or higher
Injector (I15-2) or #7 (E7-6) - Body ground	10 kΩ or higher
Injector (I16-2) or #8 (E7-5) - Body ground	10 kΩ or higher

Check the harness and connector between the injector connector and the ignition switch:

PREPARATION:

(a) Disconnect the I9, I10, I11, I12, I13, I14, I15 or I16 injector connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Injector (I9-1) - IG2 (I18-6)	Below 1 Ω
Injector (I10-1) - IG2 (I18-6)	Below 1 Ω
Injector (I11-1) - IG2 (I18-6)	Below 1 Ω
Injector (I12-1) - IG2 (I18-6)	Below 1 Ω
Injector (I13-1) - IG2 (I18-6)	Below 1 Ω
Injector (I14-1) - IG2 (I18-6)	Below 1 Ω
Injector (I15-1) - IG2 (I18-6)	Below 1 Ω
Injector (I16-1) - IG2 (I18-6)	Below 1 Ω
Injector (I9-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I10-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I11-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I12-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I13-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I14-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I15-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Injector (I16-1) or IG2 (I18-6) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

11	Check injector injection of misfiring cylinder (See page SF-24).

NG → Replace injector.

OK

12	Check compression pressure of misfiring cylinder (See page EM-3).

NG → Repair or replace.

OK

13	Check valve clearance of misfiring cylinder (See page EM-4).

NG → Adjust valve clearance.

OK

14	Check result of step 4 switch step by number of misfire cylinder.

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → Check for intermittent problems (See page DI-3).

A

15	Check valve timing (Check for looseness or a jumped tooth of timing belt) (See page EM-22).

NG → Adjust valve timing (Repair or replace timing belt).

OK ↓

16	Check fuel pressure (See page SF-7).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF-1).

OK ↓

17	Check intake air temperature and mass air flow rate.

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON.

CHECK:

Check the intake air temperature.

(1) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/INTAKE AIR”.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

OK:

Equivalent to ambient temperature

CHECK:

Check the air flow rate.

(1) Select the item ”DIAGNOSIS/ENHANCED OBD II/DATA LIST/ALL/MAF”.

(2) Read its value displayed on the hand-held tester or the OBD II scan tool.

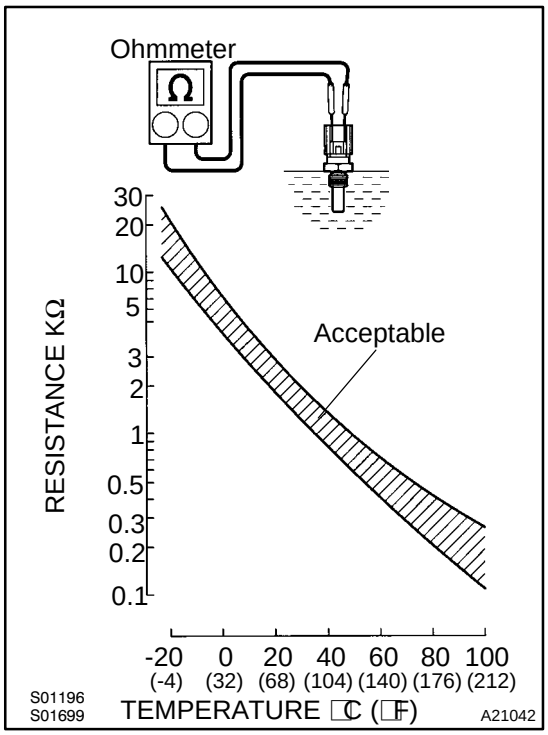
OK:

Condition	Air Flow Rate (gm/s)
Ignition switch ON (do not start engine)	0
Idling	4 to 6
Running without load (2,500 rpm)	13 to 20
Idling to quickly accelerating	Air flow rate fluctuates

NG → **Replace mass air flow meter.**

OK

18	Check engine coolant temperature sensor.



PREPARATION:

Remove the engine coolant temperature sensor.

CHECK:

Measure the resistance between the terminals of the engine coolant temperature sensor.

Resistance:

Tester Connection	Specified Condition
1 - 2	2.32 to 2.59 kΩ (20°C (68°F))
	0.310 to 0.326 kΩ (80°C (176°F))

NOTICE:

In case of checking the engine coolant temperature sensor in the water, be careful not to allow water to go into the terminals. After checking, dry the sensor.

HINT:

Alternate procedure: Connect an ohmmeter to the installed engine coolant temperature sensor and read the resistance. Use an infrared thermometer to measure the engine temperature in the immediate vicinity of the sensor. Compare these values to the resistance/temperature graph. Change the engine temperature (warm up or allow to cool down) and repeat the test.

NG → **Replace engine coolant temperature sensor.**

OK

19	Switch step by number of misfire cylinder (Refer result of step 4).

High misfire rate cylinder	Proceed to
1 or 2 cylinders	A
More than 3 cylinders	B

B → **Go to step 5.**

A

Check for intermittent problems (See page DI-3).

DI1LQ-14

DTC	P0325	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)

DTC	P0330	Knock Sensor 2 Circuit (Bank 2)

CIRCUIT DESCRIPTION

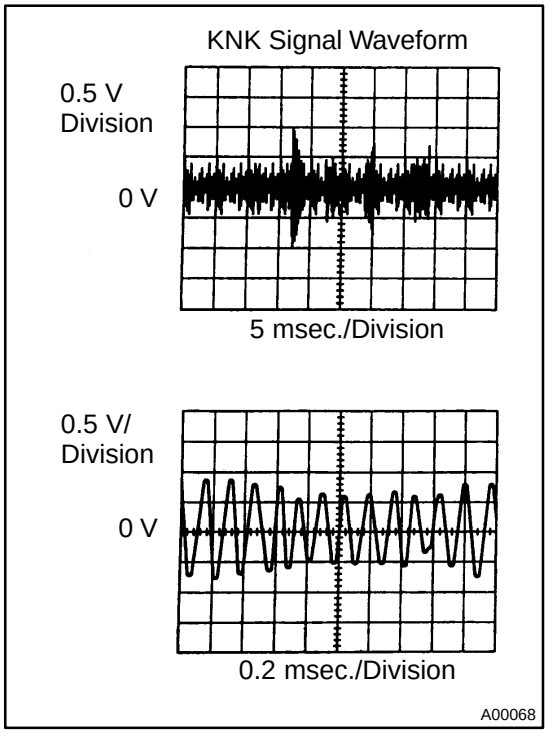
Each knock sensor is fitted to the right bank and left bank of the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed. The piezoelectric element sends a signal to the ECM, when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No signal of knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,400 rpm	★Open or short in knock sensor 1 circuit ★Knock sensor 1 (looseness) ★ECM
P0330	No signal of knock sensor 2 signal to ECM with engine speed between 2,000 rpm and 5,400 rpm	★Open or short in knock sensor 2 circuit ★Knock sensor 2 (looseness) ★ECM

HINT:

★ Bank 1 refers to the bank that includes cylinder No. 1.

★ Bank 2 refers the the bank that does not include cylinder No. 1.



Reference: INSPECTION USING OSCILLOSCOPE

★ With the engine racing (4,000 rpm), check the waveform between terminals KNK1 and KNK2 of the ECM connector and body ground.

HINT:

The correct waveform is as shown.

★ Spread the time on the horizontal axis, and confirm that period of the wave is 0.13 msec. (Normal mode vibration frequency of knock sensor: 8.1 kHz)

HINT:

If normal mode vibration frequency is not 8.1 kHz, the sensor has malfunction.

MONITOR DESCRIPTION

The knock sensor located on the cylinder block, detects spark knock.
When spark knock occurs, the sensor pick-up vibrates in a specific frequency range. When the ECM detects the voltage in this frequency range, it retards the ignition timing to suppress the spark knock.
The ECM also senses background engine noise with the knock sensor and uses this noise to check for faults in the sensor. If the knock sensor signal level is too low for more than 10 sec., and if the knock sensor output voltage is out of normal range, the ECM interprets this as a fault in the knock sensor and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0325	Knock sensor (Bank 1) range check or rationality
	P0330	Knock sensor (Bank 2) range check or rationality
Required sensors/components	Main sensors/components	Knock sensor
	Related sensors/components	Crankshaft position sensor, Camshaft position sensor, Engine coolant temperature sensor, Mass air flow meter
Frequency of operation	Continuous	
Duration	10 sec.	
MIL operation	Immediate	
Sequence of operation	None	

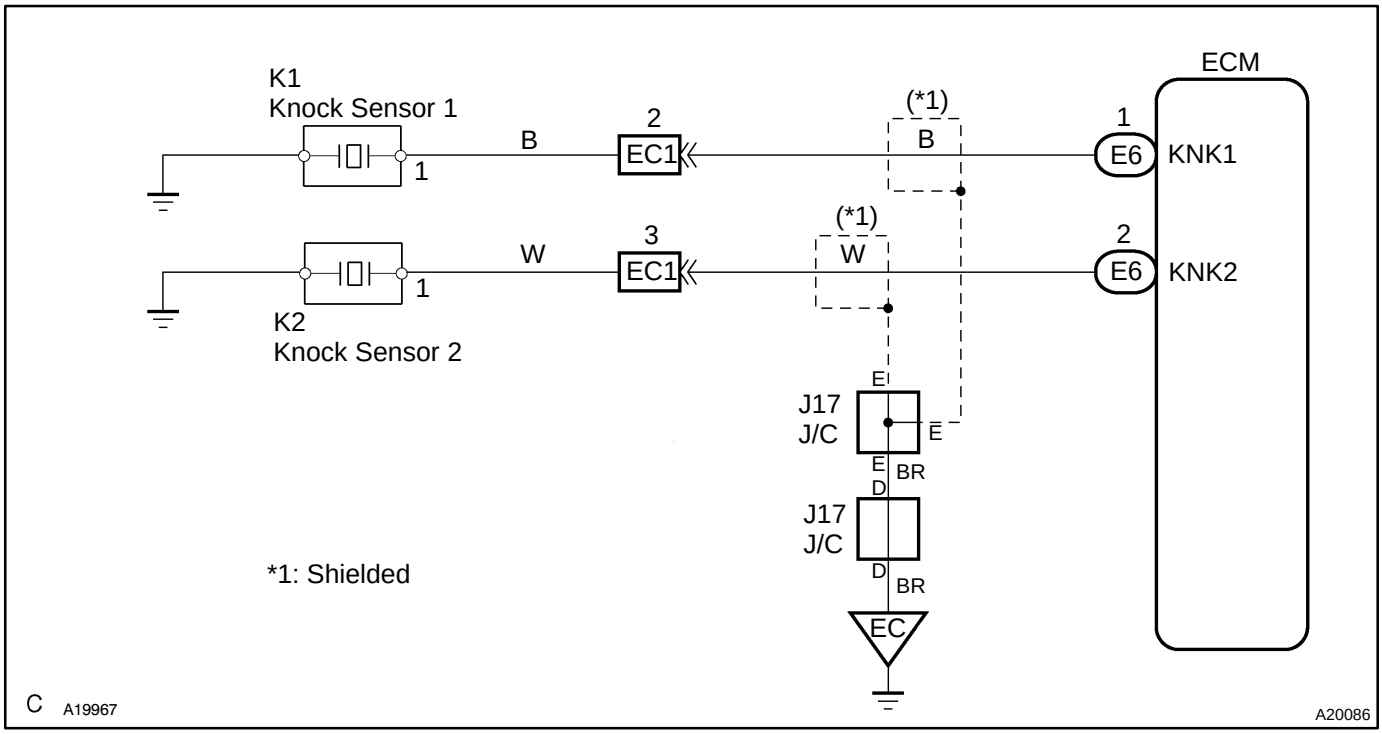
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10 V	-
Idle	OFF	
Time after engine start	5 sec.	-
Engine coolant temperature	60°C (140°F)	-
Intake air amount per revolution	0.45 g/rev	-
Engine speed	2,000 rpm	5,400 rpm

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor failure is indicated when the knock sensor output level is below the specific threshold for:	10 sec.

WIRING DIAGRAM

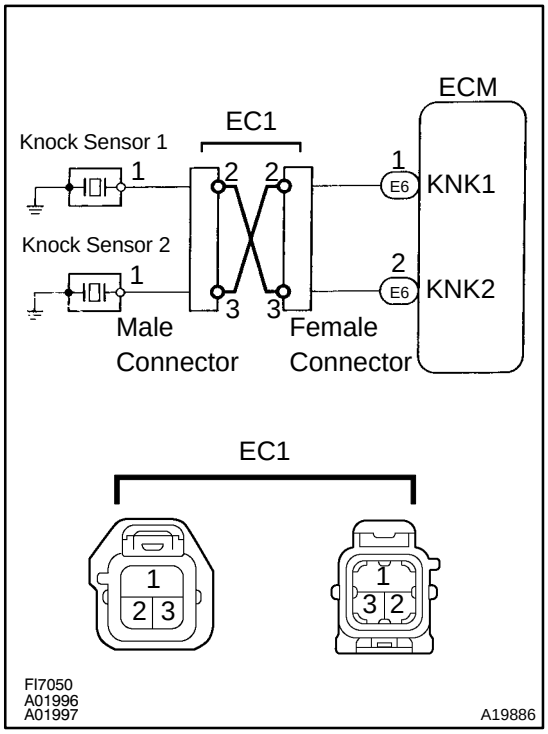


INSPECTION PROCEDURE

HINT:

★ DTC P0325 is for the bank 1 knock sensor circuit.
★ DTC P0330 is for the bank 2 knock sensor circuit.
★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Connect OBD II scan tool or hand-held tester, and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or hand-held tester to the DLC3.
(b) Disconnect the EC1 connector.
(c) Connect the terminals of the disconnected EC1 male connector and EC1 female as follows.

Male connector ↔ Female connector
Terminal 2 ↔ Terminal 3
Terminal 3 ↔ Terminal 2

(d) Turn ignition switch ON and push the OBD II scan tool or hand-held tester main switch ON.
(e) After the engine is warmed up, perform quick racing to 4,000 rpm 3 times.

CHECK:

Check the DTC.

RESULT:

Type I	DTC same as when vehicle brought in P0325 → P0325 or P0330 → P0330
Type II	DTC different to when vehicle brought in P0325 → P0330 or P0330 → P0325

Type II	**Go to step 3.**

Type I

2	**Check for open and short in harness and connector between EC1 connector and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN-36).**

HINT:

★ If DTC P0325 has changed to P0330, check the knock sensor circuit on the bank 1 side.
★ If DTC P0330 has changed to P0325, check the knock sensor circuit on the bank 2 side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.

DIC2D-01

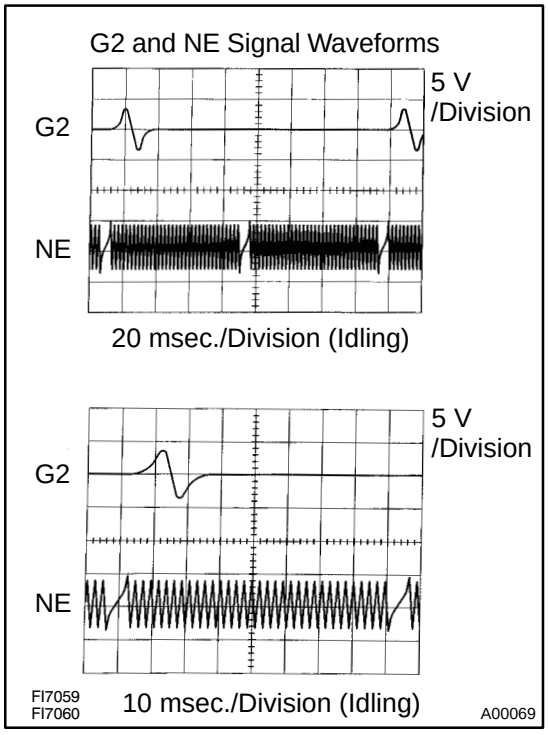
DTC	P0335	Crankshaft Position Sensor ”A” Circuit

DTC	P0339	Crankshaft Position Sensor ”A” Circuit Intermittent

CIRCUIT DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pick-up coil. The sensor plate has 34 teeth and is installed on the crankshaft. The pick-up coil is made of an iron core and magnet. The sensor plate rotates and as each tooth passes through the pick-up coil, a pulse signal is created. The pick-up coil generates 34 signals for each 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.

DTC No.	DTC Detecting Condition	Trouble Area
P0335	No crankshaft position sensor signal to ECM during cranking (2 trip detection logic)	★Open or short in crankshaft position sensor circuit ★Crankshaft position sensor ★Signal plate ★ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	
P0339	In condition (a), (b) and (c), when no crankshaft position sensor (NE) signal is input for 0.05 sec. or more. : (1 trip detection logic) (c) Engine revolution 1000 rpm or more (d) STA signal is OFF (e) 3 sec. or more has lapsed after STA signal is switched from ON to OFF.	



Reference: Inspection using the oscilloscope.

The correct waveform is as shown.

Tester Connection	Specified Condition
G2+ (E7-27) - G2- (E7-32)	Correct waveform is as shown
NE+ (E7-25) - NE- (E7-24)	

MONITOR DESCRIPTION

If there is no signal from the crankshaft sensor even though the engine is revolving, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0335	Crankshaft position sensor range check or rationality
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Engine speed sensor
Frequency of operation	Continuous	
Duration	Case 1: 4.7 sec. Case 2: 0.016 sec. Case 3: 2 rev x 5 times	
MIL operation	Case 1: 2 driving cycles Case 2, 3: 1 driving cycle	
Sequence of operation	None	

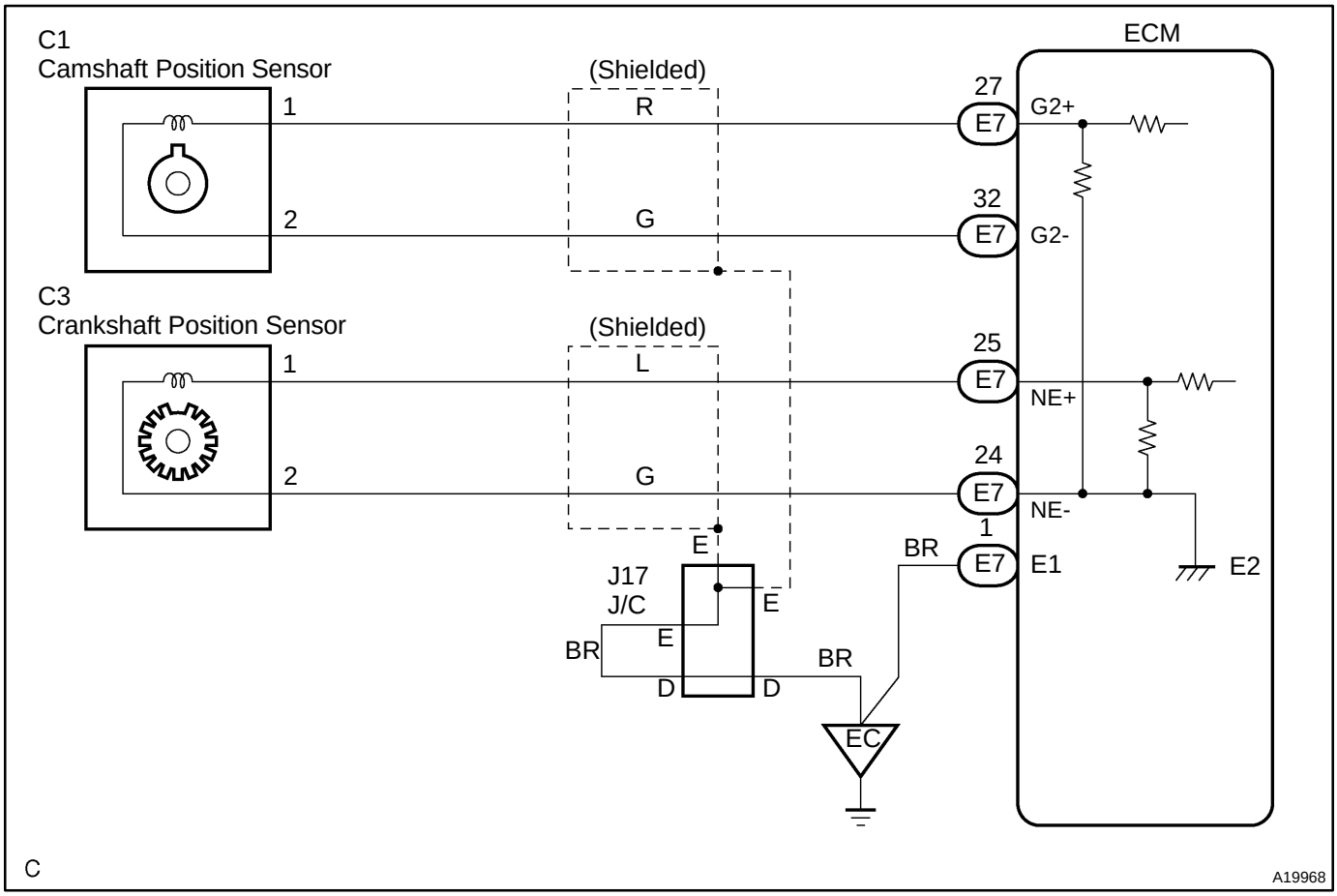
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Case 1:		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
Case 2:		
Engine speed	600 rpm	-
Starter	OFF	
Time after starter ON to OFF	3 sec.	-
Case 3:		
Time after starter ON to OFF	0.3 sec.	-
Number of camshaft position sensor signal pulse	1	
Battery voltage	7 V	-
Minimum battery voltage while starter ON	-	11 V

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Case 1:	
Engine speed signal	No signal for 4.7 sec.
Case 2:	
Engine speed signal	No signal for 0.016 sec.
Case 3:	
Number of crankshaft position sensor signal pulse	17 or more and 29 or less

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

★ Read freeze frame data using the hand-held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting it is useful for determining whether the vehicle was running or stopped. the engine was warmed up or not, the air-fuel ratio lean or rich, etc. at the time of the malfunction.

★ READ VALUE OF HAND-HELD TESTER OR OBD II SCAN TOOL

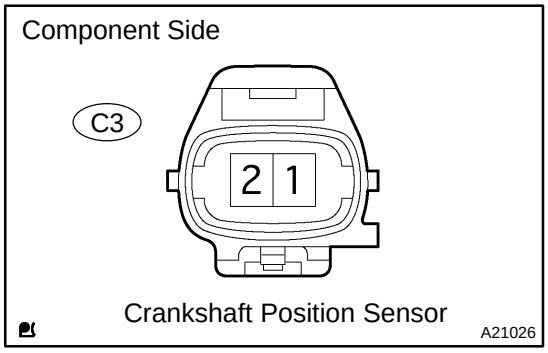
(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Start the engine and push the hand-held tester or the OBD II scan tool main switch ON.

(c) Select the item ”DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / ENGINE SPD”.

★ The engine speed can be confirmed in DATA LIST using the hand-held tester or OBD II scan tool. If there is no NE signals from the crankshaft position sensor despite the engine revolving, the engine speed will be indicated as zero. If voltage output of the crankshaft position sensor is insufficient, the engine speed will be indicated as lower RPM (than the actual RPM).

1	**Check resistance of crankshaft position sensor.**



PREPARATION:

Disconnect the C3 crankshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Tester Connection	Specified Condition
1 - 2	985 to 1,600 Ω at cold
	1,265 to 1,890 Ω at hot

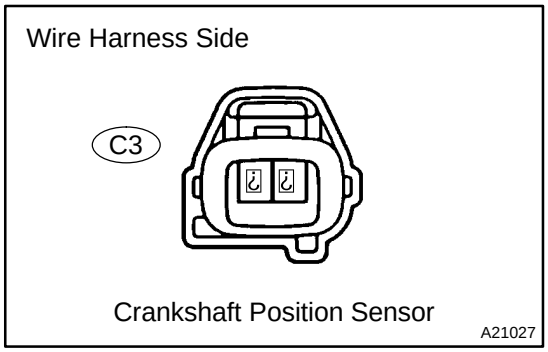
NOTICE:

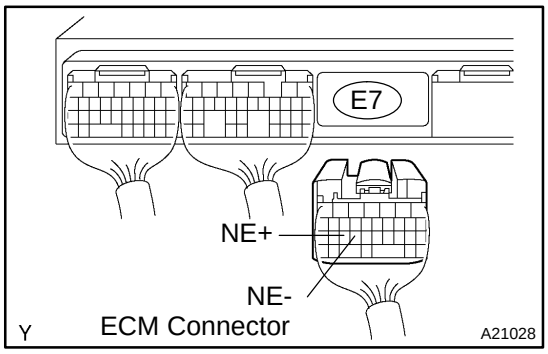
” Cold” and ”Hot” shown above mean the temperature of the coils themselves. ”Cold” is form -10˚C (14˚F) to 50˚C (122˚F) and ”Hot” is from 50˚C (122˚F) to 100˚C (212˚F).

NG → **Replace crankshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and crankshaft position sensor.





PREPARATION:

(a) Disconnect the C3 crankshaft position sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Crankshaft position sensor (C3-1) - NE+ (E7-25)	Below 1 Ω
Crankshaft position sensor (C3-2) - NE- (E7-24)	Below 1 Ω
Crankshaft position sensor (C3-1) or NE+ (E7-25) - Body ground	10 kΩ or higher
Crankshaft position sensor (C3-2) or NE- (E7-24) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	Check sensor installation (crankshaft position sensor).

CHECK:

Check the crankshaft position sensor installation.

NG → **Tighten sensor.**

OK

4	**Inspect teeth of sensor plate.**

PREPARATION:
Remove the crankshaft angle sensor plate (See page EM-15).
CHECK:
Check the teeth of sensor plate.

NG → **Replace sensor plate.**

OK

Replace ECM (See page SF-60).

DIC2E-01

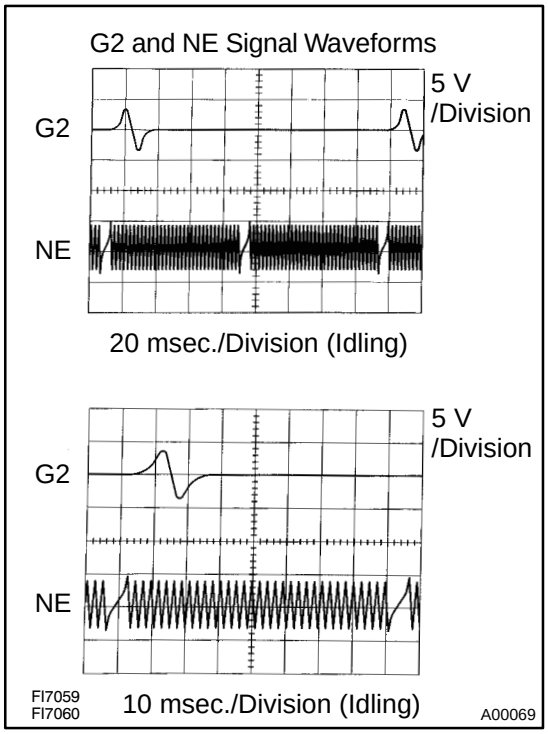
DTC	P0340	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)

DTC	P0341	Camshaft Position Sensor ”A” Circuit Range/Performance (Single Sensor)

CIRCUIT DESCRIPTION

The camshaft position sensor (G signal) consists of a magnet iron core and pickup coil.
The G signal plate has 1 tooth on its outer circumference and is installed on the LH camshaft timing pulley. When the camshafts rotate, protrusion on the signal plate and air gap on the pickup coil change, causing fluctuations in the magnetic field and generating a voltage in the pickup coil.
The NE signal plate has 34 teeth and is mounted on the crankshaft. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the crankshaft angle and the engine revolution based on the NE signals, and the cylinder and the angle of the G2 based on the combination of the G and NE signals.

DTC No.	DTC Detection Condition	Trouble Area
P0340	No camshaft position sensor signal to ECM during cranking (2 trip detection logic)	★Open or short in camshaft position sensor circuit ★Camshaft position sensor ★LH camshaft timing pulley ★Jumping teeth of timing belt ★ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more (1 trip detection logic)	
P0341	While crankshaft rotates twice, camshaft position sensor signal will be input to ECM 12 times or more (1 trip detection logic) ★Hint: Under normal condition, the camshaft position signal is input into the ECM 3 times per 2 engine revolutions	



Reference: Inspection using the oscilloscope.
The correct waveform is as shown.

Tester Connection	Specified Condition
G2+ (E7-27) - G2- (E7-32)	Correct waveform is as shown
NE+ (E7-25) - NE- (E7-24)	

MONITOR DESCRIPTION

If there is no signal from the camshaft position sensor even though the engine is turning, or if the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

MONITOR STRATEGY

Related DTCs	P0340	Camshaft position sensor (Bank 1) range check or rationality
	P0341	Camshaft position sensor (Bank 1) range check or rationality
Required sensors/components	Main sensors/components	Camshaft position sensor
	Related sensors/components	Crankshaft position sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	5 sec.	
MIL operation	P0340 case 1 (no signal): 2 driving cycles P0340 case 2 (mis-aligned), P0341: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P0340 Case 1 (No signal):		
Starter	ON	
Minimum battery voltage while starter ON	-	11 V
P0340 Case 2 (Mis-aligned):		
Engine speed	600 rpm	-
Starter	OFF	
P0341:		
Starter	After OFF to ON timing	
Engine revolution	720°CA	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0340 Case 1 (No signal):	
Camshaft position sensor signal	No signal
P0340 Case 2 (Mis-aligned):	
Crankshaft/camshaft alignment is mis-aligned (judged by comparing the crankshaft position to the camshaft position)	
Camshaft position sensor signal: No input in appropriate timing.	
P0341:	
Crankshaft/Camshaft alignment	Mis-aligned
Camshaft position sensor count	12 or more / 720°CA (= Engine 2 revolutions)

COMPONENT OPERATING RANGE

Parameter	Standard Value
Camshaft position sensor signal input during every 720°CA	3

WIRING DIAGRAM

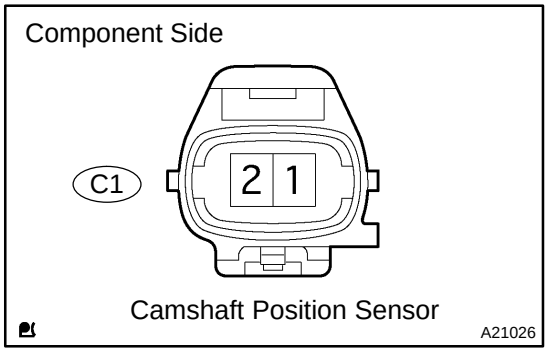
Refer to DTC P0335 on page DI-191 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Check resistance of camshaft position sensor.**



PREPARATION:

Disconnect the C1 camshaft position sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2.

OK:

Tester Connection	Specified Condition
1 - 2	1,630 to 2,740 Ω at cold
	2,065 to 3,225 Ω at hot

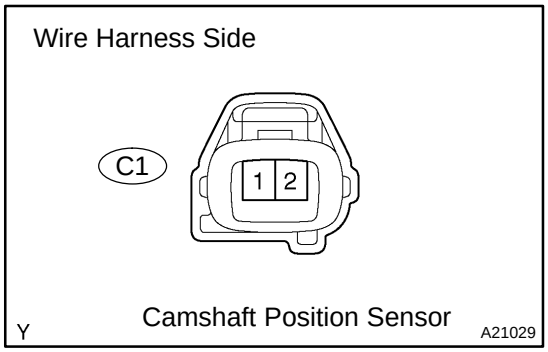
NOTICE:

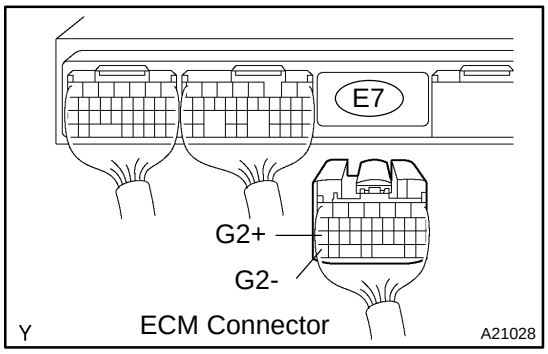
" Cold" and "Hot" shown above mean the temperature of the coils themselves. "Cold" is from -10°C (14°F) to 50°C (122°F) and "Hot" is from 50°C (122°F) to 100°C (212°F).

NG → **Replace camshaft position sensor.**

OK

2	Check for open and short in harness and connector between ECM and camshaft position sensor.





PREPARATION:

(a) Disconnect the C1 camshaft position sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Camshaft position sensor (C1-1) - G2+ (E7-27)	Below 1 Ω
Camshaft position sensor (C1-2) - G2- (E7-32)	Below 1 Ω
Camshaft position sensor (C1-1) or G2+ (E7-27) - Body ground	10 kΩ or higher
Camshaft position sensor (C1-2) or G2- (E7-32) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	Check sensor installation (Camshaft position sensor).

CHECK:

Check the camshaft position sensor installation.

NG → **Tighten sensor.**

OK

4	**Inspect teeth of LH camshaft timing belt pulley.**

PREPARATION:

Remove the LH camshaft timing belt pulley (See page EM-35).

CHECK:

Check the LH camshaft timing belt pulley.

NG → **Replace LH camshaft timing pulley.**

OK

Replace ECM (See page SF-60).

DIC2F-01

DTC	P0351	Igniter Coil ”A” Primary/Secondary Circuit

DTC	P0352	Igniter Coil ”B” Primary/Secondary Circuit

DTC	P0353	Igniter Coil ”C” Primary/Secondary Circuit

DTC	P0354	Igniter Coil ”D” Primary/Secondary Circuit

DTC	P0355	Igniter Coil ”E” Primary/Secondary Circuit

DTC	P0356	Igniter Coil ”F” Primary/Secondary Circuit

DTC	P0357	Igniter Coil ”G” Primary/Secondary Circuit

DTC	P0358	Igniter Coil ”H” Primary/Secondary Circuit

HINT:

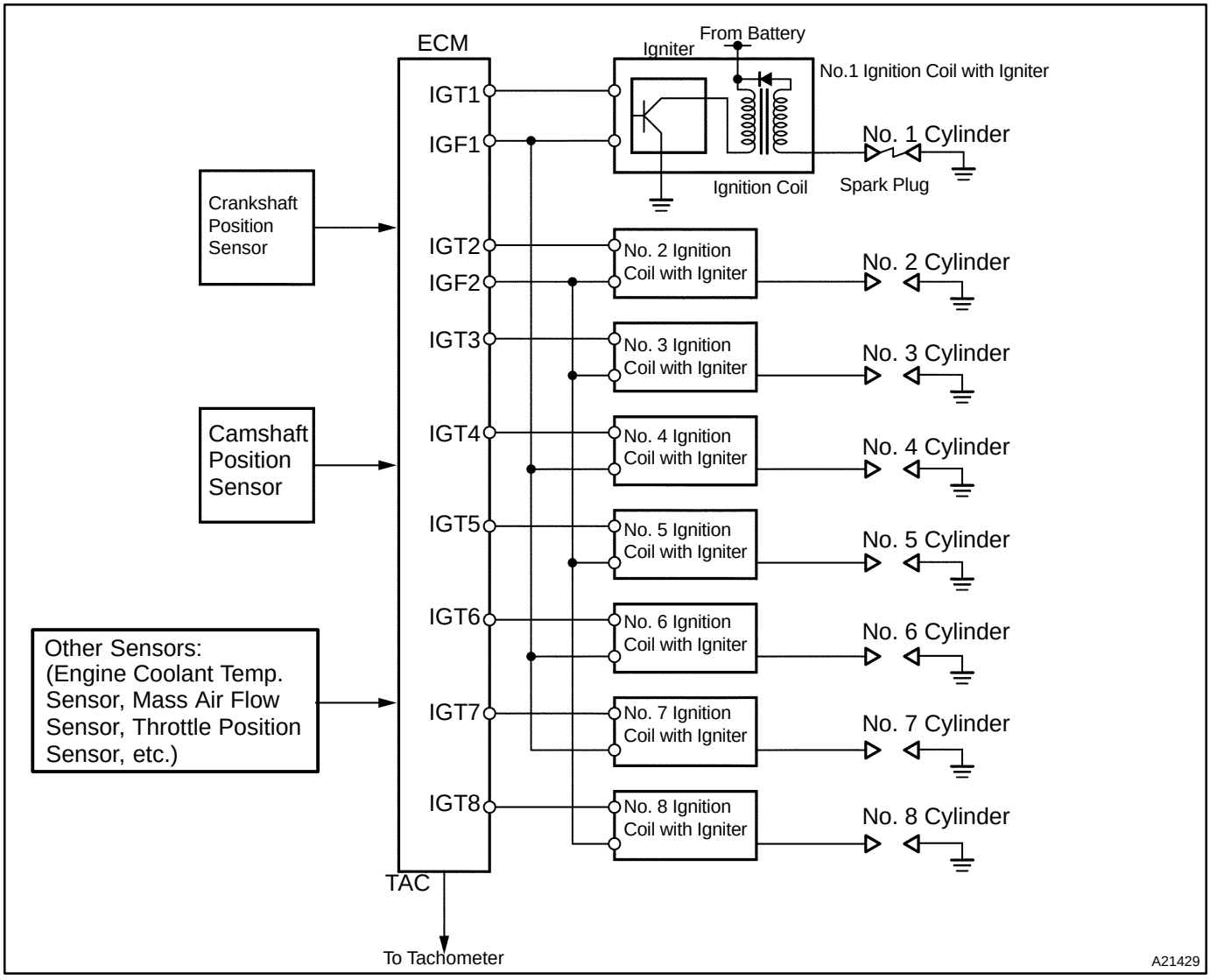
★ These DTCs indicate a malfunction related to primary circuit.
★ If DTC P0351 is displayed, check No. 1 ignition coil with igniter circuit.
★ If DTC P0352 is displayed, check No. 2 ignition coil with igniter circuit.
★ If DTC P0353 is displayed, check No. 3 ignition coil with igniter circuit.
★ If DTC P0354 is displayed, check No. 4 ignition coil with igniter circuit.
★ If DTC P0355 is displayed, check No. 5 ignition coil with igniter circuit.
★ If DTC P0356 is displayed, check No. 6 ignition coil with igniter circuit.
★ If DTC P0357 is displayed, check No. 7 ignition coil with igniter circuit.
★ If DTC P0358 is displayed, check No. 8 ignition coil with igniter circuit.

CIRCUIT DESCRIPTION

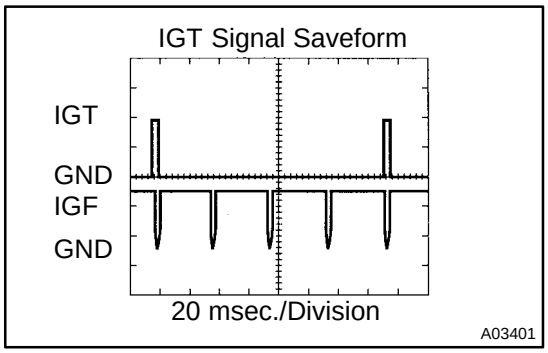
These DTCs indicate a malfunction related to primary circuit.

The DIS is a 1-cylinder ignition system which ignites one cylinder with one ignition coil. In the 1-cylinder ignition system, the one spark plug is connected to the end of the secondary winding. High voltage generated in the secondary winding is applied directly to the spark plug. The spark of the spark plug passes from the center electrode to the ground electrode.

The ECM determines the ignition timing and outputs the ignition signals (IGTs) for each cylinder. Using the IGT, the ECM turns on and off the power transistor inside the igniter and this switches on and off the current to the primary coil. When current to the primary coil is cut off, high-voltage is generated in the secondary coil and this voltage is applied to the spark plugs to create sparks inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back the ignition confirmation signal (IGF) for each cylinder ignition to the ECM.

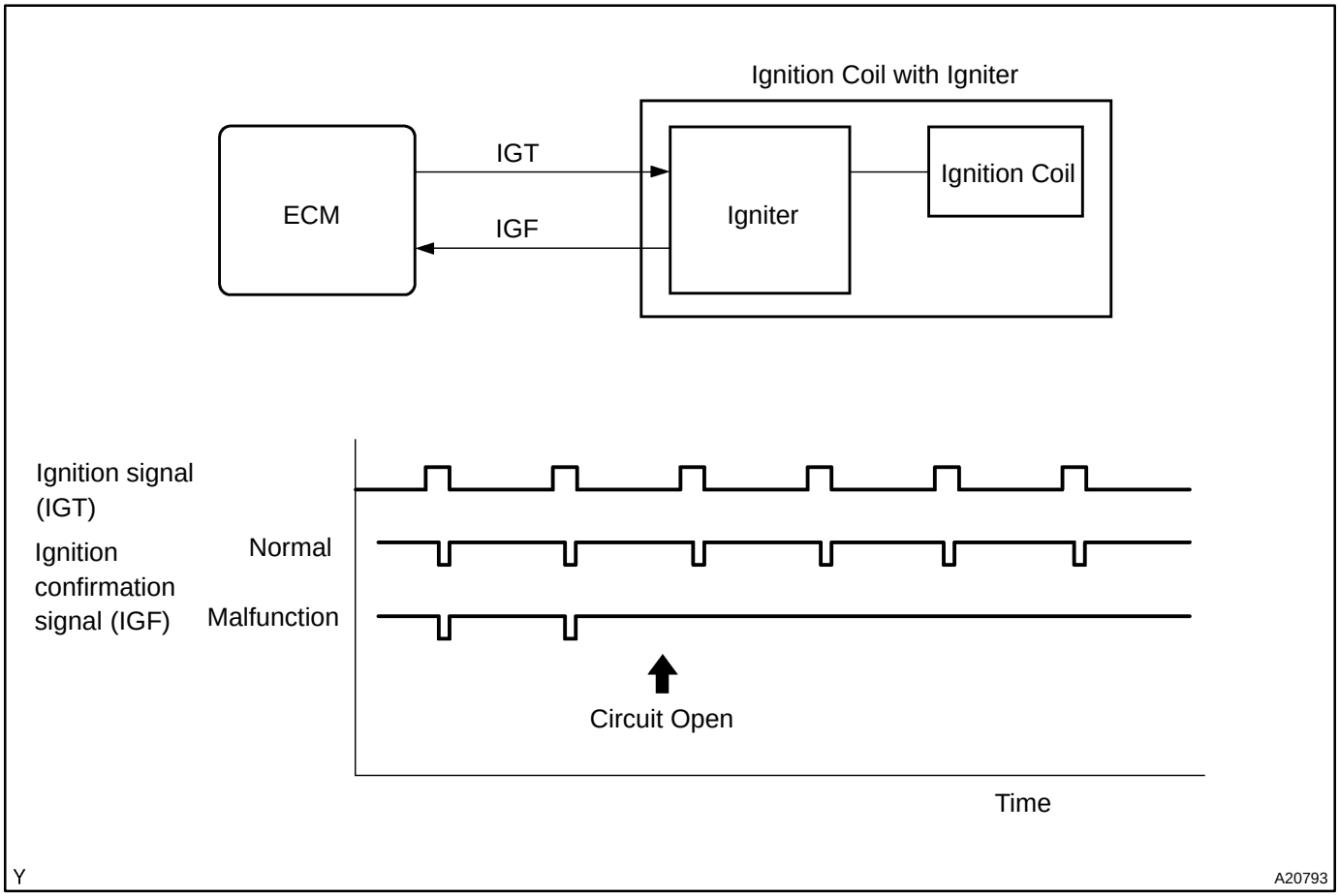


DTC No.	DTC Detecting Condition	Trouble Area
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	No IGF signal to ECM while engine is running	★Open or short in IGF1 or IGF2 and IGT1 to IGT8 circuit from ignition coil with igniter to ECM ★No. 1 to No. 8 ignition coil with igniter ★Ignition system ★ECM



Reference: Inspection using the oscilloscope.
During cranking or idling, check the waveform between terminals IG1 to IG8 and E1, and IGF1, IGF2 and E1 of the E5 and E7 ECM connectors.

MONITOR DESCRIPTION



If the ECM does not receive the IGF after sending the IGT it interprets this as a fault in the igniter and sets a DTC.

MONITOR STRATEGY

Related DTCs	P0351	No. 1 ignition coil with igniter circuit malfunction
	P0352	No. 2 ignition coil with igniter circuit malfunction
	P0353	No. 3 ignition coil with igniter circuit malfunction
	P0354	No. 4 ignition coil with igniter circuit malfunction
	P0355	No. 5 ignition coil with igniter circuit malfunction
	P0356	No. 6 ignition coil with igniter circuit malfunction
	P0357	No. 7 ignition coil with igniter circuit malfunction
	P0358	No. 8 ignition coil with igniter circuit malfunction
Required sensors/components	Igniter	
Frequency of operation	Continuous	
Duration	0.256 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Engine speed	-	1,500 rpm
Either of the following conditions is met:	A or B	
A. Following conditions are met:	(a) and (b)	
(a) Engine speed	-	500 rpm
(b) Battery voltage	6 V	-
B. Following conditions are met:	(a) and (b)	
(a) Engine speed	500 rpm	-
(b) Battery voltage	10 V	-

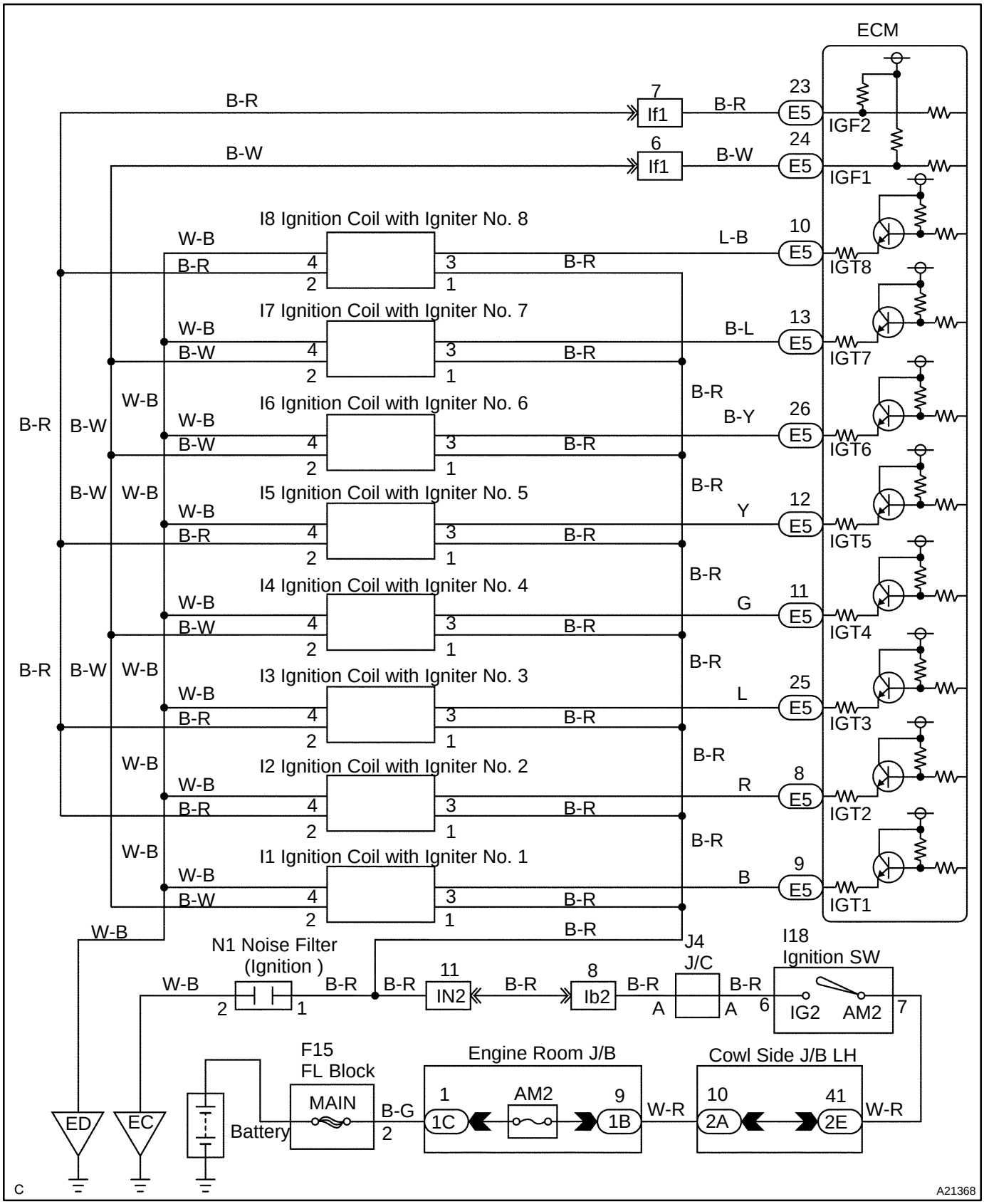
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
”Ignition signal fail count”	More than 2
”Ignition signal fail count” is as follows:	When IGF should have returned despite sending IGT.

COMPONENT OPERATING RANGE

Standard Value
Confirmed signal number = ignition signal number

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

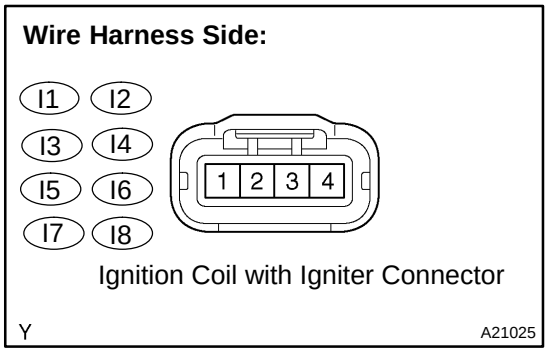
- ★ If DTCs P0351, P0354, P0356 and P0357 are output simultaneously, IGF1 circuit may be open or short.
- ★ If DTCs P0352, P0353, P0355 and P0358 are output simultaneously, IGF2 circuit may be open or short.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data 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, as well as other data from the time when a malfunction occurred.

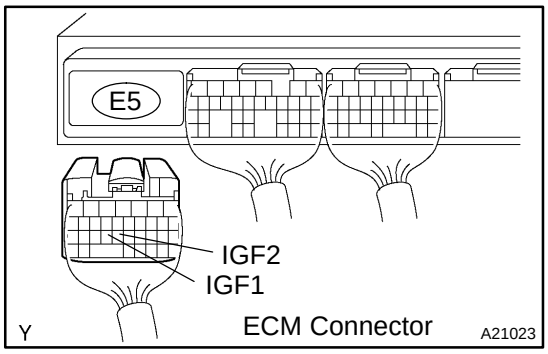
1	**Check spark plug and spark (See page IG-1).**

NG → **Go to step 4.**

OK

2	**Check for open and short in harness and connector in IGF signal circuits between ECM and ignition coil with igniter.**





PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil will igniter connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

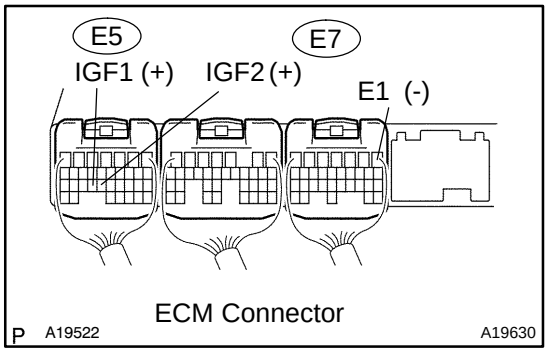
OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I2-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I3-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I4-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I5-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I6-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I7-2) - IGF1 (E5-24)	Below 1 Ω
Ignition coil (I8-2) - IGF2 (E5-23)	Below 1 Ω
Ignition coil (I1-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGF1 (E5-24) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGF2 (E5-23) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGF1, IGF2 and E1 of ECM connector.**



PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between the E5 and E7 ECM connectors.

OK:

Tester Connection	Specified Condition
IGF1 (E5-24) - E1 (E7-1)	4.5 to 5.5 V
IGF2 (E5-23) - E1 (E7-1)	4.5 to 5.5 V

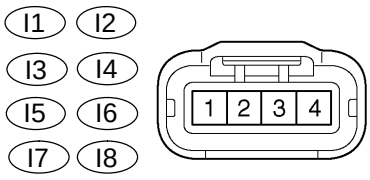
NG → **Replace ECM (See page SF-60).**

OK →

Replace ignition coil with igniter.

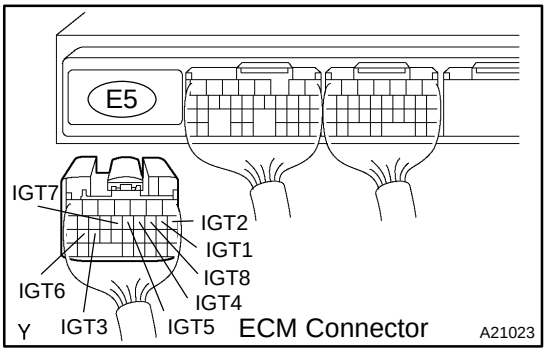
4	**Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter.**

Wire Harness Side:



Ignition Coil with Igniter Connector

Y A21025



ECM Connector A21023

PREPARATION:

(a) Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil connector.

(b) Disconnect the E5 ECM connector.

CHECK:

Check the resistance between the wire harness side connectors.

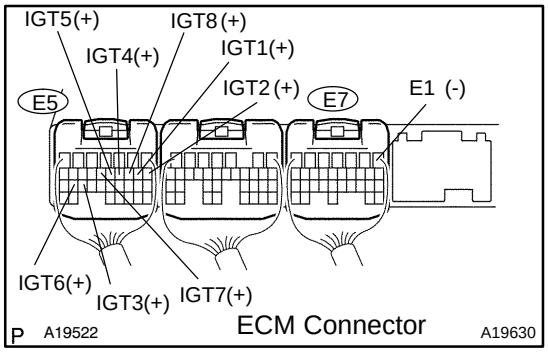
OK:

Tester Connection	Specified Condition
Ignition coil (I1-2) - IGT1 (E5-9)	Below 1 Ω
Ignition coil (I2-2) - IGT2 (E5-8)	Below 1 Ω
Ignition coil (I3-2) - IGT3 (E5-25)	Below 1 Ω
Ignition coil (I4-2) - IGT4 (E5-11)	Below 1 Ω
Ignition coil (I5-2) - IGT5 (E5-12)	Below 1 Ω
Ignition coil (I6-2) - IGT6 (E5-26)	Below 1 Ω
Ignition coil (I7-2) - IGT7 (E5-13)	Below 1 Ω
Ignition coil (I8-2) - IGT8 (E5-10)	Below 1 Ω
Ignition coil (I1-2) or IGT1 (E5-9) - Body ground	10 kΩ or higher
Ignition coil (I2-2) or IGT2 (E5-8) - Body ground	10 kΩ or higher
Ignition coil (I3-2) or IGT3 (E5-25) - Body ground	10 kΩ or higher
Ignition coil (I4-2) or IGT4 (E5-11) - Body ground	10 kΩ or higher
Ignition coil (I5-2) or IGT5 (E5-12) - Body ground	10 kΩ or higher
Ignition coil (I6-2) or IGT6 (E5-26) - Body ground	10 kΩ or higher
Ignition coil (I7-2) or IGT7 (E5-13) - Body ground	10 kΩ or higher
Ignition coil (I8-2) or IGT8 (E5-10) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

5	Check voltage between terminals IGT1 - IGT8 and E1 of ECM connector and body ground.



CHECK:

Measure the voltage between terminals the E5 and E7 ECM connectors when the engine is cranked.

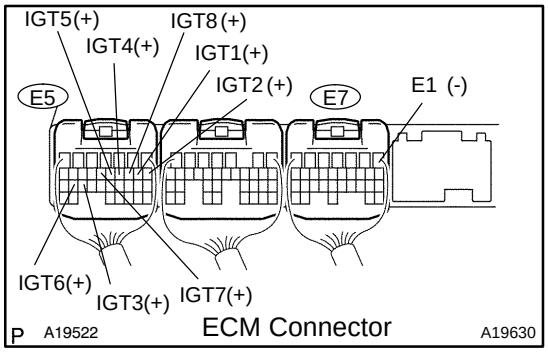
OK:

Tester Connection	Specified Condition
IGT1 (E5-9) - E1 (E7-1)	More than 0.1 V or less than 4.5 V
IGT2 (E5-8) - E1 (E7-1)	
IGT3 (E5-25) - E1 (E7-1)	
IGT4 (E5-11) - E1 (E7-1)	
IGT5 (E5-12) - E1 (E7-1)	
IGT6 (E5-26) - E1 (E7-1)	
IGT7 (E5-13) - E1 (E7-1)	
IGT8 (E5-10) - E1 (E7-1)	

NG → **Replace ECM (See page SF-60).**

OK

6	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 - IGT8 of ECM connector and body ground.**



PREPARATION:

Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

CHECK:

Measure the voltage between terminals the E5 and E7 ECM connectors when the engine is cranked.

OK:

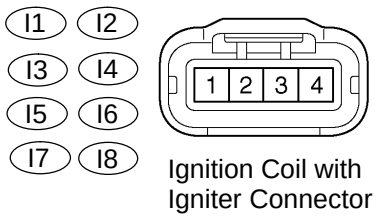
Tester Connection	Specified Condition
IGT1 (E5-9) - E1 (E7-1)	4.5 V or more
IGT2 (E5-8) - E1 (E7-1)	
IGT3 (E5-25) - E1 (E7-1)	
IGT4 (E5-11) - E1 (E7-1)	
IGT5 (E5-12) - E1 (E7-1)	
IGT6 (E5-26) - E1 (E7-1)	
IGT7 (E5-13) - E1 (E7-1)	
IGT8 (E5-10) - E1 (E7-1)	

NG → **Replace ECM (See page SF-60).**

OK →

7	Check ignition coil with igniter power source circuit.

Wire Harness Side:



Ignition Coil with Igniter Connector

Y A21025

PREPARATION:

Disconnect the I1, I2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

CHECK:

Measure the voltage between the terminal of the wire harness side connector and body ground.

OK:

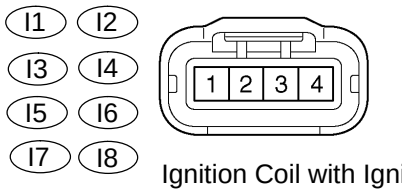
Tester Connection	Specified Condition
I1-1 - Body ground	9 to 14 V
I2-1 - Body ground	
I3-1 - Body ground	
I4-1 - Body ground	
I5-1 - Body ground	
I6-1 - Body ground	
I7-1 - Body ground	
I8-1 - Body ground	

OK → **Repair ignition coil with igniter.**

NG

8	**Check for open and short in harness and connector between ignition switch and ignition coil with igniter.**

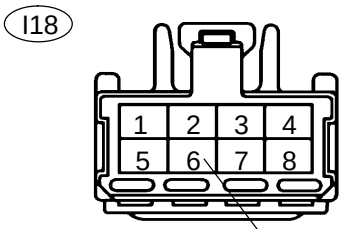
Wire Harness Side:



Ignition Coil with Igniter

Y A21025

Wire Harness Side:



Ignition Switch

A21030

PREPARATION:

(a) Disconnect the I1, 2, I3, I4, I5, I6, I7 or I8 ignition coil with igniter connector.

(b) Disconnect the I18 ignition switch connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Ignition coil (I1-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I2-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I3-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I4-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I5-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I6-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I7-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I8-1) - IG2 (I18-6)	Below 1 Ω
Ignition coil (I1-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I2-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I3-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I4-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I5-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I6-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I7-1) or IG2 (I18-6) - Body ground	10 kΩ or higher
Ignition coil (I8-1) or IG2 (I18-6) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace ignition coil with igniter.

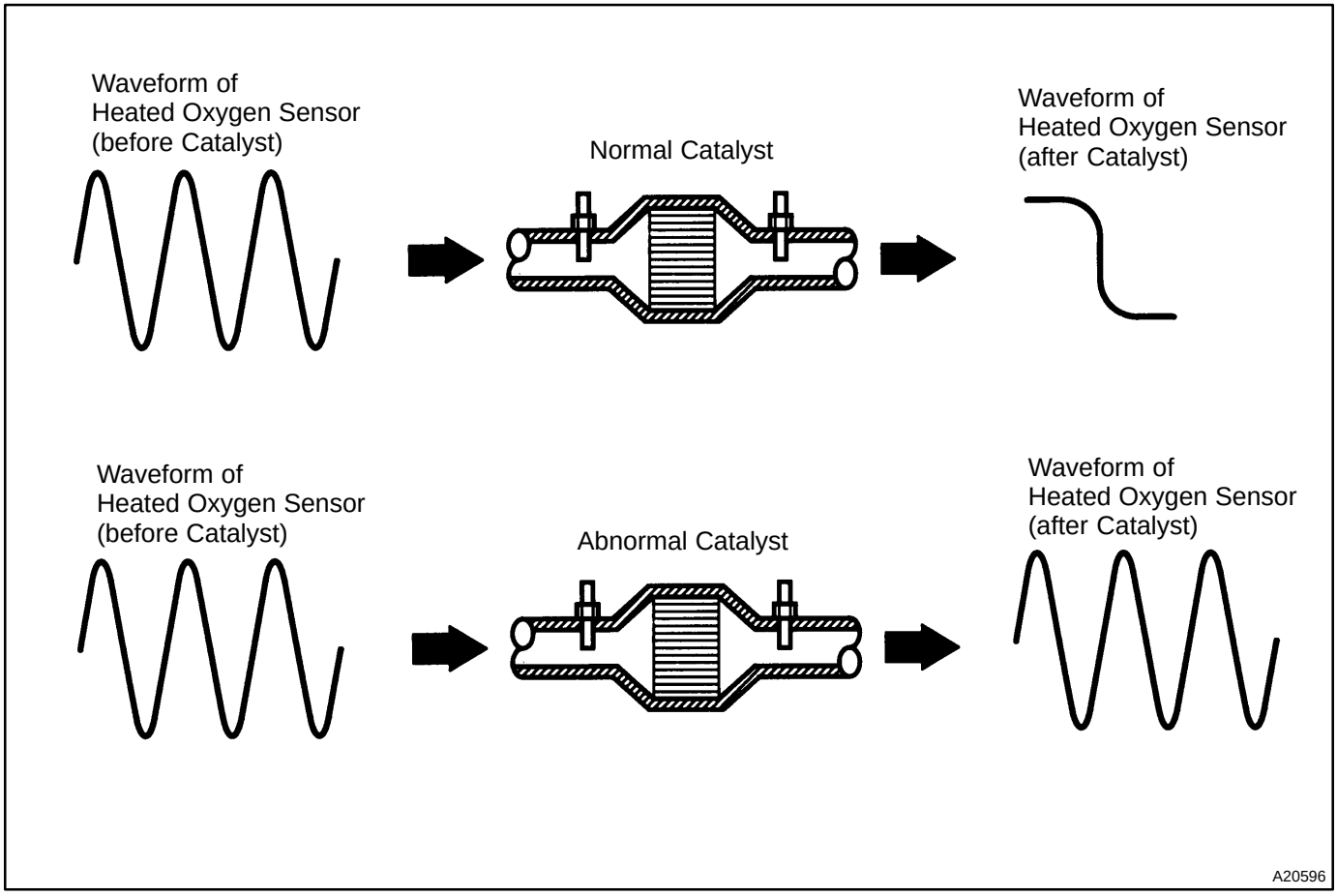
DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

DTC	P0430	Catalyst System Efficiency Below Threshold (Bank 2)

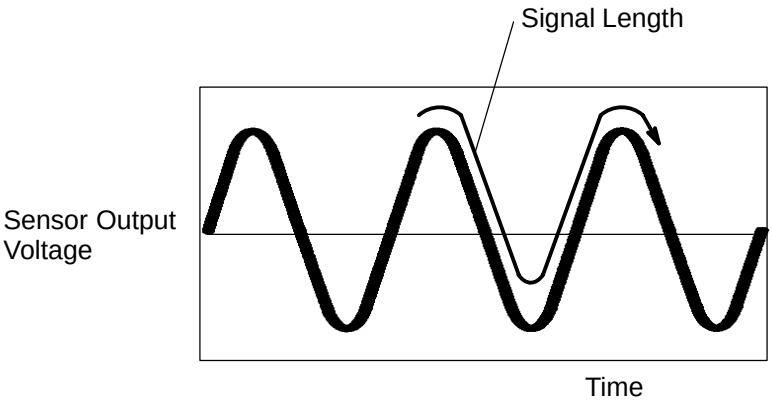
MONITOR DESCRIPTION

The vehicle is equipped with two heated oxygen sensors. One is mounted upstream from the TWC (Three-Way Catalytic) converter (Front Oxygen Sensor, "sensor 1"), the second is mounted downstream (Rear Oxygen Sensor "sensor 2"). The catalyst efficiency monitor compares the sensor 1 and sensor 2 signals in order to calculate TWC ability to store the oxygen.

During normal operation, the TWC stores and releases oxygen as needed. This results in low oxygen variations in the post TWC exhaust stream as shown below.



Heated Oxygen Sensor Signal Length



DTC No.	DTC Detecting Condition	Trouble Area
P0420 P0430	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensors have same amplitude (2 trip detection logic)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 1, 2 sensor 1, 2) ★Three-way catalytic converter

HINT:

- ★ Bank 1 refers to the bank that includes cylinder No.1.
- ★ Bank 2 refers to the bank that does not include cylinder No.1.
- ★ Sensor 1 refers to the sensor closest to the engine assembly.
- ★ Sensor 2 refers to the sensor farthest away from the engine assembly.

MONITOR STRATEGY

Related DTCs	P0420	Bank 1 catalyst is deteriorated
	P0430	Bank 2 catalyst is deteriorated
Required sensors/components	Main sensors/components	Front and rear heated oxygen sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor, Engine speed sensor, Intake air temperature sensor
Frequency of operation	Once per driving cycle	
Duration	90 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	11 V	-
Intake air temperature	-10 □C (14□F)	-
Idle	OFF	
Intake air amount	8 g/sec.	50 g/sec.
Engine speed	-	4,000 rpm
Engine coolant temperature	75˚C (167˚F)	
Estimated catalyst temperature conditions are met:	A and B	
A. Estimated temperature of up stream catalyst	450□C (842□F)	820□C (1,508□F)
B. Estimated temperature of down stream catalyst	450□C (842□F)	820□C (1,508□F)
Fuel system status	Closed loop	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Catalyst deterioration level (Heated oxygen sensor locus length ratio)	0.6 or more
Number of times detection	8 times

MONITOR RESULT

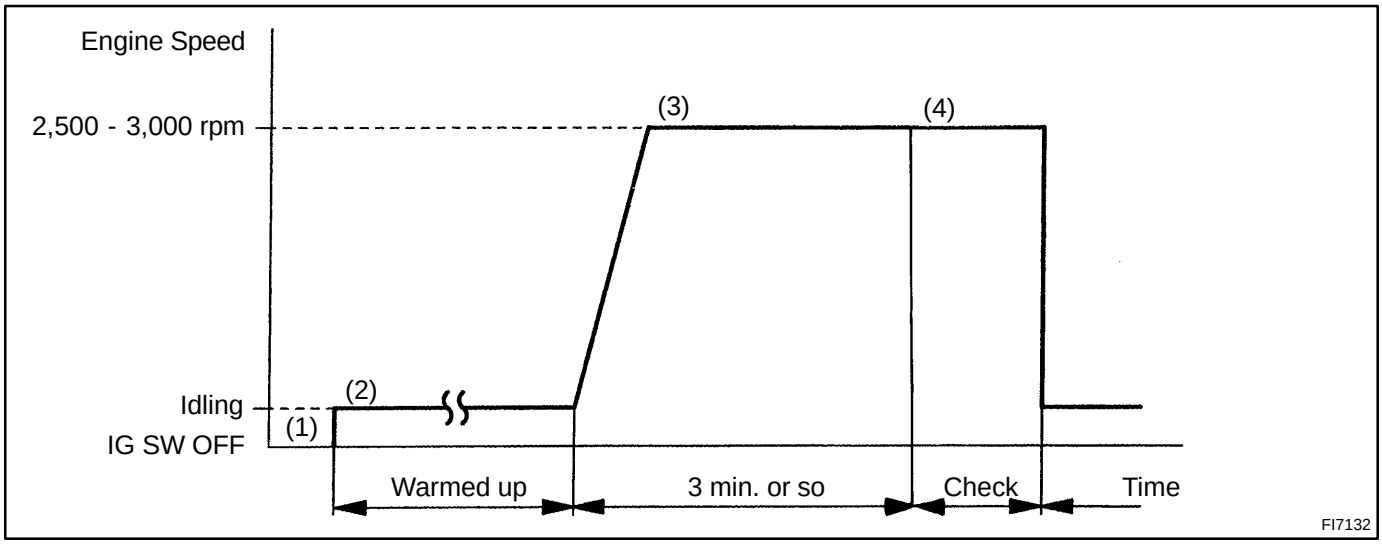
The detailed information is described in "CHECKING MONITOR STATUS" (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

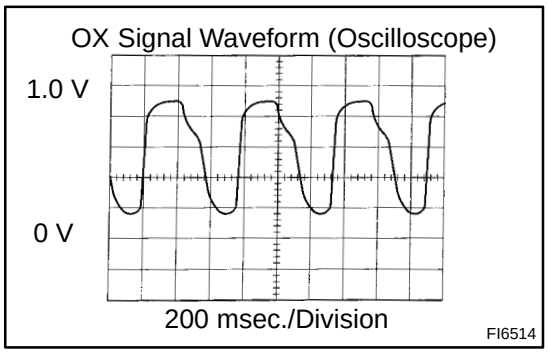
TID $01: Catalyst- Using Front HO2S and Rear HO2S

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
0	$01	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 1: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion
0	$02	Multiply by 0.0078 (no dimension)	Catalyst deterioration level bank 2: Determined by waveform of front HO2S and rear HO2S	Malfunction criterion

CONFIRMATION ENGINE RACING PATTERN



(a) Connect the hand-held tester to the DLC3, or connect the probe of the oscilloscope between terminals OXL1, OXL2, OXR1, OXR2 and E1 of the ECM connector.
(b) Start the engine and warm it up with all accessories switched OFF until engine coolant temperature is stable.
(c) Race the engine at 2,500 - 3,000 rpm for about 3 minutes.
(d) After confirming that the waveform of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)), oscillate around 0.5 V during feedback to the ECM, check the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)).



HINT:
If there is a malfunction in the system, the waveform of the heated oxygen sensor (bank 1, 2 sensor 2 (OX1B, OX2B)) is almost the same as that of the heated oxygen sensor (bank 1, 2 sensor 1 (OX1A, OX2A)) on the left.
There are some cases where, even though a malfunction exists, the MIL may either light up or not light up.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P0420 or P0430) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
”P0420 and/or P0430”	A
”P0420 or P0430” and other DTCs	B

HINT:

If any other codes besides ”P0420 and/or P0430” are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Check gas leakage on exhaust system.**

NG → **Repair or replace exhaust gas leakage point.**

OK

3	**Check heated oxygen sensor (bank 1, 2 sensor 1) (See page SF-57).**

HINT:

Refer to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

4	**Check heated oxygen sensor (bank 1, 2 sensor 2) (See page SF-57).**

HINT:
Refer to the hint following the end of this flowchart.

NG → **Replace heated oxygen sensor.**

OK

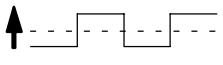
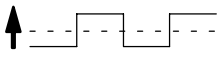
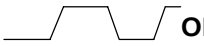
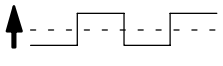
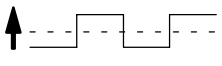
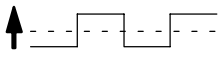
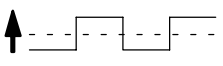
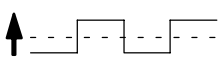
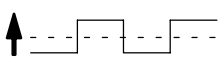
Replace the front and rear three-way catalytic converter in the bank a malfunction is detected.

HINT:
Hand-held tester only:
The narrowing down the trouble area is possible by performing ACTIVE TEST of the following ”A/F CONTROL” (Heated oxygen sensor or another can be distinguished).
(a) Perform ACTIVE TEST by hand-held tester (A/F CONTROL).
HINT:
”A/F CONTROL” is the ACTIVE TEST which changes the injection volume to -12.5 % or +25 %.
(1) Connect the hand-held tester to the DLC3 on the vehicle.
(2) Turn the ignition switch ON.
(3) Warm up the engine with the engine speed at 2,500 rpm for approximately 90 seconds.
(4) Select the item ”DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST / A/F CONTROL”.
(5) Perform ”A/F CONTROL” with the engine in an idle condition (press the right or left button).

RESULT:

Heated oxygen sensor reacts in accordance with increase and decrease of injection volume
+25 % → rich output: More than 0.5 V
-12.5 % → lean output: Less than 0.4 V

NOTICE:
However, there is a few second delay in the sensor 1 (front sensor) output. And there is about 20 seconds delay in the sensor 2 (rear sensor).

	Output voltage of heated oxygen sensor (sensor 1: front sensor)	Output voltage of heated oxygen sensor (sensor 2: rear sensor)	Mainly suspect trouble area
Case 1	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V  **OK**	—
Case 2	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Sensor 1: front sensor (sensor 1, heater, sensor 1 circuit)
Case 3	Injection volume +25 % -12.5 %  Output voltage More than 0.5 V Less than 0.4 V **OK**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Sensor 2: rear sensor (sensor 2, heater, sensor 2 circuit)
Case 4	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Injection volume +25 % -12.5 %  Output voltage Almost no reaction **NG**	Extremely rich or lean of the actual air-fuel ratio (Injector, fuel pressure, gas leakage in exhaust system, etc.)

The following A/F CONTROL procedure enables the technician to check and graph the voltage output of the heated oxygen sensors (sensor 1 and 2).
For displaying the graph indication, enter ”ACTIVE TEST / A/F CONTROL / USER DATA” then select ”O2S B1S1 and O2S B1S2” by pressing ”YES” button and push ”ENTER” button before pressing ”F4” button.
NOTICE:
If the vehicle is short of fuel, the air-fuel ratio becomes LEAN and DTCs P0133 and/or P0153 will be recorded, and the MIL then comes on.

- ★ If different DTCs related to different systems while terminal E2 as ground terminal are output simultaneously, terminal E2 may be open.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ A high heated oxygen sensor (sensor 1) voltage (0.5 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 heated oxygen 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.

DIC2H-01

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Circuit

DTC	P2418	Evaporative Emission System Valve Control Circuit/Open

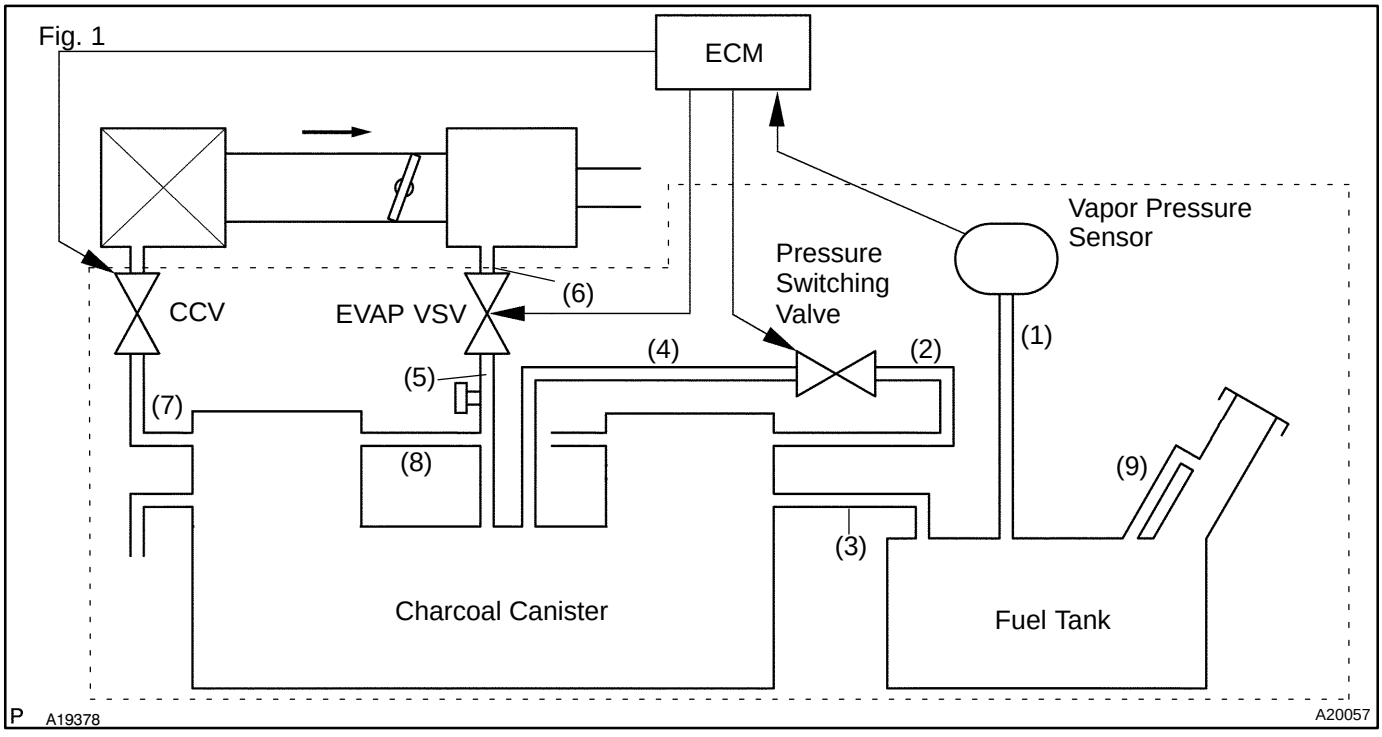
CIRCUIT DESCRIPTION

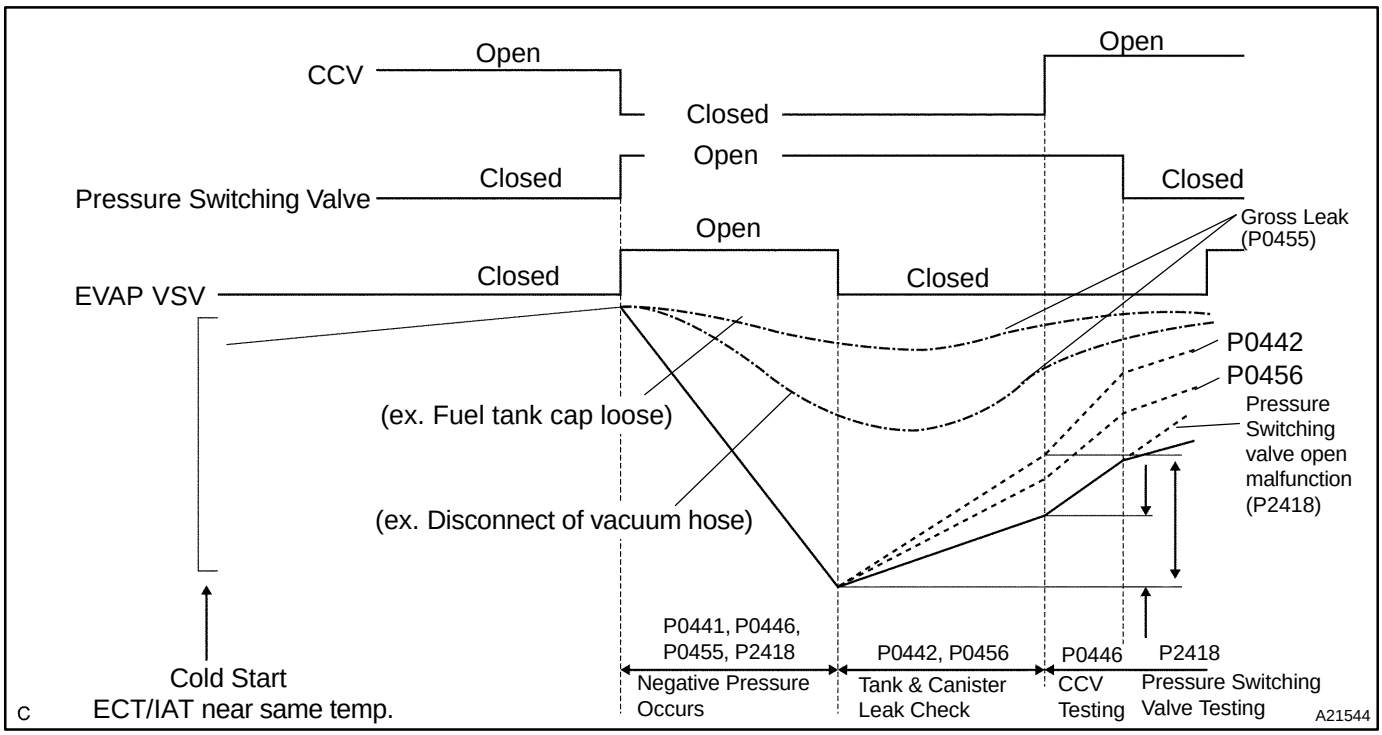
The vapor pressure sensor, canister closed valve (CCV), and pressure switching valve are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTCs P0441, P0446 and P2418 are recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when there is a malfunction in either the EVAP VSV, the pressure switching valve, or in the vapor pressure sensor itself.

Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0441	Pressure in charcoal canister and fuel tank does not drop during purge control (2 trip detection logic)	★Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★Open or short in VSV circuit for EVAP ★EVAP VSV ★Open or short in VSV circuit for CCV ★CCV ★Open or short in VSV circuit for pressure switching valve ★Pressure switching valve ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★ECM
	During purge cut-off, pressure is very low compared with atmospheric pressure (2 trip detection logic)	
P0446	No fuel tank pressure rise when commanding the CCV open after an EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	
P2418	No fuel tank pressure change when commanding the pressure switching valve closed for the check after the EVAP leak test	
	A high negative pressure (vacuum) does not occurs in the system when commanding the EVAP VSV open and CCV closed with the pressure switching valve open	

HINT:

Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		P0442 and/or P0456
Medium Leak (ex.: Vacuum hose loose)		P0455
Large Leak (ex.: Fuel tank cap loose)		P0441, P0446, P0455 and P2418
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0441, P0446, P0455 and P2418
CCV	Open Malfunction	P0441, P0446, P0455 and P2418
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P2418
	Close Malfunction	P0441, P0446, P0455 and P2418

*1: ECM may output some other DTC combination.

MONITOR DESCRIPTION

P0441

The ECM checks for a stuck closed malfunction in the EVAP VSV by commanding it to open with the CCV closed. If a high negative pressure does not develop in the fuel tank, the ECM determines that the EVAP VSV remains closed. The ECM turns on the MIL and a DTC is set.

The ECM checks for EVAP VSV ”stuck open” fault by commanding both valves (EVAP VSV and CCV) to close at a time when the fuel tank is at atmospheric pressure. If the fuel tank develops a high negative pressure at this early stage of the test, the ECM determines that the EVAP VSV is stuck OPEN.

The ECM will turn on the MIL and a DTC is set.

P0446

The ECM checks the CCV ”stuck closed” by commanding the CCV to open after the EVAP leak test. If the fuel tank pressure does not rise (lose vacuum), the ECM determines that the CCV is stuck closed. The ECM will turn on the MIL and a DTC is set.

If the EVAP VSV ”stuck closed” is detected, the ECM determines that the CCV is ”stuck open”. The ECM turns on the MIL and a DTC is set.

P2418

The ECM checks the pressure switching valve (bypass VSV) ”stuck open” by commanding the pressure switching valve to close after the EVAP leak test. If the fuel tank pressure does not change, the ECM determines that the pressure switching valve is malfunctioning. The ECM will turn on the MIL and a DTC is set.

If the EVAP VSV ”stuck closed” is detected, the ECM determines that the CCV is ”stuck closed”. The ECM turns on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0441	EVAP VSV malfunction
	P0446	CCV malfunction
	P2418	Bypass VSV malfunction
Required sensors/components	EVAP VSV, CCV, Bypass VSV and Vapor pressure sensor	
Frequency of operation	Once per drive cycle	
Duration	P0441 : 90 sec. P0446 : 10 sec. P2418 : 10 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Same as P0442 (see page DI-245).

TYPICAL MALFUNCTION THRESHOLDS

P0441

Detection Criteria	Threshold
Either the following condition is met:	A or B
A. Following conditions are met:	(a) and (b)
(a) Fuel tank pressure at the vacuum introduction start	-1.6 kPa (-12 mmHg, -0.47 in.Hg) or more
(b) Difference between the fuel tank pressure at the vacuum introduction start and completion	Less than 0.9 kPa (7 mmHg, 0.27 in.Hg)
B. Following conditions are met:	(a) and (b)
(a) Difference between ”minimum” fuel tank pressure before the leak check and the fuel tank pressure at 14 sec. after the leak check	0.5 kPa or more (3.5 mmHg, 0.15 in.Hg)
(b) Fuel tank pressure at 14 sec. after the leak check	Less than -3.7 kPa (-28 mmHg, -1.1 in.Hg)

P0446

Case 1: CCV stuck closed	
Fuel tank pressure when the CCV is opened after an EVAP leak check	Not changing
Case 2: CCV stuck open	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

P2418

Case 1: Bypass VSV stuck open	
Fuel tank pressure when the pressure switching valve is closed after an EVAP leak check	Not changing
Case 2: Bypass VSV stuck closed	
Fuel tank pressure after the EVAP VSV is opened and manifold vacuum is introduced to the fuel tank	Not changing

MONITOR RESULT

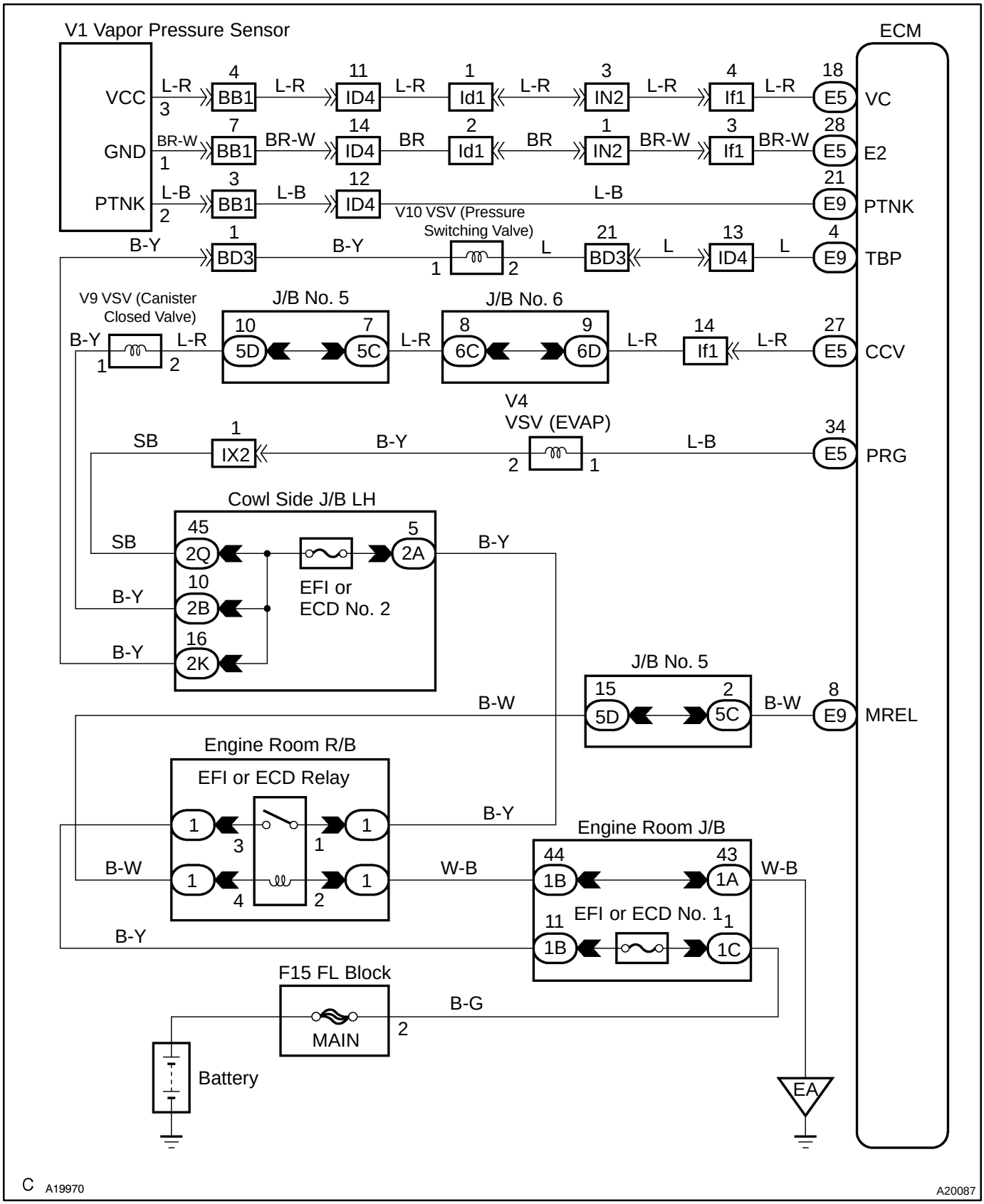
The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve): Determined by fuel tank pressure change at switching over bypass VSV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion
1	$05	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of CCV: Determined by fuel tank pressure change at switching over CCV	Malfunction criterion

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- ★ If DTC P0441 (Purge Flow), P0446 (CCV) or P2418 (Pressure switching valve) or P0451 (Evaporative Pressure Sensor) is output with DTC P0442, P0455 or P0456, first troubleshoot DTC P0441, P0446 or P0451. If no malfunction is detected, troubleshoot DTC P0442, P0455 or P0456 next.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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.
- ★ When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

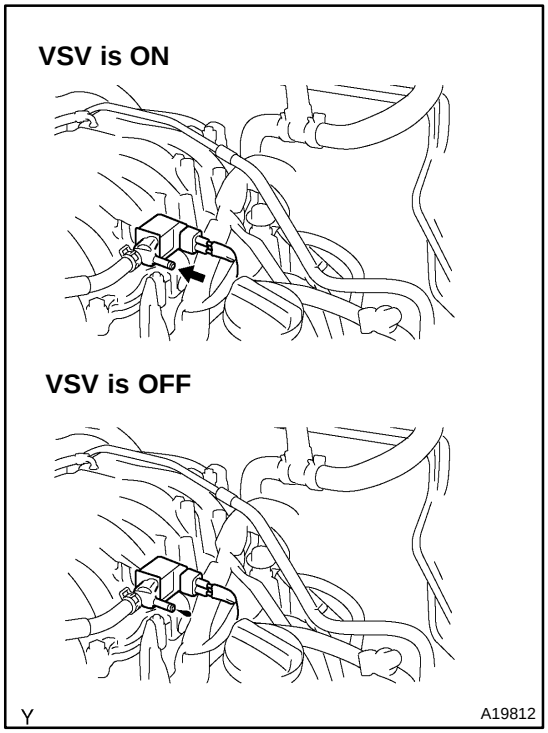
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	Check purge flow.



PREPARATION:
(a) Connect the hand-held tester to the DLC3.
(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(c) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(d) Start the engine.
(e) Select the item "EVAP (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV.

CHECK:
When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:
VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK → **Go to step 9.**

NG

6	**Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check operation of EVAP VSV (See page SF-44).**

NG → **Replace EVAP VSV.**

OK

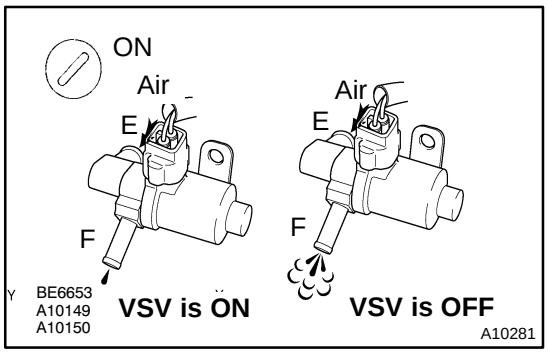
8	**Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

9	Check CCV.



PREPARATION:

(a) Disconnect the vacuum hose for the CCV VSV from the charcoal canister.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CCV.

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	Go to step 13.

NG

10	Check vacuum hose between CCV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG	Repair or replace vacuum hose.

OK

11	Check operation of CCV (See page SF-48).

NG	Replace CCV.

OK

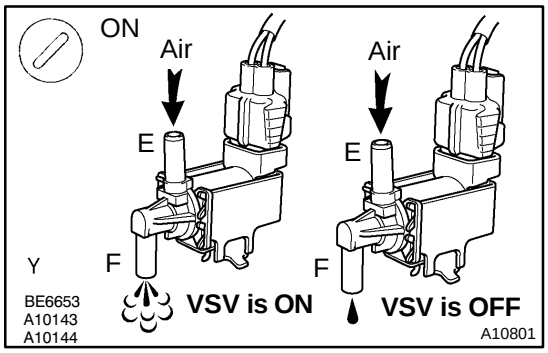
12	**Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

13	**Check pressure switching valve.**



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate pressure switching valve.

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	**Check operation of pressure switching valve (See page SF-46).**

NG → **Replace pressure switching valve.**

OK

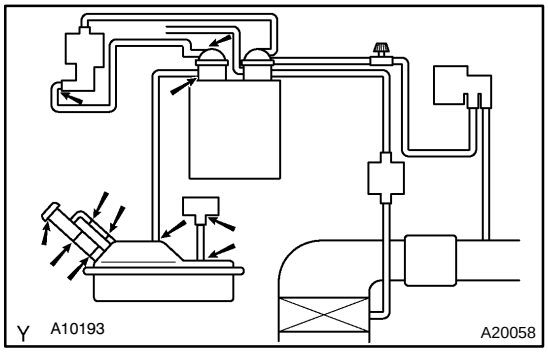
15	**Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- ★ Fuel tank
- ★ Fuel tank filler pipe
- ★ Hoses and tubes around fuel tank

NG → **Repair or replace evaporative emission leak part.**

OK

17	**Check vacuum hoses between vapor pressure sensor and fuel tank, and charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

18	Check hose and tube between fuel tank and charcoal canister.

CHECK:

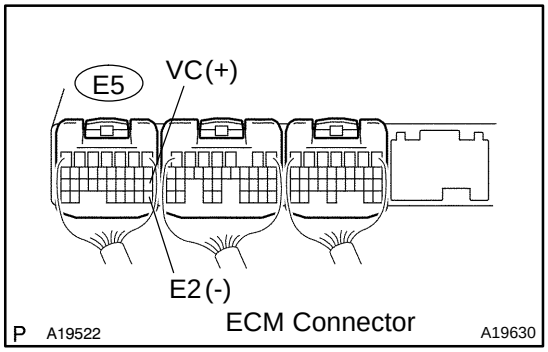
(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.

(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals the E5 ECM connector.

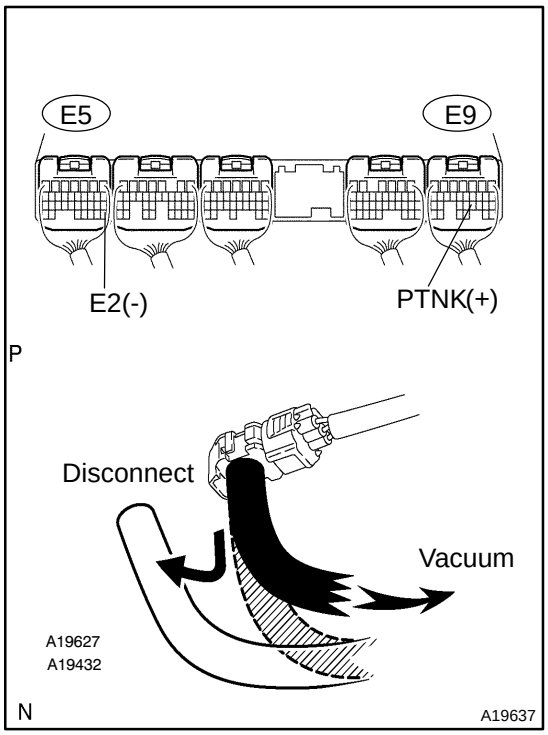
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

20	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK → **Go to step 22.**

NG

21	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

22	Check fuel tank inlet valve.

NG → **Replace fuel tank inlet valve.**

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK ↓

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK ↓

3	Check fuel tank cap (See page EC-5).

NG → Replace fuel tank cap.

OK ↓

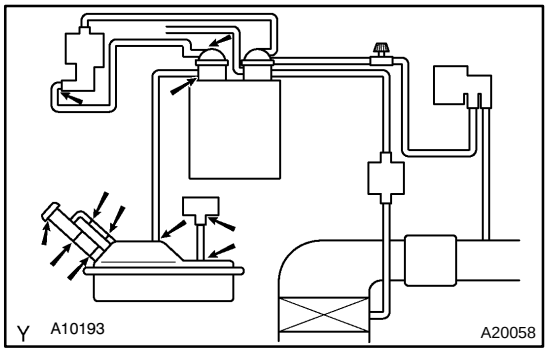
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK ↓

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- ★ Fuel tank
- ★ Charcoal canister
- ★ Fuel tank filler pipe
- ★ Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emissions leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	**Check vacuum hoses ((8) and (9) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	**Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

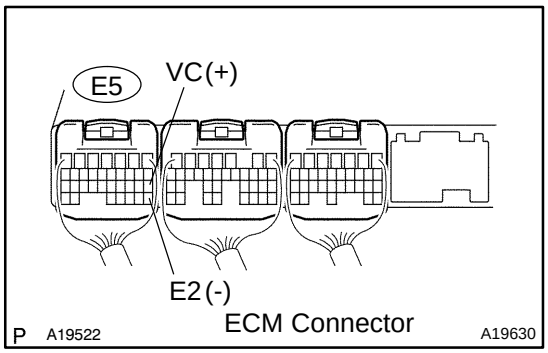
OK

10	**Check charcoal canister for cracks, hole and damage.**

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.



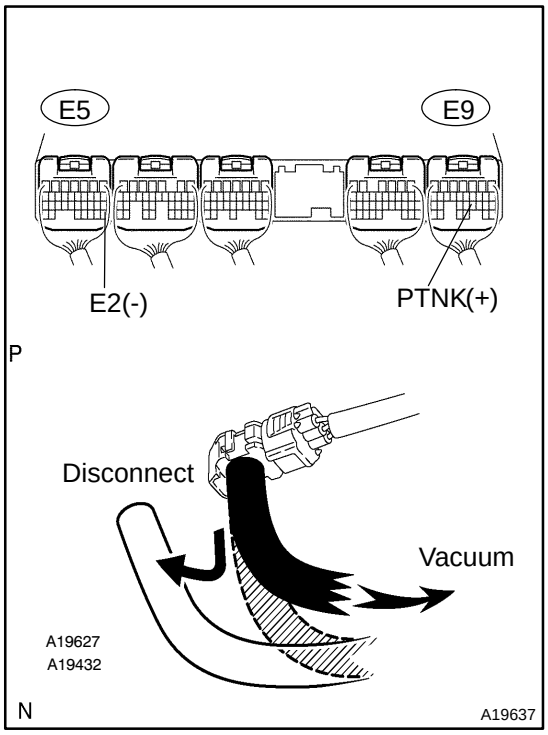
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:

Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Go to step 14.**

NG

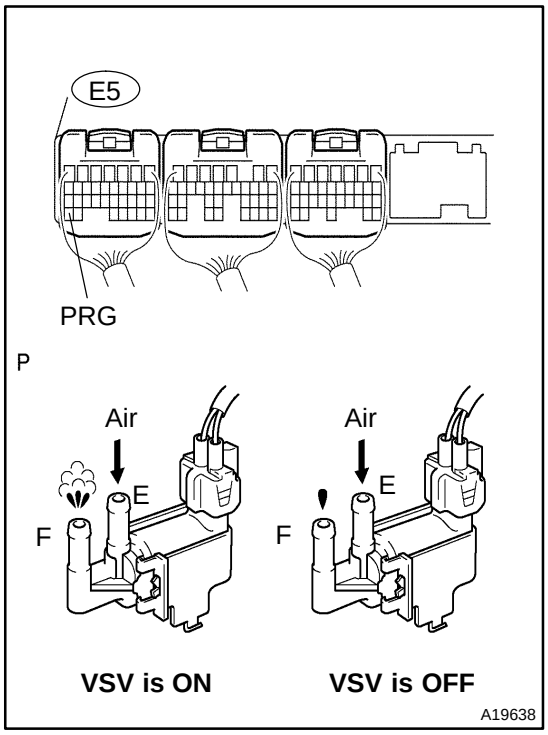
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

14	**Check EVAP VSV.**



PREPARATION:

(a) Remove the glove compartment door (See page SF-60).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal PRG of the ECM connector and body ground (ON).

(2) Disconnect between terminal PRG of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-44).**

NG → **Replace EVAP VSV.**

OK

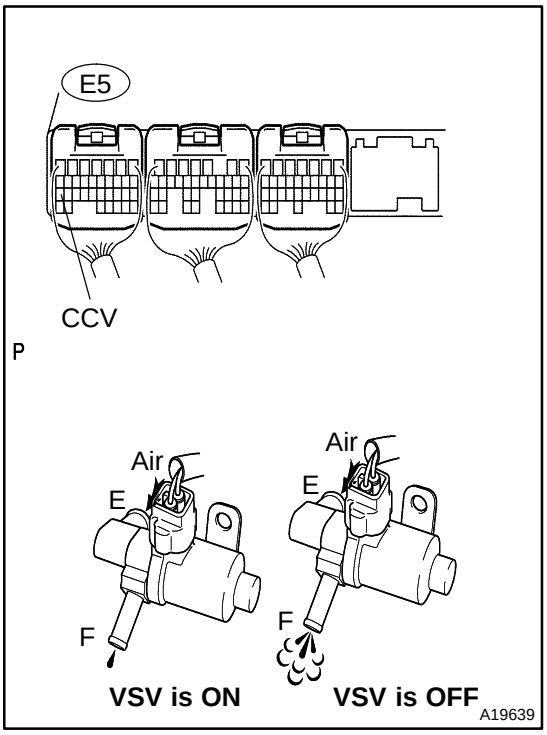
16	**Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

17	**Check CCV.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect the terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect the terminal CCV of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air does not flow from port E to port F.
(2) VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	**Check operation of CCV (See page SF-48).**

NG → **Replace CCV.**

OK

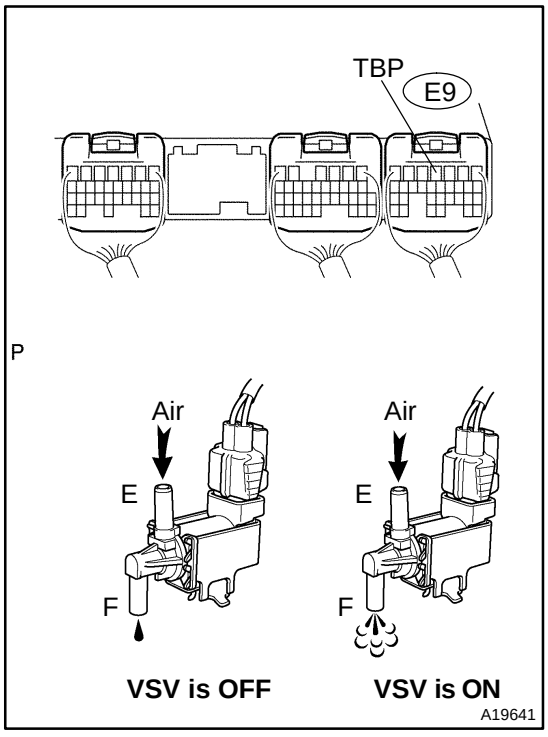
19	**Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

20	**Check pressure switching valve.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Check the VSV function.
(1) Connect the terminal TBP of the ECM connector and body ground (ON).
(2) Disconnect the terminal TBP of the ECM connector and body ground (OFF).
OK:
(1) VSV is ON:
Air does not flow from port E to port F.
(2) VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 23.**

NG

21	**Check operation of pressure switching valve (See page SF-46).**

NG → **Replace pressure switching valve.**

OK

22	Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

23	Check fuel tank inlet valve.

NG → Replace fuel tank inlet valve.

OK

24	Check fuel tank.

NG → Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.

DIC2I-01

DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

DTC	P0455	Evaporative Emission Control System Leak Detected (Gross Leak)

DTC	P0456	Evaporative Emission Control System Leak Detected (Very Small Leak)

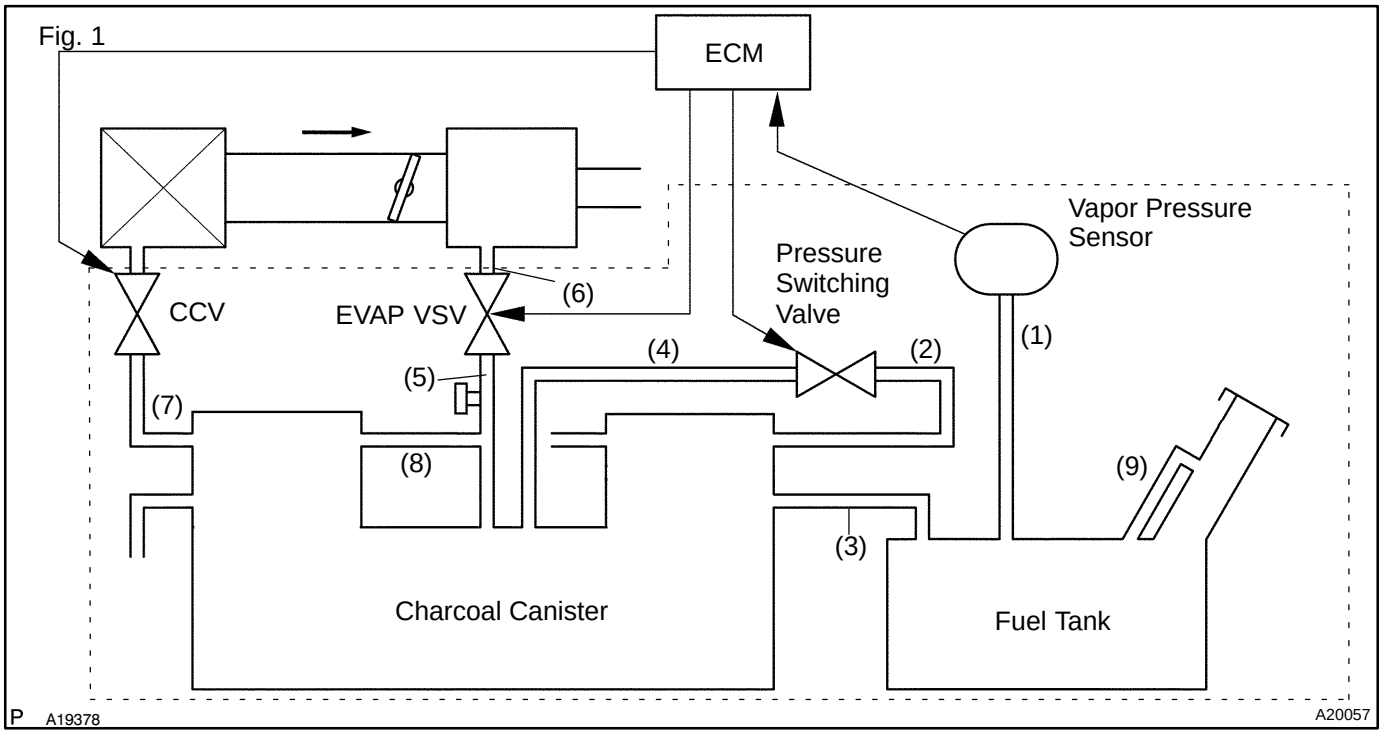
CIRCUIT DESCRIPTION

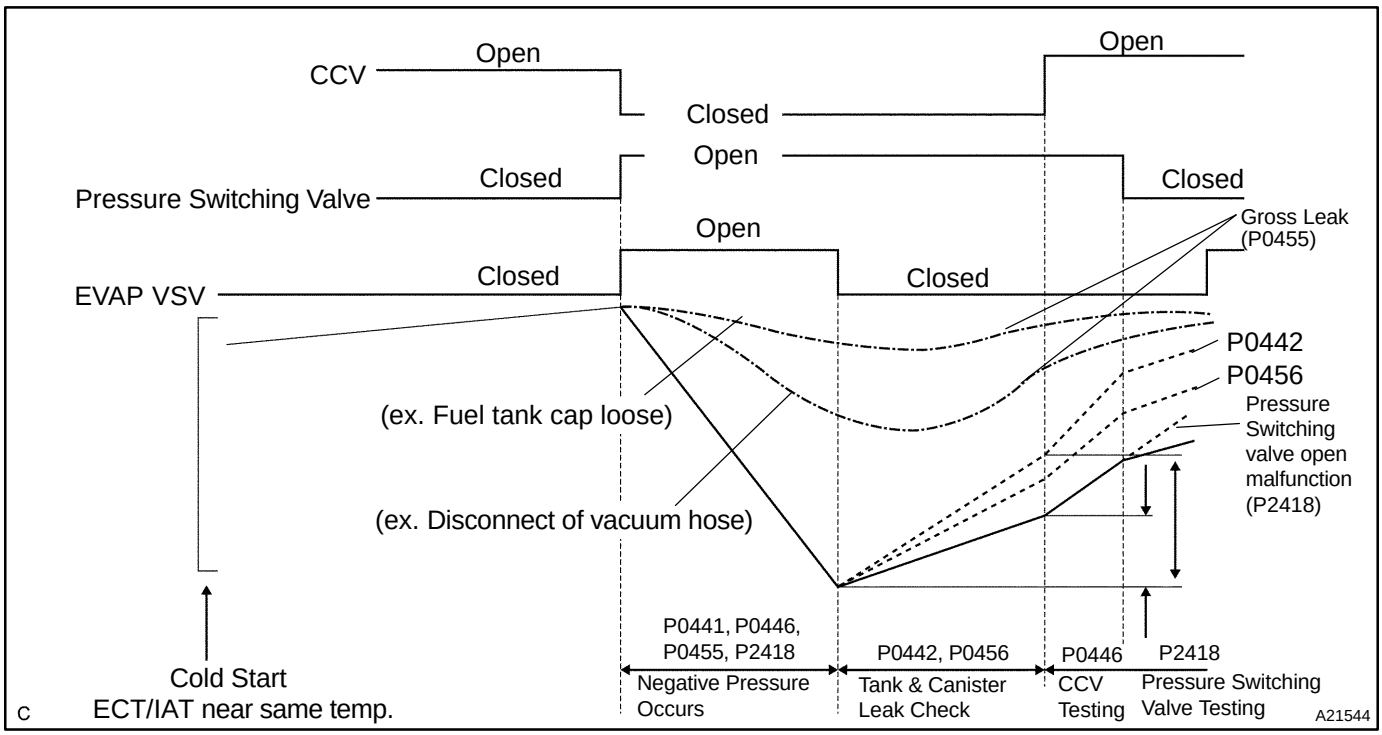
The vapor pressure sensor, canister closed valve (CCV) and pressure switching valve are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system based on the vapor pressure sensor signal.

DTC P0442, P0455 or P0456 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or when the vapor pressure sensor malfunctions.

Fig. 1





MONITOR DESCRIPTION

A leak in the evaporative emission system prompts the ECM to set DTC P0442, P0455 or P0456.
The ECM checks for leaks in the system by introducing a high negative pressure (vacuum) from the intake manifold by commanding the EVAP VSV open while the CCV (vent) is closed and the pressure switching valve is open. After sufficient time has elapsed the fuel tank should have developed a high negative pressure (vacuum) and the EVAP VSV closed. The ECM then monitors the pressure-rise (loss of vacuum) in the fuel tank. If the pressure rises too rapidly, the ECM concludes that there is a leak in the system. The ECM will turn on the MIL and set a DTC.
The ECM has separate DTCs for small and large leaks:

(1) DTC P0442 is set when the internal fuel tank pressure has a large increase and the EVAP system has a small leak.
(2) DTC P0455 is set when the EVAP system has various large leaks. Even though the ECM sends a signal to the EVAP VSV (when CCV is closed) to create a vacuum, the internal fuel tank pressure does not decrease beyond a specified level.
(3) DTC P0456 is set when the internal fuel tank pressure increase slightly and the EVAP system has a small leak.

HINT:
Refer to DTCs P0441, P0446 and P2418

DTC No.	DTC Detecting Condition	Trouble Area
P0442	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases.	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases. ★Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM
P0455	If the vacuum is not strong enough, the ECM assumes the EVAP system has a large hole.	
P0456	If the pressure in the EVAP system slightly increase while the ECM performs a leak check.	

HINT:
Typical DTC output of each trouble part

Trouble part		Typical DTC output (*1)
Small Leak		P0442 and/or P0456
Medium Leak (ex: Vacuum hose loose)		P0455
Large Leak (ex: Fuel tank cap loose)		P0441, P0446, P0455 and P2418
EVAP VSV	Open Malfunction	P0441
	Close Malfunction	P0441, P0446, P0455 and P2418
CCV	Open Malfunction	P0441, P0446, P0455 and P2418
	Close Malfunction	P0446
Pressure Switching Valve	Open Malfunction	P2418
	Close Malfunction	P0441, P0446, P0455 and P2418

*1: ECM may output some other DTC combination.

MONITOR STRATEGY

Related DTCs	P0442	Small leak (0.040 inch or more large hole) is detected
	P0455	Gross leak detected
	P0456	Very small leak (0.020 inch hole) is detected
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow sensor, Engine coolant temperature sensor EVAP VSV (purge VSV), CCV
Frequency of operation	Once per drive cycle	
Duration	60 sec.	
MIL operation	2 drive cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Criteria	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Common pre-conditions for 0.020, 0.040 inch and gross:		
Altitude	-	2,400 m (7,872 ft.)
Throttle position learning	Completed	
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7 □C (-13□F)	11.1□C (20□F)
Vehicle speed condition	A or B	
A. Time after vehicle stopped (Less than 10 km/h (6 mph))	90 sec.	-
B. Time after vehicle started (7 km/h (4 mph) or more)	20 sec.	-
0.020 inch malfunction detection:		
Engine coolant temperature at engine start	10□C (50□F)	32□C (89.6□F)
Intake air temperature at engine start	10□C (50□F)	32□C (89.6□F)
Intake air temperature	10˚C (50˚F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	
Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.020 inch leak detection	Not completed	
0.040 inch leak detection	Not detected	
CCV malfunction, bypass VSV malfunction	Not detected	
Vehicle speed	-	130 km/h (81 mph)
EVAP VSV (Evap purge VSV) malfunction	Not detected	
0.040 inch and gross malfunction:		
Engine coolant temperature at engine start	10˚C (50˚F)	35˚C (95˚F)
Intake air temperature at engine start	10˚C (50˚F)	35˚C (95˚F)
Intake air temperature	10˚C (50˚F)	-
Fuel level condition in fuel tank during leak check	Fuel slosh is small (must not drive on road in bad conditions)	
Time after engine start	-	50 min.
Fuel tank pressure condition before leak check (Fuel tank condition before closed negative pressure introduction)	Tank inside pressure change is small before negative pressure introduction. (Reference: If fuel in tank is high temperature, vapor volume increase and tank inside pressure changes also increase)	

Vehicle speed and intake air amount condition before and after negative pressure introduction	Steady speed and not change greatly of intake air amount	
Fuel level	-	90%
0.040 inch leak detection	Not completed	
Fuel tank pressure at vacuum introduction completed	-2.4 kPa (-18 mmHg, -0.71 in.Hg)	-
P0446 VSV check	Not executed	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
0.020 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase 0.067 kPa (0.5 mmHg, 0.02 in.Hg) or more
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase 0.067 kPa (0.5 mmHg, 0.02 in.Hg) or more
0.040 inch malfunction detection:	
Fuel tank pressure changing value for 5 sec. from -2.0 kPa (-15 mmHg, -0.59 in.Hg) point	Increase 0.16 kPa (1.2 mmHg, 0.05 in.Hg) or more
Fuel tank pressure changing value for 5 sec. from -2.7 kPa (-20 mmHg, -0.79 in.Hg) point	Increase 0.16 kPa (1.2 mmHg, 0.05 in.Hg) or more
Gross leak detection:	
Fuel tank pressure min. value at vacuum introduction	-2.4 kPa (-18 mmHg, -0.71 in.Hg) or more

MONITOR RESULT

The detailed information is described in “CHECKING MONITOR STATUS” (see page DI-3).

- ★ TID (Test Identification) is assigned to each emission-related component.
- ★ TLT (Test Limit Type):
  If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
  If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- ★ CID (Component Identification) is assigned to each test value.
- ★ Unit Conversion is used to calculate the test value indicated on generic OBD scan tools.

TID $02: EVAP - Vacuum Monitor

TLT	CID	Unit Conversion	Description of Test Value	Description of Test Limit
1	$01	Multiply by 0.0916 (mmHg)	Test value of EVAP VSV: Determined by fuel tank pressure change during vacuum introduction	Malfunction criterion
1	$02	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of bypass VSV (pressure switching valve): Determined by fuel tank pressure change at switching over bypass VSV	Malfunction criterion
0	$03	Multiply by 0.0458 (mmHg)	Test value of 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criterion
0	$04	Multiply by 0.0458 (mmHg)	Test value of 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criterion
1	$05	Multiply by 0.0458 and subtract 2.93 (mmHg)	Test value of CCV: Determined by fuel tank pressure change at switching over CCV	Malfunction criterion

WIRING DIAGRAM

Refer to DTC P0441, P0446 and P2418 on page DI-222 .

Hand-held tester:

1	**Check that fuel tank cap meets OEM specifications.**

NG → **Replace with a cap that meets OEM specifications.**

OK

2	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

3	**Check fuel tank cap (See page EC-5).**

NG → **Replace fuel tank cap.**

OK

4	**Check filler neck for damage.**

PREPARATION:

Remove the fuel tank cap.

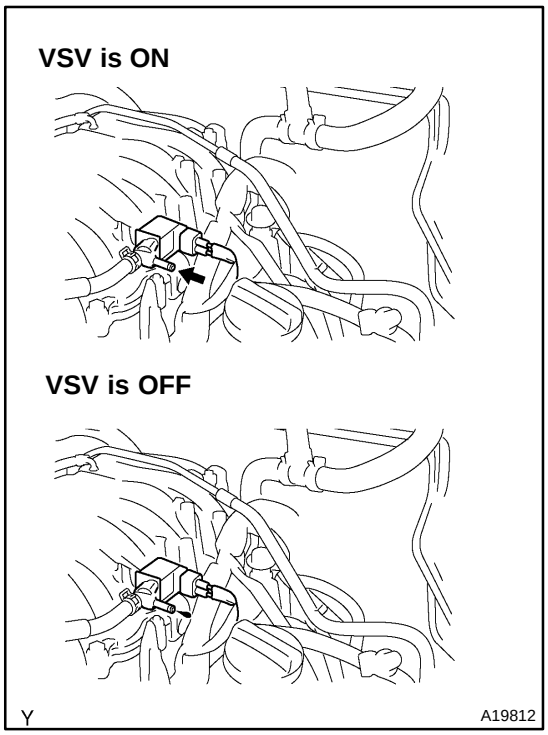
CHECK:

Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

5	Check purge flow.



PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(c) Disconnect the vacuum hose for the EVAP VSV from the charcoal canister.
(d) Start the engine.
(e) Select the item "EVAP (ALON) / ALL" in the ACTIVE TEST and operate EVAP VSV.

CHECK:

When the EVAP VSV is operated by the hand-held tester, check whether the disconnected hose applies suction to your finger.

OK:

VSV is ON:
Disconnected hose applies suction to your finger.
VSV is OFF:
Disconnected hose applies no suction to your finger.

OK	Go to step 9.

NG

6	Check vacuum hose between intake manifold and EVAP VSV, and EVAP VSV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole, damage and blockage.

NG	Repair or replace vacuum hose.

OK

7	Check operation of EVAP VSV (See page SF-44).

NG → Replace EVAP VSV.

OK

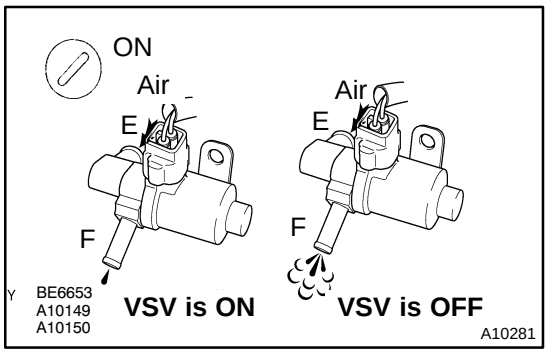
8	Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

9	Check CCV.



PREPARATION:

(a) Disconnect the vacuum hose for the CCV from the charcoal canister.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.
(d) Select the item "CAN CTRL VSV / ALL" in the ACTIVE TEST and operate CAN CTRL VSV (Press the right or left button).

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air does not flow from port E to port F.
VSV is OFF:
Air from port E flows out through port F.

OK	Go to step 13.

NG

10	Check vacuum hose between CCV and charcoal canister.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG	Repair or replace vacuum hose.

OK

11	**Check operation of CCV (See page SF-48).**

NG → **Replace CCV.**

OK

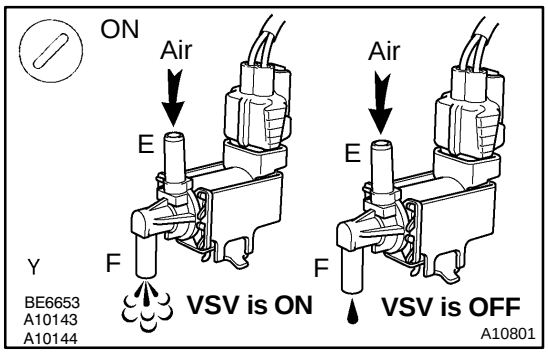
12	**Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

13	**Check pressure switching valve.**



PREPARATION:

(a) Turn the ignition switch ON and push the hand-held tester main switch ON.

(b) Select the "ENHANCED OBD II / ACTIVE TEST" mode on the hand-held tester.

(c) Select the item "TANK BYPASS VSV / ALL" in the ACTIVE TEST and operate TANK BYPASS VSV (press the right or left button).

CHECK:

Check the VSV operation when it is operated by the hand-held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 16.**

NG

14	**Check operation of pressure switching valve (See page SF-46).**

NG → **Replace pressure switching valve.**

OK

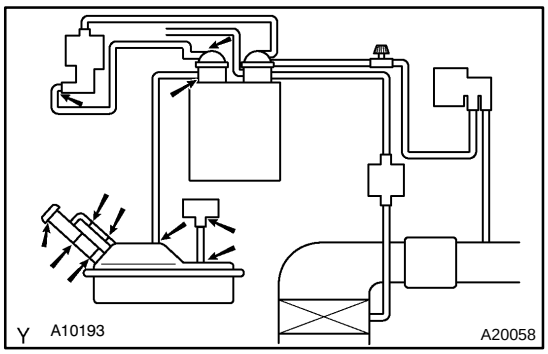
15	**Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

16	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- ★ Fuel tank
- ★ Charcoal canister
- ★ Fuel tank filler pipe
- ★ Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emissions leak part.**

OK

17	Check vacuum hoses between vapor pressure sensor and fuel tank, and charcoal canister and pressure switching valve.

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose and tube.**

OK

18	Check hose and tube between fuel tank and charcoal canister.

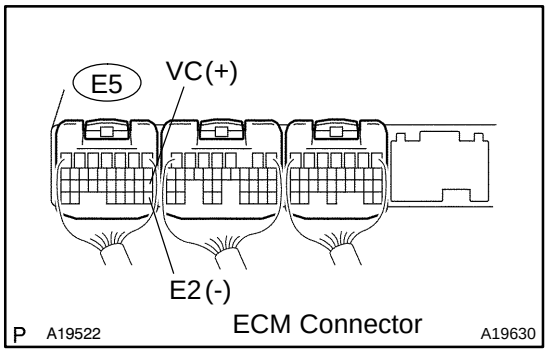
CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

19	Check voltage between terminals VC and E2 of ECM connector.



CHECK:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals of the E5 ECM connector.

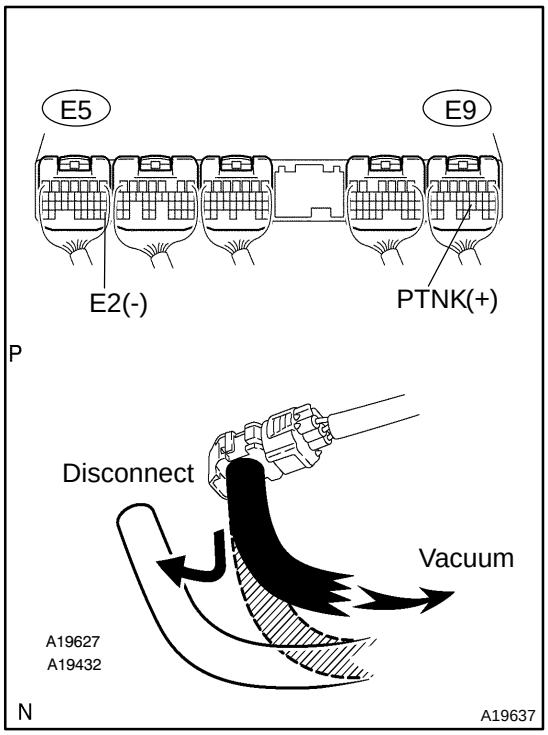
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

20	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Remove the glove compartment door (See page SF-60).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.

(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:

The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).

OK:

Condition (1) Voltage: 2.9 to 3.7 V

Condition (2) Voltage: 0.5 V or less

OK	**Go to step 22.**

NG

21	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

NG	**Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

22	**Check fuel tank inlet valve.**

NG	**Replace fuel tank inlet valve.**

OK

23	Check fuel tank.

NG → Replace fuel tank.

OK

24	Check charcoal canister for cranks, hole and damage.

NG → Replace charcoal canister.

OK

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	Check that fuel tank cap meets OEM specifications.

NG → Replace with a cap that meets OEM specifications.

OK

2	Check that fuel tank cap is correctly installed.

NG → Correctly install fuel tank cap.

OK

3	Check fuel tank cap (See page EC-5).

NG → Replace fuel tank cap.

OK

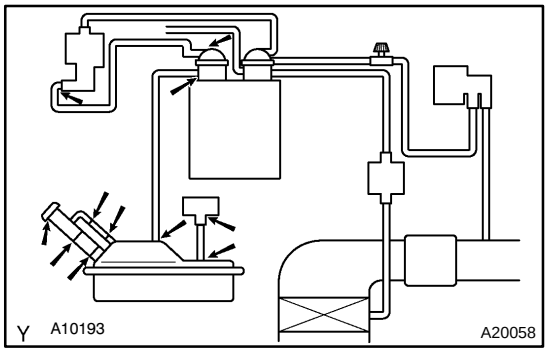
4	Check filler neck for damage.

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → Replace filler pipe.

OK

5	**Check whether hose close to fuel tank has been modified, and check whether there are signs of any accident near fuel tank or charcoal canister.**



CHECK:

Check for cracks, deformation and loose connection of the following parts:

- ★ Fuel tank
- ★ Charcoal canister
- ★ Fuel tank filler pipe
- ★ Hoses and tubes around fuel tank and charcoal canister

NG → **Repair or replace evaporative emission leak part.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and pressure switching valve, and pressure switching valve and charcoal canister.**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole and damage.

NG → **Repair or replace vacuum hose.**

OK

7	**Check hose and tube between fuel tank and charcoal canister.**

CHECK:

(a) Check for proper connection of the fuel tank and fuel evap pipe (See page EC-2), fuel evap pipe and fuel tube under the floor, fuel tube under the floor and charcoal canister.
(b) Check the hose and tube for cracks, hole and damage.

NG → **Repair or replace hose and tube.**

OK

8	**Check vacuum hoses ((5), (6), (7), (8) and (9) in Fig. 1 in circuit description).**

CHECK:

(a) Check that the vacuum hose is connected correctly.
(b) Check the vacuum hose for looseness and disconnection.
(c) Check the vacuum hose for cracks, hole damage, and blockage.

NG → **Repair or replace vacuum hose.**

OK

9	**Check VSV connector for EVAP, VSV connector for CCV, VSV connector for pressure switching valve and vapor pressure sensor connector for looseness and disconnection.**

NG → **Repair or connect VSV or sensor connector.**

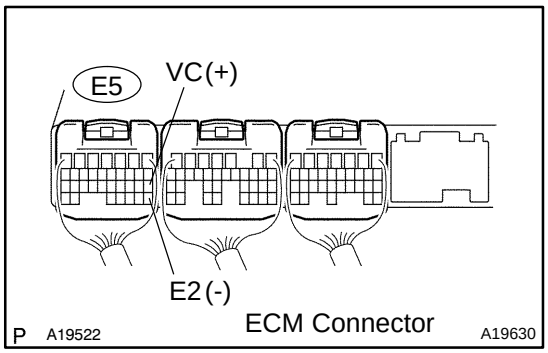
OK

10	**Check charcoal canister for cracks, hole and damage.**

NG → **Replace charcoal canister.**

OK

11	Check voltage between terminals VC and E2 of ECM connector.



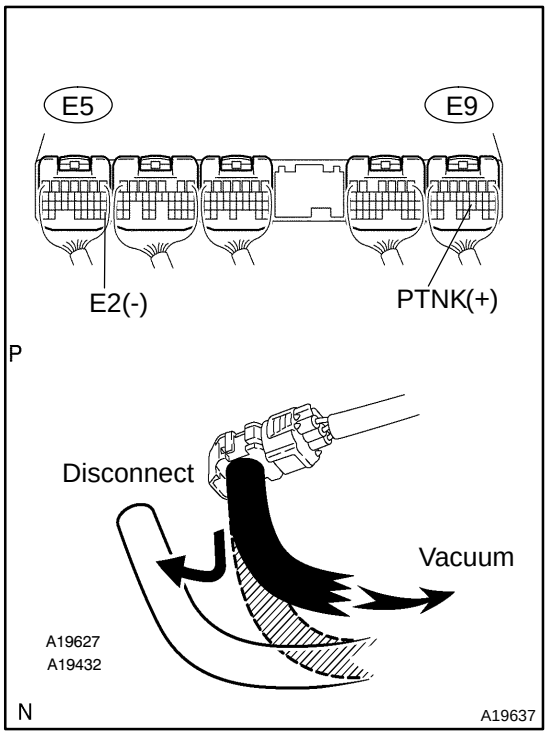
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

12	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors at following condition (1) and (2).

(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.

NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:

Condition (1) Voltage: 2.9 to 3.7 V
Condition (2) Voltage: 0.5 V or less

OK → **Go to step 14.**

NG

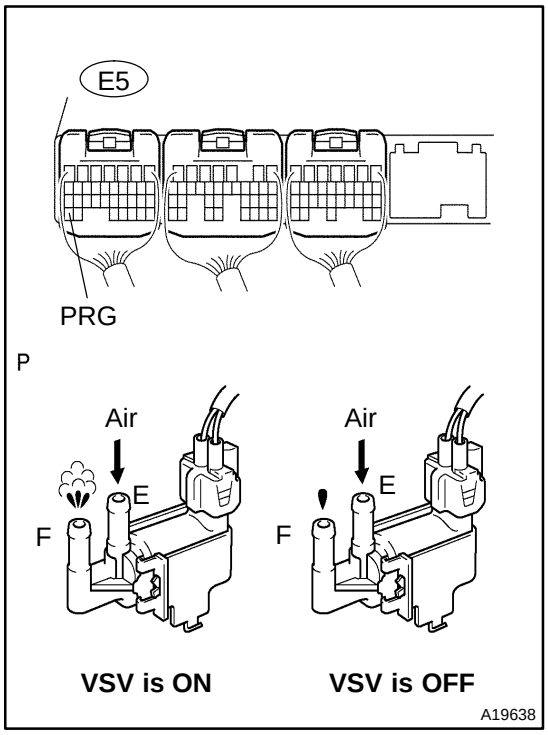
13	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

14	**Check EVAP VSV.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal EVP1 of the ECM connector and body ground (ON).

(2) Disconnect between terminal EVP1 of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK → **Go to step 17.**

NG

15	**Check operation of EVAP VSV (See page SF-44).**

NG → **Replace EVAP VSV.**

OK

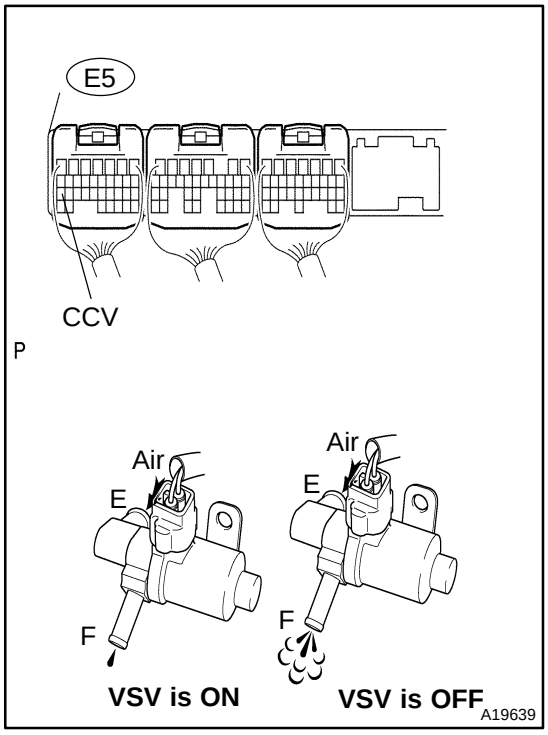
16	**Check for open and short in harness and connector between EFI or ECD relay and EVAP VSV, and EVAP VSV and ECM (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Replace ECM (See page SF-60).

17	**Check CCV.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal CCV of the ECM connector and body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air does not flow from port E to port F.

(2) VSV is OFF:
Air from port E flows out through port F.

OK → **Go to step 20.**

NG

18	Check operation of CCV (See page SF-48).

NG → Replace CCV.

OK

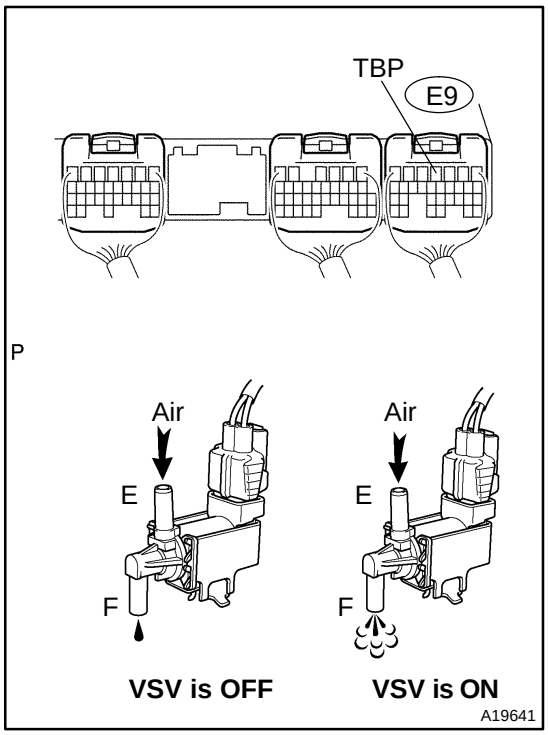
19	Check for open and short in harness and connector between EFI or ECD relay and CCV, and CCV and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

20	Check pressure switching valve.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect between terminal TBP of the ECM connector and body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not flow from port E to port F.

OK	Go to step 23.

NG

21	Check operation of pressure switching valve (See page SF-46).

NG	Replace pressure switching valve.

OK

22	Check for open and short in harness and connector between EFI or ECD relay and pressure switching valve, and pressure switching valve and ECM (See page IN-36).

NG → Repair or replace harness or connector.

OK

Replace ECM (See page SF-60).

23	Check fuel tank inlet valve.

NG → Replace fuel tank inlet valve.

OK

24	Check fuel tank.

NG → Replace fuel tank.

OK

It is likely that vehicle user did not properly close fuel tank cap.

DIC2J-01

DTC	P0451	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance

DTC	P0452	Evaporative Emission Control System Pressure Sensor/Switch Low Input

DTC	P0453	Evaporative Emission Control System Pressure Sensor/Switch High Input

MONITOR DESCRIPTION

DTC "P0451, P0452 or P0453" is recorded by the ECM when the vapor pressure sensor malfunctions.

P0451

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
When the pressure in the fuel tank is low, the output voltage of the vapor pressure sensor is low. When it is high, the output voltage is high.
For this DTC P0451, the ECM checks for a "noisy" sensor or a "stuck" sensor.
The ECM checks for a "noisy" sensor by monitoring the fuel tank pressures when the vehicle is stationary and there should be little variation in the tank pressure. If the indicated pressure varies beyond specified limits, the ECM will illuminate the MIL (2-trip detection logic) and a DTC is set.
The ECM checks for a "stuck" sensor by monitoring the fuel tank pressure for an extended time period. If the indicated pressure does not change over this period, the ECM will conclude that the fuel tank pressure sensor is malfunctioning, The ECM will illuminate the MIL and a DTC is set.

P0452 and P0453

The ECM sensor pressure in the fuel tank using the vapor pressure sensor. The ECM supplies the sensor with a regulated 5 V reference voltage and the sensor returns a signal voltage between 0.5 V and 4.5 V according to the pressure level in the fuel tank.
If the output voltage of the vapor pressure sensor is out of normal range, the ECM will determine that there is a malfunction in the sensor or sensor circuit.
When pressure indicated by the vapor pressure sensor deviates below -3.999 kPa (-30 mmHg, -1.18 in.Hg) or above 1.999 kPa (15 mmHg, 0.59 in.Hg), the ECM interprets this as a malfunction in the vapor pressure sensor. The ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0451	Vapor pressure sensor output extremely changes under conditions of (a) and (b): (2 trip detection logic) (a) Vehicle speed: 0 km/h (0mph), Engine speed: Idling and pressure switching valve is OFF (b) Vapor pressure sensor value ≧ opening pressure valve of charcoal canister	★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM
P0452	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or less: (2 trip detection logic)	
P0453	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or more: (2 trip detection logic)	

MONITOR STRATEGY

P0451

Related DTCs	P0451	Evaporative emission control system pressure sensor range/performance
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	Signal fluctuation (noise) monitoring: 10 sec. No signal change (stuck) monitoring: 20 min.	
MIL operation	2 driving cycles	
Sequence of operation	None	

P0452 and P0453

Related DTCs	P0452	Evaporative emission control system pressure sensor/switch low input
	P0453	Evaporative emission control system pressure sensor/switch high input
Required sensors/components	Main sensors/components	Vapor pressure sensor
	Related sensors/components	Mass air flow meter, Engine coolant temperature sensor
Frequency of operation	Once per driving cycle	
Duration	17 sec.	
MIL operation	2 driving cycles	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

P0451

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Signal fluctuation (noise) monitoring:		
Altitude	-	2,400 m (7,872 ft)
Difference between intake air temperature and engine coolant temperature at engine start	-7°C (-12.6°F)	11.1°C (20°F)
Engine coolant temperature at engine start	4.4°C (40°F)	35°C (95°F)
Intake coolant temperature at engine start	4.4°C (40°F)	35°C (95°F)
Vehicle stop and idling	5 sec.	15 sec.
Stuck monitoring:		
Altitude	-	2,400 m (7,872 ft)
Vapor pressure sensor	No malfunction	
Difference between intake air temperature and engine coolant temperature at engine start	-7°C (-12.6°F)	11.1°C (20°F)
Engine coolant temperature at engine start	4.4°C (40°F)	35°C (95°F)
Intake air coolant temperature at engine start	4.4°C (40°F)	35°C (95°F)
Time after engine start	5 sec.	-

P0452 and P0453

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Difference between intake air temperature and engine coolant temperature at engine start	-	12°C (21.6°F)
Engine coolant temperature at engine start	10°C (50°F)	35°C (95°F)
Intake air temperature at engine start	10°C (50°F)	35°C (95°F)
Engine	Running	

TYPICAL MALFUNCTION THRESHOLDS

P0451

Detection Criteria	Threshold
Signal fluctuation (noise) monitoring:	
The number of times the output changed ±0.667 kPa (± 5 mmHg, ± 0.02 in.Hg) or more during 5 to 15 sec. after idling and vehicle stop	5 times or more
No signal change (stuck) monitoring:	
Fuel tank pressure "no change" time (less than 0.018 kPa (0.135 mmHg, 0.005 in.Hg) change since engine start)	10 min. or more

P0452 and P0453

Detection Criteria	Threshold
P0452:	
Fuel tank pressure	Less than -3.999 kPa (-30 mmHg, -1.18 in.Hg) / when engine running
P0453:	
Fuel tank pressure	1.999 kPa (15 mmHg, 0.59 in.Hg) or more / when engine running

WIRING DIAGRAM

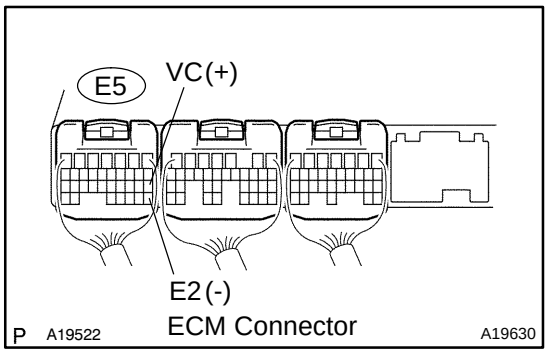
Refer to DTC P0441, P0446 and P2418 on page DI-222 .

INSPECTION PROCEDURE

HINT:

- ★ If different DTCs related to different system that have terminal E2 as the ground terminal are output simultaneously, terminal E2 may be open.
- ★ If DTC P0441 (Purge Flow), P0446 (CCV), P0451, P0452 or P0453 (Evaporative Pressure Sensor) is output with DTC P0442 or P0456, troubleshoot DTC P0441, P0446, P0451, P0452 or P0453 first. If no malfunction is detected, troubleshoot DTC P0442 or P0456 next.
- ★ Read freeze frame data using the hand−held tester or the OBD II scan tool. Freeze frame data records the engine conditions when a malfunction is detected. When troubleshooting, it is useful for determining whether the vehicle was running or stopped, the engine was warmed up or not, the air-fuel ratio was lean or rich, etc. at the time of the malfunction.
- ★ When the ENGINE RUN TIME in the freeze frame data is less than 200 seconds, carefully check the vapor pressure sensor.

1	Check voltage between terminals VC and E2 of ECM connector.



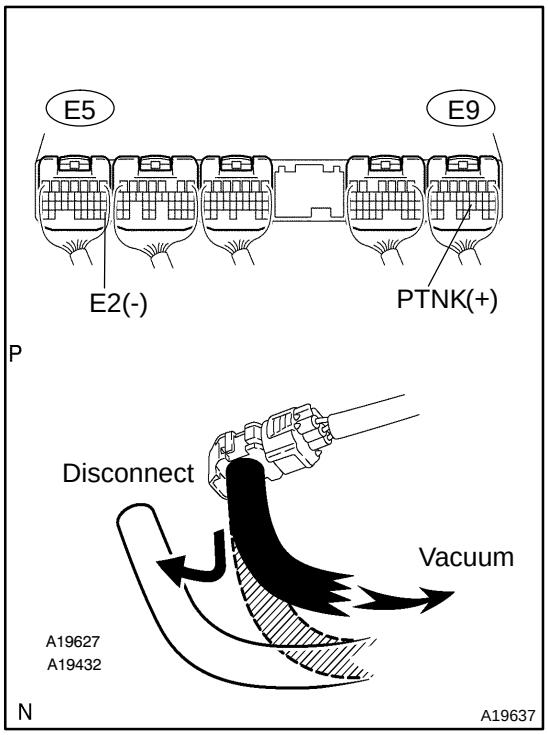
CHECK:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals of the E5 ECM connector.
OK:

Tester Connection	Specified Condition
VC (E5-18) - E2 (E5-28)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

2	Check voltage between terminals PTNK and E2 of ECM connectors.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminals PTNK and E2 of the ECM connectors.

(1) Disconnect the vacuum hose from the vapor pressure sensor.
(2) Using the MITYVAC (Hand-Held Vacuum Pump), apply a vacuum of 4.0 kPa (30 mmHg, 1.18 in.Hg) to the vapor pressure sensor.
(3) Check the vapor pressure sensor output waveform using a hand-held tester.

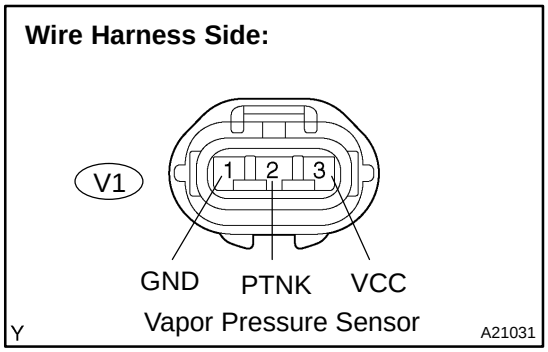
NOTICE:
The vacuum applied to the vapor pressure sensor must be less than 66.7 kPa (500 mmHg, 19.7 in.Hg).
OK:

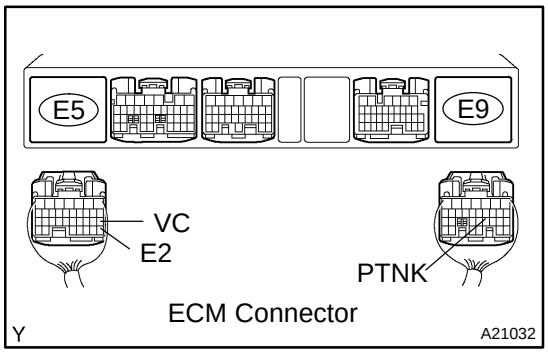
(1) Voltage: 2.9 to 3.7 V
(2) Voltage: 0.5 V or less
(3) A consecutive waveform presents.

OK → **Check for intermittent problems (See page DI-3).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM.**





PREPARATION:

(a) Disconnect the V1 vapor pressure sensor connector.

(b) Disconnect the E5 and E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
PTNK (V1-2) - PTNK (E9-21)	Below 1 Ω
GND (V1-1) - E2 (E5-28)	Below 1 Ω
VCC (V1-3) - VC (E5-18)	Below 1 Ω
PTNK (V1-2) or PTNK (E9-21) - Body ground	10 kΩ or higher
VCC (V1-3) or VC (E5-18) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Replace vapor pressure sensor.

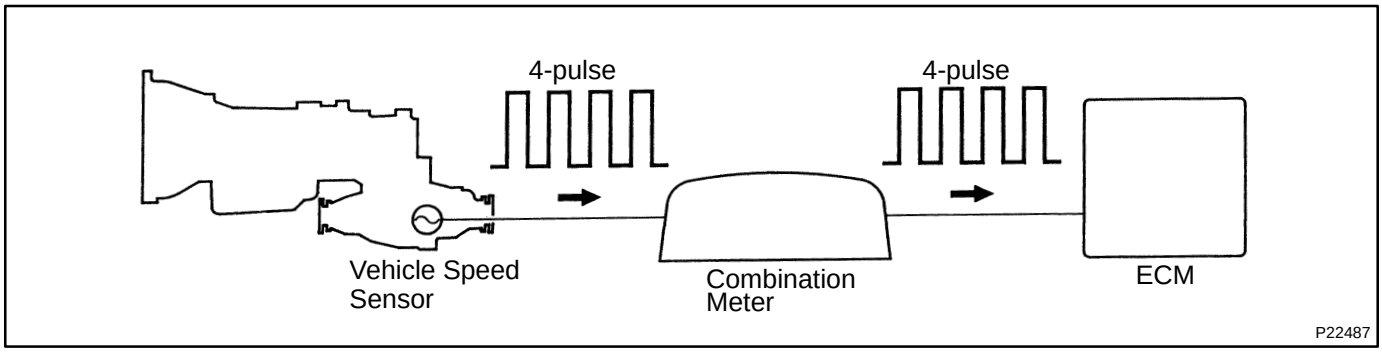
DI3CQ-13

DTC	P0500	Vehicle Speed Sensor ”A”

DTC	P0503	Vehicle Speed Sensor ”A” Intermittent/ Erratic/High

CIRCUIT DESCRIPTION

The No.1 vehicle speed sensor outputs a 4-pulse signal for every revolution of the rotor shaft, which is rotated by the transmission output shaft via the driven gear. After this signal is converted into a more precise rectangular waveform by the waveform shaping circuit inside the combination meter, it is then transmitted to the ECM. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	Proceed to	DTC Detection Condition	Trouble Area
P0500	Step 1	No vehicle speed sensor signal to ECM under following conditions (a) and (b): (1 trip detection logic) (a) Park/neutral position switch is OFF (b) Vehicle is being driven	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM
P0503	DI-3	Intermittent problem in the vehicle speed sensor circuit	

MONITOR DESCRIPTION

The ECM assumes that the vehicle is driven when the park/neutral position switch is OFF and it has been over 4 sec. since the actual vehicle speed was 9 km/h (6 mph) or more.
If there is no signal from the vehicle speed sensor with these conditions satisfied, the ECM concludes that there is a fault in the vehicle speed sensor. The ECM will turn on the MIL and a DTC is set.

MONITOR STRATEGY

Related DTCs	P0500	Vehicle speed sensor ”A” pulse input error
Required sensors/components	Main sensors	Vehicle speed sensor
	Related sensors	Park/Neutral position switch, Engine coolant temperature sensor, Combination meter
Frequency of operation	Continuous	
Duration	500 output X 4 times	
MIL operation	Immediate	
Sequence of operation	None	

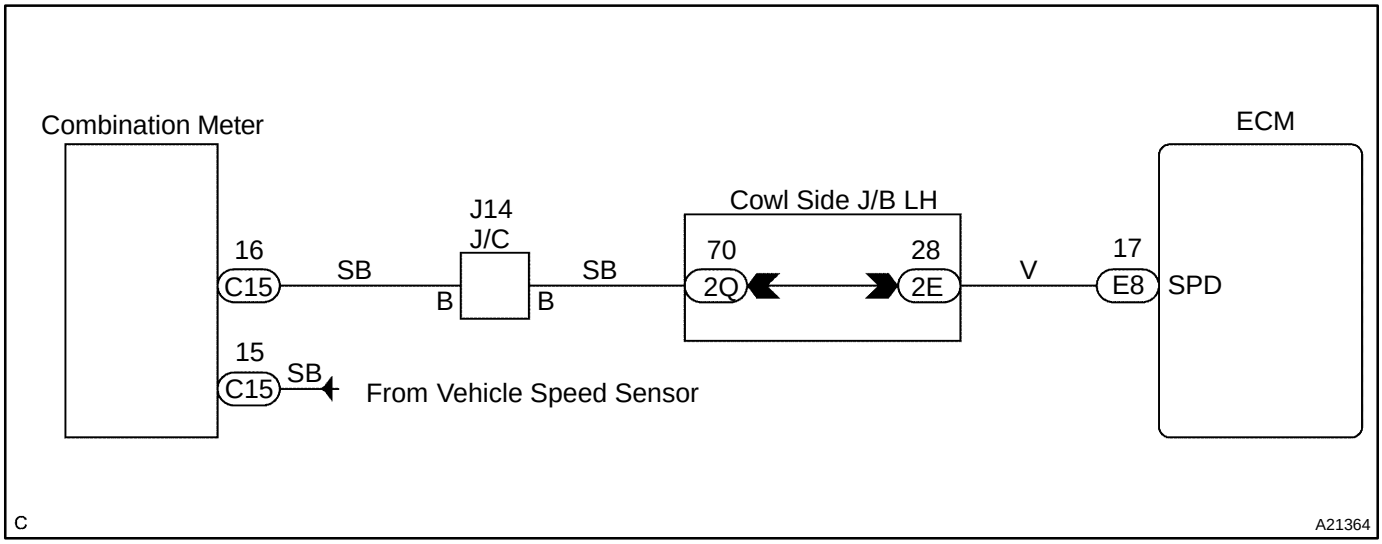
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Vehicle speed is 9 km/h (6 mph) or more	4 sec.	-
Park/neutral position switch	OFF	
Transfer neutral switch	Not ”N” position	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Sensor signal	No pulse input

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

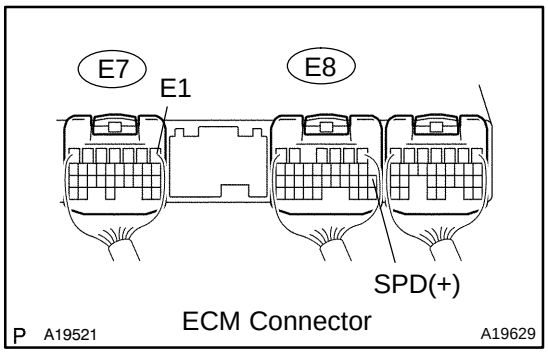
1	**Check operation of speedometer.**

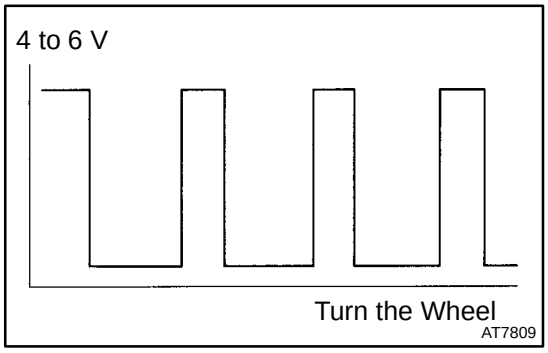
CHECK:
Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.
HINT:
The vehicle speed is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit. See combination meter troubleshooting (See page BE-2).**

OK

2	Check voltage between terminal SPD and E1 of ECM connector.





PREPARATION:

(a) Shift the shift lever to neutral.
(b) Jack up the rear wheel on one side.
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminal of the E7 and E8 ECM connector when the wheel is turned slowly.

OK:

Tester Connection	Specified Condition
SPD (E8-17) - E1 (E7-1)	Generated intermittently

HINT:

The output voltage should fluctuate up and down similarly to the diagram on the left when the wheel is turned slowly.

NG → **Check and repair harness and connector between combination meter and ECM.**

OK

Replace ECM (See page SF-60).

DIC2K-01

DTC	P0504	Brake Switch ”A”/”B” Correlation

CIRCUIT DESCRIPTION

In addition to turning on the stop lamps, the stop lamp switch signals are used for a variety of engine, transmission, and suspension functions as well as being an input for diagnostic checks. It is important that the switch operates properly, therefore this switch is designed with two complementary signal outputs: STP and ST1-. The ECM analyzes these signal outputs to detect malfunctions in the stop lamp switch.

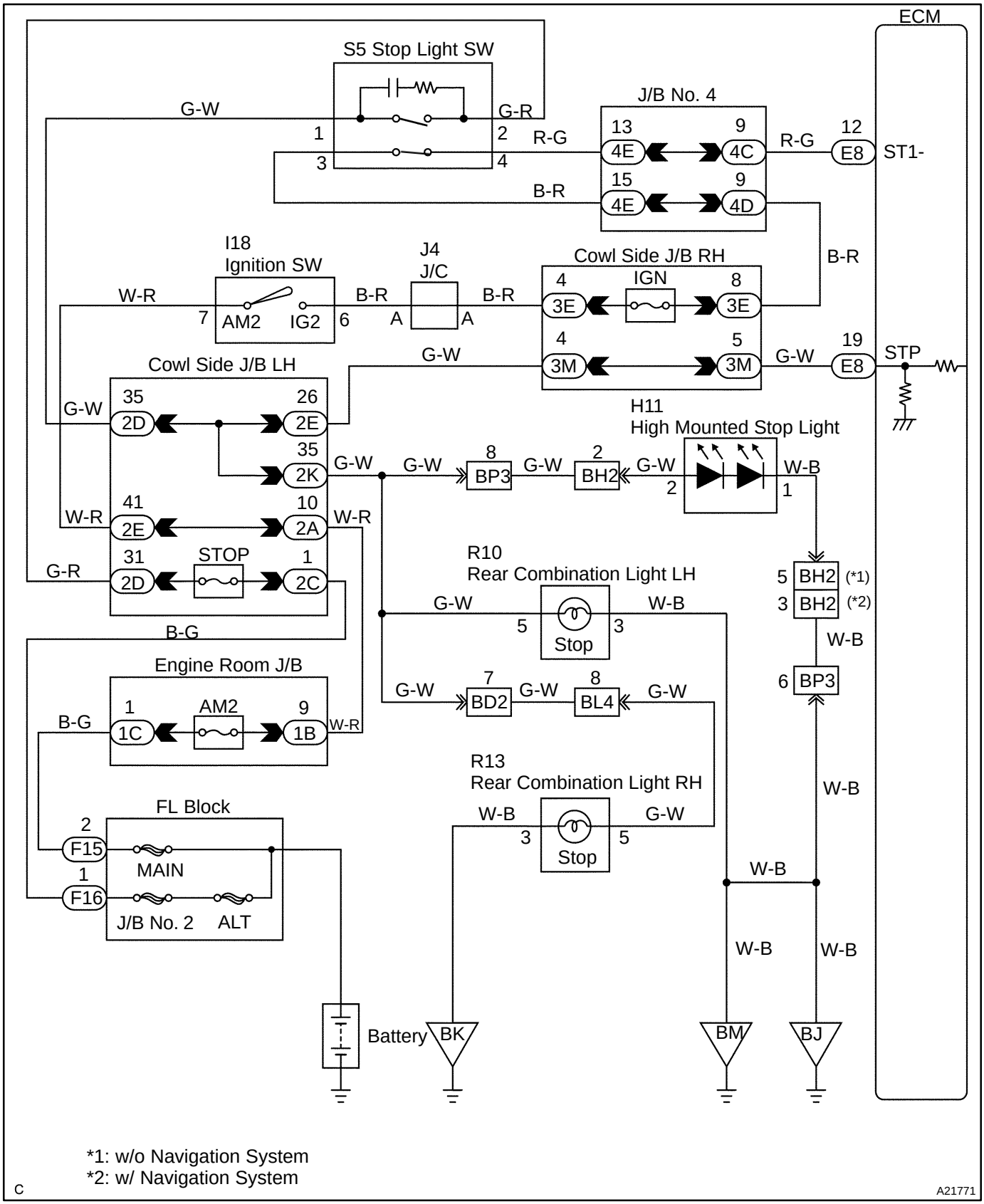
HINT:

Normal condition is as shown in the table.

Signal	Brake pedal released	In transition	Brake pedal depressed
STP	OFF	ON	ON
ST1-	ON	ON	OFF

DTC No.	DTC Detection Condition	Trouble Area
P0504	Conditions (a), (b) and (c) continue for 0.5 sec. or more: (a) Ignition switch ON (b) Brake pedal released (c) STP signal is OFF when the ST1- signal is OFF	★Short in stop lamp switch signal circuit ★Stop lamp fuse ★Stop lamp switch ★ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Check operation of stop light.**

CHECK:

Check if the stop lights come on and go off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit.**

OK ↓

2	**Check STOP fuse.**

PREPARATION:

Remove the STOP fuse from the cowl side J/B LH.

CHECK:

Check the continuity of the STOP fuse.

OK:

Continuity

NG → **Check for short in all harness and components connected to STOP fuse.**

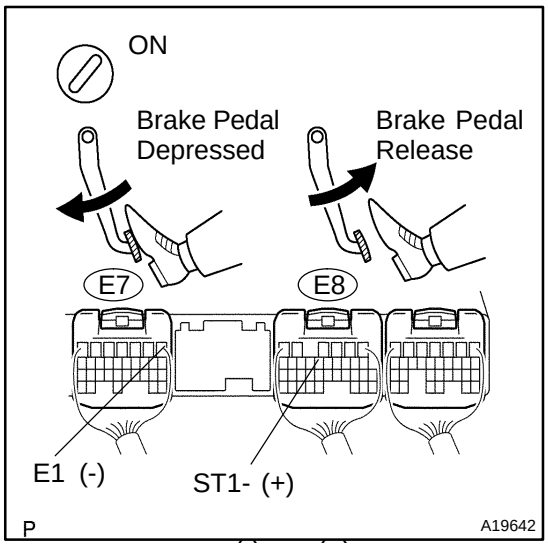
OK ↓

3	**Check stop light switch (See page BE-50).**

NG → **Replace stop light switch.**

OK ↓

4	Check STP signal and ST1- voltage.



PREPARATION:

(a) Turn the ignition switch ON.

(b) Select the item "DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STOP LIGHT SW".

CHECK:

Read the signal displayed on the hand-held tester.

OK:

Brake Pedal	Specified Condition
Depressed	STP Signal ON
Released	STP Signal OFF

CHECK:

Measure the voltage between the specified terminals of the E7 and E8 ECM connectors.

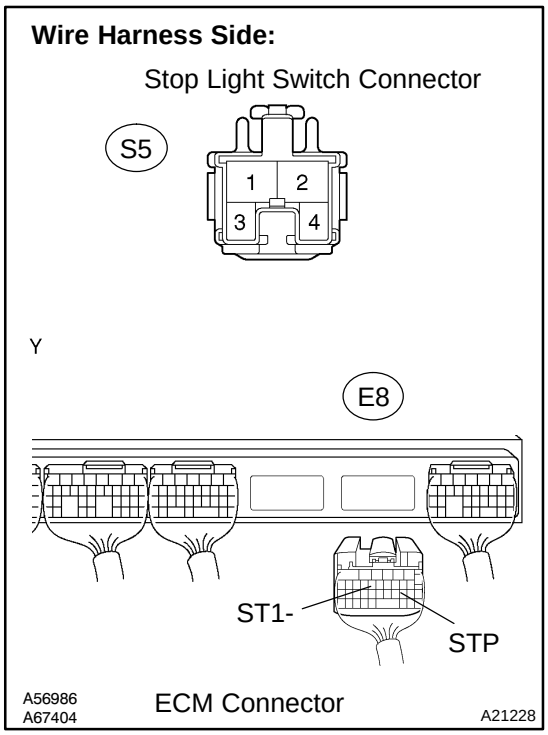
OK:

Tester Connection	Brake Pedal	Specified Condition
ST1- (E8-12) - E1 (E7-1)	Depressed	Below 1.5 V
	Released	7.5 to 14 V

OK → **Check for intermittent problems (See page DI-3).**

NG

5	Check harness and connector between ECM and stop light switch.



PREPARATION:

(a) Disconnect the S5 stop light switch connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Stop light switch (S5-1) - STP (E8-19)	Below 1 Ω
Stop light switch (S5-4) - ST1- (E8-12)	Below 1 Ω
Stop light switch (S5-1) or STP (E8-19) - Body ground	10 kΩ or higher
Stop light switch (S5-4) or ST1- (E8-12) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of stop light.**

CHECK:

Check if the stop lights come on and go off normally when the brake pedal is operated and released.

NG → **Check and repair stop light circuit.**

OK ↓

2	**Check STOP fuse.**

PREPARATION:

Remove the STOP fuse from the cowl side J/B LH.

CHECK:

Check the continuity of the STOP fuse.

OK:

Continuity

NG → **Check for short in all harness and components connected to STOP fuse.**

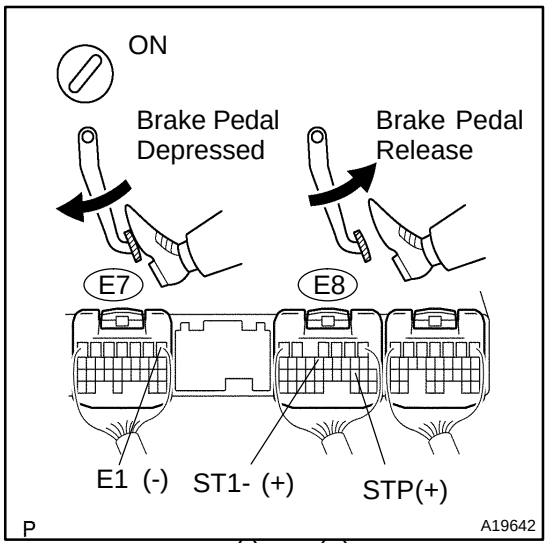
OK ↓

3	**Check stop light switch (See page BE-50).**

NG → **Replace stop light switch.**

OK ↓

4	Check STP signal.



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E7 and E8 ECM connectors.

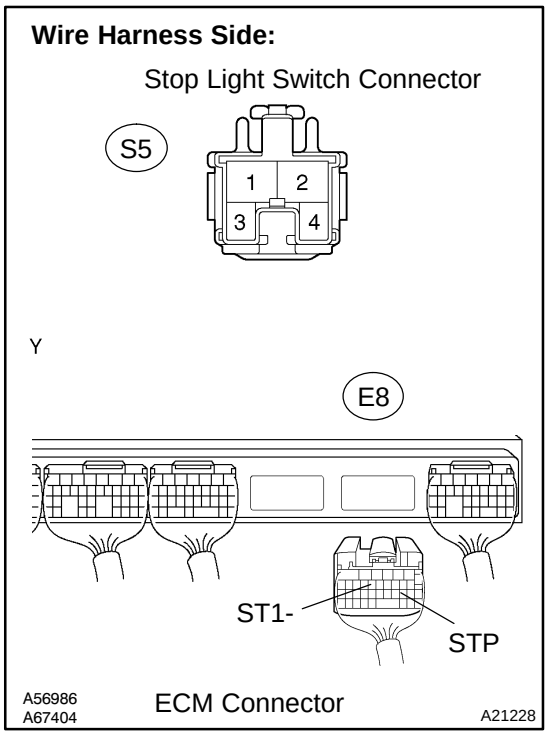
OK:

Tester Connection	Brake Pedal Position	Specified Condition
STP (E8-19) - E1 (E7-1)	Depressed	7.5 to 14 V
	Released	Below 1.5 V
ST1- (E8-12) - E1 (E7-1)	Depressed	Below 1.5 V
	Released	7.5 to 14 V

OK → **Check for intermittent problems (See page DI-3).**

NG

5	Check harness and connector between ECM and stop light switch.



PREPARATION:

(a) Disconnect the S5 stop light switch connector.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
Stop light switch (S5-1) - STP (E8-19)	Below 1 Ω
Stop light switch (S5-4) - ST1- (E8-12)	Below 1 Ω
Stop light switch (S5-1) or STP (E8-19) - Body ground	10 kΩ or higher
Stop light switch (S5-4) or ST1- (E8-12) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK →

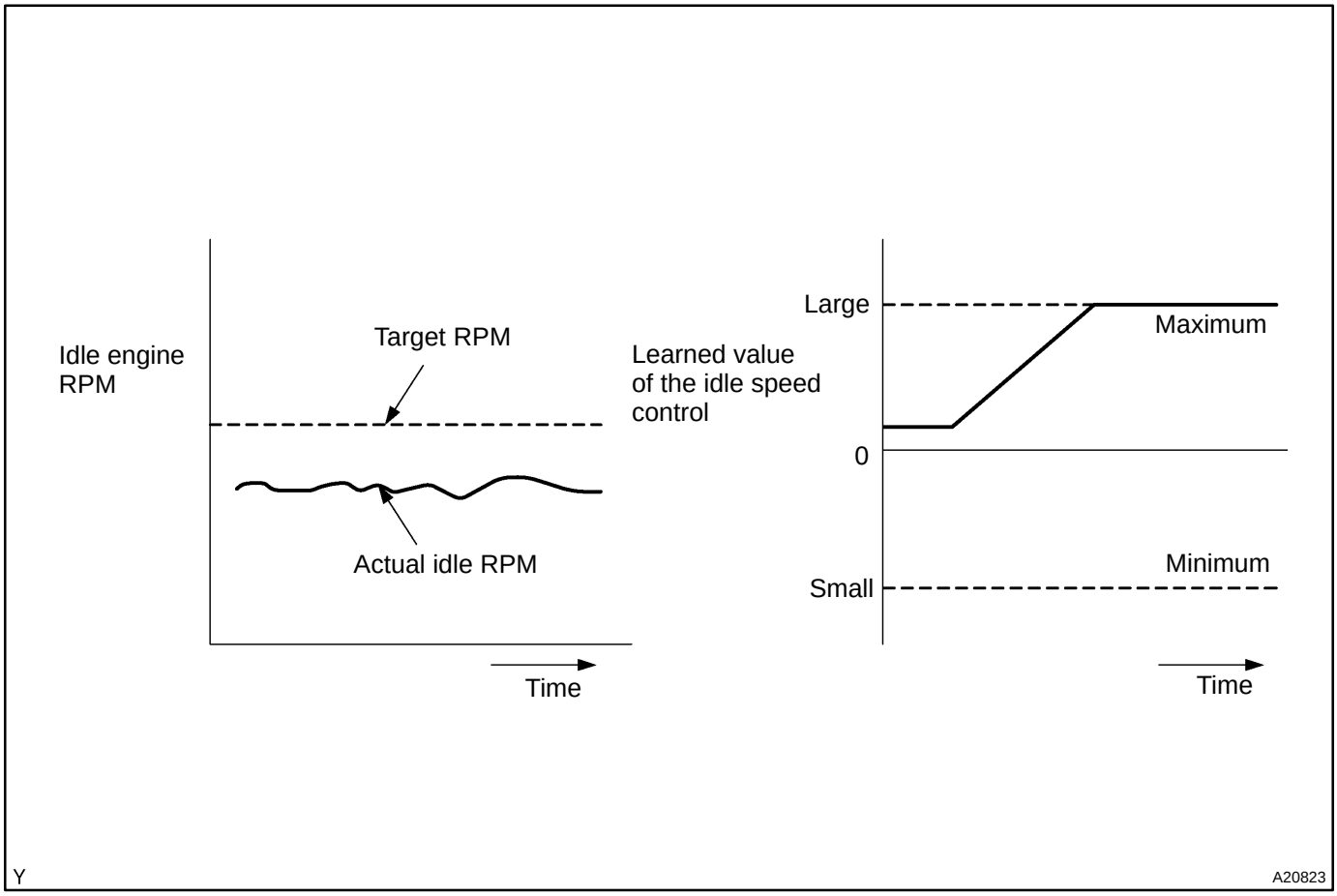
Replace ECM (See page SF-60).

DIC2L-01

DTC	P0505	Idle Air Control System

MONITOR DESCRIPTION

The idle speed is controlled by the ETCS (Electronic Throttle Control System).
The ETCS is composed of the throttle motor which operates the throttle valve, and the throttle position sensor, which detects the opening angle of the throttle valve.
The ECM controls the throttle motor to provide the proper throttle valve opening angle to obtain the target idle speed.
The ECM regulates the idle speed by opening and closing the throttle valve using the ETCS. The ECM concludes that the idle speed control ECM function is malfunctioning if: 1) the actual idle RPM varies more than the specified amount, or 2) a learned value of the idle speed control remains at the maximum or minimum five times or more during a drive cycle. The ECM will turn on the MIL and set a DTC.
Example:
If the actual idle RPM varies from the target idle RPM by more than 100 (*1) rpm five times during a drive cycle, the ECM will turn on the MIL and a DTC is set.
HINT:
*1: RPM threshold varies with engine load.



DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from target speed (1 trip detection logic)	★Electric throttle control system ★Air induction system ★PCV hose connection

MONITOR STRATEGY

Related DTCs	P0505	Idle air control malfunction
Required sensors/components	Main sensors/components	Crankshaft position sensor
	Related sensors/components	Vehicle speed sensor, Engine coolant temperature sensor
Frequency of operation	Functional check: Once per trip Range check: Continuous	
Duration	Functional check: 10 min. Range check: 10 sec.	
MIL operation	Functional check: 2 driving cycles Range check: Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Functional check:		
Precondition is met when both of the following are met	A and B	
A. Intake air flow rate learnings is enabled	3 sec.	-
B. Engine	Running	
Range check:		
Output signal duty	10%	90%
Battery voltage	10 V	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Functional check:	
Case 1:	
All of the following conditions are met:	A, B and C
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6.2 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Number of fall judgment	5 times or more
C. Intake air control flow rate learning value	Value when fail is judged first + 3.31 L/sec. or more or Value when fail is judged first - 3.31 L/sec. or less
Case 2:	
Both or the following condition are met:	A and B
A. Engine RPM - target engine RPM (History that vehicle had run for 10 km/h (6.2 mph) or more)	Less than -100 rpm or more than 200 rpm (A/C ON or park/neutral position switch ON) or Less than -100 rpm or more than 150 rpm (A/C OFF and park/neutral position switch OFF)
B. Intake air control flow rate learning value is for 5 sec.	2.48 L/sec. or less or 11 L/sec. or more

Range check:
Missing output duty change

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 P0505 will possibly be detected.

★ Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides P0505) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.

(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P0505	A
”P0505” and other DTCs	B

HINT:

If any other codes besides P0505 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	**Check connection of PCV piping.**

NG → **Repair or replace PCV piping.**

OK

3	**Check air induction system (See page SF-1).**

CHECK:

Check for vacuum leaks in air induction system.

NG → **Repair or replace air induction system.**

OK

Check electric throttle control system (See page SF-33).

DIC2M-01

DTC	P0560	System Voltage

MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the ignition switch is OFF. This electricity allows the ECM store data such as DTC history, freeze frame data, fuel trim values, and other data.
If the battery voltage falls below a minimum level, the ECM will conclude that there is a fault in the power supply circuit. The next time the engine starts, the ECM will turn on the MIL and a DTC will be set.

DTC No.	DTC Detecting Condition	Trouble Area
P0560	Open in back up power source circuit	★Open in back-up power source circuit ★EFI or ECD No.1 fuse ★ECM

HINT:
If DTC P0560 present, the ECM will not store another DTC.

MONITOR STRATEGY

Related DTCs	P0560	System voltage malfunction
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	3 sec.	
MIL operation	Immediate (*1)	
Sequence of operation	None	

*1: The DTC is set immediate. The MIL will be illuminated after the next engine start.

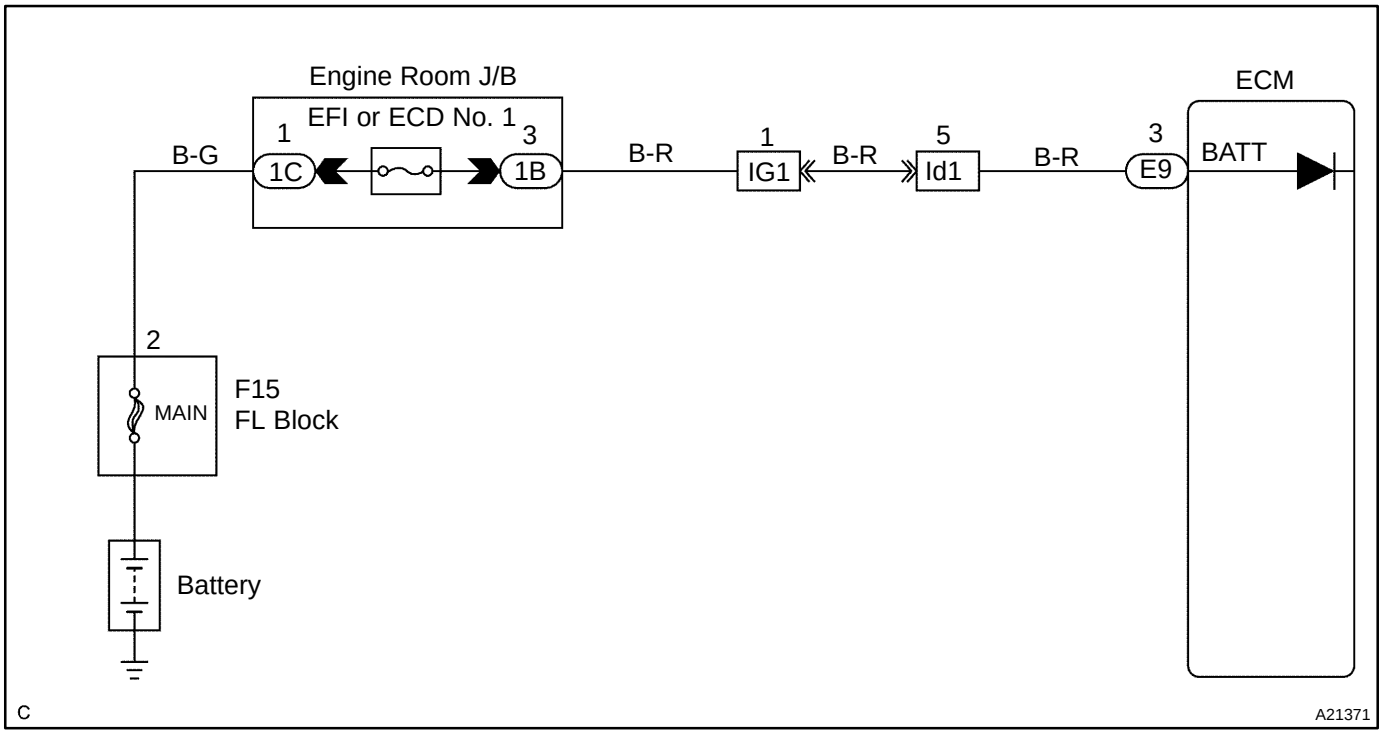
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Stand-by RAM	Initialized	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Battery voltage	Less than 3.5 V

WIRING DIAGRAM

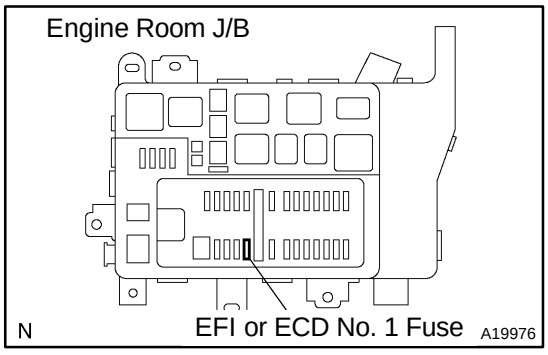


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Check EFI or ECD No. 1 fuse of engine room J/B.**



PREPARATION:

Remove the EFI or ECD No. 1 fuse from the engine room J/B.

CHECK:

Check the continuity of the EFI or ECD No. 1 fuse.

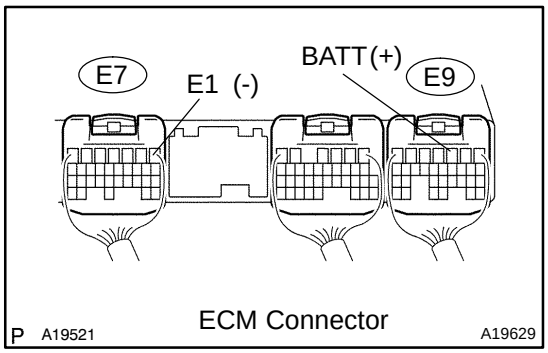
OK:

Continuity

NG → **Check for short in all harness and components connected to EFI or ECD No. 1 fuse.**

OK

2	Check voltage between terminal BATT and E1 of ECM connector.



CHECK:

Measure the voltage between terminals of the E7 and E9 ECM connector.

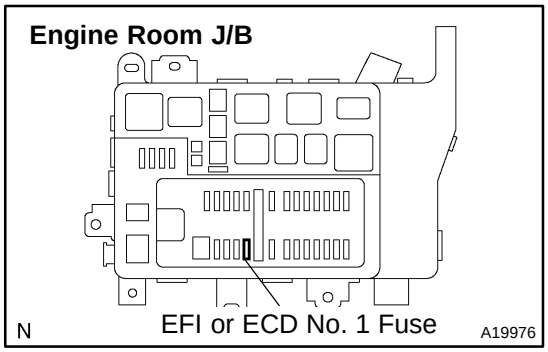
OK:

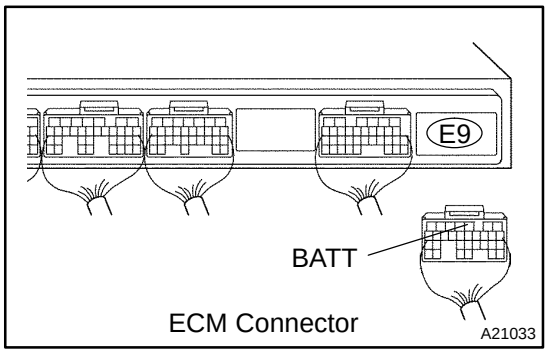
Tester Connection	Specified Condition
BATT (E9-3) - E1 (E7-1)	9 to 14 V

OK → **Check for intermittent problems (See page DI-3).**

NG

3	Check for open and short in harness and connector between ECM and EFI or ECD No. 1 fuse, EFI or ECD No. 1 fuse and battery.





Check the harness and the connector between the EFI or ECD No. 1 fuse and the ECM:

PREPARATION:

(a) Remove the EFI or ECD No. 1 fuse from the engine room J/B.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (EFI or ECD No. 1 fuse terminal 2) - BATT (E9-3)	Below 1 Ω
Engine Room J/B (EFI or ECD No. 1 fuse terminal 2) or BATT (E9-3) - Body ground	10 kΩ or higher

Check the harness and connector between the EFI or ECD No. 1 fuse and the battery:

PREPARATION:

(a) Remove the EFI or ECD No. 1 fuse from the engine room J/B.

(b) Disconnect the battery positive terminal.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (EFI or ECD No. 1 fuse terminal 1) - Battery positive terminal	Below 1 Ω
Engine Room J/B (EFI or ECD No. 1 fuse terminal 1) or Battery positive terminal - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check and replace engine room J/B.

DTC	P0604	Internal Control Module Random Access Memory (RAM) Error

DTC	P0606	ECM/PCM Processor

DTC	P0607	Control Module Performance

DTC	P0657	Actuator Supply Voltage Circuit / Open

MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status, internal circuits, and output signals to the throttle actuator. This self-check insures that the ECM is functioning properly. If any malfunction is detected, the ECM will set the appropriate DTC and illuminate the MIL.
The ECM memory status is diagnosed by internal ”mirroring” of the main CPU and the sub CPU to detect RAM (Random Access Memory) errors. The two CPUs also perform continuous mutual monitoring.
The ECM sets a DTC if: 1) outputs from the 2 CPUs are different and deviate from the standards, 2) the signals to the throttle actuator deviate from the standards, 3) a malfunction is found in the throttle actuator supply voltage, and 4) any other ECM malfunction is found.

DTC No.	DTC Detecting Condition	Trouble Area
P0604 P0606 P0607 P0657	ECM malfunction	★ECM

MONITOR STRATEGY

Related DTCs	P0604	Random access memory (RAM) error range check
	P0606	ECM range check/description
	P0657	Actuator supply voltage circuit range check
Required sensors/components	ECM	
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P0604:	
RAM mirror check failure	
P0606:	
ECM error	
P0657:	
ECM error	

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Replace ECM (See page SF-60).

DIC2N-01

DTC	P0617	Starter Relay Circuit High

MONITOR DESCRIPTION

While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. If the vehicle is being driven and the ECM detects the starter control signal (STA), the ECM concludes that the starter control circuit is malfunctioning. The ECM will turn on the MIL and a DTC is set.

DTC No.	DTC Detection Condition	Trouble Area
P0617	When all conditions (a), (b) and (c) are satisfied for 20 seconds with battery (+B) voltage 10.5 V or more (a) Vehicle speed ± 20 km/h (12.4 mph) (b) Engine revolution ± 1,000 rpm (c) STA signal ON	★Park/neutral position switch ★Starter relay circuit ★Ignition switch ★ECM

MONITOR STRATEGY

Related DTCs	P0617	Starter signal error
Required sensors/components	Main sensors/components	Starter signal
	Related sensors/components	Vehicle speed sensor, Engine speed sensor
Frequency of operation	Continuous	
Duration	20 sec.	
MIL operation	Immediate	
Sequence of operation	None	

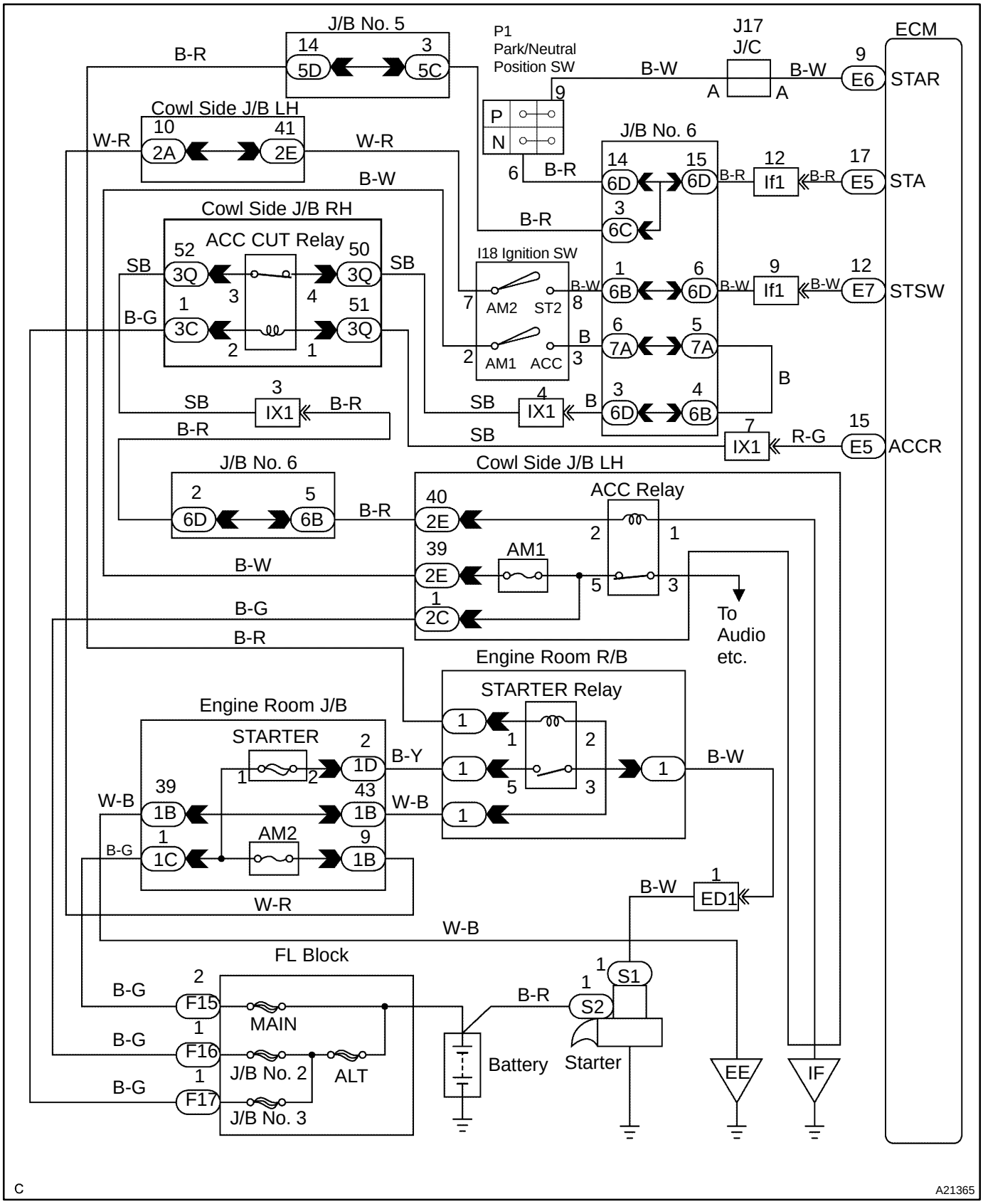
TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Battery voltage	10.5 V	-
Vehicle speed	20 km/h (12.4 mph)	-
Engine speed	1,000 rpm	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Starter signal	ON (at "more than 20 km/h (12.4 mph) and more than 1,000 rpm")

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand-held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter operates.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-402).**

NG → **Replace park/neutral position switch.**
Go to next step 5 after the replacement.

OK

3	**Check ignition switch (See page BE-29).**

NG → **Replace ignition switch.**
Go the next step 5 after the replacement.

OK

4	**Connect hand-held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter operates.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

NG → **Repair or replace harness or connector.**

OK

5	**Check DTC reoccur.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and hand-held tester main switch ON.
(c) Clear DTC (See page DI-3).
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.

CHECK:

Check DTC reoccur.

RESULT:

Display (DTC output)	Proceed to
P0617	A
No DTC output	B

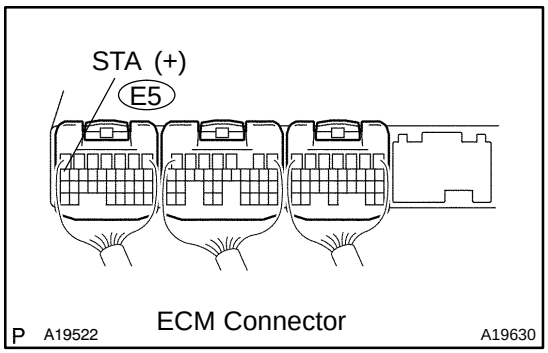
A → **Replace ECM (See page SF-60).**

B

Check for intermittent problems (See page DI-3).

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal STA of the ECM connector and the body ground, while cranking the engine (ignition switch START position) and while not engine cranking the engine (ignition switch position ON).
OK:

Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

OK	**Go to step 5.**

NG

2	**Check park/neutral position switch (See page DI-402).**

NG	**Replace park/neutral position switch. Go to next step 5 after the replacement.**

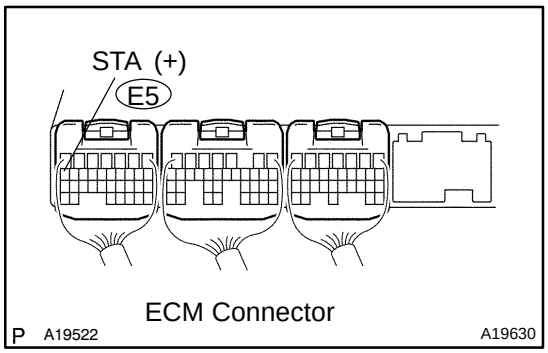
OK

3	**Check ignition switch (See page BE-29).**

NG	**Replace ignition switch. Go to next step 5 after the replacement.**

OK

4	Check voltage between terminal STA of ECM connector and body ground.



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal STA of the ECM connector and the body ground, while cranking the engine (ignition switch START position) and while not engine cranking the engine (ignition switch position ON).
OK:

Voltage:
6 V or more (ignition switch START position)
0 V (ignition switch ON position)

NG → **Repair or replace harness or connector.**

OK ↓

5	Check DTC reoccur.

PREPARATION:
(a) Connect the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and hand-held tester main switch ON.
(c) Clear DTC (See page DI-3).
(d) Drive the vehicle more than 40 km/h (25 mph) for 20 seconds or more.
CHECK:
Check DTC reoccur.
RESULT:

Display (DTC output)	Proceed to
P0617	A
No DTC output	B

A → **Replace ECM (See page SF-60).**

B ↓

Check for intermittent problems (See page DI-3).

DIC2O-01

DTC	P2102	Throttle Actuator Control Motor Circuit Low

DTC	P2103	Throttle Actuator Control Motor Circuit High

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve.
The opening angle of the throttle valve is detected by the throttle position sensor which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to control the throttle motor and monitor the throttle opening angle as the ECM responds to driver inputs.
HINT:
This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2102	Conditions (a) and (b) continue for 2.0 seconds: (a) Throttle control motor output duty 80 % or more (b) Throttle control motor current 0.5 A or less	★Open in throttle control motor and sensor circuit ★Throttle control motor and sensor ★ECM
P2103	Either of following conditions is met. (a) Throttle control motor current 10 A or more (0.1 sec) (b) Throttle control motor current 7 A or more (0.6 sec.)	★Short in throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body ★ECM

MONITOR DESCRIPTION

The ECM monitors the current through the electronic throttle motor and detects malfunctions or open circuit in the throttle motor based on the voltage of the current. When the current deviates from the standard, the ECM concludes that there is a fault in the throttle motor.
Or, if the throttle valve is not functioning properly (for example, stuck ON) the ECM concludes that there is a fault and turns on the MIL and a DTC is set.
Example:
When the current is more than 10 A. Or the current is less than 0.5 A when the motor driving duty ratio is exceeding 80%. The ECM concludes that the current is out of range, turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2102	Throttle actuator control motor current (Low current)
	P2103	Throttle actuator control motor current (High current)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	P2102: Immediate P2103: 1 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2102:		
Throttle motor	ON	
Duty-cycle ratio to open throttle actuator	80%	-
Throttle actuator power supply	8 V	-
Current motor current - Motor current at 0.016 sec. before	-	0.2 A
P2103:		
Throttle motor	ON	
Either of the following conditions is met:	A or B	
A. Throttle actuator power supply	8 V	-
B. Throttle actuator power	ON	

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2102:	
Throttle motor current	Less than 0.5 A (when motor drive duty 80% or more)
P2103:	
Throttle motor current	More than 10 A (0.1 sec.) More than 7 A (0.6 sec.)

WIRING DIAGRAM

Refer to DTC P0120 on page DI-84 .

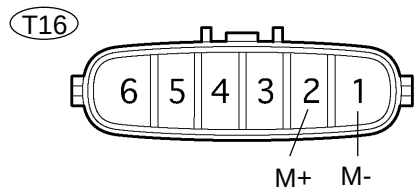
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Check throttle control motor.**

Component Side:
Throttle Control Motor and Sensor



PREPARATION:

Disconnect the throttle control motor and sensor connector.

CHECK:

Measure the resistance between terminals of the throttle control motor.

OK:

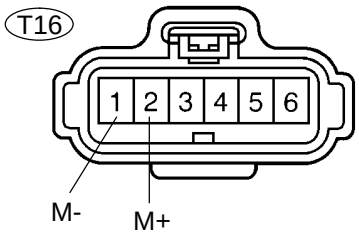
Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20˚C (68˚F))

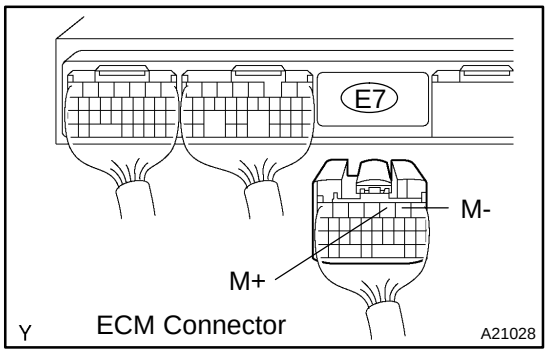
NG → **Replace throttle body (See page SF-36).**

OK

2	Check for open and short in harness and connector between throttle control motor and ECM.

Wire Harness Side:
Throttle Control Motor and Sensor





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
M+ (T16-2) - M+ (E7-3)	Below 1 Ω
M- (T16-1) - M- (E7-2)	Below 1 Ω
M+ (T16-2) or M+ (E7-3) - Body ground	10 kΩ or higher
M- (T16-1) or M- (E7-2) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	Visually check throttle valve.

CHECK:

Check between the throttle valve and the housing for foreign objects.
Also, check if the valve can open and close smoothly.

NG → **Remove foreign object and clean throttle body.**

OK

Replace ECM (See page SF-60).

DIC2P-01

DTC	P2111	Throttle Actuator Control System -Stuck Open

DTC	P2112	Throttle Actuator Control System -Stuck Closed

CIRCUIT DESCRIPTION

The throttle motor is operated by the ECM and it opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body. The throttle position sensor provides feedback to the ECM to control the throttle motor and set the throttle valve angle in response to driver input.

HINT:

This Electrical Throttle Control System (ETCS) does not use a throttle cable.

DTC No.	DTC Detection Condition	Trouble Area
P2111	Throttle motor locked during ECM order to close.	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle body ★Throttle valve
P2112	Throttle motor locked during ECM order to open.	

MONITOR DESCRIPTION

The ECM concludes that there is a malfunction of the ETCS (Electronic Throttle Control System) when the throttle valve remains at a fixed angle despite high drive current from the ECM. The ECM will turn on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.

If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.

If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2111	Throttle motor actuator lock (Open)
	P2112	Throttle motor actuator lock (Closed)
Required sensors/components	Main sensors/components	Throttle actuator motor
	Related sensors/components	Throttle position sensor
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
P2111:		
Throttle motor current	2 A	-
Throttle motor duty to close side	80%	-
P2112:		
Throttle motor current	2 A	-
Throttle motor duty to open side	80%	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|Current throttle position sensor voltage at this time - throttle position sensor voltage 0.016 sec. earlier|	Less than 0.1 V when throttle motor open (or close) duty 80% or more

WIRING DIAGRAM

Refer to DTC P0120 on page DI-84 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Visually check throttle valve.**

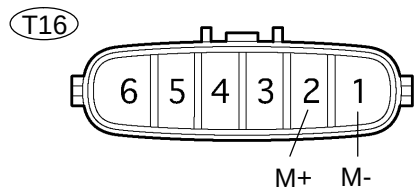
PREPARATION:
Remove the intake air connector.
CHECK:
Check whether or not a foreign matter is caught between the throttle valve and housing. Also, if the valve can open and close smoothly.

NG → **Remove foreign matter and clean throttle body.**

OK

2	**Check throttle control motor.**

Component Side:
Throttle Control Motor and Sensor



PREPARATION:
Disconnect the throttle control motor and sensor connector.
CHECK:
Measure the resistance between terminals of the throttle control motor.
OK:

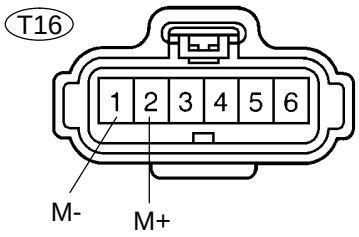
Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20˚C (68˚F))

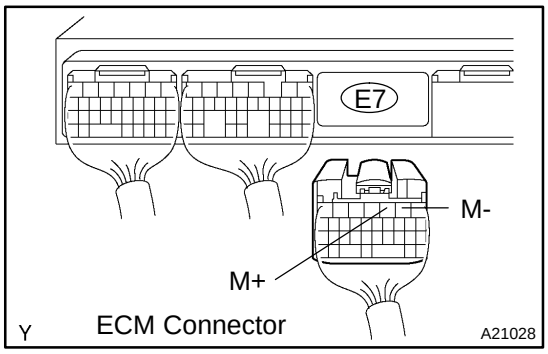
NG → **Replace throttle body (See page SF-36).**

OK

3	**Check for open and short in harness and connector between ECM and throttle control motor.**

Wire Harness Side:
Throttle Control Motor and Sensor





PREPARATION:

(a) Disconnect the T16 throttle control motor and sensor connector.

(b) Disconnect the E7 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Tester Connection	Specified Condition
M+ (T16-2) - M+ (E7-3)	Below 1 Ω
M- (T16-1) - M- (E7-2)	Below 1 Ω
M+ (T16-2) or M+ (E7-3) - Body ground	10 kΩ or higher
M- (T16-1) or M- (E7-2) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check for intermittent problems (See page DI-3).

DIC2Q-01

DTC	P2118	Throttle Actuator Control Motor Current Range/Performance

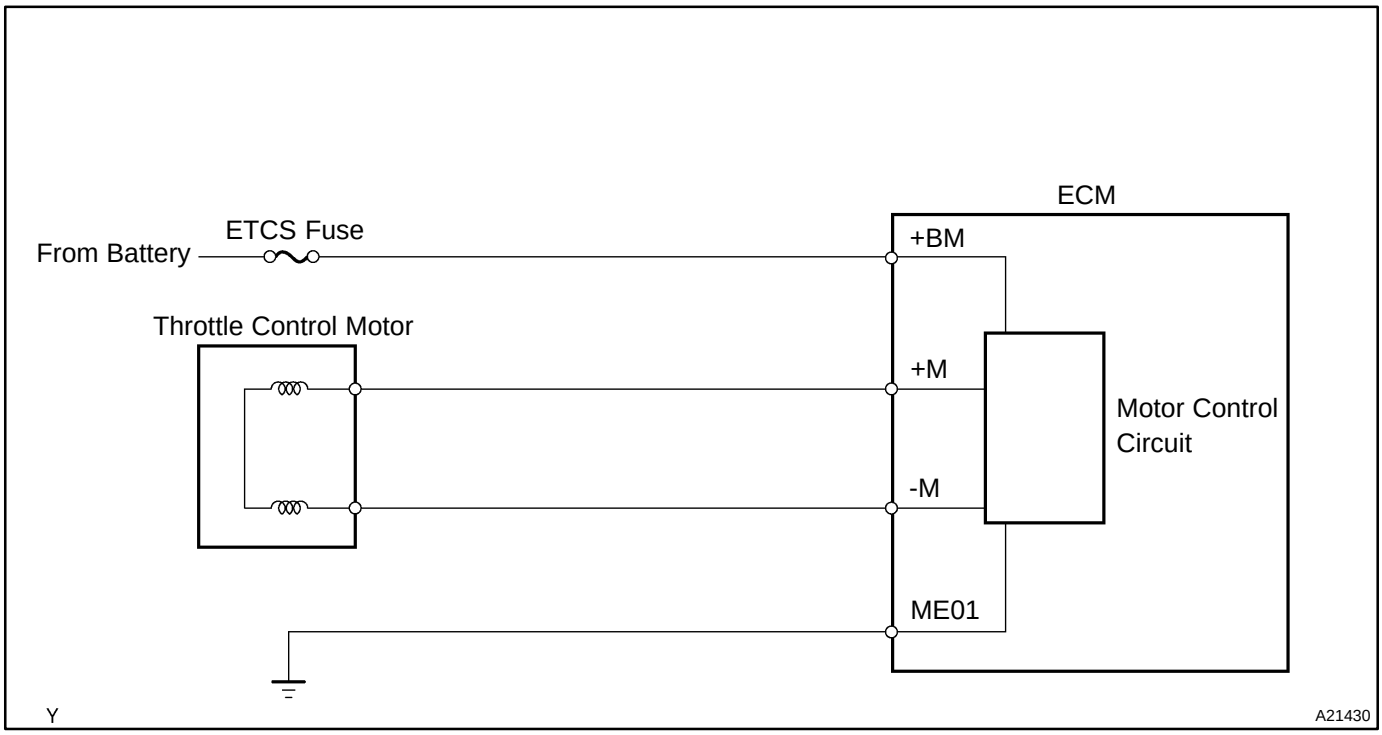
CIRCUIT DESCRIPTION

The Electronic Throttle Control System (ETCS) has a dedicated power supply circuit. The voltage (+BM) is monitored and when the voltage is low (less than 4V), the ECM concludes that the ETCS has a fault and current to the throttle control motor is cut.

When the voltage becomes unstable, the ETCS itself becomes unstable. For this reason, when the voltage is low, the current to the motor is cut. If repairs are made and the system has returned to normal, turn the ignition switch to OFF. The ECM then allows current to flow to the motor and the motor can be restarted.

HINT:

This Electrical Throttle Control System (ETCS) does not use a throttle cable.



DTC No.	DTC Detection Condition	Trouble Area
P2118	Open in ETCS power source circuit	★Open in ETCS power source circuit ★ETCS fuse ★ECM

MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the electronic throttle motor. When the power supply voltage drops below the threshold, the ECM concludes that the power supply has an open circuit. A DTC is set and the MIL is turned on.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2118	Throttle actuator motor power supply line range check (Low voltage)
Required sensors/components	Throttle actuator motor	
Frequency of operation	Continuous	
Duration	0.8 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)	
Actuator power	ON	
Battery voltage	8 V	-

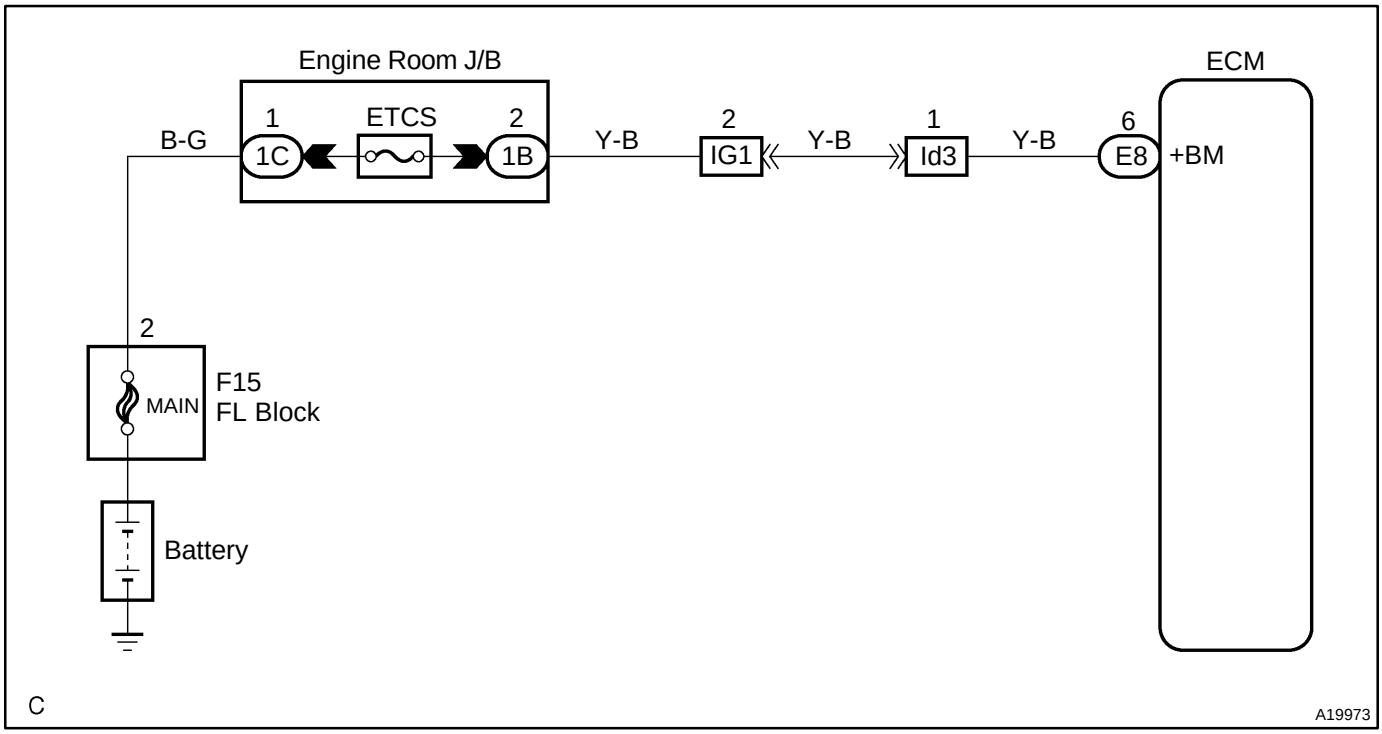
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Throttle actuator motor power supply voltage	Less than 4 V

COMPONENT OPERATING RANGE

Parameter	Standard Value
Throttle actuator motor power supply voltage	9 to 14 V

WIRING DIAGRAM

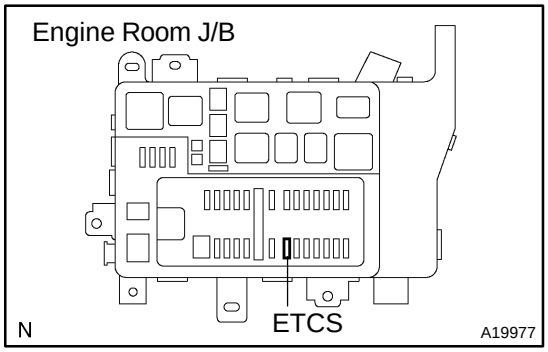


INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Check ETCS fuse.**



PREPARATION:

Remove the ETCS fuse from the engine room J/B.

CHECK:

Check the continuity of the ETCS fuse.

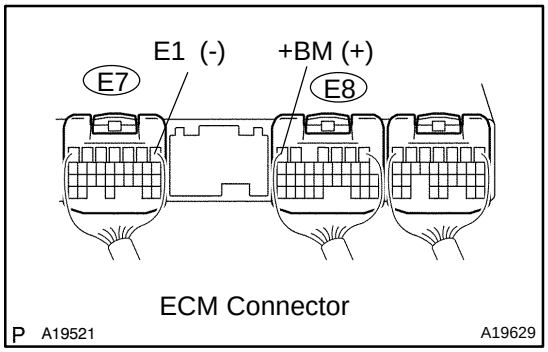
OK:

Continuity

NG → **Check for short in all harness and components connected to ETCS fuse.**

OK

2	**Check voltage between terminal +BM and E1 of ECM connector.**



CHECK:

Measure the voltage between the specified terminals of the E7 and E8 ECM connector.

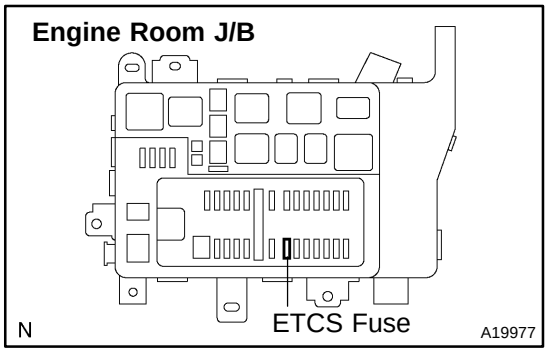
OK:

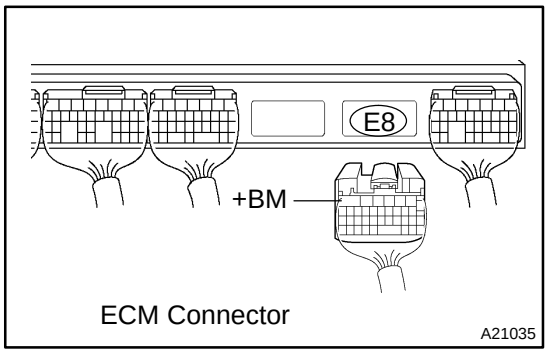
Tester Connection	Specified Condition
+BM (E8-6) - E7 (E7-1)	9 to 14 V

OK → **Check for intermittent problems (See page DI-3).**

NG

3	**Check for open or short in harness or connector between battery and ETCS fuse, ETCS fuse and ECM.**





Check the harness and the connector between the ETCS fuse and the ECM:

PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the E8 ECM connector.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse terminal 2) - +BM (E8-6)	Below 1 Ω
Engine Room J/B (ETCS fuse terminal 2) or +BM (E8-6) - Body ground	10 kΩ or higher

Check the harness and connector between the ETCS fuse and the battery:

PREPARATION:

(a) Remove the ETCS fuse from the engine room J/B.

(b) Disconnect the battery positive terminal.

CHECK:

Measure the resistance between the wire harness side connector.

OK:

Tester Connection	Specified Condition
Engine Room J/B (ETCS fuse teminal 1) - Battery positive terminal	Below 1 Ω
Engine Room J/B (ETCS fuse terminal 1) or Battery positive terminal - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

Check engine room J/B.

DTC	P2119	Throttle Actuator Control Throttle Body Range/Performance

CIRCUIT DESCRIPTION

The Electric Throttle Control System (ETCS) is composed of a throttle motor that operates the throttle valve, a throttle position sensor that detects the opening angle of the throttle valve, an accelerator pedal position sensor that detects the accelerator pedal position, and the ECM that controls the ETCS system.
The ECM operates the throttle motor to position the throttle valve for proper response to driver inputs. The throttle position sensor, mounted on the throttle body, detects the opening angle of the throttle valve and provides this signal to the ECM so that the ECM can regulate the throttle motor.

DTC No.	DTC Detection Condition	Trouble Area
P2119	Throttle opening angle continues to vary greatly from target throttle opening angle	★Electric throttle control system ★Throttle body

MONITOR DESCRIPTION

The ECM determines the ”actual” throttle angle based on the throttle position sensor signal. The ”actual” throttle position is compared to the ”target” throttle position commanded by the ECM. If the difference of these two values exceeds a specified limit, the ECM interprets this as a fault in the ETCS (Electronic Throttle Control System). The ECM turns on the MIL and a DTC is set.

FAIL SAFE

If the ETCS (Electronic Throttle Control System) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16˚) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel infection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimum speed.
If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2119	Electronic throttle control system failure
Required sensors/components	Main sensors	Throttle actuator motor
	Related sensors	Throttle position sensor
Frequency of operation	Continuous	
Duration	1 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

The monitor will run whenever the following DTCs are not present	See ”List of disable a monitor” (on page DI-3)
The typical enabling condition is not available	-

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Difference between ”target throttle position” and ”actual throttle position”	0.3 V or more

COMPONENT OPERATING RANGE

Standard Value
Commanded throttle position and current throttle position are nearly same

WIRING DIAGRAM

Refer to DTC P2102 and P2103 on page DI-302 .

INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

1	**Are there any other codes (besides DTC P2119) being output?**

PREPARATION:

(a) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester or OBD II scan tool main switch ON.
(c) When using hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODES.

CHECK:

Read the DTC using the hand-held tester or the OBD II scan tool.

RESULT:

Display (DTC Output)	Proceed to
P2119	A
”P2119” and other DTC	B

HINT:

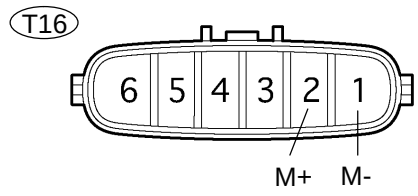
If any other codes besides P2119 are output, perform the troubleshooting for those DTCs first.

B → **Go to relevant DTC chart (See page DI-36).**

A

2	Check throttle control motor.

Component Side:
Throttle Control Motor and Sensor



PREPARATION:
Disconnect the throttle control motor and sensor connector.
CHECK:
Measure the resistance between terminals of the throttle control motor.
OK:

Tester Connection	Specified Condition
M+ (T16-2) - M- (T16-1)	0.3 to100 Ω (20˚C (68˚F))

NG → **Replace throttle body (See page SF-36).**

OK

3	Replace ECM and clear DTC (Check if DTC outputs reoccur).

PREPARATION:
(a) Replace ECM.
(b) Clear the DTC (See page DI-3).
(c) Start and warm up the engine.
(d) Run the engine at idle for 15 seconds or more.
CHECK:
Read the DTC using the hand-held tester or the OBD II scan tool.
OK:
No DTC output.

OK → **System is normal.**

NG

Replace throttle body.

DIC2S-01

DTC	P2120	Throttle/Pedal Position Sensor/Switch ”D” Circuit

DTC	P2122	Throttle/Pedal Position Sensor/Switch ”D” Circuit Low Input

DTC	P2123	Throttle/Pedal Position Sensor/Switch ”D” Circuit High Input

DTC	P2125	Throttle/Pedal Position Sensor/Switch ”E” Circuit

DTC	P2127	Throttle/Pedal Position Sensor/Switch ”E” Circuit Low Input

DTC	P2128	Throttle/Pedal Position Sensor/Switch ”E” Circuit High Input

DTC	P2138	Throttle/Pedal Position Sensor/Switch ”D”/”E” Voltage Correlation

HINT:
This is the repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

HINT:

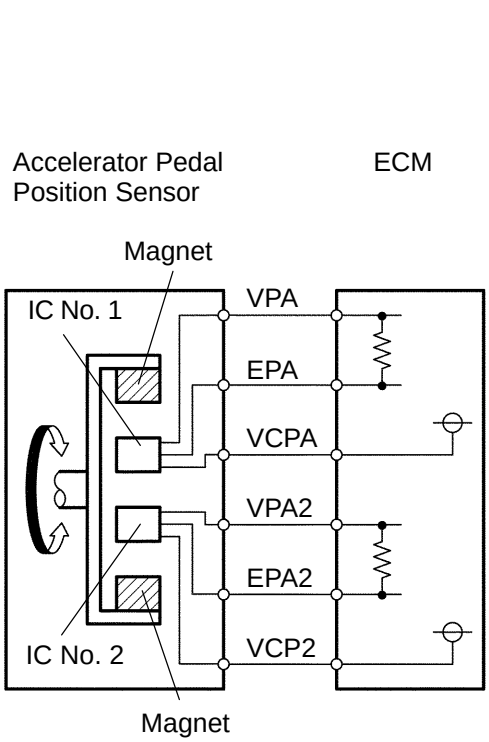
★ This electrical throttle system does not use a throttle cable.

★ This accelerator pedal position sensor is a non-contact type.

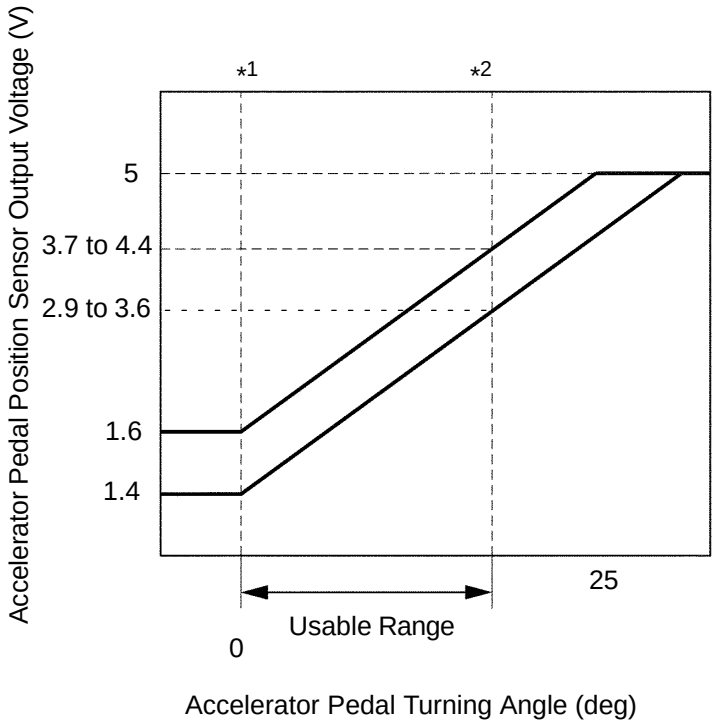
The accelerator pedal position sensor is mounted in the accelerator pedal to detect the angle of the accelerator pedal. This sensor is electronically controlled and uses Hall-effect elements.

In the accelerator pedal position sensor, the voltage applied to terminals VPA and VPA2 of the ECM changes between 0 V and 5 V in proportion to the angle of the accelerator pedal. The VPA is a signal to indicate the actual accelerator pedal angle and is used for the engine control. VPA2 is used to detect malfunctions of the sensor itself.

The ECM judges the current angle of the accelerator pedal from these signals input from terminals VPA and VPA2, and the ECM controls the throttle motor based on these signals.



A19694



*1 : Accelerator Pedal Fully Released

*2 : Accelerator Pedal Fully Depressed

A19803

DTC No.	DTC Detection Condition (Open or short in accelerator pedal position sensor circuit)	Main trouble Area
P2120	Condition (a) continues for 0.5 seconds or more: (a) VPA ± 0.2 V and VPA2 ≧ 0.97 deg, or VPA ≧ 4.8 V	★Accelerator pedal position sensor ★ECM
P2122	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA ± 0.2 V (b) VPA2 ≧ 0.97 deg	★Accelerator pedal position sensor ★VCPA circuit open ★VPA circuit open or ground short ★ECM
P2123	Condition (a) continues for 2.0 seconds or more: (a) VPA ≧ 4.8 V	★Accelerator pedal position sensor ★EPA circuit open ★ECM
P2125	Condition (a) continues for 0.5 seconds or more: (a) VPA2 ± 0.5 V and VPA ≧ 0.97 deg, or VPA2 ≧ 4.8 V and 0.2 V ± VPA ± 3.45 V	★Accelerator pedal position sensor ★ECM
P2127	Condition (a) and (b) continues for 0.5 seconds or more: (a) VPA2 ± 0.5 V (b) VPA ≧ 0.97 deg	★Accelerator pedal position sensor ★VCP2 circuit open ★VPA2 circuit open or ground short ★ECM
P2128	Condition (a) and (b) continues for 2.0 seconds or more: (a) VPA2 ≧ 4.8 V (a) 0.2 V ± VPA ± 3.45 V	★Accelerator pedal position sensor ★EPA circuit open ★ECM
P2138	Condition (a) or (b) continues for 2.0 seconds or more: (a) |VPA - VPA2| ± 0.02 V (b) VPA ± 0.2 V and VPA2 ± 0.5 V	★VPA and VPA2 circuit are short circuited ★Accelerator pedal position sensor ★ECM

HINT:
After confirming DTC P2120, P2122, P2123, P2125, P2127, P2128 and P2138 use the OBD II scan tool or the hand-held tester to confirm the accelerator pedal opening percentage.

Trouble area	Accelerator pedal position expressed as voltage			
	Accelerator pedal completely released		Accelerator pedal fully depressed	
	ACCEL POS #1	ACCEL POS #2	ACCEL POS #1	ACCEL POS #2
VC circuit open	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V	0 to 0.2 V
VPA circuit open or ground short	0 to 0.2 V	1.2 to 2.0 V	0 to 0.2 V	3.4 to 5.3 V
VPA2 circuit open or ground short	0.5 to 1.1 V	0 to 0.2 V	2.6 to 4.5 V	0 to 0.2 V
E2 circuit open	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V	4.5 to 5.5 V

MONITOR DESCRIPTION

When VPA or VPA2, deviates from the standard, or the difference between the voltage outputs of the two sensors is less than threshold, the ECM concludes that there is a defect in the accelerator pedal position sensor. The ECM turns on the MIL and a DTC is set.
Example:
When the voltage output of the VPA below 0.2 V or exceeds 4.8 V.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2120	Accelerator position sensor 1 (VPA) range check (Fluttering)
	P2122	Accelerator position sensor 1 (VPA) range check (Low voltage)
	P2123	Accelerator position sensor 1 (VPA) range check (High voltage)
	P2125	Accelerator position sensor 2 (VPA2) range check (Fluttering)
	P2127	Accelerator position sensor 2 (VPA2) range check (Low voltage)
	P2128	Accelerator position sensor 2 (VPA2) range check (High voltage)
	P2138	Accelerator position sensor correlation range check
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	2 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Ignition switch	ON	
Throttle control motor power	ON	

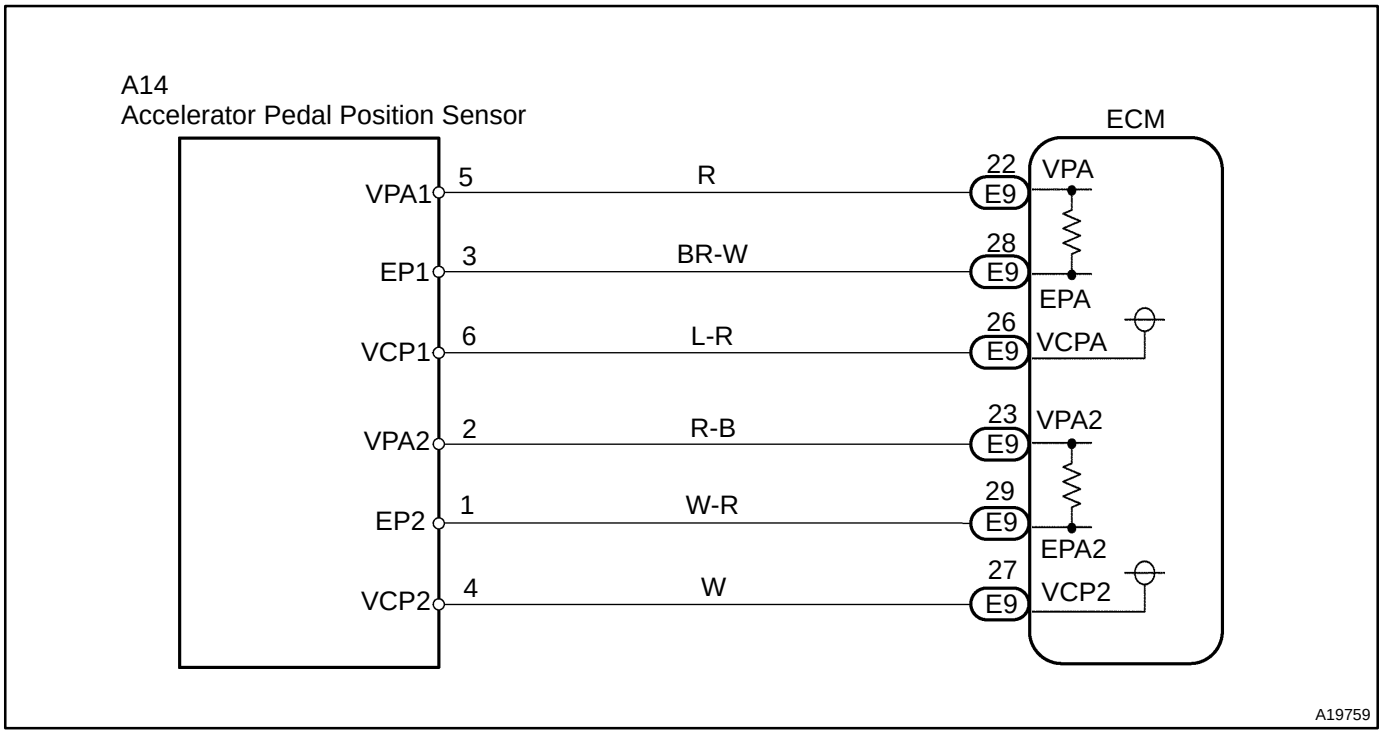
TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
P2120:	
VPA voltage	0.2 V or less or 4.8 V or more fluttering
P2122:	
VPA voltage	0.2 V or less (When VPA2 angle 1 deg or more)
P2123:	
VPA voltage	4.8 V or more
P2125:	
VPA2 voltage	0.5 V or less or 4.8 V or more fluttering
P2127:	
VPA2 voltage	0.5 V or less (When VPA angle 1 deg or more)
P2128:	
Following conditions are met:	A and B
A. VPA voltage	0.2 V or more and 3.45 V or less
B. VPA2 voltage	4.8 V or more
P2138:	
Following condition is met for	A or B
A. Difference between VPA and VPA2 voltages	0.02 V or less
B. Both following conditions are met:	(a) and (b)
(a) VPA voltage	0.2 V or less
(b) VPA2 voltage	0.5 V or less

COMPONENT OPERATING RANGE

Parameter	Standard Value
VPA voltage	More than 0.2 V and less than 4.8 V
VPA2 voltage	More than 0.5 V and Less than 4.8 V
Difference between VPA and VPA2 voltages	More than 0.02 V

WIRING DIAGRAM



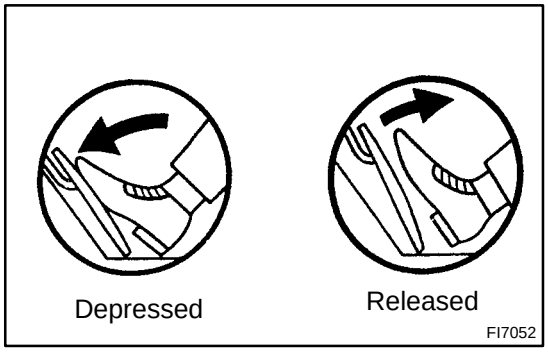
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.

(b) Turn the ignition switch ON and push the hand-held tester main switch ON.

(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

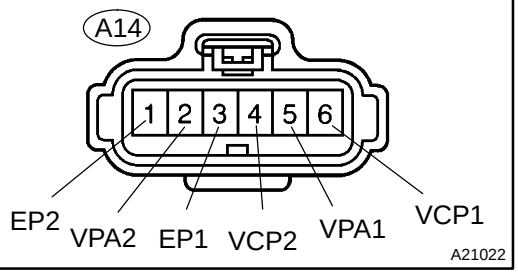
Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

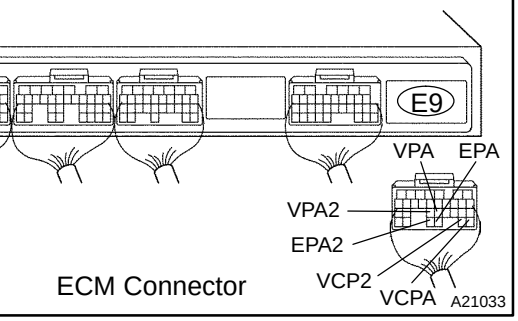
OK	**Go to step 5.**

NG

2	**Check for open and short in harness and connector in VCPA, VCP2, VPA, VPA2 EPA and EPA2 circuit between ECM and accelerator pedal position sensor.**

Wire Harness Side:
Accelerator Pedal Position Sensor





ECM Connector

PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

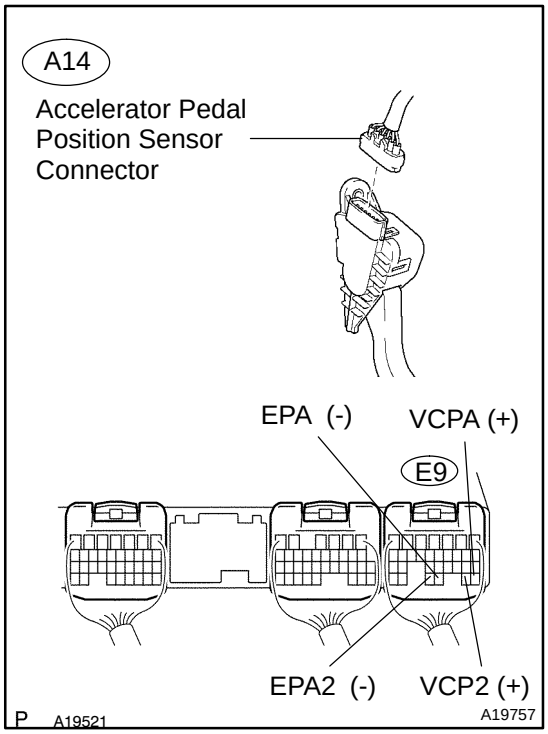
OK:

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

3	**Check voltage between terminals VCPA and EPA, and VCP2 and EPA2 of ECM terminals.**



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

4	**Replace accelerator pedal assembly (See page SF-58).**

Go

5	**Check if DTC output recur?**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Disconnect the battery terminals or remove the EFI or ECD No. 1 fuse and ETCS fuse (Clear DTCs).
(c) Start the engine.
(d) Drive the engine at idle for 15 seconds or more.

CHECK:

Read the DTC output.

OK:

No DTC output.

OK → **System is OK.**

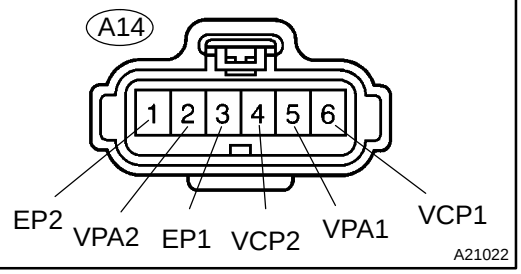
NG

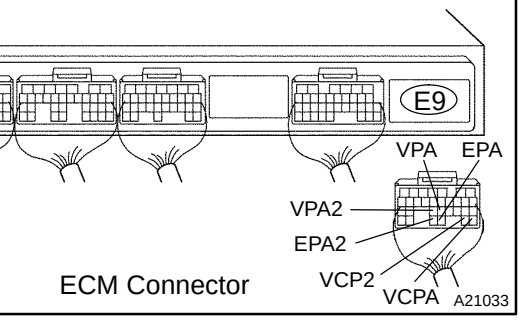
Replace ECM (See page SF-60).

OBD II scan tool (excluding hand-held tester):

1	**Check for open and short in harness and connector in VCPA, VCP2, VPA, VPA2 EPA and EPA2 circuit between ECM and accelerator pedal position sensor.**

Wire Harness Side:
Accelerator Pedal Position Sensor





ECM Connector

PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

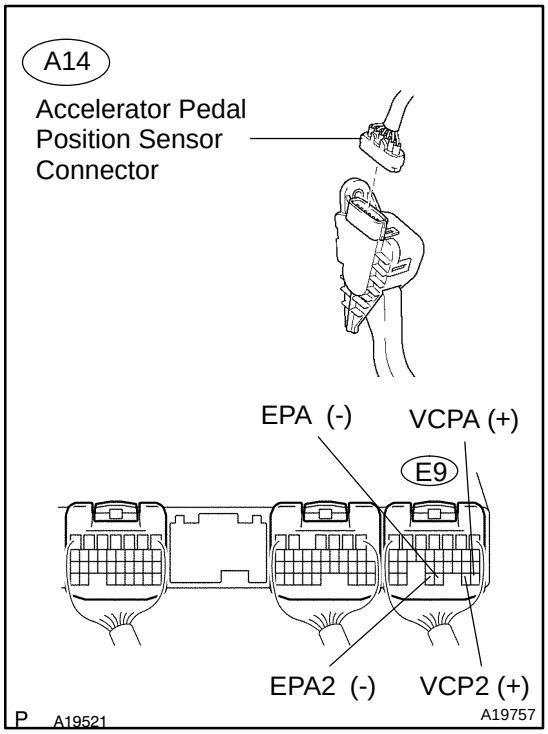
OK:

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

NG → **Repair or replace harness or connector.**

OK

2	Check voltage between terminals VCPA and EPA, and VCP2 and EPA2 of ECM terminals.



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

3	Replace accelerator pedal assembly (See page SF-58).

Go

4	**Check if DTC output recur?**

PREPARATION:

(a) Connect the OBD II scan tool to the DLC3.
(b) Disconnect the battery terminals or remove the EFI or ECD No. 1 fuse and ETCS fuse (Clear DTCs).
(c) Start the engine.
(d) Drive the engine at idle for 15 seconds or more.

CHECK:

Read the DTC output.

OK:

No DTC output.

OK → **System is OK.**

NG

Replace ECM (See page SF-60).

DIC2T-01

DTC	P2121	Throttle/Pedal Position Sensor/Switch ”D” Circuit Range/Performance

HINT:
This is repair procedure for the ”accelerator pedal position sensor”.

CIRCUIT DESCRIPTION

Refer to DTC P2120 on page DI-318 .

DTC No.	DTC Detecting Condition	Trouble Area
P2121	Conditions (a) and (b) continue for 0.5 seconds: (a) Difference between VPA and VPA2 exceeds the threshold (b) IDL is OFF	★Accelerator pedal position sensor circuit ★Accelerator pedal position sensor ★ECM

MONITOR DESCRIPTION

The accelerator pedal position sensor is mounted on the accelerator pedal bracket. The accelerator pedal position sensor has 2 sensor elements/signal outputs: VPA1 and VPA2. VPA1 is used to detect the actual accelerator pedal angle (used for engine control) and VPA2 is used to detect malfunctions in VPA1. When the difference between the voltage outputs of VPA1 and VPA2 deviate from the standard, the ECM concludes the accelerator pedal position sensor has a malfunction. The ECM turns on the MIL and a DTC is set.

FAIL SAFE

The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving.
If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.
If a ”pass” condition is detected and then the ignition switch is turned OFF, the fail-safe operation will stop and the system will return to normal condition.

MONITOR STRATEGY

Related DTCs	P2121	Accelerator position sensor (rationality)
Required sensors/components	Accelerator position sensor	
Frequency of operation	Continuous	
Duration	0.5 sec.	
MIL operation	Immediate	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever the following DTCs are not present	See "List of disable a monitor" (on page DI-3)	
Either of the following conditions is met	A or B	
A. Ignition switch	ON	
B. Throttle control motor power	ON	
System is not under limp home mode due to accelerator pedal position sensor malfunction		

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
|VPA - (VPA2 - 0.8)|* *Corrected by learning value	More than 0.4 V

WIRING DIAGRAM

Refer to DTC P2120 on page DI-318 .

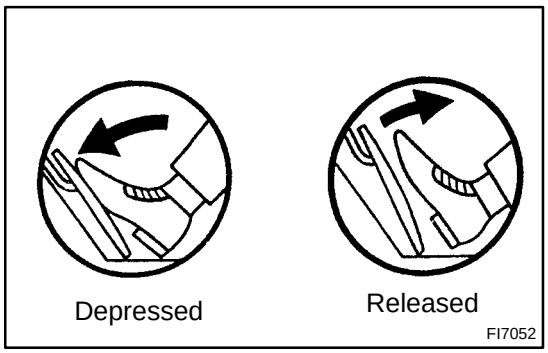
INSPECTION PROCEDURE

HINT:

Read freeze frame data using the hand−held tester or the OBD II scan tool. 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, as well as other data from the time when a malfunction occurred.

Hand-held tester:

1	**Connect hand-held tester, and read the voltage for accelerator pedal position sensor data.**



PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ETCS / ACCEL POS #1 and ACCEL POS #2.

CHECK:

Read the voltage for the accelerator pedal position sensor data.

OK:

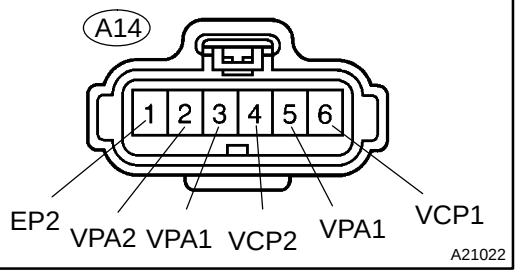
Accelerator pedal	ACCEL POS #1	ACCEL POS #2
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

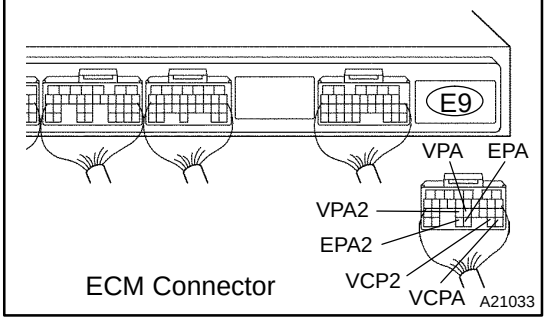
OK → **Replace ECM (See page SF-60).**

NG

2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM.**

Wire Harness Side:
Accelerator Pedal Position Sensor





PREPARATION:

(a) Disconnect the A14 accelerator pedal position sensor connector.

(b) Disconnect the E9 ECM connector.

CHECK:

Measure the resistance between the wire harness side connectors.

OK:

Standard (Check for open):

Tester Connection	Specified Condition
VPA1 (A14-5) - VPA (E9-22)	Below 1 Ω
EP1 (A14-3) - EPA (E9-28)	Below 1 Ω
VCP1 (A14-6) - VCPA (E9-26)	Below 1 Ω
VPA2 (A14-2) - VPA2 (E9-23)	Below 1 Ω
EP2 (A14-1) - EPA2 (E9-29)	Below 1 Ω
VCP2 (A14-4) - VCP2 (E9-27)	Below 1 Ω

Standard (Check for short):

Tester Connection	Specified Condition
VPA1 (A14-5) or VPA (E9-22) - Body ground	10 kΩ or higher
EP1 (A14-3) or EPA (E9-28) - Body ground	10 kΩ or higher
VCP1 (A14-6) or VCPA (E9-26) - Body ground	10 kΩ or higher
VPA2 (A14-2) or VPA2 (E9-23) - Body ground	10 kΩ or higher
EP2 (A14-1) or EPA2 (E9-29) - Body ground	10 kΩ or higher
VCP2 (A14-4) or VCP2 (E9-27) - Body ground	10 kΩ or higher

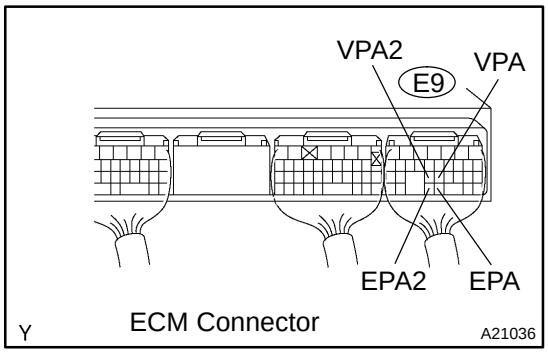
NG → **Repair or replace harness or connector.**

OK

Replace accelerator pedal pedal assembly.

OBD II scan tool (excluding hand-held tester):

1	**Check voltage between terminals VPA and EPA, VPA2 and EPA2 of ECM connector.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

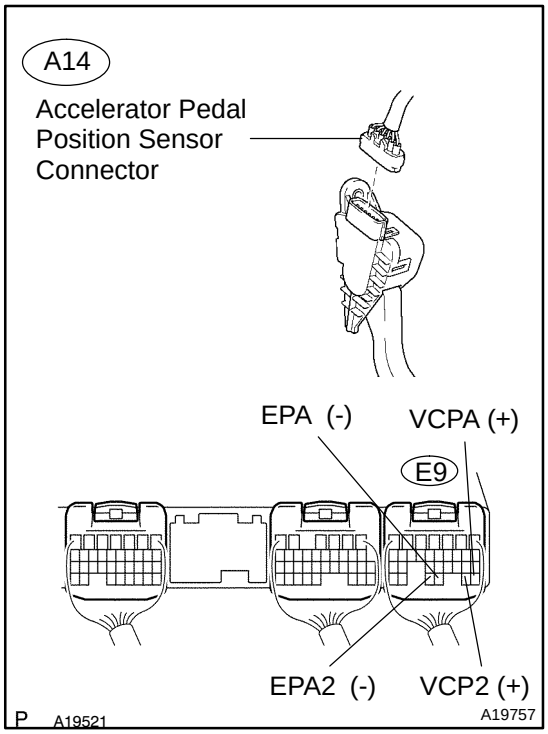
OK:

Accelerator Pedal Position	Tester Connection	Tester Connection
	VPA (E9-22) - EPA (E9-28)	VPA2 (E9-23) - EPA2 (E9-29)
Released	0.5 to 1.1 V	1.2 to 2.0 V
Depressed	2.6 to 4.5 V	3.4 to 5.3 V

OK → **Replace ECM (See page SF-60).**

NG

2	**Check for open and short in harness and connector between accelerator pedal position sensor and ECM.**



PREPARATION:

(a) Turn the ignition switch ON.

(b) Disconnect the A14 accelerator pedal position sensor connector.

CHECK:

Measure the voltage between the specified terminals of the E9 ECM connector.

OK:

Tester Connection	Specified Condition
VCPA (E9-26) - EPA (E9-28)	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	4.5 to 5.5 V

NG → **Replace ECM (See page SF-60).**

OK

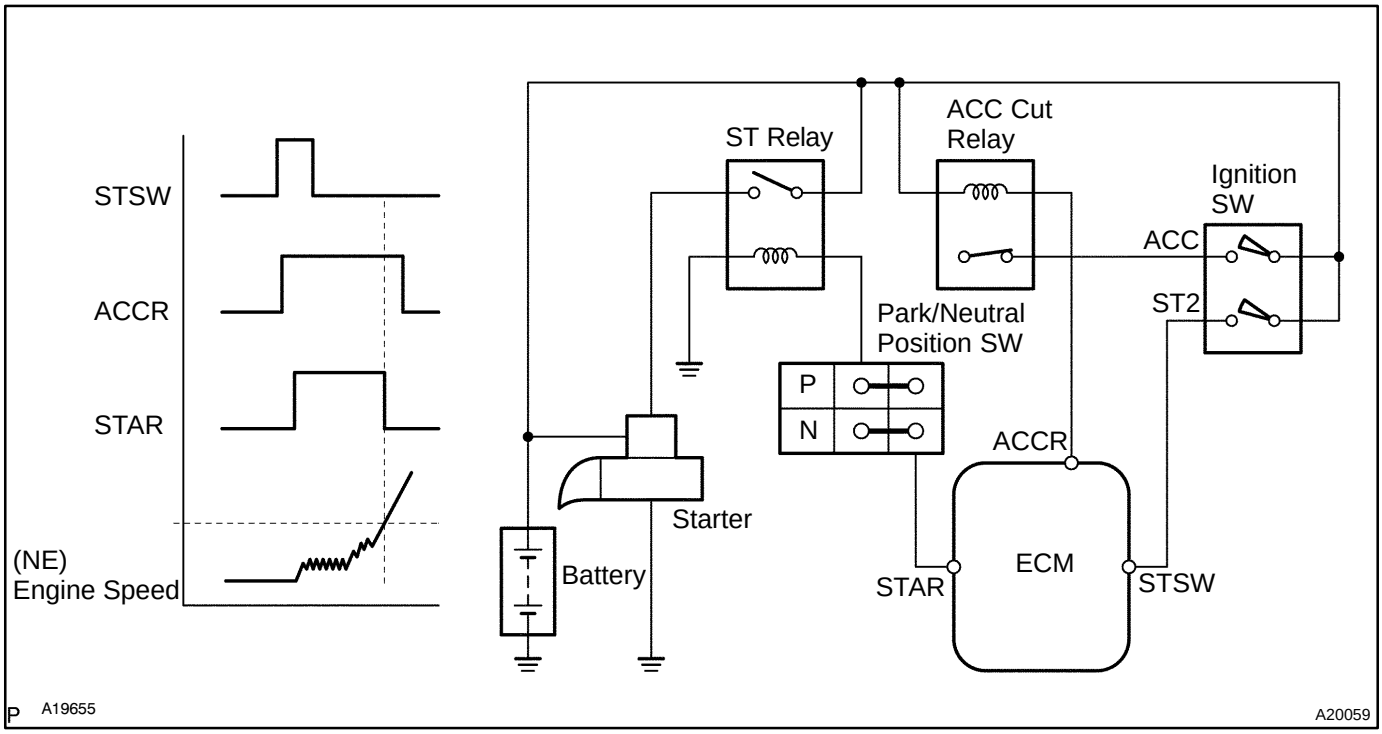
Replace accelerator pedal assembly.

DIC2U-01

Cranking Hold Function Circuit

CIRCUIT DESCRIPTION

The starter is controlled by the ECM, when the ECM detects a start signal (STSW) from the ignition switch, this system monitors the engine speed (NE) and continues to operate the starter until it has determined that the engine has started (engine speed reaches approximately 500 rpm). If the engine is already running and the ignition switch is turned to START, the ECM will not operate the starter.



WIRING DIAGRAM

Refer to DTC P0617 on page DI-296 .

INSPECTION PROCEDURE

Hand-held tester:

1	**Check operation of engine cranking.**

CHECK:

When turning the ignition switch to the START position, check whether the starter motor starts.

OK:

Starter motor starts.

OK	**Check for intermittent problems (See page DI-3).**

NG

2	**Connect hand-held tester, and check STA signal.**

PREPARATION:

(a) Connect the hand-held tester to the DLC3.
(b) Turn the ignition switch ON, and push the hand-held tester main switch ON.
(c) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST / ALL / STARTER SIG.

CHECK:

Read the STA signal on the hand-held tester while the starter operates.

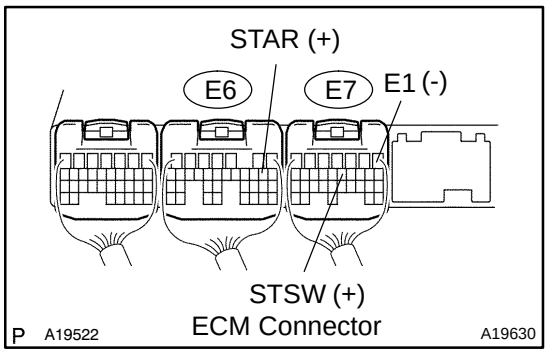
OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

NG → **Go to step 5.**

OK

3	**Check voltage between terminal STAR, STSW and E1 of ECM connector.**



CHECK:

Measure the voltage between the terminals of the E6 and E7 ECM connectors, while cranking the engine (ignition switch START position).

OK:

Tester Connection	Specified Condition
STAR (E6-9) - E1 (E7-1)	9 to 14 V
STSW (E7-12) - E1 (E7-1)	9 to 14 V

RESULT:

Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	B
0 V	0 V	C

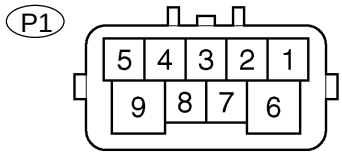
B → **Replace ECM (See page SF-60).**

C → **Go to step 9.**

A

4	**Check park/neutral position switch.**

Component Side:
Park/neutral Position Switch



N D06601

PREPARATION:
Remove the P1 park/neutral position switch connector.

CHECK:
Check continuity between each terminal shown below when the shift lever is moved to each range.

Shift range	Terminal No. to continuity	
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D	3 - 7	-
2	3 - 4	-
L	3 - 8	-

OK:
There is continuity.

NG → **Replace the park/neutral position switch.**

OK

Check and repair harness and connector between park/neutral position switch and ECM (See page IN-36).

5	**Check starter relay (See page ST-18).**

NG → **Replace starter relay.**

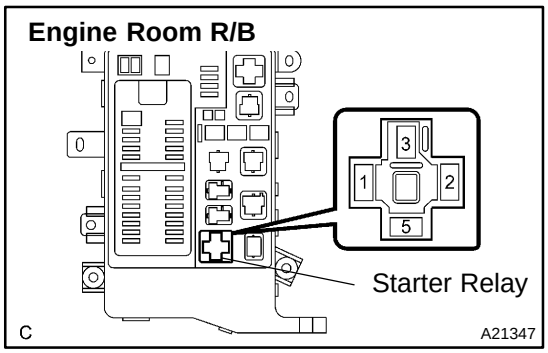
OK

6	**Check for open and short in harness and connector between park/neutral position switch and starter relay, starter relay and body ground (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

7	Check engine room R/B (Starter relay voltage).



PREPARATION:

Remove the starter relay from the engine room R/B.

CHECK:

Measure the voltage between the terminal of the engine room R/B and body ground.

OK:

Tester Connection	Specified Condition
Starter relay (5) - Body ground	9 to 14 V

NG → **Check and repair harness and connector between starter relay and battery.**

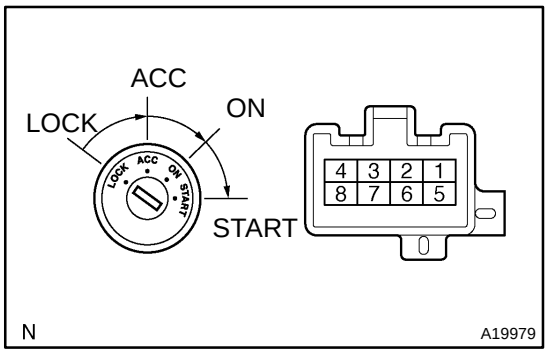
OK →

8	Check starter (See page ST-16).

NG → **Repair or replace starter.**

OK →

9	Check ignition switch.



PREPARATION:

(a) Remove the lower finish panel.

(b) Disconnect the ignition switch connector.

CHECK:

Check continuity between terminals shown below.

OK:

Switch Position	Terminal No. to continuity	
LOCK	-	-
ACC	2-3	-
ON	2-3-4	6-7
START	1-2-4	6-7-8

NG → **Replace ignition switch.**

OK

Check for open in harness and connector between ECM and ignition switch, ignition switch and battery (See page IN-36).

OBD II scan tool (excluding hand-held tester):

1	**Check operation of engine cranking.**

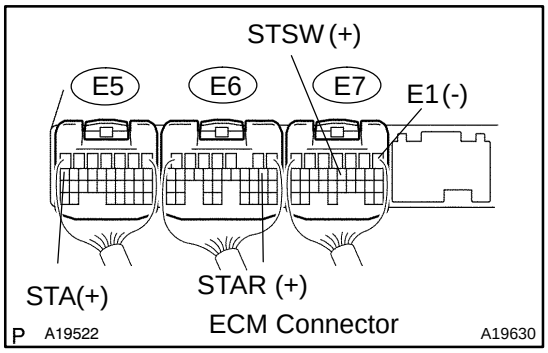
CHECK:

When turning the ignition switch to the ST position, check whether the starter motor starts.

OK → **Check for intermittent problems (See page DI-3).**

NG

2	**Check voltage between terminal STSW, STAR, STA and E1 of ECM connector.**



CHECK:

Measure the voltage between the terminals of E5, E6 and E7 ECM connectors, while cranking the engine (ignition switch START position).

OK:

Tester Connection	Specified Condition
STA (E5-17) - E1 (E7-1)	9 to 14 V
STAR (E6-9) - E1 (E7-1)	9 to 14 V
STSW (E7-12) - E1 (E7-1)	9 to 14 V

RESULT:

Terminal STA	Terminal STAR	Terminal STSW	Proceed to
9 to 14 V	9 to 14 V	9 to 14 V	A
0 V	9 to 14 V	9 to 14 V	B
0 V	0 V	9 to 14 V	C
0 V	0 V	0 V	D

B → **Go to step 7.**

C → **Replace ECM (See page SF-60).**

D → **Go to step 8.**

A

3	**Check starter relay (See page ST-18).**

NG → **Replace starter relay.**

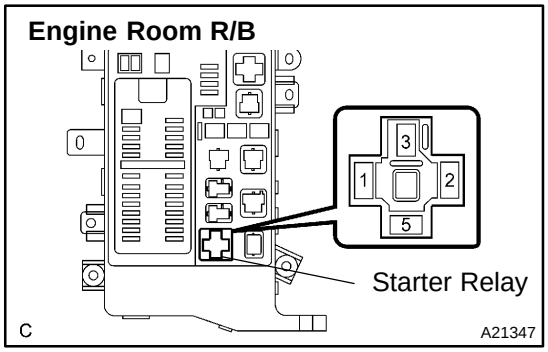
OK

4	**Check for open and short in harness and connector between park/neutral position switch and starter relay, starter relay and body ground (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

5	**Check engine room R/B (Starter relay voltage).**



PREPARATION:

Remove the starter relay from the engine room R/B.

CHECK:

Measure the voltage between the terminal of the engine room R/B and body ground.

OK:

Tester Connection	Specified Condition
Starter relay (5) - Body ground	9 to 14 V

NG → **Check and repair harness and connector between starter relay and battery (See page IN-36).**

OK

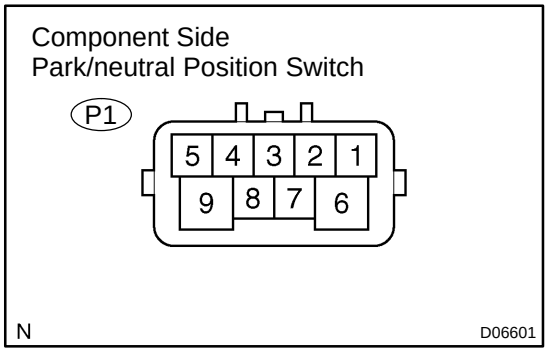
6	**Check starter (See page ST-16).**

NG → **Repair or replace starter.**

OK

Check and repair harness and connector between starter relay and starter, starter and battery (See page IN-36).

7	**Check park/neutral position switch.**



PREPARATION:

Remove the P1 park/neutral position switch connector.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved to each range.

Shift range	Terminal No. to continuity	
P	1 - 3	6 - 9
R	2 - 3	-
N	3 - 5	6 - 9
D	3 - 7	-
2	3 - 4	-
L	3 - 8	-

OK:

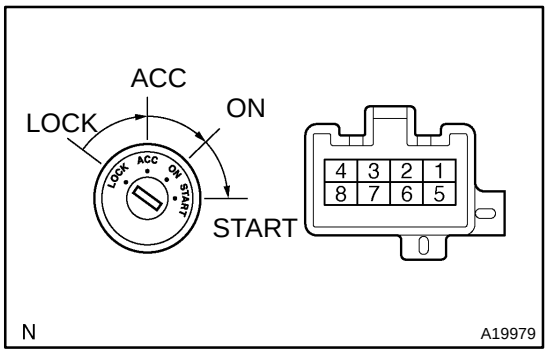
There is continuity.

NG → **Replace the park/neutral position switch.**

OK

Check and repair harness and connector between park/neutral position switch and ECM (See page IN-36).

8	Check ignition switch.



PREPARATION:

(a) Remove the lower finish panel.

(b) Disconnect the ignition switch connector.

CHECK:

Check continuity between terminals shown below.

OK:

Switch Position	Terminal No. to continuity	
LOCK	-	-
ACC	2-3	-
ON	2-3-4	6-7
START	1-2-4	6-7-8

NG → **Replace ignition switch.**

OK

Check and replace harness and connector between ECM and ignition switch, ignition switch and battery (See page IN-36).

DI079-18

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		VIN	
Driver's Name		Production Date	
Data Vehicle Brought in		Licence Plate No.	
Engine model		Odometer Reading	km miles

Problem Symptoms	☐ Engine does not Start	☐ Engine does not crank ☐ No initial combustion ☐ No complete combustion
	☐ Difficult to Start	☐ Engine cranks slowly ☐ Other _____
	☐ Poor Idling	☐ Incorrect first idle ☐ Idling rpm is abnormal ☐ High (rpm) ☐ Low (rpm) ☐ Rough idling ☐ Other _____
	☐ Poor Driveability	☐ Hesitation ☐ Back fire ☐ Muffler explosion (after-fire) ☐ Surging ☐ Knocking ☐ Other _____
	☐ Engine Stall	☐ Soon after starting ☐ After accelerator pedal depressed ☐ After accelerator pedal released ☐ During A/C operation ☐ Shifting from N to D ☐ Other _____
	☐ Others	

Dates Problem Occurred		
Problem Frequency		☐ Constant ☐ Sometimes (times per day/month) ☐ Once only ☐ Other _____
Condition When Problem Occurs	Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Other _____
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (approx. ____˚C/____˚F)
	Place	☐ Highway ☐ Suburbs ☐ Inner city ☐ Uphill ☐ Downhill ☐ Rough road ☐ Other _____
	Engine Temp.	☐ Cold ☐ Warming up ☐ After warming up ☐ Any temp. ☐ Other _____
	Engine Operation	☐ Starting ☐ Just after starting (min.) ☐ Idling ☐ Racing ☐ Driving ☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ A/C switch ON/OFF ☐ Other _____

Condition of malfunction indicator light (MIL)		☐ Remains on	☐ Sometimes light up ☐ Does not light up
DTC Inspection	Normal Mode (Pre-check)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freezed frame data ( )

DI1L4-19

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in check mode, check the circuit for the codes listed in the table below. For details of each code, refer to the "See page" under the respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0031 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 1)	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0032 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 1)	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0037 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2)	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0038 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2)	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0051 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 1)	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0052 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 1)	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0057 (DI-49)	Oxygen Sensor Heater Control Circuit Low (Bank 2 Sensor 2)	★Open in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0058 (DI-49)	Oxygen Sensor Heater Control Circuit High (Bank 2 Sensor 2)	★Short in heater circuit of heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★ECM	□	□
P0100 (DI-57)	Mass or Volume Air Flow Circuit	★Open or short in mass air flow meter circuit ★Mass air flow meter ★ECM	□	□
P0101 (DI-65)	Mass or Volume Air Flow Circuit Range/Performance Problem	★Mass air flow meter	□	□
P0102 (DI-57)	Mass or Volume Air Flow Circuit Low Input	★Open or short in mass air flow meter circuit ★Mass air flow meter ★ECM	□	□
P0103 (DI-57)	Mass or Volume Air Flow Circuit High Input	★Open or short in mass air flow meter circuit (+B circuit) ★Mass air flow meter ★ECM	□	□

P0110 (DI-68)	Intake Air Temperature Circuit	★Open or short in intake air temperature sensor circuit ★Intake air temperature sensor (built in mass air flow meter) ★ECM	□	□
P0112 (DI-68)	Intake Air Temperature Circuit Low Input	★Open or short in intake air temperature sensor circuit ★Intake air temperature sensor (built in mass air flow meter) ★ECM	□	□
P0113 (DI-68)	Intake Air Temperature Circuit High Input	★Open or short in intake air temperature sensor circuit ★Intake air temperature sensor (built in mass air flow meter) ★ECM	□	□
P0115 (DI-75)	Engine Coolant Temperature Circuit	★Open or short in engine coolant temperature sensor circuit ★Engine coolant temperature sensor ★ECM	□	□
P0116 (DI-82)	Engine Coolant Temperature Circuit Range/Performance Problem	★Engine coolant temperature sensor	□	□
P0117 (DI-75)	Engine Coolant Temperature Circuit Low Input	★Open or short in engine coolant temperature sensor circuit ★Engine coolant temperature sensor ★ECM	□	□
P0118 (DI-75)	Engine Coolant Temperature Circuit High Input	★Open or short in engine coolant temperature sensor circuit ★Engine coolant temperature sensor ★ECM	□	□
P0120 (DI-84)	Throttle Pedal Position Sensor/ Switch "A" Circuit	★Throttle control motor and sensor ★ECM	□	□
P0121 (DI-97)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Range/Performance Problem	★Throttle control motor and sensor	□	□
P0122 (DI-84)	Throttle/Pedal Position Sensor/ Switch "A" Circuit Low Input	★Throttle control motor and sensor ★Short in VTA1 circuit ★Open in VC circuit ★ECM	□	□
P0123 (DI-84)	Throttle/Pedal Position Sensor/ Switch "A" Circuit High Input	★Throttle control motor and sensor ★Open in VTA1 circuit ★Open in E2 circuit ★VC and VTA1 circuit are short-circuited ★ECM	□	□
P0125 (DI-99)	Insufficient Coolant Temperature for Closed Loop Fuel Control	★Cooling system ★Engine coolant temperature sensor ★Thermostat	□	□
P0128 (DI-102)	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	★Thermostat ★Cooling system ★Engine coolant temperature sensor ★ECM	☑	☑
P0130 (DI-106)	Oxygen Sensor Circuit (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	□	□

P0133 (DI-117)	Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	□	□
P0134 (DI-129)	Oxygen Sensor Circuit No Activity Detected (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM	□	□
P0136 (DI-138)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay	□	□
P0150 (DI-106)	Oxygen Sensor Circuit (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	□	□
P0153 (DI-117)	Oxygen Sensor Circuit Slow Response (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	□	□
P0154 (DI-129)	Oxygen Sensor Circuit No Activity Detected (Bank 2 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★PCV hose connection ★PCV valve and hose ★Injector ★Gas leakage on exhaust system ★PCV piping ★ECM	□	□
P0156 (DI-138)	Oxygen Sensor Circuit Malfunction (Bank 2 Sensor 2)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay	□	□

P0171 (DI-147)	System too Lean (Bank 1)	★Air induction system ★Injector blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Fuel pressure ★Gas leakage on exhaust system ★Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ★Heated oxygen sensor (bank 1 sensor 1) ★Heated oxygen sensor heater ★EFI or ECD relay ★PCV piping ★ECM	□	□
P0172 (DI-147)	System too Rich (Bank 1)	★Injector leak, blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Ignition system ★Fuel pressure ★Gas leakage in exhaust system ★Open or short in heated oxygen sensor (bank 1 sensor 1) circuit ★Heated oxygen sensor (bank 1 sensor 1) ★ECM	□	□
P0174 (DI-147)	System too Lean (Bank 2)	★Air induction system ★Injector blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Fuel pressure ★Gas leakage on exhaust system ★Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ★Heated oxygen sensor (bank 2 sensor 1) ★Heated oxygen sensor heater ★EFI or ECD relay ★PCV piping ★ECM	□	□
P0175 (DI-147)	System too Rich (Bank 2)	★Injector leak, blockage ★Mass air flow meter ★Engine coolant temperature sensor ★Ignition system ★Fuel pressure ★Gas leakage in exhaust system ★Open or short in heated oxygen sensor (bank 2 sensor 1) circuit ★Heated oxygen sensor (bank 2 sensor 1) ★ECM	□	□
P0220 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit	★Throttle control motor and sensor ★ECM	□	□
P0222 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit Low Input	★Throttle control motor and sensor ★Short in VTA2 circuit ★Open in VC circuit ★ECM	□	□
P0223 (DI-84)	Throttle/Pedal Position Sensor/ Switch "B" Circuit High Input	★Throttle control motor and sensor ★Open in VTA2 circuit ★Open in E2 circuit ★VC and VTA2 circuit are short-circuited ★ECM	□	□

P0230 (DI-162)	Fuel Pump Primary Circuit	★Open or short in fuel pump relay circuit ★Fuel pump relay ★Circuit opening relay ★Fuel pump ★ECM	-	□
P0300 (DI-167)	Random/Multiple Cylinder Misfire Detected	★Open or short in engine wire ★Connector connection ★Vacuum hose connection ★Ignition system ★Injector ★Fuel pressure ★Mass air flow meter ★Engine coolant temperature sensor ★Compression pressure ★Valve clearance ★Valve timing ★PCV piping ★ECM	□*2	□
P0301 (DI-167)	Cylinder 1 Misfire Detected		□*2	□
P0302 (DI-167)	Cylinder 2 Misfire Detected		□*2	□
P0303 (DI-167)	Cylinder 3 Misfire Detected		□*2	□
P0304 (DI-167)	Cylinder 4 Misfire Detected		□*2	□
P0305 (DI-167)	Cylinder 5 Misfire Detected		□*2	□
P0306 (DI-167)	Cylinder 6 Misfire Detected		□*2	□
P0307 (DI-167)	Cylinder 7 Misfire Detected		□*2	□
P0308 (DI-167)	Cylinder 8 Misfire Detected		□*2	□
P0325 (DI-186)	Knock Sensor 1 Circuit (Bank 1 or Single Sensor)	★Open or short in knock sensor 1 circuit ★Knock sensor 1 (looseness) ★ECM	□	□
P0330 (DI-186)	Knock Sensor 2 Circuit (Bank 2)	★Open or short in knock sensor 2 circuit ★Knock sensor 2 (looseness) ★ECM	□	□
P0335 (DI-191)	Crankshaft Position Sensor ”A” Circuit	★Open or short in crankshaft position sensor circuit ★Crankshaft position sensor ★Signal plate ★ECM	□	□
P0339 (DI-191)	Crankshaft Position Sensor ”A” Circuit Intermittent	★Open or short in crankshaft position sensor circuit ★Crankshaft position sensor ★Signal plate ★ECM	-	□
P0340 (DI-197)	Camshaft Position Sensor ”A” Circuit (Bank 1 or Single Sensor)	★Open or short in camshaft position sensor circuit ★Camshaft position sensor ★LH camshaft timing pulley ★Jumping teeth of timing belt ★ECM	□	□
P0341 (DI-197)	Camshaft Position Sensor ”A” Circuit Range/Performance (Bank 1 or Single Sensor)		□	□
P0351 (DI-202)	Ignition Coil ”A” Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 1 circuit from No. 1 ignition coil with igniter to ECM ★No. 1 ignition coil with igniter ★Ignition system ★ECM	□	□
P0352 (DI-202)	Ignition Coil ”B” Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 2 circuit from No. 2 ignition coil with igniter to ECM ★No. 2 ignition coil with igniter ★Ignition system ★ECM	□	□

P0353 (DI-202)	Ignition Coil "C" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 3 circuit from No. 3 ignition coil with igniter to ECM ★No. 3 ignition coil with igniter ★Ignition system ★ECM	□	□
P0354 (DI-202)	Ignition Coil "D" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 4 circuit from No. 4 ignition coil with igniter to ECM ★No. 4 ignition coil with igniter ★Ignition system ★ECM	□	□
P0355 (DI-202)	Ignition Coil "E" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 5 circuit from No. 5 ignition coil with igniter to ECM ★No. 5 ignition coil with igniter ★Ignition system ★ECM	□	□
P0356 (DI-202)	Ignition Coil "F" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 6 circuit from No. 6 ignition coil with igniter to ECM ★No. 6 ignition coil with igniter ★Ignition system ★ECM	□	□
P0357 (DI-202)	Ignition Coil "G" Primary/Secondary Circuit	★Open or short in IGF 1 and IGT 7 circuit from No. 7 ignition coil with igniter to ECM ★No. 7 ignition coil with igniter ★Ignition system ★ECM	□	□
P0358 (DI-202)	Ignition Coil "H" Primary/Secondary Circuit	★Open or short in IGF 2 and IGT 8 circuit from No. 8 ignition coil with igniter to ECM ★No. 8 ignition coil with igniter ★Ignition system ★ECM	□	□
P0420 (DI-215)	Catalyst System Efficiency Below Threshold (Bank 1)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 1 sensor 1, 2) ★Three-way catalytic converter	□	□
P0430 (DI-215)	Catalyst System Efficiency Below Threshold (Bank 2)	★Gas leakage on exhaust system ★Heated oxygen sensor (bank 2 sensor 1, 2) ★Three-way catalytic converter	□	□
P0441 (DI-222)	Evaporative Emission Control System Incorrect Purge Flow	★Vacuum hose cracks, holed, blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★Open or short in VSV circuit for EVAP ★EVAP VSV ★Open or short in VSV circuit for CCV ★CCV ★Open or short in VSV circuit for pressure switching valve ★Pressure switching valve ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★ECM	□	□

P0442 (DI-245)	Evaporative Emission Control System Leak Detected (Small Leak)	After the negative pressure introduction has been completed, if the pressure in the EVAP system sharply increases. ★Hose or tube cracked, holed, damaged or loose seal ((3) in Fig. 1) ★Fuel tank cap incorrectly installed ★Fuel tank cap cracked or damaged ★Vacuum hose cracked, holed, blocked, damaged or disconnected ((1), (2), (4), (5), (6), (7), (8) and (9) in Fig. 1) ★Fuel tank cracked, holed or damaged ★Charcoal canister cracked, holed or damaged ★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM	□	□
P0446 (DI-222)	Evaporative Emission Control System Vent Control Circuit	★Same as DTC No. P0441	□	□
P0451 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch Range/Performance	★Open or short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM	□	□
P0452 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch Low Input	★Open in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM	□	□
P0453 (DI-268)	Evaporative Emission Control System Pressure Sensor/Switch High Input	★Short in vapor pressure sensor circuit ★Vapor pressure sensor ★ECM	□	□
P0455 (DI-245)	Evaporative Emission Control System Leak Detected (Gross Leak)	★Same as DTC No. P0442	□	□
P0456 (DI-245)	Evaporative Emission Control System Leak Detected (Very Small Leak)	★Same as DTC No. P0442	□	□
P0500 (DI-274)	Vehicle Speed Sensor ”A”	★Combination meter ★Open or short in vehicle speed sensor circuit ★Vehicle speed sensor ★ECM	□	□
P0503 (DI-274)	Vehicle Speed Sensor ”A” Intermittent/Erratic/High		-	□
P0504 (DI-278)	Brake Switch ”A”/”B” Correlation	★Short in stop lamp switch signal circuit ★STOP fuse ★Stop lamp switch ★ECM	-	□
P0505 (DI-286)	Idle Air Control System	★Air induction system ★Electric throttle control system ★PCV hose connection	□	□
P0560 (DI-290)	System Voltage	★Back-up power source circuit ★EFI or ECD No. 1 fuse ★ECM	□	□
P0571 (DI-993)	Brake Switch ”A” Circuit	★Stop light switch signal circuit ★Stop light switch ★ECM	-	□
P0604 (DI-294)	Internal Control Module Random Access Memory (RAM) Error	★ECM	□	□
P0606 (DI-294)	ECM/PCM Processor	★ECM	□	□
P0607 (DI-294)	Control Module Performance	★ECM	□	□

P0617 (DI-296)	Starter Relay Circuit High	★Park/neutral position switch ★Starter relay circuit ★Ignition switch ★ECM	□	□
P0657 (DI-294)	Actuator Supply Voltage Circuit / Open	★ECM	□	□
P0724 (DI-424)	Brake Switch "B" Circuit High	★Short in stop light switch signal circuit ★Stop light switch ★ECM	□	□
P2102 (DI-302)	Throttle Actuator Control Motor Circuit Low	★Open in throttle control motor and sensor circuit ★Throttle control motor and sensor ★ECM	□	□
P2103 (DI-302)	Throttle Actuator Control Motor Circuit High	★Short in throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body ★ECM	□	□
P2111 (DI-306)	Throttle Actuator Control System - Stuck Open	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body	□	□
P2112 (DI-306)	Throttle Actuator Control System - Stuck Closed	★Throttle control motor and sensor circuit ★Throttle control motor and sensor ★Throttle valve ★Throttle body	□	□
P2118 (DI-310)	Throttle Actuator Control Motor Current Range/Performance	★Open in throttle control motor and sensor power source circuit ★ETCS fuse ★ECM	□	□
P2119 (DI-315)	Throttle Actuator Control Throttle Body Range/Performance	★Electric throttle control system ★Throttle body	□	□
P2120 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit	★Accelerator pedal position sensor ★ECM	□	□
P2121 (DI-331)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Range/Performance	★Accelerator pedal position sensor	□	□
P2122 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit Low Input	★Accelerator pedal position sensor ★VCPA circuit open ★VPA circuit open or ground short ★ECM	□	□
P2123 (DI-318)	Throttle/Pedal Position Sensor/ Switch "D" Circuit High Input	★Accelerator pedal position sensor ★EPA circuit open ★ECM	□	□
P2125 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit	★Accelerator pedal position sensor ★ECM	□	□
P2127 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit Low Input	★Accelerator pedal position sensor ★VCP2 circuit open ★VPA2 circuit open or ground short ★ECM	□	□
P2128 (DI-318)	Throttle/Pedal Position Sensor/ Switch "E" Circuit High Input	★Accelerator pedal position sensor ★EPA circuit open ★ECM	□	□
P2135 (DI-84)	Throttle Pedal Position Sensor/ Switch "A" / "B" Voltage Correlation	★VTA1 and VTA2 circuit are short-circuited ★Throttle control motor and sensor ★ECM	□	□

P2138 (DI-318)	Throttle Pedal Position Sensor/ Switch "D" / "E" Voltage Correlation	★VPA and VPA2 circuit are short circuited ★Accelerator pedal position sensor ★ECM	□	□
P2195 (DI-106)	Oxygen Sensor Signal Stuck Lean (Bank 1 Sensor 1)	★Open or short in heated oxygen sensor circuit ★Heated oxygen sensor ★Heated oxygen sensor heater ★EFI or ECD relay ★Air induction system ★Fuel pressure ★Injector ★ECM	□	□
P2196 (DI-106)	Oxygen Sensor Signal Stuck Rich (Bank 1 Sensor 1)		□	□
P2197 (DI-106)	Oxygen Sensor Signal Stuck Lean (Bank 2 Sensor 1)		□	□
P2198 (DI-106)	Oxygen Sensor Signal Stuck Rich (Bank 2 Sensor 1)		□	□
P2418 (DI-222)	Evaporative Emission System Valve Control Circuit/Open	★Same as DTC No. P0441	□	□

*1: - .... MIL does not light up. □ .... MIL lights up.

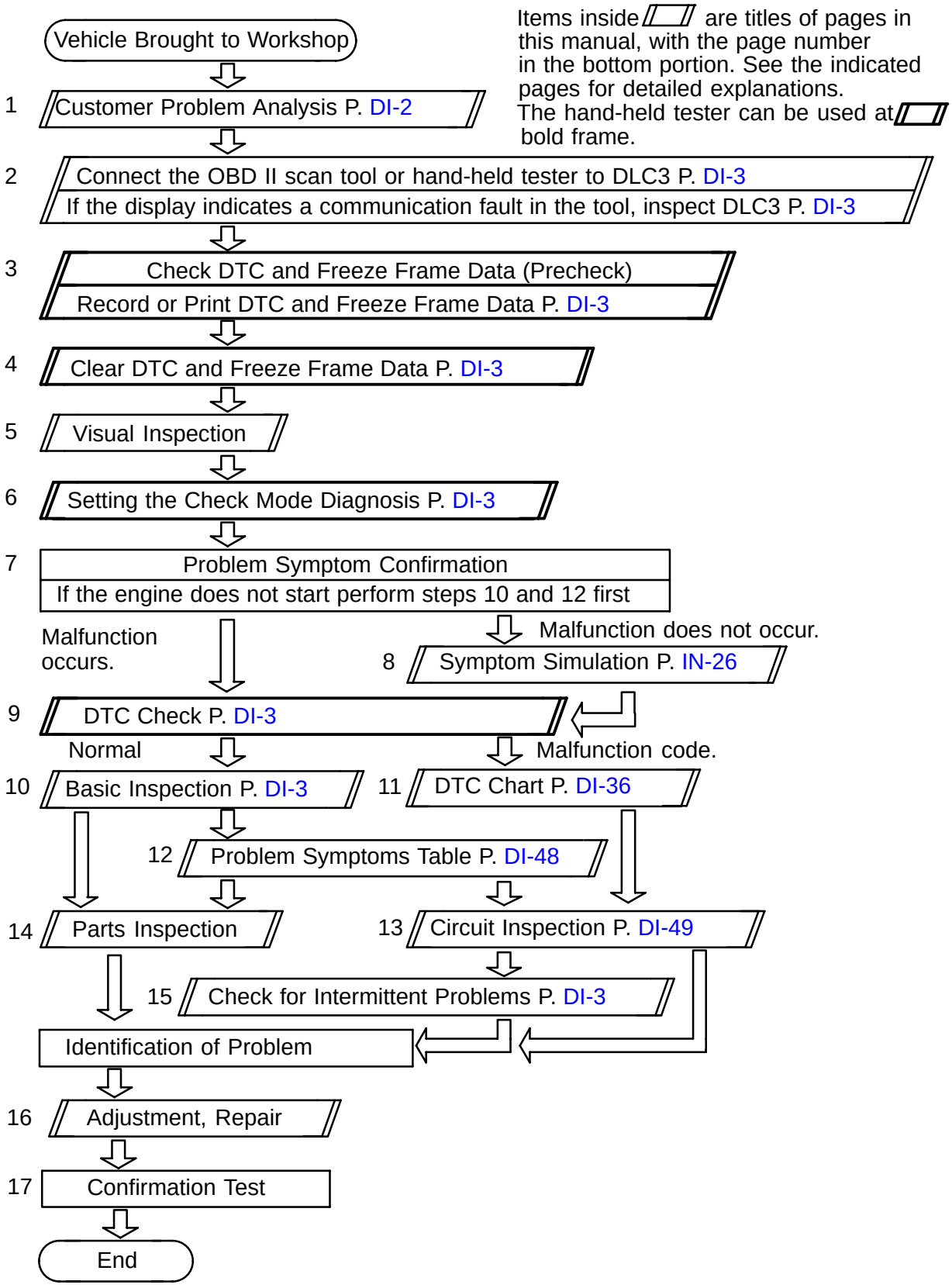
*2: MIL lights up or blinks.

ENGINE

DI078-23

HOW TO PROCEED WITH TROUBLESHOOTING

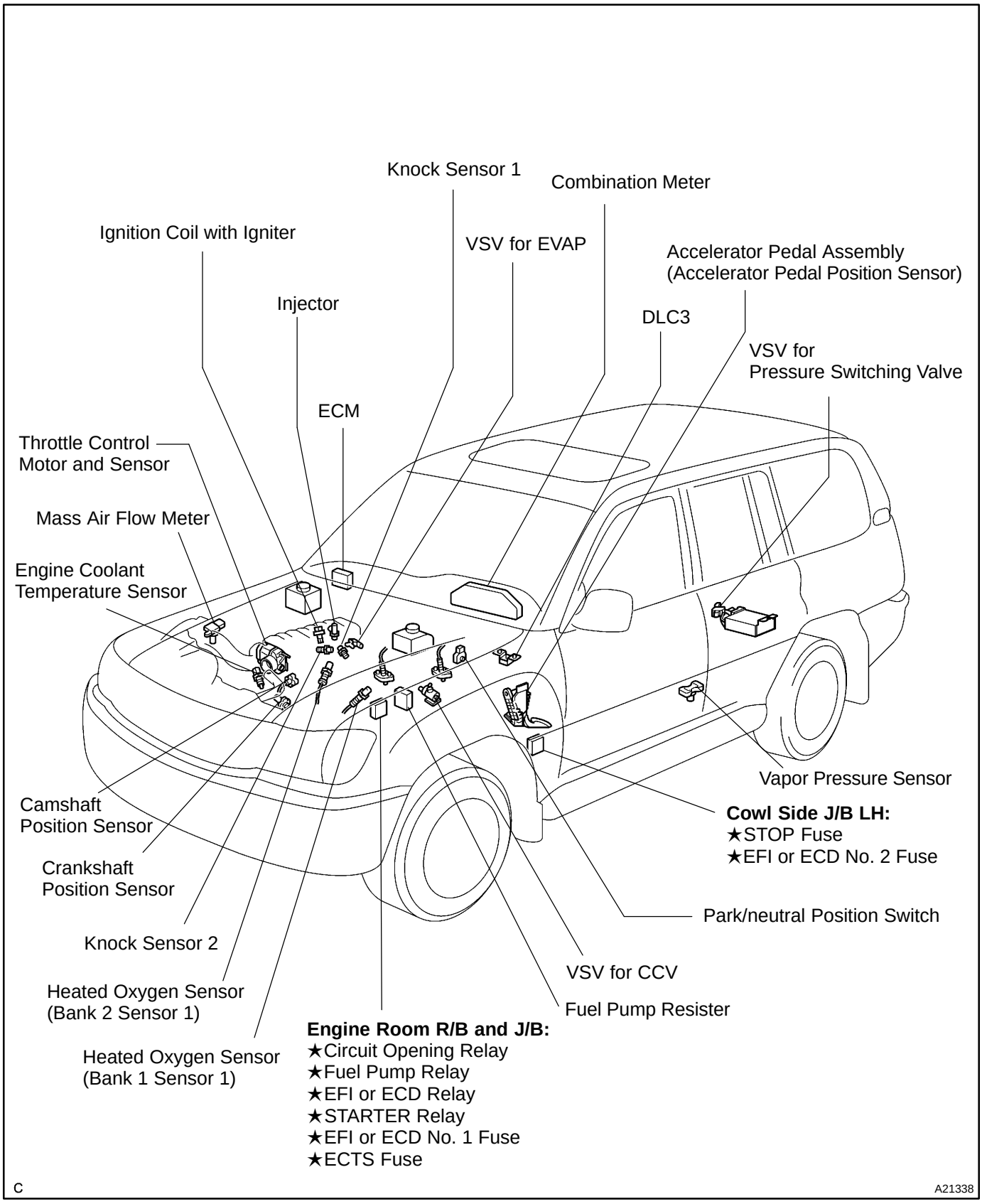
Troubleshoot in accordance with the procedure on the following page.



Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the indicated pages for detailed explanations.
The hand-held tester can be used at ▰ bold frame.

DI1L5-18

PARTS LOCATION



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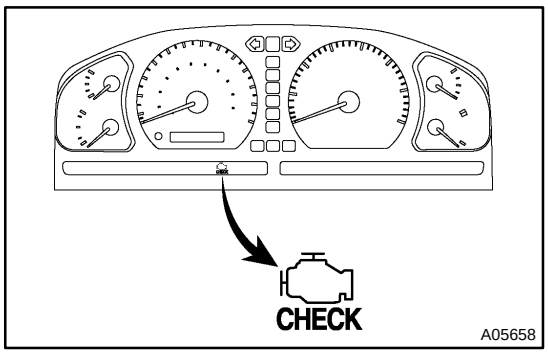


PRE-CHECK

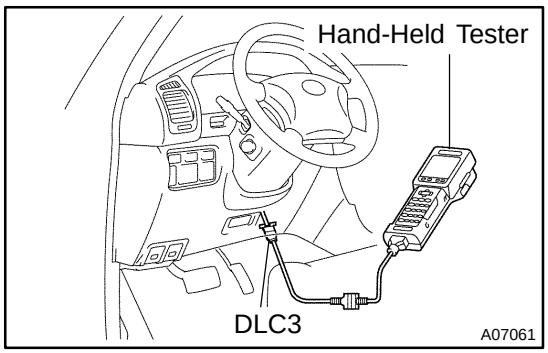
1. DIAGNOSIS SYSTEM

(a) Description

★ When troubleshooting On-Board Diagnostic (OBD ll) vehicles, the vehicle must be connected to the OBD ll scan tool (in compliance with SAE J1978) or the hand-held tester. Various data output from the vehicle's ECM can then be read.

★ OBD ll regulations require that the vehicle's on-board computer illuminates the Malfunction Indicator Light (MIL) on the instrument panel when the computer detects a malfunction in: 1) the emission control system/components, or 2) the powertrain control components (which affect vehicle emissions), or 3) the computer. In addition, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 are recorded in the ECM memory (See page DI-36).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTCs remain recorded in the ECM memory.



★ To check the DTC, connect the hand-held tester or OBD II scan tool to the Data Link Connector 3 (DLC3) of the vehicle. The hand-held tester or OBD II scan tool also enables you to erase the DTC and check the freeze frame data and various forms of engine data (See the instruction manual for the OBD ll scan tool or the hand-held tester). The DTC includes SAE controlled codes and manufacturer controlled codes. SAE controlled codes must be set according to the SAE, while manufacturer controlled codes can be set by a manufacturer with certain restrictions (See the DTC chart on page DI-36).

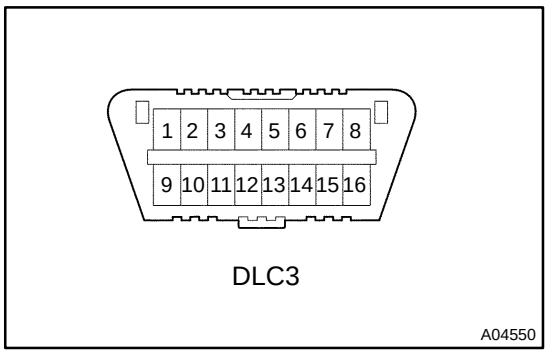
★ The diagnosis system operates in ”normal mode” during normal vehicle use. In ”normal mode”, 2 trip detection logic* is used to ensure accurate detection of malfunctions. A ”check mode” is also available to technicians as an option. In ”check mode”, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system’s ability to detect malfunctions, including intermittent malfunctions (hand-held tester only) (See step 3).

★ *2 trip detection logic:
When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory. This is known as 1st trip detection. If the ignition switch is turned OFF and then ON again, and the same malfunction is detected again, the MIL will illuminate. This is known as 2nd trip detection.

★ Freeze frame data:
The 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 determining 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.

Priorities for troubleshooting:
When multiple DTCs occur, find out the order in which the DTCs should be inspected by checking the component’s DTC chart. If no instructions are written in the DTC chart, check DTCs in the following order of priority:

(1) DTCs other than fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175) and misfire DTCs (P0300 to P0308).
(2) Fuel trim malfunction DTCs (P0171, P0172, P0174 and P0175).
(3) Misfire DTCs (P0300 to P0308).



(b) Check the DLC3.
The vehicle's ECM uses the ISO 9141-2 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Symbol	Name	Result
(Terminal No.)	(Reference terminal)	(Condition)
SIL	Bus "+" line	Pulse generation
(7)	(5 - Signal ground)	(During transmission)
CG	Chassis ground	1 Ω or less
(4)	(Body ground)	(Always)
SG	Signal ground	1 Ω or less
(5)	(Body ground)	(Always)
BAT	Battery positive	9 to 14 V
(16)	(Body ground)	(Always)

HINT:
Connect the cable of the hand-held tester to the DLC3, turn the ignition switch ON and attempt to use the hand-held tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side.

★ If the communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.

★ If the communication is still impossible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(c) Inspect the battery voltage.
Battery Voltage: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

(d) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

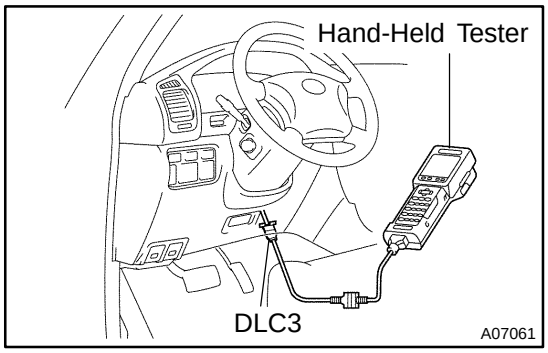
HINT:
If the MIL is not illuminated, troubleshoot the MIL circuit (See page DI-355).

(2) When the engine is started, the MIL should not illuminate. If the lamp remains on, the diagnosis system has detected a malfunction or abnormality in the system.

2. DTC CHECK (Normal Mode)

NOTICE:

- ★ **If no DTC appears in normal mode:**
  On the OBD II scan tool or the hand-held tester check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979).
- ★ **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 will be erased. Before changing modes, always check and make a note of DTCs and freeze frame data.**



(a) Checking DTCs using the OBD II scan tool or hand-held tester.
  (1) Connect the OBD II scan tool or the hand-held tester to DLC3.
  (2) Turn the ignition switch ON.
  (3) Use the OBD II scan tool or the hand-held tester to check the DTCs and freeze frame data and then write them down.
  For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CURRENT CODEDS. For the OBD II scan tool, see its instruction manual.
  (4) See page DI-36 to confirm the details of the DTCs.

NOTICE:

When simulating a symptom with the OBD II scan tool (excluding hand-held tester) to check the DTCs, use the normal mode. For DTCs chart subject to "2 trip detection logic", perform either of the following actions.

- ★ **Check the pending fault code:**
  For the hand-held tester, enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / PENDING CODES.
- ★ **Turn the ignition switch OFF after the symptom is simulated once. Then repeat the simulation process again. When the problem has been simulated twice, the MIL comes on and the DTCs are recorded in the ECM.**

★ **Check the pending fault code using the Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool.**

(b) Clearing the DTCs using the OBD II scan tool or the hand-held tester.
  (1) Connect the OBD II scan tool or the hand-held tester to the DLC3.
  (2) Turn the ignition switch ON.
  (3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS / ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.

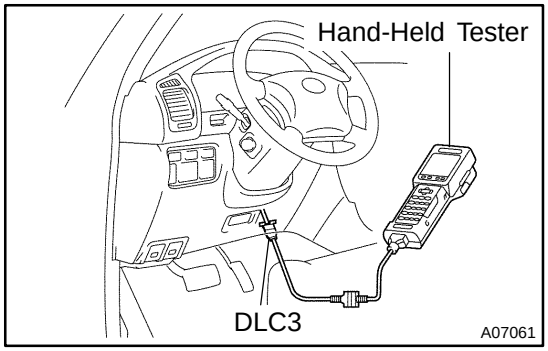
(c) Clearing the DTCs not using the OBD II scan tool or the hand-held tester.
  Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
  After disconnecting the battery terminal, perform the "INITIALIZE procedure.

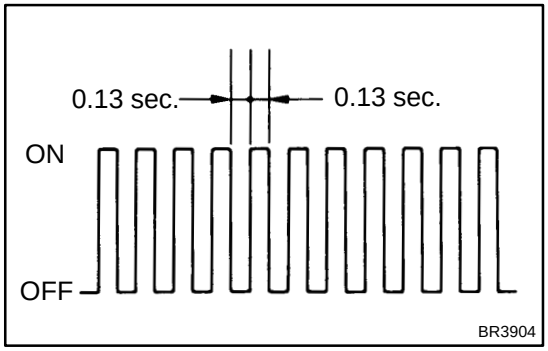
3. DTC CHECK (Check Mode)

HINT:

Hand-held tester only:

Check mode has a higher sensitivity to detect malfunctions and can detect malfunctions that normal mode cannot detect. Check mode can also detect all the malfunctions that normal mode can detect.





(a) Follow these steps when preparing to use the hand-held tester check mode.
  (1) Make sure that the items below are true:
    ★ Battery positive voltage 11 V or more
    ★ Throttle valve fully closed
    ★ Transmission in the P or N position
    ★ A/C switched OFF
  (2) Turn the ignition switch OFF.
  (3) Connect the hand-held tester to the DLC3.
  (4) Turn the ignition switch ON.
  (5) Change the ECM to check mode with the hand-held tester. Enter the following menus: DIAGNOSIS / ENHANCED OBD II / 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 hand-held 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.

(6) Start the engine. The MIL should turn off after the engine starts.
(7) Simulate the conditions of the malfunction described by the customer.
(8) After simulating the malfunction conditions, use the hand-held tester diagnosis selector to check the DTC, freeze frame data and other data.
(9) After checking the DTC, inspect the applicable circuit.

(b) Clearing DTCs using the OBD ll scan tool or the hand-held tester.
(1) Connect the OBD ll scan tool or the hand-held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Erase DTCs and freeze frame data with the OBD II scan tool (complying with SAE J1978) or the hand-held tester. For the hand-held tester: 1) enter the following menus: DIAGNOSIS ENHANCED OBD II / DTC INFO / CLEAR CODES; and 2) press YES. For the OBD II scan tool, see its instruction manual.

(c) Clearing the DTCs without using the OBD ll scan tool or the hand-held tester.
Remove the EFI or ECD No. 1 and ETCS fuses from the engine room J/B for more than 60 seconds, or disconnect the battery terminal for more than 60 seconds.
After disconnecting the battery terminal, perform the "INITIALIZE" procedure.

4. FAIL-SAFE CHART

If any of the following code is recorded, the ECM enters fail-safe mode.

DTC No.	Fail-Safe Operation	Fail-Safe Deactivation Conditions
P0031 P0032 P0037 P0038 P0051 P0052 P0057 P0058	The heater circuit in which an abnormality is detected is turned off	Ignition switch OFF
P0100 P0102 P0103	Ignition timing is calculated from engine speed and throttle angle	"Pass" condition detected
P0110 P0112 P0113	Intake air temperature is fixed at 20˚C (68˚F)	"Pass" condition detected
P0115 P0117 P0118	Engine coolant temperature is fixed at 80˚C (176˚F)	"Pass" condition detected

P0120 P0121 P0122 P0123 P0220 P0222 P0223 P0607 P0657 P2102 P2103 P2111 P2112 P2118 P2119 P2135	If the Electronic Throttle Control System (ETCS) has a malfunction, the ECM cuts off current to the throttle control motor. The throttle control valve returns to a predetermined opening angle (approximately 16□) by the force of the return spring. The ECM then adjusts the engine output by controlling the fuel injection (intermittent fuel-cut) and ignition timing in accordance with the accelerator pedal opening angle to enable the vehicle to continue at a minimal speed. If the accelerator pedal is depressed firmly and slowly, the vehicle can be driven slowly. If the accelerator pedal is depressed quickly, the vehicle may speed up and slow down erratically.	”Pass” condition is detected and then the ignition switch is turned OFF.
P0325 P0330	Max. timing retardation	Ignition switch OFF
P0351 P0352 P0353 P0354 P0355 P0356 P0357 P0358	Fuel cut	”Pass” condition detected
P2120 P2121 P2122 P2123 P2125 P2127 P2128 P2138	The accelerator pedal position sensor has two (main and sub) sensor circuits. If a malfunction occurs in either of the sensor circuits, the ECM detects the abnormal signal voltage difference between the two sensor circuits and switches to limp mode. In limp mode, the remaining circuit is used to calculate the accelerator pedal opening to allow the vehicle to continue driving. If both circuits malfunction, the ECM regards the opening angle of the accelerator pedal to be fully closed. In this case, the throttle valve will remain closed as if the engine is idling.	”Pass” condition is detected and the ignition switch is turned OFF.

5. CHECK FOR INTERMITTENT PROBLEMS

Hand-held tester only:

Inspect the vehicle’s ECM using check mode. Intermittent problems are easier to detect when the ECM is in check mode with hand-held tester. In check mode, the ECM uses 1 trip detection logic, which has a higher sensitivity to malfunctions than normal mode (default), which uses 2 trip detection logic.

(a) Clear the DTCs. (See step 2)
(b) Set the check mode. (See step 3)
(c) Perform a simulation test (See page IN-26).
(d) Check the connector and terminal (See page IN-36).
(e) Wiggle the harness and connector (See page IN-36).

6. BASIC INSPECTION

When the malfunction is not confirmed in the DTC check, troubleshooting should be carried out in all the possible circuits considered as causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location causing the problem can be found quickly and efficiently. Therefore, using this check is essential in the engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to page ST-16 and ST-18 , and continue to troubleshoot.**

YES

3	**Does engine start?**

NO → **Go to step 6.**

YES

4	**Check air filter.**

PREPARATION:
Remove the air filter.
CHECK:
Visual check that the air filter is not excessively dirty or oily.

NG → **Repair or replace air filter.**

OK

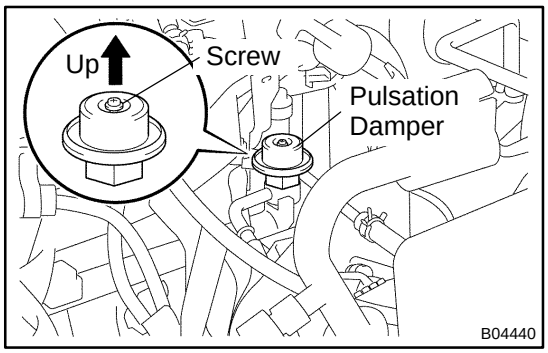
5	**Check idle speed.**

PREPARATION:
(a) Warm up the engine to the normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift the transmission into the N position.
(e) Connect the OBD II scan tool or hand-held tester to the DLC3 of the vehicle.
CHECK:
Use CURRENT DATA to check the idle speed.
OK:
Idle speed:
650 to 750 rpm

NG → **Proceed to problem symptoms table on page DI-48 .**

OK

6	**Check fuel pressure.**



PREPARATION:

(a) Be sure that enough fuel is in the tank.
(b) Connect the hand-held tester to the DLC3.
(c) Turn the ignition switch ON and push the hand-held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) Please refer to the hand-held tester operator's manual for further details.
(f) If you have no hand-held tester, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-7).

CHECK:

Check that the pulsation damper screw rises up when the fuel pump operation (See page SF-7).

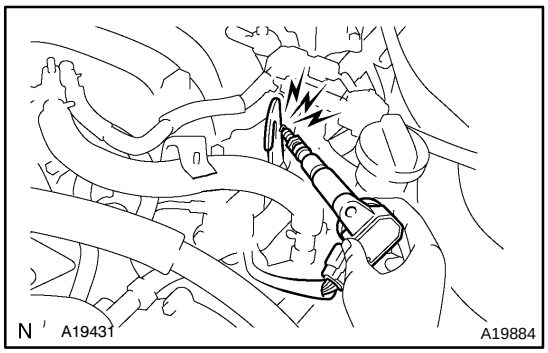
HINT:

At this time, you will hear a fuel flowing noise.

NG → **Proceed to page SF-7 and continue to trouble-shoot.**

OK

7	Check for spark.



PREPARATION:

(a) Disconnect the ignition coil.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Ground the spark plug.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 to 10 seconds at a time.

NG → **Proceed to page IG-1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table on page DI-48 .

7. DATA LIST

HINT:

Using the hand-held tester 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 shorten labor 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 hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the "ON" button of the hand-held tester.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / DATA LIST.
(g) According to the display on tester, read the "DATA LIST".

Item	Measurement Item/Range (Display)	Normal Condition*	Diagnostic Note
INJECTOR	Injection period of the No. 1 cylinder/ Min.: 0 ms, Max.: 32.64 ms	Idling: 2.1 to 3.9 ms	-
IGN ADVANCE	Ignition timing advance for No.1 cylinder/ Min.: -64 deg., Max.: 63.5 deg.	Idling: BTDC 5 to 25°	-
CALC LOAD	Calculated load by ECM/ Min.: 0%, Max.: 100%	★Idling: 12.5 to 19.7% ★Racing without load (2,500 rpm): 10.7 to 17.9%	-
MAF	Air flow rate from MAF sensor/ Min.: 0 gm/s, Max.: 655 gm/s	★Idling: 4.1 to 6.4 gm/sec. ★Racing without load (2,500 rpm): 12.5 to 20.8 gm/sec.	If value is approximately 0.0 gm/s: ★Mass air flow meter power source circuit open ★VG circuit open or short If value is 160.0 gm/s or more: ★E2G circuit open
ENGINE SPD	Engine Speed/ Min.: 0 rpm, Max.: 16,383 rpm	Idling: 650 to 750 rpm	-
COOLANT TEMP	Coolant temperature/ Min.: -40°C, Max.: 140°C	After warming up: 80 to 95°C (176 to 203°F)	★If value is -40°C (-40°F): sensor circuit is open. ★If value is 140°C (284°F) or more: sensor circuit is shorted.
INTAKE AIR	Intake air temperature/ Min.: -40 °C, Max.: 140 °C	Equivalent to ambient temp. (After cold soak)	
THROTTLE POS	Absolute throttle position sensor/ Min.: 0%, Max.: 100%	★Throttle fully closed: 10 to 24% ★Throttle fully open: 66 to 98%	Read value with the ignition switch ON (Do not start engine).
THROTTLE INITIAL	Throttle fully closed rearing value	0.5 to 0.9 V	-
CTP SW	Closed throttle position switch/ ON or OFF	★Throttle fully closed: ON ★Throttle open: OFF	-
VEHICLE SPD	Vehicle speed/ Min.: 0 km/h, Max.: 255 km/h	Vehicle stopped: 0 km/h (0 mph)	Speed indicated on speedometer
O2S B1 S1	Oxygen sensor output voltage of the bank 1 sensor 1/ Min.: 0 V, Max.: 1.275 V	Idling: 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S1	Oxygen sensor output voltage of the bank 2 sensor 1/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.

O2S B1 S2	Oxygen sensor output voltage of the bank 1 sensor 2/ Min.: 0 V, Max.: 1.275 V	Driving 50 km/h (31 mph): 0.1 to 0.9 V	Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
O2S B2 S2	Oxygen sensor output voltage of the bank 2 sensor 2/ Min.: 0 V, Max.: 1.275 V		Performing INJ VOL or A/F CONTROL function of ACTIVE TEST enables the technician to check the voltage output of each sensor.
SHORT FT #1	Short term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is short-term fuel compensation used to maintain air-fuel ratio at stoichiometric air-fuel ratio
LONG FT #1	Long term fuel trim of bank 1/ Min.: -100%, Max.: 100%	0 ± 20%	This item is overall, long-term fuel compensation that helps to maintain air-fuel ratio at stoichiometric air-fuel ratio (steadies long term deviations of short-term fuel trim from central value)
TOTAL FT #1	Total fuel trim of bank 1/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	-
SHORT FT #2	Short term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
LONG FT #2	Long term fuel trim of bank 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as LONG FT #1
TOTAL FT #2	Total fuel trim of bank 2/ Min.: 0.5, Max.: 1.496	Idling: 0.5 to 1.4	-
O2FT B1 S1	Short term fuel trim associated with the bank 1, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B1 S2	Short term fuel trim associated with the bank 1, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2FT B2 S1	Short term fuel trim associated with the bank 2, sensor 1/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #1
O2FT B2 S2	Short term fuel trim associated with the bank 2, sensor 2/ Min.: -100%, Max.: 100%	0 ± 20%	Same as SHORT FT #2
O2 LR B1 S1	Response time of the O2 sensor lean to rich (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 LR B2 S1	Response time of the O2 sensor lean to rich (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 RL B1 S1	Response time of the O2 sensor rich to lean (bank 1, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms	Idling after warming up: 0 to 1,000 ms	-
O2 RL B2 S1	Response time of the O2 sensor rich to lean (bank 2, sensor 1)/ Min.: 0 ms, Max.: 16,711 ms		-

FUEL SYS #1	Fuel system status (Bank1)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT	Idling after warming up: CL	★OL: Open Loop-has not yet satisfied conditions to go closed loop. ★CL: Closed Loop-using oxygen sensor(s) as feed back for fuel control. ★OL DRIVE: Open loop due to driving conditions (Power enrichment, deceleration enlargement). ★OL FAULT: Open loop due to detected system fault. ★CL FAULT: Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.
FUEL SYS #2	Fuel system status (Bank2)/ OL or CL or OLDRIVE or OL-FAULT or CLFAULT		
FC IDL	Idle fuel cut/ ON or OFF	Fuel cut operation: ON	FC IDL = ”ON” when throttle valve fully closed and engine speed is over 1,500 rpm.
MIL	MIL status/ ON or OFF	MIL ON: ON	-
STARTER SIG	Starter signal/ ON or OFF	Cranking: ON	-
A/C SIG	A/C signal/ ON or OFF	A/C ON: ON	-
PNP SW [NSW]	Park/neutral position switch signal/ ON or OFF	P or N range: ON	-
ELECT LOAD SIG	Electrical load signal/ ON or OFF	Defogger switch ON: ON	-
STOP LIGHT SW	Stop light switch/ ON or OFF	★Brake pedal depressed: ON ★Brake pedal released: OFF	-
FUEL PMP SP CTL	Fuel pump speed control status/ ON or OFF	Idling: ON	-
FUEL PUMP/SPD	Fuel pump/speed status/ ON/H or OFF/M, L	Idling: ON	-
A/C MAG CLUTCH	A/C magnet clutch status/ ON or OFF	A/C magnet clutch ON: ON	-
EVAP VSV	VSV status for EVAP control/ ON or OFF	VSV operating: ON	VSV for EVAP is controlled by the ECM (ground side duty control)
IGNITION	Ignition counter/ Min.: 0, Max.: 400	0 to 400	-
VAPOR PRESS	Vapor pressure/ Min.: -4.125 kPa, Max.: 2.125 kPa	Fuel tank cap removed: 0 kPa	Pressure inside of fuel tank as read by the vapor pressure sensor.
CYL #1 - CYL #8	Misfire ratio of the cylinder/ Min.: 0%, Max.: 50%	0%	This item is displayed in only idling

*1: If no conditions are specifically stated for ”Idling”, it means the shift lever is in the N or P position, the A/C switch is OFF and all accessory switches are OFF.

8. ACTIVE TEST

HINT:

Performing the ACTIVE TEST using the hand-held tester or the OBD II scan tool allows the relay, VSV, actuator and so on to operate without parts removal. Performing the ACTIVE TEST as a first step of troubleshooting is one method to shorten diagnostic time.

It is possible to display the DATA LIST during the ACTIVE TEST.

(a) Warm up the engine.
(b) Turn the ignition switch OFF.
(c) Connect the hand-held tester or the OBD II scan tool to the DLC3.
(d) Turn the ignition switch ON.
(e) Push the ”ON” button of the hand-held tester or the OBD II scan tool.
(f) Enter the following menus: DIAGNOSIS / ENHANCED OBD II / ACTIVE TEST.
(g) According to the display on tester, perform the ”ACTIVE TEST”.

Item	Test Details	Diagnostic Note
INJ VOL	[Test Details] Control the injection volume. Min.: -12.5%, Max.: 24.8% [Vehicle Condition] Engine speed: 3,000 rpm or less.	★All injectors are tested at once. ★Injection volume is gradually changed between -12.5 and 25%
A/F CONTROL	[Test Details] Control injection volume -12.5 or 25 % (change injection volume -12.5 % or 25 %) [Vehicle Condition] Engine speed: 3,000 rpm or less	Following A/F CONTROL procedure enables technician to check and graph voltage outputs of both the A/F sensor and heated oxygen sensor For displaying graph, enter ”ACTIVE TEST / A/F CONTROL / USER DATA”, select ”AFS B1S1 and O2S B1S2” by pressing ”YES” and push ”ENTER”. Then press ”F4”
FUEL PUMP / SPD	[Test Details] Control the fuel pump speed. ON or OFF	-
VVT CTRL B1	[Test Details] Active VVT system (Bank 1) ON or OFF	★ON: Rough idle or engine stall ★OFF: Normal engine speed
VVT CTRL B2	[Test Details] Active VVT system (Bank 2) ON or OFF	★ON: Rough idle or engine stall ★OFF: Normal engine speed
CAN CTRL VSV	[Test Details] Activate the VSV for canister control. ON or OFF	-
TANK BYPASS VSV	[Test Details] Activate the VSV for tank bypass. ON or OFF	-
A/C MAG CLUTCH	[Test Details] Control the A/C magnet clutch. ON or OFF	-
EVAP VSV (ALONE)	[Test Details] Activate the VSV for EVAP control. ON or OFF	-

TC/TE1	[Test Details] Connect the TC and TE1. ON or OFF	Switch to the same state as the connection between terminal TC and TE1.
FC IDL PROHBT	[Test Details] Control the idle fuel cut prohibit. ON or OFF	-

9. 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. When a sensor is being monitored, the next sensor or component will not be monitored until the sensor monitoring is finished.
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 the malfunction only one time during a single driving cycle. ”Continuous” means that the ECM detects malfunction every time an 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. ”Immediately” means that the ECM illuminates MIL the instant the ECM determines that there is a malfunction. ”2 driving cycle” means that the ECM illuminates MIL if the same malfunction is detected again in the 2nd driving cycle.

10. TOYOTA/LEXUS 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, VVTL	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
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
O2 sensor	Heater 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 press 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 skid 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
Intermediate shaft speed sensor ”A”	Counter gear speed sensor
Output speed sensor	Output shaft speed sensor
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

11. The monitor will run whenever the following DTCs are not present (Monitor disablement List)

HINT:

This table indicates ECM monitoring status for the items in the upper columns if the DTCs in each line on the left are being set.

As for the ”X” mark, when the DTC on the left is stored, detection of the DTC in the upper column is not performed.

Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0031,32,51,52	P0031,32,51,52	P0037,38,57,58	P0043,44,63,64	P0100-P0103	P0101	P0105-P0108	P0106	P0110-P0113	P0115-P0118	P0116	P0120-P0223,P2135	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308			
			VVT VSV1,2	VVT System1 -Advance	VVT System1 - Retard	VVT System - Misalignment	VVT System2 - Advance	VVT System2 - Retard	O2 Sensor Heater - Sensor1	A/F Sensor Heater - Sensor1	O2 Sensor Heater - Sensor2	O2 Sensor Heater - Sensor3	MAF sensor	MAF sensor	MAP sensor	MAP sensor	IAT sensor	ECT sensor	ECT sensor	TP sensor	Insufficient ECT for Closed Loop	Thermostat	O2 Sensor -Sensor1	O2 Sensor, A/F Sensor(No Activity) - Sensor1	O2 Sensor - Sensor2	O2 Sensor - Sensor3	Fuel system	Misfire			
P0010,P0020	P0010,P0020	VVT VSV1,2																			X					X					
P0011	P0011	VVT System1 - Advance				X		X														X					X					
P0012	P0012	VVT System1 - Retard				X		X														X					X					
P0016,P0018	P0016,P0018	VVT System - Misalignment																													
P0021	P0021	VVT System2 - Advance			X	X																X					X					
P0022	P0022	VVT System2 - Retard			X																	X					X					
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																				X	X	X	X	X	X					
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1																				X			X	X	X					
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2																							X	X						
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																								X						
P0100,P0101	P0100-P0103	MAF sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0105,P0106	P0105-P0108	MAP sensor		X	X		X	X											X		X	X	X	X	X	X	X	X	X			
P0110	P0110-P0113	IAT sensor																			X	X	X	X	X	X		X				
P0115,P0116	P0115-P0118	ECT sensor		X	X	X	X	X						X		X					X	X	X	X	X	X	X	X				
P0120,P0121	P0120-P0223,P2135	TP sensor												X		X							X	X	X	X	X	X				
P0125	P0125	Insufficient ECT for Closed Loop		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0128	P0128	Thermostat																														
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																				X		X	X	X						
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1								X												X	X		X	X	X					
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2																														
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																														
P0171,P0172	P0171,P0172	Fuel system																				X	X	X	X	X						
P0300-P0308	P0300-P0308	Misfire							X													X	X	X	X	X						
P0325,P0330	P0325-P0333	Knock sensor																														
P0335	P0335	CKP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340, P0341	P0340, P0341	CMP sensor		X	X		X	X						X		X						X	X	X	X	X	X	X				
P0340-P0346	P0340-P0346	VVT sensor1,2																				X										
P0351-P0358	P0351-P0358	Ignitor		X	X		X	X														X										
P0385	P0385	CKP sensor 2												X		X						X	X	X	X	X	X	X				
P0401	P0401	EGR system (closed)																				X					X					
P0402	P0402	EGR system (open)																				X	X	X	X	X	X					
P0405,P0409	P0405-P0409	Lift sensor																									X					
P0420,P0430	P0420,P0430	Catalyst																														
P0442-P0456	P0442-P0456	EVAP system																					X	X	X	X						
P0450,P0451	P0450-P0453	EVAP press sensor																														

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																										
			P0010,P0020	P0011	P0012	P0016,P0018	P0021	P0022	P0030,50	P0135,P0155	P0036,56	P0043,44,63,64	P0100	P0101	P0105	P0106	P0110	P0115	P0116	P0120,P0121	P0125	P0128	P0130-P0153	P0134,P0154	P0136,P0156	P0142,P0162	P0171,P0172	P0300-P0308
	P0010,P0020	VVT VSV1,2																											
	P0011	VVT System1 -Advance																											
	P0012	VVT System1 - Retard																											
	P0016,P0018	VVT System - Misalignment																											
	P0021	VVT System2 - Advance																											
	P0022	VVT System2 - Retard																											
	P0031,32,51,52	O2 Sensor Heater - Sensor1																											
	P0031,32,51,52	A/F Sensor Heater - Sensor1																											
	P0037,38,57,58	O2 Sensor Heater - Sensor2																											
	P0043,44,63,64	O2 Sensor Heater - Sensor3																											
	P0100-P0103	MAF sensor																											
	P0101	MAF sensor												X								X	X		X	X	X	X	X
	P0105-P0108	MAP sensor														X													
	P0106	MAP sensor																											
	P0110-P0113	IAT sensor																											
	P0115-P0118	ECT sensor																											
	P0116	ECT sensor																											
	P0120-P0223,P2135	TP sensor																											
	P0125	Insufficient ECT for Closed Loop																											
	P0128	Thermostat																				X							
	P0130-P0153	O2 Sensor -Sensor1																				X	X						
	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1																					X						
	P0136,P0156	O2 Sensor - Sensor2																											
	P0142,P0162	O2 Sensor - Sensor3																											
	P0171,P0172	Fuel system																											
	P0300-P0308	Misfire																											
P0500	P0500	VSS																				X	X	X	X	X	X	X	X
P0511	P0511	IAC valve																					X						
P0510	P0510	Idle switch												X		X						X	X		X	X	X	X	X
P0560	P0560	System Voltage																											
P0617	P0617	Starter signal																											
P0705	P0705	Shift lever position switch																											
P0710	P0710-P0713	Trans fluid temp sensor																											
P0720-P0793	P0720-P0793	Output speed sensor																											
P0715-P0717	P0715-P0717	Input speed sensor																											
P0724	P0724	Stop lamp switch																											
P0741-P0796	P0741-P0796	Trans solenoid (function)																											
P0748-P0798	P0748-P0799	Trans solenoid (range)																											
P0850	P0850	PNP switch																											X
P1010,P1020	P1010,P1020	VVTL																				X					X		
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)																				X					X		
P1126	P1126	Electronic magnet clutch																											
P1129	P1129	Electronic throttle system																											
P1430	P1430	HC adsorber ACT press sensor																											
P2004,6	P2004,6	Intake Manifold Runner Control																											
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																											
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																											
P2102,P2103	P2102,P2103	Throttle motor																											
P2120-P2138	P2120-P2138	Accel position sensor																											
P2196,P2198	P2196,P2198	A/F sensor (rationality)																				X			X	X			
P2226	P2226	BARO sensor																					X		X	X			
P2237,P2240	P2237,P2240	A/F sensor (open)																				X			X	X			
P2423,24	P2423,24	HC Adsorption Catalyst																											
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																											
P2431	P2431	AIR Pressure Sensor(Rationality)																											
P2440	P2440	AIR control valve stuck open																					X	X	X	X	X		
P2441	P2441	AIR control valve stuck close																					X	X	X	X	X		
P2444	P2444	AIP stuck On																					X	X	X	X	X		
P2445	P2445	AIP stuck Off																					X	X	X	X	X		
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																											
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)																				X			X	X			

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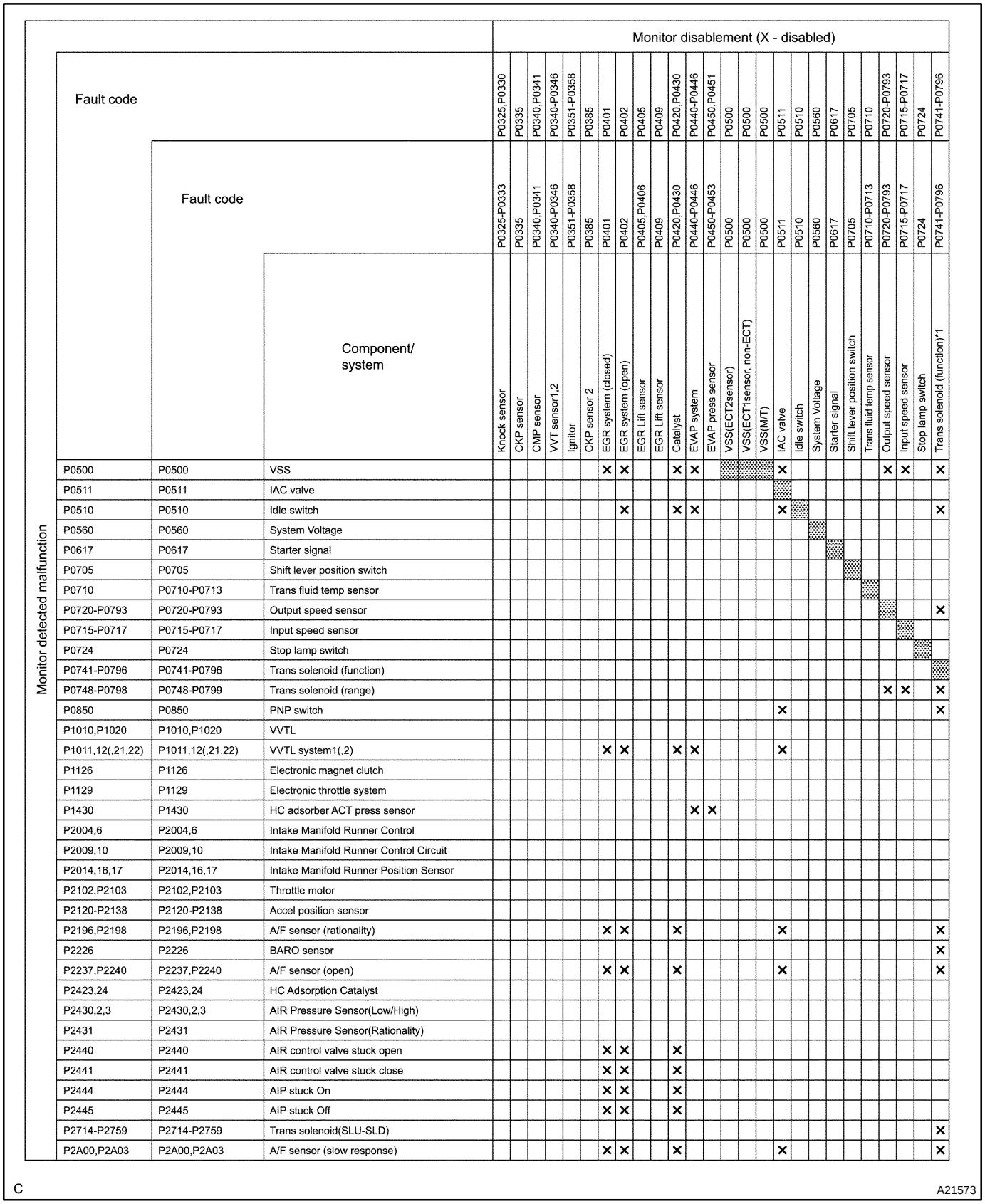
Monitor detected malfunction

| Fault code | Fault code | Component/ system | Monitor disablement (X - disabled) | | |



Monitor detected malfunction: Fault code	Fault code	Component/system	Monitor disablement (X - disabled): P0325,P0330	P0335	P0340,P0341	P0340-P0346	P0351-P0358	P0385	P0401	P0402	P0405,P0406	P0409	P0420,P0430	P0440-P0446	P0450,P0451	P0500	P0500	P0500	P0511	P0510	P0560	P0617	P0705	P0710	P0720-P0793	P0715-P0717	P0724	P0741-P0796
	P0325-P0333	Knock sensor																										
	P0335	CKP sensor																										
	P0340,P0341	CMP sensor																										
	P0340-P0346	VVT sensor1,2																										
	P0351-P0358	Ignitor																										
	P0385	CKP sensor 2																										
P0500	P0500	VSS							X	X			X	X					X						X	X		X
P0511	P0511	IAC valve																										
P0510	P0510	Idle switch								X			X	X					X									X
P0560	P0560	System Voltage																										
P0617	P0617	Starter signal																										
P0705	P0705	Shift lever position switch																										
P0710	P0710-P0713	Trans fluid temp sensor																										
P0720-P0793	P0720-P0793	Output speed sensor																										X
P0715-P0717	P0715-P0717	Input speed sensor																										
P0724	P0724	Stop lamp switch																										
P0741-P0796	P0741-P0796	Trans solenoid (function)																										
P0748-P0798	P0748-P0799	Trans solenoid (range)																							X	X		X
P0850	P0850	PNP switch																	X									X
P1010,P1020	P1010,P1020	VVTL																										
P1011,12(,21,22)	P1011,12(,21,22)	VVTL system1(,2)							X	X			X	X					X									
P1126	P1126	Electronic magnet clutch																										
P1129	P1129	Electronic throttle system																										
P1430	P1430	HC adsorber ACT press sensor												X	X													
P2004,6	P2004,6	Intake Manifold Runner Control																										
P2009,10	P2009,10	Intake Manifold Runner Control Circuit																										
P2014,16,17	P2014,16,17	Intake Manifold Runner Position Sensor																										
P2102,P2103	P2102,P2103	Throttle motor																										
P2120-P2138	P2120-P2138	Accel position sensor																										
P2196,P2198	P2196,P2198	A/F sensor (rationality)							X	X			X						X									X
P2226	P2226	BARO sensor																										X
P2237,P2240	P2237,P2240	A/F sensor (open)							X	X			X						X									X
P2423,24	P2423,24	HC Adsorption Catalyst																										
P2430,2,3	P2430,2,3	AIR Pressure Sensor(Low/High)																										
P2431	P2431	AIR Pressure Sensor(Rationality)																										
P2440	P2440	AIR control valve stuck open							X	X			X															
P2441	P2441	AIR control valve stuck close							X	X			X															
P2444	P2444	AIP stuck On							X	X			X															
P2445	P2445	AIP stuck Off							X	X			X															
P2714-P2759	P2714-P2759	Trans solenoid(SLU-SLD)																										X
P2A00,P2A03	P2A00,P2A03	A/F sensor (slow response)							X	X			X						X									X

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Monitor detected malfunction

Fault code	Fault code	Component/ system	Monitor disablement (X - disabled)																												
			P0741-P0796	P0748-P0798	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,P2006	P2009,P2010	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			P0741-P0796	P0748-P0999	P0850	P1010,P1020	P1011,12(,21,22)	P1126	P1129	P1430	P2004,6	P2009,10	P2014,16,17	P2102,P2103	P2120-P2138	P2196,P2198	P2226	P2237,P2240	P2423,24	P2430,2,3	P2431	P2440	P2441	P2444	P2445	P2714-P2759	P2A00,P2A03
			Trans solenoid (function)*2	Trans solenoid (range)	PNP switch	VVTL	VVTL system1(,2)	Electronic magnet clutch	Electronic throttle system	HC adsorber ACT press sensor	Intake Manifold Runner Control	Intake Manifold Runner Control Circuit	Intake Manifold Runner Position Sensor	Throttle motor	Accel position sensor	A/F Sensor(Rationality) - Sensor1	BARO sensor	A/F Sensor(Open) - Sensor1	HC Adsorption Catalyst	AIR Pressure Sensor(Low/High)	AIR Pressure Sensor(Rationality)	AIR control valve stuck open	AIR control valve stuck close	AIP stuck On	AIP stuck Off	Trans solenoid(SLU-SLD)	A/F Sensor (Slow response) - Sensor1
P0010,P0020	P0010,P0020	VVT VSV1,2																				X	X	X	X		
P0011	P0011	VVT System1 - Advance																				X	X	X	X		
P0012	P0012	VVT System1 - Retard																				X	X	X	X		
P0016,P0018	P0016,P0018	VVT System - Misalignment																				X	X	X	X		
P0021	P0021	VVT System2 - Advance																				X	X	X	X		
P0022	P0022	VVT System2 - Retard																				X	X	X	X		
P0030,50	P0031,32,51,52	O2 Sensor Heater - Sensor1																	X			X	X	X	X		
P0135,P0155	P0031,32,51,52	A/F Sensor Heater - Sensor1														X		X	X			X	X	X	X		X
P0036,56	P0037,38,57,58	O2 Sensor Heater - Sensor2														X			X								
P0043,44,63,64	P0043,44,63,64	O2 Sensor Heater - Sensor3																	X								
P0100,P0101	P0100-P0103	MAF sensor				X	X									X		X	X			X	X	X	X		X
P0105,P0106	P0105-P0108	MAP sensor				X	X									X		X	X			X	X	X	X		X
P0110	P0110-P0113	IAT sensor									X					X		X				X	X	X	X		X
P0115,P0116	P0115-P0118	ECT sensor	X			X	X				X					X		X	X			X	X	X	X		X
P0120,P0121	P0120-P0223,P2135	TP sensor														X		X	X			X	X	X	X		X
P0125	P0125	Insufficient ECT for Closed Loop	X			X										X		X	X			X	X	X	X		X
P0128	P0128	Thermostat																									
P0130-P0153	P0130-P0153	O2 Sensor - Sensor1																	X			X	X	X	X		
P0134,P0154	P0134,P0154	O2 Sensor, A/F Sensor(No Activity) - Sensor1														X		X	X			X	X	X	X		X
P0136,P0156	P0136,P0156	O2 Sensor - Sensor2														X			X								
P0142,P0162	P0142,P0162	O2 Sensor - Sensor3																	X								
P0171,P0172	P0171,P0172	Fuel system														X		X	X			X	X	X	X		X
P0300-P0308	P0300-P0308	Misfire														X		X	X			X	X	X	X		X
P0325,P0330	P0325-P0333	Knock sensor																				X	X	X	X		
P0335	P0335	CKP sensor				X	X									X		X	X			X	X	X	X		X
P0340, P0341	P0340, P0341	CMP sensor				X	X									X		X	X			X	X	X	X		X
P0340-P0346	P0340-P0346	VVT sensor1,2																				X	X	X	X		
P0351-P0358	P0351-P0358	Ignitor																	X			X	X	X	X		
P0385	P0385	CKP sensor 2				X	X									X		X	X			X	X	X	X		X
P0401	P0401	EGR system (closed)																	X								
P0402	P0402	EGR system (open)														X		X	X			X	X	X	X		X
P0405,P0409	P0405-P0409	Lift sensor																									
P0420,P0430	P0420,P0430	Catalyst																									
P0442-P0456	P0442-P0456	EVAP system														X		X				X	X	X	X		X
P0450,P0451	P0450-P0453	EVAP press sensor																				X	X	X	X		

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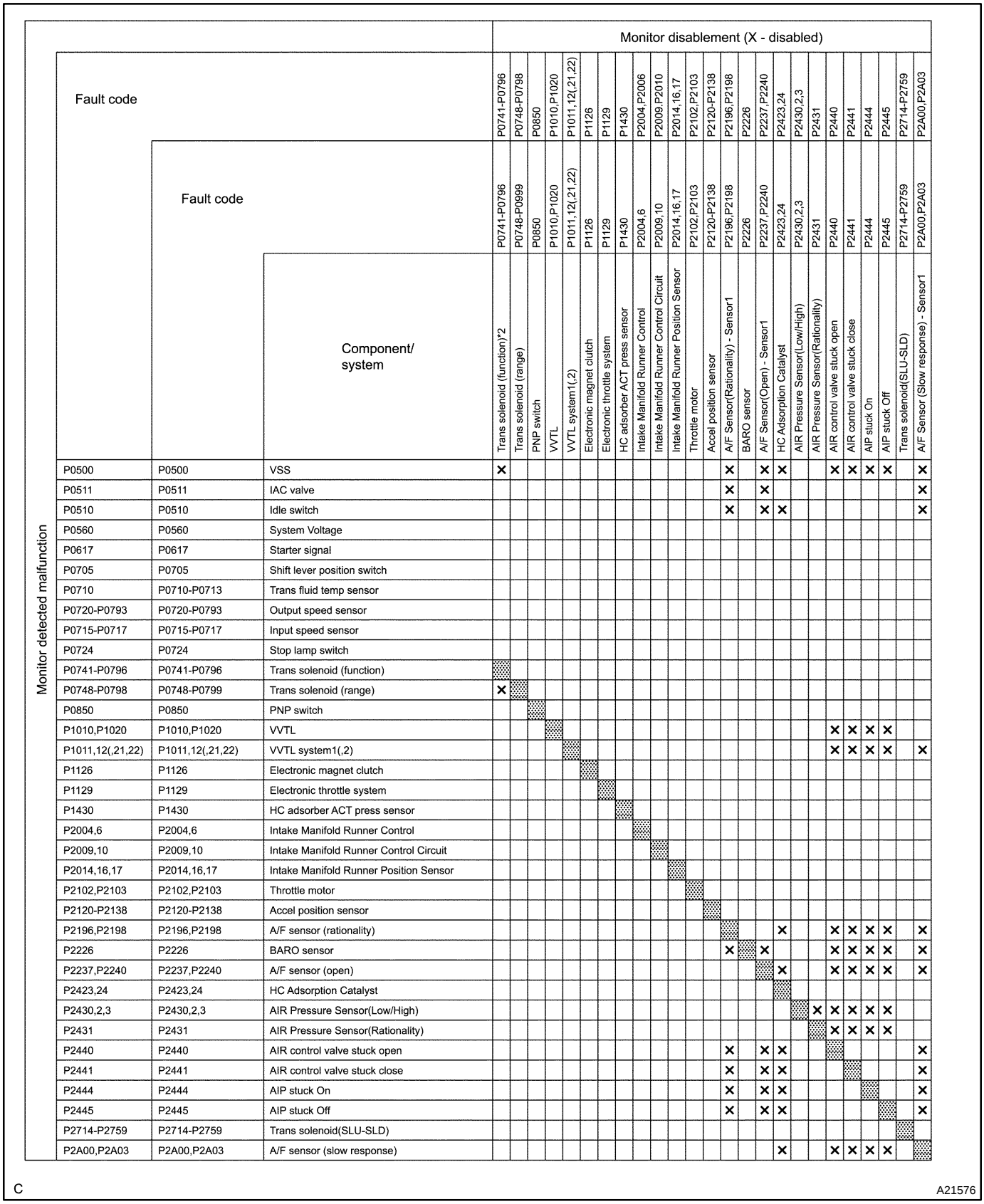
Monitor detected malfunction
Fault code
Fault code
Component/ system
Monitor disablement (X - disabled)
P0741-P0796
P0748-P0798
P0850
P1010,P1020
P1011,12(,21,22)
P1126
P1129
P1430
P2004,P2006
P2009,P2010
P2014,16,17
P2102,P2103
P2120-P2138
P2196,P2198
P2226
P2237,P2240
P2423,24
P2430,2,3
P2431
P2440
P2441
P2444
P2445
P2714-P2759
P2A00,P2A03
Trans solenoid (function)*2
Trans solenoid (range)
PNP switch
VVTL
VVTL system1(,2)
Electronic magnet clutch
Electronic throttle system
HC adsorber ACT press sensor
Intake Manifold Runner Control
Intake Manifold Runner Control Circuit
Intake Manifold Runner Position Sensor
Throttle motor
Accel position sensor
A/F Sensor(Rationality) - Sensor1
BARO sensor
A/F Sensor(Open) - Sensor1
HC Adsorption Catalyst
AIR Pressure Sensor(Low/High)
AIR Pressure Sensor(Rationality)
AIR control valve stuck open
AIR control valve stuck close
AIP stuck On
AIP stuck Off
Trans solenoid(SLU-SLD)
A/F Sensor (Slow response) - Sensor1
P0500 P0500 VSS
P0511 P0511 IAC valve
P0510 P0510 Idle switch
P0560 P0560 System Voltage
P0617 P0617 Starter signal
P0705 P0705 Shift lever position switch
P0710 P0710-P0713 Trans fluid temp sensor
P0720-P0793 P0720-P0793 Output speed sensor
P0715-P0717 P0715-P0717 Input speed sensor
P0724 P0724 Stop lamp switch
P0741-P0796 P0741-P0796 Trans solenoid (function)
P0748-P0798 P0748-P0799 Trans solenoid (range)
P0850 P0850 PNP switch
P1010,P1020 P1010,P1020 VVTL
P1011,12(,21,22) P1011,12(,21,22) VVTL system1(,2)
P1126 P1126 Electronic magnet clutch
P1129 P1129 Electronic throttle system
P1430 P1430 HC adsorber ACT press sensor
P2004,6 P2004,6 Intake Manifold Runner Control
P2009,10 P2009,10 Intake Manifold Runner Control Circuit
P2014,16,17 P2014,16,17 Intake Manifold Runner Position Sensor
P2102,P2103 P2102,P2103 Throttle motor
P2120-P2138 P2120-P2138 Accel position sensor
P2196,P2198 P2196,P2198 A/F sensor (rationality)
P2226 P2226 BARO sensor
P2237,P2240 P2237,P2240 A/F sensor (open)
P2423,24 P2423,24 HC Adsorption Catalyst
P2430,2,3 P2430,2,3 AIR Pressure Sensor(Low/High)
P2431 P2431 AIR Pressure Sensor(Rationality)
P2440 P2440 AIR control valve stuck open
P2441 P2441 AIR control valve stuck close
P2444 P2444 AIP stuck On
P2445 P2445 AIP stuck Off
P2714-P2759 P2714-P2759 Trans solenoid(SLU-SLD)
P2A00,P2A03 P2A00,P2A03 A/F sensor (slow response)

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12. O2S TEST RESULT

INTRODUCTION

The O2S TEST RESULT refers to the results of the engine control module (ECM) when it monitors the oxygen sensor (O2S), and it can be read using the hand-held tester or the generic OBD II scantool. Based on this, you can find the O2S's conditions.

The ECM monitors the O2S in the various items. You can read the monitor result (TEST DATA) of each monitor item using the O2S TEST RESULT. However, the output value of the TEST DATA is the latest "snapshot" value that is taken after monitoring and therefore is not dynamic.

In this repair manual, the description of the O2S TEST RESULT (for O2S related DTCs) are written in a table.

This table consists of 5 items:

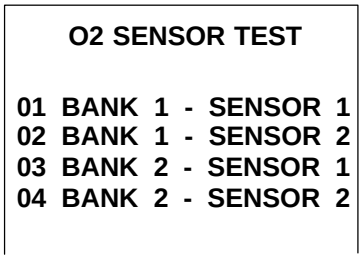
(1) TEST ID (a code applied to each TEST DATA)
(2) Description of TEST DATA
(3) Conversion Factor (When Conversion Factor has a value written in the table, multiply the TEST DATA value appearing on the scan tool by the Conversion Factor value. The result will be the required value.)
(4) Unit
(5) Standard Value

If the TEST DATA value appearing on the scan tool is out of the standard value, the O2S is malfunctioning. If it is within the standard value, the O2S is functioning normally. However, if the value is on the borderline of the standard value, the O2S may malfunction very soon.

HOW TO READ O2S TEST RESULT USING HAND-HELD TESTER

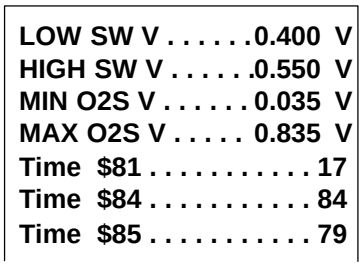
(a) Connect the hand-held tester to the DLC3.

O2S TEST RESULT Screen



(b) On the tester screen, select the following menus: DIAGNOSIS/CARB OBDII/O2S TEST RESULT. A list of the O2S equipped on the vehicle will be displayed.

TEST DATA Screen



(c) Select the desired O2S and press ENTER. The following screen will appear.

(d) Press HELP and ⇩ simultaneously. More information will appear.

(e) Example:

(1) The hand-held tester displays ”17” as a value of the ”TIME $81” (see the illustration on the left).

(2) Find the Conversion Factor value of ”TIME $81” in the O2S TEST RESULT chart below. 0.3906 is specified for $81 in this chart.

(3) Multiply ”17” in step (1) by 0.3906 (Conversion Factor) in the step (2).
17 x 0.3906 = 6.6 %

(4) If the answer is within the standard value, the ”TIME $81” can be confirmed to be normal.

O2S TEST RESULT Chart

TEST ID	Description of TEST DATA	Conversion Factor	Unit	Standard Value
$81	Percentage of monitoring time when the HO2S voltage is less than 0.05V	Multiply 0.3906	%	Within 60 %

13. CHECKING MONITOR STATUS

NOTICE:

The Monitor Status is not applicable to the heated oxygen sensor (HO2S). The HO2S status can be checked with O2S TEST RESULT.

(a) INTRODUCTION

The purpose of the monitor result (mode 6) 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, EVAP and thermostat.

The monitor result allows the OBD scan tool to display the monitor status, test value and test limit. The monitor status indicates whether the component is functioning normally or not (PASS or FAIL). The test value is the value that was used to determine the monitor status. When the test value is inside the test limit, the ECM determines the component is functioning normally (PASS). If the test value is outside the test limit, the ECM determines the component is malfunctioning (FAIL).

A problem in these components/systems can be found by comparing the test value and test limit. The monitor result information is included under “MONITOR RESULT” in the DTC sections.

(b) PROCEDURE

NOTICE:

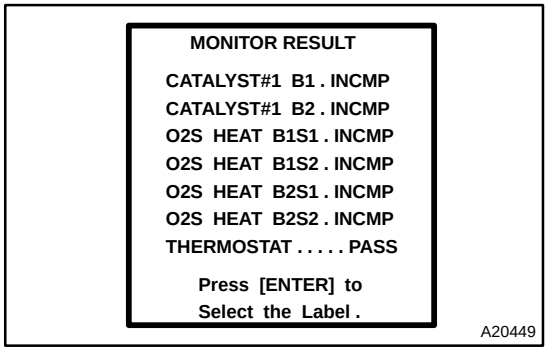
The monitor result and test value are cleared when the ignition switch is turned OFF.

(1) Connect the hand-held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Clear the DTCs.

(4) Run the vehicle in accordance with the applicable drive pattern described in READINESS MONITOR DRIVE PATTERN (see page DI-30).



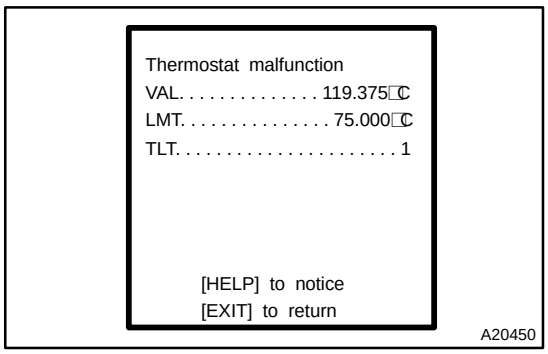
(5) Select from the tester menus: DIAGNOSIS, ENHANCED OBD II, MONITOR INFO and MONITOR RESULT. The monitor result appears after the component name.

INCMP: The component has not been monitored yet.

PASS: The component is functioning normally.

FAIL: The component is malfunctioning.

(6) Confirm that the component is set to either PASS or FAIL.



(7) Select the component (Label) and press ENTER. The accuracy test value appears when the monitor result is either PASS or FAIL.
VAL The test value
LMT: The test limit
TLT: The test limit type. Either 0 or 1 is displayed.

(8) If TLT is 0, the component is malfunctioning when the test value is higher than the test limit. If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.

(9) Compare the test value with the test limit. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, there is a potential malfunction in the component.

HINT:
The monitor result might on rare occasions be PASS even if the MIL is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

DI1L9-13

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	16.Starter 17.Starter relay 18.Park/neutral position switch	ST-16 ST-18 DI-402
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI-345 DI-350 IN-36
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-350
Engine cranks normally but difficult to start	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-336 DI-350 EM-3
Difficult to start with cold engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-336 DI-350
Difficult to start with hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-336 DI-350
High engine idle speed (Poor idling)	1. A/C switch circuit 2. ECM power source circuit	- DI-345
Low engine idle speed (Poor idling)	1. A/C switch circuit 2. Fuel pump control circuit	- DI-350
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM-3 DI-350
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI-345 DI-350
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI-350 DI-396
Surging (Poor driveability)	1. Fuel pump control circuit	DI-350
Engine stalls soon after starting	1. Fuel pump control circuit	DI-350
Engine stalls during A/C operation	1. A/C switch circuit 2. Engine control module (ECM)	- IN-36
Unable to refuel/Difficult to refuel	1. ORVR system	-

DIC21-01

READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF THE READINESS TESTS

★ The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission-related components and report any detected abnormalities in the form of Diagnostic Trouble Codes (DTCs). Since the various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors. Many state Inspection and Maintenance (I/M) programs require that vehicles complete their Readiness Monitors prior to beginning an emissions test.

★ The current status of the Readiness Monitors can be seen by using the hand-held tester with version 9.0 software (or newer), or a generic OBD II Scan tool.

★ To view the Readiness Monitor status using the hand-held tester, select ”Monitor Status” from the Enhanced OBD II Menu.

★ A status of ”complete” indicates that the necessary conditions have been met to run the performance tests for the related Readiness Monitor.

★ The Readiness Monitor will be reset to ”incomplete” if:
  - ★ ECM has lost power (battery or fuse).
  - ★ DTCs have been cleared.
  - ★ The conditions for running the Readiness Monitor have not been met.

★ In the event that any Readiness Monitor shows ”incomplete,” follow the appropriate Readiness Monitor Drive Pattern to active the monitor and change the readiness status to ”complete.”

CAUTION:

Strictly observe of posted speed limits, traffic laws, and road conditions when performing these drive patterns.

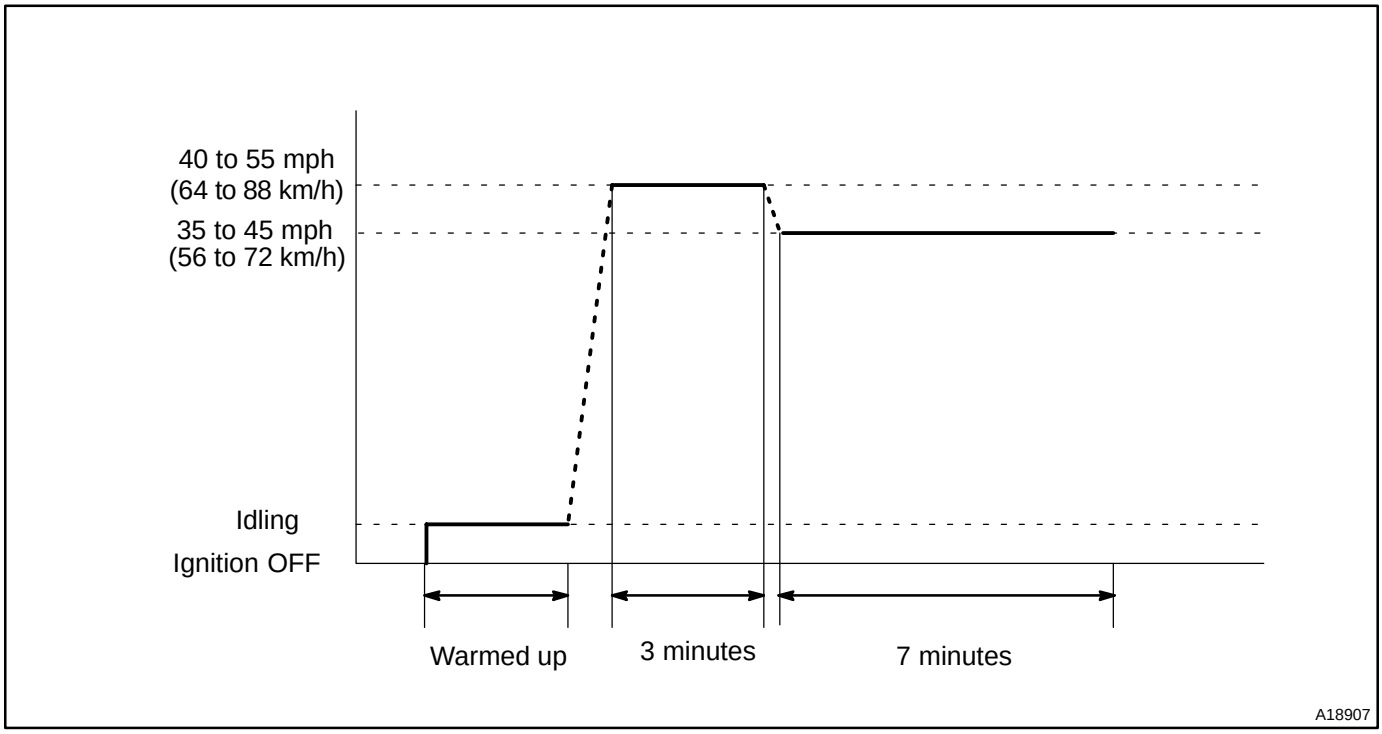
NOTICE:

These drive patterns represent the fastest method to satisfy all necessary conditions which allow the specific readiness monitor to complete.

In the event that the drive pattern must be interrupted (possibly due to traffic conditions or other factors) the drive pattern can be resumed, and in most cases, the readiness monitor will still set to ”complete”.

To ensure rapid completion of readiness monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (O2S TYPE)



(a) Preconditions

The monitor will not run unless:

★ MIL is OFF.

★ Engine Coolant Temperature (ECT) is 75˚C (167˚F) or greater.

★ Intake Air Temperature (IAT) is -10˚C (14˚F) or greater

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 cycling the ignition off.

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions.

(2) Drive the vehicle at 40 to 55 mph (64 to 88 km/h) for approximately for 3 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden acceleration.

If IAT is less than 10˚C (50˚F) when engine was started, drive the vehicle at 40 to 55 mph (64 to 88 km/h) for additional 4 minutes.

(3) Drive the vehicle at 35 to 45 mph (56 to 72 km/h) for approximately 7 minutes.

NOTICE:

Drive with smooth throttle operation and avoid sudden deceleration as much as possible with the throttle fully closed.

(4) If readiness status does not switch to complete, make sure that the preconditions are met and the ignition switch is turned OFF and then repeat steps (2) and (3).

(5) Release pressure in the fuel tank by removing and then reinstalling the fuel tank cap.

(6) Start the engine and immediately begin driving as directed.

3. EVAP MONITOR (VACUUM PRESSURE MONITOR)

NOTICE:

A cold soak must be performed prior to conducting the drive pattern to complete the Internal Pressure Readiness Monitor.

(a) Cold Soak Preconditions

The monitor will not run unless:

★ MIL is OFF

★ Fuel level is approximately 1/2 to 3/4

★ Altitude is 7,800 feet (2,400 m) or less

(b) Cold Soak Procedure

Let the vehicle cold soak for 8 hours or until the difference between IAT and ECT becomes less than 7˚C (13˚F)

HINT:

Examples:

★ Scenario 1

ECT = 24˚C (75˚F)

IAT = 16˚C (60˚F)

Difference between ECT and IAT is 8˚C (15˚F)

→ The monitor will not run because difference between ECT and IAT is greater than 7˚C (13˚F)

★ Scenario 2

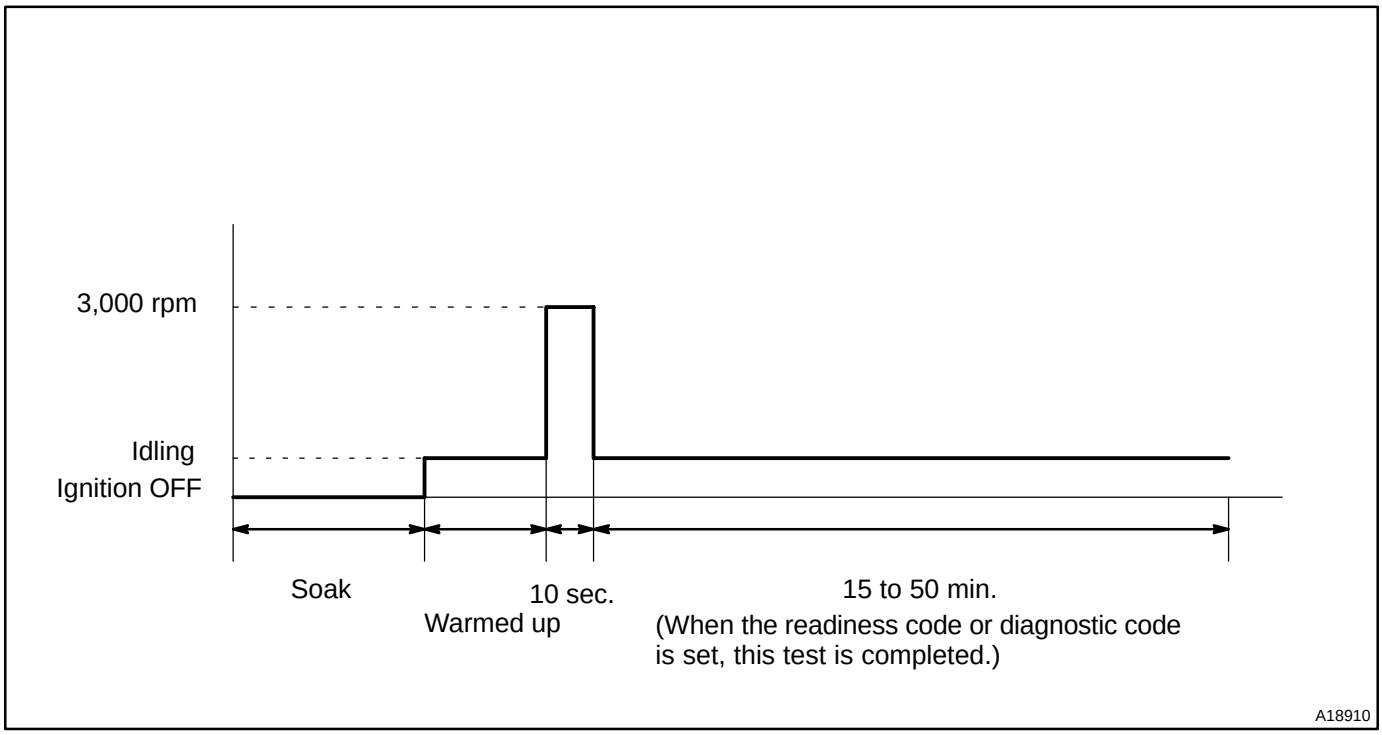
ECT = 21˚C (70˚F)

IAT = 20˚C (68˚F)

Difference between ECT and IAT is 1˚C (2˚F)

→ The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

4. EVAP MONITOR (VACUUM PRESSURE MONITOR) (CONTINUED)



(a) Preconditions

The monitor will not run unless:

★ MIL is OFF
★ Fuel level is approximately 1/2 to 3/4
★ Altitude is 7,800 feet (2,400 m) or less*
★ Engine Coolant Temperature (ECT) is between 4.4˚C and 35˚C (40˚F and 95˚F)
★ Intake Air Temperature (IAT) is between 4.4˚C and 35˚C (40˚F and 95˚F)
★ Cold Soak Procedure has been completed
★ Before starting the engine, the difference between ECT and IAT must be less than 7˚C (13˚F)

HINT:

Examples:

★ Scenario 1

ECT = 24˚C (75˚F)
IAT = 16˚C (60˚F)
Difference between ECT and IAT is 8˚C (15˚F)
→ The monitor will not run because difference between ECT and IAT is greater than 7˚C (13˚F)

★ Scenario 2

ECT = 21˚C (70˚F)
IAT = 20˚C (68˚F)
Difference between ECT and IAT is 1˚C (2˚F)
→ The monitor will run because difference between ECT and IAT is less than 7˚C (13˚F)

The readiness test can be completed in cold ambient conditions (less than 40˚F / 4.4˚C) and/or at high altitudes (more than 7,800 feet / 2,400 m) if the drive pattern is repeated a second time after cycling the ignition off.

(b) Drive Pattern

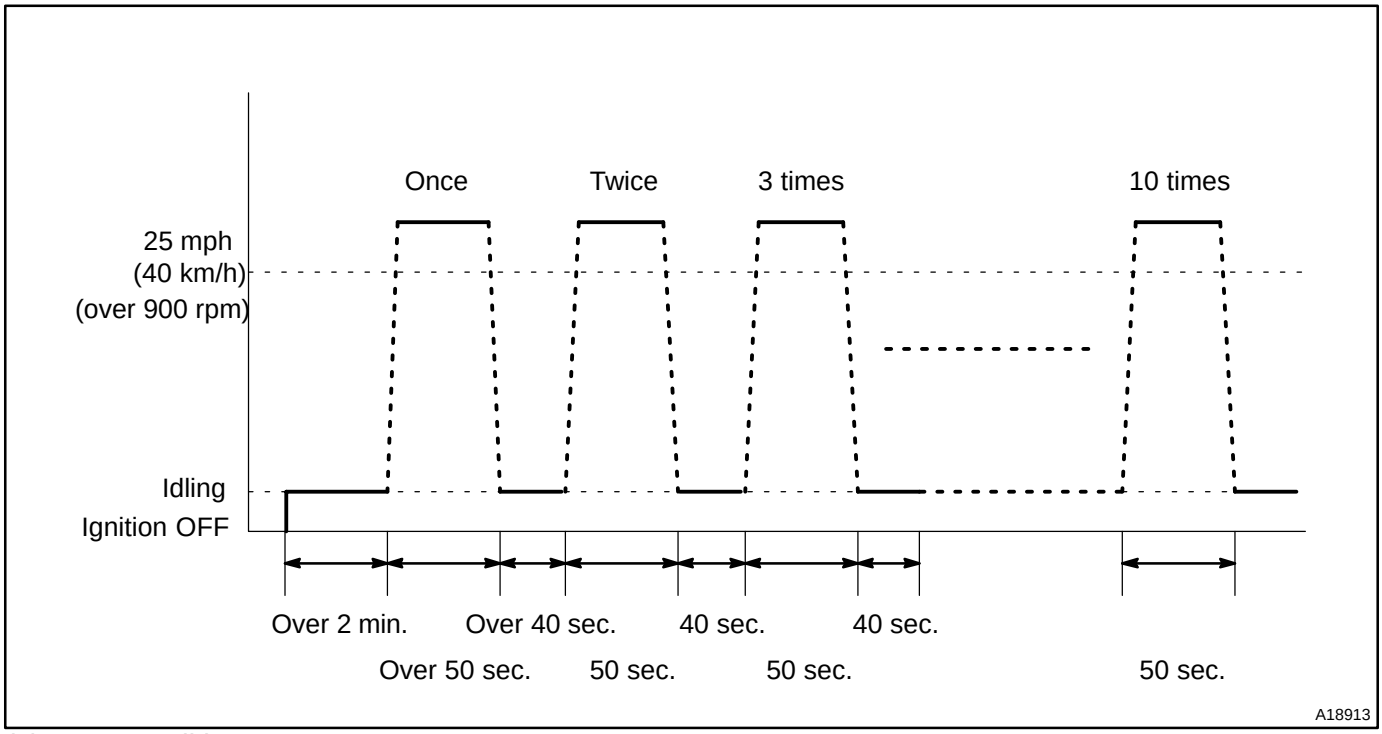
(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to ”a”).
(2) Release pressure in fuel tank by removing the fuel tank cap and then reinstalling it.
(3) Start the engine and allow it to idle until ECT becomes 75˚C (167˚F) or higher.
(4) Run the engine at 3,000 rpm for about 10 seconds.
(5) Allow the engine to idle with the A/C ON (to create slight load) for 15 to 50 minutes.

NOTICE:

If the vehicle is not equipped with A/C put a slight load on the engine by doing the following :

★ **Securely set the parking brake.**
★ **Block the drive wheels with wheel chocks.**
★ **Allow the vehicle to idle in drive for 15 to 50 minutes.**

5. OXYGEN SENSOR MONITOR (FRONT AND REAR O2S SYSTEM)



(a) Preconditions

The monitor will not run unless:

★ MIL is OFF

(b) Drive Pattern

(1) Connect the OBD II scan tool to DLC3 to check monitor status and preconditions (refer to step "a").

(2) Start the engine and allow it to idle for 2 minutes or more.

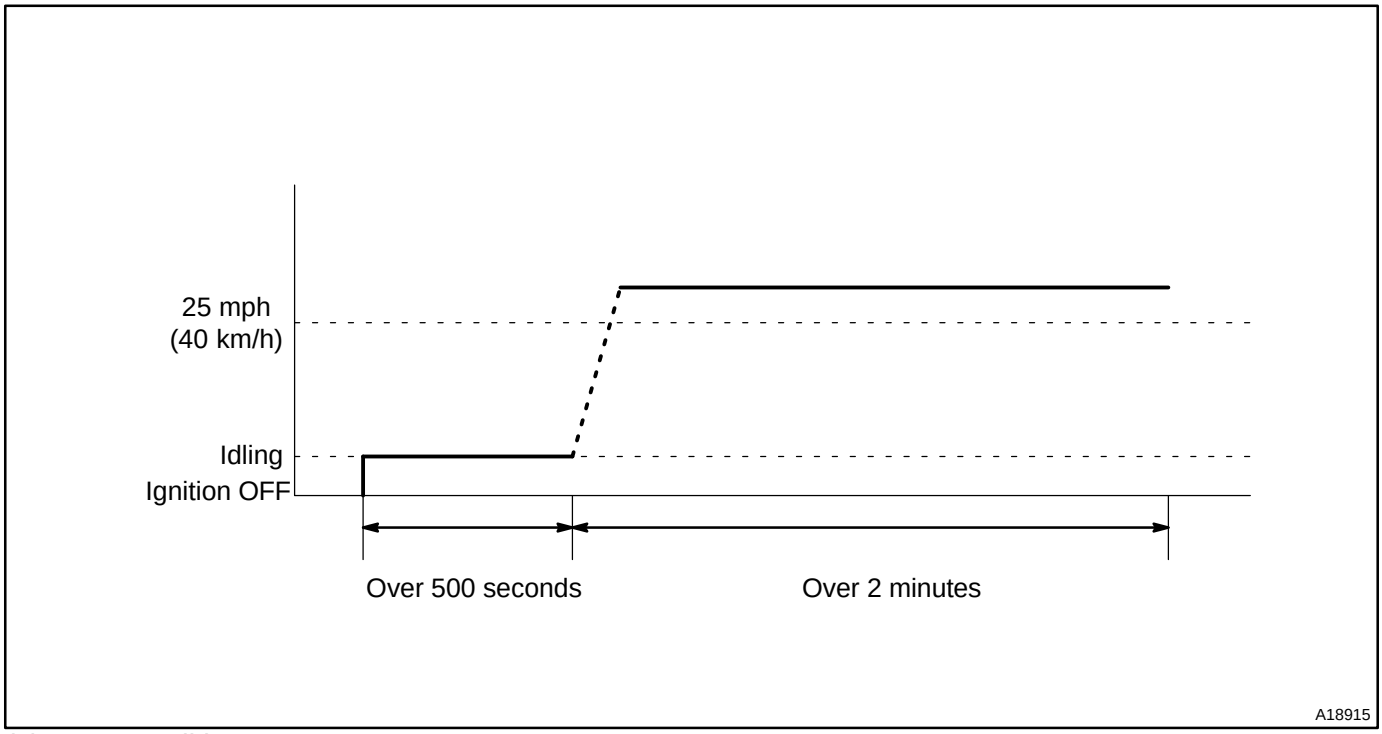
(3) Drive the vehicle at 25 mph (40 km/h) or more for at least 50 seconds.

(4) Stop the vehicle and allow the engine to idle for 40 seconds or more.

(5) Perform steps (3) and (4) ten times.

(6) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure preconditions are met, turn the ignition off and then repeat steps (1) and (5).

6. OXYGEN SENSOR HEATER MONITOR



(a) Preconditions

The monitor will not run unless:

★ MIL is OFF

(b) Drive Pattern

(1) Connect the OBD II scan tool to the DLC3 to check monitor status and preconditions (refer to step ”a”).

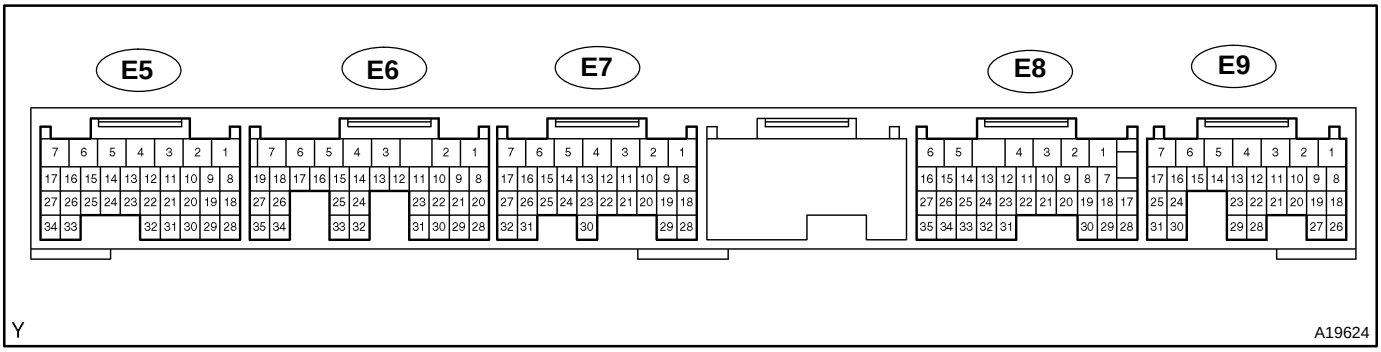
(2) Start the engine and allow it to idle for 500 seconds or more.

(3) Drive the vehicle at 25 mph (40 km/h) or more at least 2 minutes.

(4) Check the status of the readiness monitor on the scan tool display. If readiness status did not switch to complete, ensure the preconditions are met, turn the ignition off and then repeat steps (2) and (3).

DI1L7-17

TERMINALS OF ECM



Each ECM terminals standard normal voltage is shown in the table below. In the table, first follow the information under ”Condition”.
Look under ”Symbols (Terminals No.)” for the terminals to be inspected.
The standard normal voltage between the terminals is shown under ”STD Voltage”.
Use the illustration above as a reference for the ECM terminals.

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage
BATT (E9-3) - E1 (E7-1)	B-R - BR	Always	9 to 14 V
+BM (E8-6) - E1 (E7-1)	Y-B - BR		
IGSW (E9-9) - E1 (E7-1)	B-R - BR	IG switch ON	9 to 14 V
+B (E9-1) - E1 (E7-1)	B-Y - BR		
MREL (E9-8) - E1 (E7-1)	B-W - BR	IG switch ON	9 to 14 V
VC (E5-18) - E2 (E5-28)	L-R - BR-W	IG switch ON	4.5 to 5.5 V
VG (E5-30) - E2G (E5-29)	L-Y - G-W	Idling, P or N position, A/C switch OFF	0.5 to 3.0 V
THA (E5-20) - E2 (E5-28)	Y-B - BR-W	Idling, Intake air temp. 20˚C (68˚F)	0.5 to 3.4 V
THW (E5-19) - E2 (E5-28)	G-B - BR-W	Idling, Engine coolant temp. 80˚C (176˚F)	0.2 to 1.0 V
VTA1 (E5-21) - E2 (E5-28)	R-Y - BR-W	IG switch ON, Accelerator pedal released	0.5 to 1.2 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VTA2 (E5-31) - E2 (E5-28)	Y-B - BR-W	IG switch ON, Accelerator pedal released	2.0 to 3.1 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VPA (E9-22) - E2 (E5-28)	R - BR-W	IG switch ON, Accelerator pedal released	0.3 to 0.9 V
		IG switch ON, Accelerator pedal depressed	3.2 to 4.8 V
VPA2 (E9-23) - E2 (E5-28)	R-B - BR-W	IG switch ON, Accelerator pedal released	1.8 to 2.7 V
		IG switch ON, Accelerator pedal depressed	4.7 to 5.1 V
VCPA (E9-26) - EPA (E9-28)	L-R - BR-W	IG switch ON	4.5 to 5.5 V
VCP2 (E9-27) - EPA2 (E9-29)	W - W-R	IG switch ON	4.5 to 5.5 V
OX1A (E6-23) - E1 (E7-1) OX1B (E6-29) - E1 (E7-1)	B - BR B - BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI-215)
OX2A (E6-22) - E1 (E7-1) OX2B (E6-21) - E1 (E7-1)	W - BR W - BR	Maintain engine speed at 2,500 rpm for 2 minutes after warming up	Pulse generation (See page DI-215)
HT1A (E6-4) - E1 (E7-1) HT1B (E6-5) - E1 (E7-1)	R - BR L - BR	Idling	Below 3.0 V
HT2A (E6-33) - E1 (E7-1) HT2B (E6-25) - E1 (E7-1)	Y - BR R - B - BR	IG switch ON	9 to 14 V

#1 (E5-1) - E01 (E5-7) #2 (E5-2) - E01 (E5-7) #3 (E5-3) - E01 (E5-7) #4 (E5-4) - E01 (E5-7) #5 (E5-5) - E01 (E5-7) #6 (E6-3) - E01 (E5-7) #7 (E7-6) - E01 (E5-7) #8 (E7-5) - E01 (E5-7)	Y - W-B B - W-B L - W-B R - W-B G - W-B R-L - W-B W - W-B B-W - W-B	IG switch ON	9 to 14 V
		Idling	Pulse generation (See page DI-167)
KNK1 (E6-1) - E1 (E7-1)	B - BR	Maintain engine speed at 4,000 rpm after warming up	Pulse generation (See page DI-186)
KNK2 (E6-2) - E1 (E7-1)	W - BR		
G2+ (E7-27) - G2- (E7-32)	R - G	Idling	Pulse generation (See page DI-191)
NE+ (E7-25) - NE- (E7-24)	L - G		
PRG (E5-34) - E1 (E7-1)	L-B - BR	IG switch ON	9 to 14 V
CCV (E5-27) - E1 (E7-1)	L-R - BR	IG switch ON	9 to 14 V
TBP (E9-4) - E1 (E7-1)	L - BR	IG switch ON, disconnect vacuum hose from VSV for pressure switching valve	9 to 14 V
PTNK (E9-21) - E2 (E5-28)	L-B - BR-W	Ignition switch ON	2.9 to 3.7 V
		Apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg)	Below 0.5 V
SPD (E8-17) - E1 (E7-1)	V - BR	IG switch ON, Rotate driving wheel slowly	Pulse generation (See page DI-274)
M+ (E7-3) - E1 (E7-1) M- (E7-2) - E1 (E7-1)	R - BR W - BR	Idling	Pulse generation (See page DI-302)
FPR (E5-33) - E1 (E7-1)	G-W - BR	IG switch ON	0 to 3.0 V
FC (E9-10) - E1 (E7-1)	B-W - BR	IG switch ON	9 to 14 V
IGT1 (E5-9) - E1 (E7-1) IGT2 (E5-8) - E1 (E7-1) IGT3 (E5-25) - E1 (E7-1) IGT4 (E5-11) - E1 (E7-1) IGT5 (E5-12) - E1 (E7-1) IGT6 (E5-26) - E1 (E7-1) IGT7 (E5-13) - E1 (E7-1) IGT8 (E5-10) - E1 (E7-1)	B - BR R - BR L - BR G - BR Y - BR B-Y - BR B-L - BR L-B - BR	Idling	Pulse generation (See page DI-202)
IGF1 (E5-24) - E1 (E7-1) IGF2 (E5-23) - E1 (E7-1)	B-W - BR B-R - BR	IG switch ON	4.5 to 5.5 V
		Idling	Pulse generation (See page DI-202)
STP (E8-19) - E1 (E7-1)	G-W - BR	Brake pedal is depressed	7.5 to 14 V
		Brake pedal is released	Below 1.5 V
ST1- (E8-12) - E1 (E7-1)	R-G - BR	Brake pedal is depressed	Below 1.5 V
		Brake pedal is released	7.5 to 14 V
STA (E5-17) - E1 (E7-1)	B-R - BR	Shift lever range P or N, Ignition switch START	6.0 V or more
STSW (E7-12) - E1 (E7-1)	B-W - BR	Shift lever range P or N, ignition switch START	6.0 V or more
ACCR (E5-15) - E1 (E7-1)	R-G - BR	Shift lever range P or N, ignition switch START	9 to 14 V
STAR (E6-9) - E1 (E7-1)	B-W - BR	Shift lever range P or N, ignition switch START	9 to 14 V
NSW (E5-16) - E1 (E7-1)	B-W - BR	IG switch ON, Other shift position in P, N	9 to 14 V
		IG switch ON, Shift position in P, N	0 to 3.0 V
W (E9-11) - E1 (E7-1)	W - BR	Idling	9 to 14 V
		IG switch ON	Below 3.0 V
SIL (E9-18) - E1 (E7-1)	V-W - BR	During transmission	Pulse generation
TACH (E9-5) - E1 (E7-1)	B - BR	Idling	Pulse generation

DIB5X-02

CIRCUIT INSPECTION

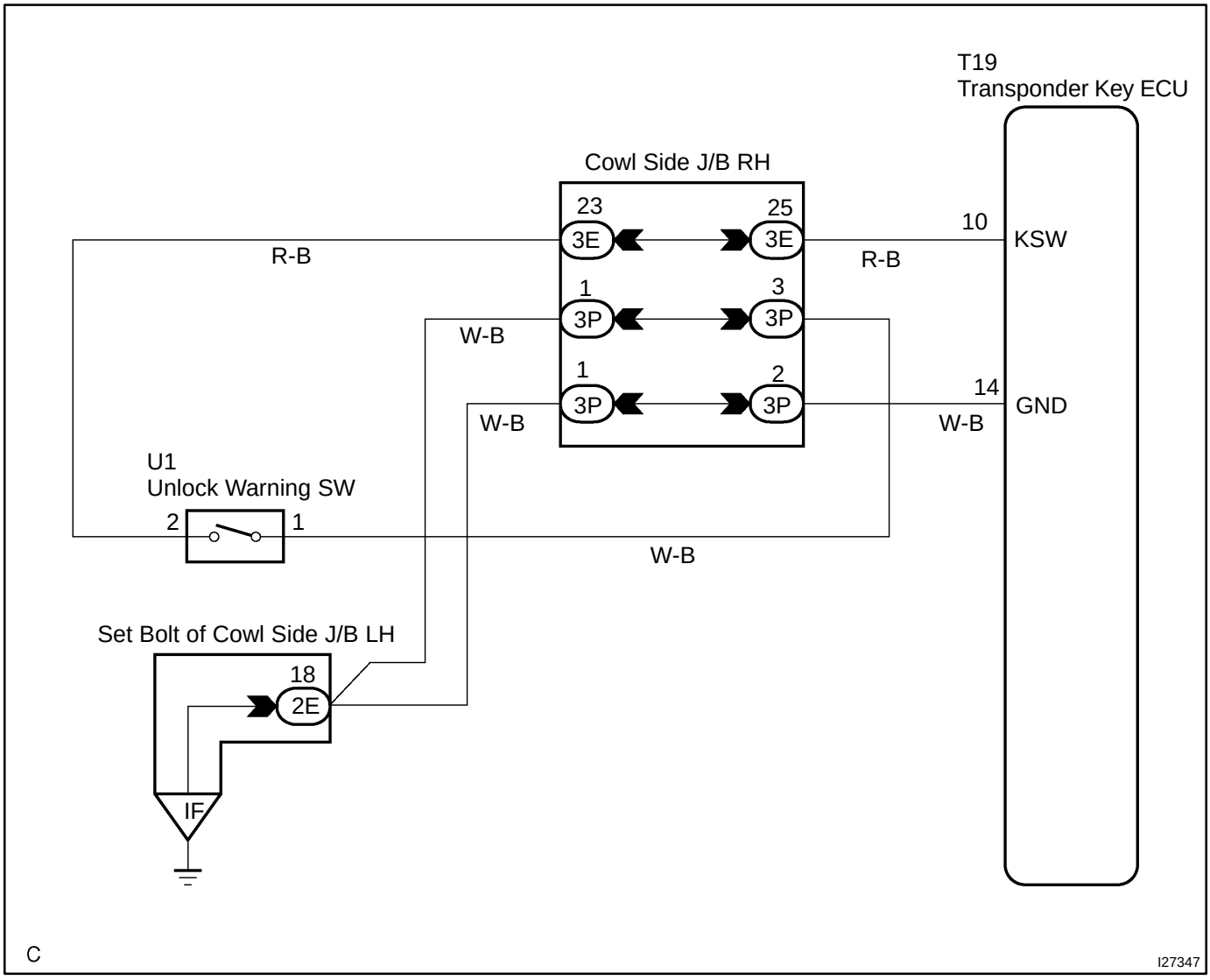
DTC	B2780	Key Unlock Warning Switch Malfunction

CIRCUIT DESCRIPTION

This DTC is detected when the Transponder key ECU does not detect the key unlock warning switch ON even with the ignition switch ON. (In normal condition, the key unlock warning switch should be ON when the ignition switch is ON.)

DTC No.	DTC Detecting Condition	Trouble Area
B2780	The key unlock warning switch On is not detected when the ignition switch is ON.	★Key unlock warning switch ★Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check key unlock warning switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to the DLC3.
CHECK:
Check the key unlock warning switch using DATA LIST.

OK → **Go to step 4.**

NG

2	**Check key unlock warning switch (See page BE-29).**

NG → **Replace the key unlock warning switch.**

OK

3	**Check wire harness and connector between key unlock warning switch and transponder key ECU (See page IN-36).**

NG → **Repair or replace wire harness or connector.**

OK

Replace transponder key ECU.

4	**Check whether or not DTC is detected when DTC is cleared, key is inserted into ignition key cylinder and IG SW is turned ON. (See page DI-1004).**

RESULT:

OK	B2780 is not output.
NG	B2780 is output.

NG → **Replace Transponder Key ECU).**

OK

No problem at this time.
It is suspected that DTC was detected for some reason in the past.

DIB5Y-01

DTC	B2784	TRANSPONDER KEY COIL MALFUNCTION

CIRCUIT DESCRIPTION

This DTC is output when short or open of the key coil built in the transponder key amplifier is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B2784	Transponder key coil malfunction	Transponder key amplifier with coil

INSPECTION PROCEDURE

Replace key.

DI1AK-22

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBILISER Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	☐ Immobiliser is not set. (Engine starts with key codes other than the registered key code.)
	☐ Engine does not start.

Check Item	**Malfunction Indicator Lamp**	☐ Normal ☐ Remains ON ☐ Does not Light Up

DTC Check	**1st Time**	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI1AM-29

DIAGNOSTIC TROUBLE CODE CHART

DTC No. (SEE PAGE)	Circuit Inspection	Trouble Area
B2780 (DI-1014)	Key unlock warning switch malfunction	★Key unlock warning switch ★Wire harness
B2784 (DI-1017)	Transponder key coil malfunction	Transponder key amplifier with coil
B2793 (DI-1018)	Transponder chip malfunction	Key
B2794 (DI-1019)	Unmatched encryption code	★Key ★Transponder key amplifier
B2795 (DI-1020)	Unmatched key code	★Key ★Unregistered key inserted before
B2796 (DI-1021)	No communication in immobiliser system	★Key ★Transponder key amplifier with coil ★Wire harness ★Transponder key ECU
B2797 (DI-1023)	Communication malfunction No.1	★Key ★Wire harness ★Transponder key amplifier with coil ★Transponder key ECU
B2798 (DI-1026)	Communication malfunction No.2	★Key ★Transponder key amplifier with coil ★Wire harness ★Transponder key ECU
B2799/99 (DI-1026)	Engine immobiliser system malfunction	★Wire harness ★Transponder key ECU ★ECM

HINT:

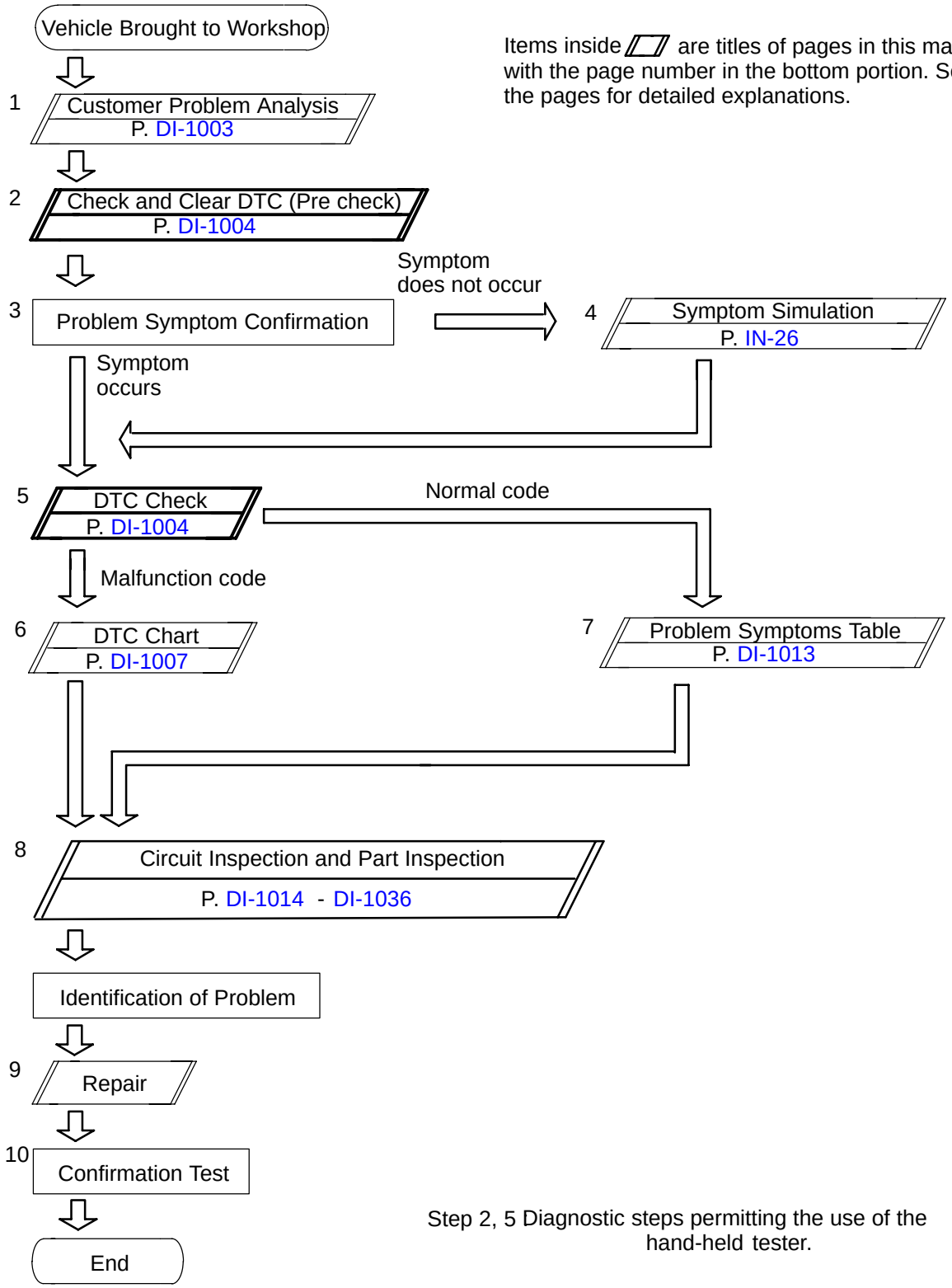
To reduce the unnecessary exchange of Transponder key ECU, check that a trouble occurs with the original Transponder key ECU at the time of exchanging Transponder key ECU and the trouble will disappear with a new Transponder key ECU.

ENGINE IMMOBILISER SYSTEM

DI1AJ-40

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following pages.

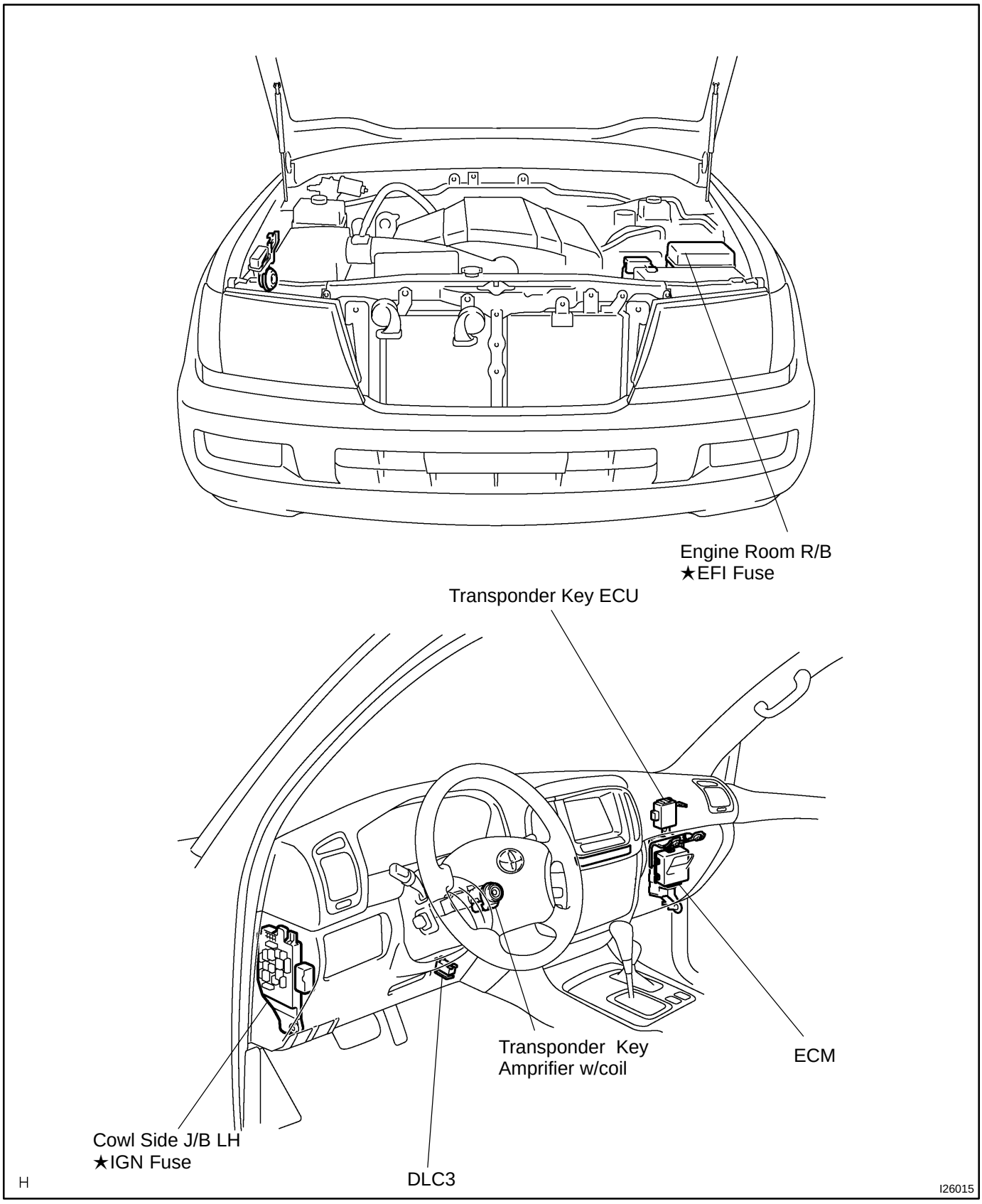


Items inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

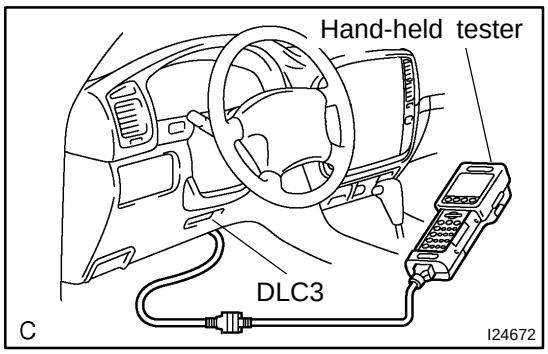
Step 2, 5 Diagnostic steps permitting the use of the hand-held tester.

DI3CE-03

PARTS LOCATION



DI1AL-28



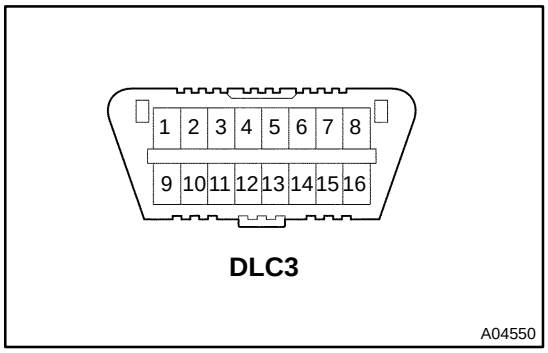
PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read from DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light up but DTC inspection is performed.

Therefore when there seems to be a trouble on immobiliser, use hand-held tester or SST to check and troubleshoot it.



(b) Inspect the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAEJ1962 and matches the ISO 9141-2 format.

Tester connection	condition	Specified condition
7 (Bus ± Line) - 5 (Signal ground)	During communication	Pulse generation
4 (Chassis Ground) - Body	Always	1 Ω or less
5 (Signal Ground) - Body	Always	1 Ω or less
16 (B+) - Body	Always	9 - 14 V

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of hand-held tester to DLC3, turned the ignition switch ON and operated the hand-held tester, there is a problem on the vehicle side or tool side.

★ If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.

★ If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

2. INSPECT DIAGNOSIS

(a) Check the DTC (Using hand-held tester).

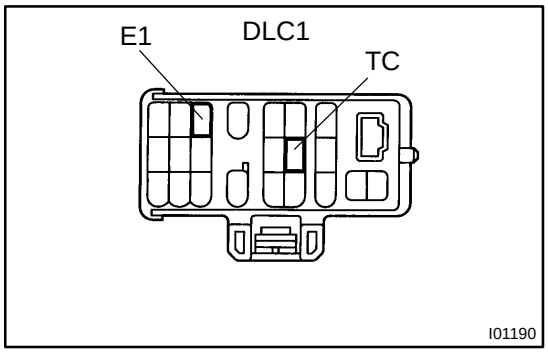
(1) Prepare hand-held tester.

(2) Connect hand-held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn hand-held tester switch ON.

(4) Use hand- held tester to check the DTCs. and "Snap-shot function" which records the monitor data (For operating instructions, see the hand-held tester instruction book.).

(5) See page DI-1007 to confirm the details of the DTCs.



(b) Check the DTC (Using diagnosis check wire).

(1) Turn ignition switch ON.

(2) Using SST, connect between terminals 11 (TC) and 3 (E1) of DLC1.

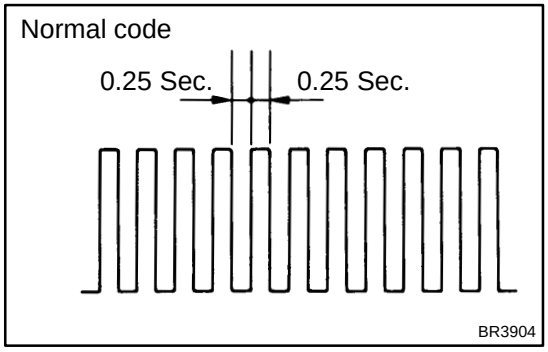
SST 09843-18020

(3) Read the diagnostic trouble code from malfunction indicator lamp.

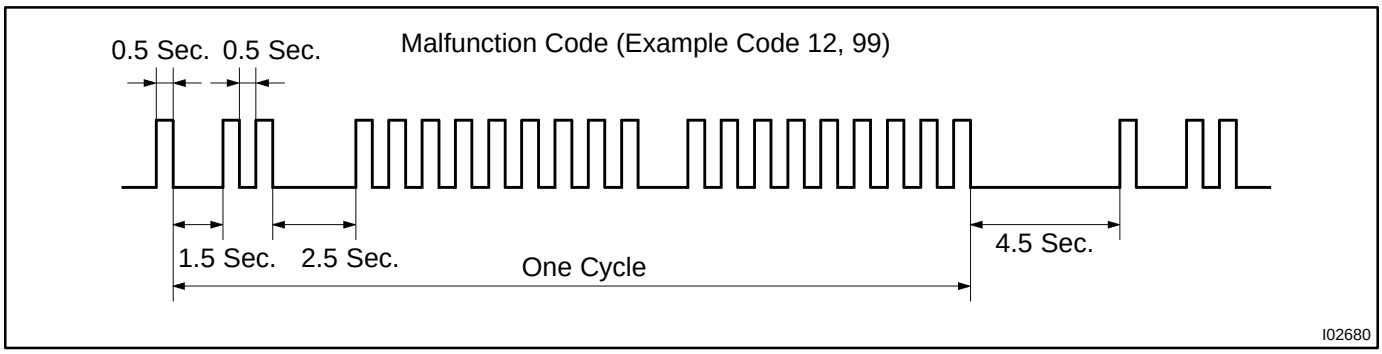
HINT:

★ If a diagnostic trouble code is not output, check the TC terminal circuit.

★ ECM controls the immobiliser function on this vehicle, DTC is out put with engine data.



★ As an example, the blinking patterns for codes; normal, 12 and 99 are shown in the charts.



(4) When DTC "99" is output, there is a trouble of immobiliser. Start troubleshooting referring to PROBLEM SYMPTOMS TABLE.

(5) After completing the check, disconnect terminals 11 (TC) and 3 (E1) and turn off the display.

HINT:

In the event of 2 or more malfunction codes, indication will begin from the smaller numbered code and continue in order to the larger.

(c) Clear the DTC.

The following operations will erase the DTCs and freeze frame data.

(1) Operating the hand-held tester to erase the codes (See the hand-held tester instruction book for operating instructions.).

(2) Disconnecting the battery terminals or EFI fuse.

3. CHECK HAND-HELD TESTER

(a) ECU DATA MONITOR

(1) Make a judgement of good or bad and find out a malfunctioning part by the data monitor.

Standard:

TRANSPONDER KEY ECU

Item	Condition	Specified Condition
IMMOBILISER	Ignition switch ON → When key is not inserted in the ignition switch cylinder	UNSET/SET
MASTER KEY	Ignition switch ON with master key → Pull out key from ignition switch cylinder	CORRESP/WRONG
SUB KEY	Ignition switch ON with sub-key → Pull out key from ignition switch cylinder	CORRESP/WRONG
REGIST MAS CODE	-	0 - 3
REGIST SUB CODE	-	0 - 1
KEY SW	Ignition switch ON → Without key	ON/OFF
IG SW	Ignition switch ON → OFF	ON/OFF

(b) ACTIVE TEST

(1) Make a judgement of good or bad and find out a malfunctioning part by the active test.

Standard:

TRANSPONDER KEY ECU

Item	Operation
SECURITY INDIC	ON / OFF

DI1AP-34

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. Transponder key ECU	IN-36
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. Transponder key ECU 6. ECM	*1 IN-36 BE-196 IN-36
Security indicator is always ON.	1. Multi-display (security indicator) 2. Wire harness 3. Transponder key ECU	*2 IN-36 IN-36
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2. Transponder key amplifier with coil 3. Transponder key ECU	IN-36 BE-196 IN-36
Security indicator is OFF. (When DTC of immobiliser is output)	1. Wire harness 2. Transponder key amplifier with coil 3. Transponder key ECU	IN-36 BE-196 IN-36
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Multi-display (security indicator) 2. Diagnosis circuit 3. Wire harness 4. Transponder key ECU	 IN-36 IN-36
Security indicator is abnormally blinking.	1. Wire harness 2. Transponder key ECU	IN-36 IN-36
No code is output.	1. Power source circuit 2. Transponder key ECU	DI-1031 IN-36

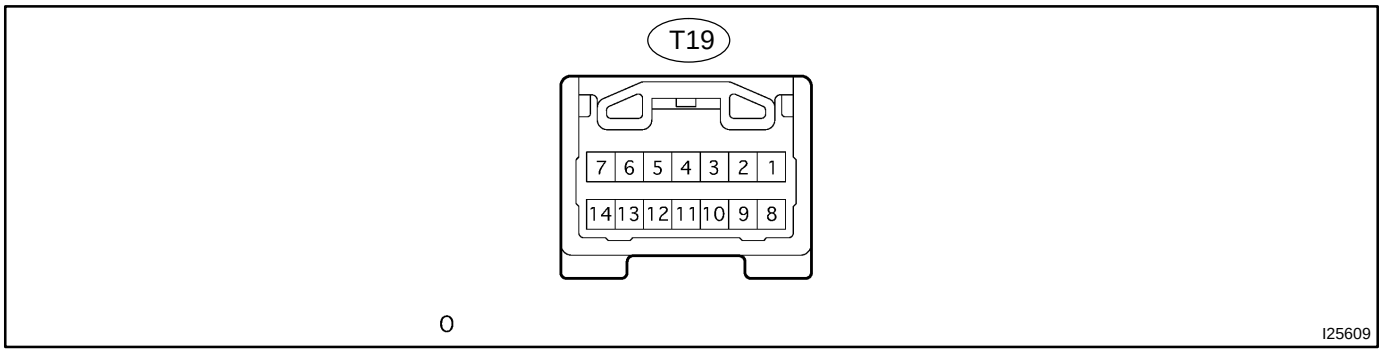
*1 : Check that the key which did not start the engine has been registered and that it is possible to start with other already registered key.

*2 : Finish the automatic registration mode because the mode might still remain.

DIB5W-01

TERMINALS OF ECM

1. TRANSPONDER KEY ECU



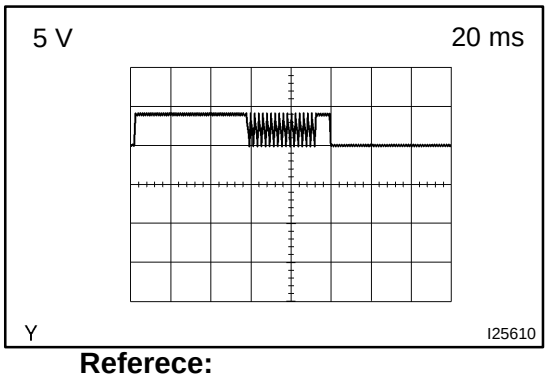
(a) Disconnect the transponder key ECU connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Condition	Specified condition
T19-14 – Body ground (GND – Body ground)	W-B ↔ Body ground	Constant	Continuity
T19-1 – T19-14 (+B – GND)	L-W ↔ W-B	Constant	10 - 14 V
T19-2 – T19-14 (IG – GND)	B-R ↔ W-B	Ignition switch OFF → ON	0 V → 10 - 14 V
T19-10 – T19-14 (KSW – GND)	R-B ↔ W-B	No key in the ignition key cylinder → With key	No Continuity → Continuity
T19-4 – T19-14 (CTY – GND)	R-Y ↔ W-B	Driver's door close → open	No Continuity → Continuity
T19-10 – T19-14 (KSW – GND)	R-B ↔ W-B	No key in the ignition key cylinder → With key	10 - 14 V → 0 V
T19-8 – T19-14 (VC5 – GND)	Y ↔ W-B	Ignition switch OFF → ON	0 V → 5 V
T19-12 – T19-14 (TXCT – GND)	V-G ↔ W-B	Ignition switch OFF → ON	Waveform 1
T19-11 – T19-14 (CODE – GND)	L-B ↔ W-B	Ignition switch OFF → ON	Waveform 2
T19-6 – T19-14 (EFIO – GND)	W ↔ W-B	Ignition switch OFF → ON	Waveform 3
T19-7 – T19-14 (EFII – GND)	Y ↔ W-B	Ignition switch OFF → ON	Waveform 4
T19-3 – T19-14 (IND – GND)	G-R ↔ W-B	Immobiliser system unset → set	0 V → 10 - 14 V ↔ 0 V
T19-4 – T19-14 (CTY – GND)	R-Y ↔ W-B	Driver's door close → open	10 - 14 V → 0 V

(b) Inspection using osilloscope.

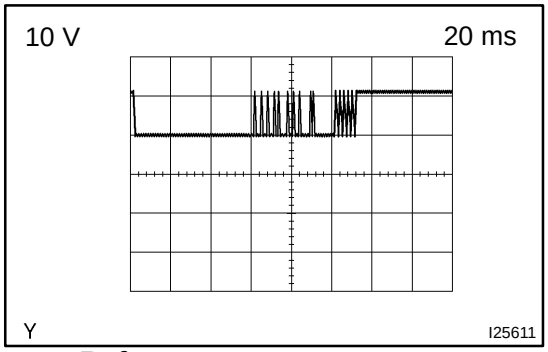
Referece:



(c) Waveform 1

Item	Condition
Terminal	TXCT - GND
Tool setting	5 V/DIV, 20 ms/DIV
Vehicle condition	Ignition switch ON

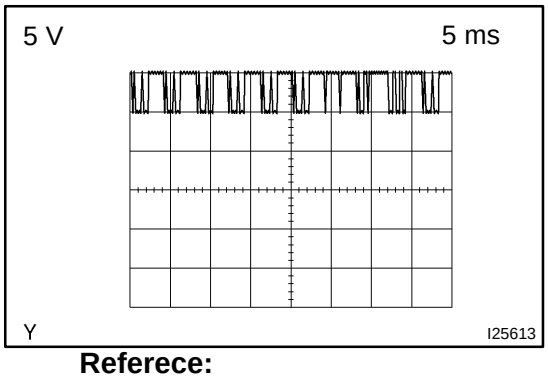
Referece:



(d) Waveform 2

Item	Condition
Terminal	CODE - GND
Tool setting	10 V/DIV, 20 ms/DIV
Vehicle condition	Ignition switch ON

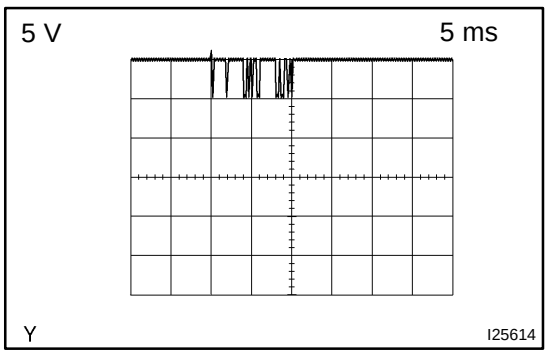
Referece:



(e) Waveform 3

Item	Condition
Terminal	EFIO - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Ignition switch ON

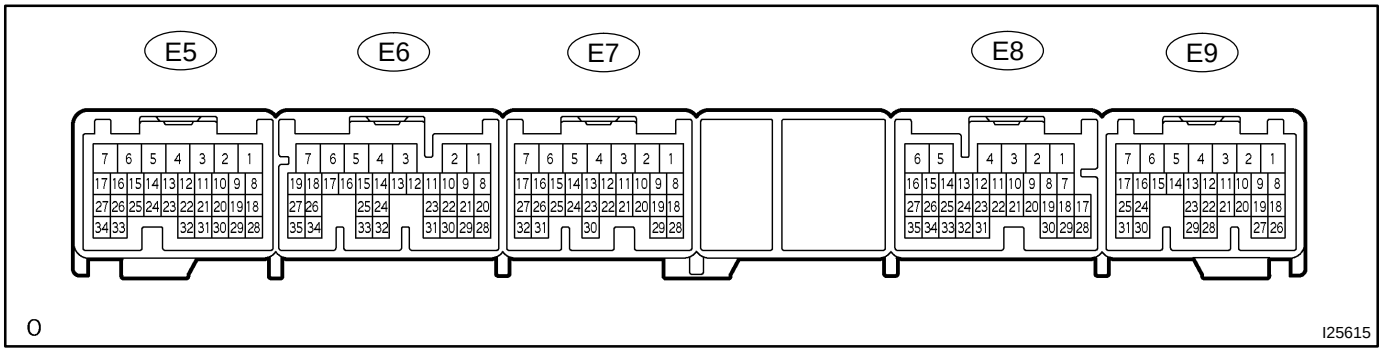
Referece:



(f) Waveform 4

Item	Condition
Terminal	EFII - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Constant

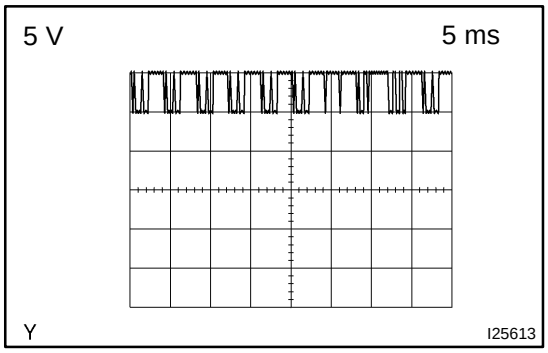
2. ECM



Symbols (Terminal No.)	Wiring Color	Condition	Specified condition
E9-3 ↔ E7-1 (BATT ↔ E1)	B-R ↔ BR	Constant	9 - 14 V
E9-1 ↔ E7-1 (+B ↔ E1)	B-Y ↔ BR	Ignition switch OFF → ON	9 - 14 V
E9-2 ↔ E7-1 (+B2 ↔ E1)	B-Y ↔ BR	Ignition switch OFF → ON	9 - 14 V
E9-9 ↔ E7-1 (IGSW ↔ E1)	B-R ↔ BR	Ignition switch OFF → ON	9 - 14 V
E8-27 ↔ E7-1 (IMI ↔ E1)	W ↔ BR	No key in the ignition key cylinder → With key	Waveform 1
E8-26 ↔ E7-1 (IMO ↔ E1)	Y ↔ BR	No key in the ignition key cylinder → With key	Waveform 2
E7-1 ↔ Body ground (E1 ↔ Body ground)	BR ↔ Body ground	Constant	Continuity

(a) Inspection using osilloscope.

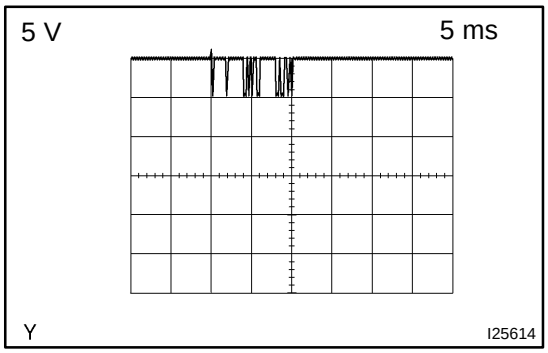
Referece:



(b) Waveform 1

Item	Condition
Terminal	IMI - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Ignition switch ON

Referece:



(c) Waveform 2

Item	Condition
Terminal	IMO - GND
Tool setting	5 V/DIV, 5 ms/DIV
Vehicle condition	Constant

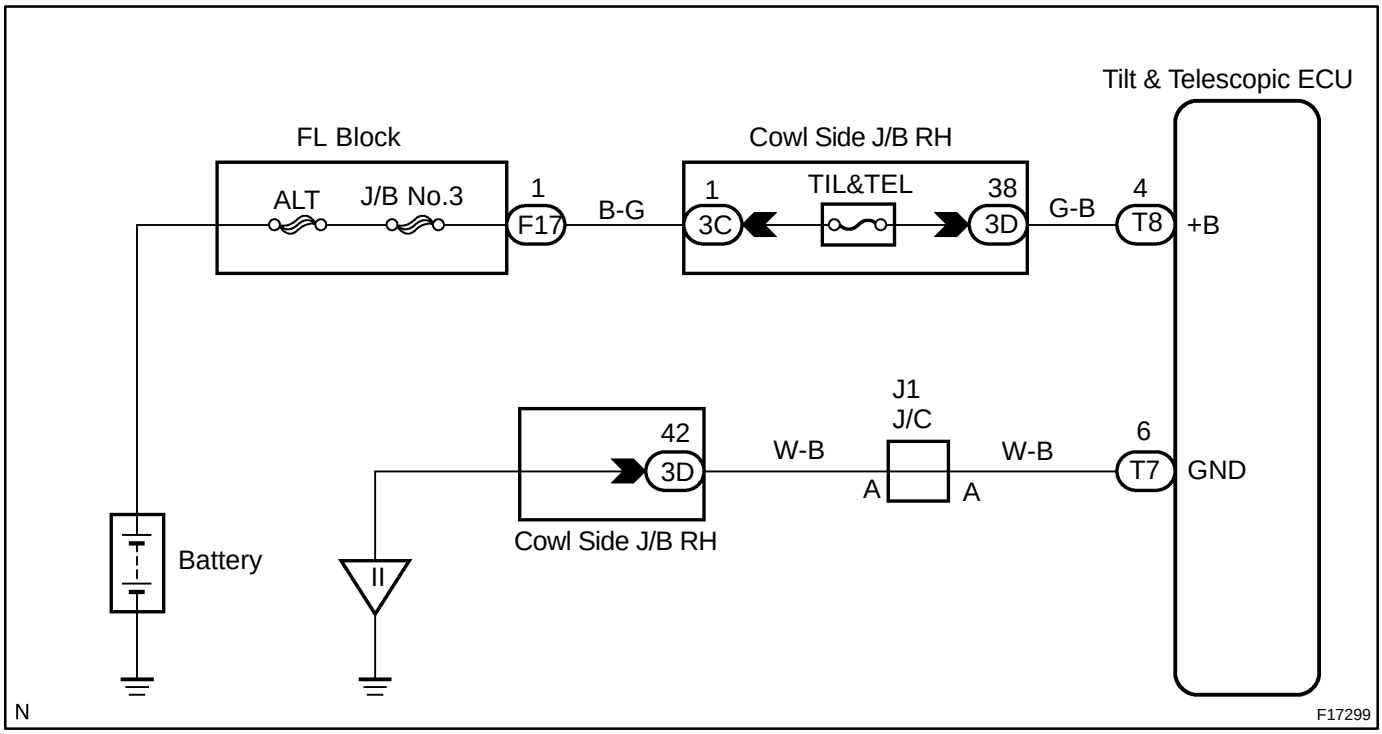
DI23L-17

Actuator Power Source Circuit

CIRCUIT DESCRIPTION

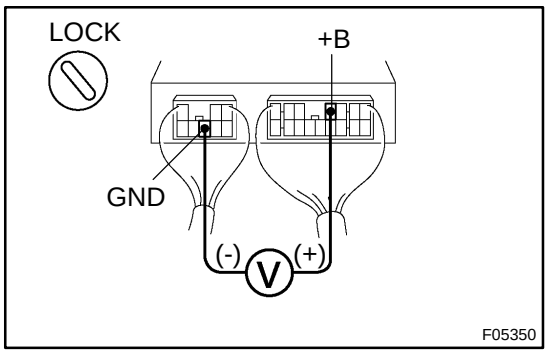
This is the power source for the motors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals +B and GND of ECU connector.



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals +B and GND of ECU connector.

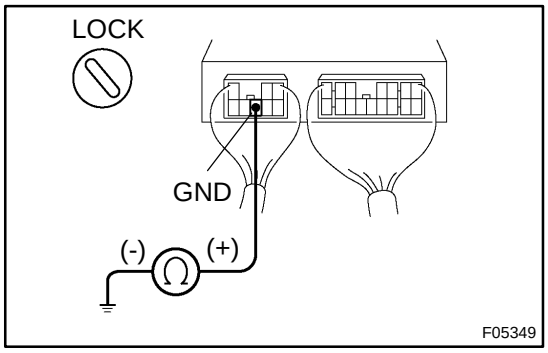
OK:

Voltage: 8 - 16 V

OK	Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

NG

2	Check continuity between terminal GND of ECU connector and body ground.



CHECK:

Measure resistance between terminal GND of ECU connector and body ground.

OK:

Resistance: 1 kΩ or less

NG	Repair or replace harness or connector.

OK

3	**Check POWER fuse.**

PREPARATION:

Remove POWER fuse from passenger side J/B.

CHECK:

Check continuity of POWER fuse.

OK:

Continuity

NG → **Check for short circuit in harness and all components connected to POWER fuse.**

OK

Check for open circuit in harness and connector between ECU and battery (See page IN-36).

DI23F-13

CIRCUIT INSPECTION

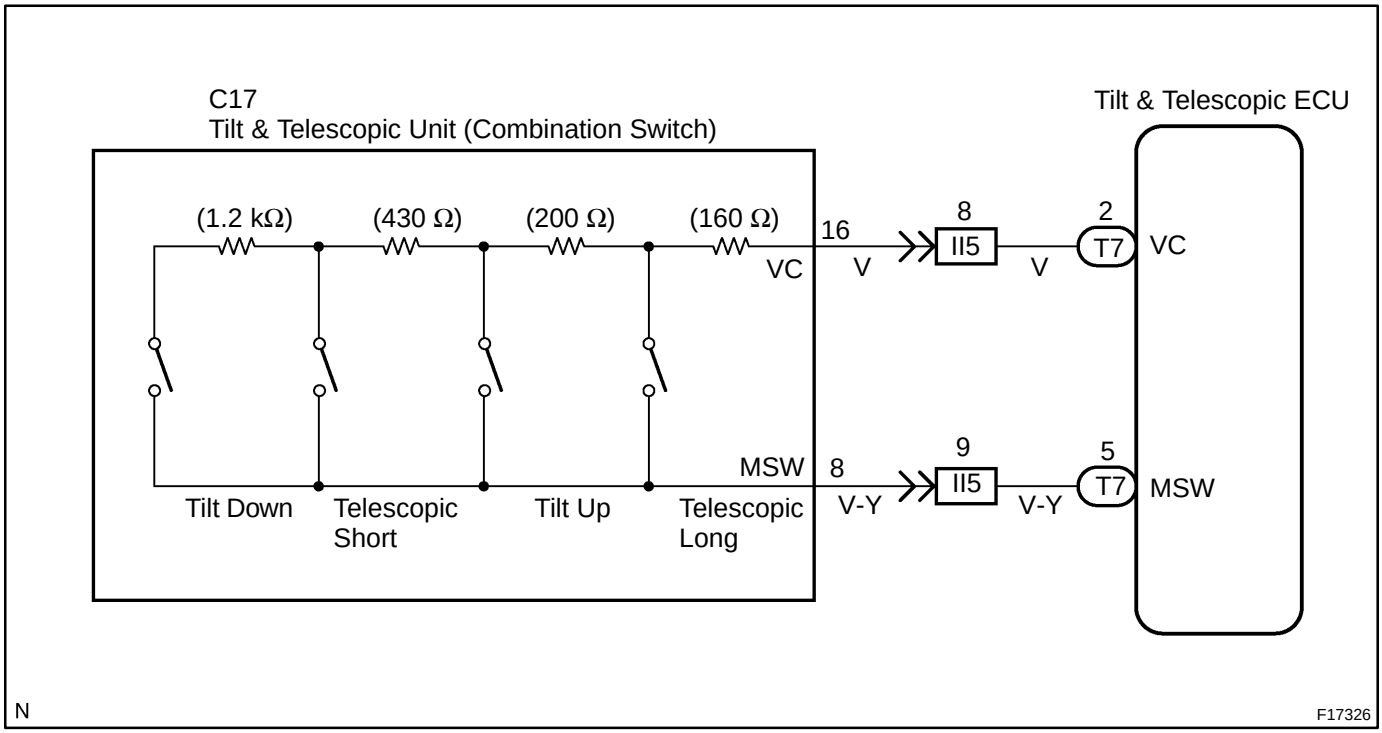
DTC	B2603	Tilt and Telescopic Manual switch circuit Malfunction

CIRCUIT DESCRIPTION

The different voltage value is input to tilt and telescopic ECU by operating the manual switch. Then tilt and telescopic ECU judges which motor and which direction tilt motor or telescopic motor should be moved based on the voltage value.

DTC No.	DTC Detecting Condition	Trouble Area
B2603	The abnormal voltage value which is not within the specification is input to tilt and telescopic ECU when being operated with the manual switch.	★Tilt and telescopic manual switch circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check tilt and telescopic manual switch circuit (See page DI-687).

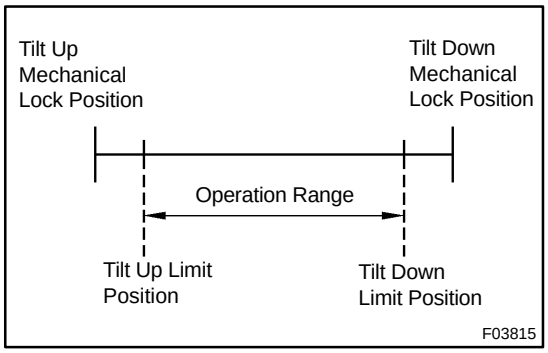
NG → Repair or replace malfunction part.

OK →

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23G-17

DTC	B2610	Tilt Position Sensor or Tilt Motor Circuit Malfunction



CIRCUIT DESCRIPTION

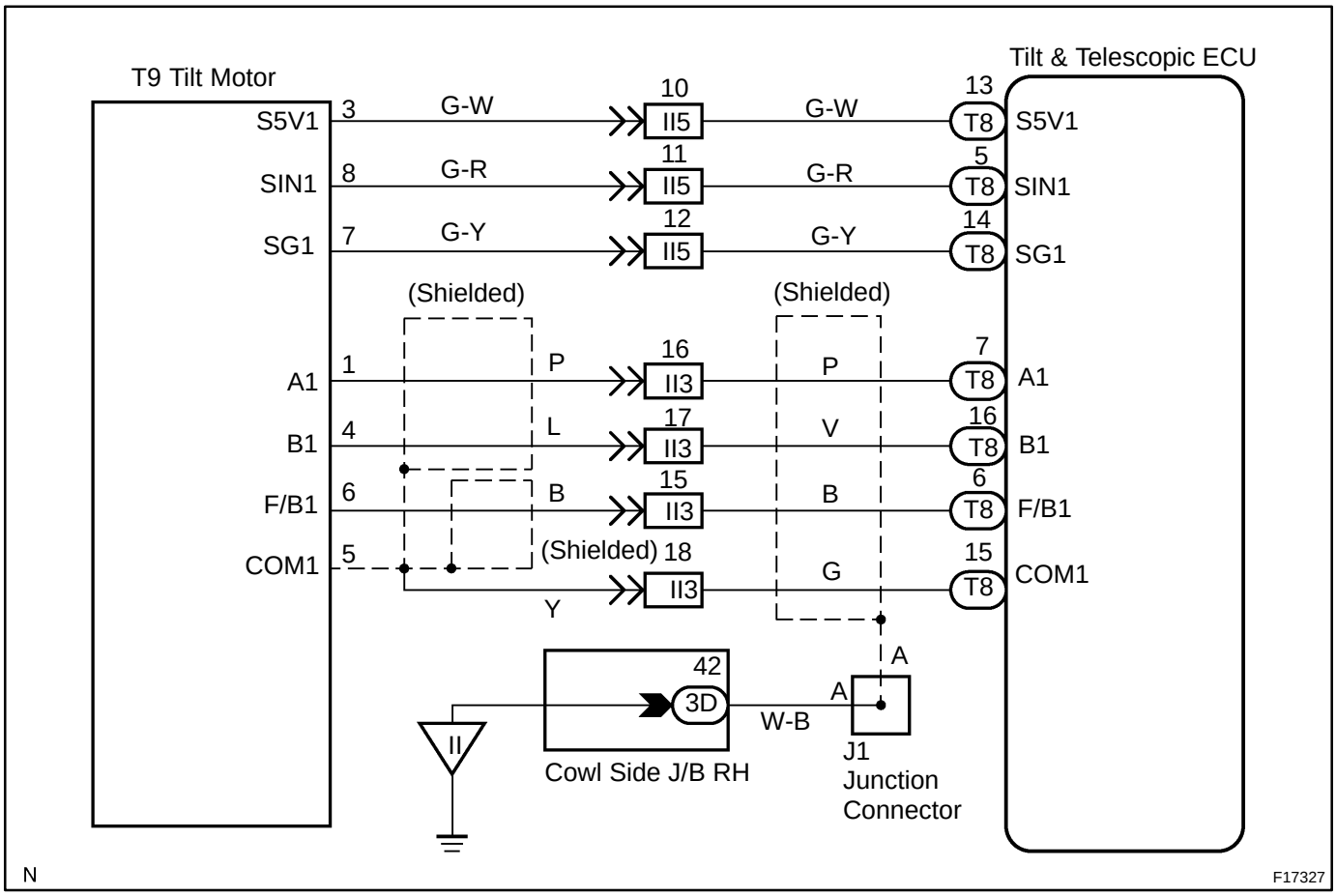
Tilt motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column tilt upward and downward. Tilt position sensor (Hole IC) in the tilt motor detects the tilt of the steering column and outputs the signal to the CPU in response to that tilt.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand-held tester.

DTC No.	DTC Detecting Condition	Trouble Area
B2610	During tilt function operation, tilt operation stops within the operation range.	★Sensor power source circuit ★Actuator power source circuit ★Tilt motor circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check sensor power source circuit (See page DI-679).

NG → Repair or replace malfunction part.

OK

2	Check actuator power source circuit (See page DI-676).

NG → Repair or replace malfunction part.

OK

3	Check tilt motor circuit (See page DI-681).

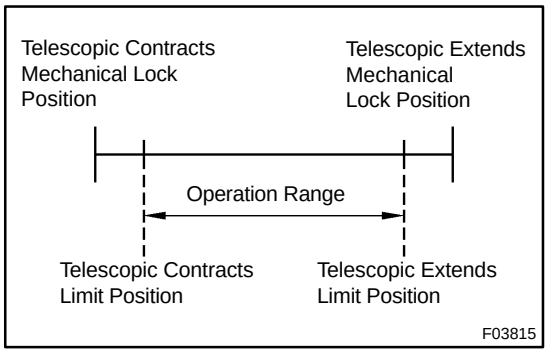
NG → Repair or replace malfunction part.

OK

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23H-17

DTC	B2611	Telescopic Position Sensor or Telescopic Motor Circuit Malfunction



CIRCUIT DESCRIPTION

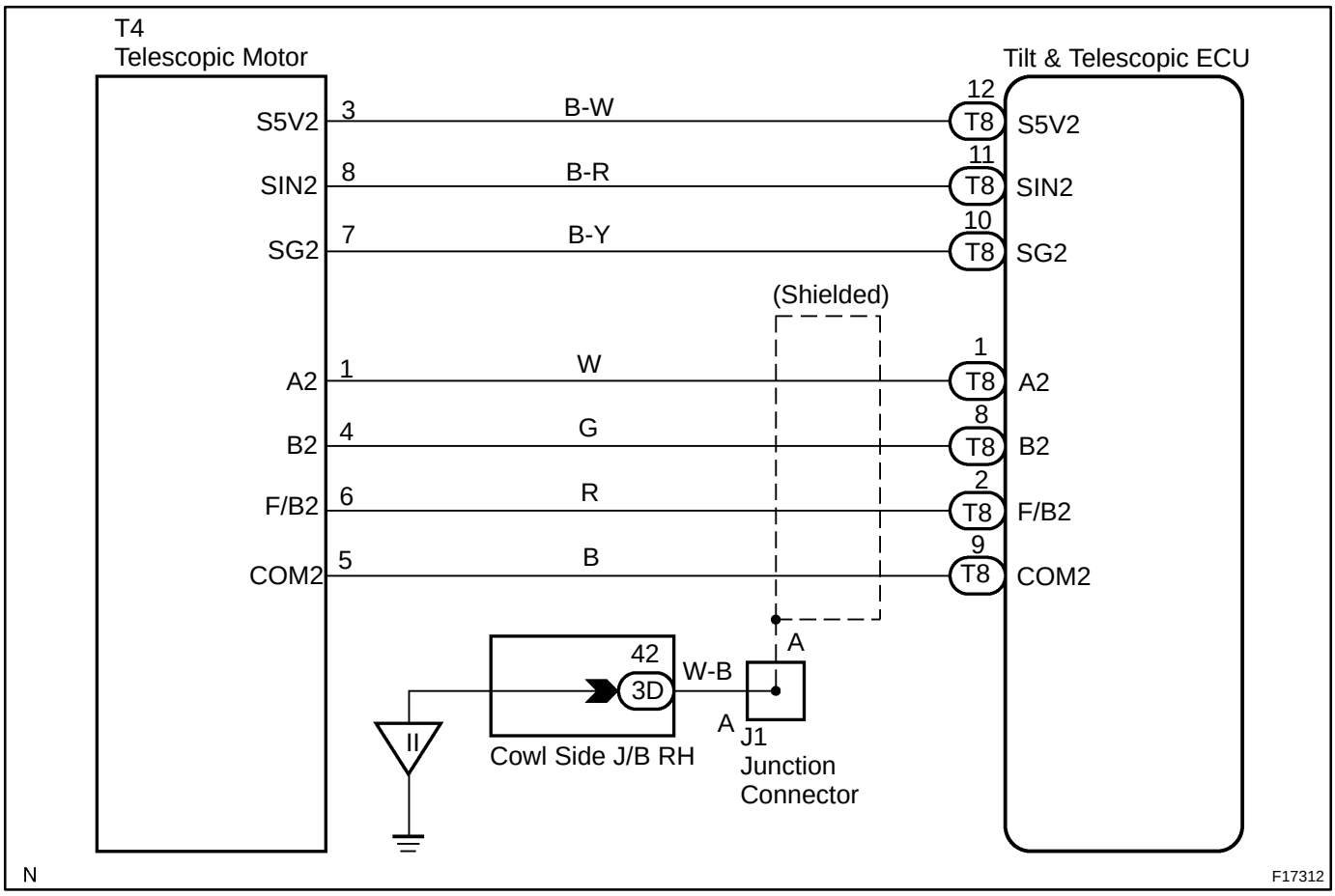
Telescopic motor is operated by the power voltage supplied from tilt and telescopic ECU and makes the steering column slide forward and rearward. Telescopic position sensor (Hole IC) in the telescopic motor detects the sliding position of the forward and rearward direction of the steering column and outputs the signal to the CPU in response to that sliding amount.

HINT:

Limit positions can be confirmed on the screen of the TOYOTA hand-held tester.

DTC No.	DTC Detecting Condition	Trouble Area
B2611	During telescopic function operation, telescopic operation stops within the operation range.	★Sensor power source circuit ★Actuator power source circuit ★Telescopic motor circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check sensor power source circuit (See page DI-679).

NG → Repair or replace malfunction part.

OK

2	Check actuator power source circuit (See page DI-676).

NG → Repair or replace malfunction part.

OK

3	Check telescopic motor circuit (See page DI-684).

NG → Repair or replace malfunction part.

OK

Check and replace the tilt and telescopic ECU (See page IN-36).

DI23I-16

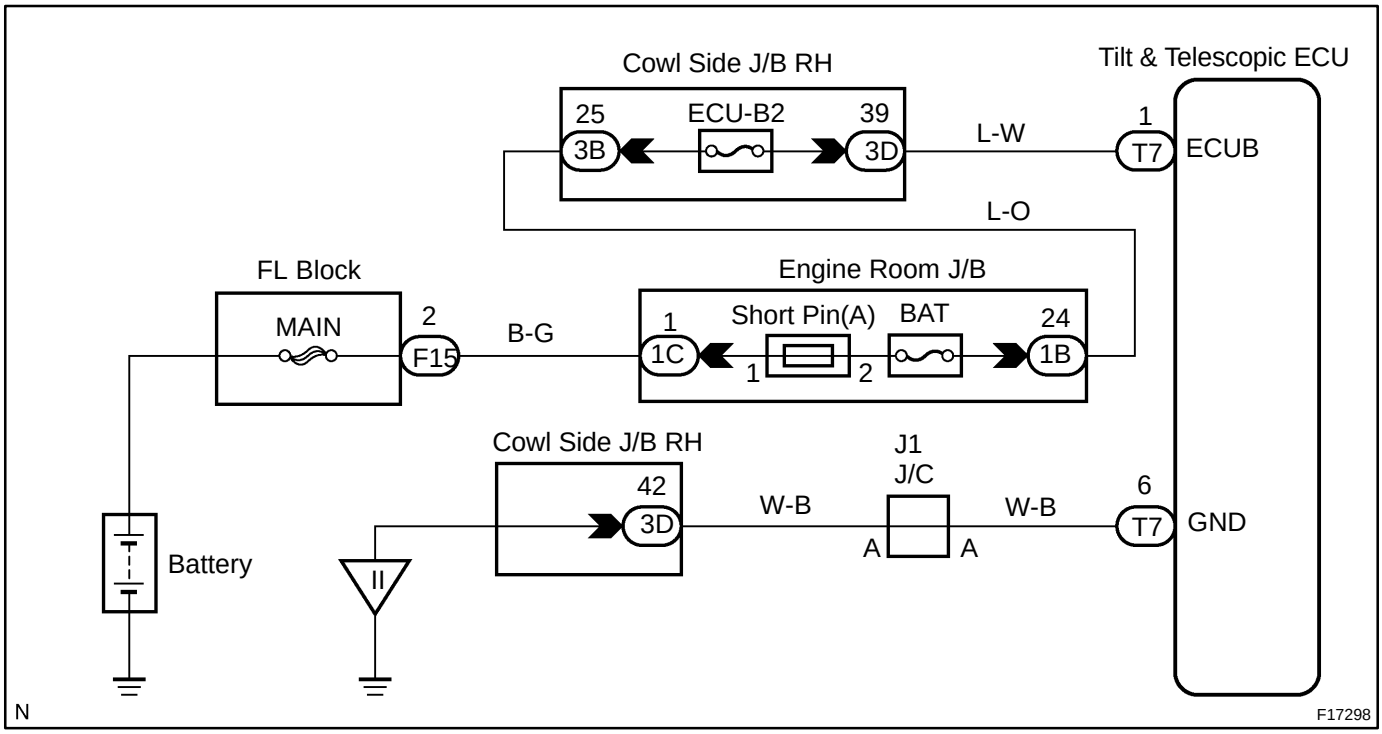
DTC	B2620	ECU Power Source Circuit Malfunction

CIRCUIT DESCRIPTION

ECU power source circuit supply the battery positive voltage to tilt and telescopic ECU.

DTC No.	DTC Detecting Condition	Trouble Area
B2620	The condition that the voltage of the ECU Power Source circuit drop to be 8V or less continues for 10 seconds or more	★Battery ★ECU power source circuit ★Tilt and telescopic ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check that the battery positive voltage is 11V or more when engine is stopped.

NG → Charge or replace battery.

OK ↓

2	Check ECU power source circuit (See page DI-673).

NG → Repair or replace malfunction part.

OK ↓

Check and replace the tilt and telescopic ECU (See page IN-36).

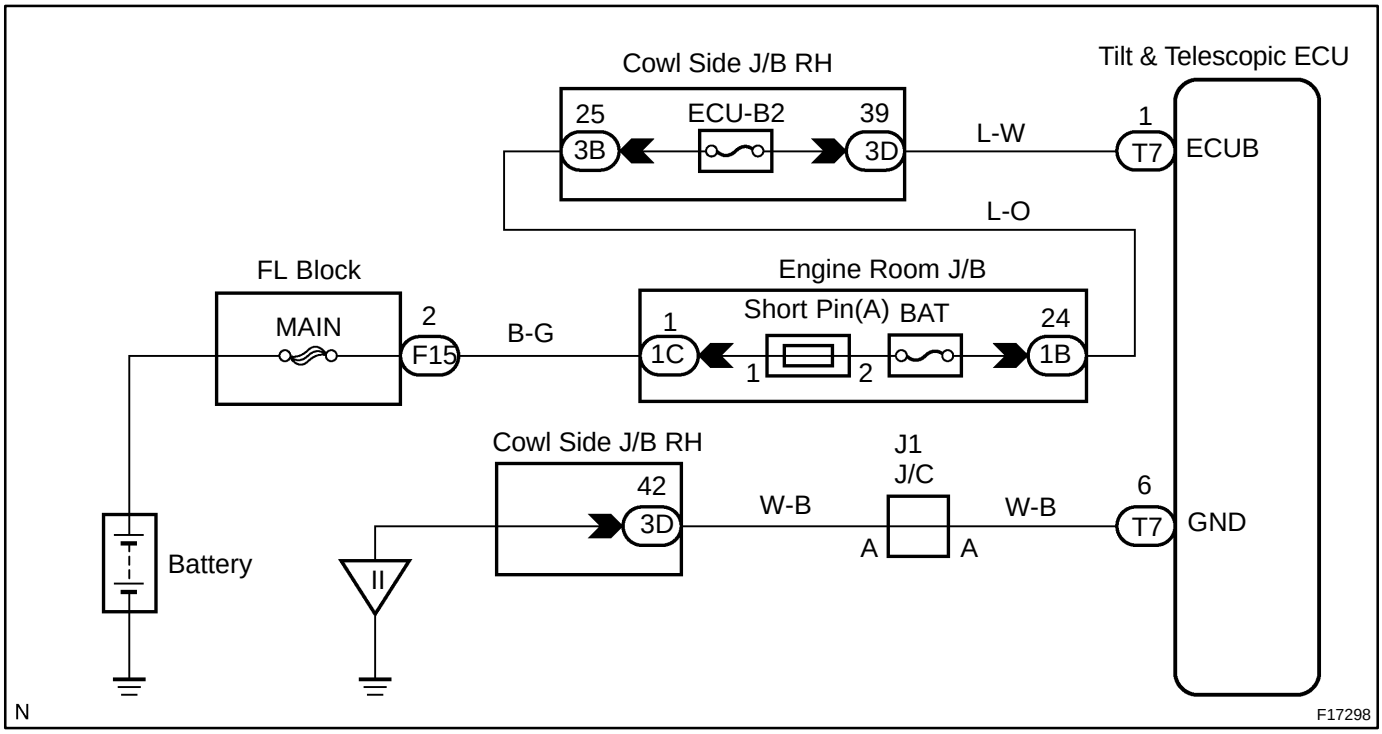
DI23K-16

ECU Power Source Circuit

CIRCUIT DESCRIPTION

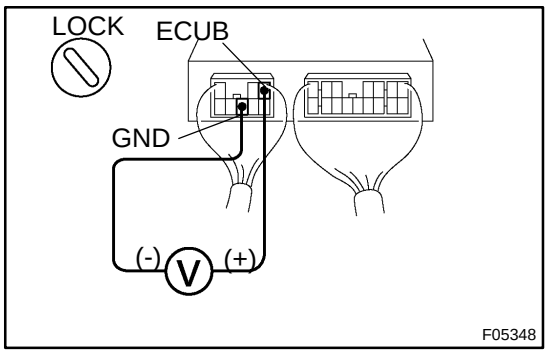
The ECU power source supplies power to the CPU and sensors, etc. power is supplied to the ECU even when the ignition switch is lock position.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals ECUB and GND of ECU connector.**



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals ECUB and GND of ECU connector.

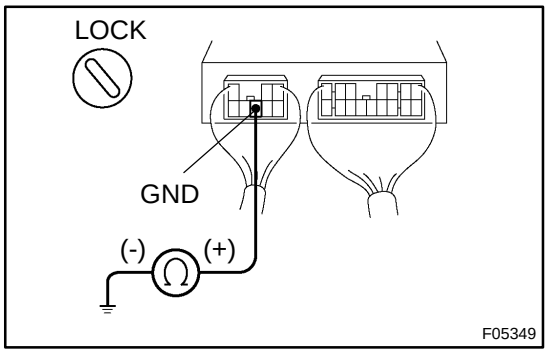
OK:

Voltage: 8 - 16 V

OK	**Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	**Check continuity between terminal GND of ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of ECU connector and body ground.

OK:

Resistance: 1 kΩ or less

NG	**Repair or replace harness or connector.**

OK

3	**Check ECU-B fuse.**

PREPARATION:

Remove ECU-B fuse from engine room R/B.

CHECK:

Check continuity of ECU-B fuse.

OK:

Continuity

NG → **Check for short in harness and all components connected to ECU-B fuse.**

OK

Check for open circuit in harness and connector between ECU and battery (See page IN-36).

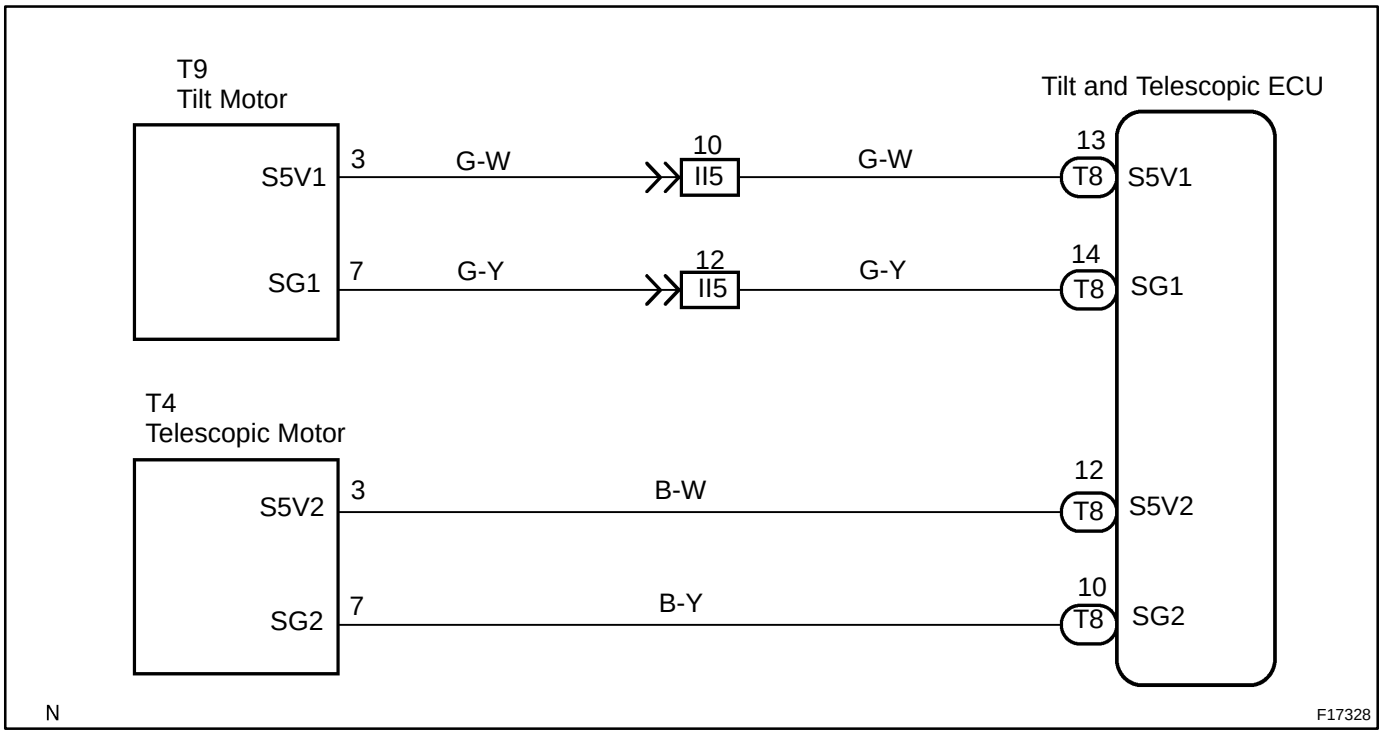
DI1TO-14

Sensor Power Source Circuit

CIRCUIT DESCRIPTION

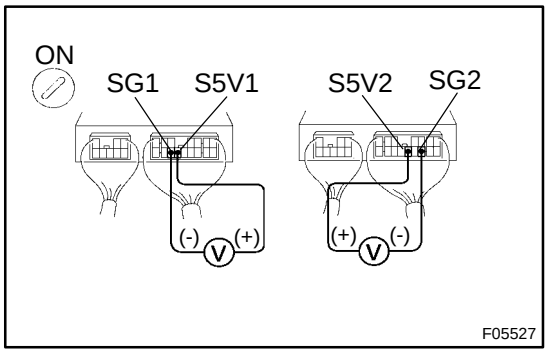
Power to the position sensor is output from ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.

OK:

Voltage: 4.5 - 5.5 V

NG → **Go to step 3.**

OK

2	**Check for open circuit in harness and connector between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

3	**Check for short circuit in harness between terminals S5V1 and SG1, S5V2 and SG2 of ECU connector.**

NG → **Repair or replace harness or connector.**

OK

Check and replace tilt and telescopic ECU (See page IN-36).

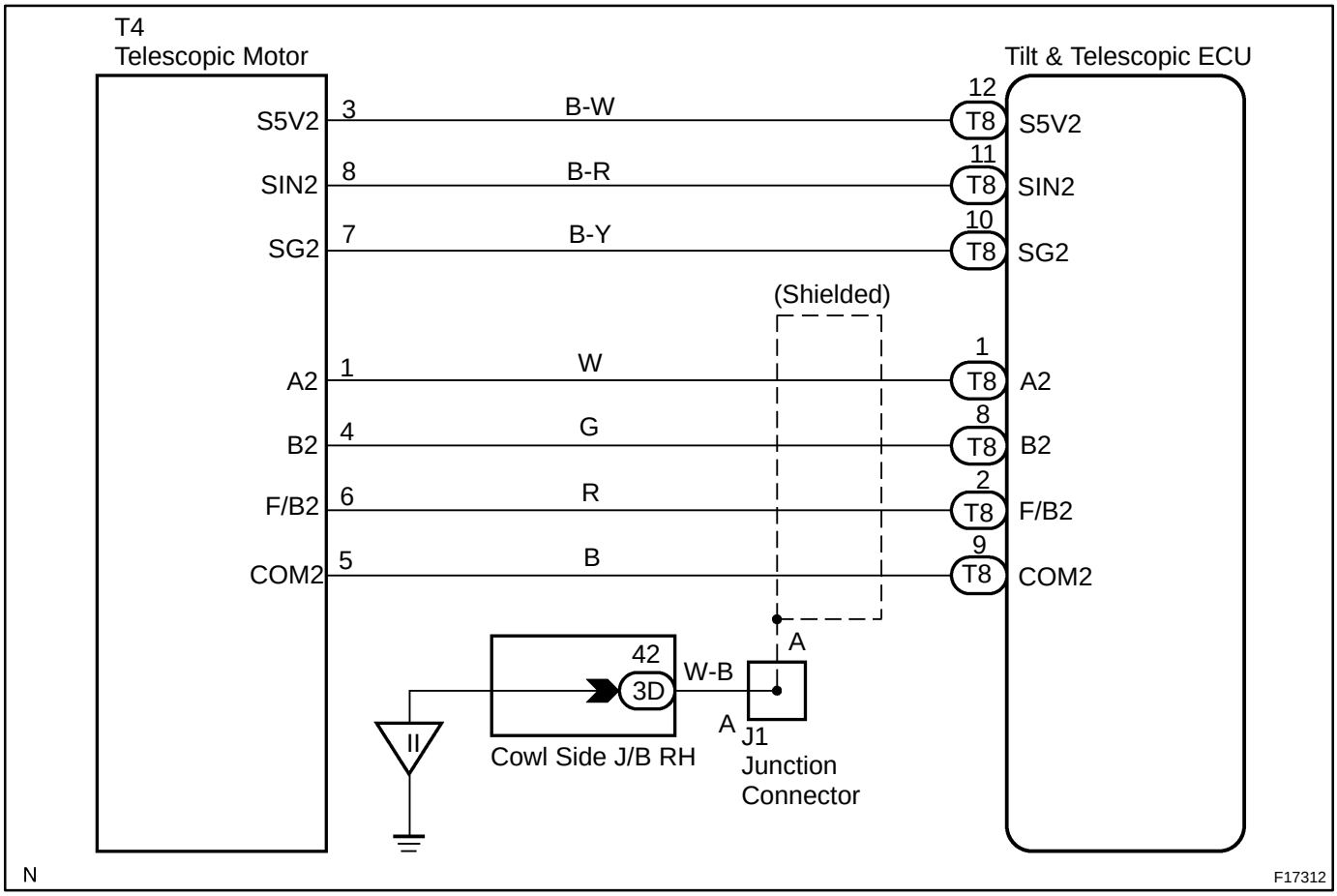
DI23N-17

Telescopic Motor Circuit

CIRCUIT DESCRIPTION

The ECU provides both +B and ground for the telescopic motor.
Reversing polarity of the applied voltage reverses the motor.

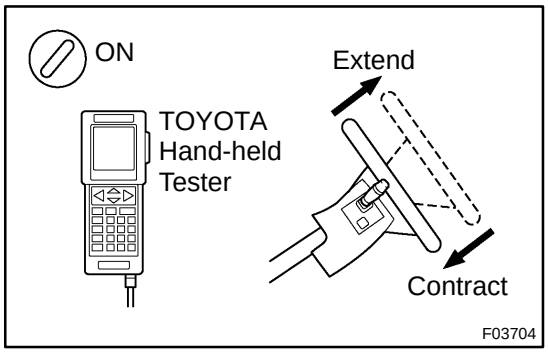
WIRING DIAGRAM



INSPECTION PROCEDURE

In case of using TOYOTA hand-held tester, start inspection from step 1.
In case of not using TOYOTA hand-held tester, start inspection from step 2.

1	**Check telescopic motor operation using TOYOTA hand-held tester.**



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

CHECK:

Check that the steering column length become short (long) and confirm that telescopic position value change when the ACTIVE TEST carried out.

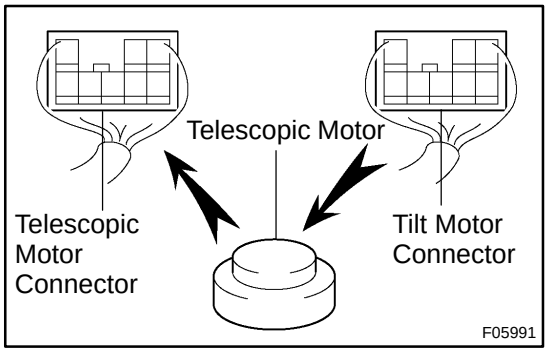
OK:

Steering column length must be short (long).
Telescopic position value must be changed.

OK	**Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	**Check telescopic motor.**



PREPARATION:

(a) Disconnect telescopic motor connector and tilt motor connector.
(b) Remove telescopic motor (See page SR-30).

CHECK:

Connect tilt motor connector to telescopic motor. Then confirm that telescopic motor moved when operating the manual switch.

NG	**Replace telescopic motor.**

OK

3	**Check for open or short circuit in harness and connector between tilt and telescopic ECU and telescopic motor (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

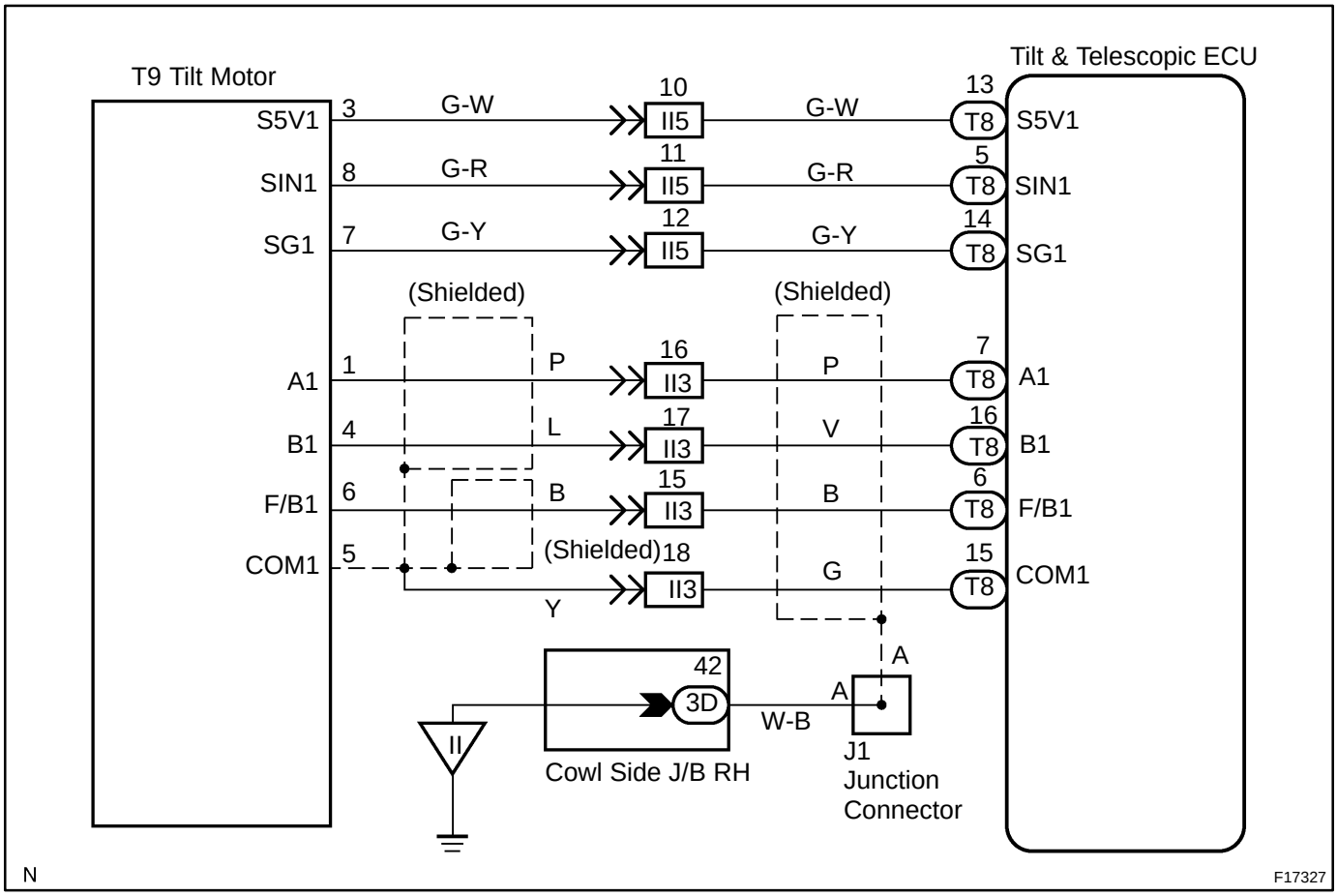
DI23M-18

Tilt Motor Circuit

CIRCUIT DESCRIPTION

The ECU provided both +B and ground for the tilt motor.
Reversing polarity of the applied voltage reverses the motor.

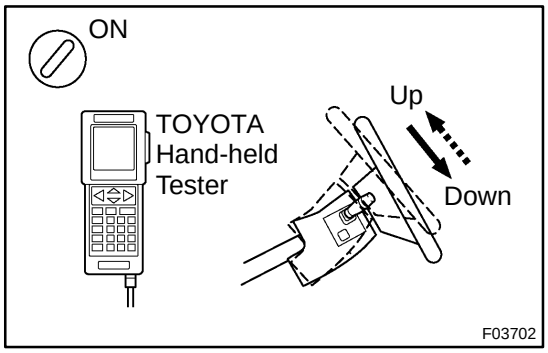
WIRING DIAGRAM



INSPECTION PROCEDURE

In case of using TOYOTA hand-held tester, start inspection from step 1.
In case of not using TOYOTA hand-held tester, start inspection from step 2.

1	**Check tilt motor operation using TOYOTA hand-held tester.**



PREPARATION:

(a) Connect the TOYOTA hand-held tester to the DLC3.
(b) Turn ignition switch ON and push the TOYOTA hand-held tester main switch ON.
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester.

CHECK:

Check that the steering wheel tilt up (down) and confirm that tilt position value change when the ACTIVE TEST carried out.

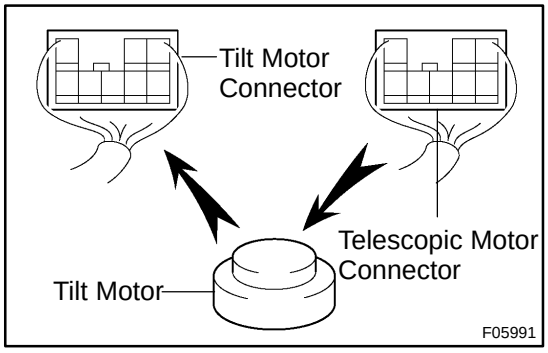
OK:

Steering wheel must be moved upward (downward). Tilt position value must be changed.

OK	**Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

NG

2	**Check tilt motor.**



PREPARATION:

(a) Disconnect tilt motor connector and telescopic motor connector.
(b) Remove tilt motor (See page SR-30).

CHECK:

Connect telescopic motor connector to tilt motor. Then confirm that tilt motor moved when operating the manual switch.

NG	**Replace tilt motor.**

OK

3	**Check for open or short circuit in harness and connector between tilt and telescopic ECU and tilt motor (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

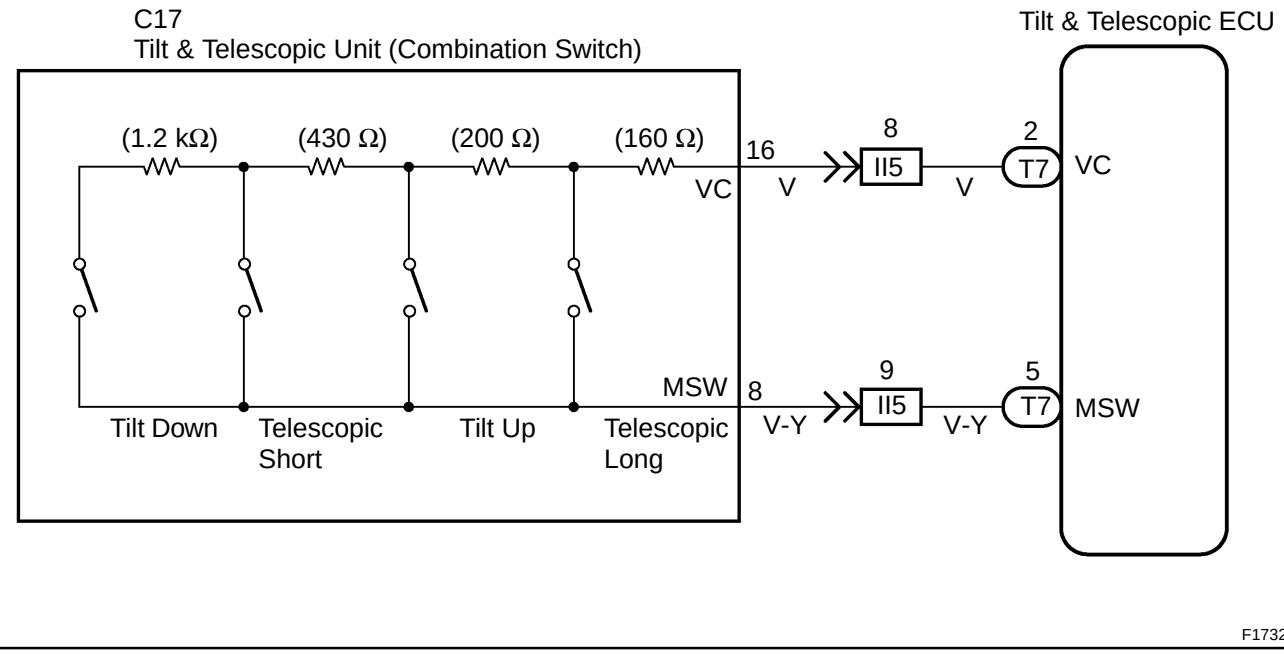
DI23O-13

Tilt and Telescopic Manual Switch Circuit

CIRCUIT DESCRIPTION

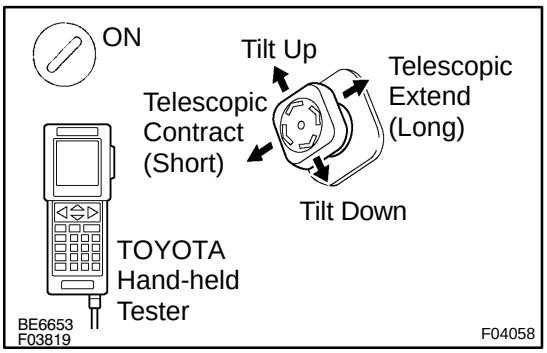
The different voltage signals which are occurred by operating the manual switch are sent to the tilt and telescopic ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check tilt and telescopic manual switch voltage.**



When using TOYOTA hand-held tester

PREPARATION:

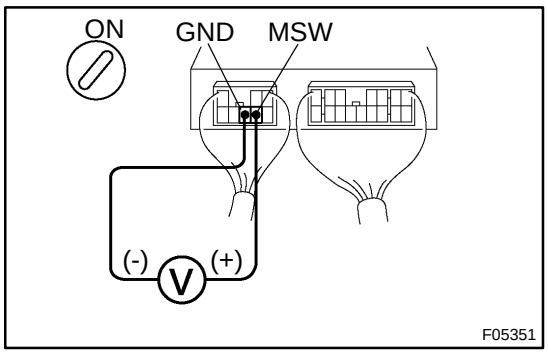
(a) Connect the TOYOTA hand-held tester to the DLC3.

(b) Turn ignition switch ON and push the TOYOTA hand-held tester main switch ON.

(c) Select DATALIST mode on the TOYOTA hand-held tester.

CHECK:

Read the voltages on the tester screen when operating the manual switch.



When not using TOYOTA hand-held tester

PREPARATION:

Remove tilt and telescopic ECU with connector still connected.

CHECK:

Measure voltage between terminals MSW and GND of ECU connector when operating the manual switch.

OK:

Manual switch position	Standard voltage
Neutral position	0.00 – 0.20 V
Tilt up	1.30 – 1.70 V
Tilt down	0.30 – 0.50 V
Telescopic short	0.65 – 0.95 V
Telescopic long	2.05 – 2.75 V

RESULT:

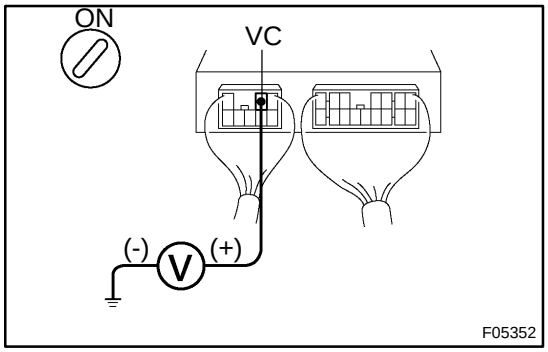
A	Switch voltages in all directions are within the standard.
B	Switch voltage in a certain direction is out of the standard.
C	Switch voltages in all directions are out of the standard.

A → **Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).**

B → **Replace the manual switch.**

C

2	Check voltage between terminal VC of ECU connector and body ground.



PREPARATION:

Remove ECU with connectors still connected.

CHECK:

Measure voltage between terminal VC of ECU and body ground.

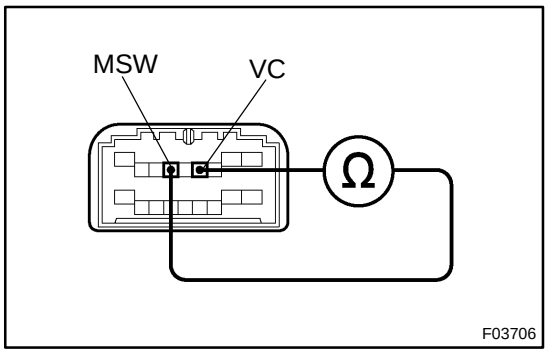
OK:

Voltage: 4.5 - 5.5 V

NG → **Go to step 4.**

OK

3	Check tilt and telescopic manual switch.



PREPARATION:

Disconnect combination switch connector.

CHECK:

Measure resistance between terminals VC and MSW of combination switch connector when operating the manual switch.

OK:

Switch position	Resistance
Tilt up	360 Ω
Tilt down	1,990 Ω
Telescopic short	790 Ω
Telescopic long	160 Ω

NG → **Replace the manual switch.**

OK

4	Check for open or short circuit in harness and connector between tilt and telescopic ECU and manual switch (See page IN-36).

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on the problem symptoms table (See page DI-663).

DI238-03

CUSTOMER PROBLEM ANALYSIS CHECK

POWER TILT AND POWER TELESCOPIC STEERING SYSTEM CHECK SHEET

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

Symptoms	Manual Function does not Operate	☐ Both Tilt and Telescopic ☐ Tilt only ☐ Telescopic only
	Auto Away/Return Function does not Operate	☐ Both Auto Away and Auto Return ☐ Auto Away only ☐ Auto Return only
	☐ Memory Function does not Operate	

DTC Check	1st Time	☐ Normal Code ☐ Malfunction Code (Code)
	2nd Time	☐ Normal Code ☐ Malfunction Code (Code)

DI1T7-11

DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit for that code listed in the table below. For details of each code, turn the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

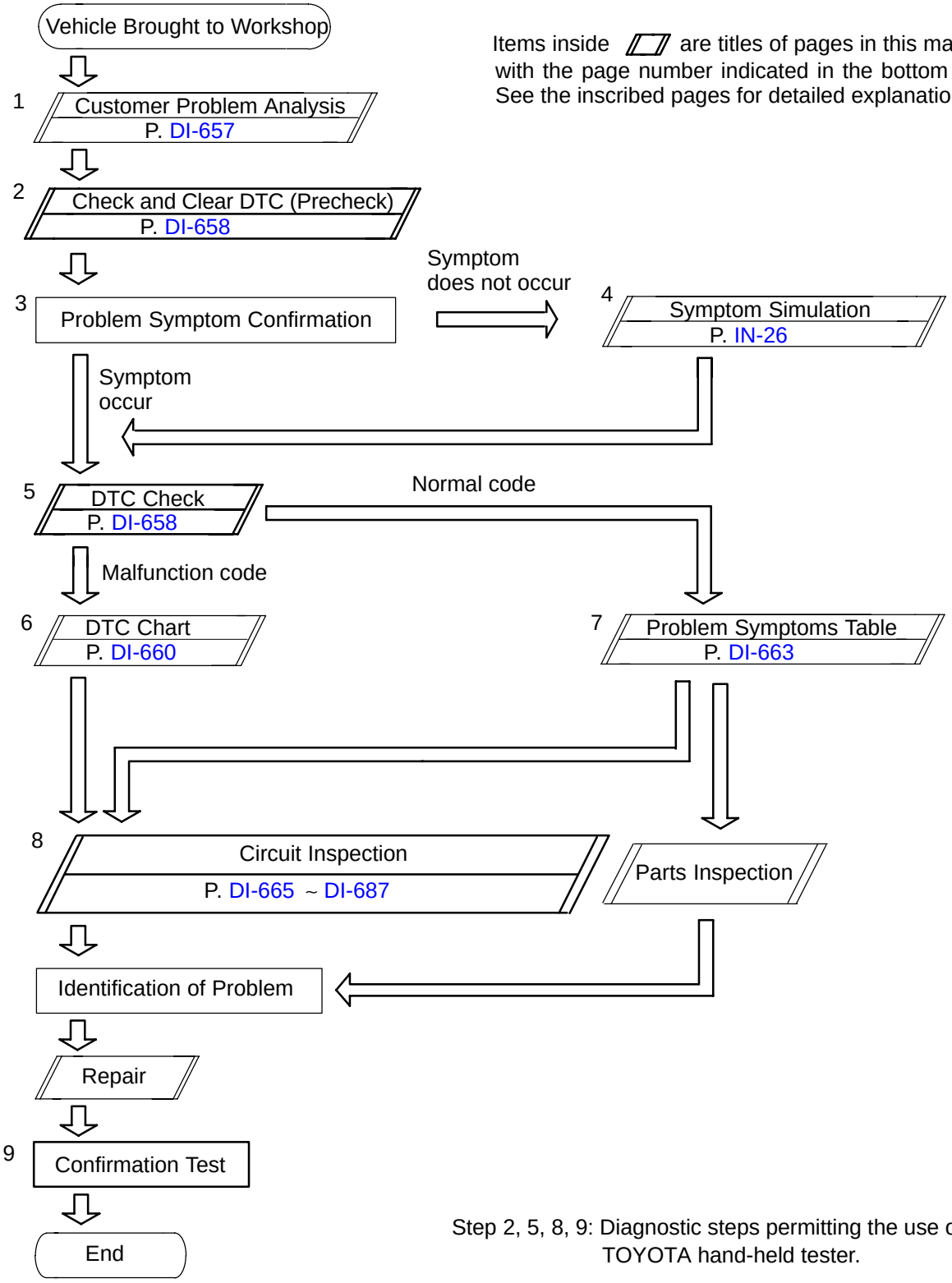
DTC No. (See Page)	Detection Item	Trouble Area
B2603 (DI-665)	Tilt and telescopic manual switch malfunction	★Tilt and telescopic manual switch circuit ★Tilt and telescopic ECU
B2610 (DI-667)	Tilt position sensor or tilt motor malfunction	★Sensor power source circuit ★Actuator power source circuit ★Tilt motor circuit ★Tilt and telescopic ECU
B2611 (DI-669)	Telescopic position sensor or telescopic motor malfunction	★Sensor power source circuit ★Actuator power source circuit ★Telescopic motor circuit ★Tilt and telescopic ECU
B2620 (DI-671)	ECU power source circuit malfunction	★Battery ★ECU power source circuit ★Tilt and telescopic ECU

POWER TILT AND POWER TELESCOPIC STEERING COLUMN

DI237-14

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the following page.

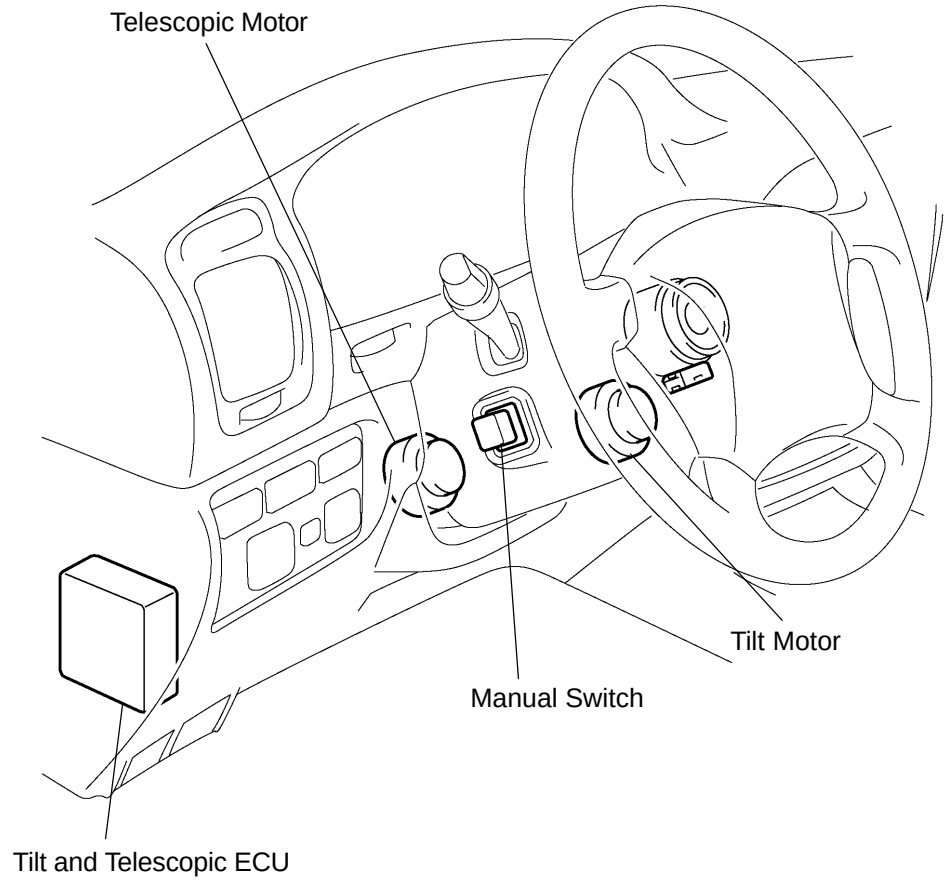


Items inside ▱ are titles of pages in this manual, with the page number indicated in the bottom portion. See the inscribed pages for detailed explanations.

Step 2, 5, 8, 9: Diagnostic steps permitting the use of the TOYOTA hand-held tester.

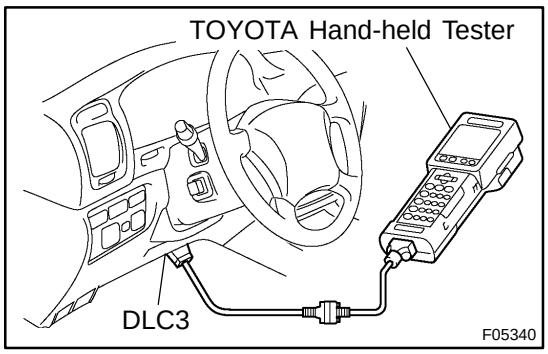
DI23B-11

PARTS LOCATION



F05526

DI239-15



PRE-CHECK

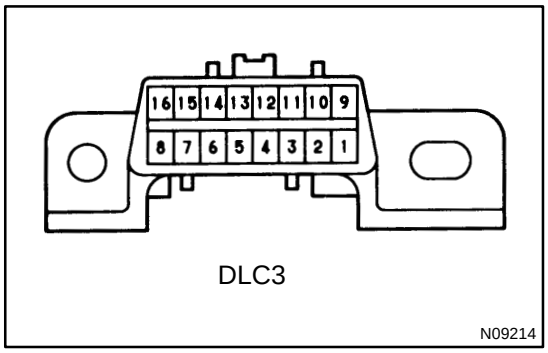
1. DESCRIPTION

(a) DIAGNOSIS SYSTEM

When troubleshooting Multiplex OBD (M-OBD) vehicles, the only difference from the usual troubleshooting procedure is that you connect the TOYOTA hand-held tester to vehicle, and read off various data output from the vehicle's Power Tilt and Telescopic Steering ECU.

The Power Tilt and Telescopic Steering ECU records the applicable DTCs when the computer detects a malfunction in the computer itself or its circuit.

To check the DTCs, connect a TOYOTA hand-held tester to DLC3 on the vehicle. The TOYOTA hand-held tester enables you to erase the DTCs and activate the several actuators and check freeze frame data and various forms on steering data.



(b) DATA LINK CONNECTOR 3 (DLC3)

The Power Tilt and Telescopic Steering ECU uses ISO 14230 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 14230 format.

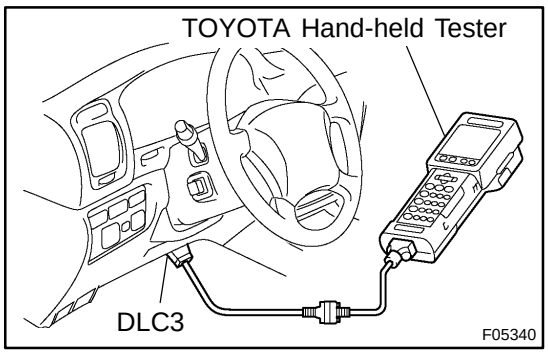
Terminal No.	Connection	Voltage or Resistance	Condition
7	Bus + Line	Pulse generation	During transmission
4	Chassis Ground	↔ Body Ground 1 Ω or less	Always
5	Signal Ground	↔ Body Ground 1 Ω or less	Always
16	Battery Positive	↔ Body Ground 9 - 14 V	Always

HINT:

If your display shows "UNABLE TO CONNECT TO VEHICLE" when you have connected the cable of TOYOTA hand-held tester to DLC3, turned the ignition switch ON and operated the TOYOTA hand-held tester, there is a problem on the vehicle side or tester side.

★ If communication is normal when the tester is connected to another vehicle, inspect 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, so consult the Service Department listed in the tester's Operator's Manual.



2. DIAGNOSIS INSPECTION

(a) Check the DTC.

(1) Prepare the TOYOTA hand-held tester.

(2) Connect the TOYOTA hand-held tester to DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and turn the TOYOTA hand-held tester switch ON.

(4) Use the TOYOTA hand-held tester to check the DTCs and freeze frame data, note or print them (See the Operator's Manual for operating instructions.).

(5) See page DI-660 to confirm the details of the DTC.

(b) Clear the DTC.

The following actions will erase the DTC and freeze frame data.

★ When using the TOYOTA hand-held tester: Operating the TOYOTA hand-held tester to erase the DTCs (See the Operator's Manual for operating instructions.).

★ When not using the TOYOTA hand-held tester: Disconnecting the battery terminals.

DI23D-13

PROBLEM SYMPTOMS TABLE

This system uses the multiplex communication system, so check diagnosis system of the multiplex communication system before you proceed with troubleshooting.

The table below will be useful for you in troubleshooting these electrical systems. The most likely causes of the malfunction are shown in the order of their probability. Inspect each part in the order shown, and replace the part when it is found to be faulty.

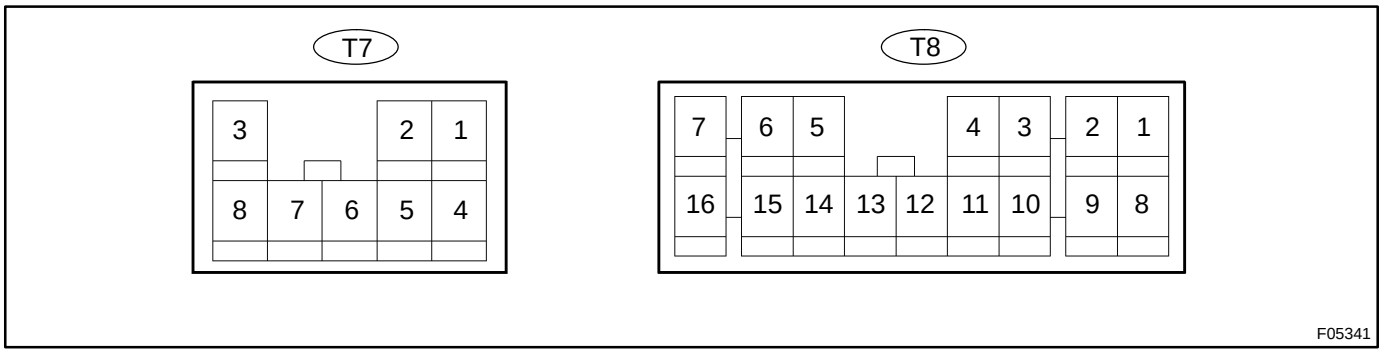
- If the instruction "Proceed to next circuit inspection shown on the chart" is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.
- If the problem still occurs even though there are no abnormalities in any of the other circuits, then check and replace ECU.

Symptom	Suspect Area	See page
Both tilt and telescopic: Manual, auto away/return and memory functions □Do not operate □Stop part way □Do not stop	1. Multiplex communication system 2. ECU power source circuit 3. Key unlock warning switch 4. Body ECU 5. Actuator power source circuit 6. Sensor power source circuit 7. Tilt motor circuit 8. Telescopic motor circuit 9. Tilt and telescopic ECU	- DI-673 BE-29 DI-1038 DI-676 DI-679 DI-681 DI-684 IN-36
Tilt only: Manual, auto away/return and memory functions □Do not operate □Stop part way □Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Tilt motor circuit 4. Tilt and telescopic ECU	- DI-679 DI-681 IN-36
Telescopic only: Manual, auto away/return and memory functions □Do not operate □Stop part way □Do not stop	1. Multiplex communication system 2. Sensor power source circuit 3. Telescopic motor circuit 4. Tilt and telescopic ECU	- DI-679 DI-684 IN-36
Both tilt and telescopic: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt motor circuit 4. Telescopic motor circuit 5. Tilt and telescopic ECU	- DI-687 DI-681 DI-684 IN-36
Tilt only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Tilt motor circuit 4. Tilt and telescopic ECU	- DI-687 DI-681 IN-36
Telescopic only: Only tilt and telescopic manual switch function does not operate	1. Multiplex communication system 2. Tilt and telescopic manual switch circuit 3. Telescopic motor circuit 4. Tilt and telescopic ECU	- DI-687 DI-684 IN-36

Symptom	Suspect Area	See page
Both away and return: Only auto away/return function does not operate	1. Check status of auto away function using TOYOTA hand-held tester 2. Multiplex communication system 3. Ignition switch 4. Key unlock warning switch 5. Tilt motor circuit 6. Telescopic motor circuit 7. Tilt and telescopic ECU	- - BE-29 BE-29 DI-681 DI-684 IN-36
Only away: Only Auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt motor circuit 5. Telescopic motor circuit 6. Tilt and telescopic ECU	- BE-29 BE-29 DI-681 DI-684 IN-36
Only return: Only auto away/return function does not operate	1. Multiplex communication system 2. Key unlock warning switch 3. Ignition switch 4. Tilt motor circuit 5. Telescopic motor circuit 6. Tilt and telescopic ECU	- BE-29 BE-29 DI-681 DI-684 IN-36

DI23C-14

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
IG (T7-4) - GND (T7-6)	B-W - W-B	IG switch ON	10 - 14 (DC)
		IG switch LOCK	Below 1 (DC)
VC (T7-2) - GND (T7-6)	V - W-B	Always	4.5 - 5.5 (DC)
GND (T7-6) - Body Ground	W-B - Body Ground	Always	Below 1 (DC)
ECUB (T7-1) - Body Ground	L-W - Body Ground	Always	10 - 14 (DC)
ECUB (T7-1) - GND (T7-6)	L-W - W-B	Always	10 - 14 (DC)
MSW (T7-5) - GND (T7-6)	V-Y - W-B	Tilt up by manual switch	1.30 - 1.70 (DC)
		Tilt down by manual switch	0.30 - 0.50 (DC)
		Telescopic extended by manual switch	2.05 - 2.75 (DC)
		Telescopic contracted by manual switch	0.65 - 0.95 (DC)
		Manual switch is not operating	Below 0.20 (DC)
+B (T8-4) - GND (T7-6)	G-B - W-B	Always	10 - 14 (DC)
S5V1 (T8-13) - SG1 (T8-14)	G-W - G-Y	IG switch ON	4.5 - 5.5 (DC)
S5V2 (T8-12) - SG2 (T8-10)	B-W - B-Y	IG switch ON	4.5 - 5.5 (DC)
A1 (T8-7) - COM1 (T8-15)	P - G	IG switch ON, tilt up or down by manual switch	190 - 230 (AC)
B1 (T8-16) - COM1 (T8-15)	V - G	IG switch ON, tilt up or down by manual switch	190 - 230 (AC)
A2 (T8-1) - COM2 (T8-9)	W - B	IG switch ON, telescopic extend or contracted by manual switch	190 - 230 (AC)
B2 (T8-8) - COM2 (T8-9)	G - B	IG switch ON, telescopic extend or contracted by manual switch	190 - 230 (AC)

DI3IY-09

CIRCUIT INSPECTION

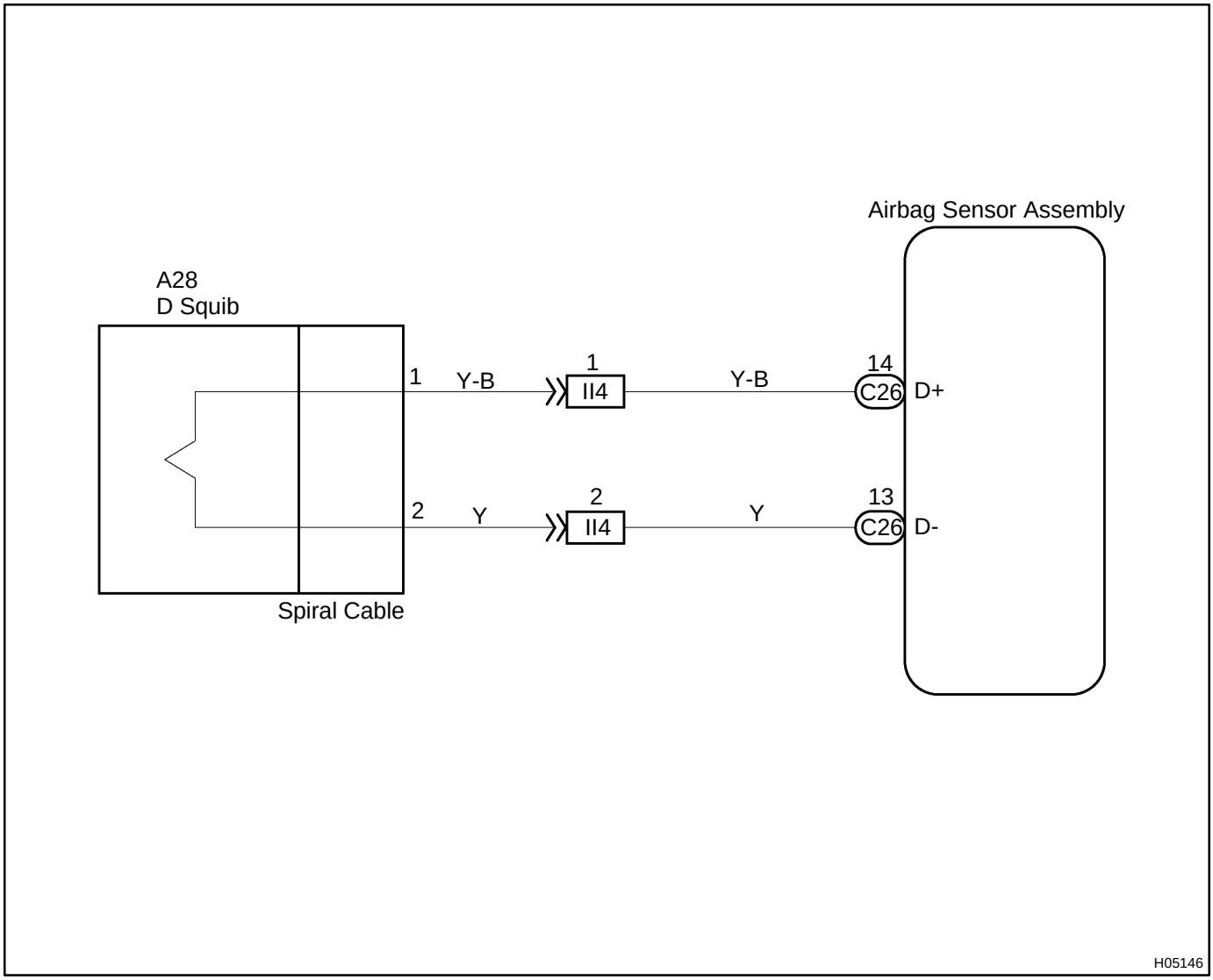
DTC	B0100/13	Short in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0100/13 is recorded when a short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0100/13	★Short in D squib circuit ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check connector.**

CHECK:

Make sure that the orange spiral cable connector is not damaged.

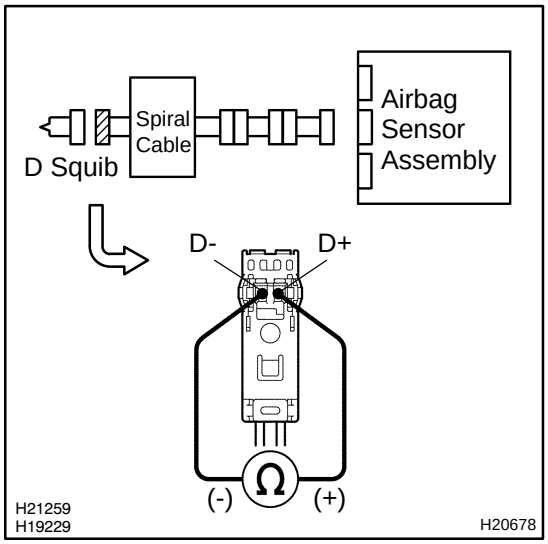
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable.**

OK

3	**Check D squib circuit.**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector on the airbag sensor assembly side between the steering wheel pad (D squib) and the airbag sensor assembly (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

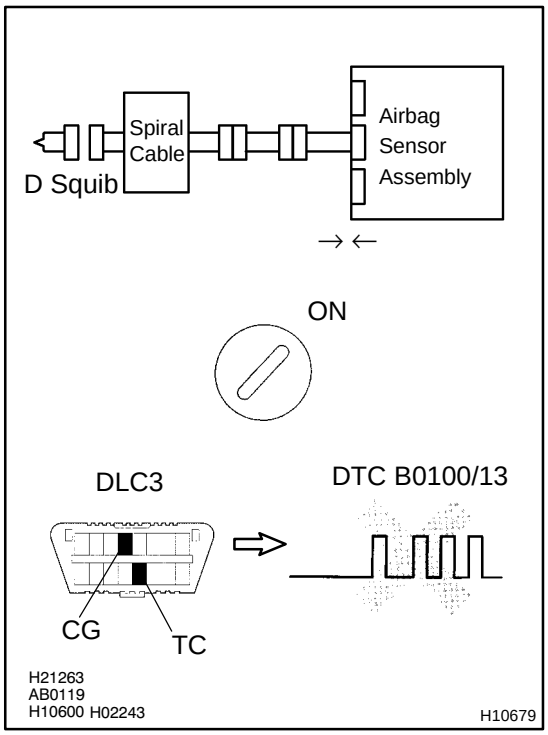
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 6.**

OK

4	**Check airbag sensor assembly.**



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0100/13 is not output.

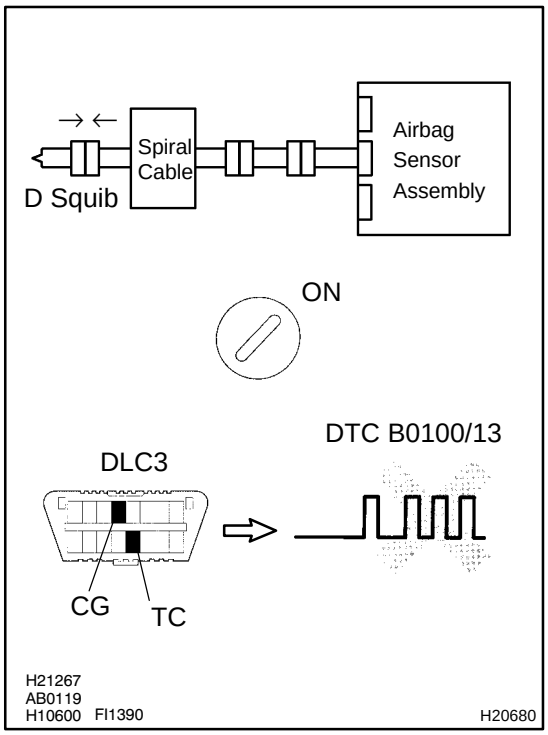
HINT:

Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

5	Check D squib.



PREPARATION:

(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 steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0100/13 is not output.

HINT:

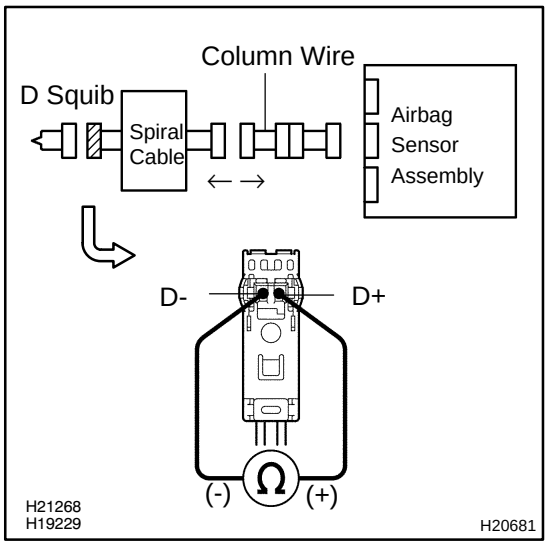
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

6	Check spiral cable.



PREPARATION:

(a) Disconnect the spiral cable connector from the column wire.

(b) Release the airbag activation prevention mechanism built in the connector of the spiral cable on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the orange spiral cable connector on the steering wheel pad (D squib) side.

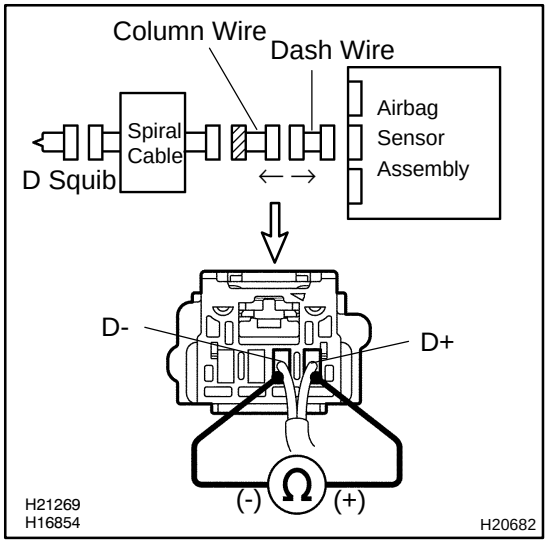
OK:

Resistance: 1 MΩ or Higher

NG	Replace spiral cable.

OK

7	Check column wire.



PREPARATION:

(a) Disconnect the column wire connector from the dash wire.

(b) Release the airbag activation prevention mechanism built in the connector of the column wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the column wire connector on the spiral cable side.

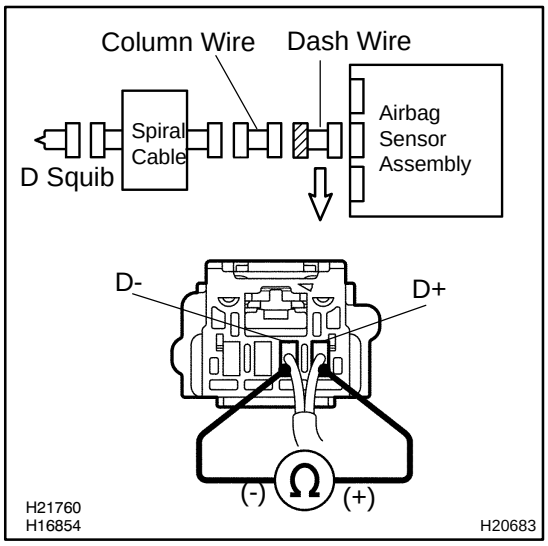
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace column wire.

OK

8	Check dash wire.



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D+ and D- of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI3IZ-04

DTC	B0101/14	Open in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0101/14 is recorded when an open is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0101/14	★Open in D squib circuit ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

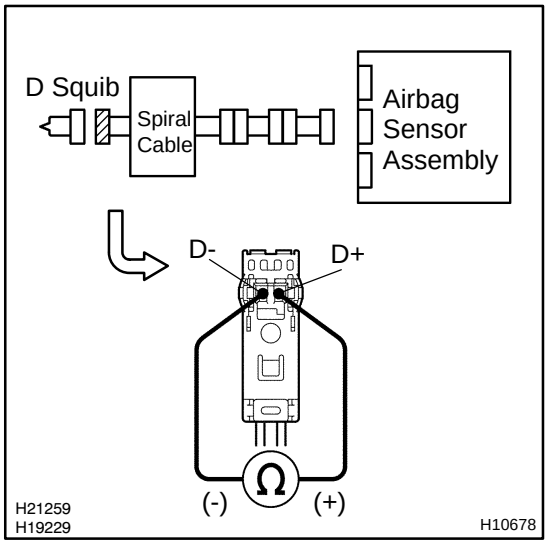
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib circuit.

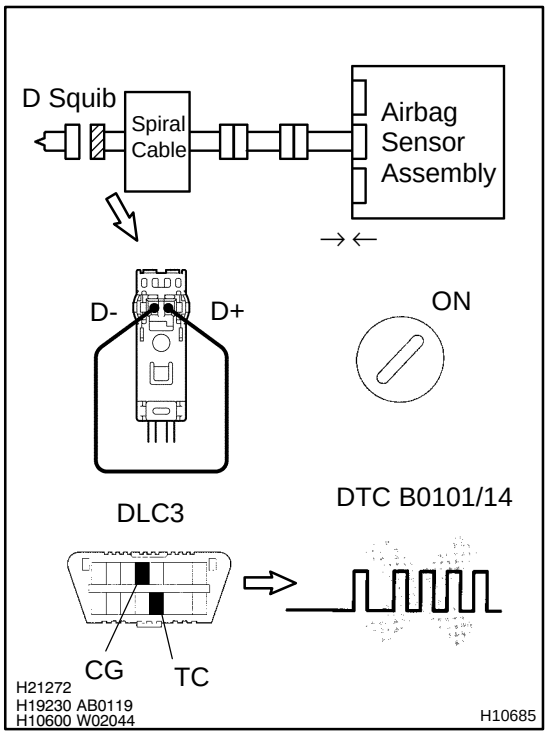


CHECK:
Measure the resistance between D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
OK:
Resistance: Below 1 Ω

NG → **Go to step 5.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0101/14 is not output.

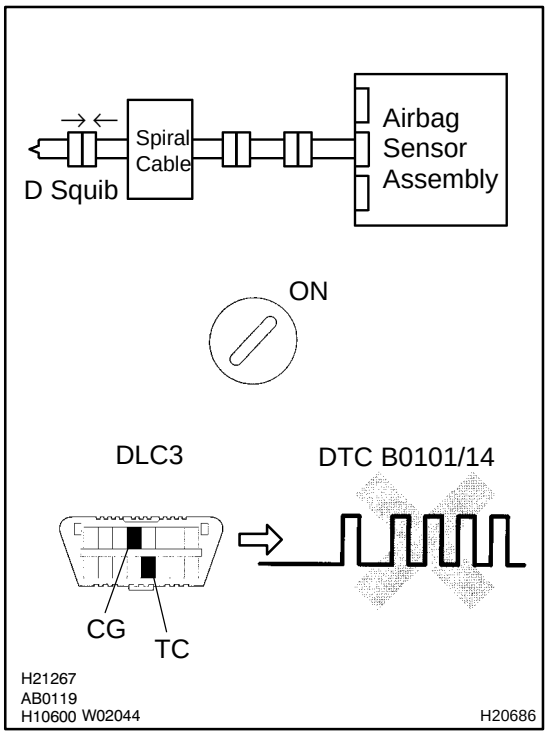
HINT:

Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib.



PREPARATION:

(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 steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0101/14 is not output.

HINT:

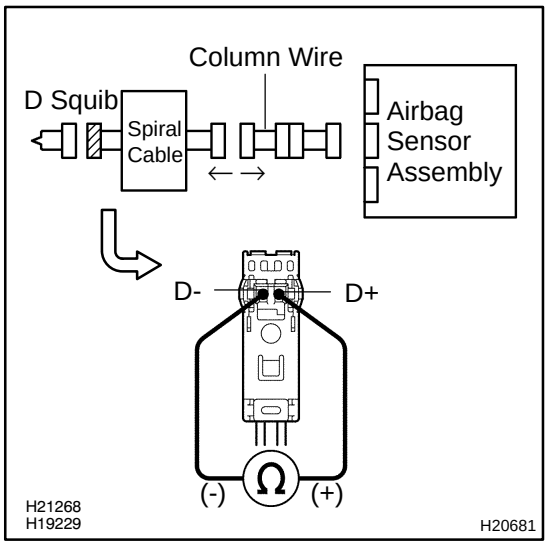
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	Check spiral cable.

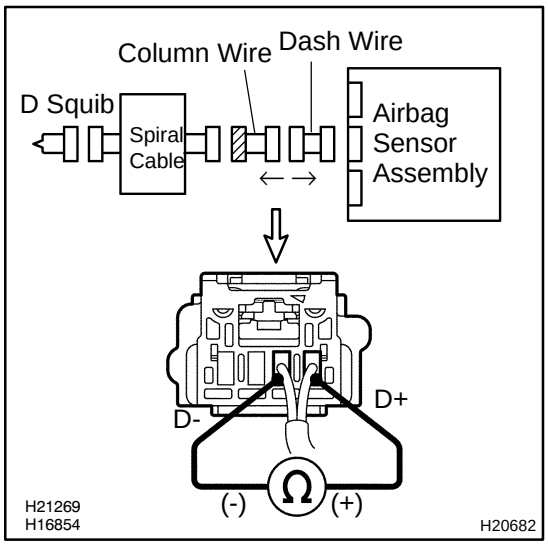


PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between D+ and D- of the orange spiral cable connector on the steering wheel pad (D squib) side.
OK:
Resistance: Below 1 Ω

NG → **Replace spiral cable.**

OK

6	Check column wire.

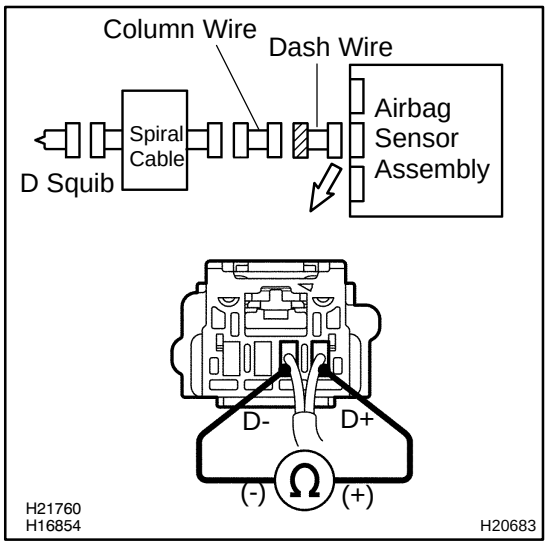


PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between D+ and D- of the column wire connector on the spiral cable side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace column wire.**

OK

7	**Check dash wire.**



CHECK:

Measure the resistance between D+ and D- of the dash wire connector on the column wire side.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI3J0-04

DTC	B0102/11	Short in D Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0102/11 is recorded when a ground short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0102/11	★Short in D squib circuit (to ground) ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

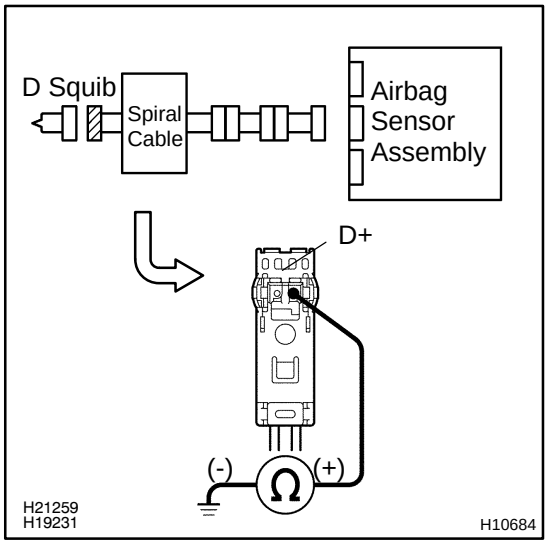
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib circuit.

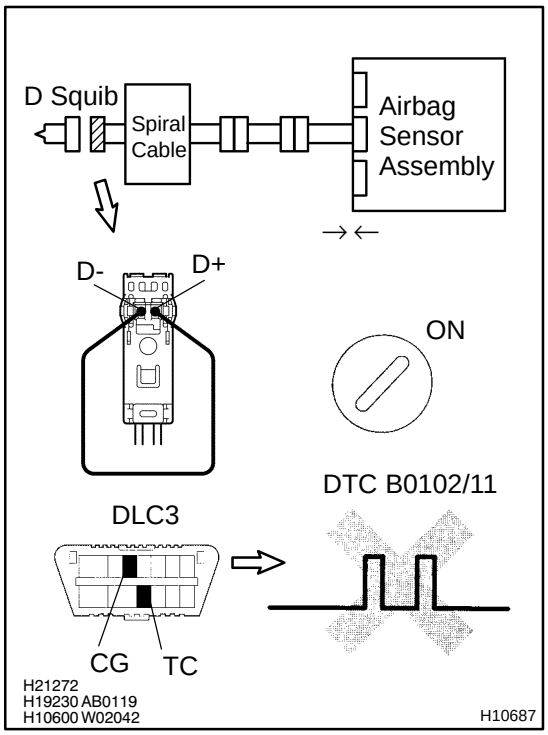


CHECK:
Measure the resistance between the body ground and D+ of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Go to step 5.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check DTC (See page DI-692).

OK:

DTC B0102/11 is not output.

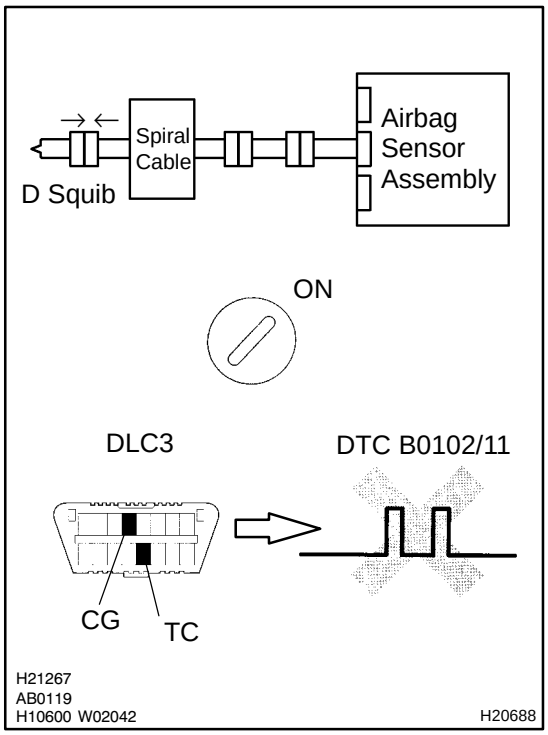
HINT:

Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib.



PREPARATION:

(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 steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0102/11 is not output.

HINT:

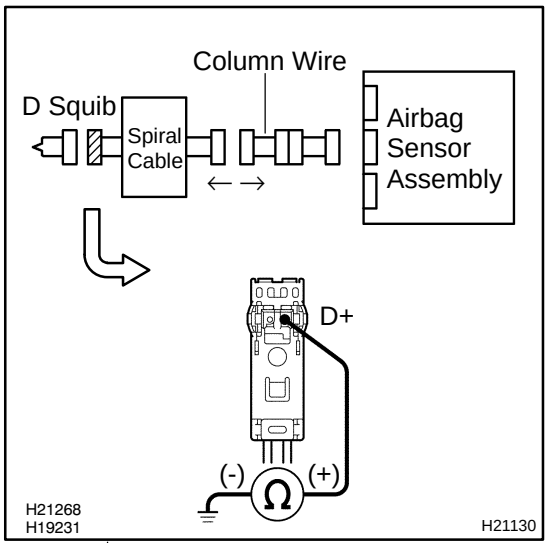
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	**Check spiral cable.**



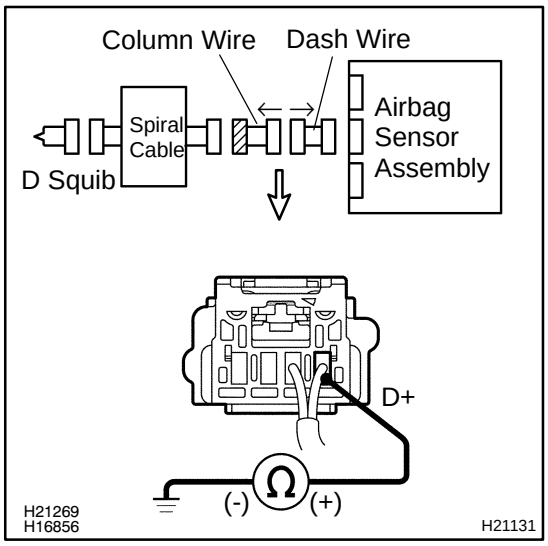
PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between the body ground and D+ of the orange spiral cable connector on the steering wheel pad (D squib) side.
OK:

Resistance: 1 MΩ or Higher

NG	**Replace spiral cable.**

OK

6	**Check column wire.**



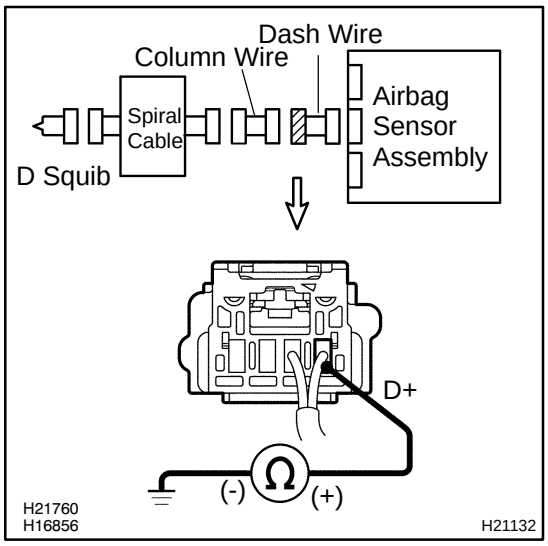
PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and D+ of the column wire connector on the spiral cable side.
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace column wire.**

OK

7	Check dash wire.



CHECK:

Measure the resistance between the body ground and D+ of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning par can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI3J1-05

DTC	B0103/12	Short in D Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each components, see page OPERATION on page RS-3 .
DTC B0103/12 is recorded when a B+ short is detected in the D squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0103/12	★Short circuit in D squib circuit (to B+) ★D squib malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

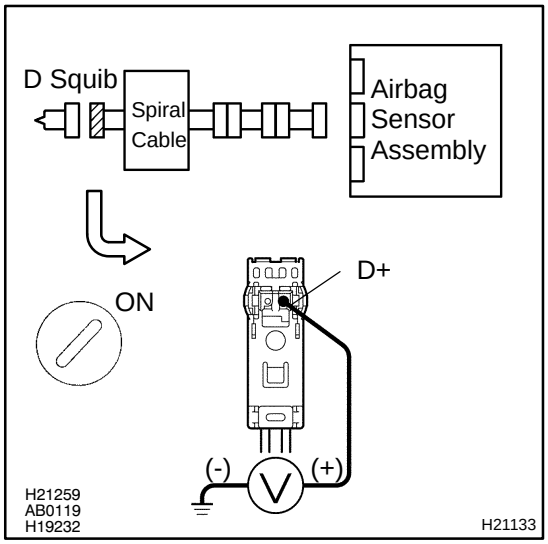
WIRING DIAGRAM

See page DI-71 1.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check D squib circuit.

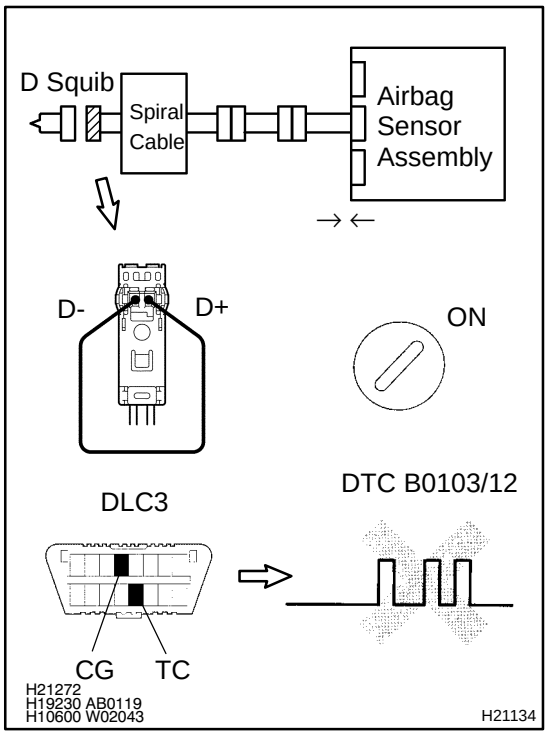


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and D+ of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
OK:
Voltage: Below 1 V

NG → **Go to step 5.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect D+ and D- of the orange connector on the steering wheel pad (D squib) side between the airbag sensor assembly and the steering wheel pad (D squib).
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0103/12 is not output.

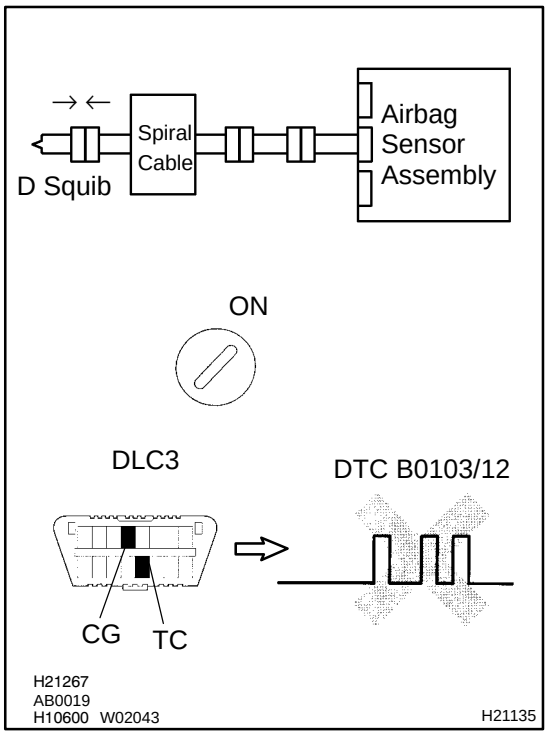
HINT:

Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check D squib.**



PREPARATION:

(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 steering wheel pad (D squib) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0103/12 is not output.

HINT:

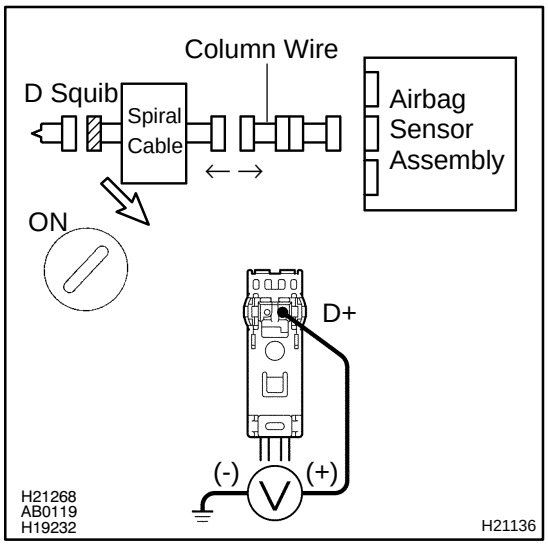
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	**Replace steering wheel pad (D squib).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	Check spiral cable.



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the spiral cable connector from the column wire.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the orange spiral cable connector on the steering wheel pad (D squib) side.

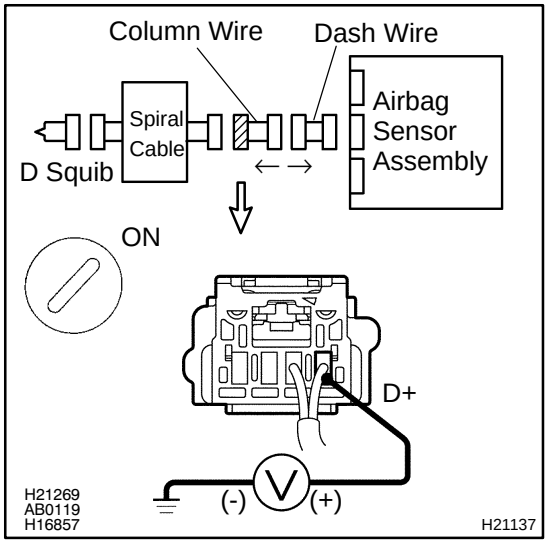
OK:

Voltage: Below 1 V

NG	Replace spiral cable.

OK

6	Check column wire.



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect the column wire connector from the dash wire.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the column wire connector on the spiral cable side.

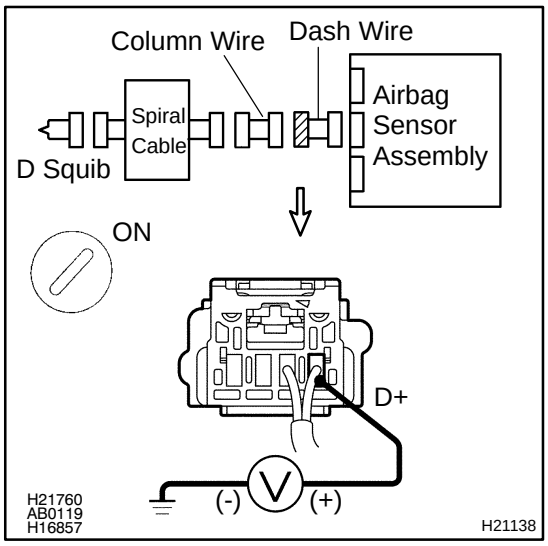
OK:

Voltage: Below 1 V

NG	Repair or replace column wire.

OK

7	**Check dash wire.**



CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D+ of the dash wire connector on the column wire side.

OK:

Voltage: Below 1 V

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6P7-26

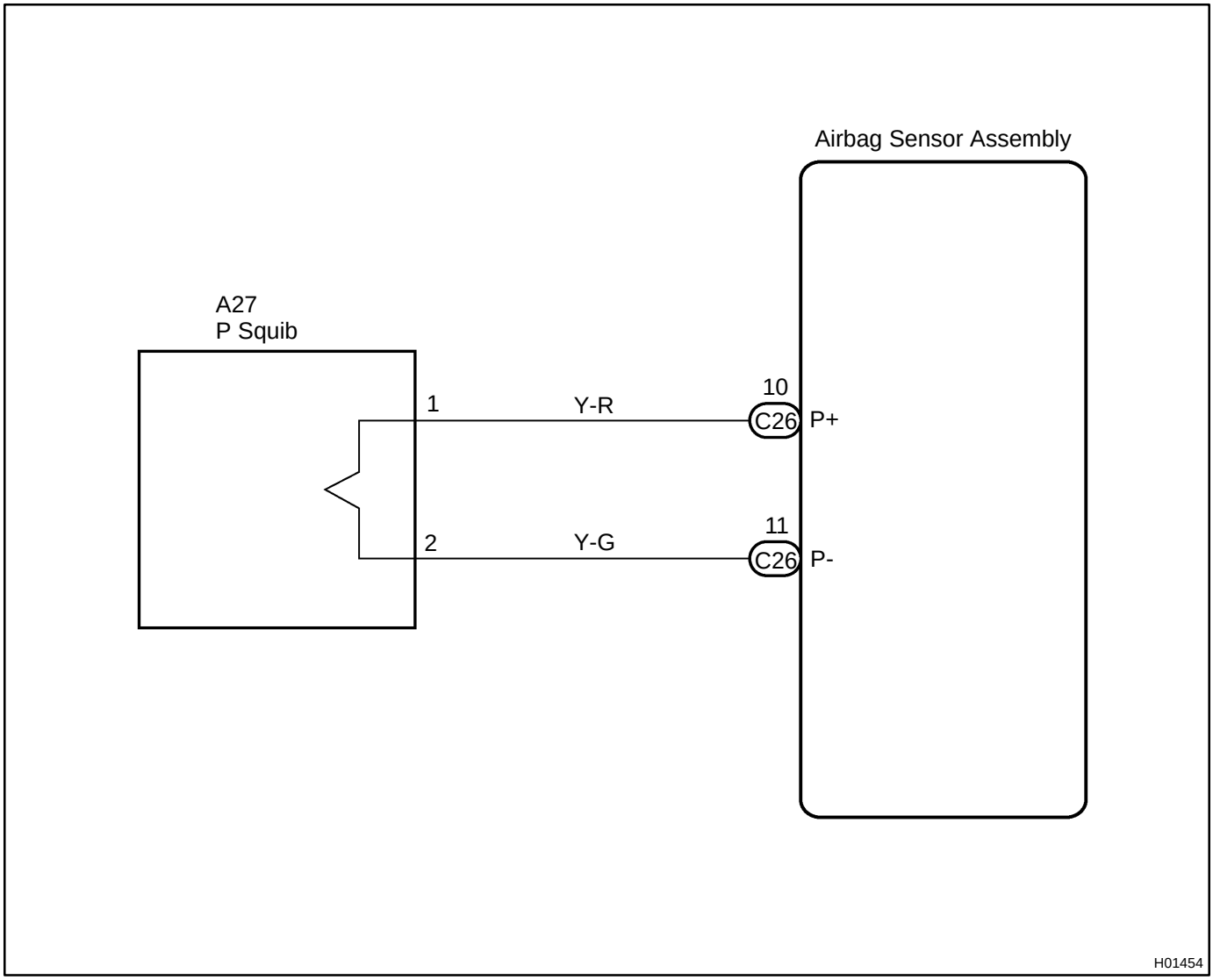
DTC	B0105/53	Short in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0105/53 is recorded when a short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0105/53	★Short in P squib circuit ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

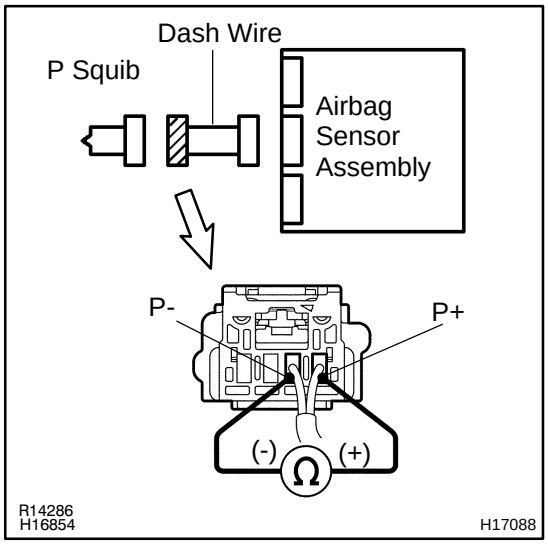
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.

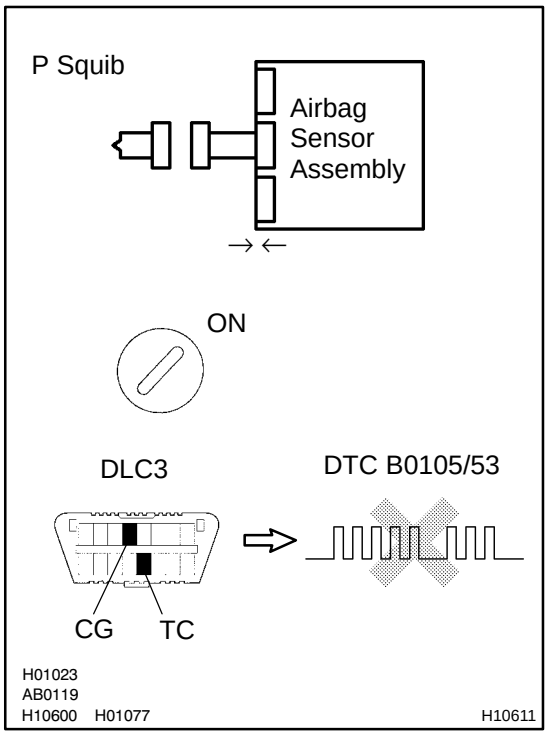
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0105/53 is not output.

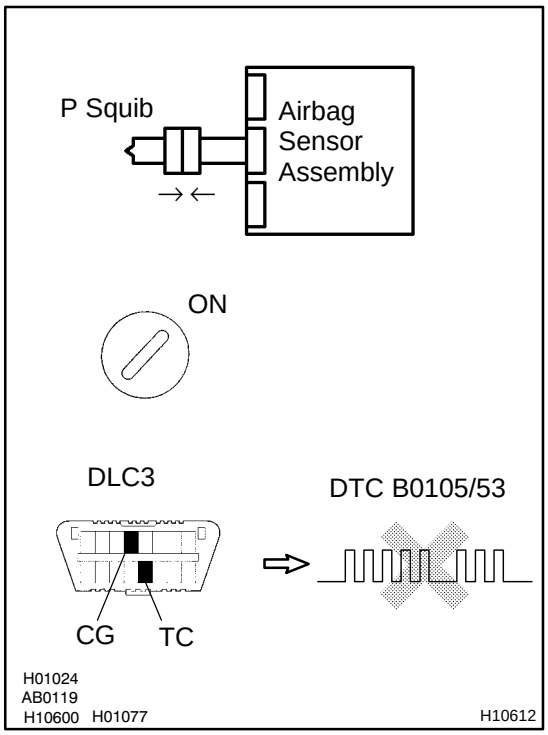
HINT:

Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	**Check P squib.**



PREPARATION:

(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 assembly (P squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6P8-14

DTC	B0106/54	Open in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0106/54 is recorded when an open is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0106/54	★Open in P squib circuit ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

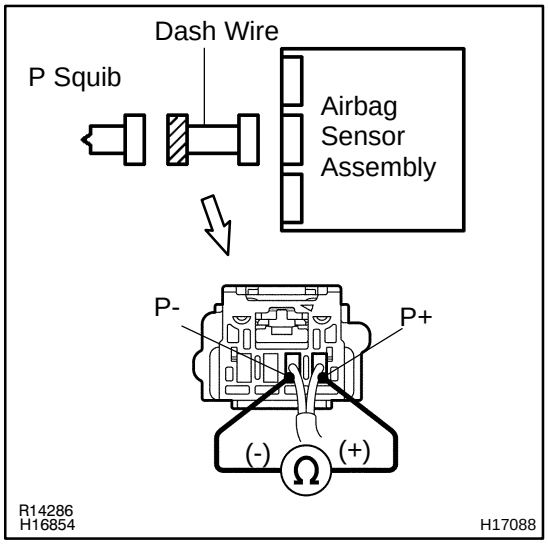
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**

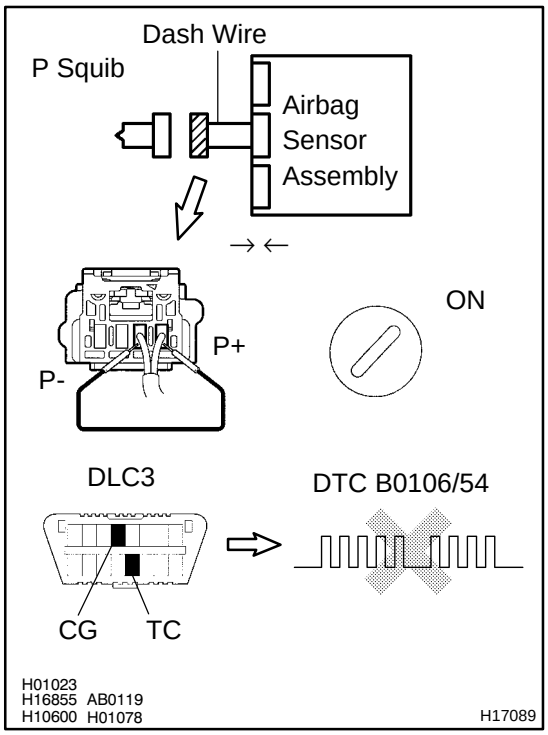


CHECK:
Measure the resistance between P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0106/54 is not output.

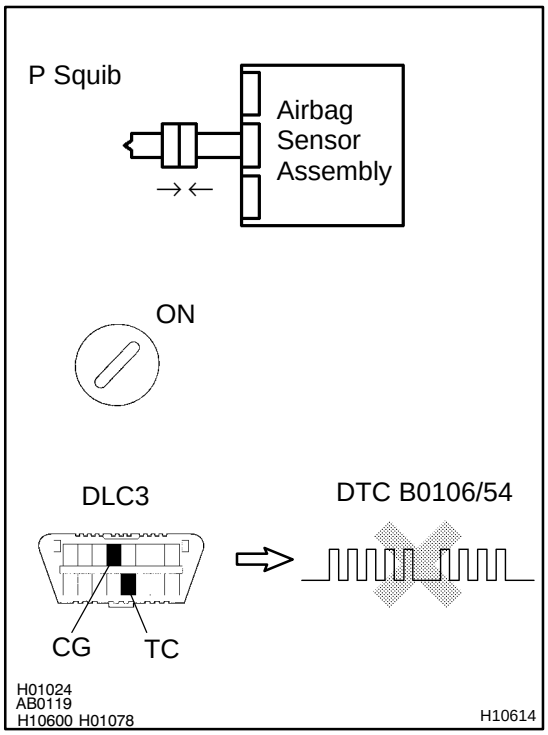
HINT:

Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P squib.



PREPARATION:

(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 assembly (P squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6P9-14

DTC	B0107/51	Short in P Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0107/51 is recorded when ground short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0107/51	★Short in P squib circuit (to ground) ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

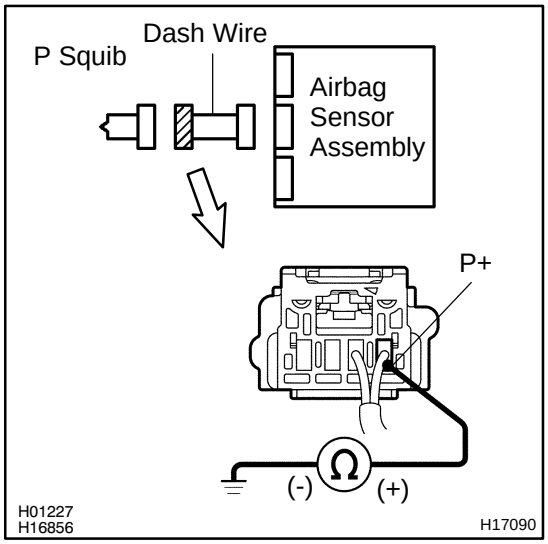
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**

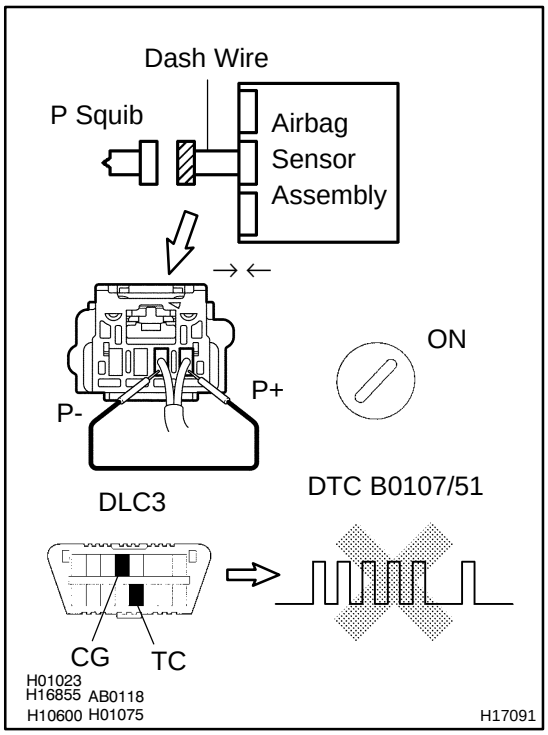


CHECK:
Measure the resistance between the body ground and P+ of the dash wire connector on the front passenger airbag assembly (P squib) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0107/51 is not output.

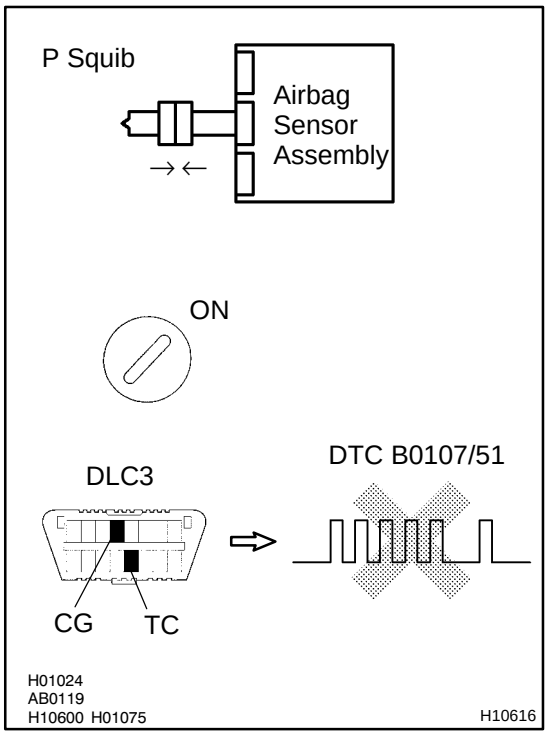
HINT:

Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P squib.



PREPARATION:

(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 assembly (P squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PA-13

DTC	B0108/52	Short in P Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0108/52 is recorded when a B+ short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0108/52	★Short in P squib circuit (to B+) ★P squib malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib) ★Airbag sensor assembly ★Dash wire

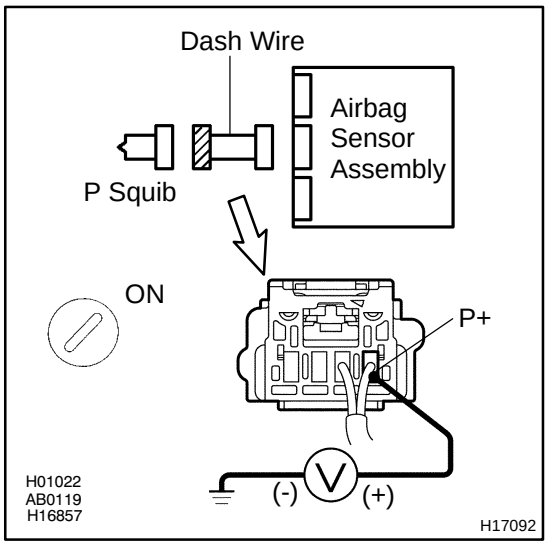
WIRING DIAGRAM

See page DI-732 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib circuit).**



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and P+ of the dash wire connector on the front passenger airbag assembly (P squib) side.

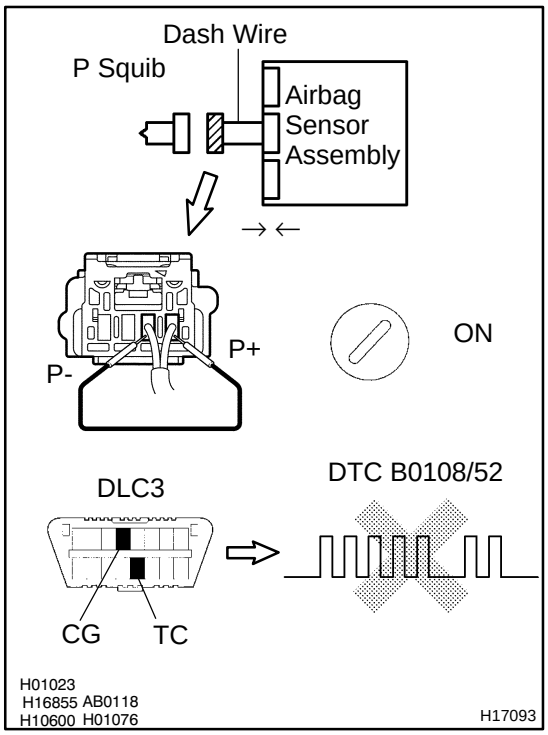
OK:

Voltage: Below 1 V

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect P+ and P- of the dash wire connector on the front passenger airbag assembly (P squib) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

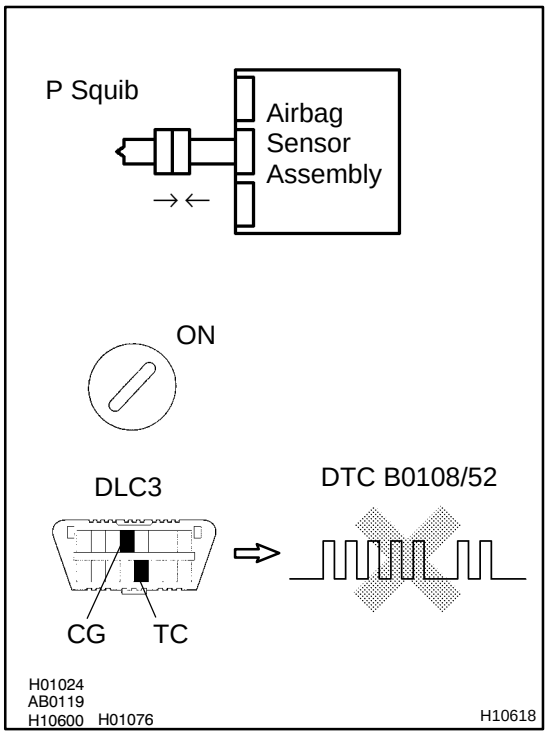
DTC B0108/52 is not output.

HINT:
Codes other than code B0108/52 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P squib.



PREPARATION:

(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 assembly (P squib) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 front passenger airbag assembly (P squib).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PB-33

DTC	B0110/43	Short in Side Squib RH Circuit

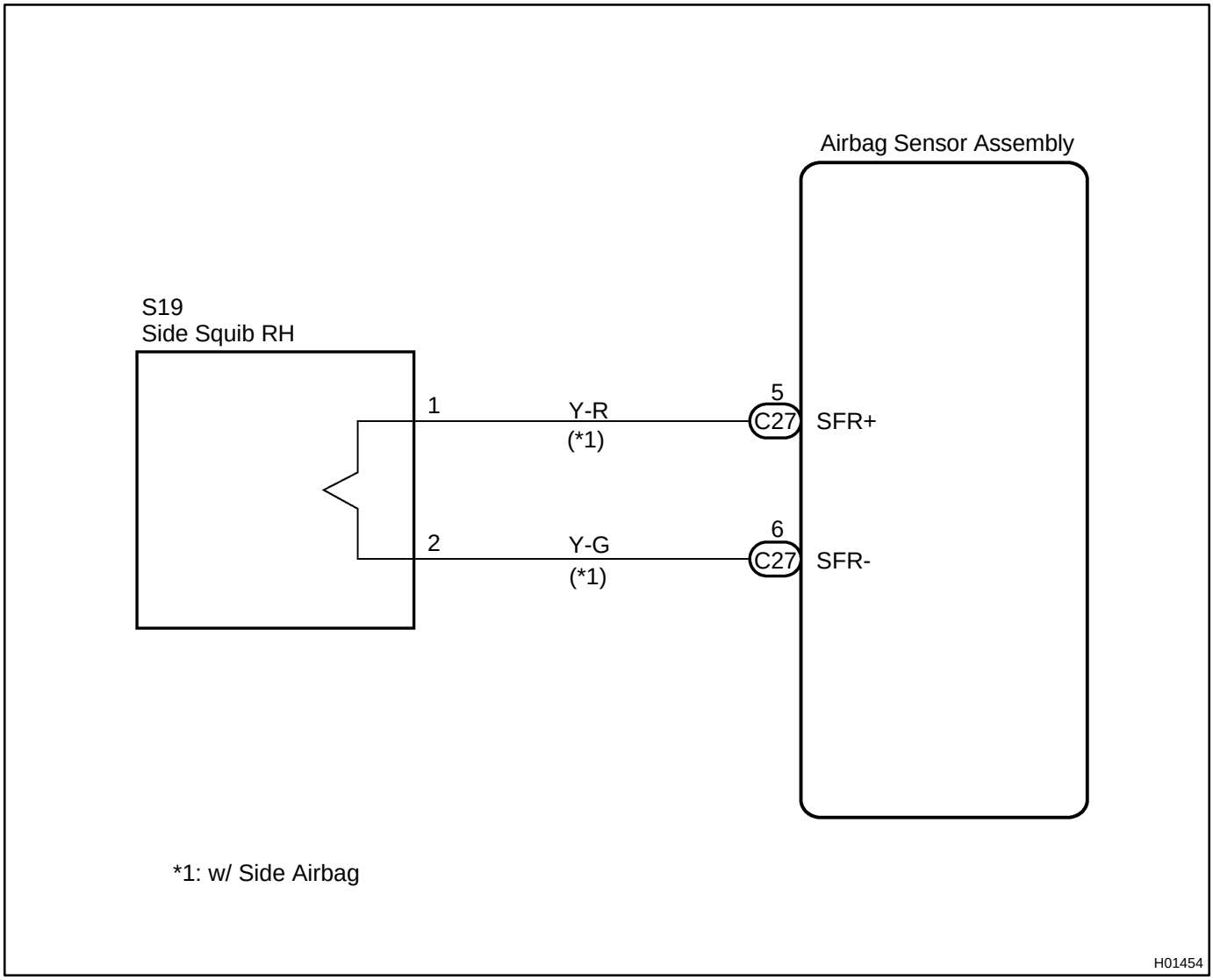
CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the side airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0110/43 is recorded when a short is detected in the side squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0110/43	★Short in side squib RH circuit ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0110/43 is indicated only for the vehicle equipped with the side airbag.

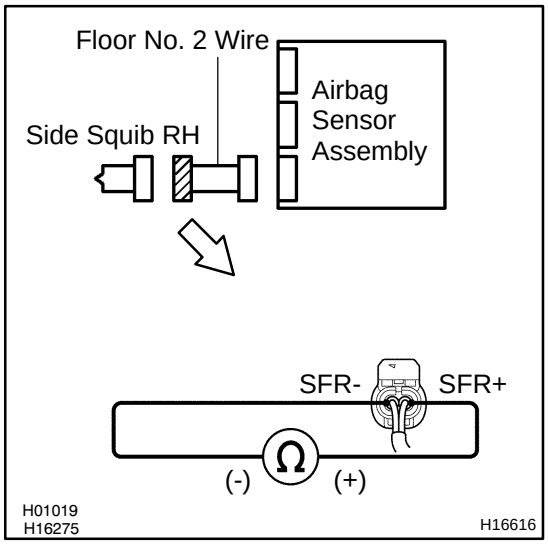
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (side squib RH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.

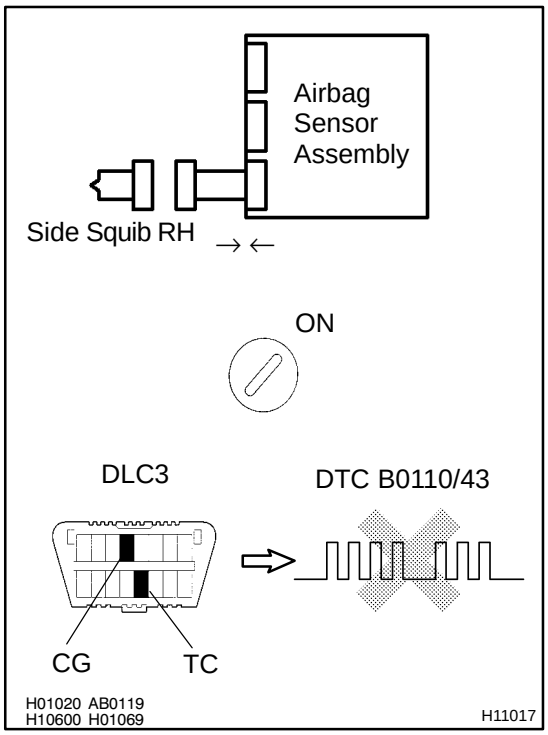
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0110/43 is not output.

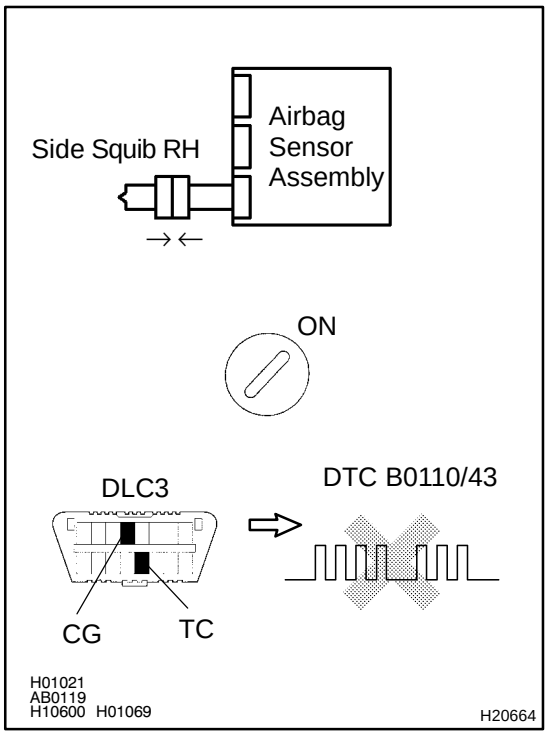
HINT:

Codes other than code B0110/43 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib RH.



PREPARATION:

(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 side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly RH (side squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PC-20

DTC	B0111/44	Open in Side Squib RH Circuit

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the side airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0111/44 is recorded when an open is detected in the side squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0111/44	★Open in side squib RH circuit ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0111/44 is indicated only for the vehicle equipped with the side airbag.

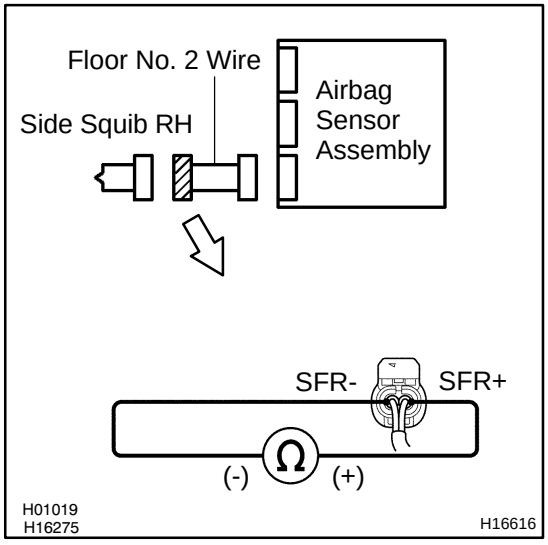
WIRING DIAGRAM

See page DI-745 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (side squib RH circuit).**

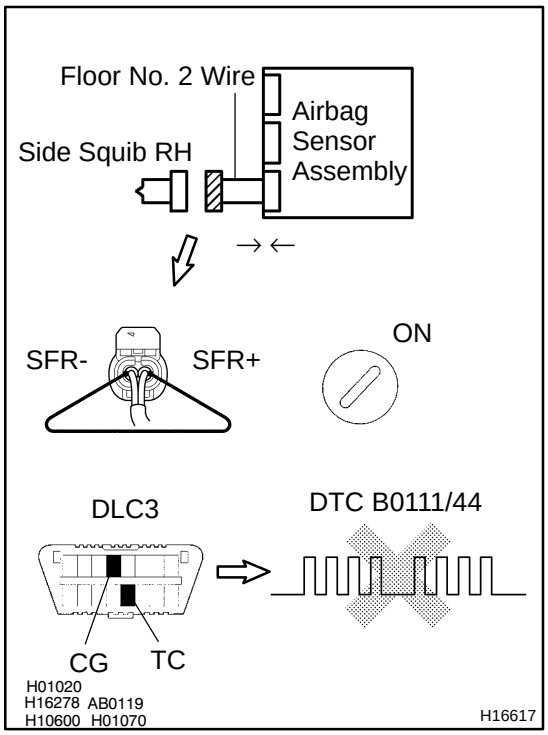


CHECK:
Measure the resistance between SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0111/44 is not output.

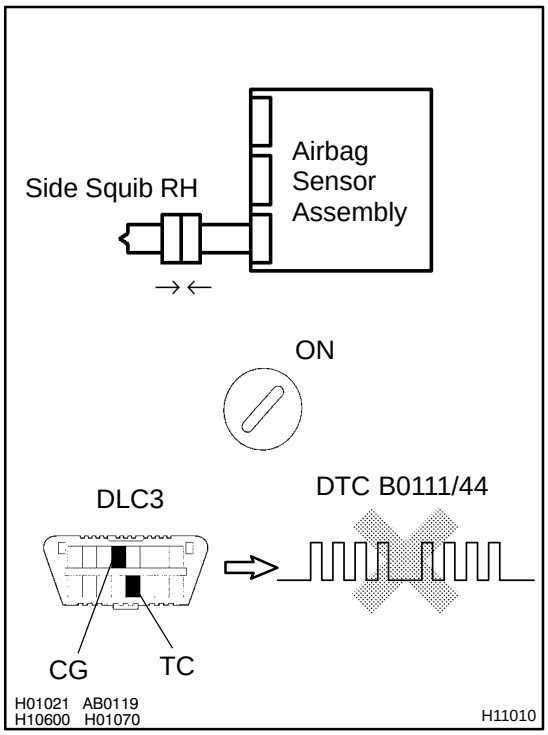
HINT:

Codes other than code B0111/44 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib RH.



PREPARATION:

(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 side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly RH (side squib RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B0112/41	Short in Side Squib RH Circuit (to Ground)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the side airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0112/41 is recorded when ground short is detected in the side squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0112/41	★Short in side squib RH circuit (to ground) ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0112/41 is indicated only for the vehicle equipped with the side airbag.

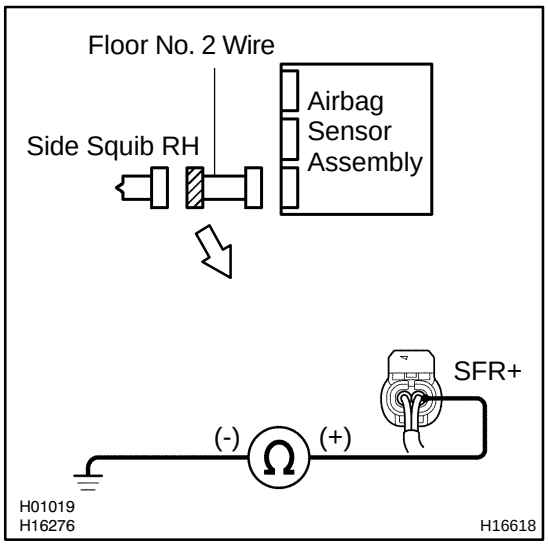
WIRING DIAGRAM

See page DI-745 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (side squib RH circuit).**

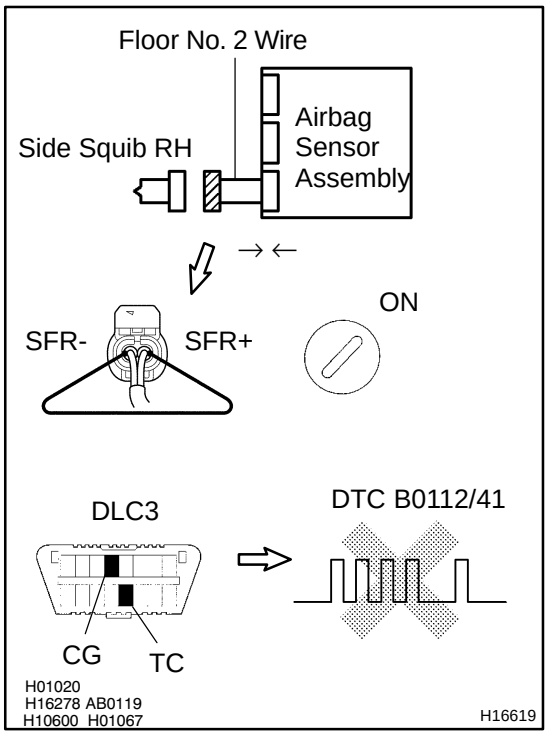


CHECK:
Measure the resistance between the body ground and SFR+ of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0112/41 is not output.

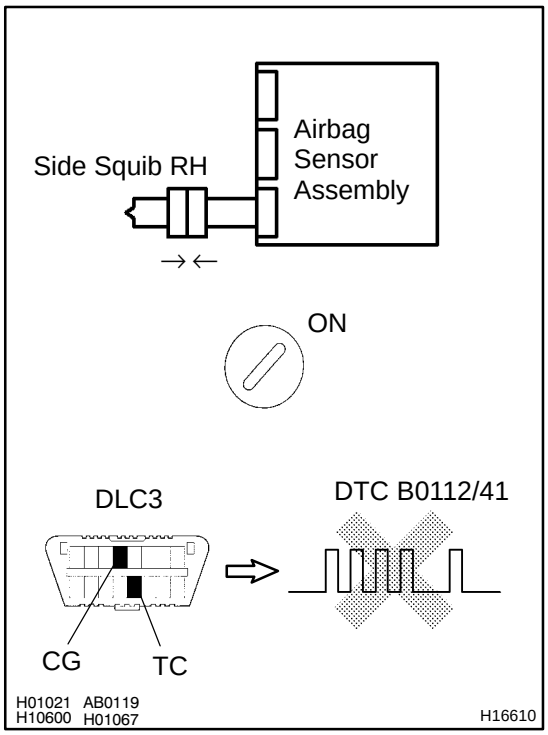
HINT:

Codes other than code B0112/41 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib RH.



PREPARATION:

(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 side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly RH (side squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PE-22

DTC	B0113/42	Short in Side Squib RH Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib RH circuit consists of the airbag sensor assembly and the side airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0113/42 is recorded when a B+ short is detected in the side squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0113/42	★Short in side squib RH circuit (to B+) ★Side squib RH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly RH (Side squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B0113/42 is indicated only for the vehicle equipped with the side airbag.

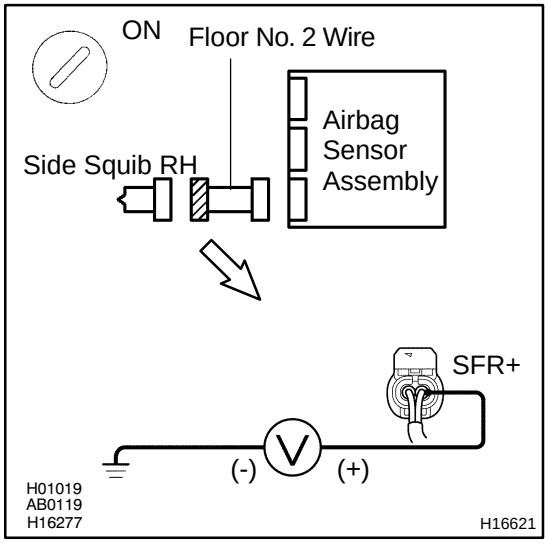
WIRING DIAGRAM

See page DI-745 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check floor No. 2 wire (side squib RH circuit).

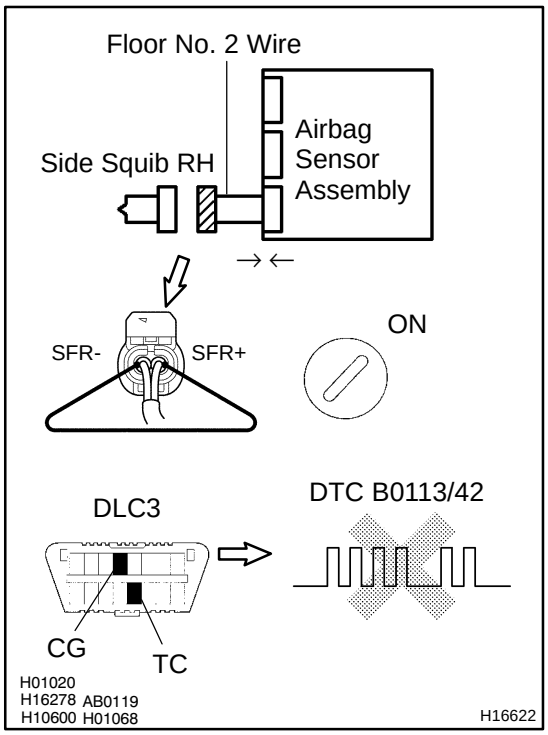


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and SFR+ of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
OK:
Voltage: Below 1 V

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect SFR+ and SFR- of the floor No. 2 wire connector on the side airbag assembly RH (side squib RH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

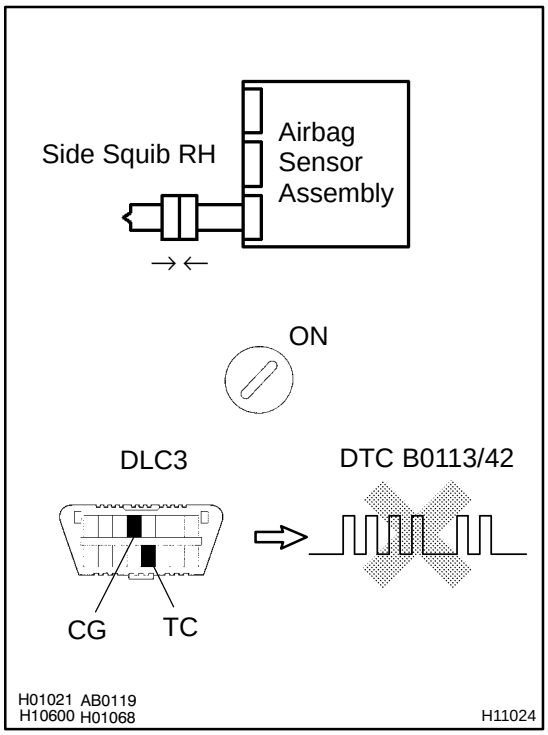
DTC B0113/42 is not output.

HINT:
Codes other than code B0113/42 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib RH.



PREPARATION:

(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 side airbag assembly RH (side squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly RH (side squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PF-34

DTC	B0115/47	Short in Side Squib LH Circuit

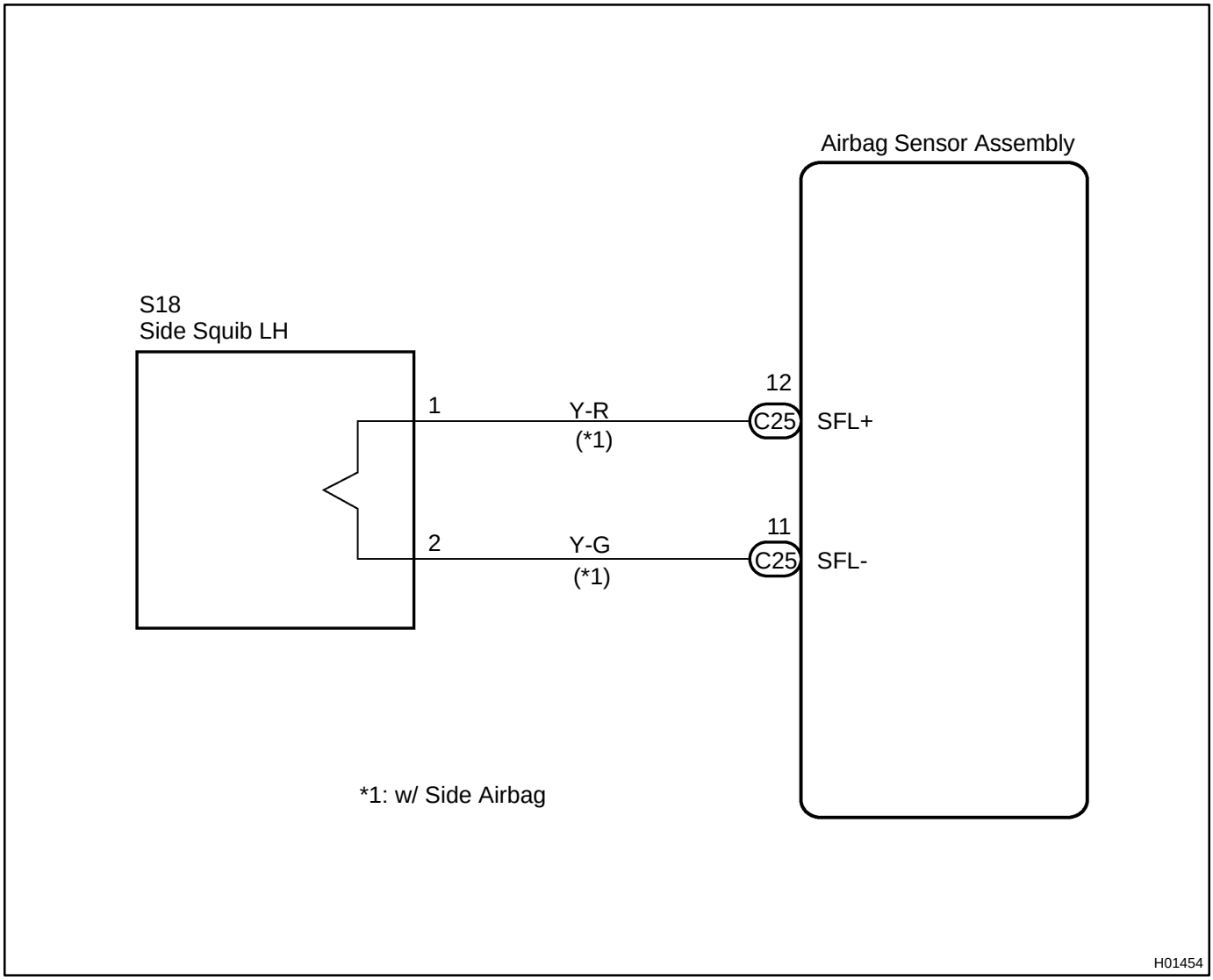
CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the side airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0115/47 is recorded when a short is detected in the side squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0115/47	★Short in side squib LH circuit ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0115/47 is indicated only for the vehicle equipped with the side airbag.

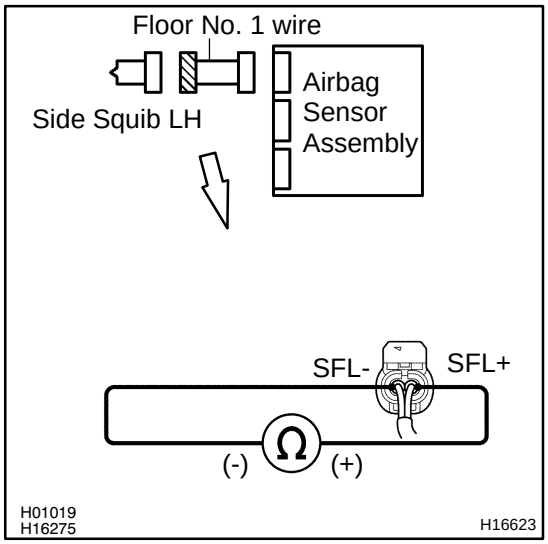
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (side squib LH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

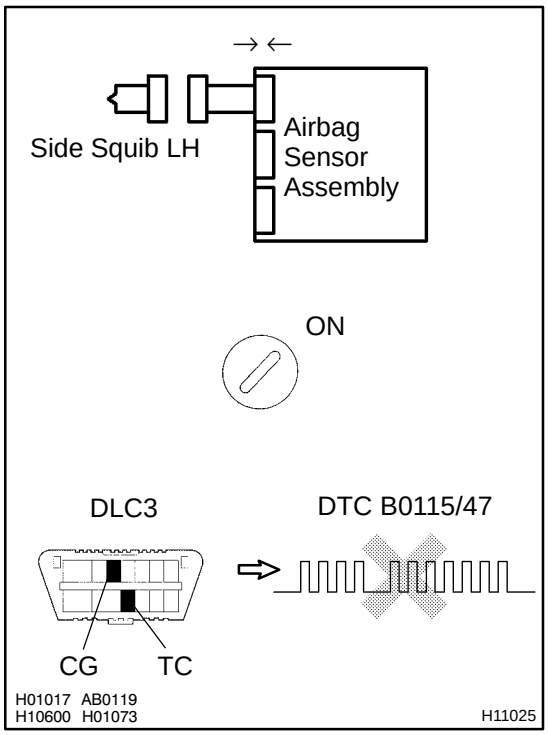
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

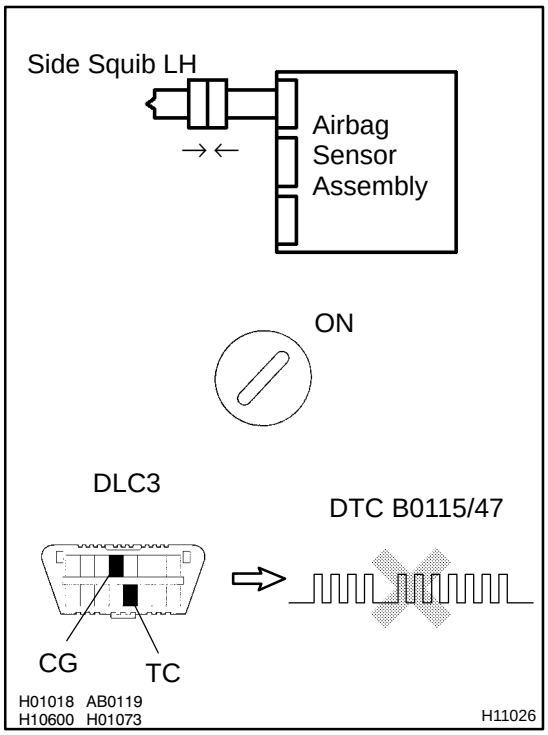
DTC B0115/47 is not output.

HINT:
Codes other than code B0115/47 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check side squib LH.



PREPARATION:

(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 side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly LH (side squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B0116/48	Open in Side Squib LH Circuit

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the side airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0116/48 is recorded when an open is detected in the side squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0116/48	★Open in side squib LH circuit ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0116/48 is indicated only for the vehicle equipped with the side airbag.

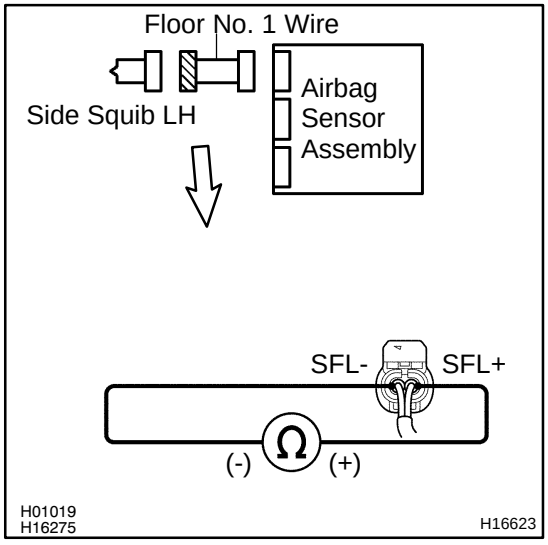
WIRING DIAGRAM

See page DI-758 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (side squib LH circuit).**

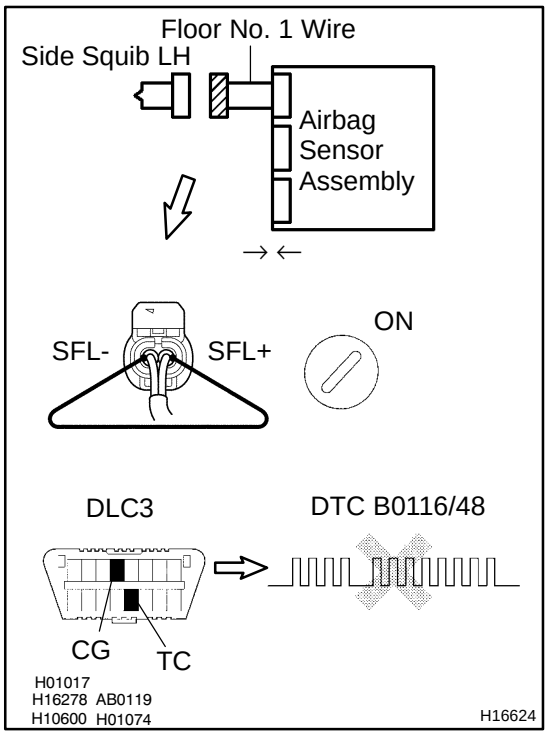


CHECK:
Measure the resistance between SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0116/48 is not output.

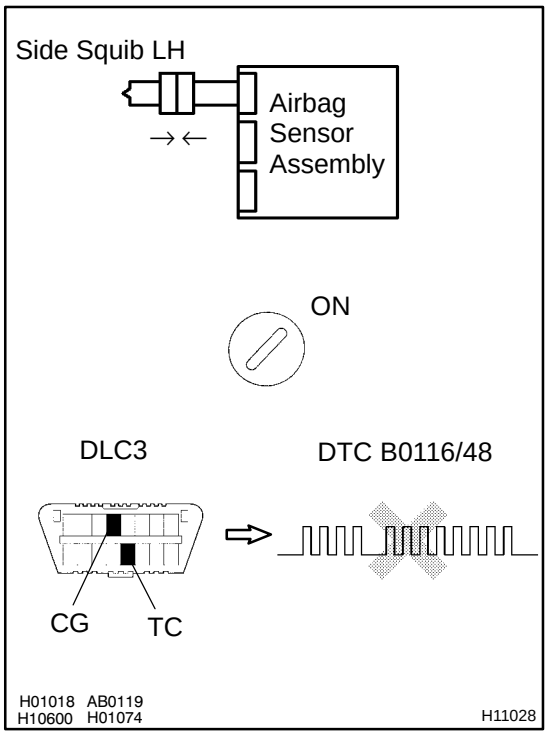
HINT:

Codes other than code B0116/48 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib LH.



PREPARATION:

(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 side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly LH (side squib LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PH-21

DTC	B0117/45	Short in Side Squib LH Circuit (to Ground)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the side airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0117/45 is recorded when ground short is detected in the side squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0117/45	★Short in side squib LH circuit (to ground) ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0117/45 is indicated only for the vehicle equipped with the side airbag.

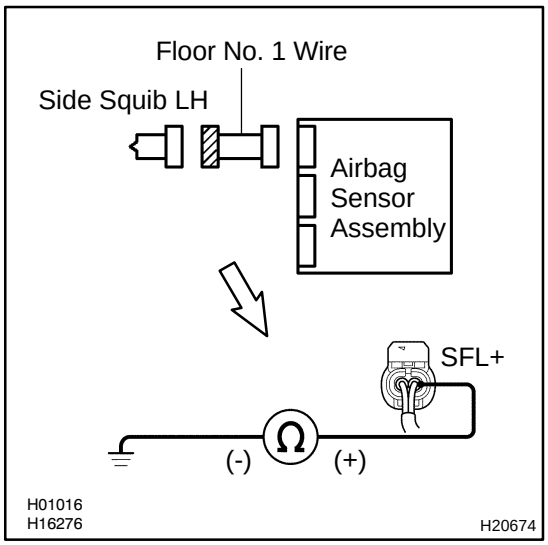
WIRING DIAGRAM

See page DI-758 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (side squib LH circuit).**

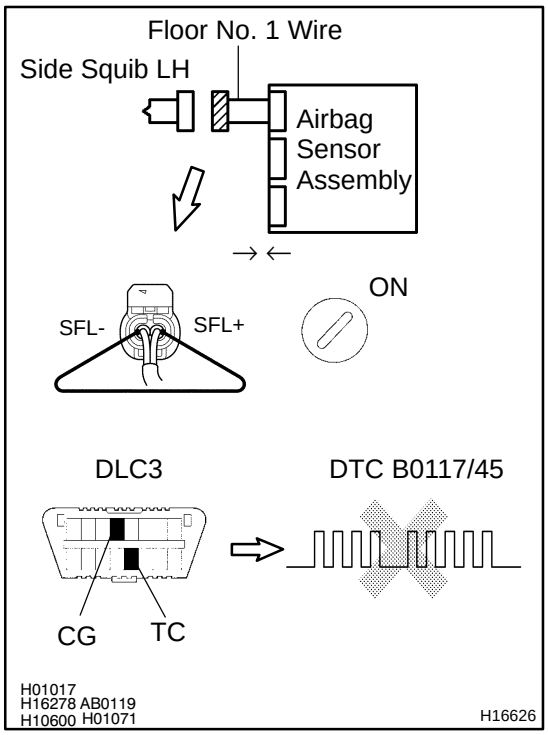


CHECK:
Measure the resistance between the body ground and SFL+ of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0117/45 is not output.

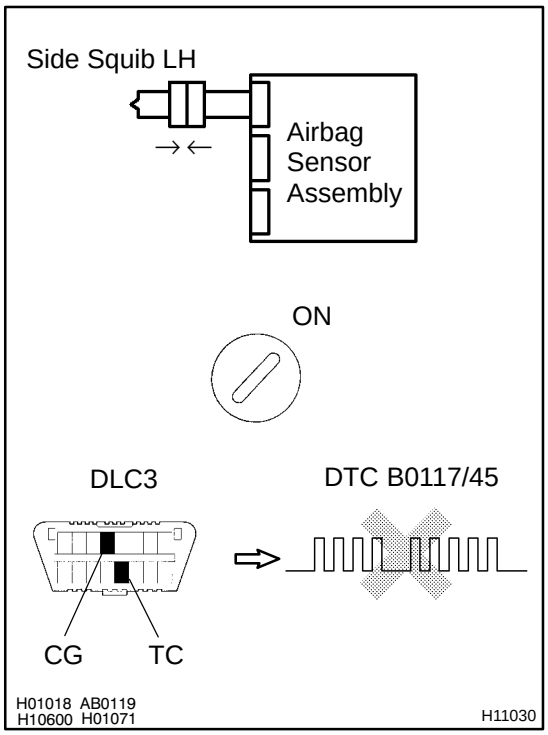
HINT:

Codes other than code B0117/45 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib LH.



PREPARATION:

(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 side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly LH (side squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PI-21

DTC	B0118/46	Short in Side Squib LH Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib LH circuit consists of the airbag sensor assembly and the side airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0118/46 is recorded when a B+ short is detected in the side squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0118/46	★Short in side squib LH circuit (to B+) ★Side squib LH malfunction ★Airbag sensor assembly malfunction	★Side airbag assembly LH (Side squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B0118/46 is indicated only for the vehicle equipped with the side airbag.

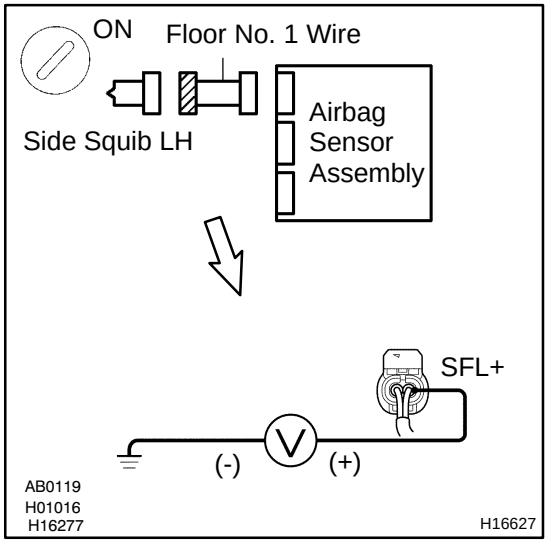
WIRING DIAGRAM

See page DI-692 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-692).

2	Check floor No. 1 wire (side squib LH circuit).



CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and SFL+ of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.

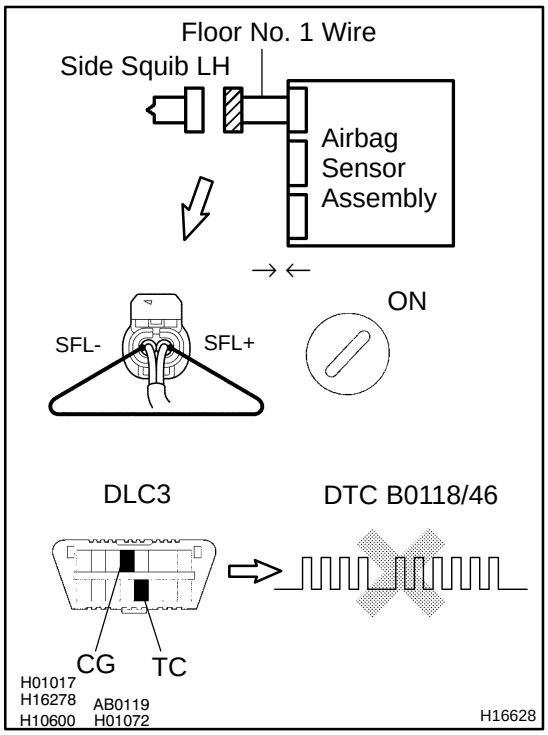
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect SFL+ and SFL- of the floor No. 1 wire connector on the side airbag assembly LH (side squib LH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

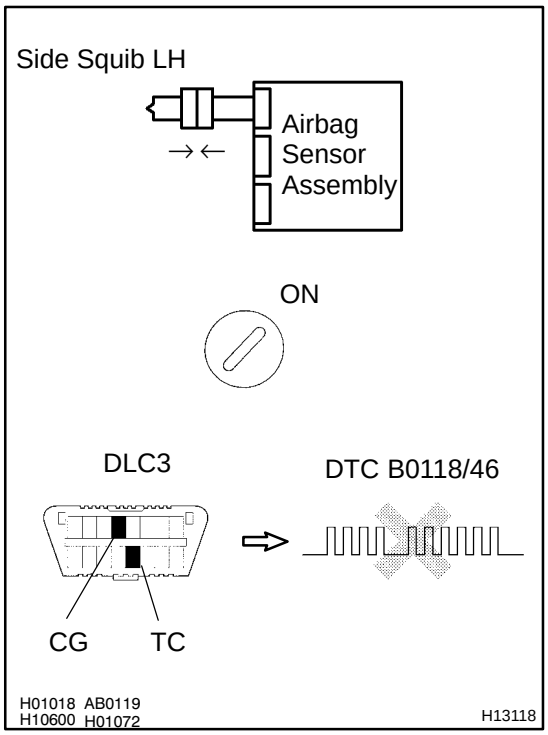
DTC B0118/46 is not output.

HINT:
Codes other than code B0118/46 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check side squib LH.



PREPARATION:

(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 side airbag assembly LH (side squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 side airbag assembly LH (side squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DIB3R-01

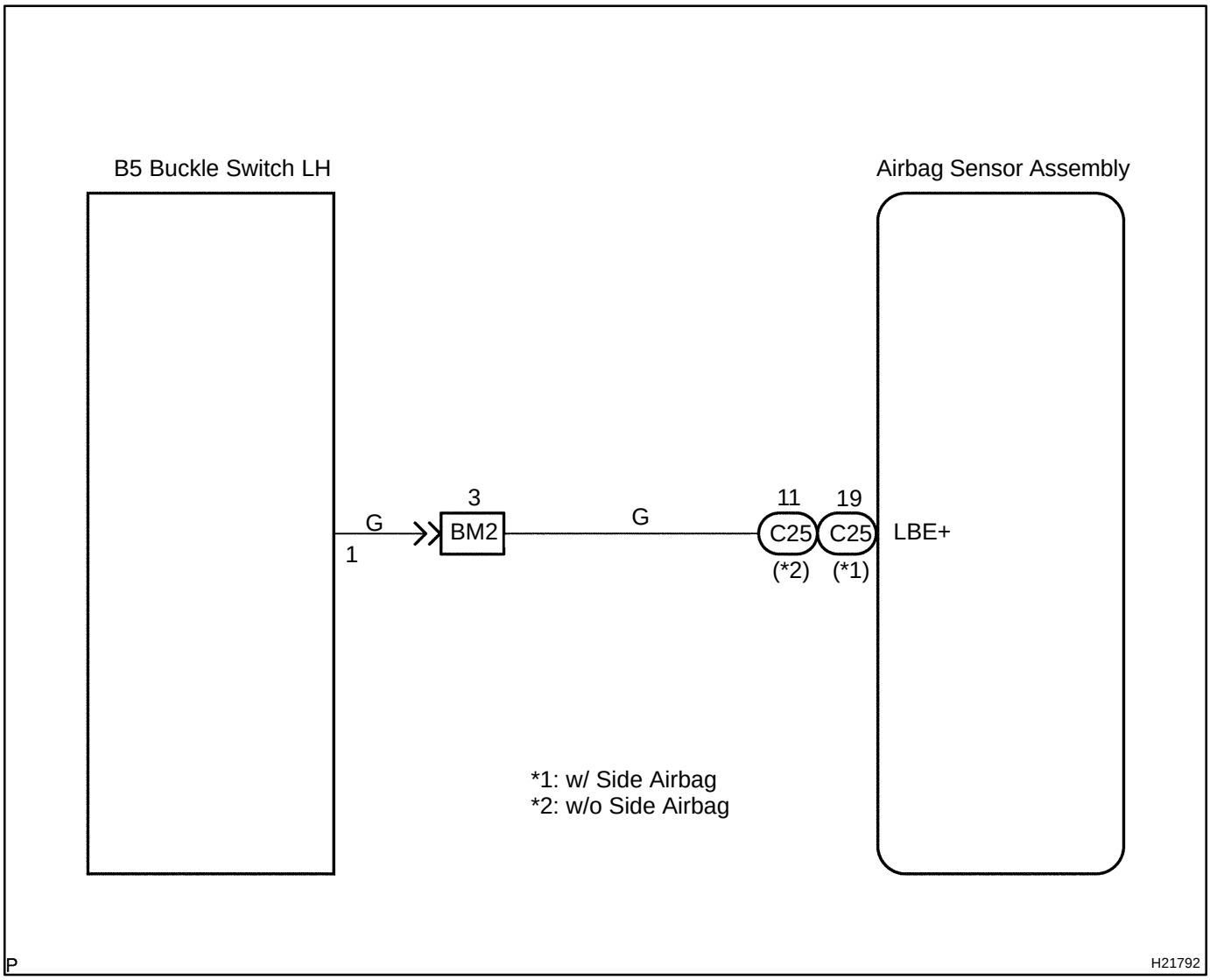
DTC	B0126/B0127/27	Seat Belt Buckle Switch LH Malfunction

CIRCUIT DESCRIPTION

The seat belt buckle switch LH malfunction circuit consists of the airbag sensor assembly and the front seat inner belt LH (seat belt buckle switch LH).
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0126/B0127/27 is recorded when a malfunction is detected in the seat belt buckle switch LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0126/B0127/27	★Seat belt buckle switch LH circuit malfunction	★Front seat inner belt LH (Seat belt buckle switch LH) ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH

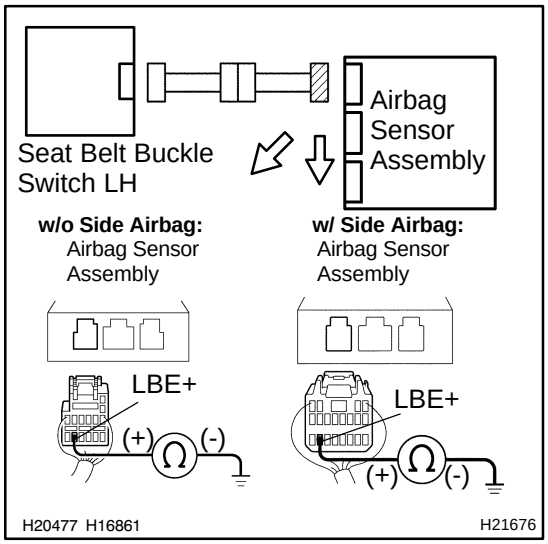
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-692).**

2	**Check wire harness (to ground).**



CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

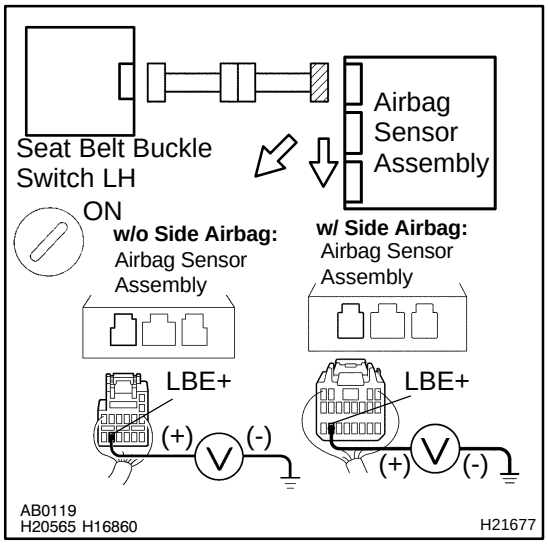
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 7.**

OK

3	**Check wire harness (to B+).**



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

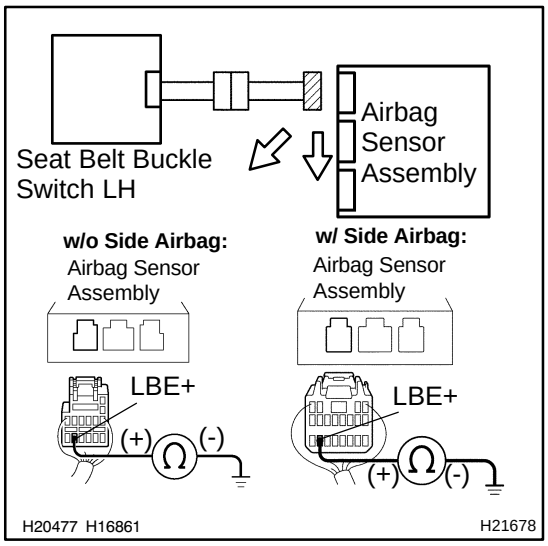
OK:

Voltage: Below 1 V

NG → **Go to step 8.**

OK

4	**Check front seat inner belt LH.**



PREPARATION:

(a) Connect the connector of the front seat inner belt LH (seat belt buckle switch LH).

(b) Unlock the seat belt for the driver's seat.

CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

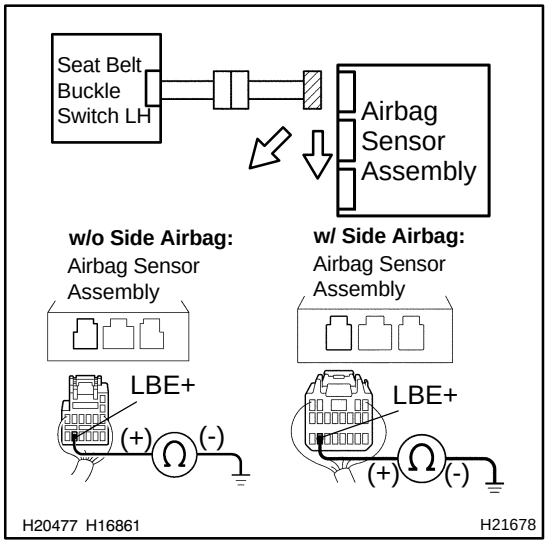
OK:

Resistance: 1 kΩ - 1.6 kΩ

NG → **Replace front seat inner belt LH.**

OK

5	**Check front seat inner belt LH.**



PREPARATION:

Lock the seat belt for the driver's seat.

CHECK:

Measure the resistance between the body ground and LBE+ of the connector on the airbag sensor assembly side between the front seat inner belt LH (seat belt buckle switch LH) and the airbag sensor assembly.

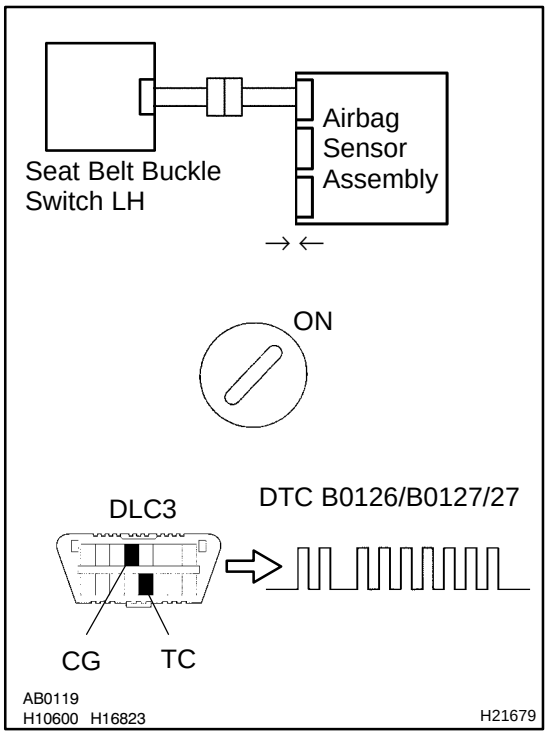
OK:

Resistance: 100 Ω - 500 Ω

NG → **Replace front seat inner belt LH.**

OK

6	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0126/B0127/27 is not output.

HINT:

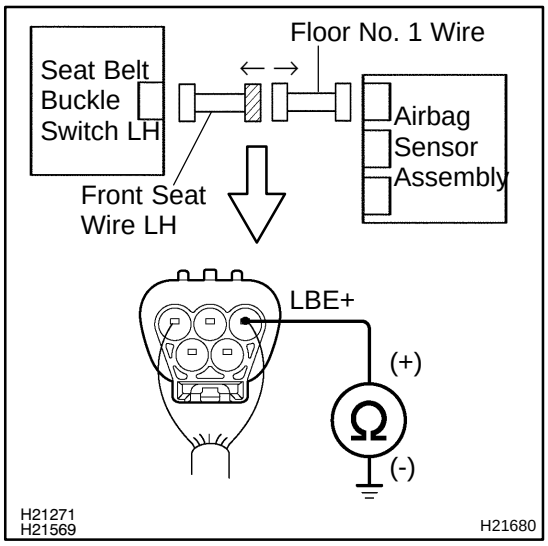
Codes other than code B0126/B0127/27 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

7	Check front seat wire LH (to ground).



PREPARATION:

Disconnect the front seat wire LH connector from the floor No. 1 wire.

CHECK:

Measure the resistance between the body ground and LBE+ of the front seat wire LH connector on the floor No. 1 wire side.

OK:

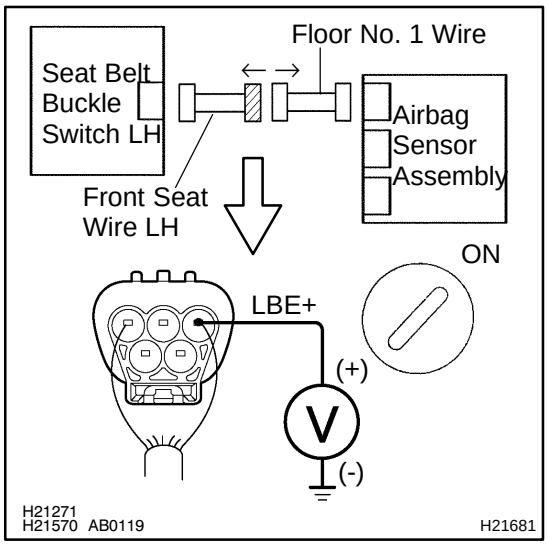
Resistance: 1 MΩ or Higher

NG → **Repair or replace front seat wire LH.**

OK

Repair or replace floor No. 1 wire.

8	Check front seat wire LH (to B+).



PREPARATION:

(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 front seat wire LH connector from the floor No. 1 wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and LBE+ of the front seat wire LH connector on the floor No. 1 wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace front seat wire LH.

OK

Repair or replace floor No. 1 wire.

DI6PJ-26

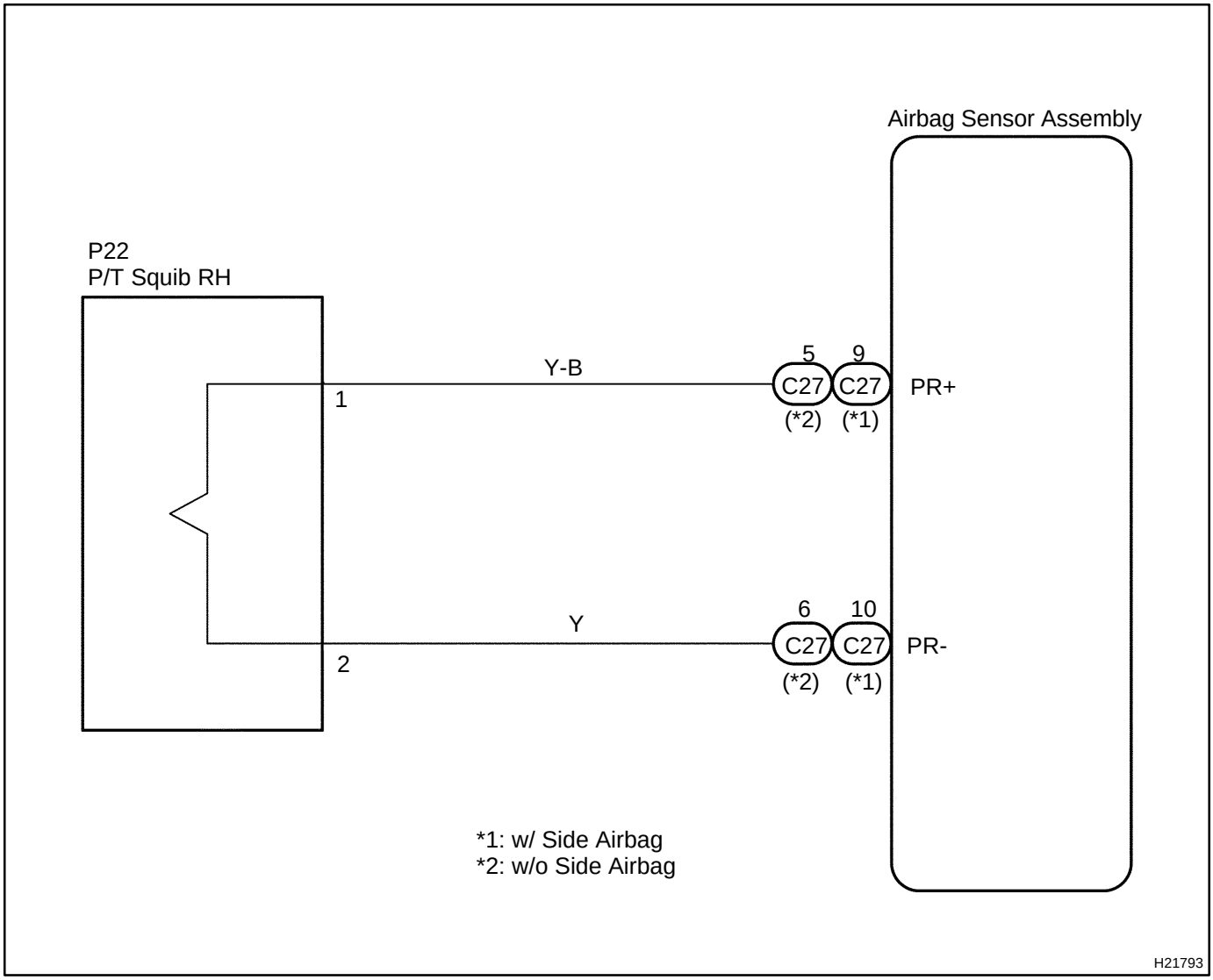
DTC	B0130/63	Short in P/T Squib RH Circuit

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the seat belt pretensioner RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0130/63 is recorded when a short is detected in the P/T squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0130/63	★Short in P/T squib RH circuit ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

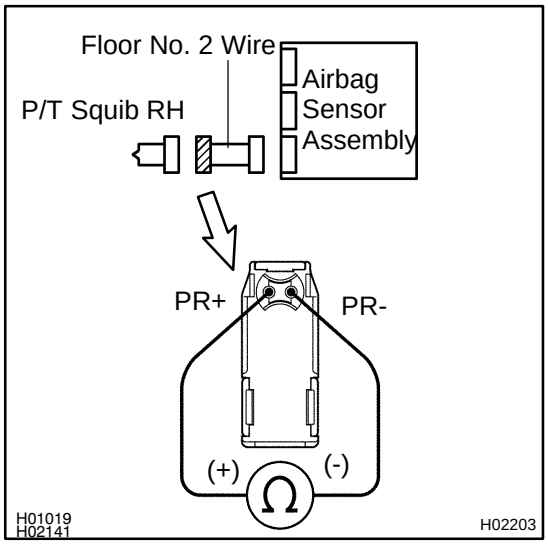
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

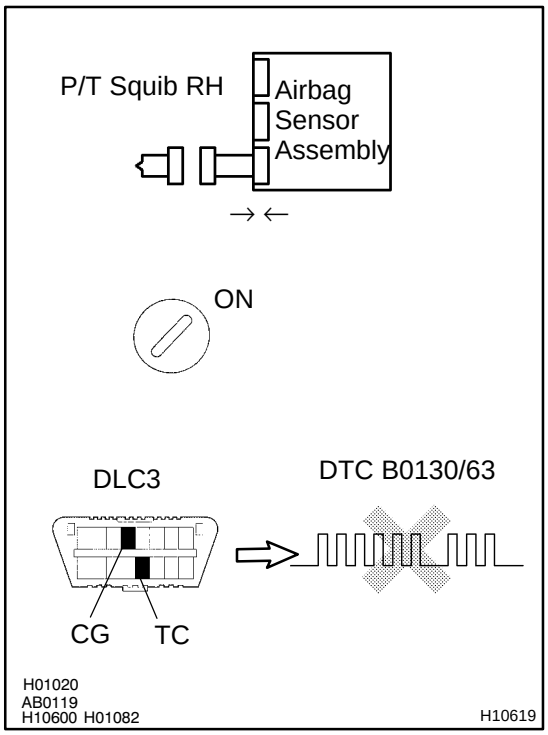
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0130/63 is not output.

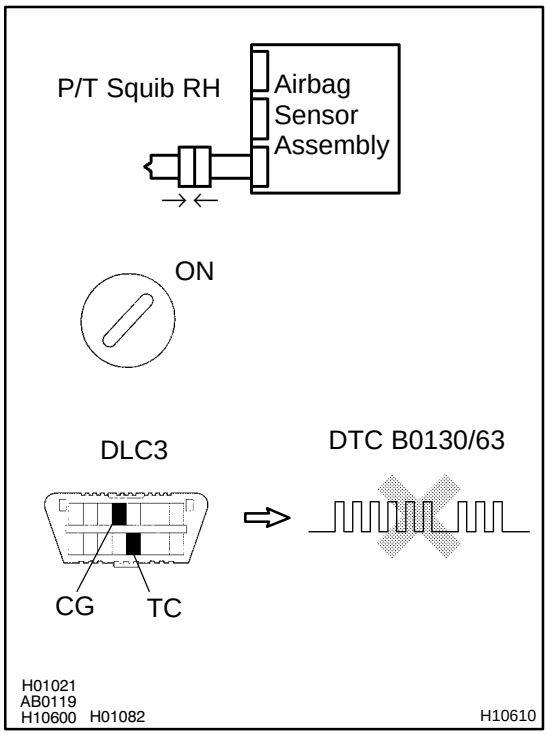
HINT:

Codes other than code B0130/63 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib RH.



PREPARATION:

(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 seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner RH (P/T squib RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PK-16

DTC	B0131/64	Open in P/T Squib RH Circuit

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the seat belt pretensioner RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0131/64 is recorded when an open is detected in the P/T squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0131/64	★Open in P/T squib RH circuit ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

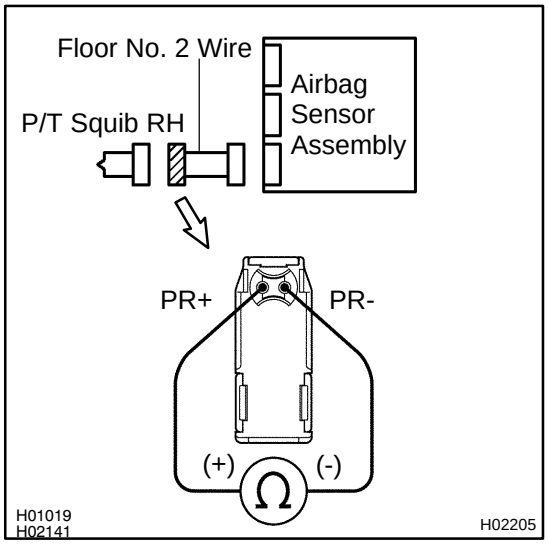
WIRING DIAGRAM

See page DI-777 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**



CHECK:

Measure the resistance between PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

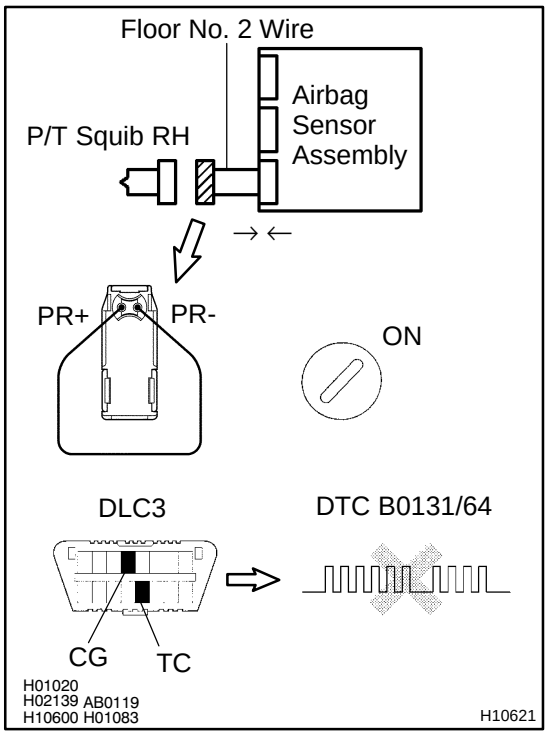
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0131/64 is not output.

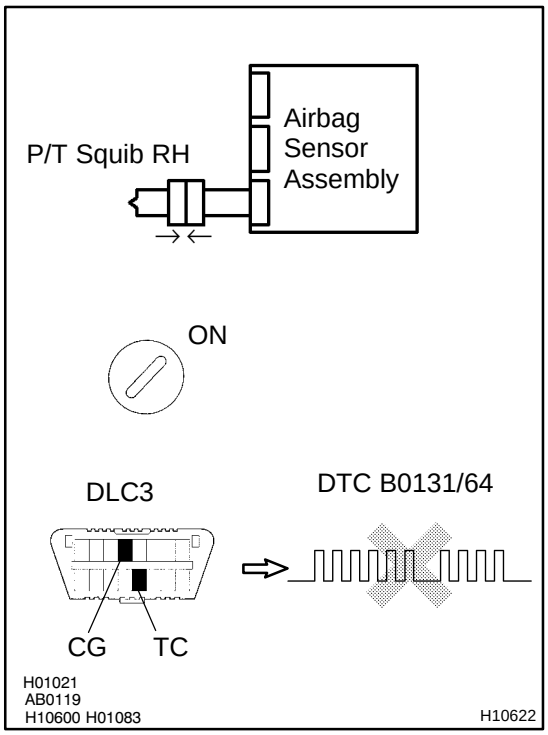
HINT:

Codes other than code B0131/64 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib RH.



PREPARATION:

(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 seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner RH (P/T squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B0132/61	Short in P/T Squib RH Circuit (to Ground)

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the seat belt pretensioner RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0132/61 is recorded when a ground short is detected in the P/T squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0132/61	★Short in P/T squib RH circuit (to ground) ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

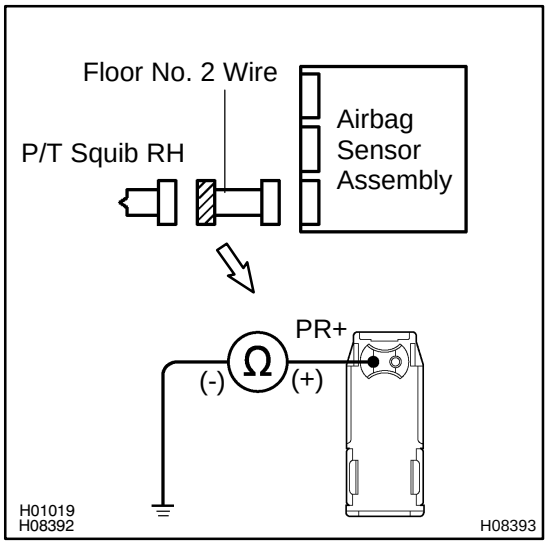
WIRING DIAGRAM

See page DI-692 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-692).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**



CHECK:

Measure the resistance between the body ground and PR+ of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.

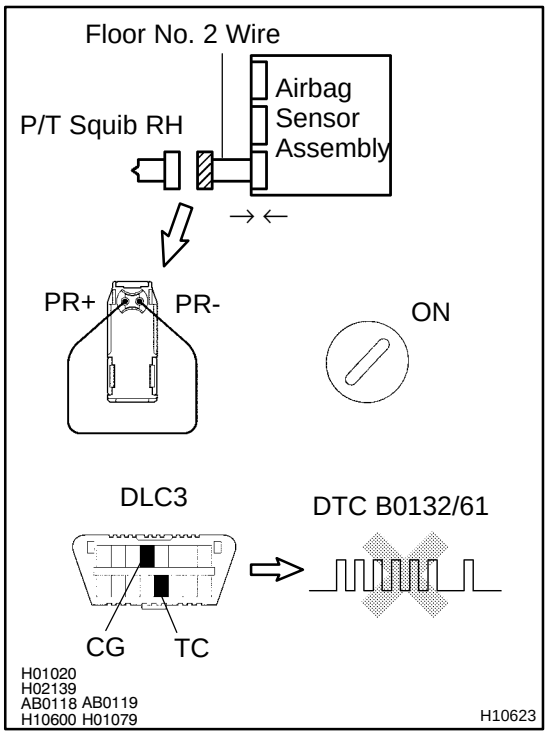
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0132/61 is not output.

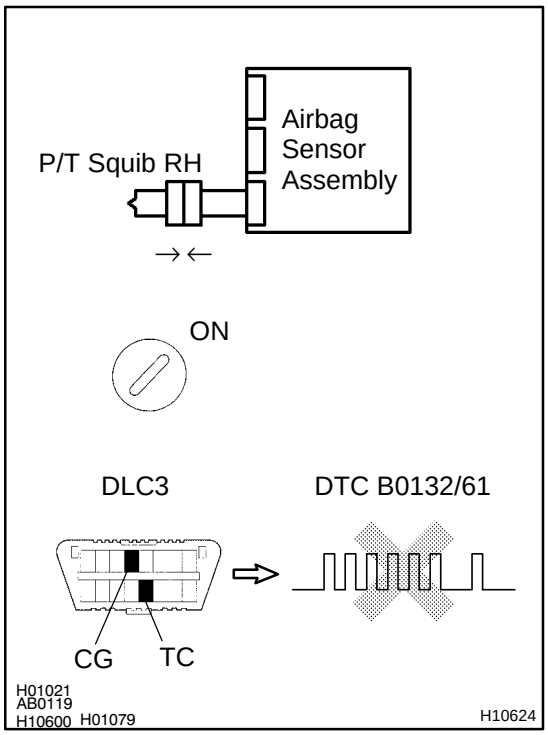
HINT:

Codes other than code B0132/61 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib RH.



PREPARATION:

(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 seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner RH (P/T squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PM-16

DTC	B0133/62	Short in P/T Squib RH Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib RH circuit consists of the airbag sensor assembly and the seat belt pretensioner RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0133/62 is recorded when a B+ short is detected in the P/T squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0133/62	★Short in P/T squib RH circuit (to B+) ★P/T squib RH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner RH (P/T squib RH) ★Airbag sensor assembly ★Floor No. 2 wire ★Dash wire (Bench seat)

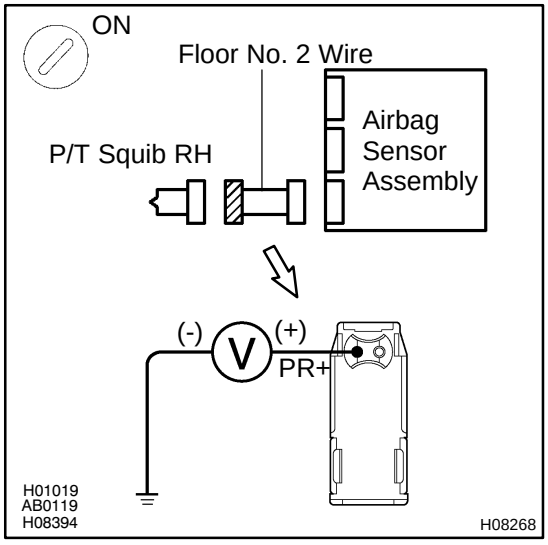
WIRING DIAGRAM

See page DI-777 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (P/T squib RH circuit).**

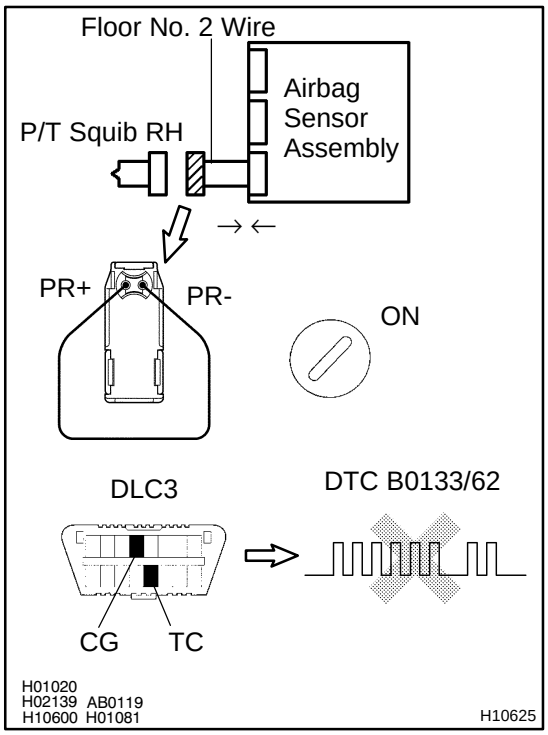


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and PR+ of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
OK:
Voltage: Below 1 V

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect PR+ and PR- of the floor No. 2 wire connector on the seat belt pretensioner RH (P/T squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0133/62 is not output.

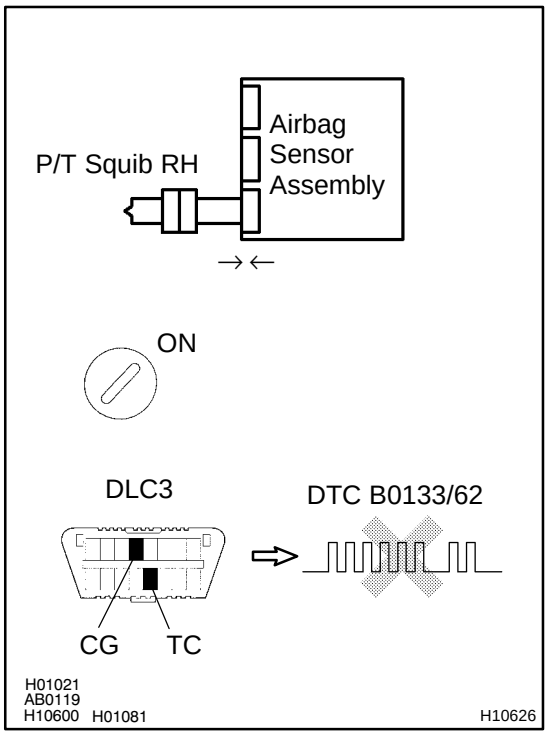
HINT:

Codes other than code B0133/62 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib RH.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner RH (P/T squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner RH (P/T squib RH).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PN-26

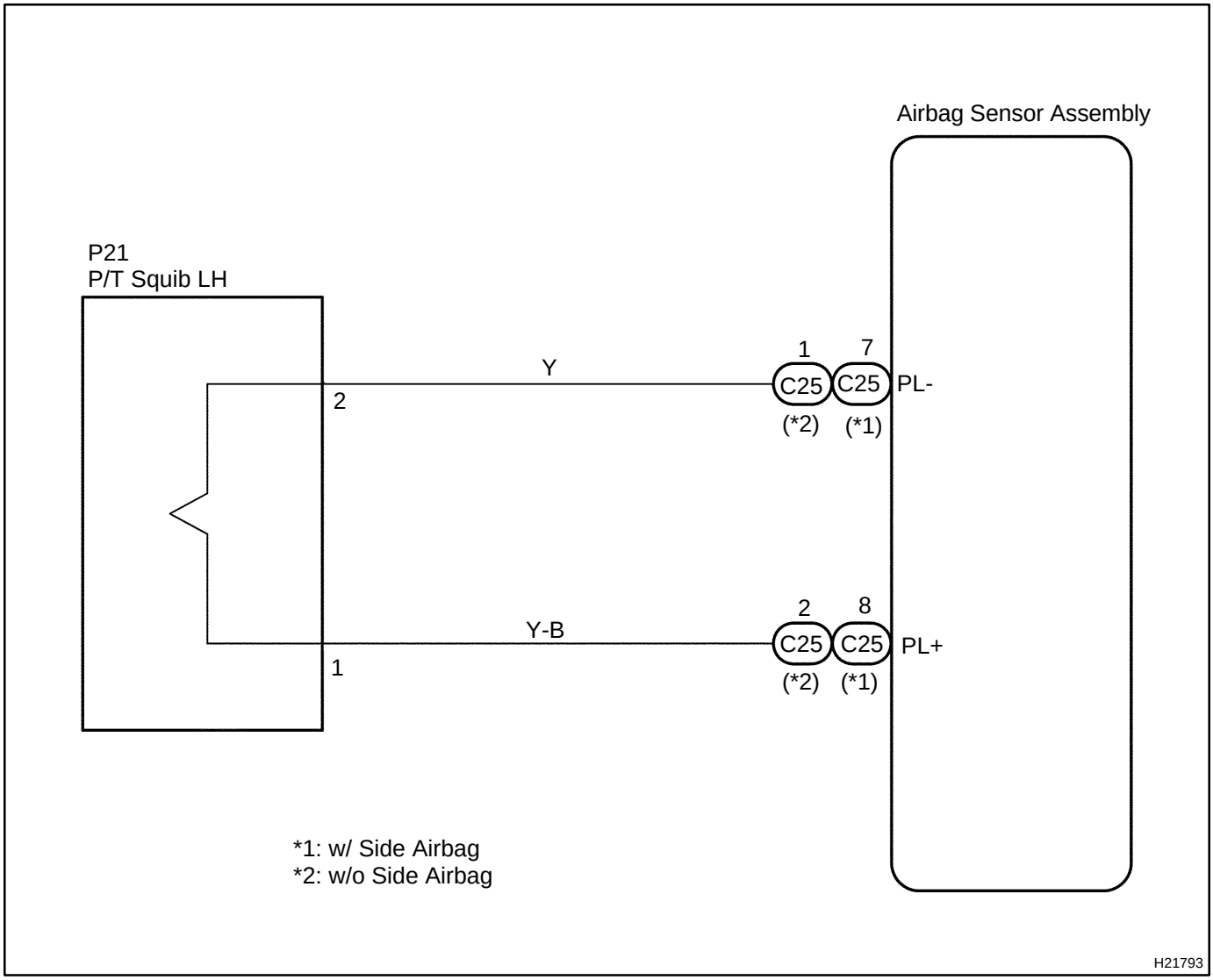
DTC	B0135/73	Short in P/T Squib LH Circuit

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the seat belt pretensioner LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0135/73 is recorded when a short is detected in the P/T squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0135/73	★Short in P/T squib LH circuit ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

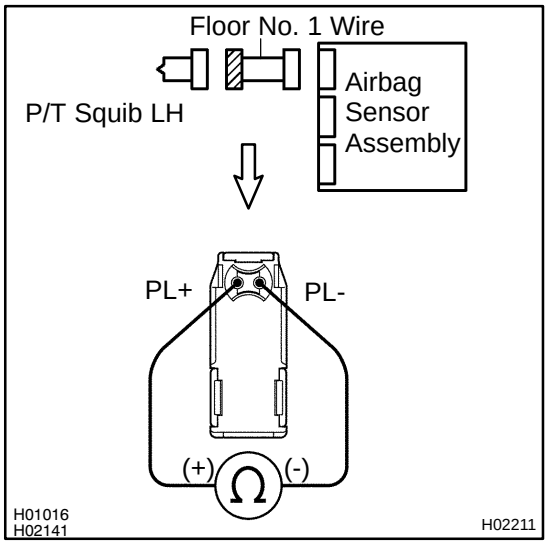
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

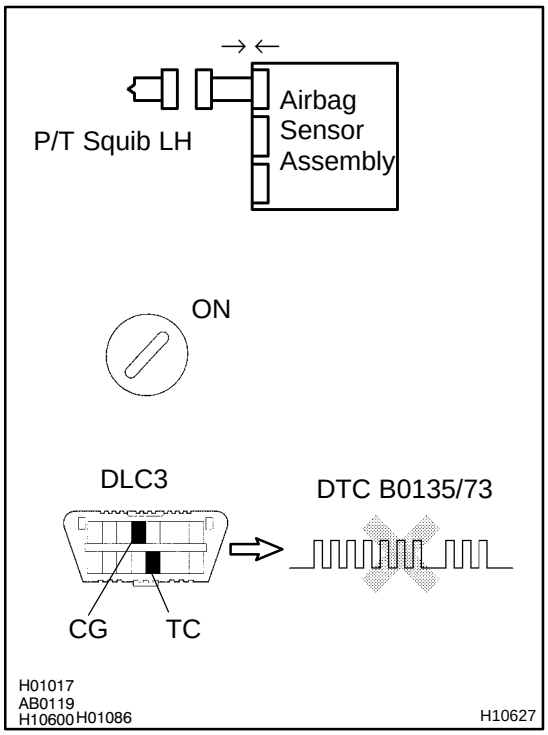
OK:

Resistance: 1 MΩ or Higher

NG	**Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

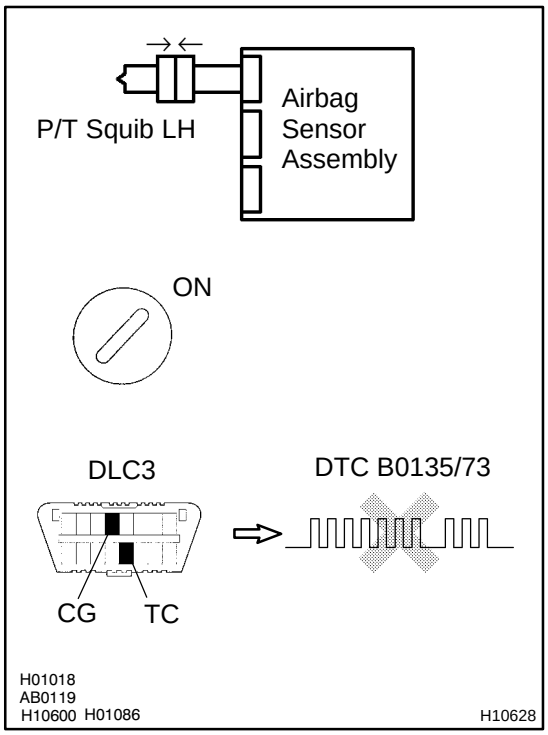
DTC B0135/73 is not output.

HINT:
Codes other than code B0135/73 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check P/T squib LH.



PREPARATION:

(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 seat belt pretensioner LH (P/T squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner LH (P/T squib LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PO-16

DTC	B0136/74	Open in P/T Squib LH Circuit

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the seat belt pretensioner LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0136/74 is recorded when an open is detected in the P/T squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0136/74	★Open in P/T squib LH circuit ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

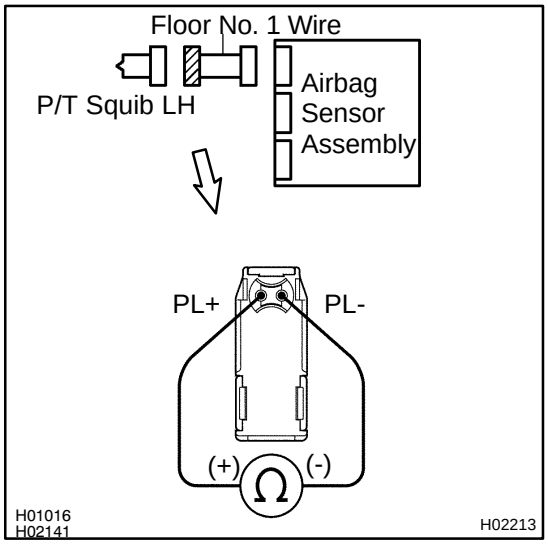
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**



CHECK:

Measure the resistance between PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

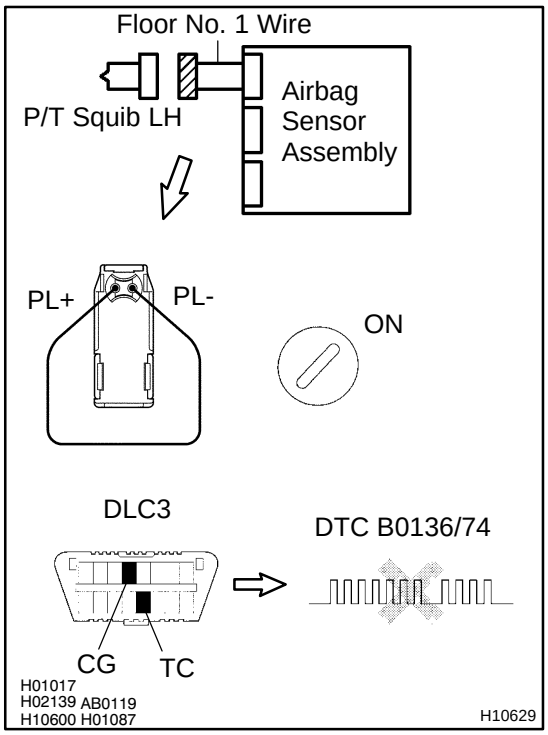
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B0136/74 is not output.

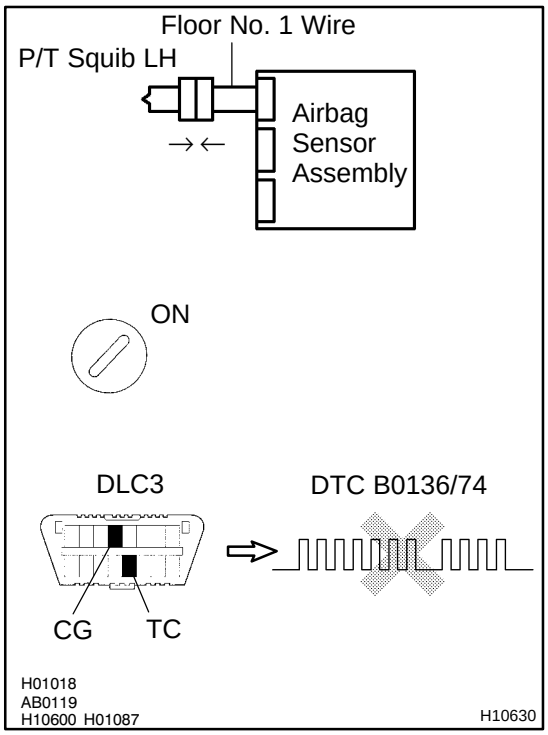
HINT:

Codes other than code B0136/74 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib LH.



PREPARATION:

(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 seat belt pretensioner LH (P/T squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner LH (P/T squib LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B0137/71	Short in P/T Squib LH Circuit (to Ground)

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and the seat belt pretensioner LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0137/71 is recorded when a ground short is detected in the P/T squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0137/71	★Short in P/T squib LH circuit (to ground) ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

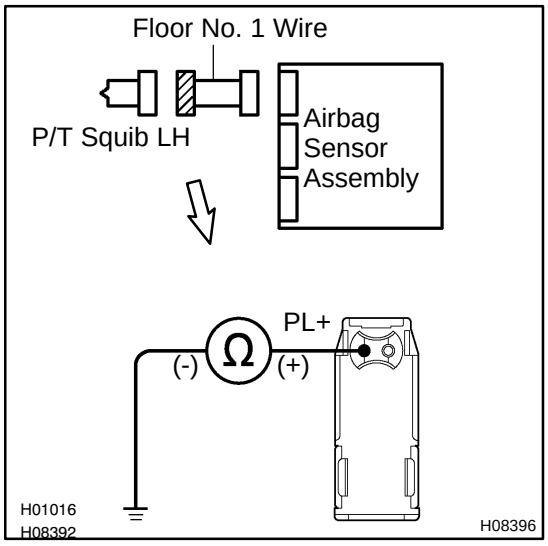
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**



CHECK:

Measure the resistance between the body ground and PL+ of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

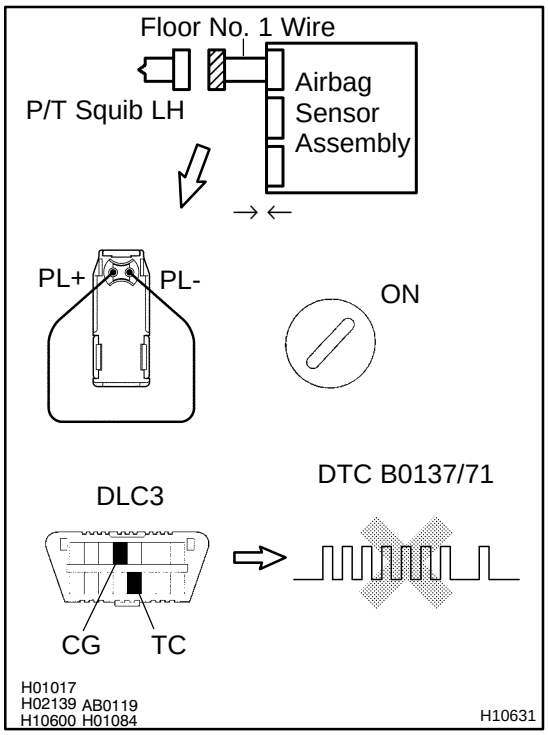
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0137/71 is not output.

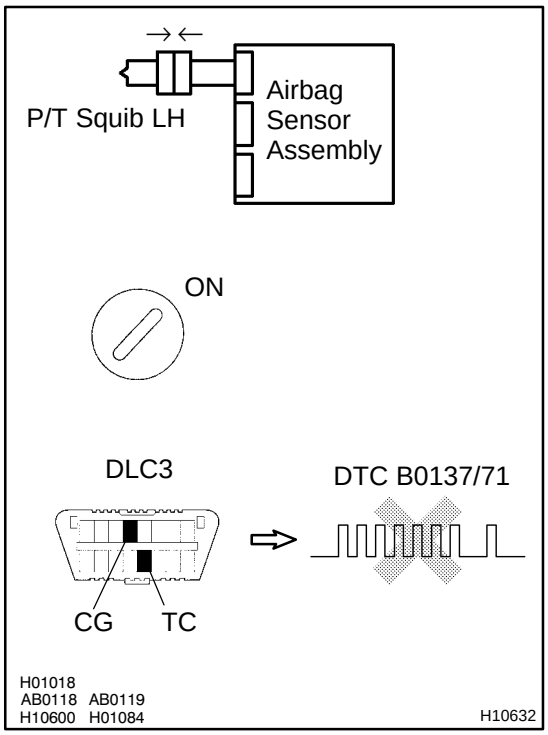
HINT:

Codes other than code B0137/71 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib LH.



PREPARATION:

(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 seat belt pretensioner LH (P/T squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner LH (P/T squib LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PQ-16

DTC	B0138/72	Short in P/T Squib LH Circuit (to B+)

CIRCUIT DESCRIPTION

The P/T squib LH circuit consists of the airbag sensor assembly and seat belt pretensioner LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0138/72 is recorded when a B+ short is detected in the P/T squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0138/72	★Short in P/T squib LH circuit (to B+) ★P/T squib LH malfunction ★Airbag sensor assembly malfunction	★Seat belt pretensioner LH (P/T squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

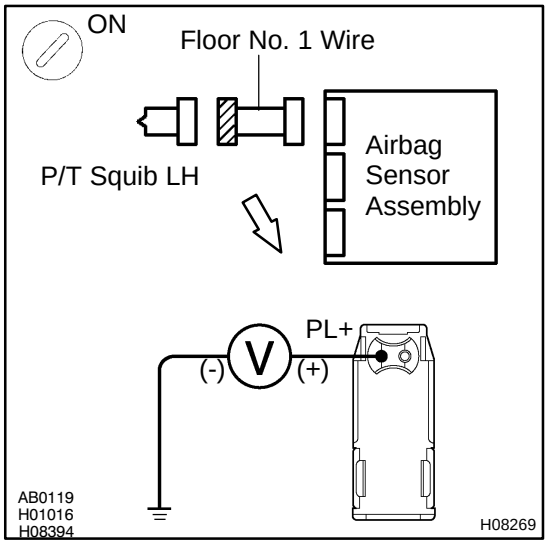
WIRING DIAGRAM

See page DI-790 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (P/T squib LH circuit).**

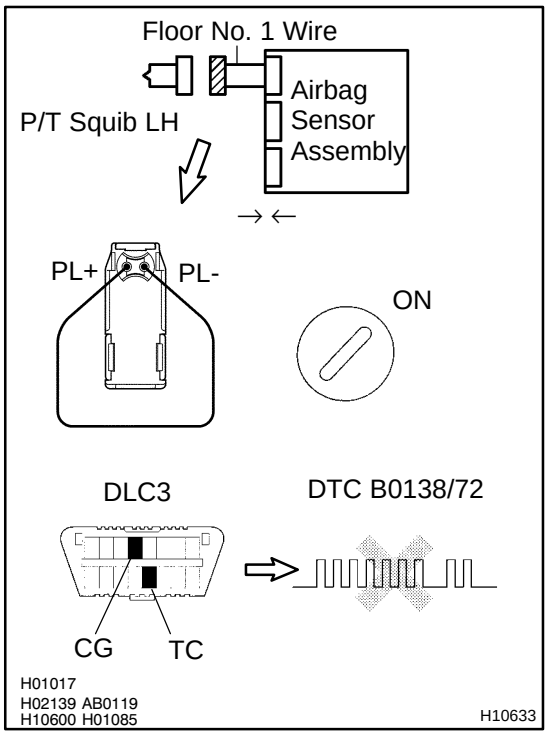


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and PL+ of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.
OK:
Voltage: Below 1 V

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect PL+ and PL- of the floor No. 1 wire connector on the seat belt pretensioner LH (P/T squib LH) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B0138/72 is not output.

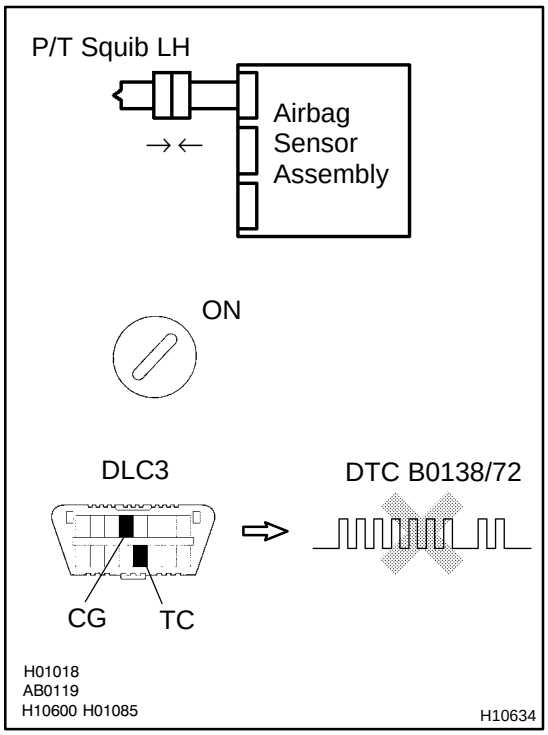
HINT:

Codes other than code B0138/72 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P/T squib LH.



PREPARATION:

(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 seat belt pretensioner LH (P/T squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 seat belt pretensioner LH (P/T squib LH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PR-15

DTC	B1100/31	Airbag Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The airbag sensor assembly consists of the airbag sensor, safing sensor, drive circuit, diagnosis circuit and ignition control, etc.
It receives signals from the airbag sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1100/31 is recorded when occurrence of a malfunction in the airbag sensor assembly is detected.

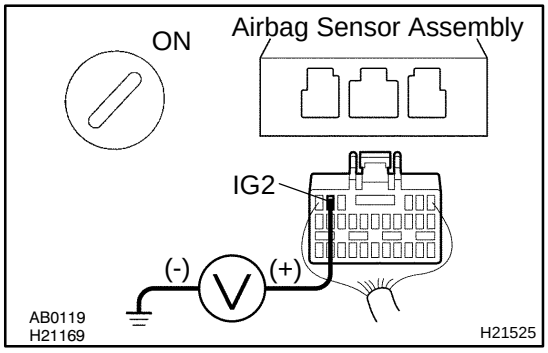
DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	★Airbag sensor assembly malfunction	★Airbag sensor assembly

INSPECTION PROCEDURE

HINT:
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.

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check airbag sensor assembly.**

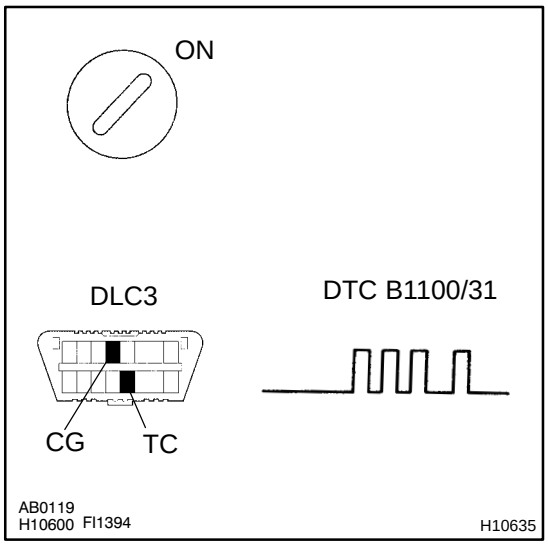


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and IG2 of the dash wire connector on the airbag sensor assembly side.
OK:
Voltage: 10 - 14 V

NG	**Check that an abnormality occurs on the battery and charging system.**

OK

3	Is DTC B1100/31 output again?



PREPARATION:

Clear the DTC (See page DI-692).

CHECK:

(a) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(b) Turn the ignition switch to ON, and wait at least for 10 seconds.

(c) Repeat operation in step (a) and (b) at least 5 times.

(d) Check the DTC (See page DI-692).

OK:

DTC B1100/31 is output.

HINT:

Codes other than code B1100/31 may be output at this time, but they are not relevant to this check.

NO → **Using simulation method, reproduce malfunction symptoms (See page IN-26).**

YES

Replace airbag sensor assembly.

DIB3S-01

DTC	B1135/24	Half Connection in Airbag Sensor Assembly Connector

CIRCUIT DESCRIPTION

The airbag sensor assembly detects partial connection of connector.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1135/24 is recorded when the airbag sensor assembly detects an open in the electrical connection check mechanism of the airbag sensor connector or in the airbag sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1135/24	★Malfunction of electrical connection check mechanism of airbag sensor assembly connector ★Airbag sensor assembly malfunction	★Electrical connection check mechanism ★Airbag sensor assembly

INSPECTION PROCEDURE

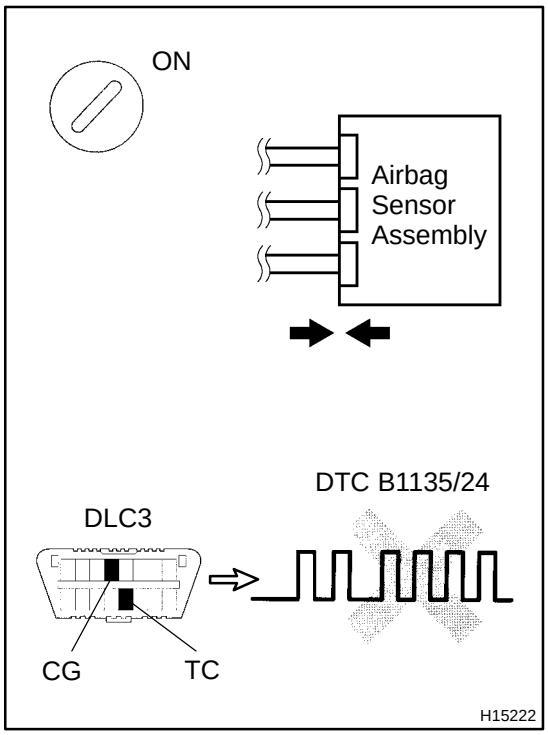
1	**Are connectors of airbag sensor assembly properly connected?**

NO → **Connect connectors.**

YES

2	**Prepare for inspection (See step 1 on page DI-923).**

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connectors to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1135/24 is not output.

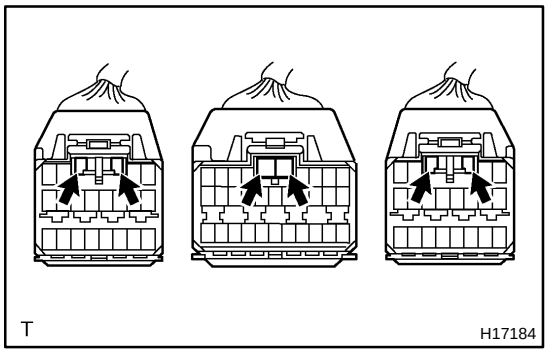
HINT:

Codes other than code B1135/24 may be output at this time, but they are not relevant to this check.

OK	Complete.

NG

4	Perform a visual check of the disconnection detection pin.



OK:

No deformation is identified.

HINT:

Compare it with the other 2 connector pins.

NG	Repair or replace wire harness.

OK

Replace airbag sensor assembly.

DIB3T-01

DTC	B1140/32	Side and Curtain Shield Airbag Sensor Assembly RH Malfunction

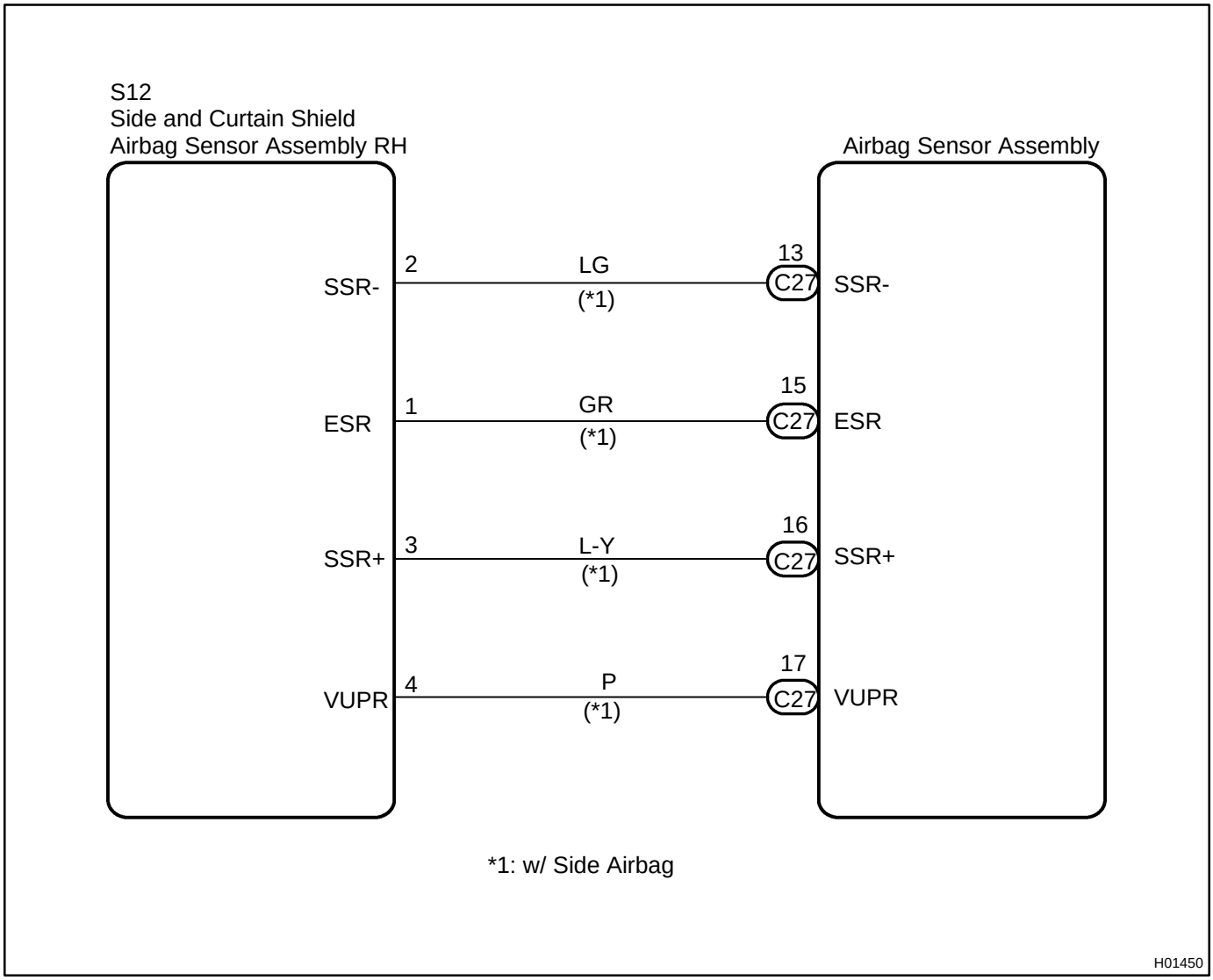
CIRCUIT DESCRIPTION

The side and curtain shield airbag sensor assembly RH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor assembly RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	★Side and curtain shield airbag sensor assembly RH malfunction	★Side and curtain shield airbag sensor assembly RH ★Floor No. 2 wire ★Airbag sensor assembly

HINT:
DTC B1140/32 is indicated only for the vehicle equipped with the side airbag.

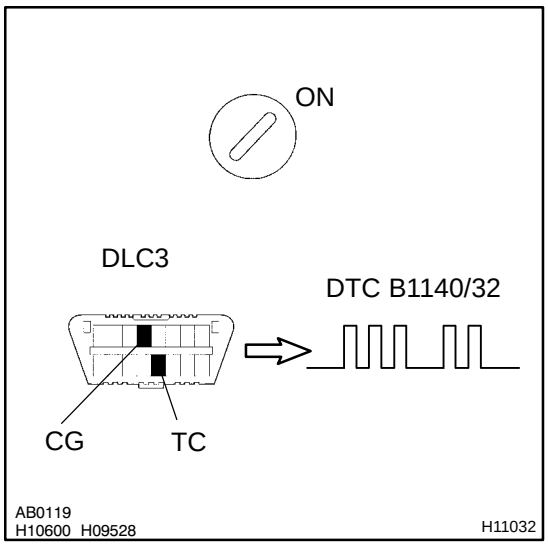
WIRING DIAGRAM



H01450

INSPECTION PROCEDURE

1	**Is DTC B1140/32 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

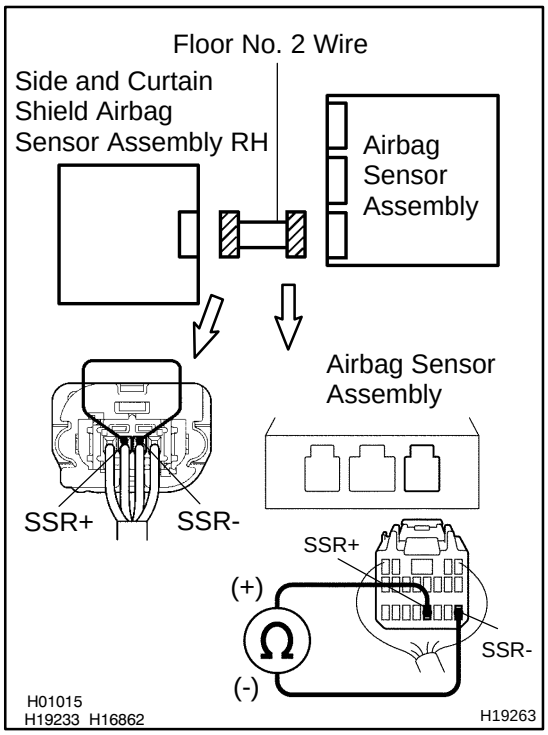
2	**Is connector of side and curtain shield airbag sensor assembly RH properly connected?**

NO → **Connect connector.**

YES

3	**Prepare for inspection (See step 1 on DI-923).**

4	**Check floor No. 2 wire.**



PREPARATION:

Using a service wire, connect SSR+ and SSR- of the floor No. 2 wire connector on the side and curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between SSR+ and SSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

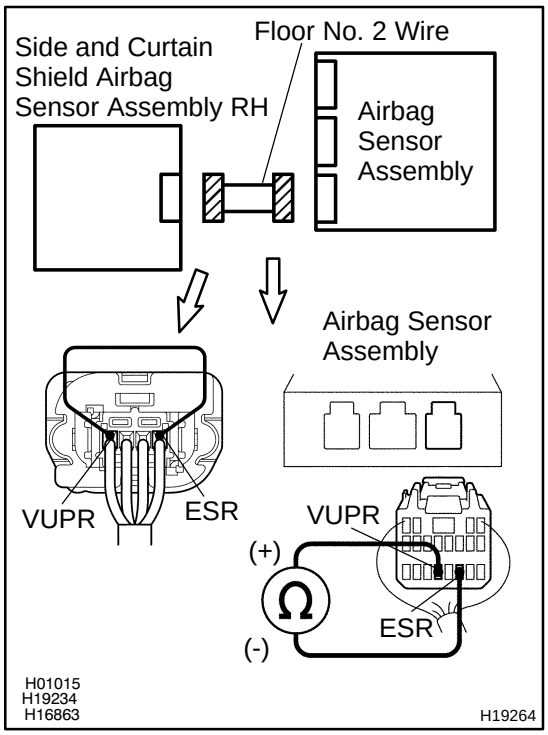
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

5	Check floor No. 2 wire.



PREPARATION:

Using a service wire, connect VUPR and ESR of the floor No. 2 wire connector on the side and curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between VUPR and ESR of the floor No. 2 wire connector on the airbag sensor assembly side.

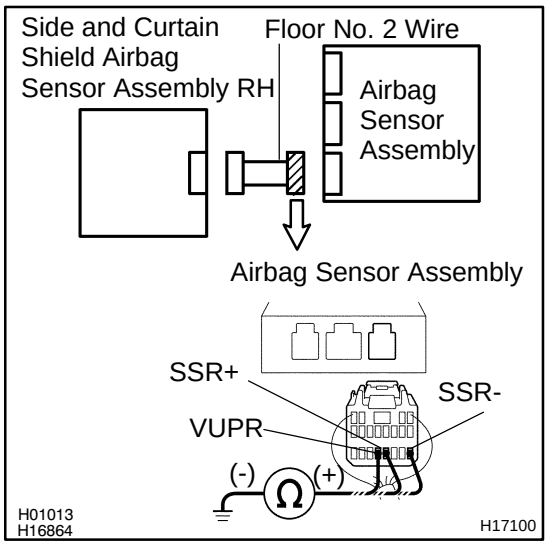
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

6	**Check floor No. 2 wire (to ground).**



CHECK:

Measure the resistance between the body ground and each of VUPR, SSR+ and SSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

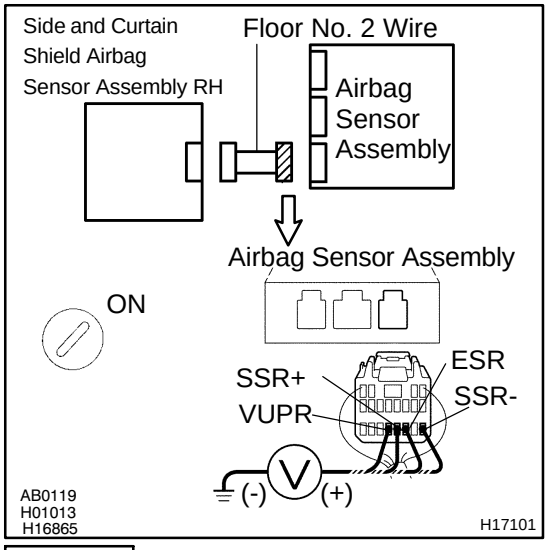
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

7	**Check floor No. 2 wire (to B+).**



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUPR, SSR+, SSR- and ESR of the floor No. 2 wire connector on the airbag sensor assembly side.

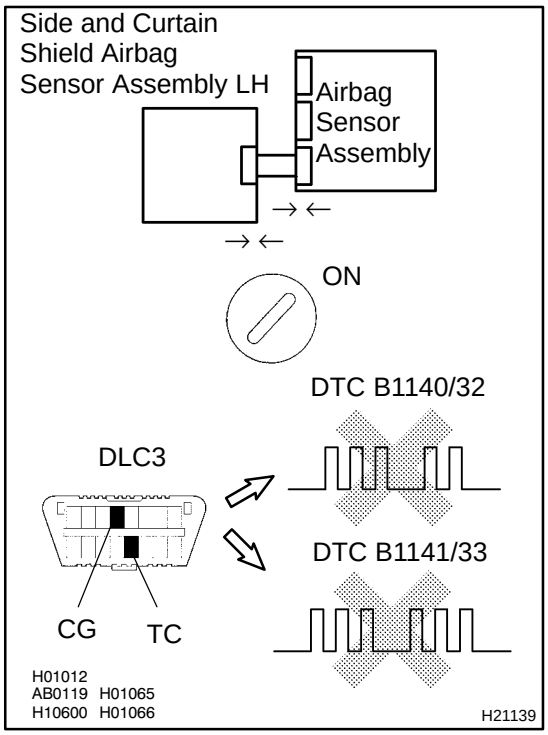
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 2 wire.**

OK

8	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Change the side and curtain shield airbag sensor assembly LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1140/32 nor B1141/33 are not output.

HINT:

Codes other than code B1140/32 or B1141/33 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly (DTC B1140/32 is output).**

NG → **Replace side and curtain shield airbag sensor assembly RH (DTC B1141/33 is output).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DIB3U-01

DTC	B1141/33	Side and Curtain Shield Airbag Sensor Assembly LH Malfunction

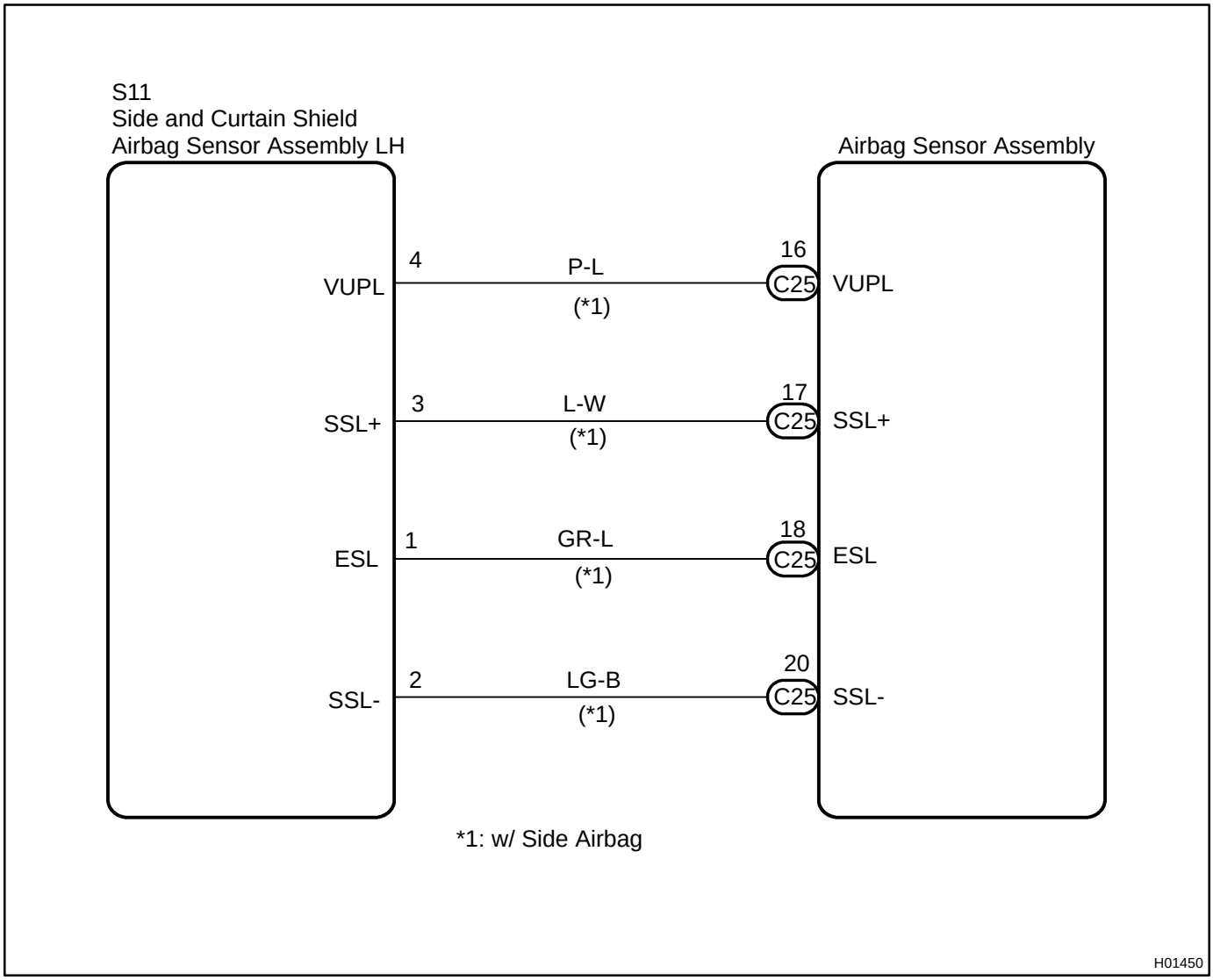
CIRCUIT DESCRIPTION

The side and curtain shield airbag sensor assembly LH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1141/33 is recorded when occurrence of a malfunction in the side and curtain shield airbag sensor assembly LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	★Side and curtain shield airbag sensor assembly LH malfunction	★Side and curtain shield airbag sensor assembly LH ★Floor No. 1 wire ★Airbag sensor assembly

HINT:
DTC B1141/33 is indicated only for the vehicle equipped with the side airbag.

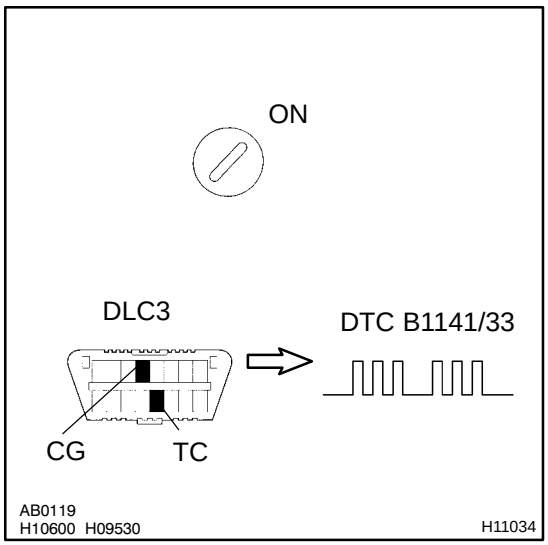
WIRING DIAGRAM



H01450

INSPECTION PROCEDURE

1	**Is DTC B1141/33 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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.

YES	**The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

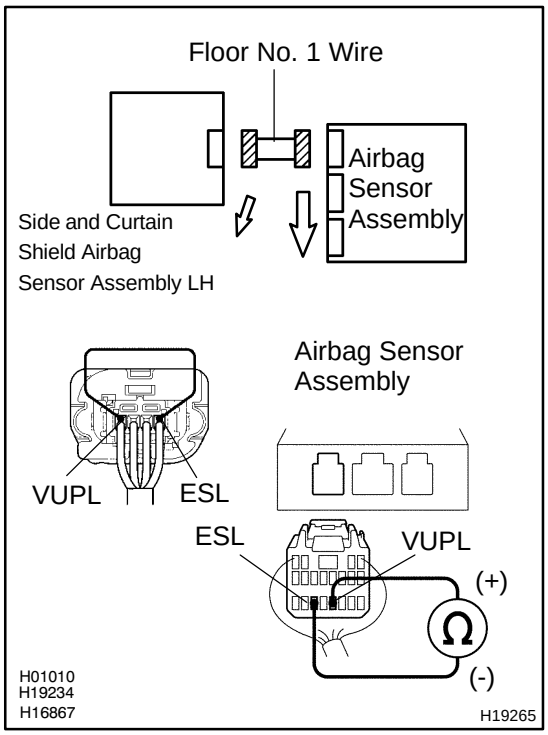
2	**Is connector of side and curtain shield airbag sensor assembly LH properly connected?**

NO	**Connect connector.**

YES

3	**Prepare for inspection (See step 1 on page DI-923).**

4	Check floor No. 1 wire.



PREPARATION:

Using a service wire, connect VUPL and ESL of the floor No. 1 wire connector on the side and curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between VUPL and ESL of the floor No. 1 wire connector on the airbag sensor assembly side.

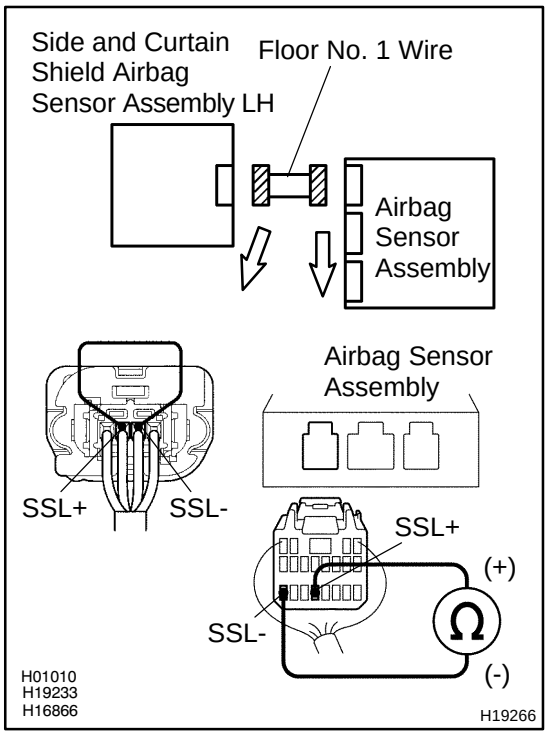
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

5	Check floor No. 1 wire.



PREPARATION:

Using a service wire, connect SSL+ and SSL- of the floor No. 1 wire connector on the side and curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between SSL+ and SSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

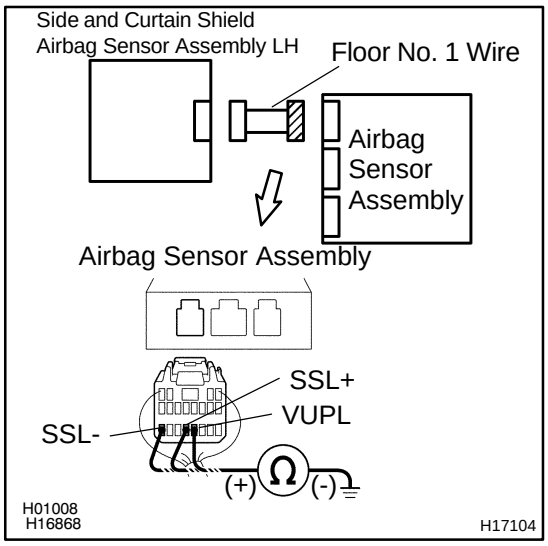
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

6	Check floor No. 1 wire (to ground).



CHECK:

Measure the resistance between the body ground and each of VUPL, SSL+ and SSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

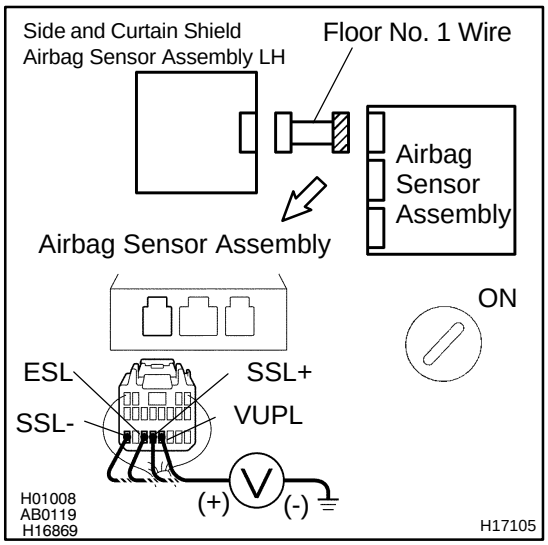
OK:

Resistance: 10 kΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

7	Check floor No. 1 wire (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUPL, SSL+, SSL- and ESL of the floor No. 1 wire connector on the airbag sensor assembly side.

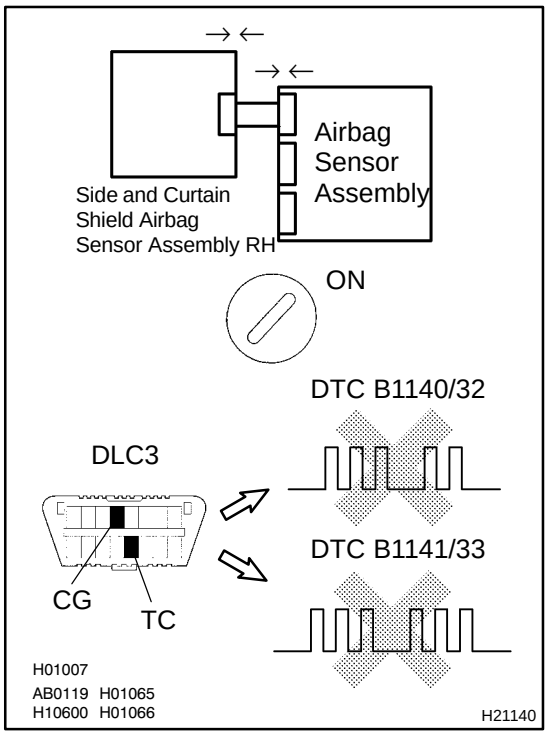
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 1 wire.**

OK

8	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Change the side and curtain shield airbag sensor assembly RH position with LH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1141/33 nor B1140/32 are not output.

HINT:

Codes other than code B1141/33 or B1140/32 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly (DTC B1141/33 is output).**

NG → **Replace side and curtain shield airbag sensor assembly LH (DTC B1140/32 is output).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DIB3V-01

DTC	B1148/36	Front Airbag Sensor RH Malfunction

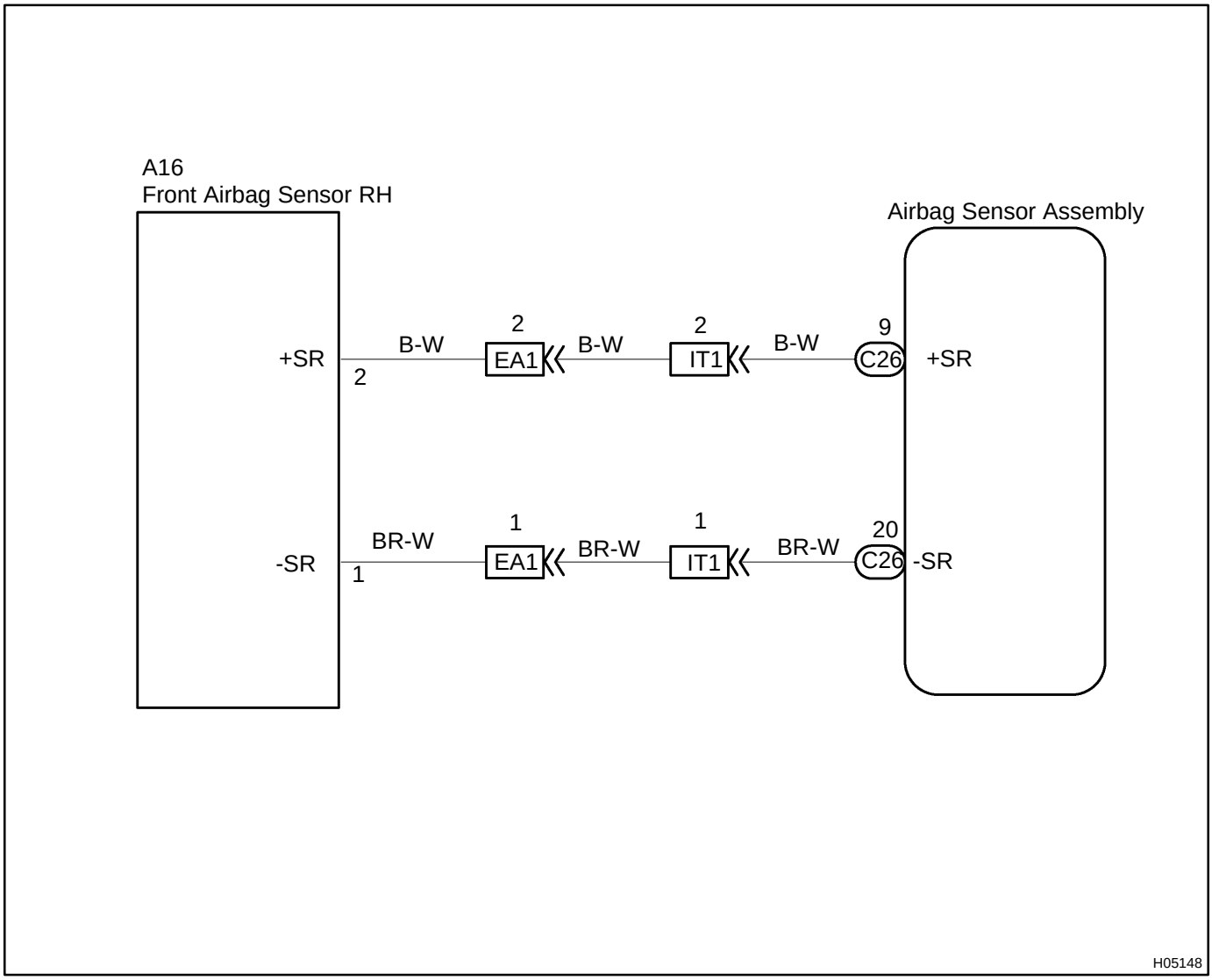
CIRCUIT DESCRIPTION

The front airbag sensor RH circuit consists of the diagnosis circuit and frontal deceleration sensor, etc.
If receives signals from the frontal deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1148/36 is recorded when occurrence of a malfunction in the front airbag sensor RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1148/36	★Front airbag sensor RH malfunction	★Front airbag sensor RH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire

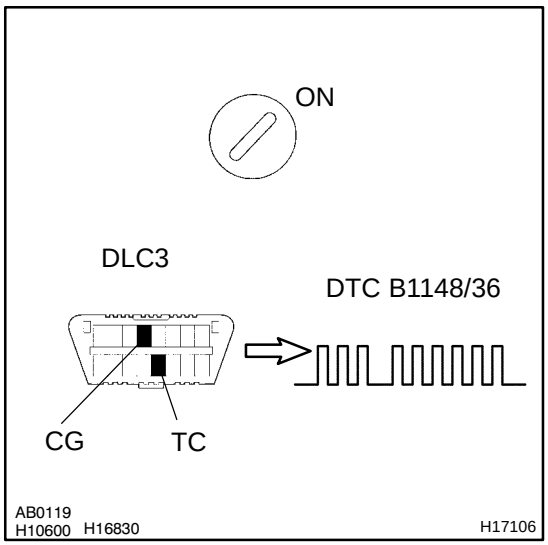
HINT:
DTC B1148/36 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1148/36 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1148/36 is output.

HINT:

Codes other than code B1148/36 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

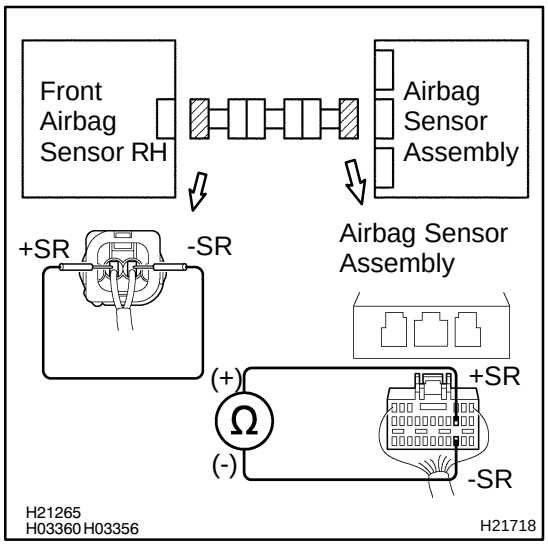
2	**Is connector of front airbag sensor RH properly connected?**

No → **Connect connector.**

YES

3	**Prepare for inspection (See step 1 on DI-923).**

4	Check wire harness.



PREPARATION:

Using a service wire, connect +SR and -SR on the front airbag sensor RH side between the front airbag sensor RH and the airbag sensor assembly.

CHECK:

Measure the resistance between +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.

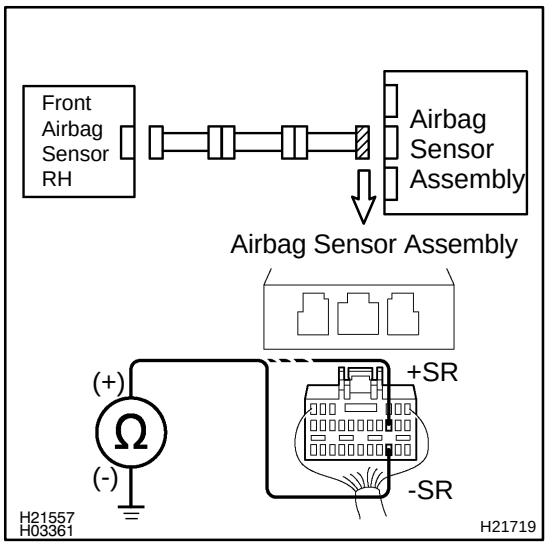
OK:

Resistance: Below 1 Ω

NG	Go to step 8.

OK

5	Check wire harness (to ground).



CHECK:

Measure the resistance between the body ground and each of +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.

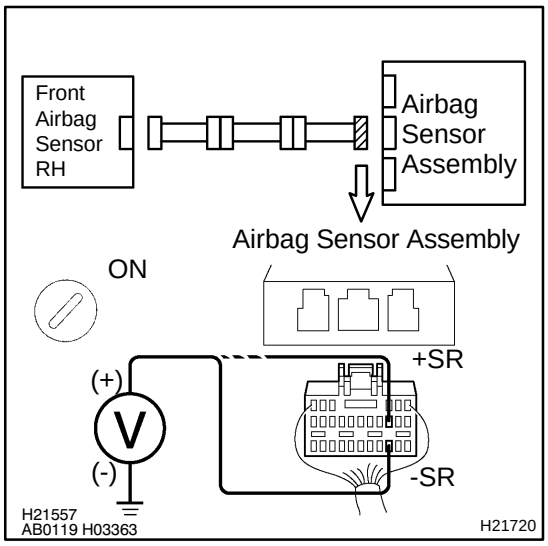
OK:

Resistance: 1 MΩ or Higher

NG	Go to step 10.

OK

6	Check wire harness (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SR and -SR on the airbag sensor assembly side between the front airbag sensor RH and the airbag sensor assembly.

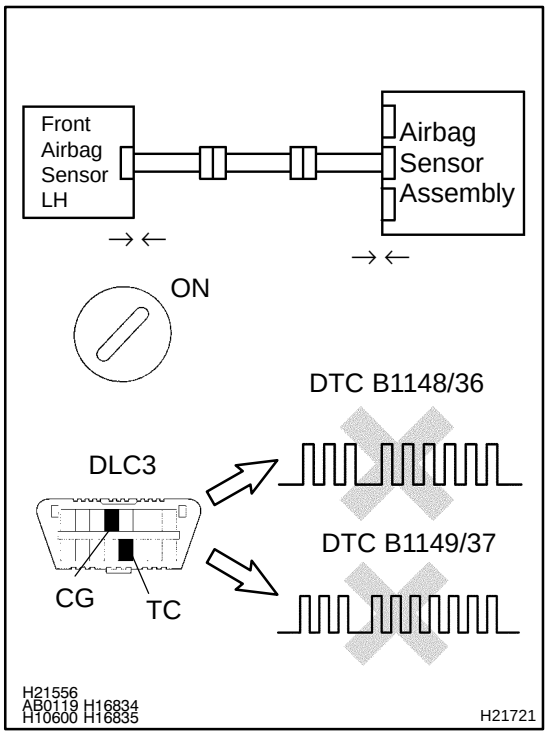
OK:

Voltage: Below 1 V

NG → **Go to step 12.**

OK

7	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Change the front airbag sensor LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1148/36 nor B1149/37 are not output.

HINT:

Codes other than code B1148/36 or B1149/37 may be output at this time, but they are not relevant to this check.

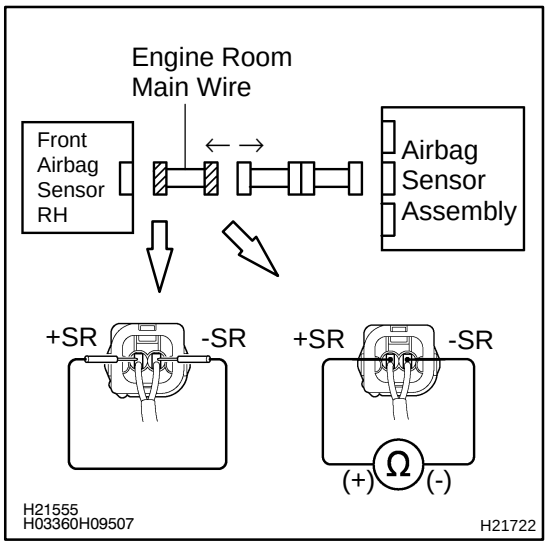
NG	Replace airbag sensor assembly (DTC B1148/36 is output).

NG	Replace front airbag sensor RH (DTC B1149/37 is output).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

8	Check engine room main wire.



PREPARATION:

(a) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(b) Using a service wire, connect +SR and -SR of the engine room main wire connector on the front airbag sensor RH side.

CHECK:

Measure the resistance between +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.

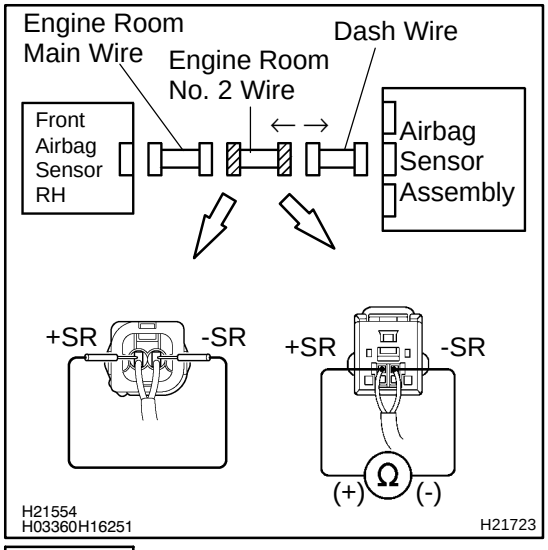
OK:

Resistance: Below 1 Ω

NG	Repair or replace engine room main wire.

OK

9	Check engine room No. 2 wire.



PREPARATION:

(a) Disconnect the engine room No. 2 wire connector from the dash wire.

(b) Using a service wire, connect +SR and -SR of the engine room No. 2 wire connector on the engine room main wire side.

CHECK:

Measure the resistance between +SR and -SR of the engine room No. 2 wire connector on the dash wire side.

OK:

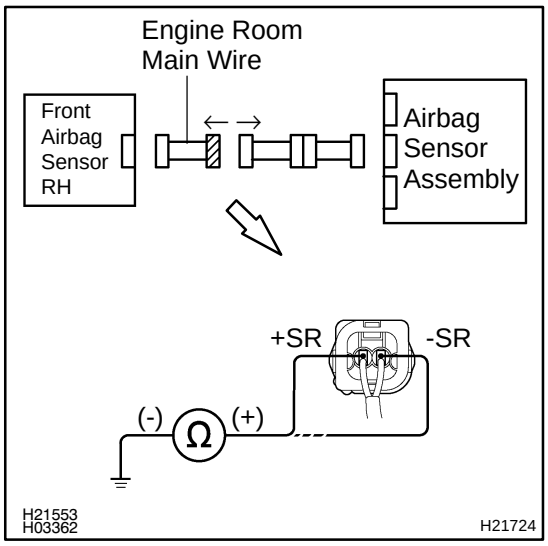
Resistance: Below 1 Ω

NG	Repair or replace engine room No. 2 wire.

OK

Repair or replace dash wire.

10	Check engine room main wire (to ground).

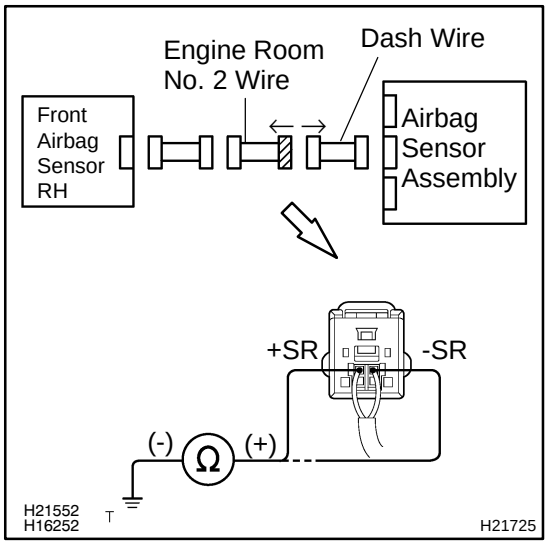


PREPARATION:
Disconnect the engine room main wire connector on the airbag sensor assembly side.
CHECK:
Measure the resistance between the body ground and each of +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire.**

OK

11	Check engine room No. 2 wire (to ground).



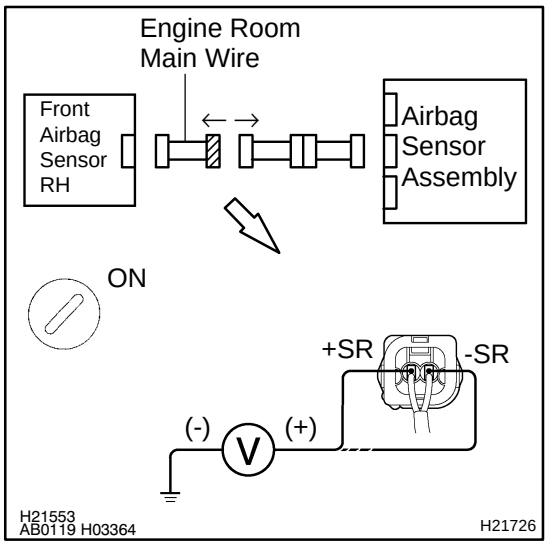
PREPARATION:
Disconnect the engine room No. 2 wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and each of +SR and -SR of the engine room No. 2 wire connector on the dash wire side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

12	Check engine room main wire (to B+).



PREPARATION:

(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 engine room main wire connector on the airbag sensor assembly side.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of +SR and -SR of the engine room main wire connector on the airbag sensor assembly side.

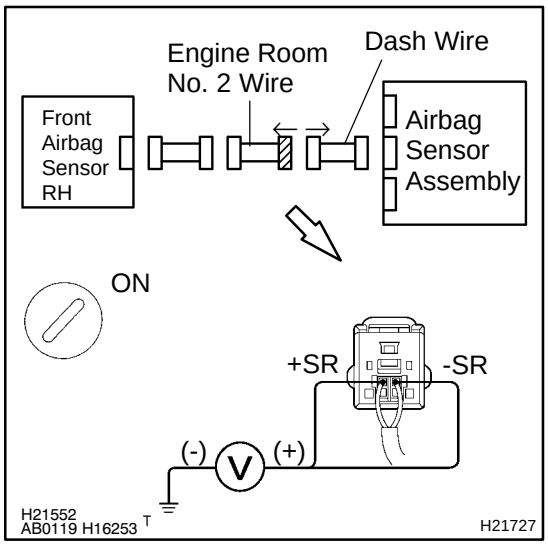
OK:

Voltage: Below 1 V

NG	Repair or replace engine room main wire.

OK

13	Check engine room No. 2 wire (to B+).



PREPARATION:

(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 engine room No. 2 wire connector from the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of +SR and -SR of the engine room No. 2 wire connector on the dash wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace engine room No. 2 wire.

OK

Repair or replace dash wire.

DIB3W-01

DTC	B1149/37	Front Airbag Sensor LH Malfunction

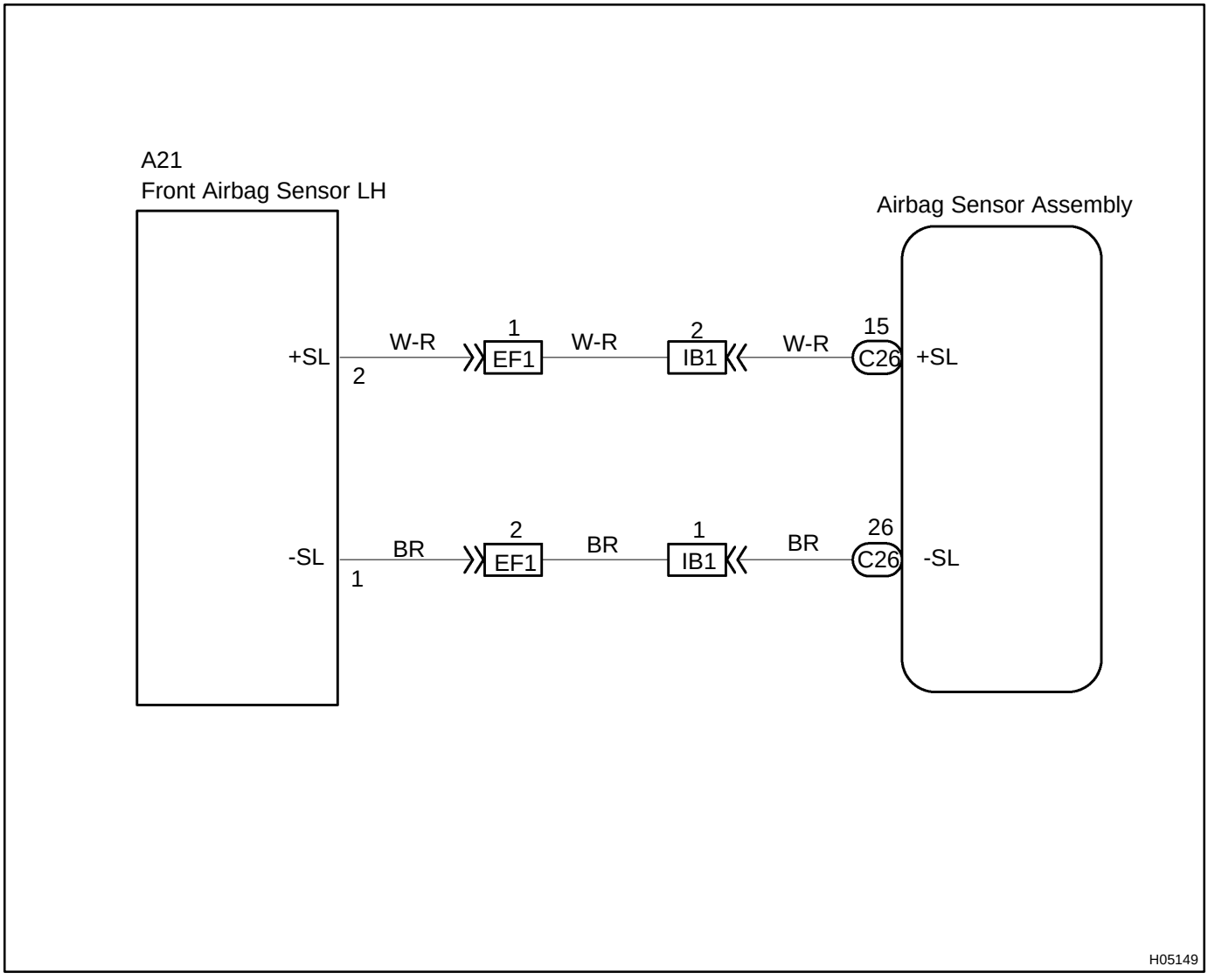
CIRCUIT DESCRIPTION

The front airbag sensor LH circuit consists of the diagnosis circuit and frontal deceleration sensor, etc.
If receives signals from the frontal deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1149/37 is recorded when malfunction is detected in the front airbag sensor LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1149/37	★Front airbag sensor LH malfunction	★Front airbag sensor LH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire

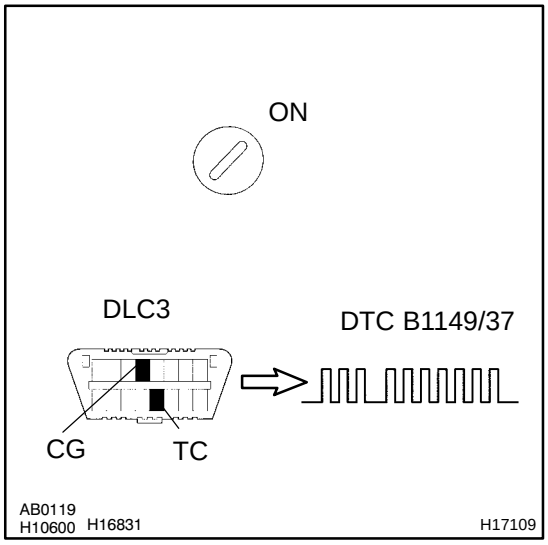
HINT:
DTC B1149/37 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Is DTC B1149/37 output?



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1149/37 is output.

HINT:
Codes other than code B1149/37 may be output at this time, but they are not relevant to this check.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

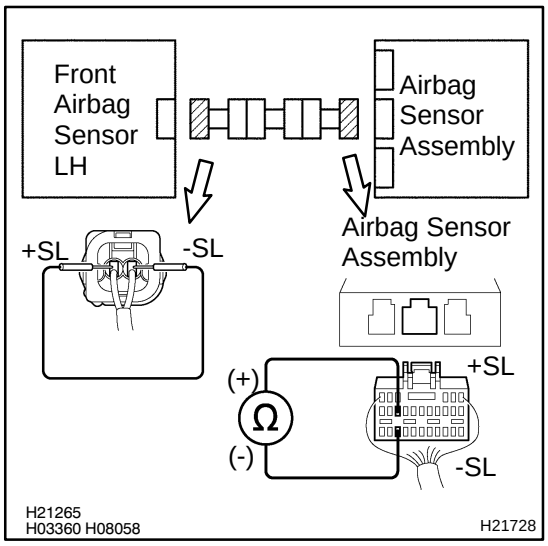
2	Is connector of front airbag sensor LH properly connected?

NO → **Connect connector.**

YES

3	Prepare for inspection (See step 1 on page DI-923).

4	Check wire harness.



PREPARATION:

Using a service wire, connect +SL and -SL on the front airbag sensor LH side between the airbag sensor assembly and the front airbag sensor LH.

CHECK:

Measure the resistance between +SL and - SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

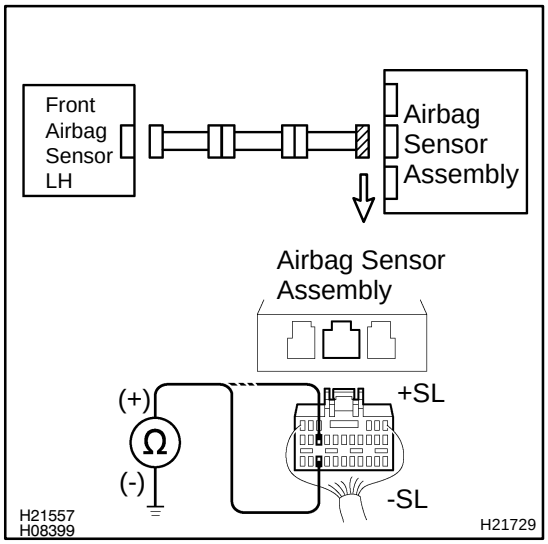
OK:

Resistance: Below 1 Ω

NG → **Go to step 8.**

OK

5	Check wire harness (to ground).



CHECK:

Measure the resistance between the body ground and each of +SL and -SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

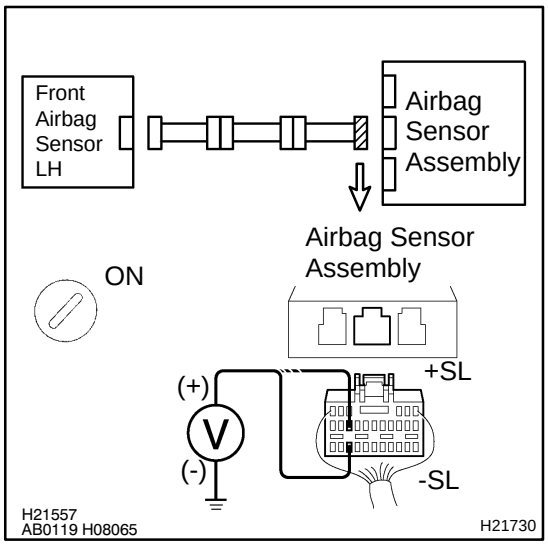
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 10.**

OK

6	Check wire harness (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of +SL and -SL on the airbag sensor assembly side between the front airbag sensor LH and the airbag sensor assembly.

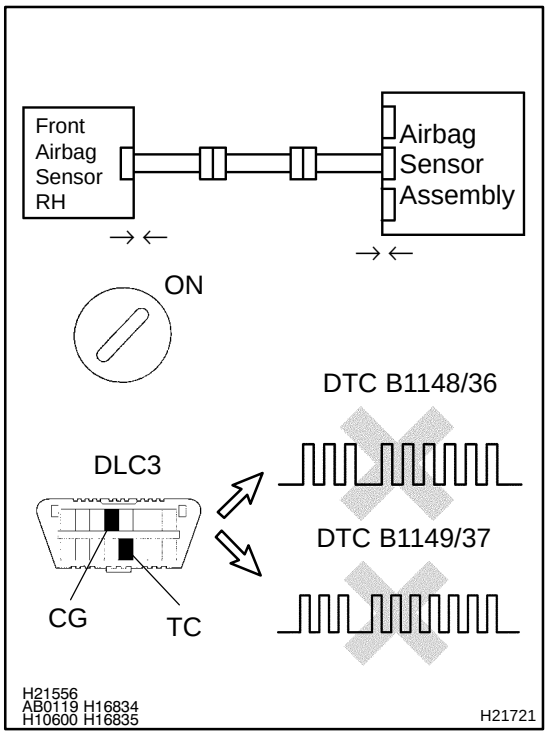
OK:

Voltage: Below 1 V

NG → **Go to step 12.**

OK

7	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Change the front airbag sensor RH position with LH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1148/36 nor B1149/37 not output.

HINT:

Codes other than code B1149/37 or B1148/36 may be output at this time, but they are not relevant to this check.

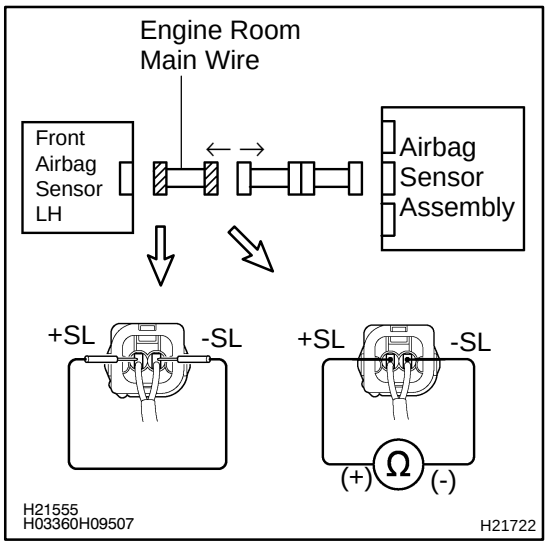
NG → **Replace airbag sensor assembly (DTC B1149/37 is output).**

NG → **Replace front airbag sensor LH (DTC B1148/36 is output).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

8	**Check engine room main wire.**



PREPARATION:

(a) Disconnect the engine room main wire connector on the airbag sensor assembly side.

(b) Using a service wire, connect +SL and -SL of the engine room main wire on the front airbag sensor LH side.

CHECK:

Measure the resistance between +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.

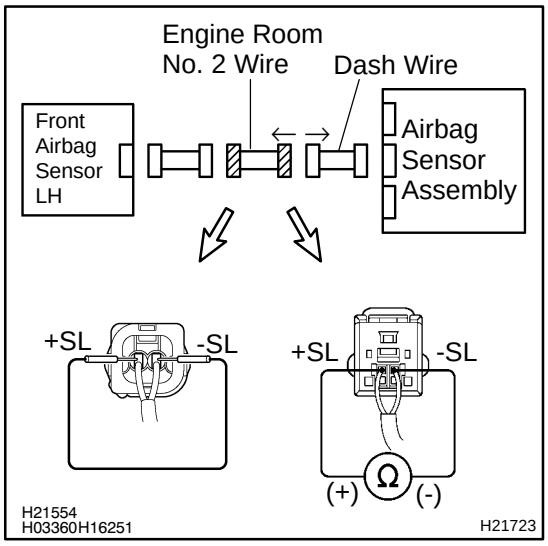
OK:

Resistance: Below 1 Ω

NG → **Repair or replace engine room main wire.**

OK

9	**Check engine room No. 2 wire.**



PREPARATION:

(a) Disconnect the engine room No. 2 wire connector from the dash wire.

(b) Using a service wire, connect +SL and -SL of the engine room No. 2 wire on the engine room main wire side.

CHECK:

Measure the resistance between +SL and -SL of the engine room No. 2 wire connector on the dash wire side.

OK:

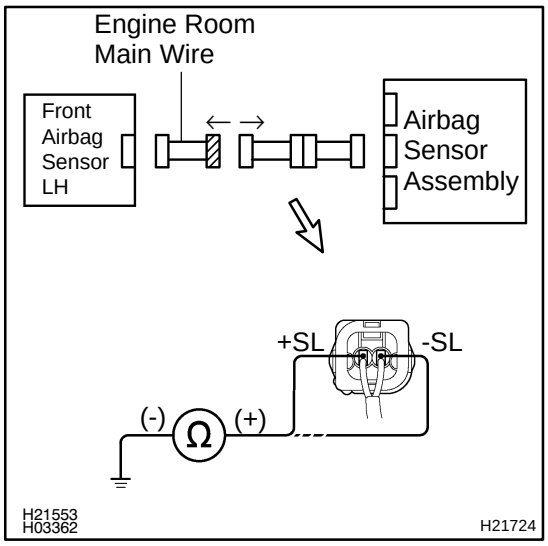
Resistance: Below 1 Ω

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

10	Check engine room main wire (to ground).

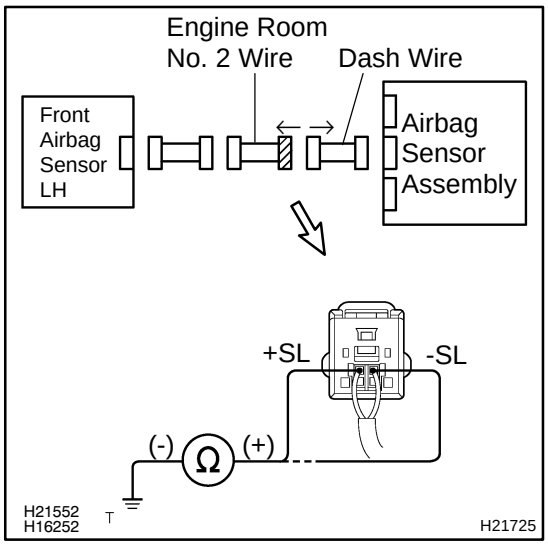


PREPARATION:
Disconnect the engine room main wire connector on the airbag sensor assembly side.
CHECK:
Measure the resistance between the body ground and each of +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire.**

OK

11	Check engine room No. 2 wire (to ground).



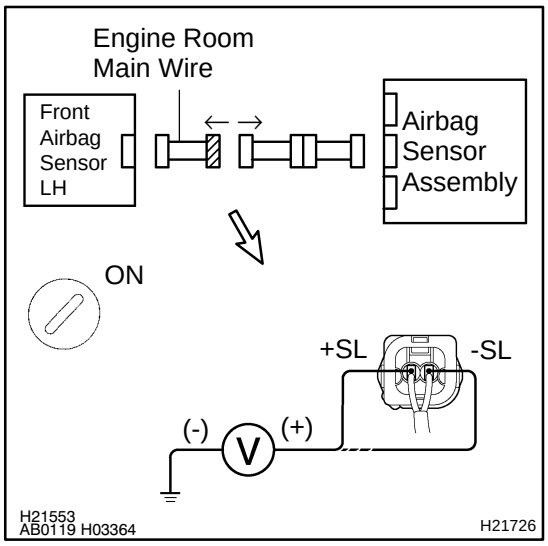
PREPARATION:
Disconnect the engine room No. 2 wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and each of +SL and -SL of the engine room No. 2 wire connector on the dash wire side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room No. 2 wire.**

OK

Repair or replace dash wire.

12	Check engine room main wire (to B+).



PREPARATION:

(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 engine room main wire connector on the airbag sensor assembly side.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of +SL and -SL of the engine room main wire connector on the airbag sensor assembly side.

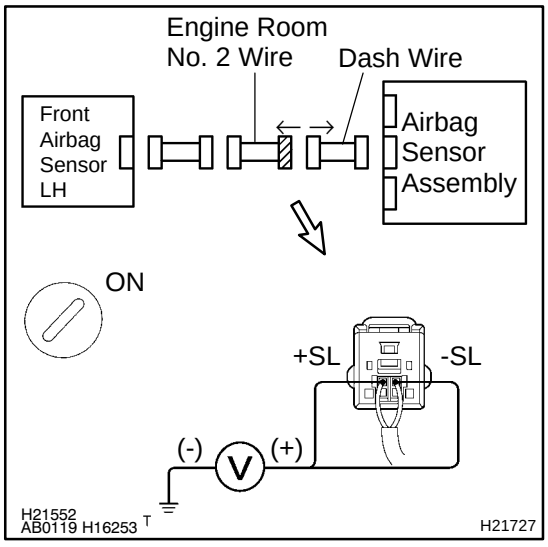
OK:

Voltage: Below 1 V

NG	Repair or replace engine room main wire.

OK

13	Check engine room No. 2 wire (to B+).



PREPARATION:

(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 engine room No. 2 wire connector from the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and each of +SL and -SL of the engine room No. 2 wire connector on the dash wire side.

OK:

Voltage: Below 1 V

NG	Repair or replace engine room No. 2 wire.

OK

Repair or replace dash wire.

DIB3X-01

DTC	B1153/25	Seat Position Sensor Assembly Malfunction

CIRCUIT DESCRIPTION

The seat position sensor circuit consists of the airbag sensor assembly and the seat position sensor assembly.

For details of the function of each components, see OPERATION on page RS-3 .

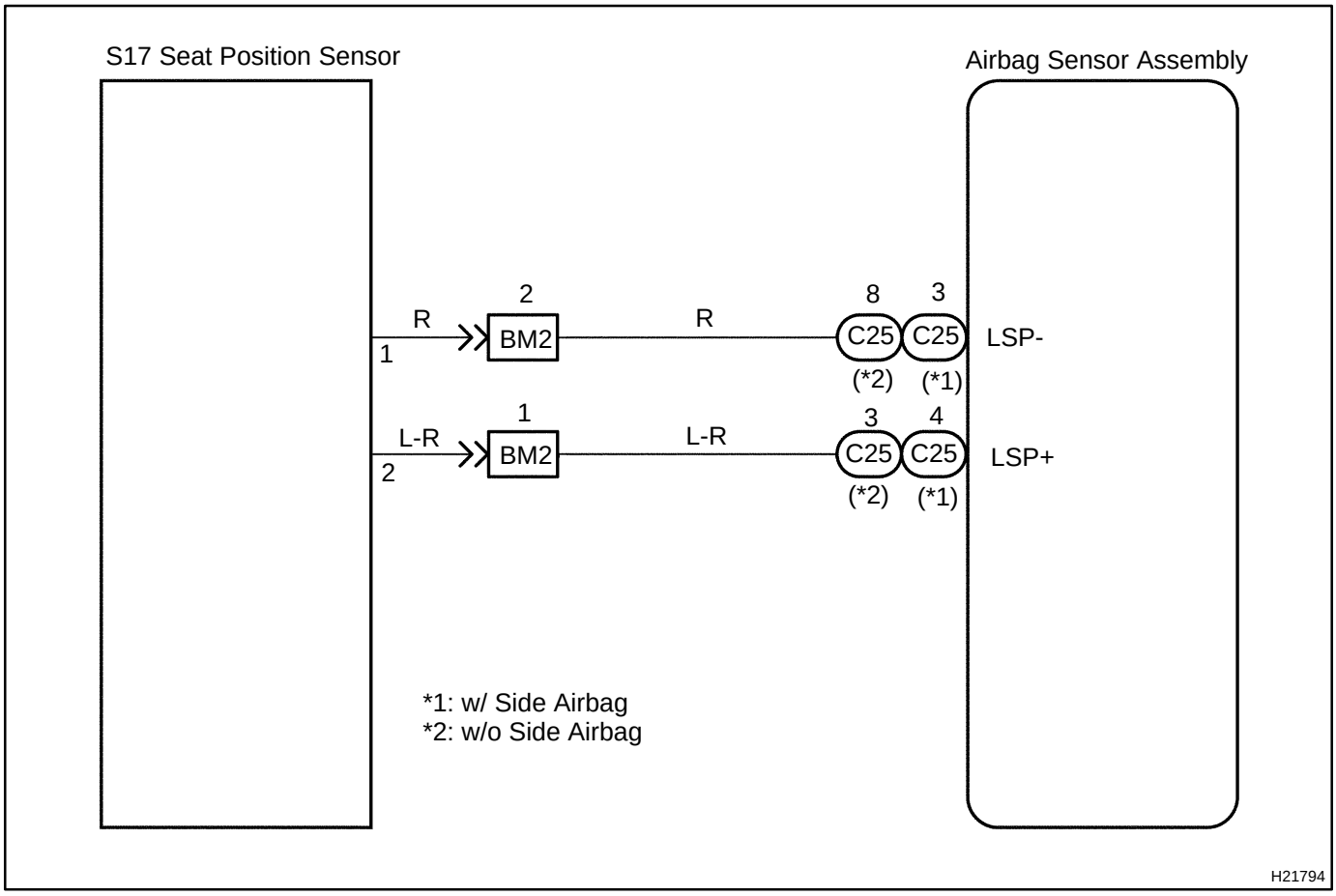
B1153/25 is recorded when a malfunction is detected in the seat position sensor circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1153/25	★Seat position sensor assembly malfunction	★Seat position sensor assembly ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH

HINT:

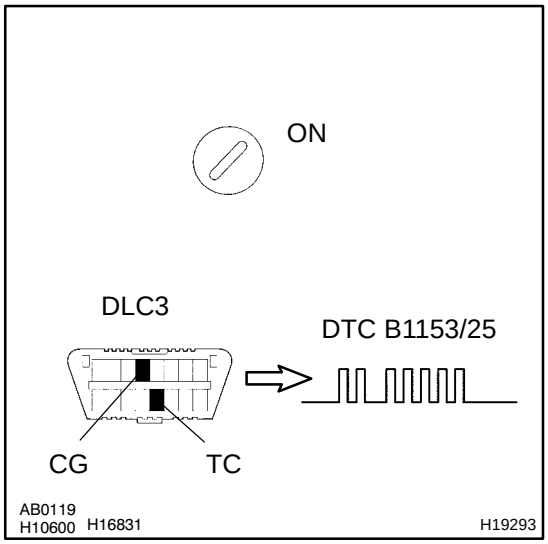
DTC B1153/25 is indicated only for the vehicle equipped with the side airbag and without the side airbag (dual stage airbag).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1153/25 output ?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

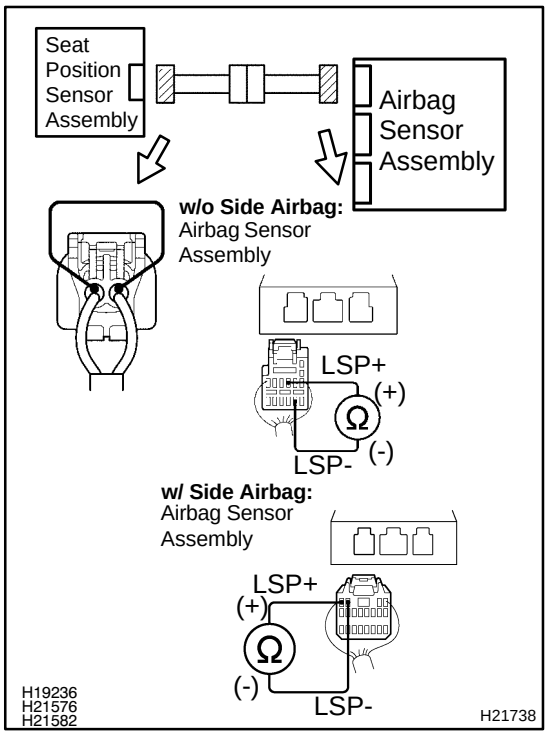
2	**Is connector of the seat position sensor assembly properly connected ?**

NO → **Connect connector.**

YES

3	**Prepare for inspection (See step 1 on DI-923).**

4	**Check wire harness.**



PREPARATION:

Using a service wire, connect LSP+ and LSP- of the connector on the seat position sensor assembly side between the airbag sensor assembly and the seat position sensor assembly.

CHECK:

Measure the resistance between LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

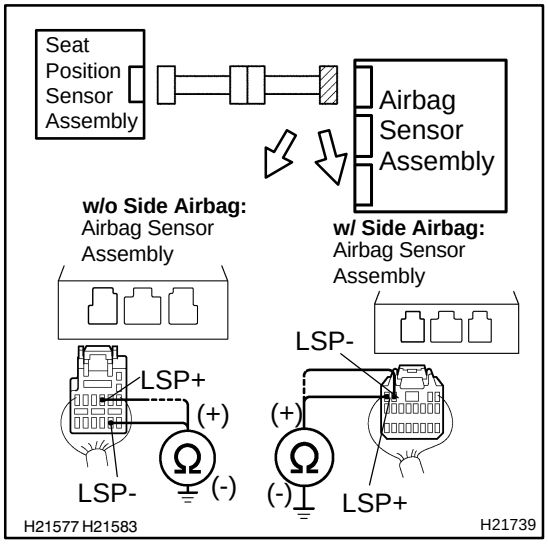
OK:

Resistance: Below 1 Ω

NG	**Go to step 9.**

OK

5	**Check wire harness (to ground).**



PREPARATION:

Release the service wire from the connector on the seat position sensor assembly side.

CHECK:

Measure the resistance between the body ground and each of LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

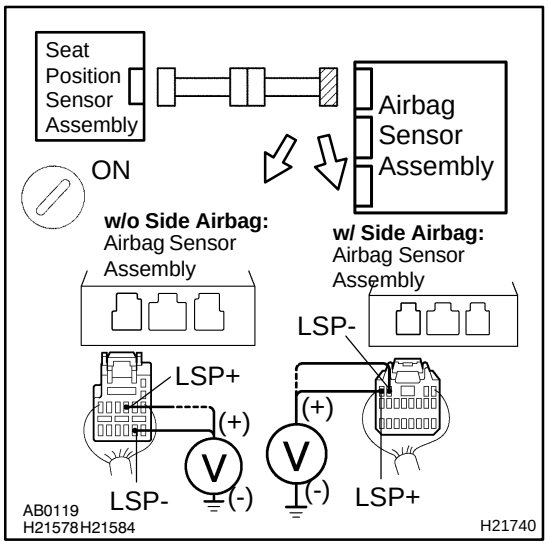
OK:

Resistance: 10 kΩ or Higher

NG	**Go to step 10.**

OK

6	Check wire harness (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of LSP+ and LSP- of the connector on the airbag sensor assembly side between the seat position sensor assembly and the airbag sensor assembly.

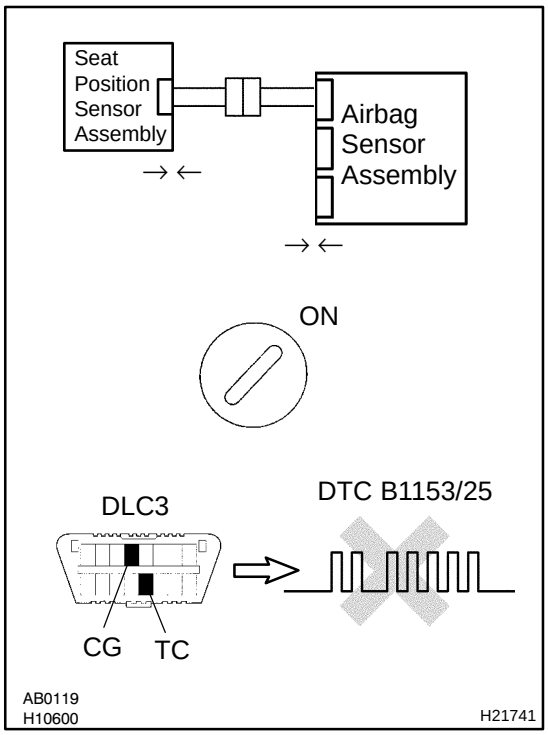
OK:

Voltage: Below 1 V

NG	Go to step 11.

OK

7	Check seat position sensor assembly.



PREPARATION:

(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 of the seat position sensor assembly and the airbag sensor assembly.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1153/25 is not output.

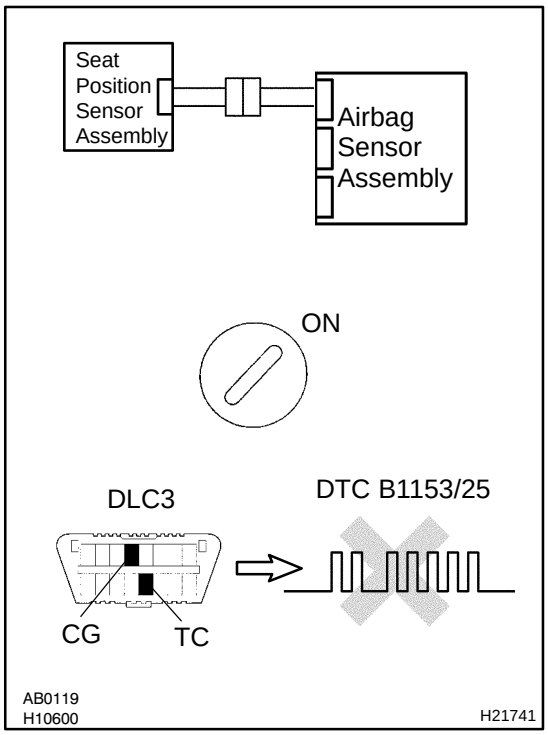
HINT:
Codes other that code B1153/25 may be output at this time, but they are not relevant to this check.

NG → **Replace seat position sensor assembly, then go to next step.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

8	Is DTC B1153/25 output again ?



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1153/25 is not output.

HINT:

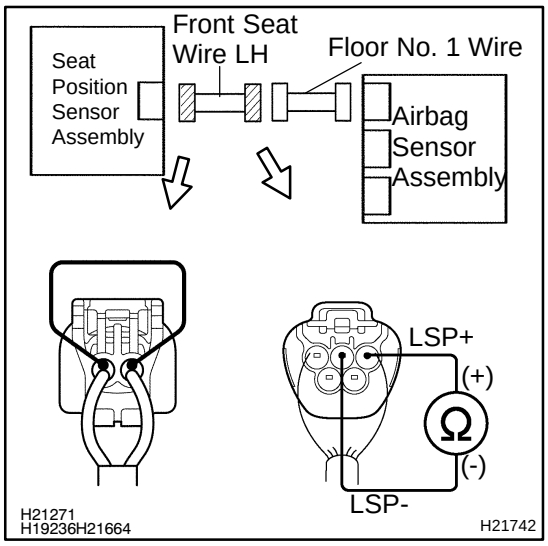
Codes other that code B1153/25 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

9	Check front seat wire LH.



PREPARATION:

(a) Disconnect the front seat wire LH connector from the floor No. 1 wire.

(b) Using a service wire, connect LSP+ and LSP- of the front seat wire LH connector on the seat position sensor assembly side.

CHECK:

Measure the resistance between LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

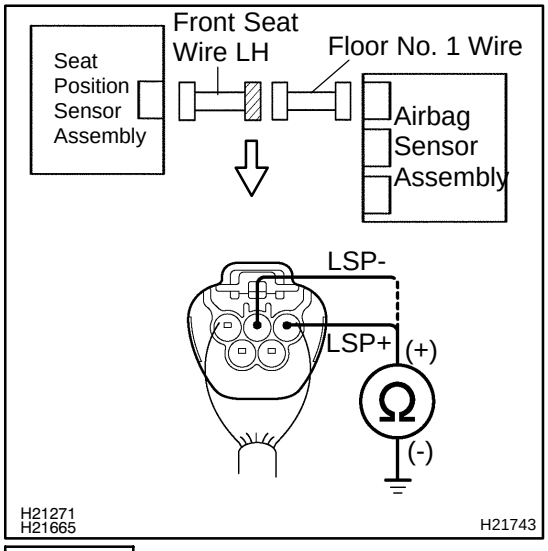
Resistance: Below 1 Ω

NG	Repair or replace front seat wire LH.

OK

Repair or replace floor No. 1 wire.

10	Check front seat wire LH (to ground).



PREPARATION:

(a) Disconnect the front seat wire LH connector from the floor No. 1 wire.

(b) Release the service wire from the front seat wire LH connector on the seat position sensor assembly side.

CHECK:

Measure the resistance between the body ground and each of LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

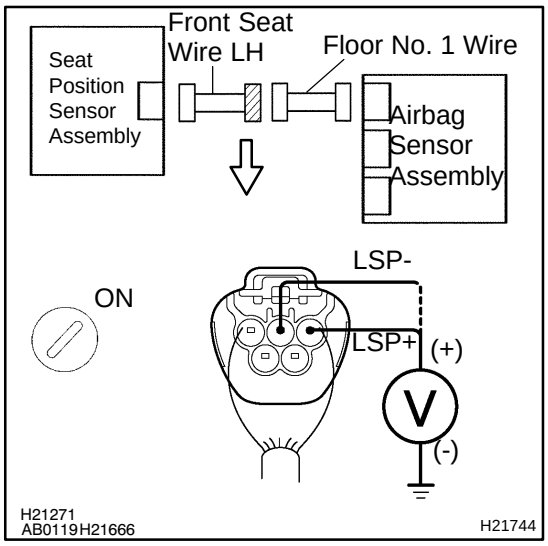
Resistance: 10 kΩ or Higher

NG	Repair and replace floor No. 1 wire.

OK

Repair and replace floor No. 1 wire.

11	**Check front seat wire LH (to B+).**



PREPARATION:

Disconnect the front seat wire LH connector from the floor No. 1 wire.

CHECK:

Measure the voltage between the body ground and each of LSP+ and LSP- of the front seat wire LH connector on the floor No. 1 wire side.

OK:

Voltage: Below 1 V

NG → **Repair or replace front seat wire LH.**

OK

Repair or replace floor No. 1 wire.

DIB3Y-01

DTC	B1154/38	Curtain Shield Airbag Sensor Assembly RH Malfunction

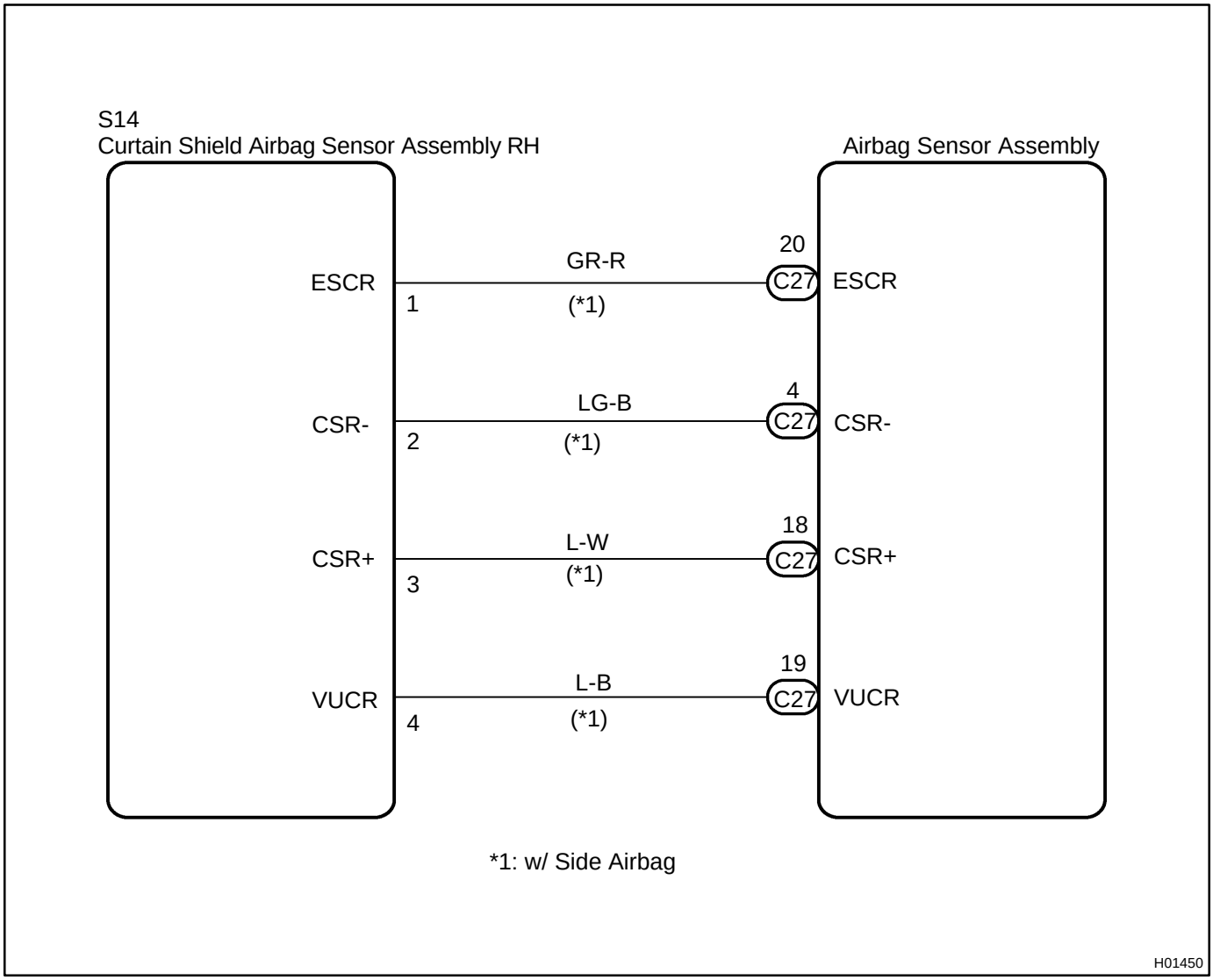
CIRCUIT DESCRIPTION

The curtain shield airbag sensor assembly RH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1154/38 is recorded when occurrence of a malfunction in the curtain shield airbag sensor assembly RH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1154/38	★Curtain shield airbag sensor assembly RH malfunction	★Curtain shield airbag sensor assembly RH ★Floor No. 2 wire ★Airbag sensor assembly

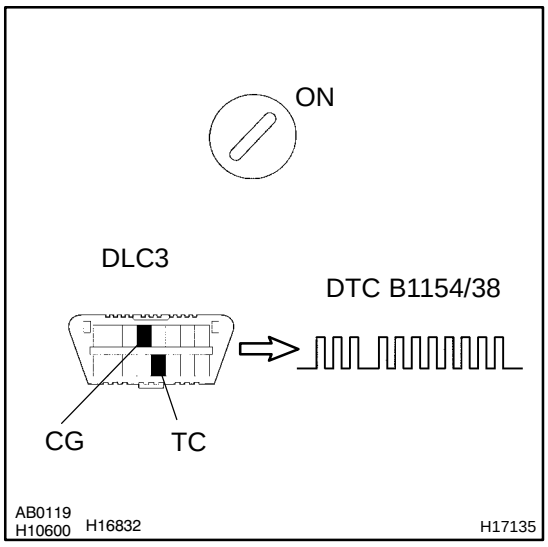
HINT:
DTC B1154/38 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1154/38 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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.

NO → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

YES

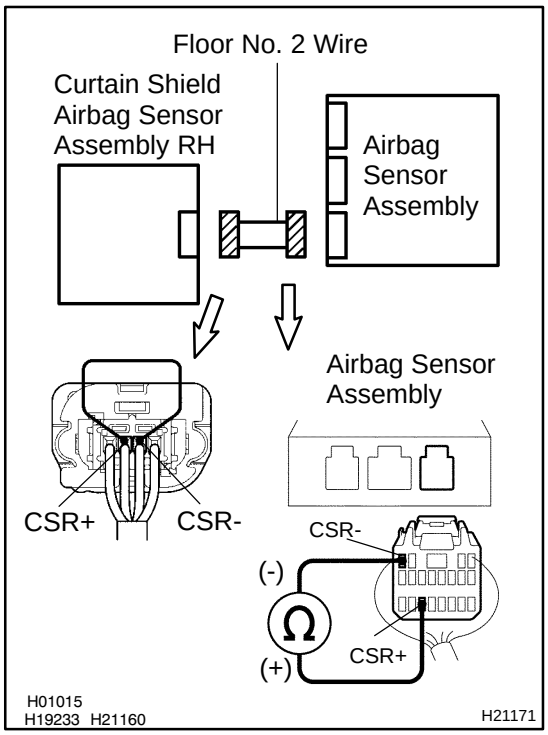
2	**Is connector of curtain shield airbag sensor assembly RH properly connected?**

NO → **Connect connector.**

YES

3	**Prepare for inspection (See step 1 on DI-923).**

4	Check floor No. 2 wire.



PREPARATION:

Using a service wire, connect CSR+ and CSR- of the floor No. 2 wire connector on the curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between CSR+ and CSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

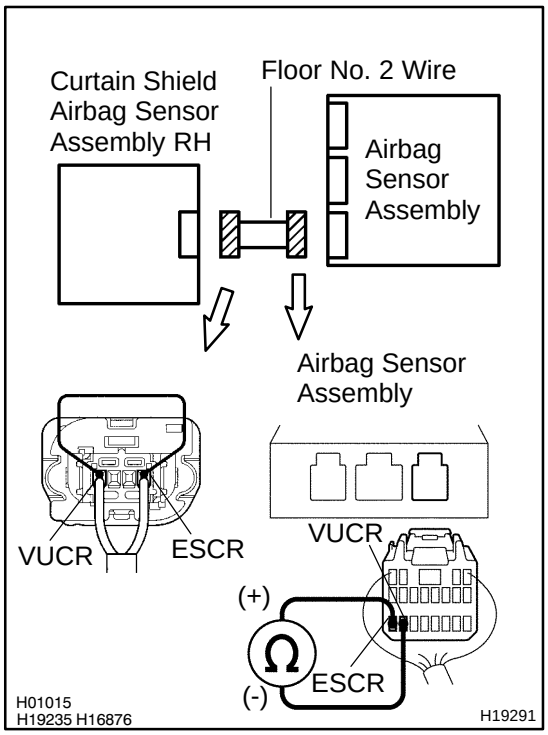
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

5	Check floor No. 2 wire.



PREPARATION:

Using a service wire, connect VUCR and ESCR of the floor No. 2 wire connector on the curtain shield airbag sensor assembly RH side.

CHECK:

Measure the resistance between VUCR and ESCR of the floor No. 2 wire connector on the airbag sensor assembly side.

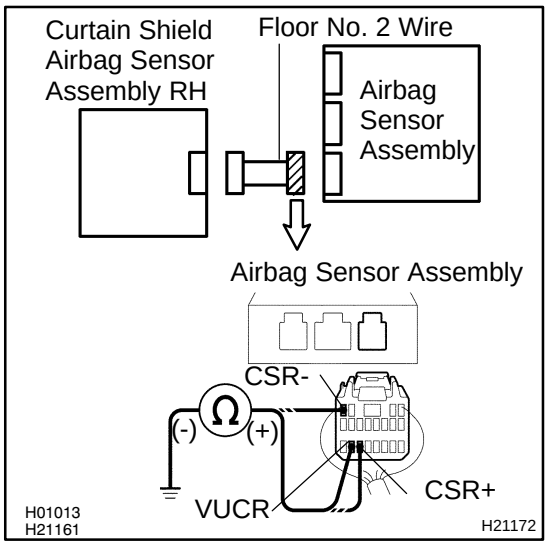
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

6	Check floor No. 2 wire (to ground).



CHECK:

Measure the resistance between the body ground and each of VUCR, CSR+ and CSR- of the floor No. 2 wire connector on the airbag sensor assembly side.

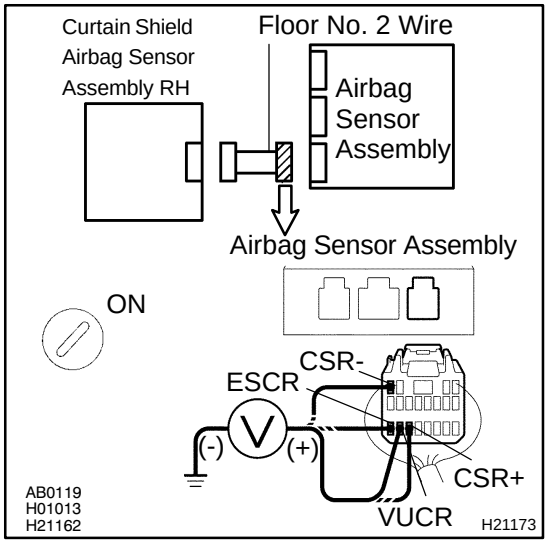
OK:

Resistance: 10 kΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

7	Check floor No. 2 wire (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUCR, CSR+, CSR- and ESCR of the floor No. 2 wire connector on the airbag sensor assembly side.

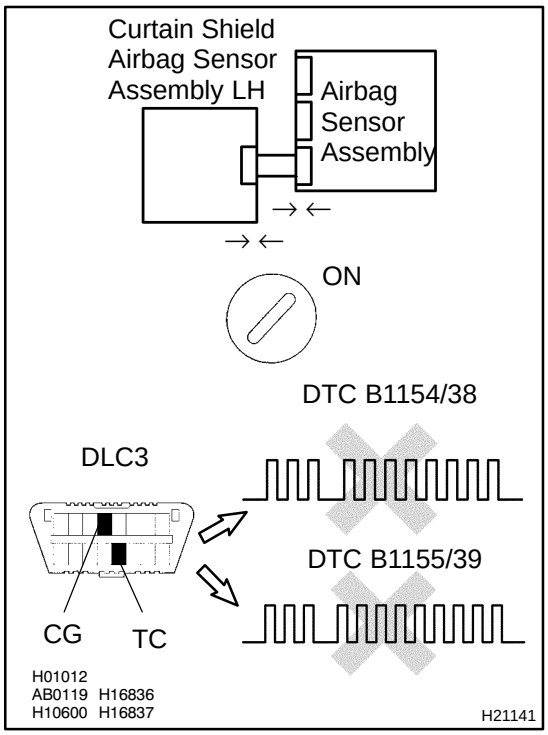
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 2 wire.**

OK

8	**Check airbag sensor assembly.**



PREPARATION:

(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 airbag sensor assembly.
(d) Change the curtain shield airbag sensor assembly LH position with RH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1154/38 nor B1155/39 are not output.

HINT:

Codes other than code B1154/38 or B1155/39 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly (DTC B1154/38 is output).**

NG → **Replace curtain shield airbag sensor assembly RH (DTC B1155/39 is output).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DIB3Z-01

DTC	B1155/39	Curtain Shield Airbag Sensor Assembly LH Malfunction

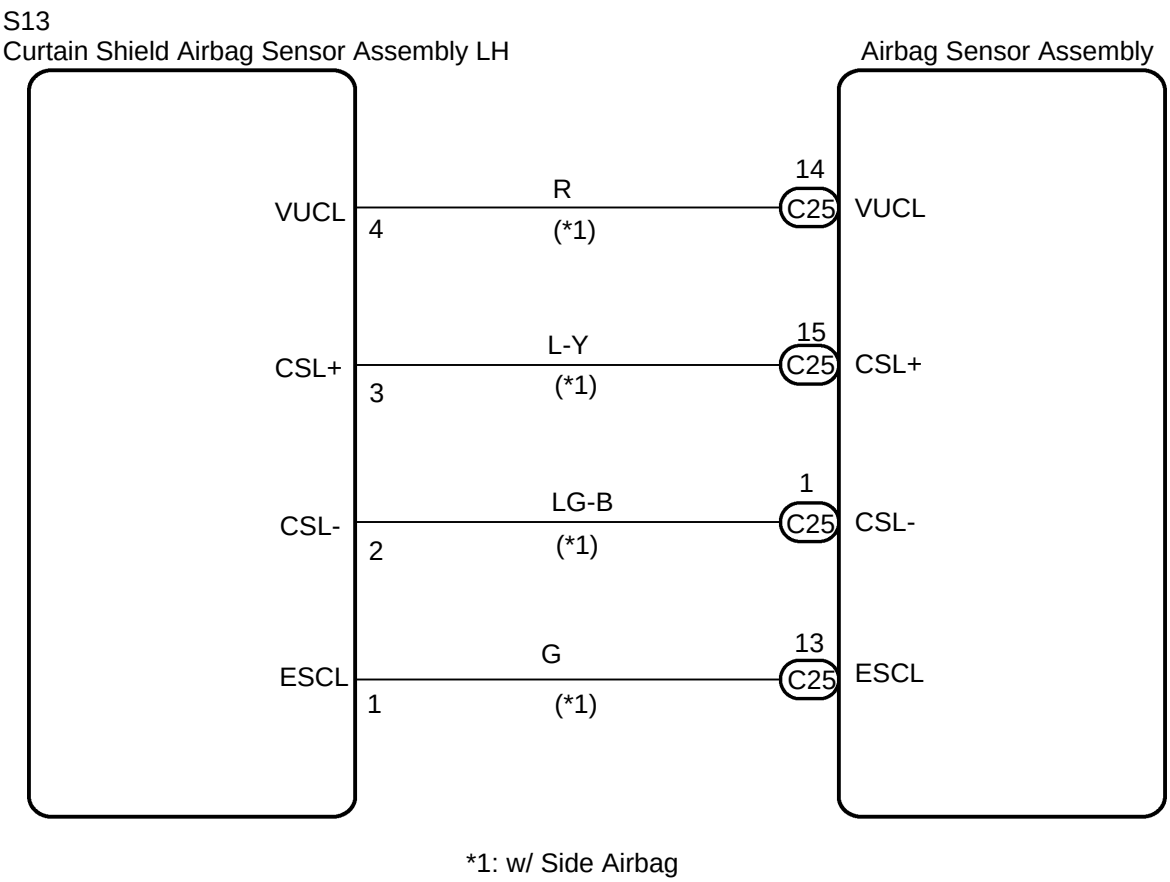
CIRCUIT DESCRIPTION

The curtain shield airbag sensor assembly LH consists of the safing sensor, diagnosis circuit and lateral deceleration sensor, etc.
It receives signals from the lateral deceleration sensor, judges whether or not the SRS must be activated, and detects diagnosis system malfunction.
DTC B1155/39 is recorded when occurrence of a malfunction in the curtain shield airbag sensor assembly LH is detected.

DTC No.	DTC Detecting Condition	Trouble Area
B1155/39	★Curtain shield airbag sensor assembly LH malfunction	★Curtain shield airbag sensor assembly LH ★Floor No. 1 wire ★Airbag sensor assembly

HINT:
DTC B1155/39 is indicated only for the vehicle equipped with the side airbag.

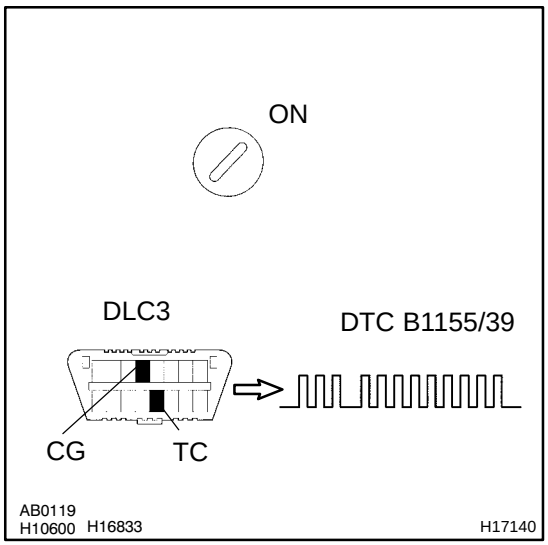
WIRING DIAGRAM



H01450

INSPECTION PROCEDURE

1	**Is DTC B1155/39 output?**



CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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.

YES	**The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

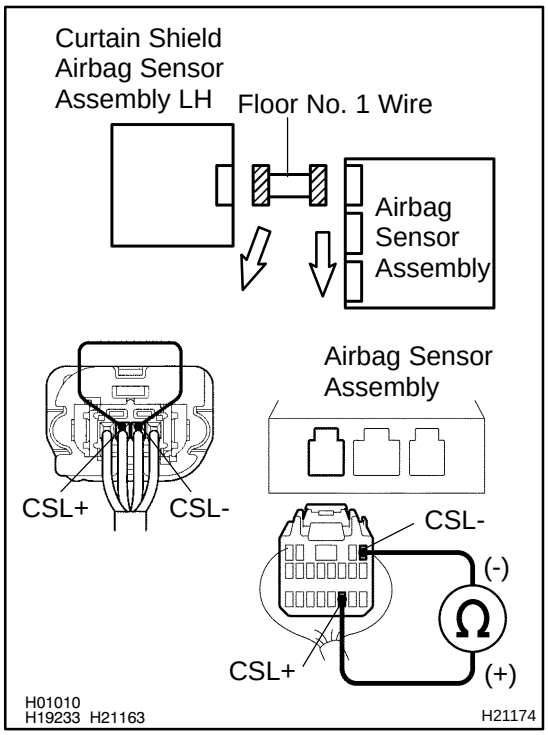
2	**Is connector of curtain shield airbag sensor assembly LH properly connected?**

NO	**Connect connector.**

YES

3	**Prepare for inspection (See step 1 on page DI-923).**

4	Check floor No. 1 wire.



PREPARATION:

Using a service wire, connect CSL+ and CSL- of the floor No. 1 wire connector on the curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between CSL+ and CSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

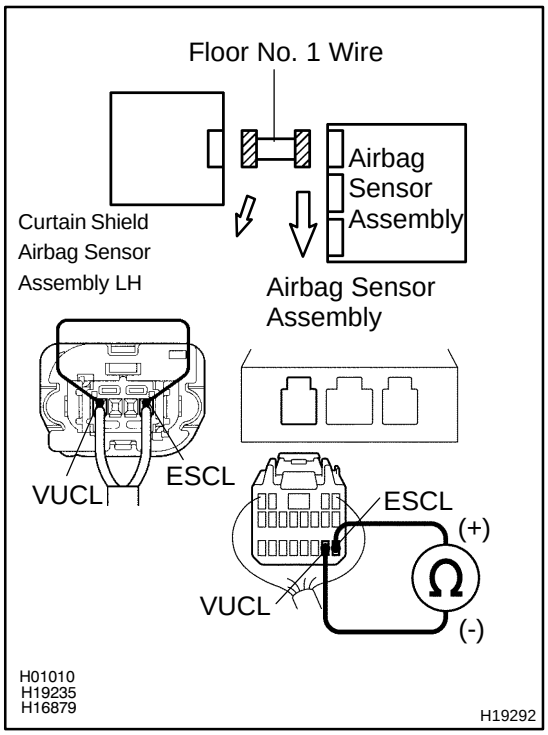
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

5	**Check floor No. 1 wire.**



PREPARATION:

Using a service wire, connect VUCL and ESCL of the floor No. 1 wire connector on the curtain shield airbag sensor assembly LH side.

CHECK:

Measure the resistance between VUCL and ESCL of the floor No. 1 wire connector on the airbag sensor assembly side.

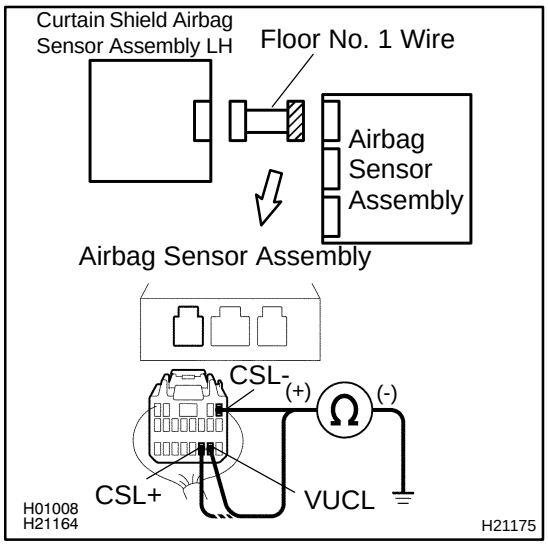
OK:

Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

6	Check floor No. 1 wire (to ground).



CHECK:

Measure the resistance between the body ground and each of VUCL, CSL+ and CSL- of the floor No. 1 wire connector on the airbag sensor assembly side.

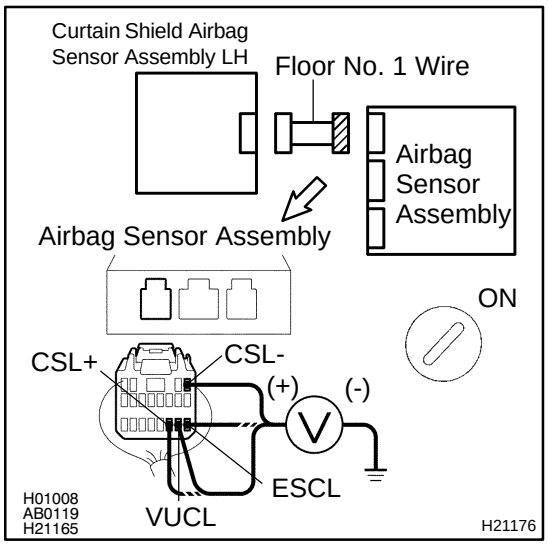
OK:

Resistance: 10 kΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

7	Check floor No. 1 wire (to B+).



PREPARATION:

Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and each of VUCL, CSL+, CSL- and ESCL of the floor No. 1 wire connector on the airbag sensor assembly side.

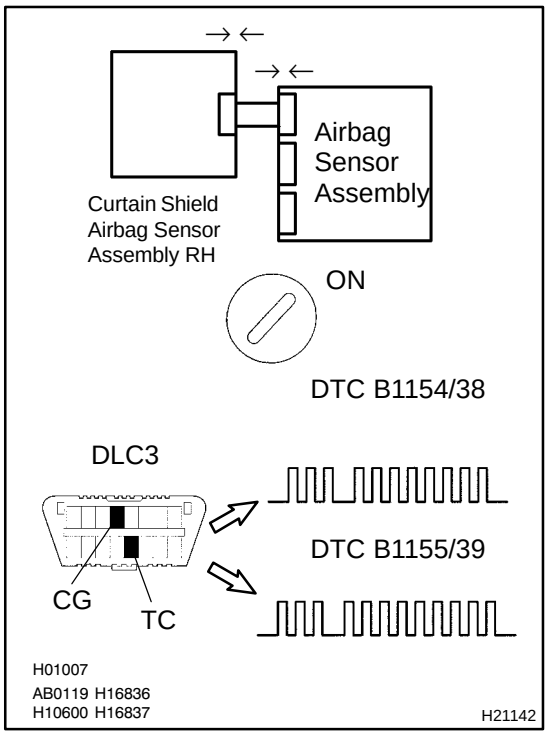
OK:

Voltage: Below 1 V

NG → **Repair or replace floor No. 1 wire.**

OK

8	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Change the curtain shield airbag sensor assembly RH position with LH position.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

Neither DTC B1155/39 nor B1154/38 are not output.

HINT:

Codes other than code B1155/39 B1154/38 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly (DTC B1155/39 is output).**

NG → **Replace curtain shield airbag sensor assembly LH (DTC B1154/38 is output).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI6PB-34

DTC	B1160/83	Short in Curtain Shield Squib RH Circuit

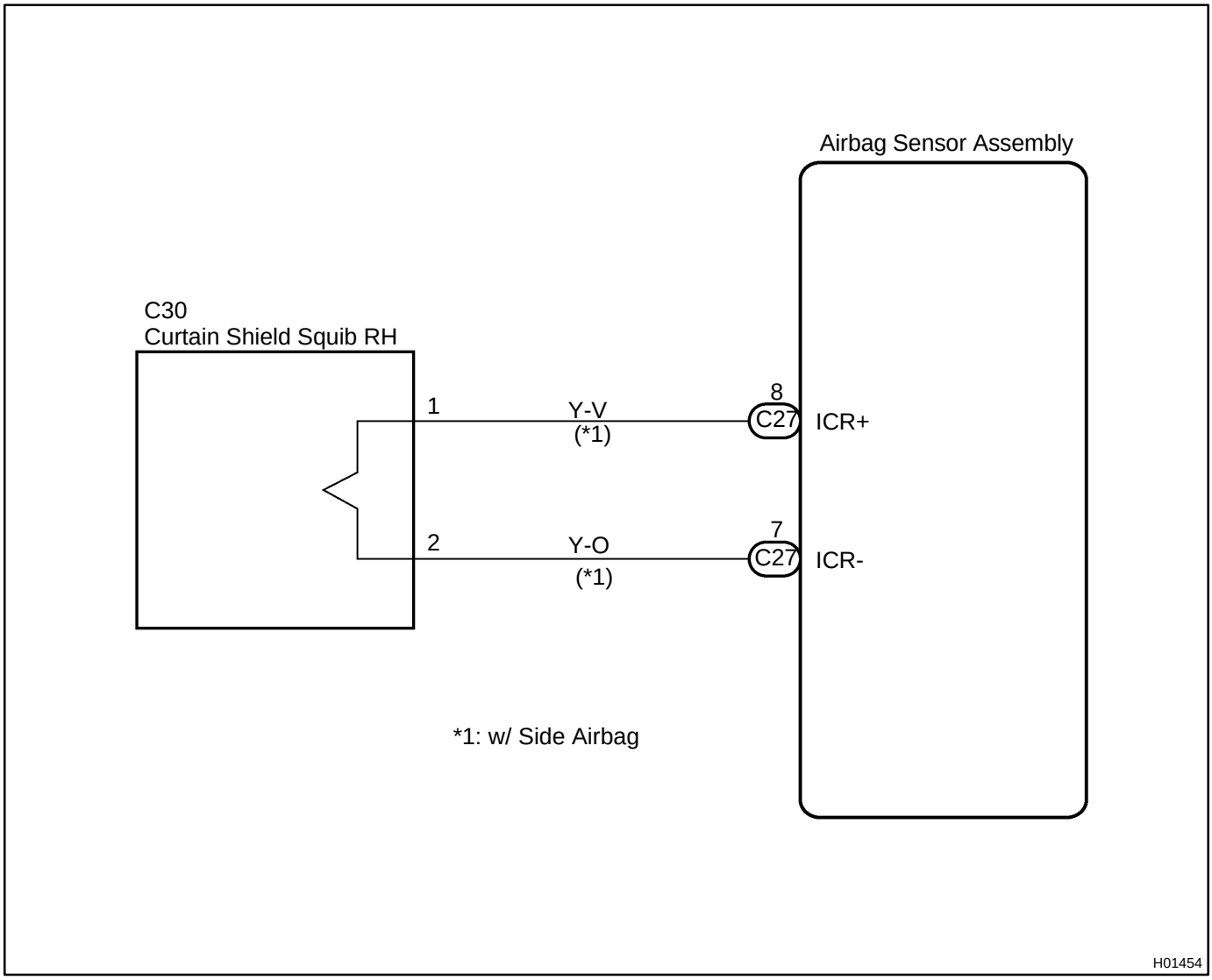
CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1110/83 is recorded when a short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1110/83	★Short in curtain shield squib RH circuit ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1160/83 is indicated only for the vehicle equipped with the side airbag.

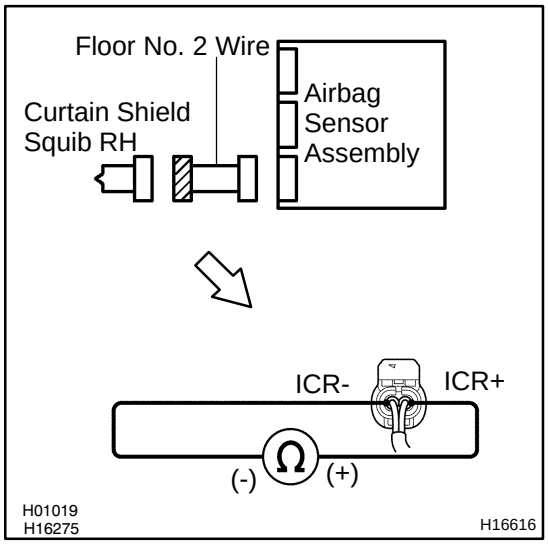
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (curtain shield squib RH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 2 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.

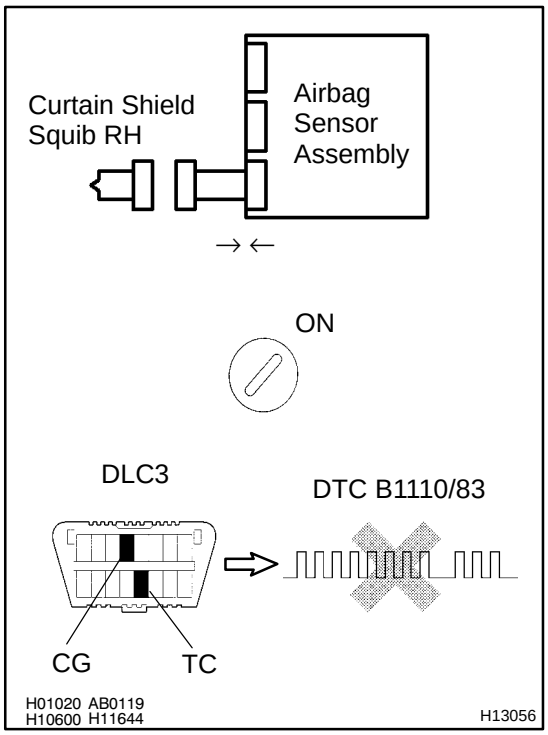
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

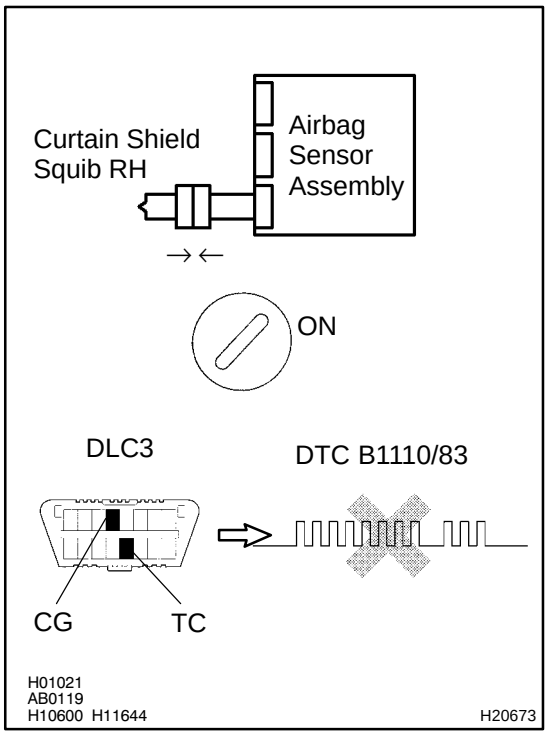
DTC B1110/83 is not output.

HINT:
Codes other than code B1110/83 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check curtain shield squib RH.



PREPARATION:

(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 assembly RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1110/83 is not output.

HINT:

Codes other than code B1110/83 may be output at this time, but they are not relevant to this check.

NG	**Replace curtain shield airbag assembly RH (curtain shield squib RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1161/84	Open in Curtain Shield Squib RH Circuit

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1161/84 is recorded when an open is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1161/84	★Open in curtain shield squib RH circuit ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1161/84 is indicated only for the vehicle equipped with the side airbag.

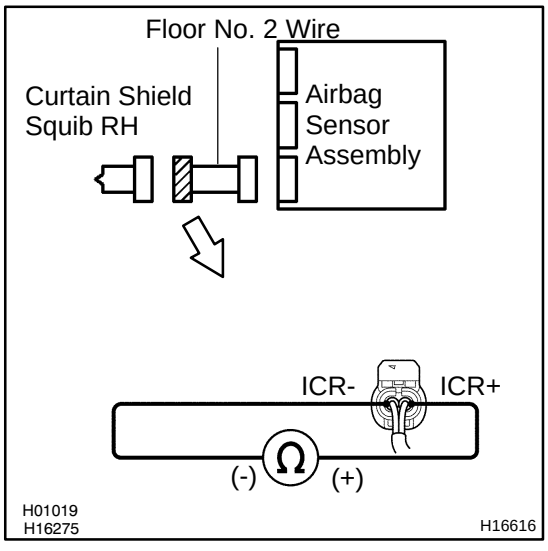
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (curtain shield squib RH circuit).**

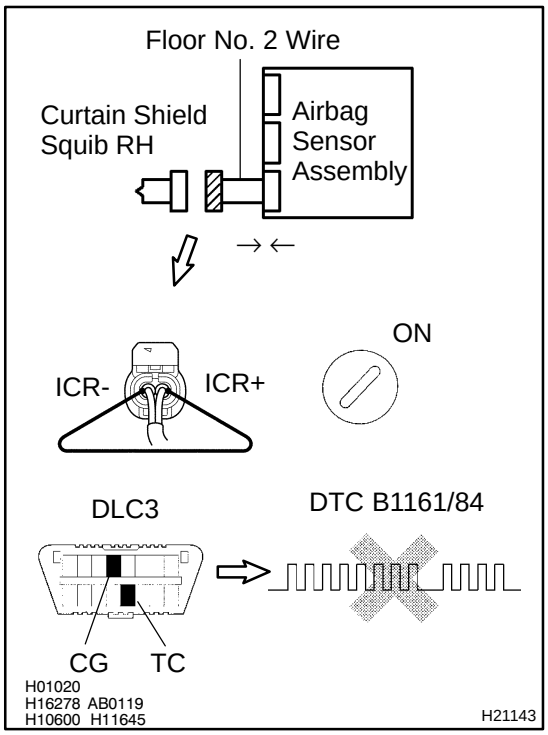


CHECK:
Measure the resistance between ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1161/84 is not output.

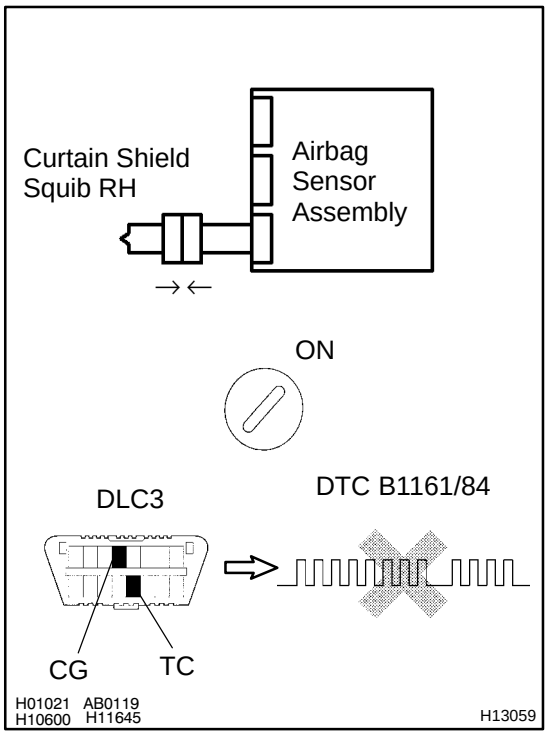
HINT:

Codes other than code B1161/84 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check curtain shield squib RH.



PREPARATION:

(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 assembly RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1162/81	Short in Curtain Shield Squib RH Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1162/81 is recorded when ground short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1162/81	★Short in curtain shield squib RH circuit (to ground) ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1162/81 is indicated only for the vehicle equipped with the side airbag.

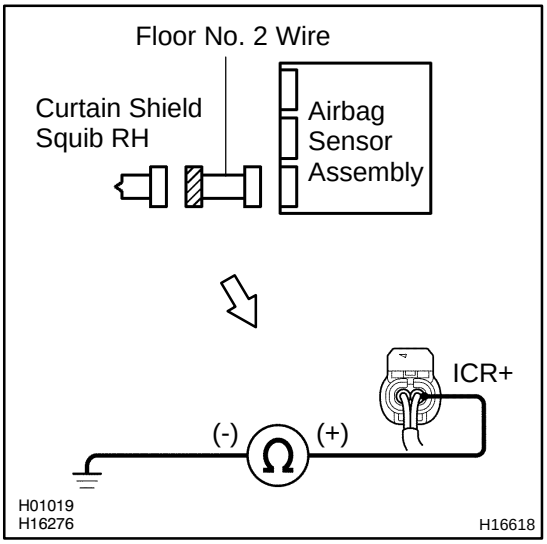
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire(curtain shield squib RH circuit).**

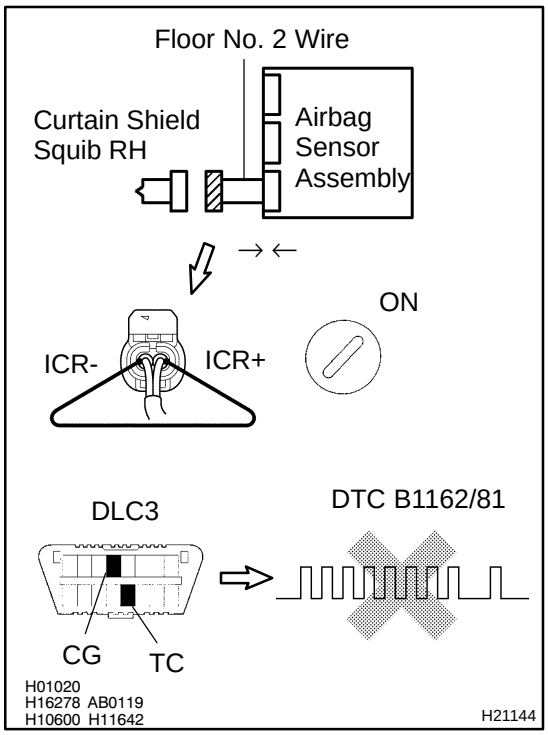


CHECK:
Measure the resistance between the body ground and ICR+ of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1162/81 is not output.

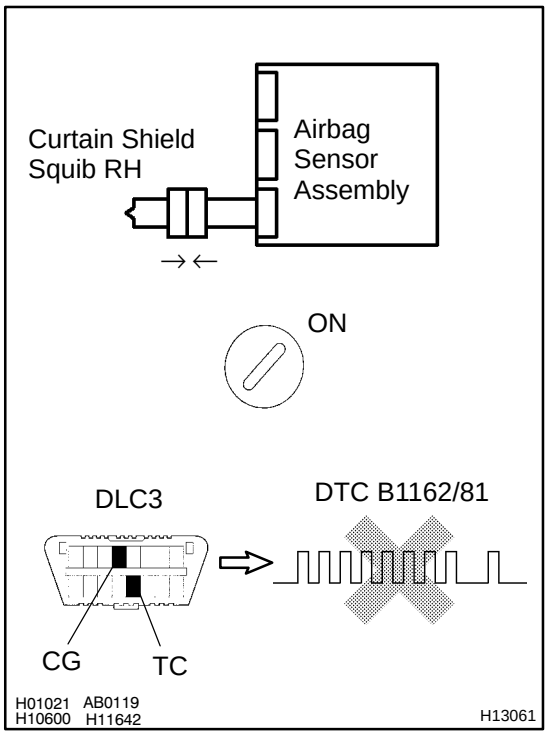
HINT:

Codes other than code B1162/81 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check curtain shield squib RH.



PREPARATION:

(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 assembly RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib RH).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PE-23

DTC	B1163/82	Short in Curtain Shield Squib RH Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib RH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly RH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1163/82 is recorded when a B+ short is detected in the curtain shield squib RH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1163/82	★Short in curtain shield squib RH circuit (to B+) ★Curtain shield squib RH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly RH (Curtain shield squib RH) ★Airbag sensor assembly ★Floor No. 2 wire

HINT:
DTC B1163/82 is indicated only for the vehicle equipped with the side airbag.

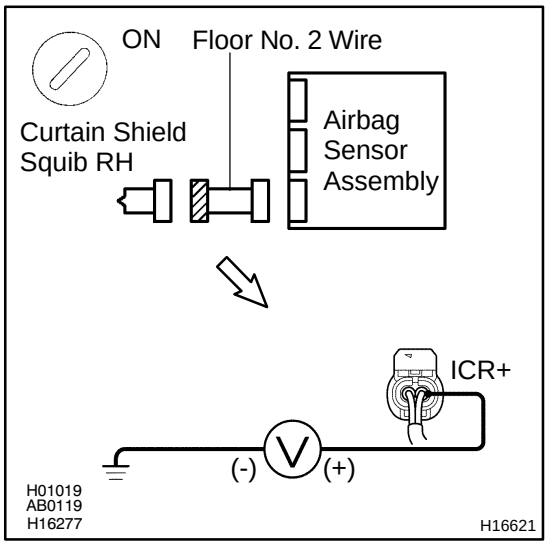
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 2 wire (curtain shield squib RH circuit).**

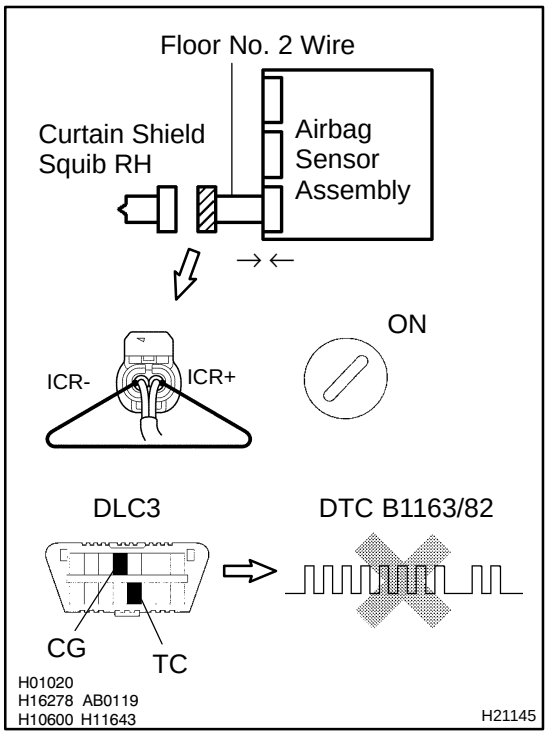


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and ICR+ of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
OK:
Voltage: Below 1 V

NG	**Repair or replace floor No. 2 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect ICR+ and ICR- of the floor No. 2 wire connector on the curtain shield airbag assembly RH (curtain shield squib RH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

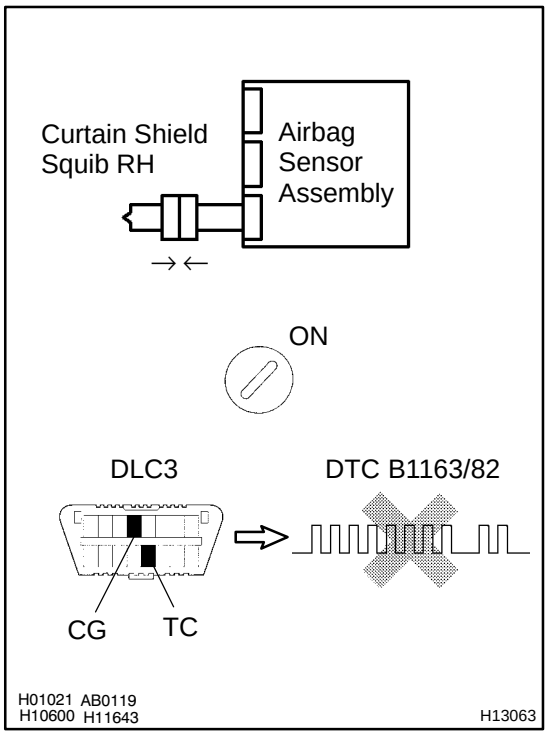
DTC B1163/82 is not output.

HINT:
Codes other than code B1163/82 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check curtain shield squib RH.



PREPARATION:

(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 assembly RH (curtain shield squib RH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib RH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI6PF-35

DTC	B1165/87	Short in Curtain Shield Squib LH Circuit

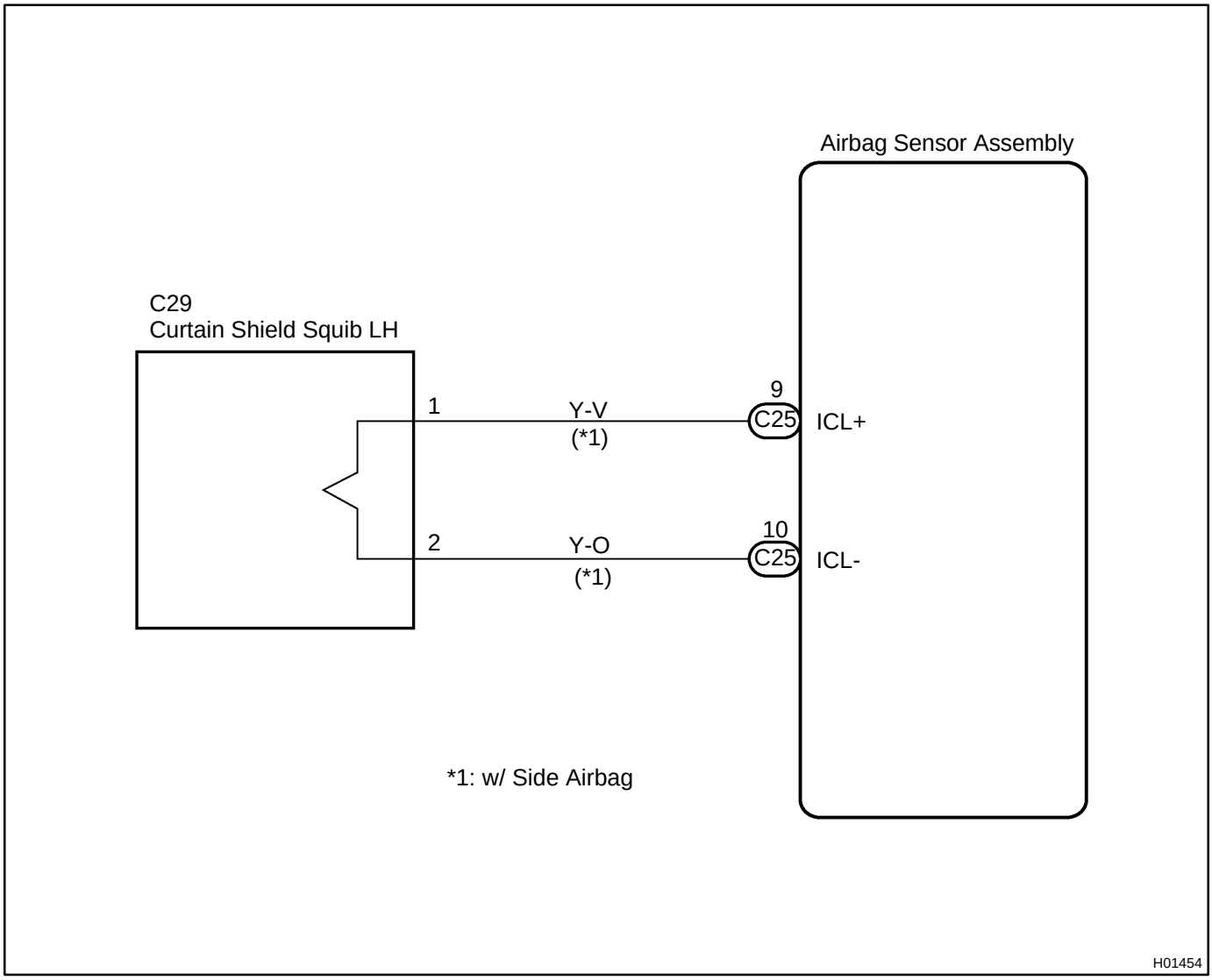
CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1165/87 is recorded when a short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1165/87	★Short in curtain shield squib LH circuit ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1165/87 is indicated only for the vehicle equipped with the side airbag.

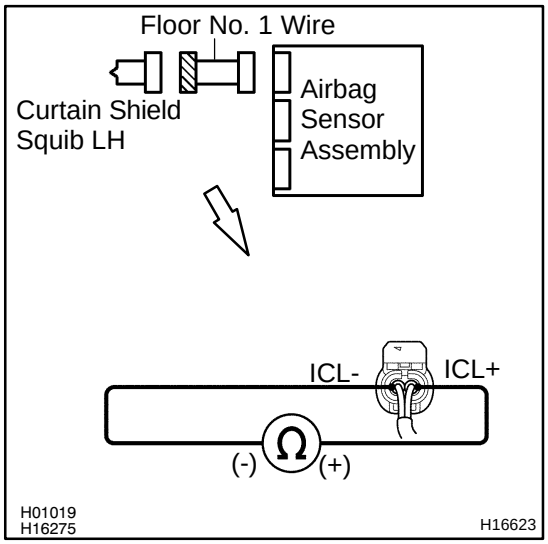
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the floor No. 1 wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.

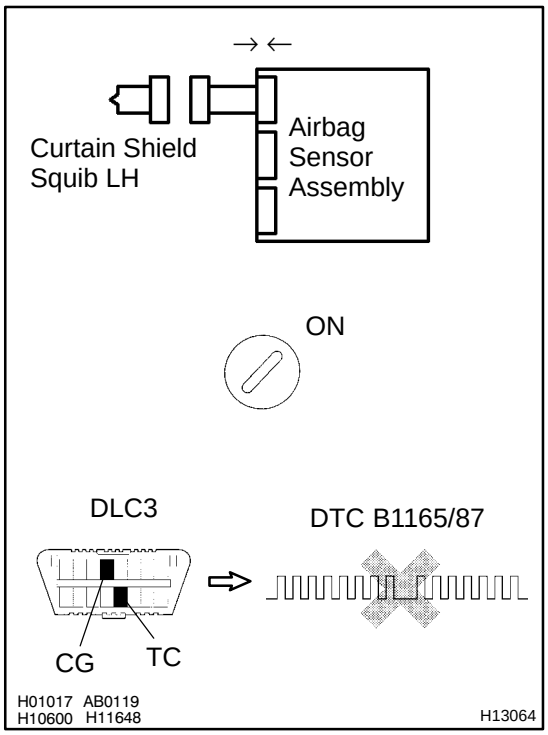
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch or ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1165/87 is not output.

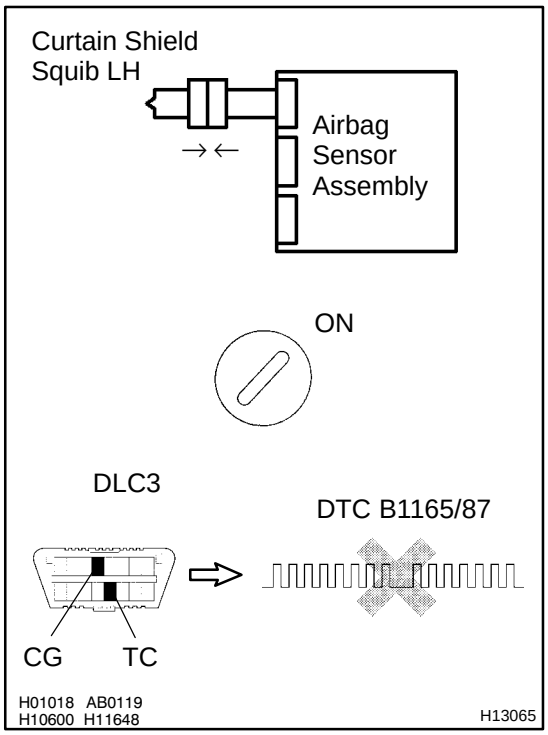
HINT:

Codes other than code B1165/87 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check curtain shield squib LH.



PREPARATION:

(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 assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1166/88	Open in Curtain Shield Squib LH Circuit

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1166/88 is recorded when an open is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1166/88	★Open in curtain shield squib LH circuit ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1166/88 is indicated only for the vehicle equipped with the side airbag.

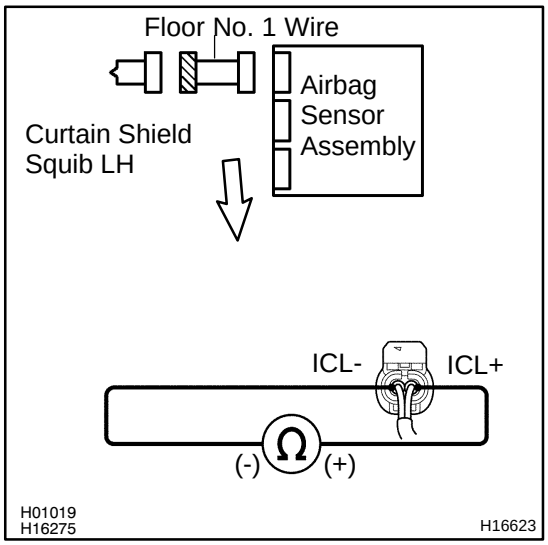
WIRING DIAGRAM

See page DI-869 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**

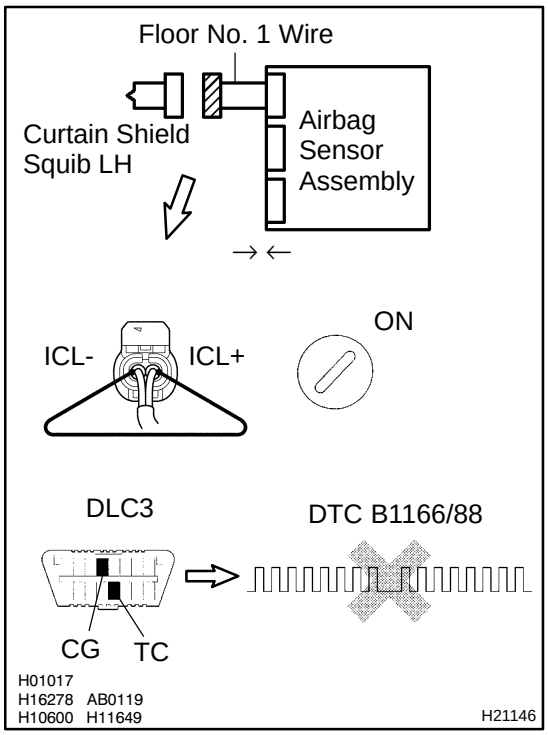


CHECK:
Measure the resistance between ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
OK:
Resistance: Below 1 Ω

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1166/88 is not output.

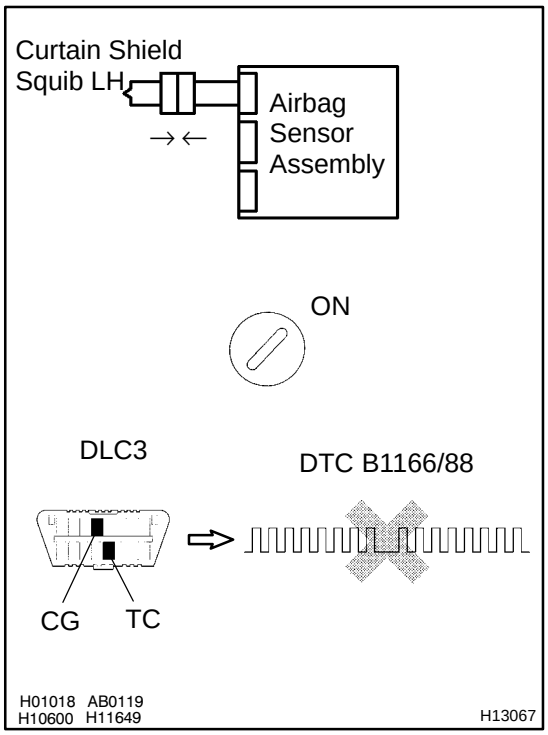
HINT:

Codes other than code B1166/88 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check curtain shield squib LH.



PREPARATION:

(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 assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DTC	B1167/85	Short in Curtain Shield Squib LH Circuit (to Ground)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1167/85 is recorded when ground short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1167/85	★Short in curtain shield squib LH circuit (to ground) ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1167/85 is indicated only for the vehicle equipped with the side airbag.

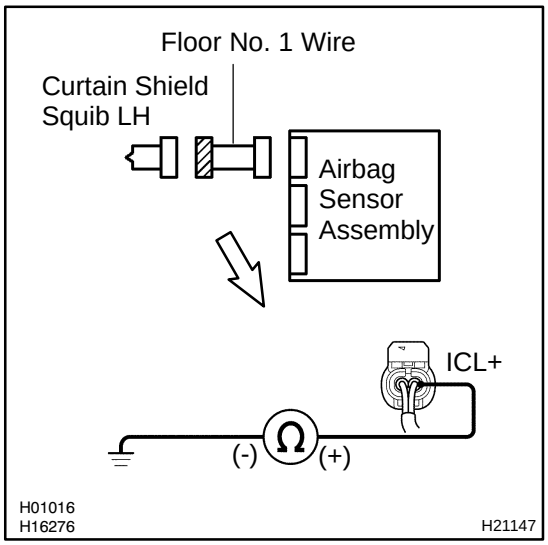
WIRING DIAGRAM

See page DI-856 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**

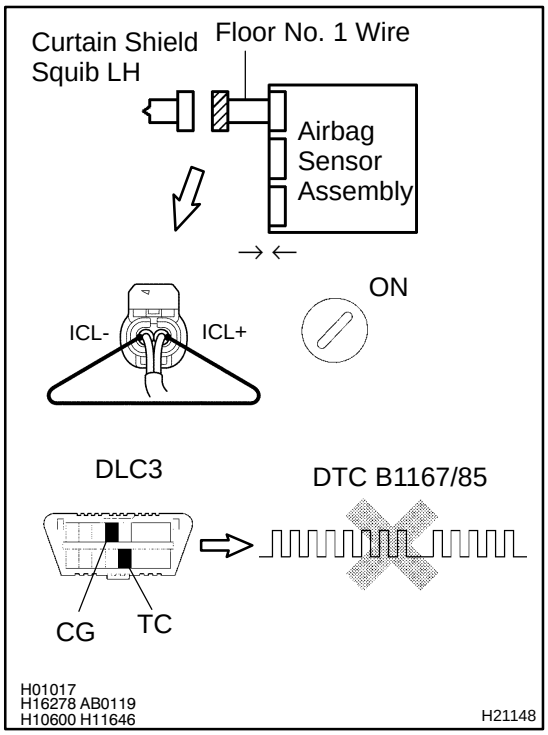


CHECK:
Measure the resistance between the body ground and ICL+ of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
OK:
Resistance: 1 MΩ or Higher

NG → **Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1167/85 is not output.

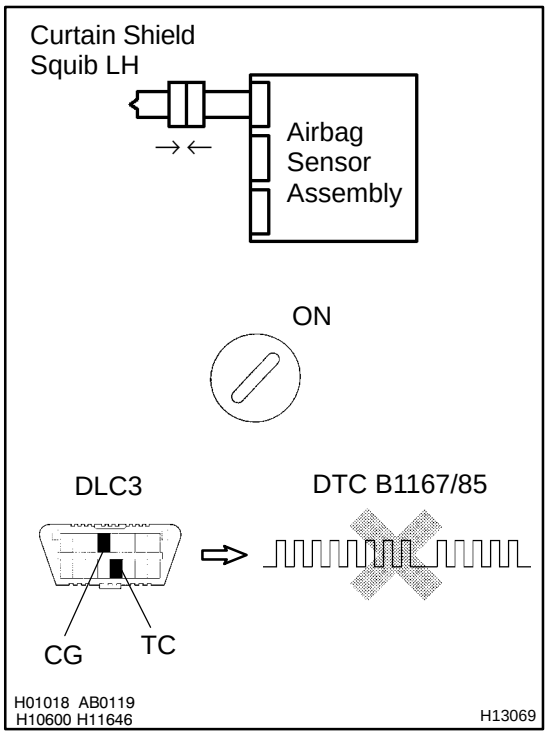
HINT:

Codes other than code B1167/85 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check curtain shield squib LH.



PREPARATION:

(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 assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DTC	B1168/86	Short in Curtain Shield Squib LH Circuit (to B+)

CIRCUIT DESCRIPTION

The curtain shield squib LH circuit consists of the airbag sensor assembly and the curtain shield airbag assembly LH.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1168/86 is recorded when a B+ short is detected in the curtain shield squib LH circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1168/86	★Short in curtain shield squib LH circuit (to B+) ★Curtain shield squib LH malfunction ★Airbag sensor assembly malfunction	★Curtain shield airbag assembly LH (Curtain shield squib LH) ★Airbag sensor assembly ★Floor No. 1 wire

HINT:
DTC B1168/86 is indicated only for the vehicle equipped with the side airbag.

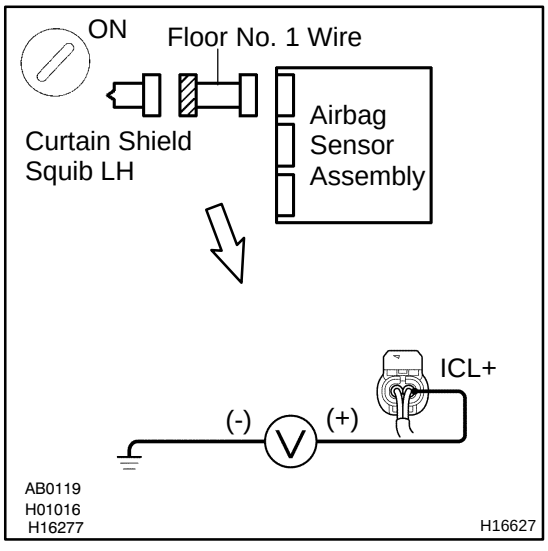
WIRING DIAGRAM

See page DI-869 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check floor No. 1 wire (curtain shield squib LH circuit).**

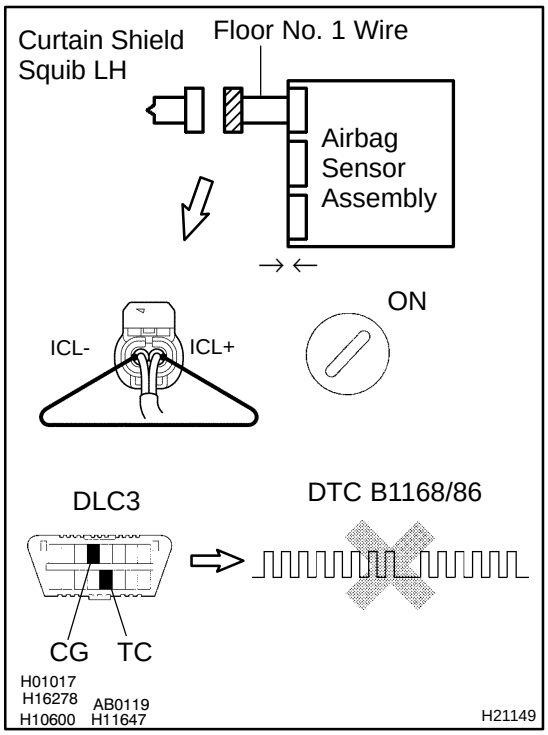


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and ICL+ of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
OK:
Voltage: Below 1 V

NG	**Repair or replace floor No. 1 wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly.
(d) Using a service wire, connect ICL+ and ICL- of the floor No. 1 wire connector on the curtain shield airbag assembly LH (curtain shield squib LH) side.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

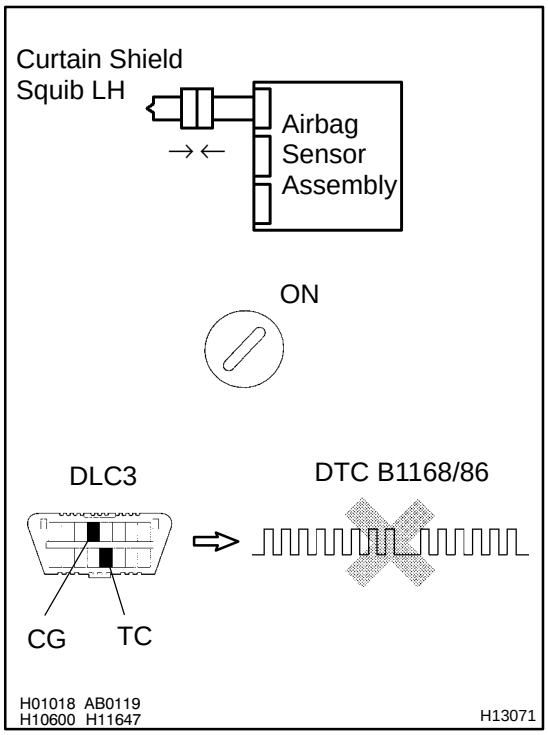
DTC B1168/86 is not output.

HINT:
Codes other than code B1168/86 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check curtain shield squib LH.



PREPARATION:

(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 assembly LH (curtain shield squib LH) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (curtain shield squib LH).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DIB40-01

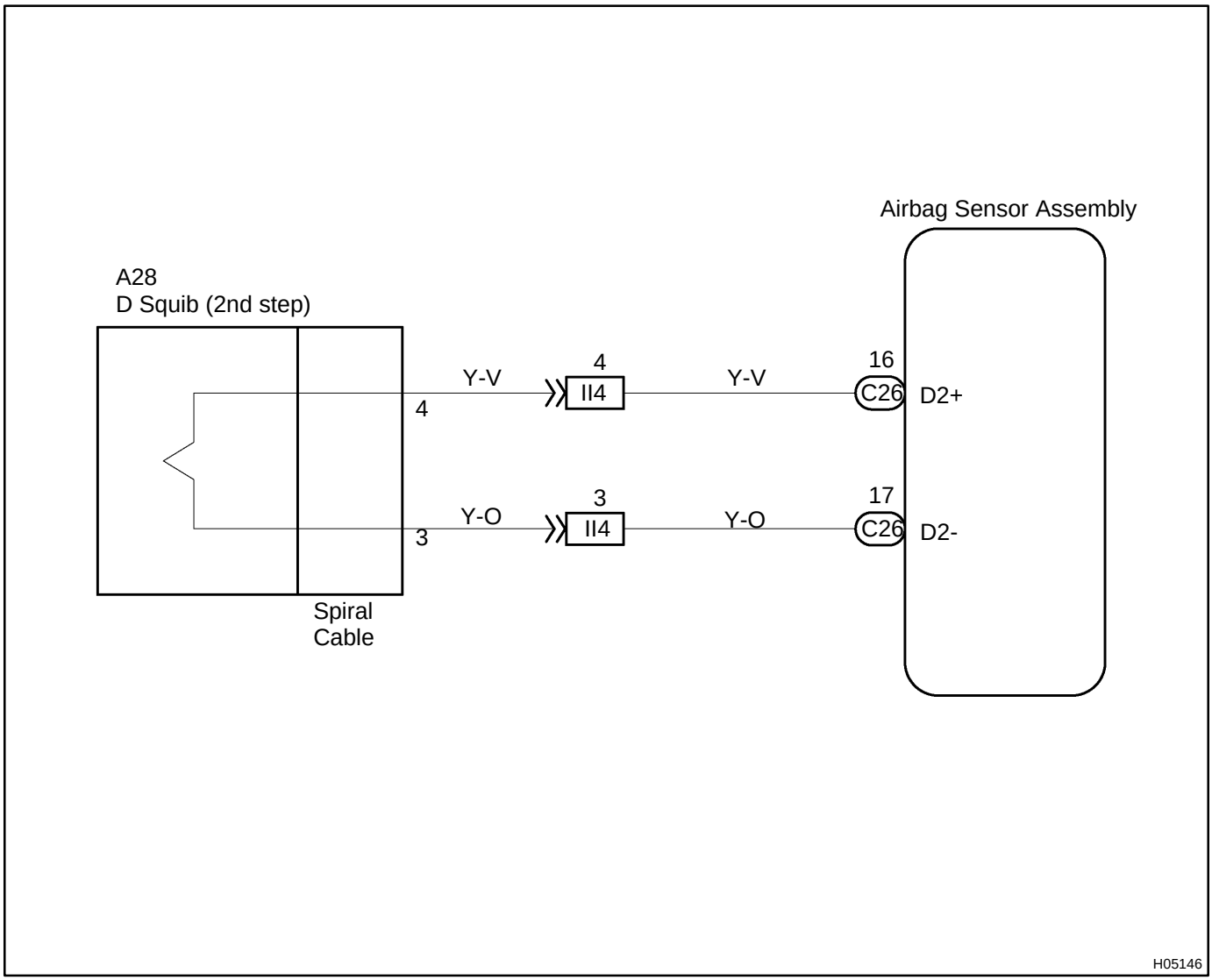
DTC	B1180/17	Short in D Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad.
It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1180/17 is recorded when a short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1180/17	★Short in D squib (2nd step) circuit ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check connector.**

CHECK:

Make sure that the black spiral cable connector is not damaged.

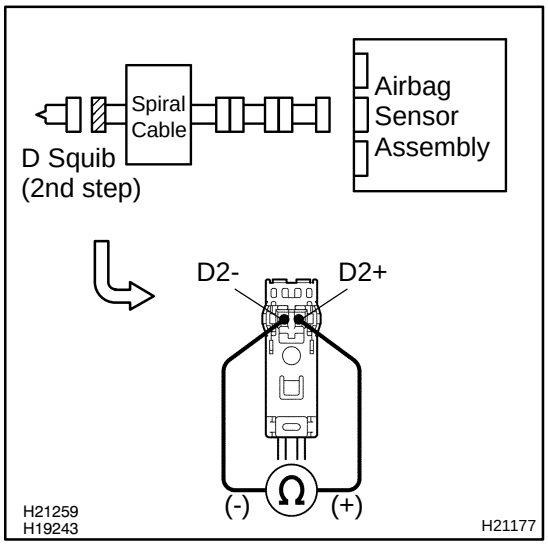
OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

NG → **Replace spiral cable.**

OK

3	**Check D squib (2nd step) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector on the airbag sensor assembly side between the air bag sensor assembly and the steering wheel pad (D squib (2nd step)) (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

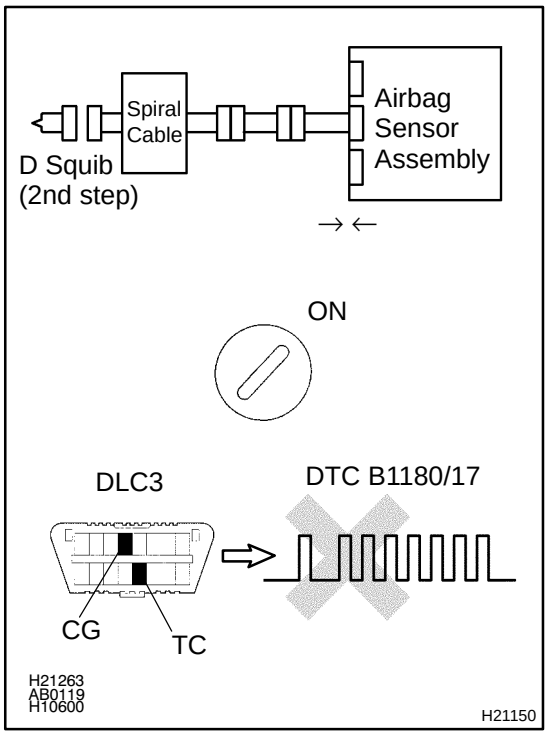
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 6.**

OK

4	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

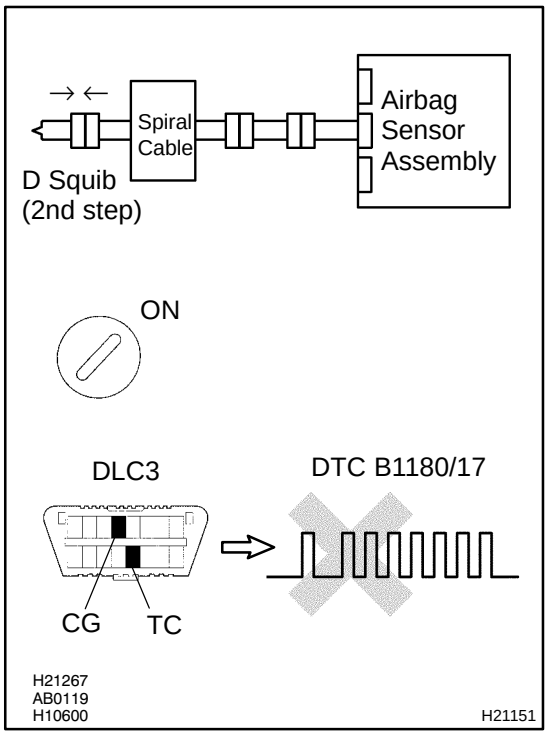
DTC B1180/17 is not output.

HINT:
Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

5	Check D squib (2nd step).



PREPARATION:

(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 steering wheel pad (D squib (2nd step)) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1180/17 is not output.

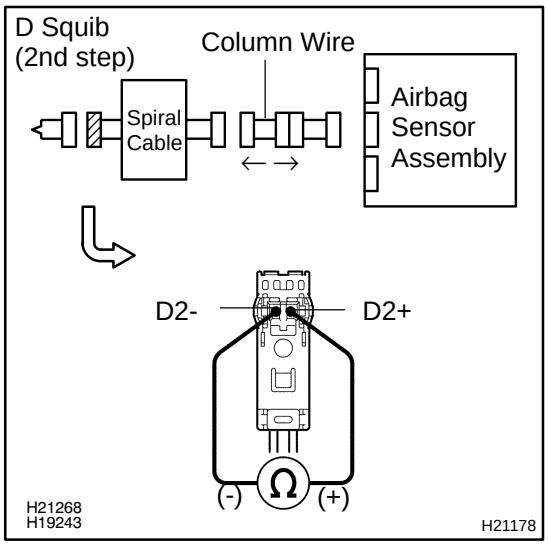
HINT:
Codes other than code B1180/17 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib (2nd step)).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

6	Check spiral cable.



PREPARATION:

(a) Disconnect the spiral cable connector from the column wire.

(b) Release the airbag activation prevention mechanism built in the spiral cable connector on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.

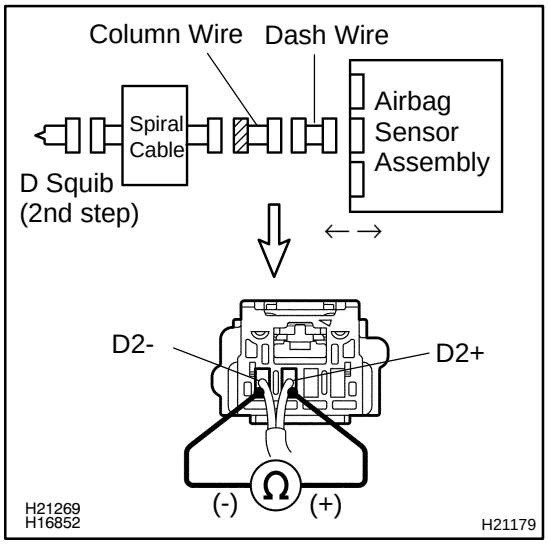
OK:

Resistance: 1 MΩ or Higher

NG → **Replace spiral cable.**

OK

7	Check column wire.



PREPARATION:

Release the airbag activation prevention mechanism built in the column wire connector on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the column wire connector on the spiral cable side.

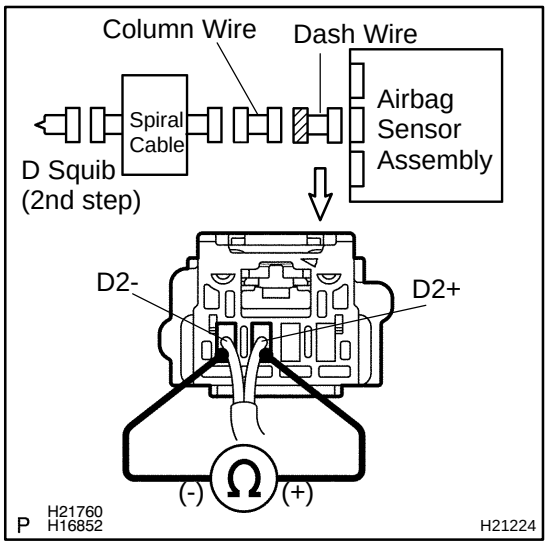
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace column wire.**

OK

8	Check dash wire.



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between D2+ and D2- of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DIB41-01

DTC	B1181/18	Open in D Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad. It causes the airbag to deploy when the airbag deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1181/18 is recorded when an open is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1181/18	★Open in D squib (2nd step) circuit ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

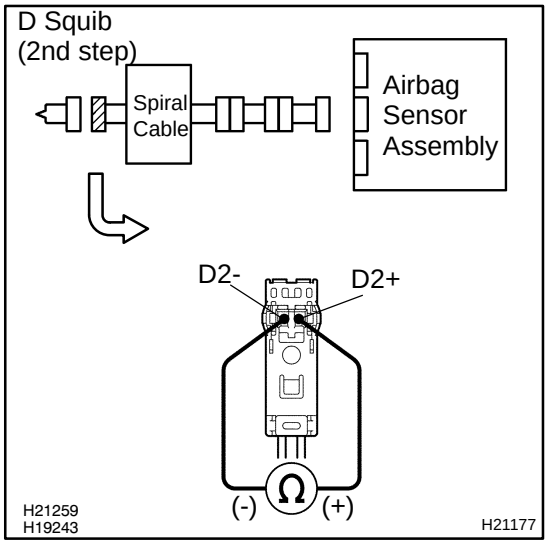
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check D squib (2nd step) circuit.**

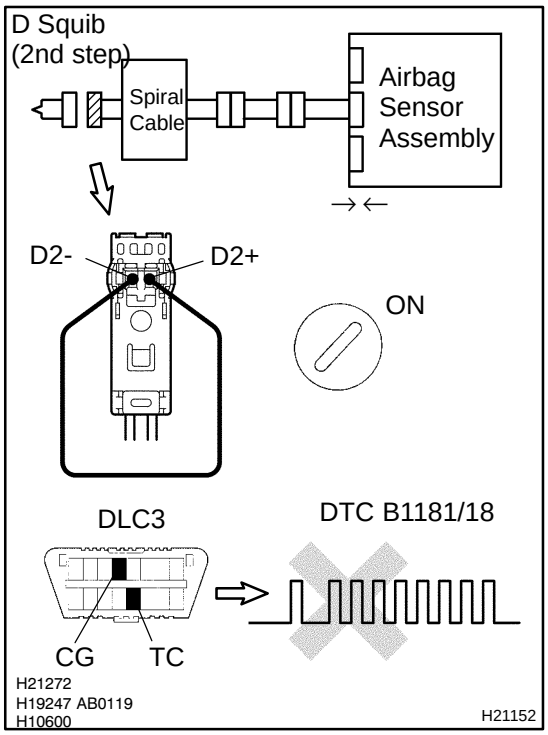


CHECK:
Measure the resistance between D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).
OK:
Resistance: Below 1 Ω

NG → **Go to step 6.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1181/18 is not output.

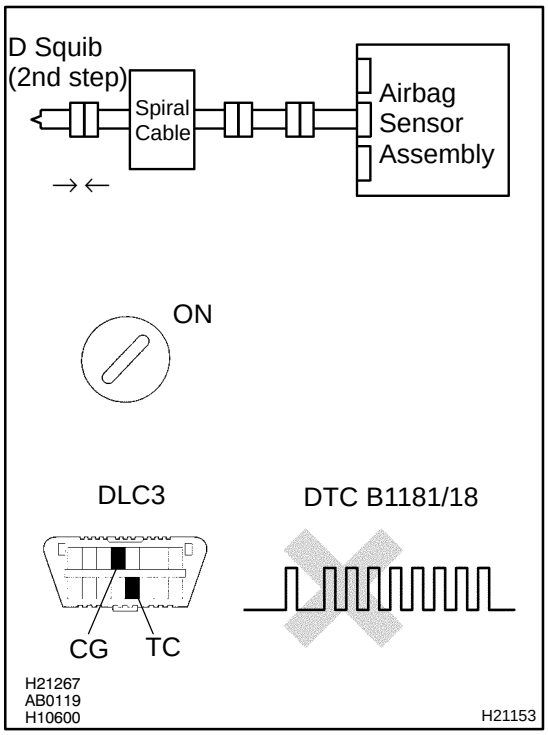
HINT:

Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib (2nd step).



PREPARATION:

(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 steering wheel pad (D squib (2nd step)) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1181/18 is not output.

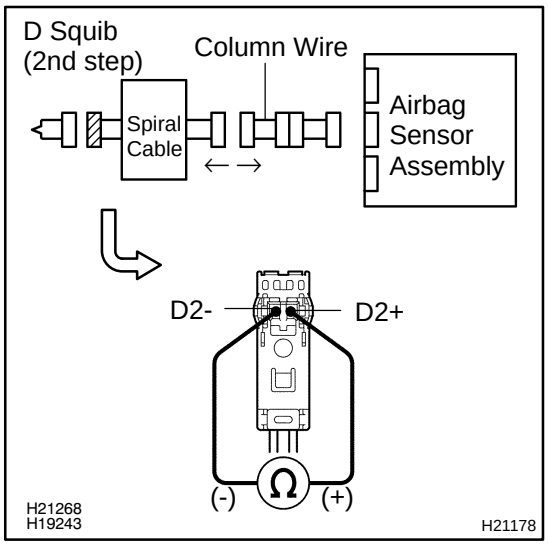
HINT:
Codes other than code B1181/18 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad (D squib (2nd step)).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

5	Check spiral cable.



PREPARATION:

Disconnect the spiral cable connector from the column wire.

CHECK:

Measure the resistance between D2+ and D2- of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.

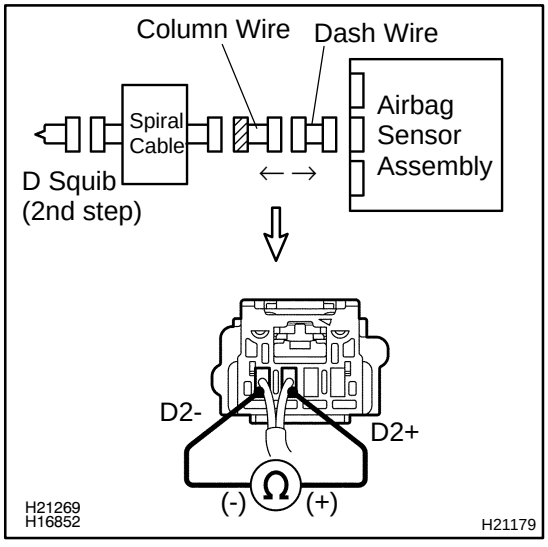
OK:

Resistance: Below 1 Ω

NG	Replace spiral cable.

OK

6	Check column wire.



PREPARATION:

Disconnect the column wire connector from the dash wire.

CHECK:

Measure the resistance between D2+ and D2- of the column wire connector on the spiral cable side.

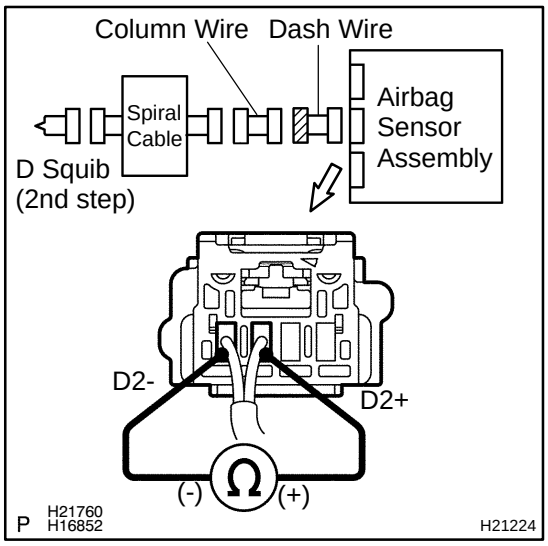
OK:

Resistance: Below 1 Ω

NG	Repair or replace column wire.

OK

7	Check dash wire.



CHECK:

Measure the resistance between D2+ and D2- of the dash wire connector on the column wire side.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DIB42-01

DTC	B1182/19	Short in D Squib (2nd step) Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib (2nd step) circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B0102/11 is recorded when a ground short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1182/19	★Short in D squib (2nd step) circuit (to ground) ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

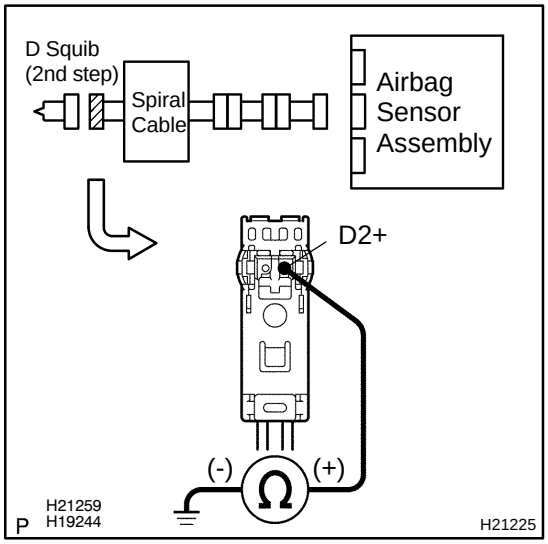
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-692).**

2	**Check D squib (2nd step) circuit.**

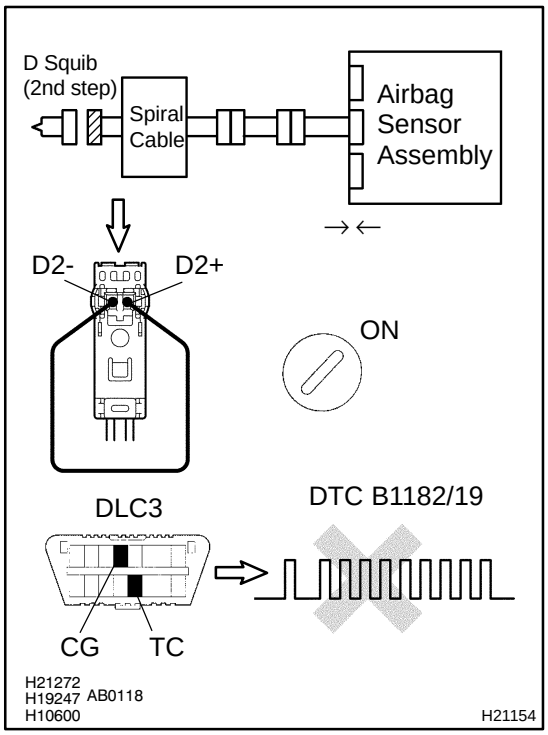


CHECK:
Measure the resistance between the body ground and D2+ of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).
OK:
Resistance: 1 MΩ or Higher

NG → **Go to step 5.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1182/19 is not output.

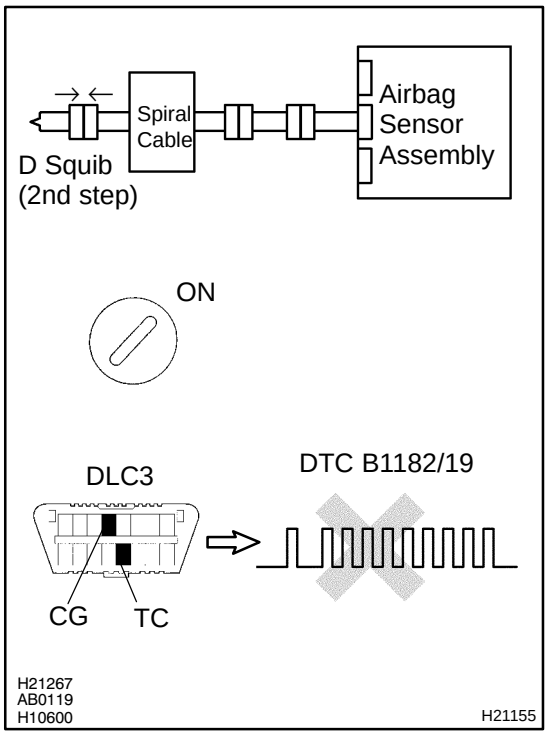
HINT:

Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib (2nd step).



PREPARATION:

(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 steering wheel pad (D squib (2nd step)) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1182/19 is not output.

HINT:

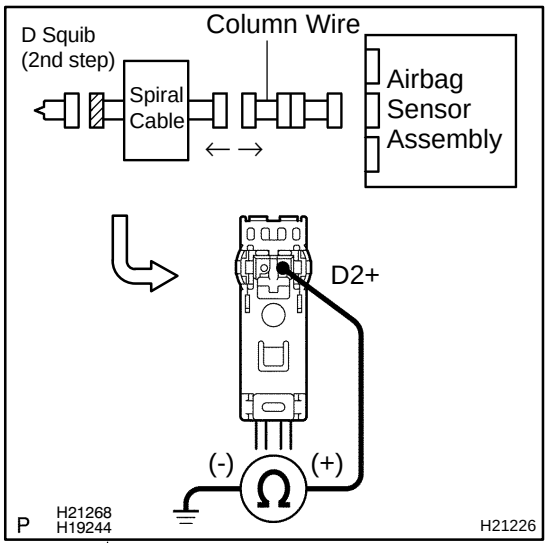
Codes other than code B1182/19 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad (D squib (2nd step)).

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	Check spiral cable.



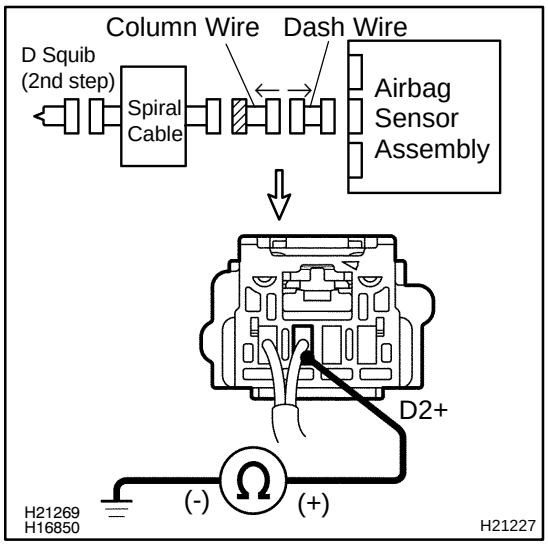
PREPARATION:
Disconnect the spiral cable connector from the column wire.
CHECK:
Measure the resistance between the body ground and D2+ of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.
OK:

Resistance: 1 MΩ or Higher

NG	Replace spiral cable.

OK

6	Check column wire.



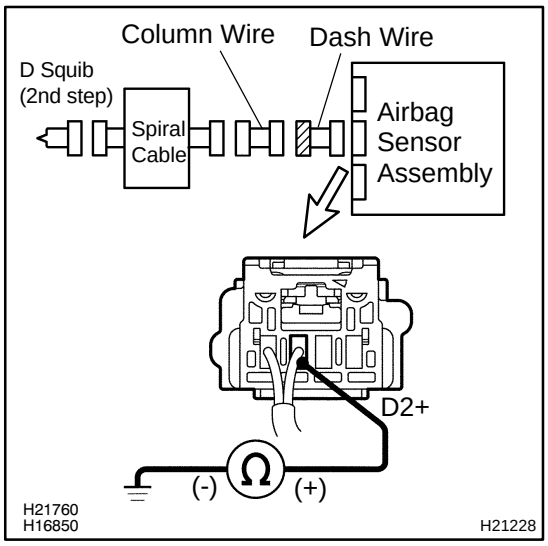
PREPARATION:
Disconnect the column wire connector from the dash wire.
CHECK:
Measure the resistance between the body ground and D2+ of the column wire connector on the spiral cable side.
OK:

Resistance: 1 MΩ or Higher

NG	Repair or replace column wire.

OK

7	Check dash wire.



CHECK:

Measure the resistance between the body ground and D2+ of the dash wire connector on the column wire side.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DIB43-01

DTC	B1183/22	Short in D Squib (2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib (2nd step)circuit consists of the airbag sensor assembly, the spiral cable and the steering wheel pad.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1183/22 is recorded when a B+ short is detected in the D squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1183/22	★Short in D squib (2nd step) circuit (to B+) ★D squib (2nd step) malfunction ★Spiral cable malfunction ★Airbag sensor assembly malfunction	★Steering wheel pad (D squib (2nd step)) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire

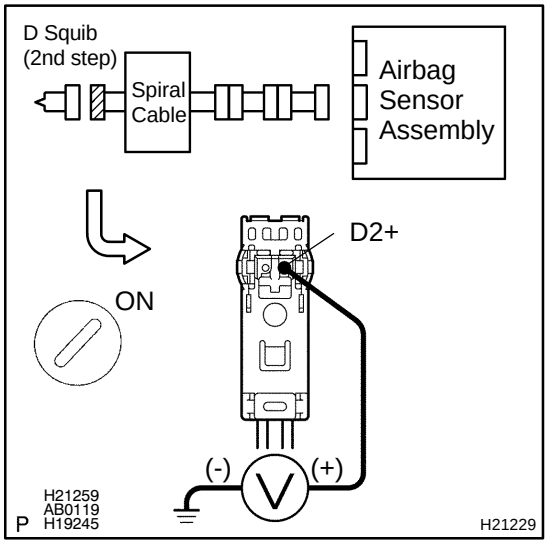
WIRING DIAGRAM

See page DI-882 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check D squib (2nd step) circuit.**

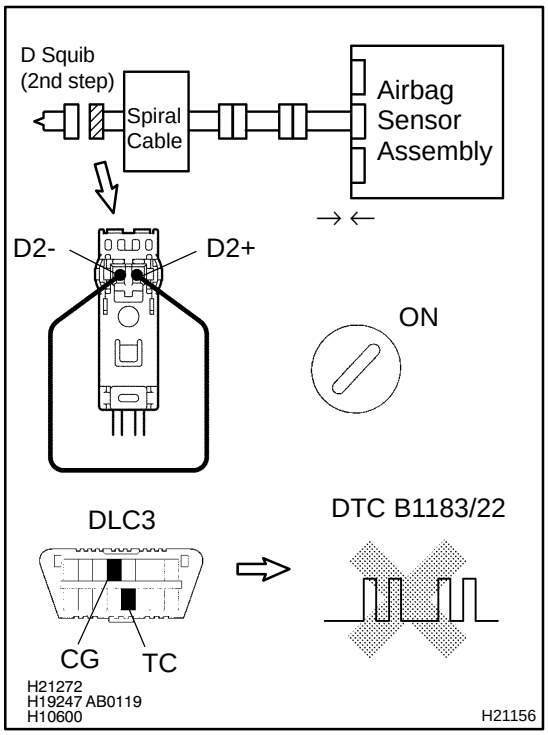


PREPARATION:
Connect the negative (-) terminal cable to the battery and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and D2+ of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).
OK:
Voltage: Below 1 V

NG → **Go to step 5.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect D2+ and D2- of the black connector on the steering wheel pad (D squib (2nd step)) side between the airbag sensor assembly and the steering wheel pad (D squib (2nd step)).

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1183/22 is not output.

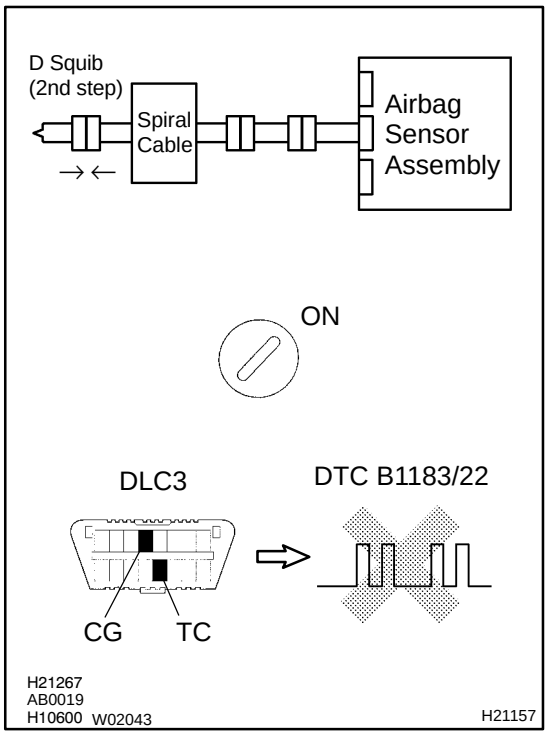
HINT:

Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check D squib (2nd step).



PREPARATION:

(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 steering wheel pad (D squib (2nd step)) to the spiral cable.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1183/22 is not output.

HINT:

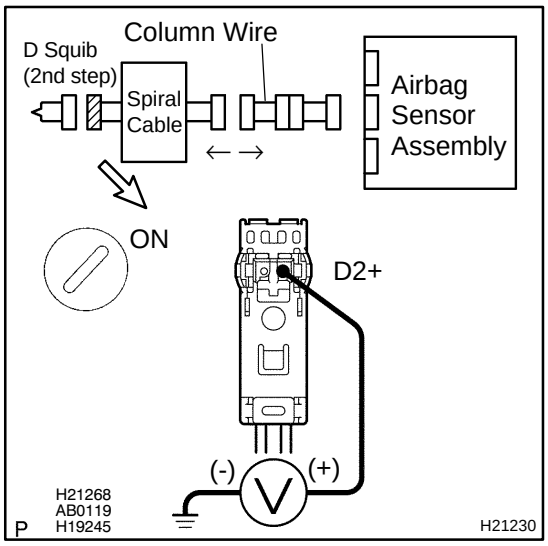
Codes other than code B1183/22 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad (D squib (2nd step)).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

5	Check spiral cable.



PREPARATION:

(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 spiral cable connector from the column wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and D2+ of the black spiral cable connector on the steering wheel pad (D squib (2nd step)) side.

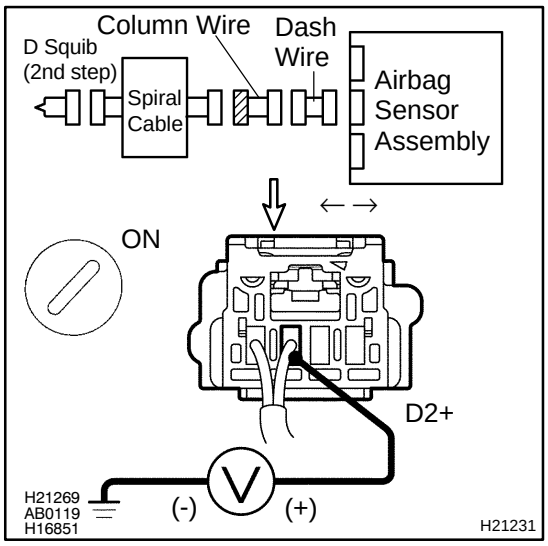
OK:

Voltage: Below 1 V

NG	Replace spiral cable.

OK

6	Check column wire.



PREPARATION:

(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 column wire connector from the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and D2+ of the column wire connector on the spiral cable side.

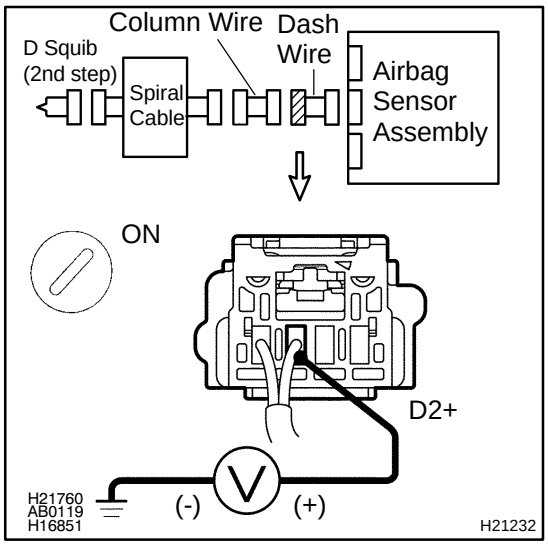
OK:

Voltage: Below 1 V

NG	Repair or replace column wire.

OK

7	Check dash wire.



CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and D2+ of the dash wire connector on the column wire side.

OK:

Voltage: Below 1 V

NG → **Repair or replace dash wire.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI8F0-06

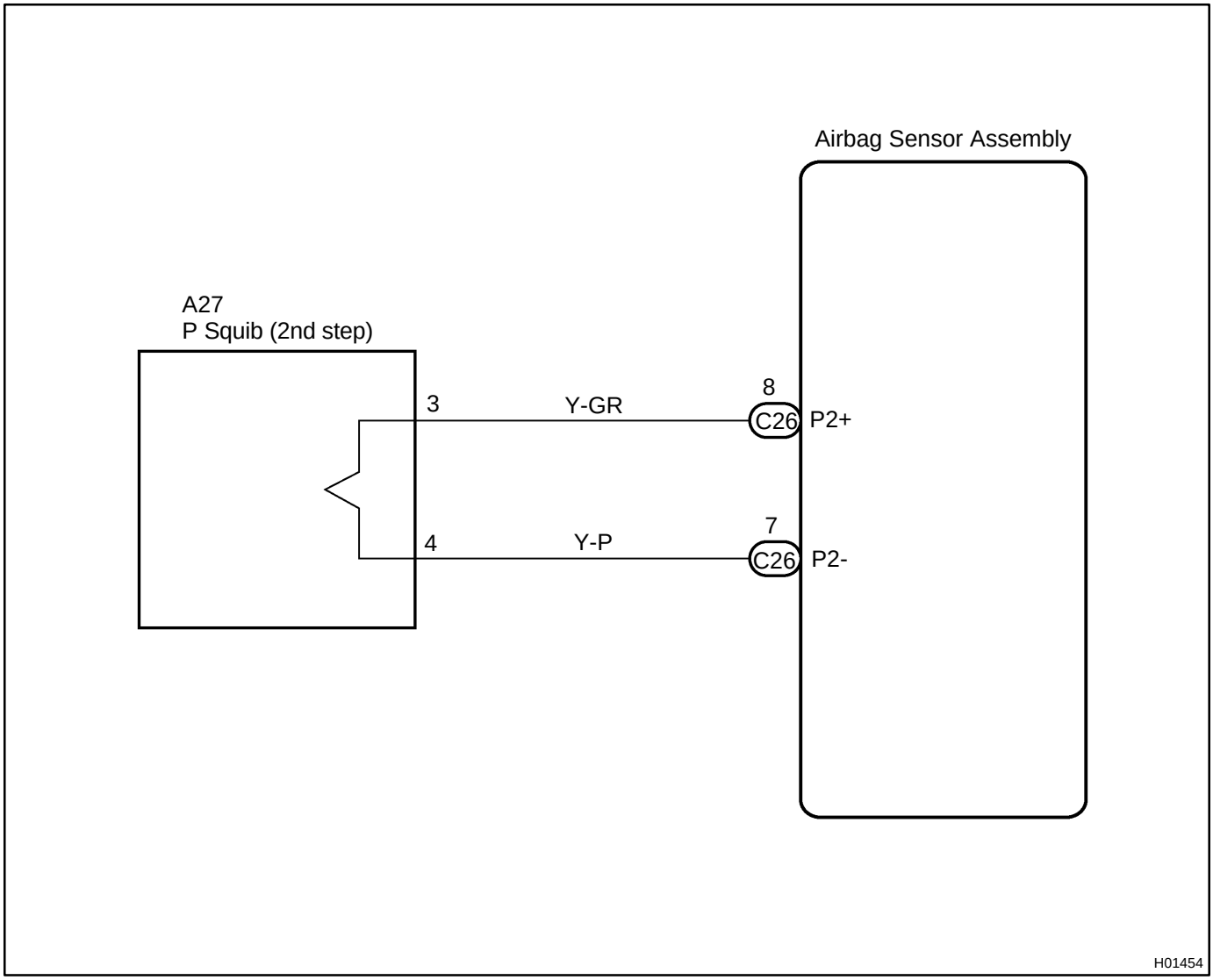
DTC	B1185/57	Short in P Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the front passenger airbag assembly. It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1185/57 is recorded when a short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1185/57	★Short in P squib (2nd step) circuit ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

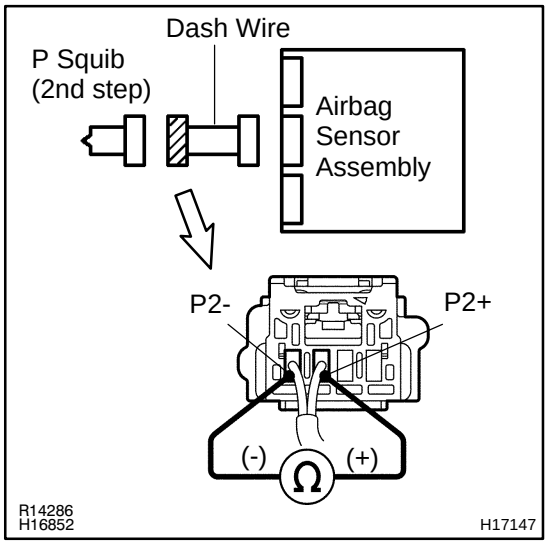
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib (2nd step) circuit).**



PREPARATION:

Release the airbag activation prevention mechanism built in the connector of the dash wire on the airbag sensor assembly side (See page DI-692).

CHECK:

Measure the resistance between P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

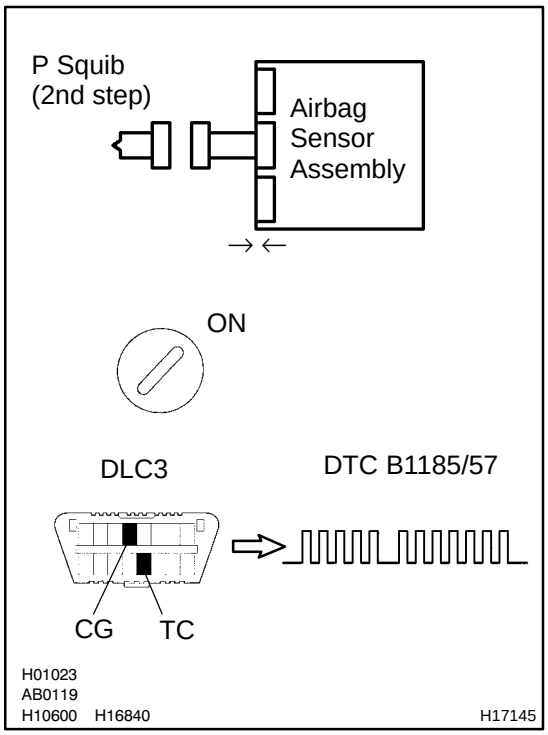
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1185/57 is not output.

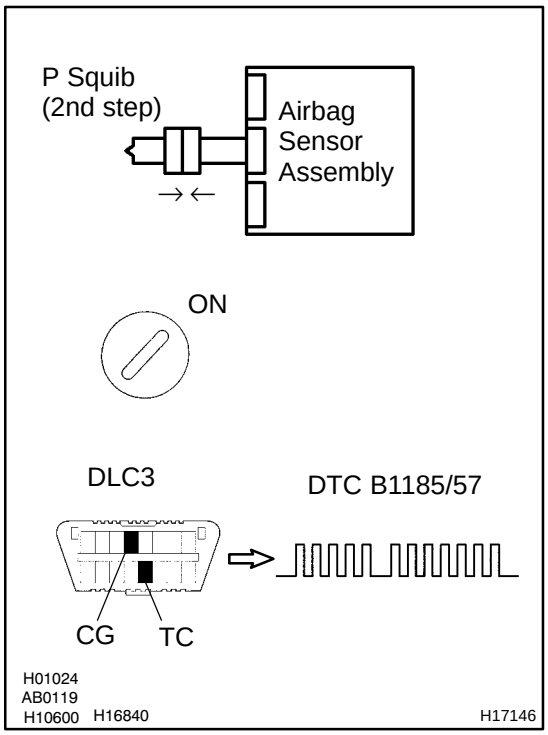
HINT:

Codes other than code B1185/57 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check P squib (2nd step).



PREPARATION:

(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 assembly (P squib (2nd step)) connector.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib (2nd step)).**

OK →

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI8F1-06

DTC	B1186/58	Open in P Squib (2nd step) Circuit

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1186/58 is recorded when an open is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1186/58	★Open in P squib (2nd step) circuit ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

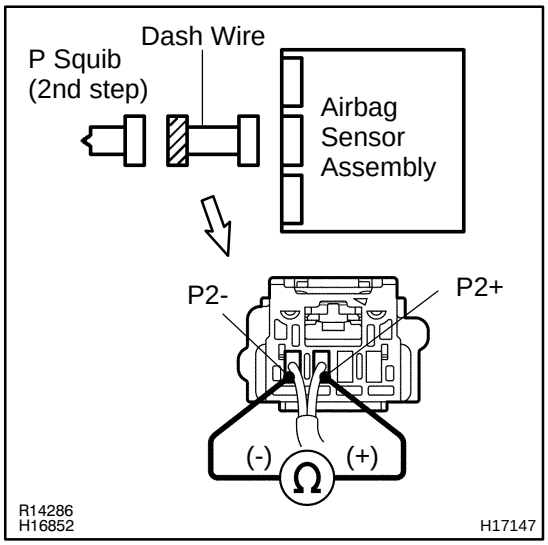
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI-923).

2	Check dash wire (P squib (2nd step) circuit).



CHECK:

Measure the resistance between P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

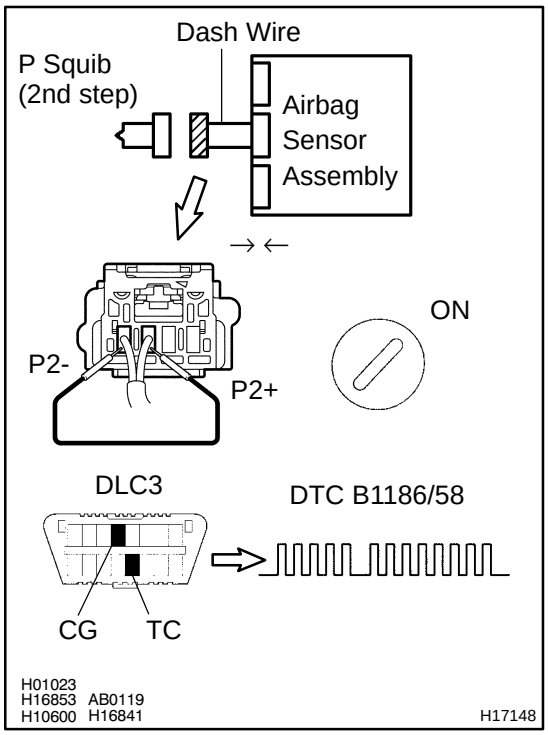
OK:

Resistance: Below 1 Ω

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1186/58 is not output.

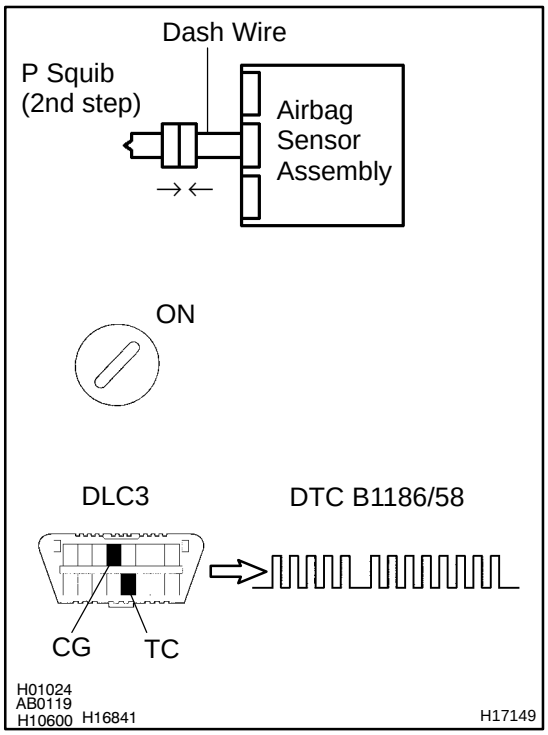
HINT:

Codes other than code B1186/58 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P squib (2nd step).



PREPARATION:

(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 assembly (P squib (2nd step)) to the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib (2nd step)).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI8F2-06

DTC	B1187/55	Short in P Squib (2nd step) Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1187/55 is recorded when ground short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1187/55	★Short in P squib (2nd step) circuit (to ground) ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

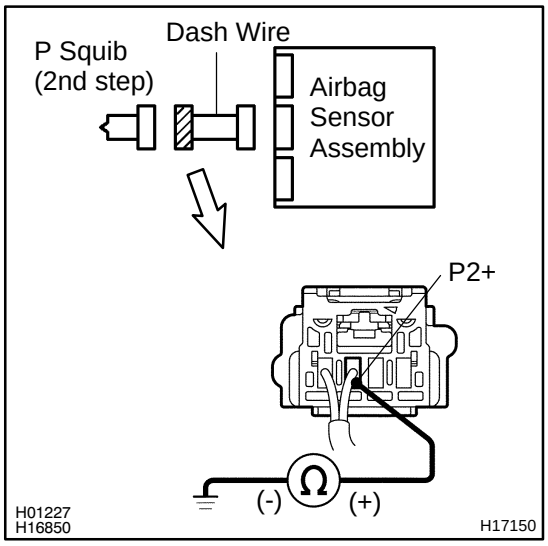
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire(P squib (2nd step) circuit).**



CHECK:

Measure the resistance between the body ground and P2+ of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

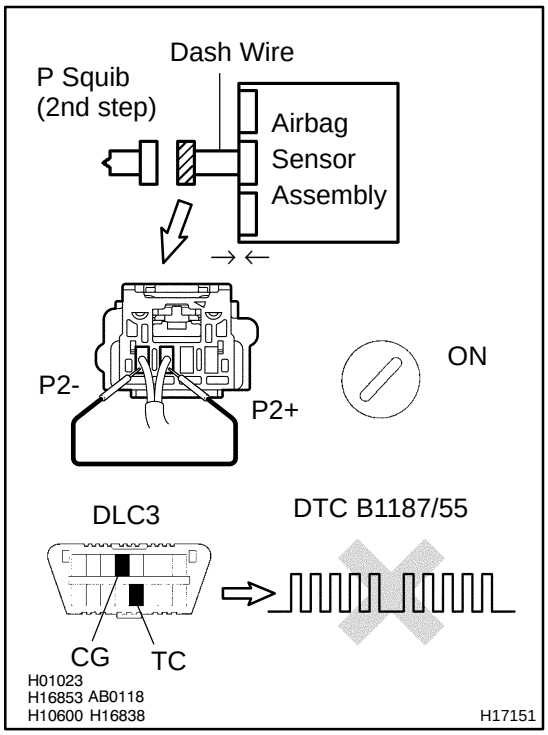
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B1187/55 is not output.

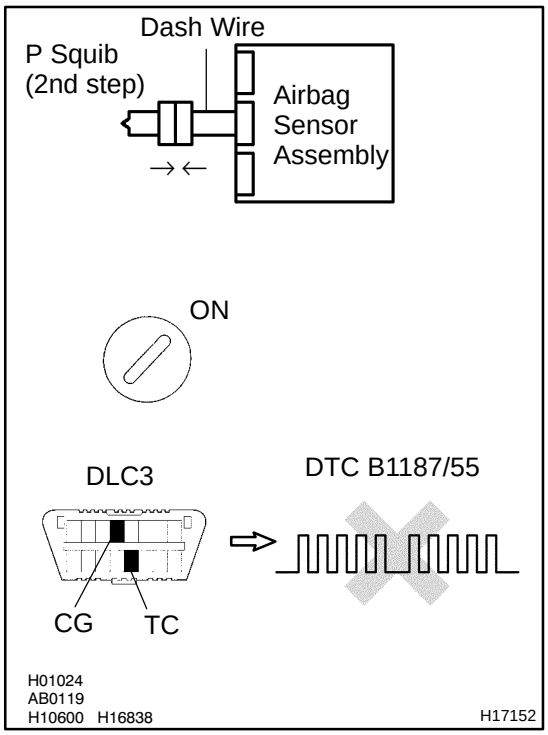
HINT:

Codes other than code B1187/55 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

4	Check P squib (2nd step).



PREPARATION:

(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 assembly (P squib (2nd step)) to the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib (2nd step)).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DI8F3-06

DTC	B1188/56	Short in P Squib (2nd step) Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib (2nd step) circuit consists of the airbag sensor assembly and the front passenger airbag assembly.
It causes the SRS to deploy when the SRS deployment conditions are satisfied.
For details of the function of each component, see OPERATION on page RS-3 .
DTC B1188/56 is recorded when a B+ short is detected in the P squib (2nd step) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1188/56	★Short in P squib (2nd step) circuit (to B+) ★P squib (2nd step) malfunction ★Airbag sensor assembly malfunction	★Front passenger airbag assembly (P squib (2nd step)) ★Airbag sensor assembly ★Dash wire

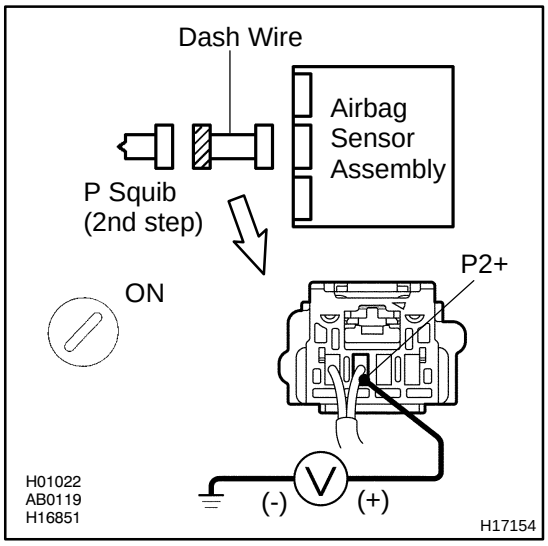
WIRING DIAGRAM

See page DI-903 .

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Check dash wire (P squib (2nd step) circuit).**

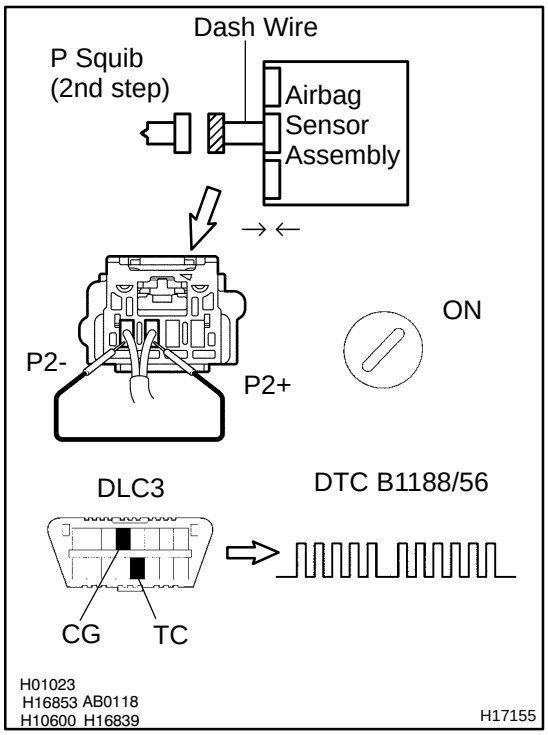


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and P2+ of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.
OK:
Voltage: Below 1 V

NG → **Repair or replace dash wire.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Using a service wire, connect P2+ and P2- of the dash wire connector on the front passenger airbag assembly (P squib (2nd step)) side.

(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1188/56 is not output.

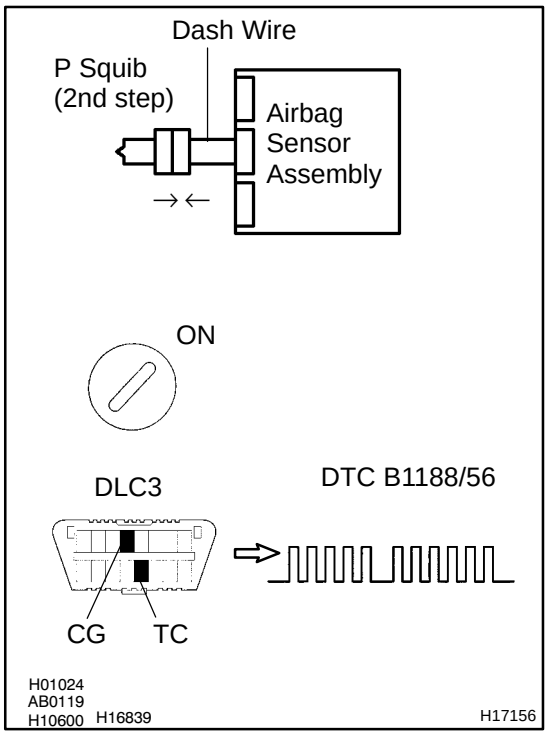
HINT:

Codes other than code B1188/56 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

4	Check P squib (2nd step).



PREPARATION:

(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 assembly (P squib (2nd step)) to the dash wire.
(d) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

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 (P squib (2nd step)).**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check. If the malfunctioning part can not be detected by the simulation method, replace all SRS components including the wire harness.

DIB44-01

DTC	B1628/29	RSCA off Switch Indicator Malfunction

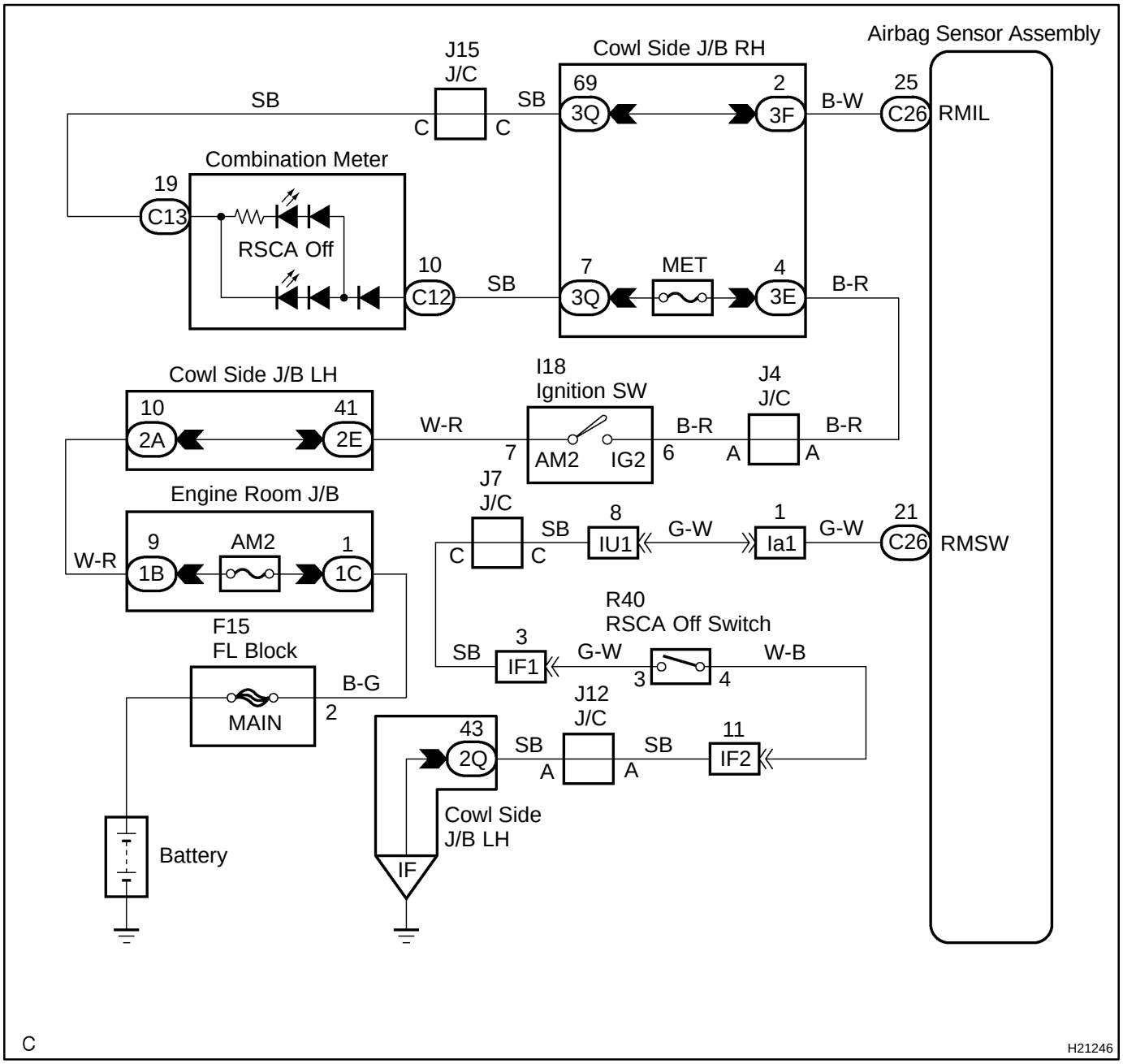
CIRCUIT DESCRIPTION

The RSCA off switch is a mechanism that operates both right and left side of the curtain shield airbag assembly and the seat belt pretensioner when the airbag sensor assembly detects a roll-over.
The RSCA off switch indicator light is installed in the combination meter.
As operating the RSCA off switch, the indicator light comes on to inform the driver that the roll-over detection system is not working.
The initial setting of the roll-over detection system is on. It automatically operates every time the ignition switch is turned on.

DTC No.	DTC Detecting Condition	Trouble Area
B1628/29	★RSCA off indicator circuit malfunction	★RSCA off switch ★Airbag sensor assembly ★Dash wire ★Instrument panel wire

HINT:
DTC B1628/29 is indicated only for the vehicle equipped with the side airbag.

WIRING DIAGRAM



INSPECTION PROCEDURE

The RSCA off indicator light remains on when the RSCA off switch is not operating (Remains ON).

1	**Does indicator light turn off?**

PREPARATION:

Disconnect the combination meter connector.

CHECK:

(a) Turn the ignition switch to ON.

(b) Check operation of RSCA off indicator light.

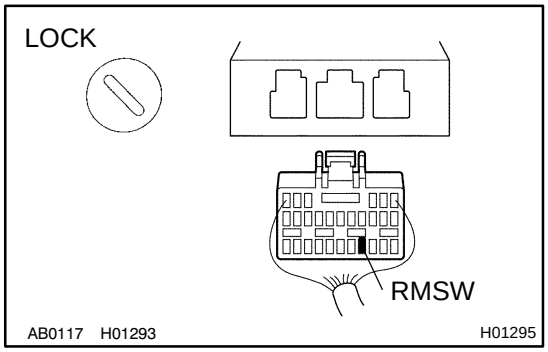
OK:

The indicator light does not light up.

NO → **Check combination meter (See page BE-58).**

YES

2	**Check wire harness.**



PREPARATION:

(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 airbag sensor assembly connector.

CHECK:

Measure the resistance between the body ground and RMSW on the airbag sensor assembly side between the combination meter and airbag sensor assembly.

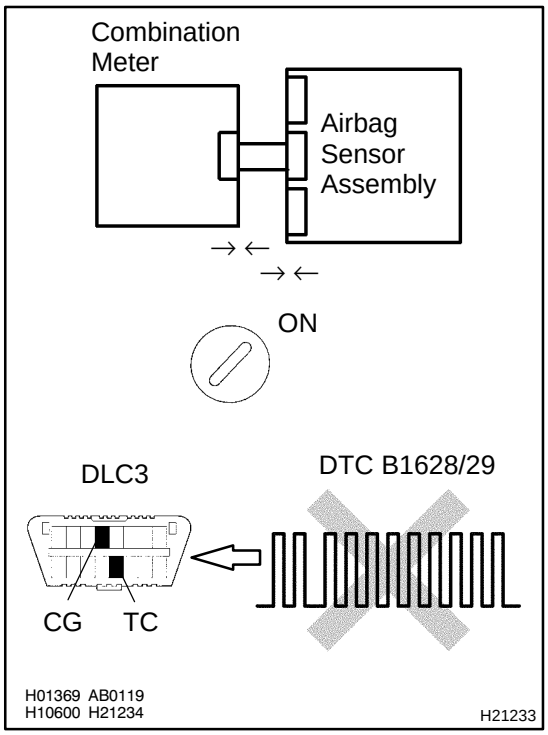
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace wire harness.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the airbag sensor assembly connector.
(b) Connect the combination meter connector.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.
(b) Clear the DTC stored in memory (See page DI-692).
(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.
(d) Turn the ignition switch to ON, and wait at least for 10 seconds.
(e) Check the DTC (See page DI-692).

OK:

DTC B2628/29 is not output.

HINT:

Codes other than code B1628/29 may be output at this time, but they are not relevant to this check.

NG	Replace airbag sensor assembly.

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

The RSCA off indicator light does not come on when the RSCA off switch is operating (Remains OFF).

1	**Check voltage of combination meter.**

PREPARATION:
Disconnect the combination meter connector.
CHECK:
Measure the voltage of the combination meter.
OK:
Voltage: 10 - 14 V

NG → **Check combination meter (See page BE-58).**

OK

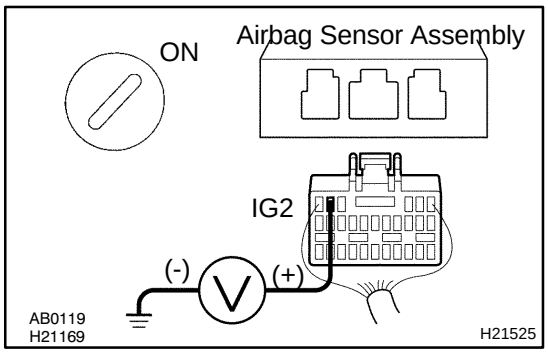
2	**Check wire harness.**

PREPARATION:
Disconnect the combination meter connector.
CHECK:
Measure the voltage between the body ground and RMSW on the combination meter side between the air-bag sensor assembly and the combination meter.
OK:
Voltage: Below 1 V

NG → **Repair or replace wire harness.**

OK

3	**Check wire harness.**



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(b) Connect the combination meter connector.
(c) Turn the ignition switch to LOCK, and wait at least for 90 seconds.
(d) Disconnect the airbag sensor assembly connector.
(e) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and IG2 on the airbag sensor assembly side.

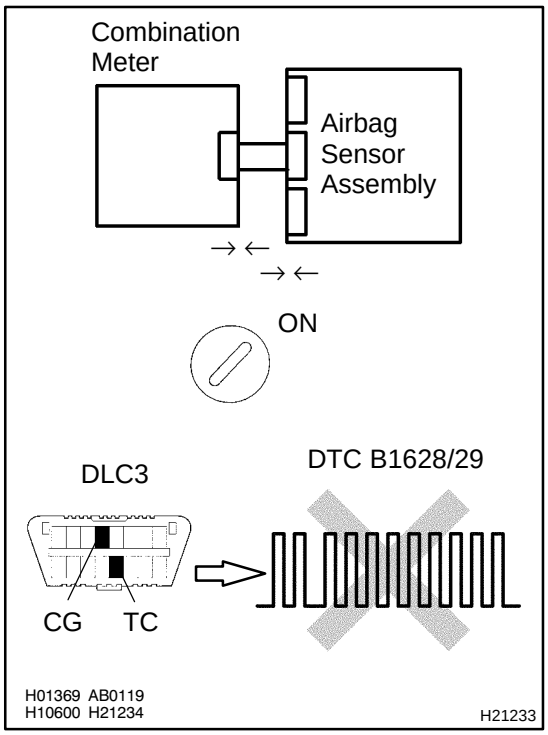
OK:

Voltage: 10 - 14 V

NG	**Repair or replace wire harness.**

OK

4	Check airbag sensor assembly.



PREPARATION:

Connect the airbag sensor assembly connector.

CHECK:

(a) Turn the ignition switch to ON, and wait at least for 10 seconds.

(b) Clear the DTC stored in memory (See page DI-692).

(c) Turn the ignition switch to LOCK, and wait at least for 10 seconds.

(d) Turn the ignition switch to ON, and wait at least for 10 seconds.

(e) Check the DTC (See page DI-692).

OK:

DTC B1628/29 is not output.

HINT:

Codes other than code B1628/29 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

DI8FC-09

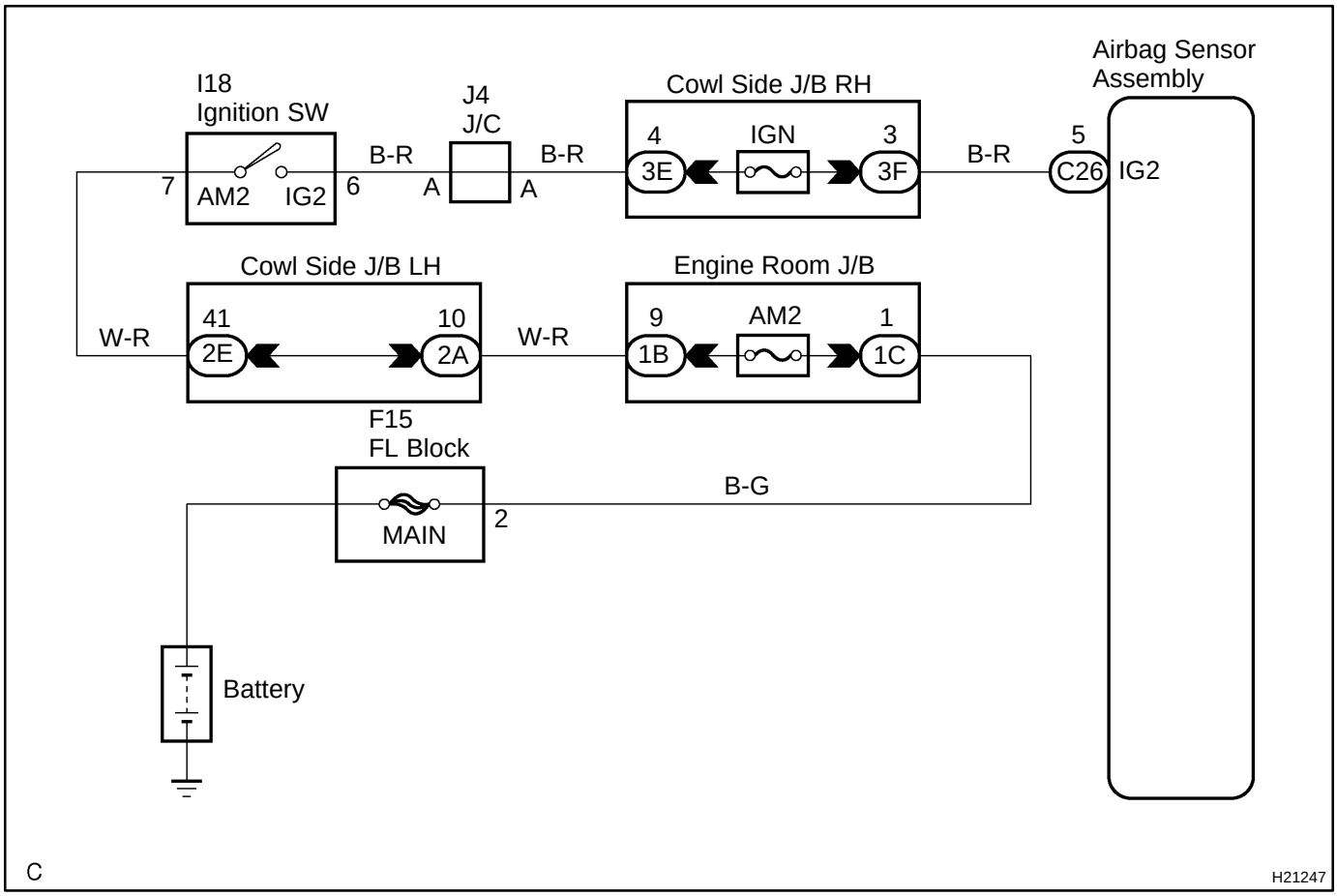
DTC	Normal	Source Voltage Drop

CIRCUIT DESCRIPTION

The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the airbag sensor assembly 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.
The diagnosis system malfunction display for this circuit is differ from the other circuits in that when the SRS warning light remains on and the DTC shows a normal code, source voltage drop is indicated.
Malfunction in this circuit is not recorded in the airbag sensor assembly, and when the source voltage returns to normal, the SRS warning light automatically goes off.

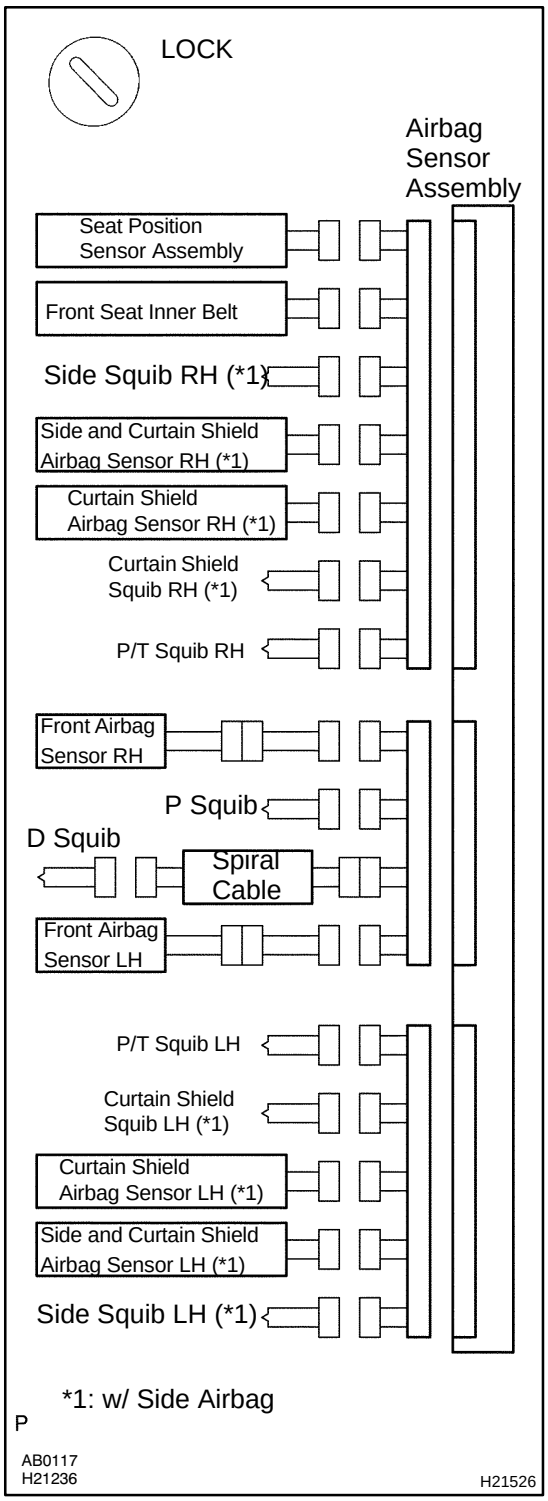
DTC No.	Diagnosis
(Normal)	Source voltage drop

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection.**



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(b) Remove the steering wheel pad (See page SR-29).

(c) Disconnect the connector of the front passenger airbag assembly (See page RS-31).

(d) w/ Side airbag:
Disconnect the connector of the side airbag assembly RH and LH (See page RS-44).

(e) w/ Side airbag:
Disconnect the connector of the curtain shield airbag assembly RH and LH (See page RS-59).

(f) Disconnect the connector of the seat belt pretensioner RH and LH (See page BO-141).

(g) Disconnect the connectors of the airbag sensor assembly (See page RS-70).

(h) Disconnect the connector of the front airbag sensor RH and LH (See page RS-75).

(i) w/ Side airbag:
Disconnect the connector of the side and curtain shield airbag sensor assembly RH and LH (See page RS-80).

(j) w/ Side airbag:
Disconnect the connector of the curtain shield airbag sensor assembly RH and LH (See page RS-86).

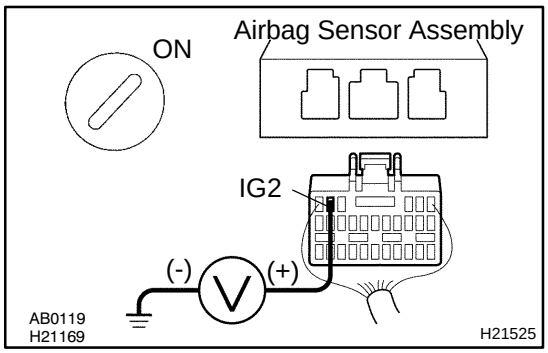
(k) Disconnect the connector of the seat position sensor assembly (See page RS-91).

(l) Disconnect the front seat inner belt LH connector (See page BO-106).

CAUTION:

Store the steering wheel pad, front passenger airbag assembly, side airbag assembly and curtain shield airbag assembly with the front surface facing upward.

2	**Check source voltage.**



PREPARATION:

Connect the negative (-) terminal cable to the battery.

CHECK:

(a) Turn the ignition switch to ON.

(b) Measure the voltage between the body ground and IG2 on the airbag sensor assembly and operate electric system (defogger, wiper, headlight, heater blower, etc.).

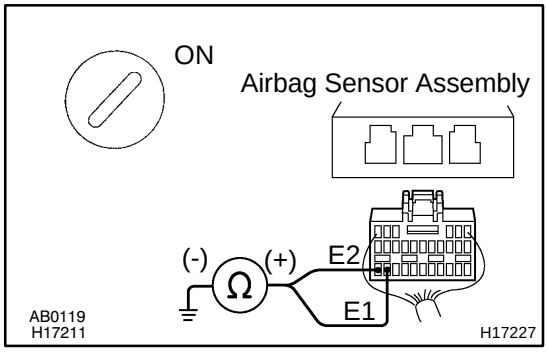
OK:

Voltage: 10 - 14 V

NG → **Check harness between battery and airbag sensor assembly, and check battery and charging system.**

OK

3	**Check airbag sensor assembly connector.**



CHECK:

Measure the resistance between the body ground and each of E1 and E2 of the airbag sensor assembly connector.

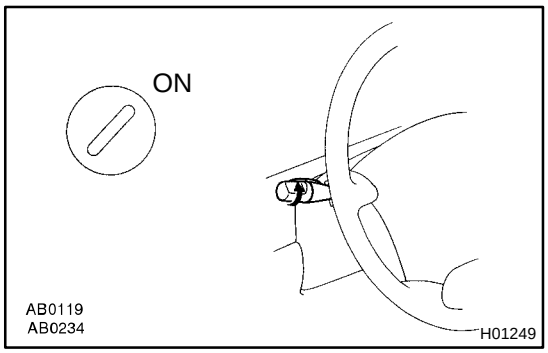
OK:

Resistance: 0 Ω (Continuity)

NG → **Repair or replace airbag sensor assembly connector.**

OK

4	Does SRS warning light turn off?



PREPARATION:

(a) Turn the ignition switch to LOCK.
(b) Connect the steering wheel pad connector.
(c) Connect the front passenger airbag assembly connector.
(d) w/ Side airbag:
Connect the side airbag assembly connectors.
(e) Connect the seat belt pretensioner connectors.
(f) Connect the airbag sensor assembly connectors.
(g) Connect the front airbag sensor connectors.
(h) w/ Side airbag:
Connect the side and curtain shield airbag sensor assembly connectors.
(i) w/ Side airbag:
Connect the curtain shield airbag assembly connectors.
(j) w/ Side airbag:
Connect the curtain shield airbag sensor assembly connectors.
(k) Connect the seat position sensor assembly connector.
(l) Connect the front seat inner belt LH connector.

CHECK:

(a) Turn the ignition switch to ON.
(b) Operate electric system (defogger, wiper, headlight, heater blower, etc.) and check that SRS warning light goes off.

NO → **Check for DTCs. If a DTC is output, perform troubleshooting for the DTC. If a normal code is output, replace airbag sensor assembly.**

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.

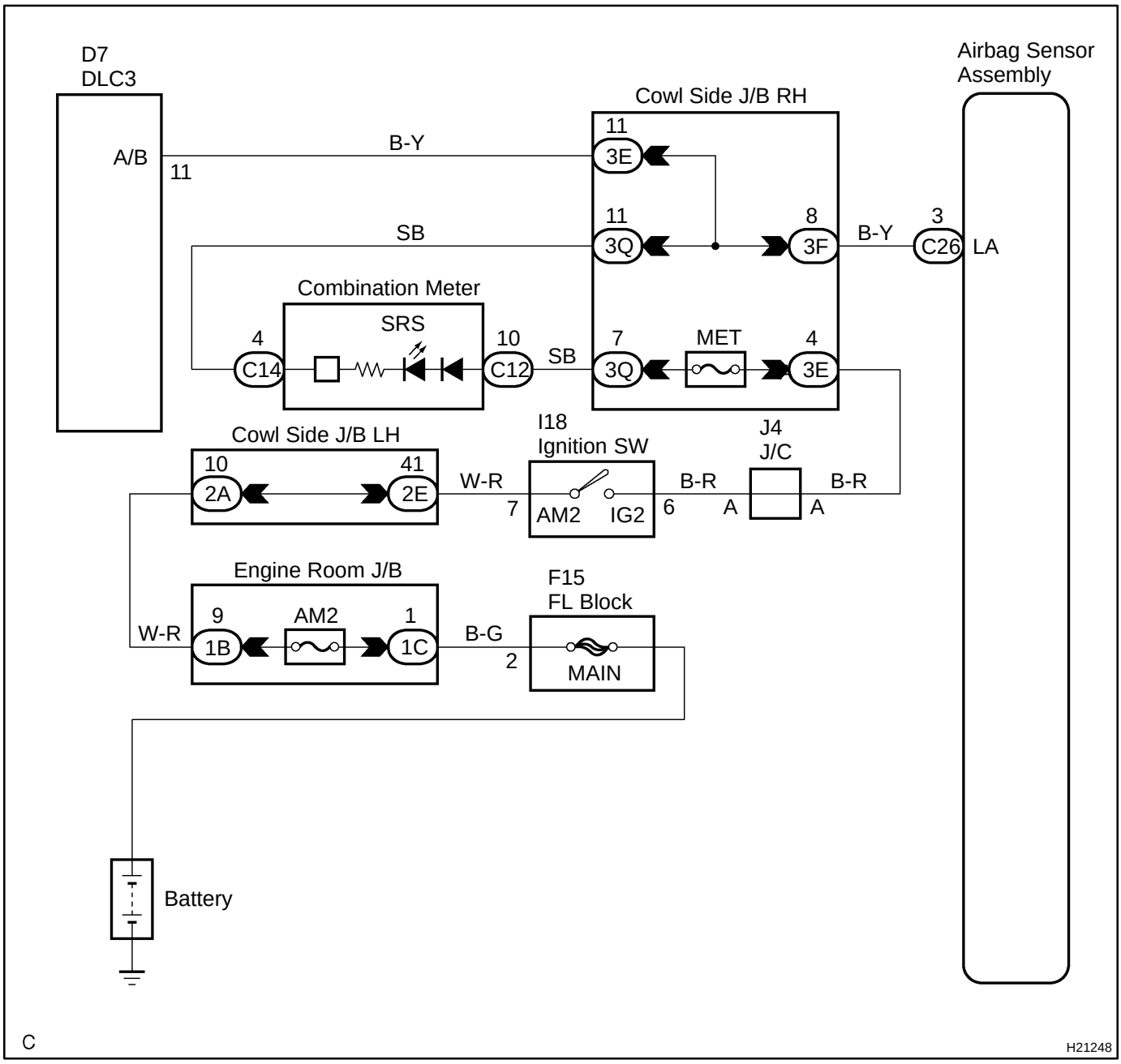
DIB45-01

SRS Warning Light Circuit Malfunction

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light comes on for approx. 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

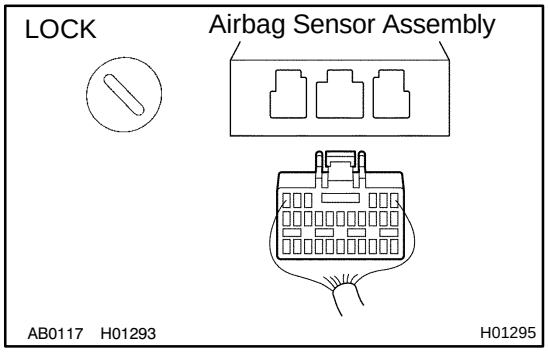


INSPECTION PROCEDURE

Always lights up, when ignition switch is in LOCK position.

1	**Prepare for inspection (See step 1 on page DI-923).**

2	**Does SRS warning light turn off?**



PREPARATION:

(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 airbag sensor assembly connector.
(d) Connect the negative (-) terminal cable to the battery.

CHECK:

Check operation of SRS warning light.

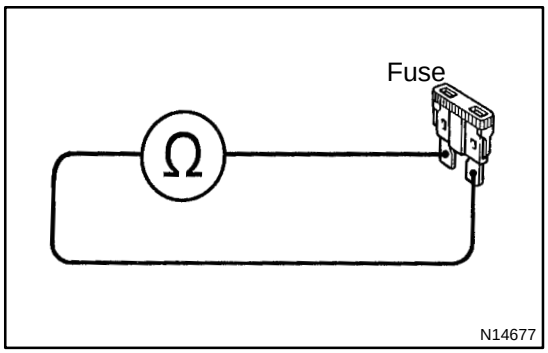
NO → **Check combination mater (See page BE-2).**

YES

Replace airbag sensor assembly.

Does not light up, when ignition switch is turned to ON.

1	**Check AM2 Fuse.**



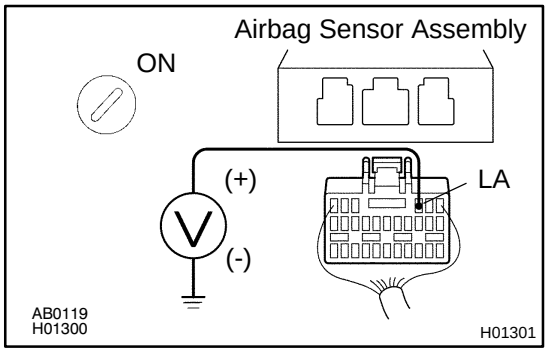
PREPARATION:
Remove the AM2 fuse.
CHECK:
Check continuity of the AM2 fuse.
OK:
Continuity
HINT:
★ Fuse may be burnt out even if it appears to be OK during visual inspection.
★ If fuse is OK, install it.

NG → **Go to step 5.**

OK

2	**Prepare for inspection (See step 1 on page DI-923).**

3	**Check SRS warning light circuit.**

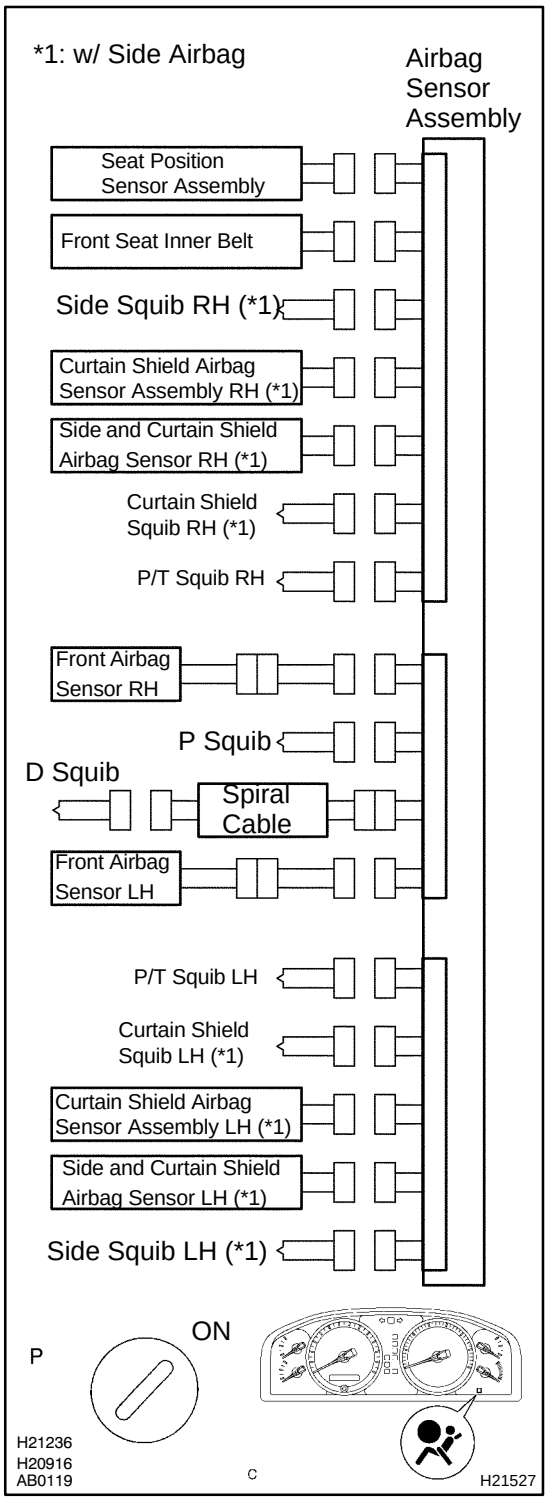


PREPARATION:
Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.
CHECK:
(a) Turn the ignition switch to ON.
(b) Measure the voltage between the body ground and LA of the airbag sensor assembly connector.
OK:
Voltage: 10 - 14 V

NG → **Check SRS warning light bulb or repair SRS warning light circuit.**

OK

4	Does SRS warning light come on?



PREPARATION:

(a) Disconnect the negative (-) terminal cable from the battery, and wait at least for 90 seconds.
(b) Connect the airbag sensor assembly connector.
(c) Connect the negative (-) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn the ignition switch to ON.
(b) Check operation of the SRS warning light.

NO → **Replace airbag sensor assembly.**

YES

From the results of the above inspection, the malfunctioning part can now be considered normal. To make sure of this, use simulation method to check.

5	**Is new AM2 fuse burnt out again?**

NO → **Using simulation method, reproduce malfunction symptoms (See page IN-26).**

YES

Check harness between AM2 fuse and SRS warning light.

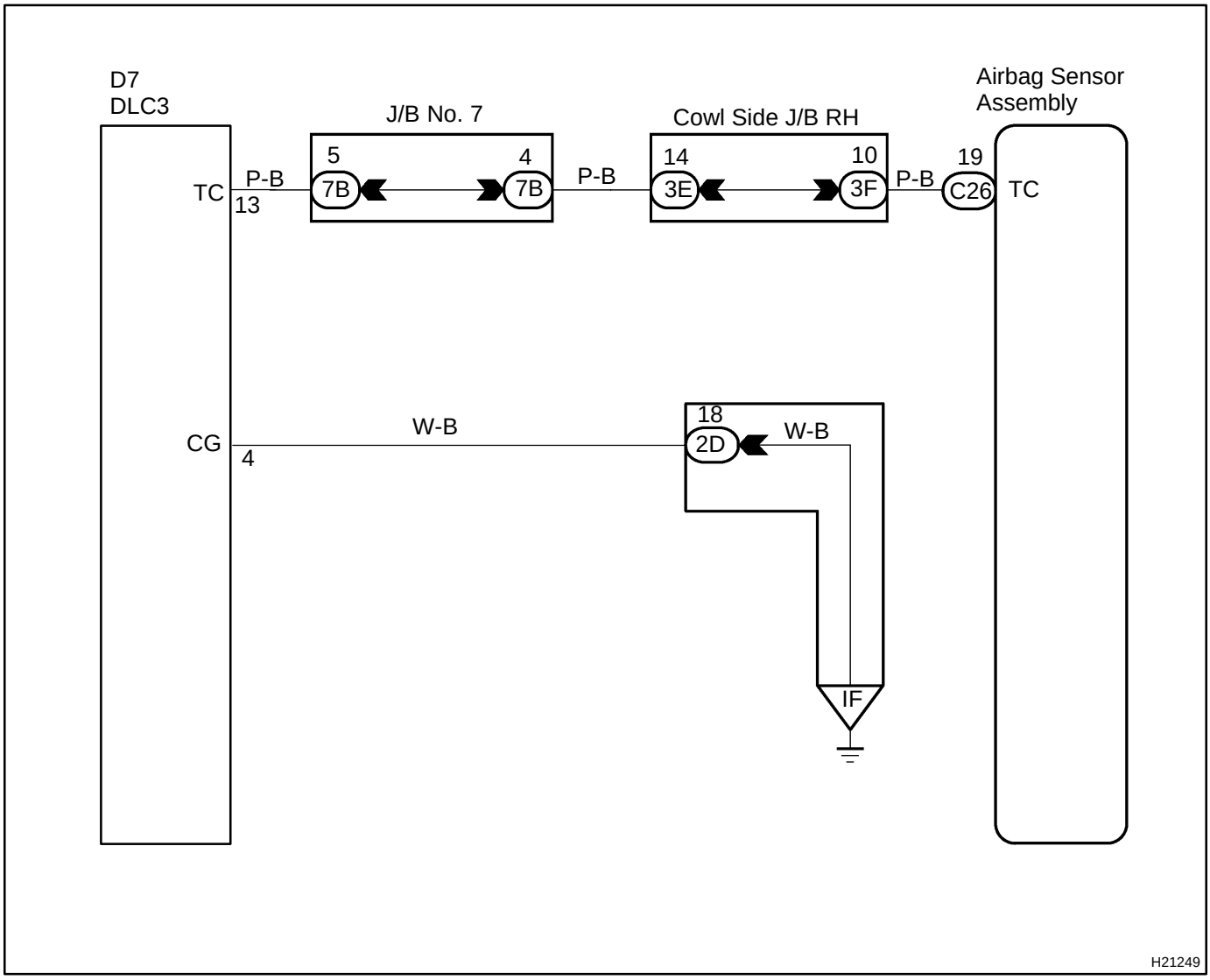
DIB46-02

TC Terminal Circuit

CIRCUIT DESCRIPTION

DTC output mode is set by connecting terminal TC and CG of the DLC3 the airbag sensor assembly. The DTCs are displayed by blinking the SRS warning light.

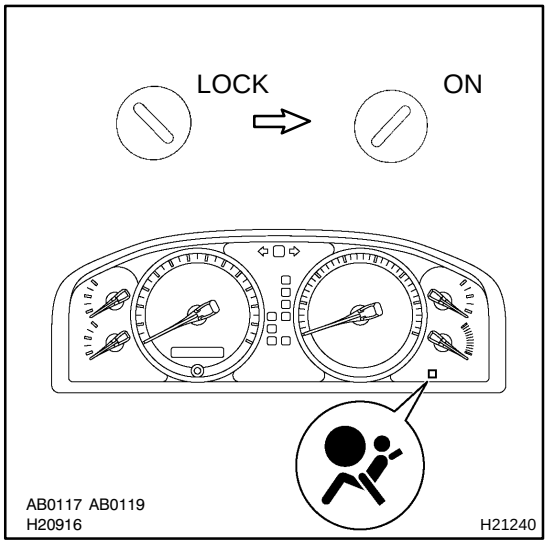
WIRING DIAGRAM



INSPECTION PROCEDURE

If the DTC is not displayed, do the following troubleshooting.

1	**Does SRS warning light light up for approx. 6 seconds?**



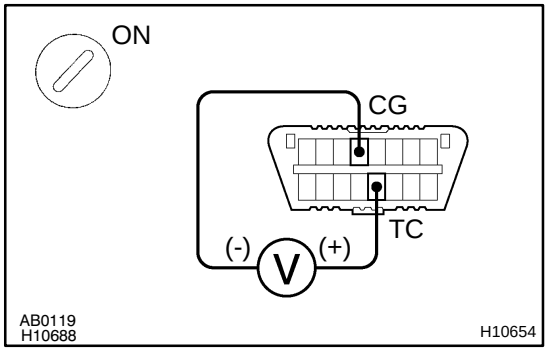
CHECK:

Check operation of the SRS warning light after ignition switch is turned from LOCK position to ON position.

NO → **Check SRS warning light system. (See page DI-927)**

YES

2	**Check voltage between terminal TC and CG of DLC3.**



PREPARATION:

Turn the ignition switch to ON.

CHECK:

Measure the voltage between terminal TC and CG of DLC3.

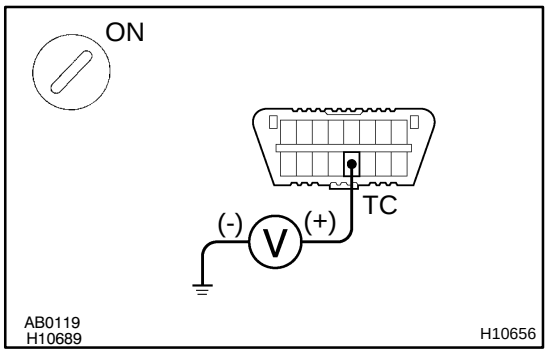
OK:

Voltage: 4 - 14 V

OK → **Go to step 4.**

NG

3	Check voltage between terminal TC of DLC3 and body ground.



CHECK:

Measure the voltage between the body ground and terminal TC of DLC3.

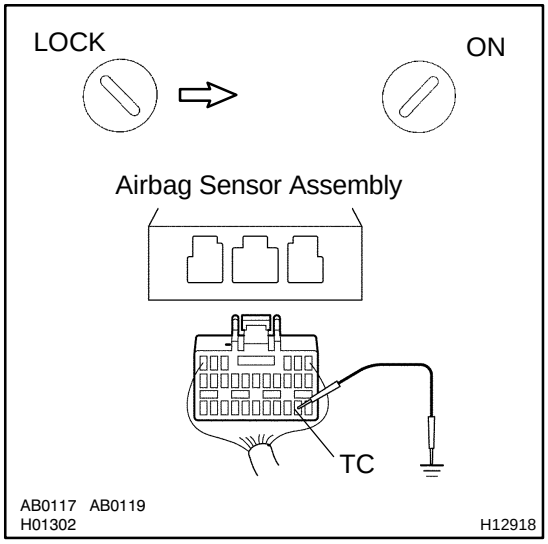
OK:

Voltage: 4 - 14 V

OK	Check harness between terminal CG of DLC3 and body ground.

NG

4	Check airbag sensor assembly.



PREPARATION:

(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 airbag sensor assembly connector.
(d) Insert the service wire into terminal TC from back side as shown in the illustration.
(e) Connect the airbag sensor assembly connector with service wire.
(f) Connect the negative (-) terminal cable to the battery.
(g) Turn the ignition switch to ON and wait at least for 20 seconds.
(h) Connect the service wire of terminal TC to body ground.

CHECK:

Check operation of SRS warning light.

OK:

SRS waning light comes on.

NOTICE:

Pay due attention to the terminal connecting position to avoid a malfunction.

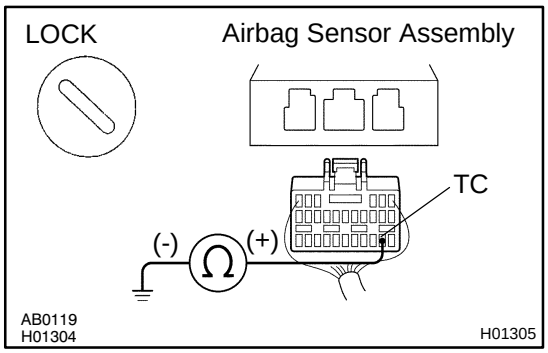
OK	Check harness between the airbag sensor assembly and DLC3.

NG

Replace airbag sensor assembly.

If the DTC is displayed without a DTC check procedure, perform the following troubleshooting.

1	**Check resistance between terminal TC of airbag sensor assembly and body ground.**



PREPARATION:

(a) Turn the ignition switch to LOCK.

(b) Disconnect negative (-) terminal cable from the battery, and wait at least for 90 seconds.

(c) Disconnect the airbag sensor assembly connector.

CHECK:

Check resistance between terminal TC of the airbag sensor assembly connector and body ground.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector.**

OK

Replace airbag sensor assembly.

DI6OX-09

CUSTOMER PROBLEM ANALYSIS CHECK

Supplemental Restraint System Check Sheet

Inspector's Name _____

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km Miles**

Date Problem Occurred	/ /
Weather	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Other
Temperature	**Approx.**

Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details of Problem	

Vehicle Inspection, Repair History Prior to Occurrence of Malfunction (Including Supplemental Restraint System)	

Diagnosis System Inspection

SRS Warning Light Inspection	**1st Time**	☐ Remains ON ☐ Sometimes Lights Up ☐ Does Not Light Up
	2nd Time	☐ Remains ON ☐ Sometimes Lights Up ☐ Does Not Light Up
DTC Inspection	**1st Time**	☐ Normal Code ☐ Malfunction Code [Code.]
	2nd Time	☐ Normal Code ☐ Malfunction Code [Code.]

DI6OZ-25

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, check the circuit listed for that code in the table below (Proceed to the page given for that circuit.).

DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0100/13 (DI-711)	★Short in D squib circuit	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0101/14 (DI-717)	★Open in D squib circuit	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0102/11 (DI-722)	★Short in D squib circuit (to ground)	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0103/12 (DI-727)	★Short in D squib circuit (to B+)	★Steering wheel pad (squib) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B0105/53 (DI-732)	★Short in P squib circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0106/54 (DI-736)	★Open in P squib circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0107/51 (DI-739)	★Short in P squib circuit (to ground)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0108/52 (DI-742)	★Short in P squib circuit (to B+)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B0110/43 (*1) (DI-745)	★Short in side squib RH circuit	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0111/44 (*1) (DI-749)	★Open in side squib RH circuit	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0112/41 (*1) (DI-752)	★Short in side squib RH circuit (to ground)	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0113/42 (*1) (DI-755)	★Short in side squib RH circuit (to B+)	★Side airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0115/47 (*1) (DI-758)	★Short in side squib LH circuit	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink

B0116/48 (*1) (DI-762)	★Open in side squib LH circuit	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0117/45 (*1) (DI-765)	★Short in side squib LH circuit (to ground)	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0118/46 (*1) (DI-768)	★Short in side squib LH circuit (to B+)	★Side airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0126/B0127/27 (DI-771)	★Seat belt buckle switch LH malfunction	★Front seat inner belt LH ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH	ON
B0130/63 (DI-777)	★Short in P/T squib RH circuit	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0131/64 (DI-781)	★Open in P/T squib RH circuit	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0132/61 (DI-784)	★Short in P/T squib RH circuit (to ground)	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0133/62 (DI-787)	★Short in P/T squib RH circuit (to B+)	★Seat belt pretensioner RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B0135/73 (DI-790)	★Short in P/T squib LH circuit	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0136/74 (DI-794)	★Open in P/T squib LH circuit	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0137/71 (DI-797)	★Short in P/T squib LH circuit (to ground)	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B0138/72 (DI-800)	★Short in P/T squib LH circuit (to B+)	★Seat belt pretensioner LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1100/31 (DI-803)	★Airbag sensor assembly malfunction	★Airbag sensor assembly	ON
B1135/24 (DI-805)	★Half connection in airbag sensor assembly connector	★Airbag sensor assembly ★Dash wire ★Floor No. 1 wire ★Floor No. 2 wire	ON
B1140/32 (*1) (DI-807)	★Side and curtain shield airbag sensor assembly RH malfunction	★Side and curtain shield airbag sensor assembly RH ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1141/33 (*1) (DI-813)	★Side and curtain shield airbag sensor assembly LH malfunction	★Side and curtain shield airbag sensor assembly LH ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1148/36 (DI-819)	★Front airbag sensor RH malfunction	★Front airbag sensor RH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire	ON

B1149/37 (DI-828)	★Front airbag sensor LH malfunction	★Front airbag sensor LH ★Airbag sensor assembly ★Dash wire ★Engine room No. 2 wire ★Engine room main wire	ON
B1153/25 (DI-836)	★Seat position sensor malfunction	★Seat position sensor assembly ★Airbag sensor assembly ★Floor No. 1 wire ★Front seat wire LH	ON
B1154/38 (*1) (DI-844)	★Curtain shield airbag sensor assembly RH malfunction	★Curtain shield airbag sensor assembly RH ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1155/39 (*1) (DI-850)	★Curtain shield airbag sensor assembly LH malfunction	★Curtain shield airbag sensor assembly LH ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1160/83 (*1) (DI-856)	★Short in curtain shield squib RH circuit	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1161/84 (*1) (DI-860)	★Open in curtain shield squib RH circuit	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1162/81 (*1) (DI-863)	★Short in curtain shield squib RH circuit (to ground)	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1163/82 (*1) (DI-866)	★Short in curtain shield squib RH circuit (to B+)	★Curtain shield airbag assembly RH (squib) ★Airbag sensor assembly ★Floor No. 2 wire	Blink
B1165/87 (*1) (DI-869)	★Short in curtain shield squib LH circuit	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1166/88 (*1) (DI-873)	★Open in curtain shield squib LH circuit	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1167/85 (*1) (DI-876)	★Short in curtain shield squib LH circuit (to ground)	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1168/86 (*1) (DI-879)	★Short in curtain shield squib LH circuit (to B+)	★Curtain shield airbag assembly LH (squib) ★Airbag sensor assembly ★Floor No. 1 wire	Blink
B1180/17 (DI-882)	★Short in D squib (2nd step) circuit	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1181/18 (DI-888)	★Open in D squib (2nd step) circuit	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1182/19 (DI-893)	★Short in D squib (2nd step) circuit (to ground)	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON

B1183/22 (DI-898)	★Short in D squib (2nd step) circuit (to B+)	★Steering wheel pad (D squib, 2nd step) ★Spiral cable ★Airbag sensor assembly ★Dash wire ★Column wire	ON
B1185/57 (DI-903)	★Short in P squib (2nd step) circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1186/58 (DI-907)	★Open in P squib (2nd step) circuit	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1187/55 (DI-910)	★Short in P squib (2nd step) circuit (to ground)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1188/56 (DI-913)	★Short in P squib (2nd step) circuit (to B+)	★Front passenger airbag assembly (squib) ★Airbag sensor assembly ★Dash wire	ON
B1628/29 (*1) (DI-913)	★RSCA cutoff switch indicator	★RSCA cutoff switch ★Airbag sensor assembly ★Dash wire ★Instrument panel wire	Blink
Normal (DI-923)	★System normal	-	OFF
	★Voltage source drop	★Battery ★Airbag sensor assembly	ON

*1: w/ Side Airbag

HINT:

★ When the SRS warning light remains lit up and the DTC is the normal code, a voltage source drop is possible.
This malfunction is not stored in memory by the airbag sensor assembly and if the power source voltage returns to normal, the SRS warning light will automatically go out.

★ When 2 or more codes are indicated, smaller numbered code will be shown first.

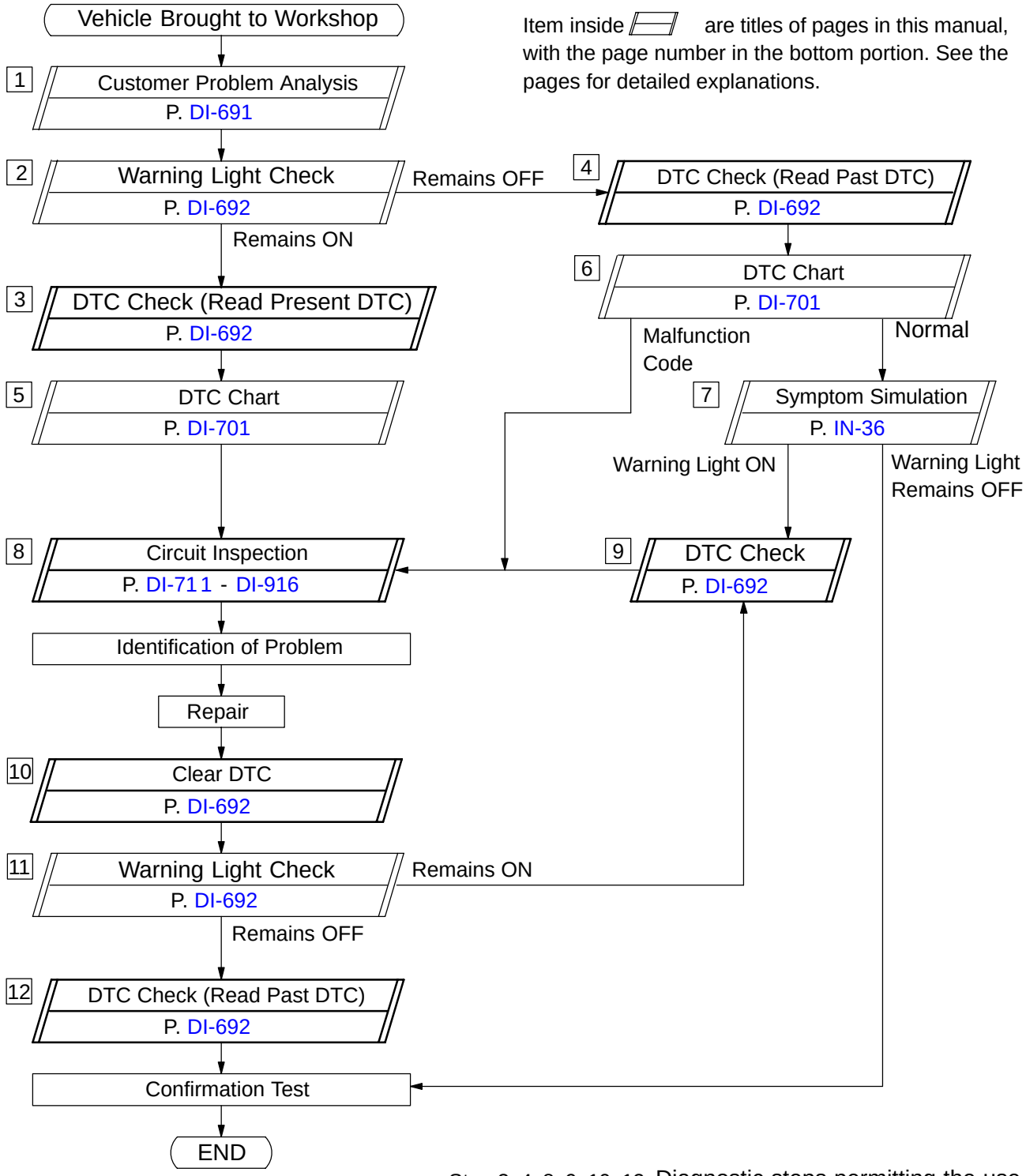
★ If a code not listed on the chart is displayed, the airbag sensor assembly is at fault.

★ In the case of any malfunction concerning any open circuit, ground short, or B+ short due to any squib, another malfunction code may not be detected. In this case, correct the malfunction currently indicated and then perform malfunction diagnosis again. Another malfunction code may then be detected.

SUPPLEMENTAL RESTRAINT SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI6OW-18

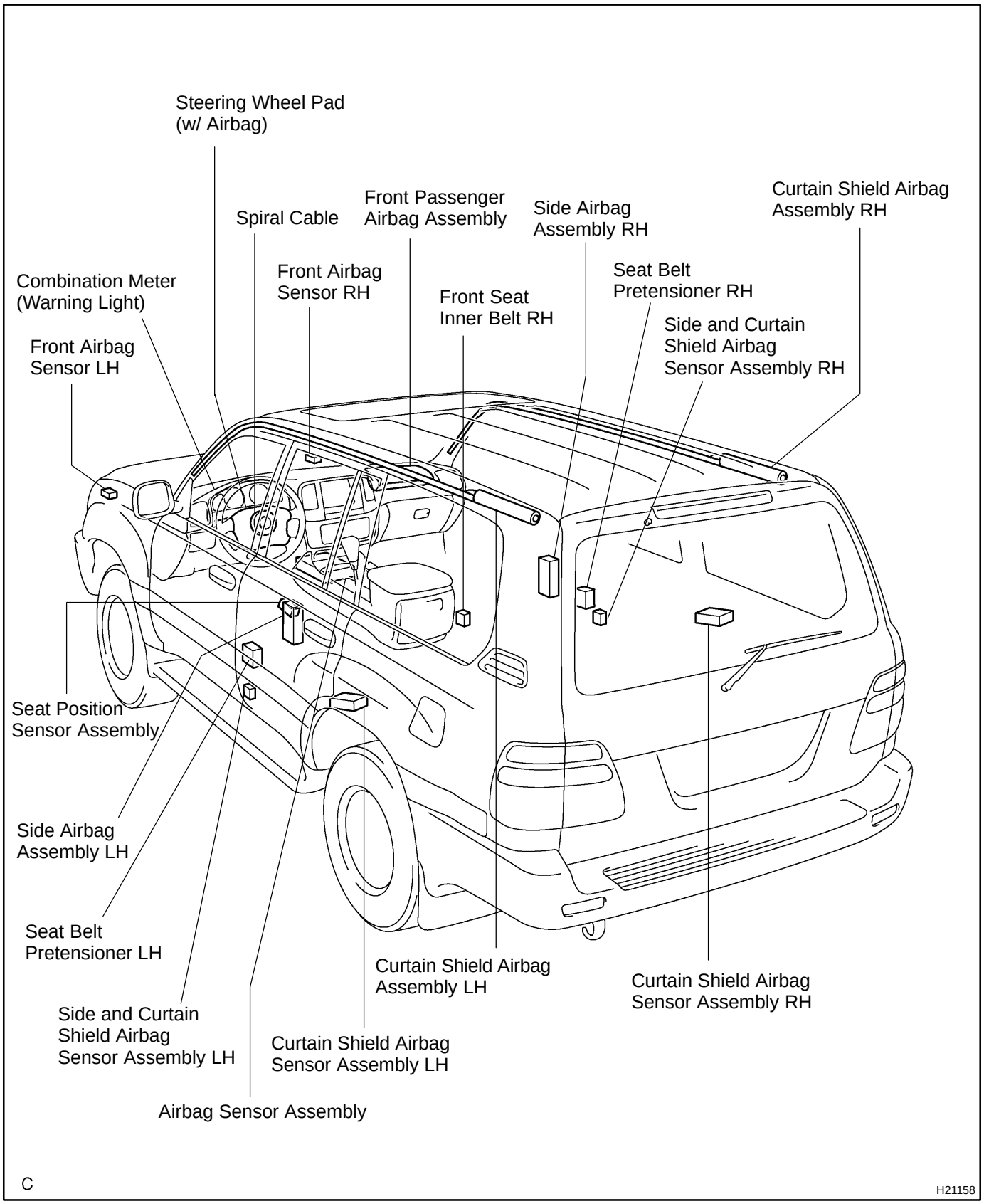


Item inside ▱ are titles of pages in this manual, with the page number in the bottom portion. See the pages for detailed explanations.

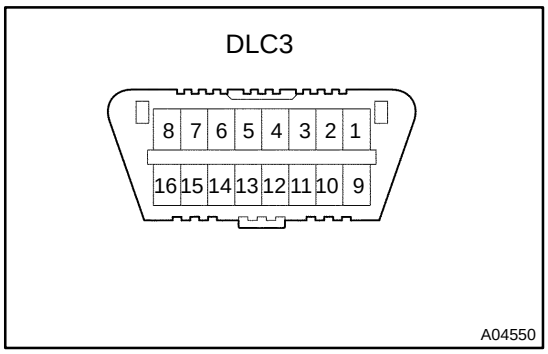
Step 3, 4, 8, 9, 10, 12: Diagnostic steps permitting the use of the TOYOTA hand-held tester.

DI6P0-19

PARTS LOCATION



DIB3P-01



PRE-CHECK

1. DIAGNOSIS SYSTEM

(a) Check the DLC3.

HINT:

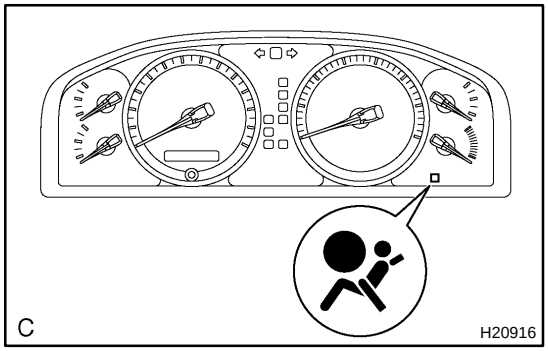
The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 9141-2 format.

Terminal No.	Connection/Voltage or Resistance	Condition
7	Bus ± Line/Pulse generation	During Transmission
4	Chassis Ground ↔ Body Ground/1 Ω or less	Always
16	Battery Positive ↔ Body Ground/ 9 – 14 V	Always

HINT:

If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of the OBD II scan tool or TOYOTA hand-held tester to the DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

- ★ If communication is normal when the tool is connected to another vehicle, inspect the DLC3 on the original vehicle.
- ★ If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.



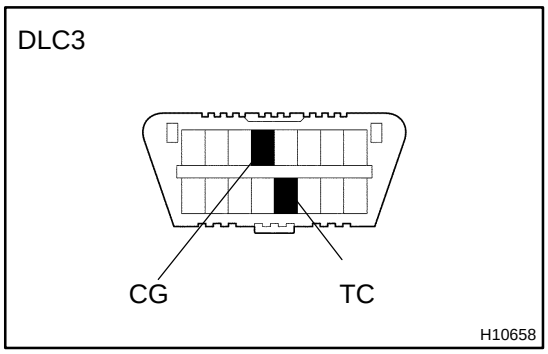
2. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch to ON, and check that the SRS warning light comes on.

(b) Check that the SRS warning light goes out after approx. 6 seconds.

HINT:

- ★ When the ignition switch is at ON and the SRS warning light remains on or flashes, the airbag sensor assembly has detected a malfunction code.
- ★ If, after approx. 6 seconds have elapsed, the SRS warning light sometimes comes on even when the ignition switch is OFF. In this case, a short in the SRS warning light circuit is possible. Proceed to "SRS warning light circuit malfunction" on page DI-927 .



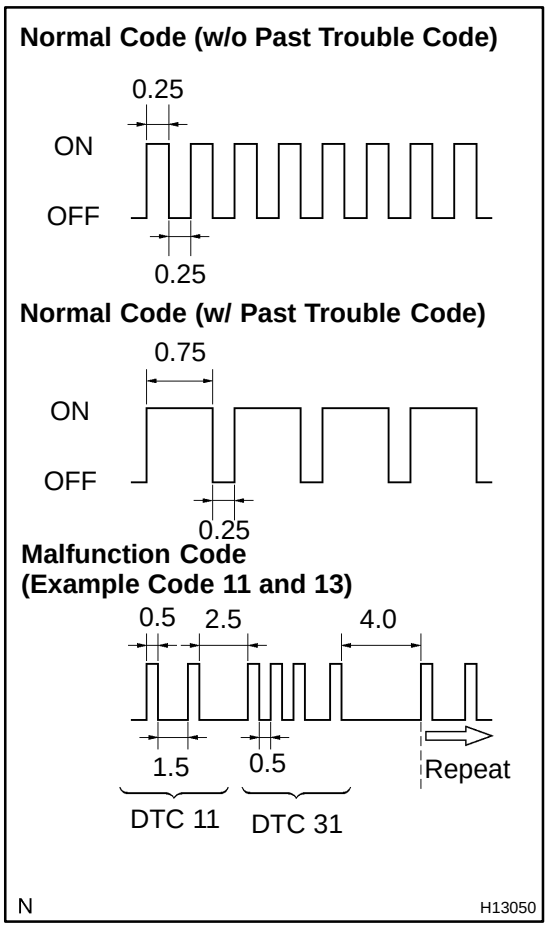
3. DTC CHECK (Using diagnosis check wire)

(a) Present troubles codes:
Output the DTC.
(1) Turn the ignition switch to ON, and wait for approx. 60 seconds.
(2) Using SST, connect terminal TC and CG of the DLC3.
SST 09843-18040

NOTICE:
Pay attention to the terminal connecting position to avoid a malfunction.

(b) Past troubles codes:
Output the DTC.
(1) Using SST, connect terminal TC and CG of the DLC3.
SST 09843-18040
(2) Turn the ignition switch to ON, and wait for approx. 60 seconds.

NOTICE:
Pay attention to the terminal connecting position to avoid a malfunction.



(c) Read the DTC.
Read the DTC by counting the blinking times. As an example, the blinking patterns of normal, 11 and 31 are shown in the illustration.

★ Normal code indication (w/o past trouble code)
The light blinks 2 times per seconds.

★ Normal code indication (w/ past trouble code)
When the past troubles code is stored in the airbag sensor assembly, the light blinks only ones a second.

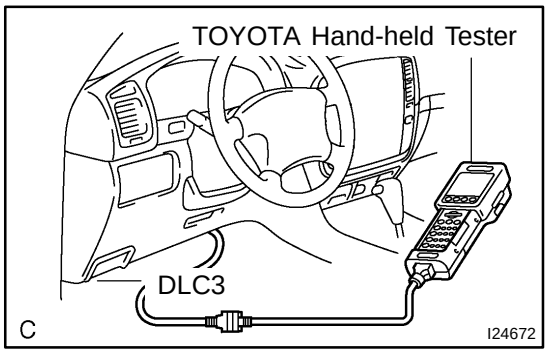
★ Malfunction code indication
The first blinking indicates the first DTC. Second blinking occurs after 1.5- second of pausing.

If there are 2 or more codes, there will be a 2.5-second pause between each code. After all the codes are shown, there will be a 4.0-second pausing, and they will all be repeated.

HINT:

★ If 2 or more malfunctions are found, the indication starts from the smaller numbered code.

★ If the light does not blink or comes out at all, or if DTCs are indicated without a connection of the terminals, proceed to the TC terminal circuit inspection on page DI-932 .



4. DTC CHECK (Using TOYOTA hand-held tester)

(a) Hook up the TOYOTA hand-held tester to the DLC3.

(b) Read the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the TOYOTA hand-held tester operator's manual for further details.

5. DTC CLEARANCE (Not using service wire)

When the ignition switch is turned OFF, the diagnostic trouble code is cleared.

HINT:

Depending on the DTC, the code might not be cleared by turning the ignition switch OFF.

In this case, proceed to the next step.

6. DTC CLEARANCE (Using service wire)

(a) Connect the service wire to terminal TC of the DLC3.

(b) Ground terminal TC of the DLC3.

(c) Turn the ignition switch to the ON position.

(d) Within 3 to 10 sec. after DTC is started to be output, release ground from terminal TC of the DLC3.

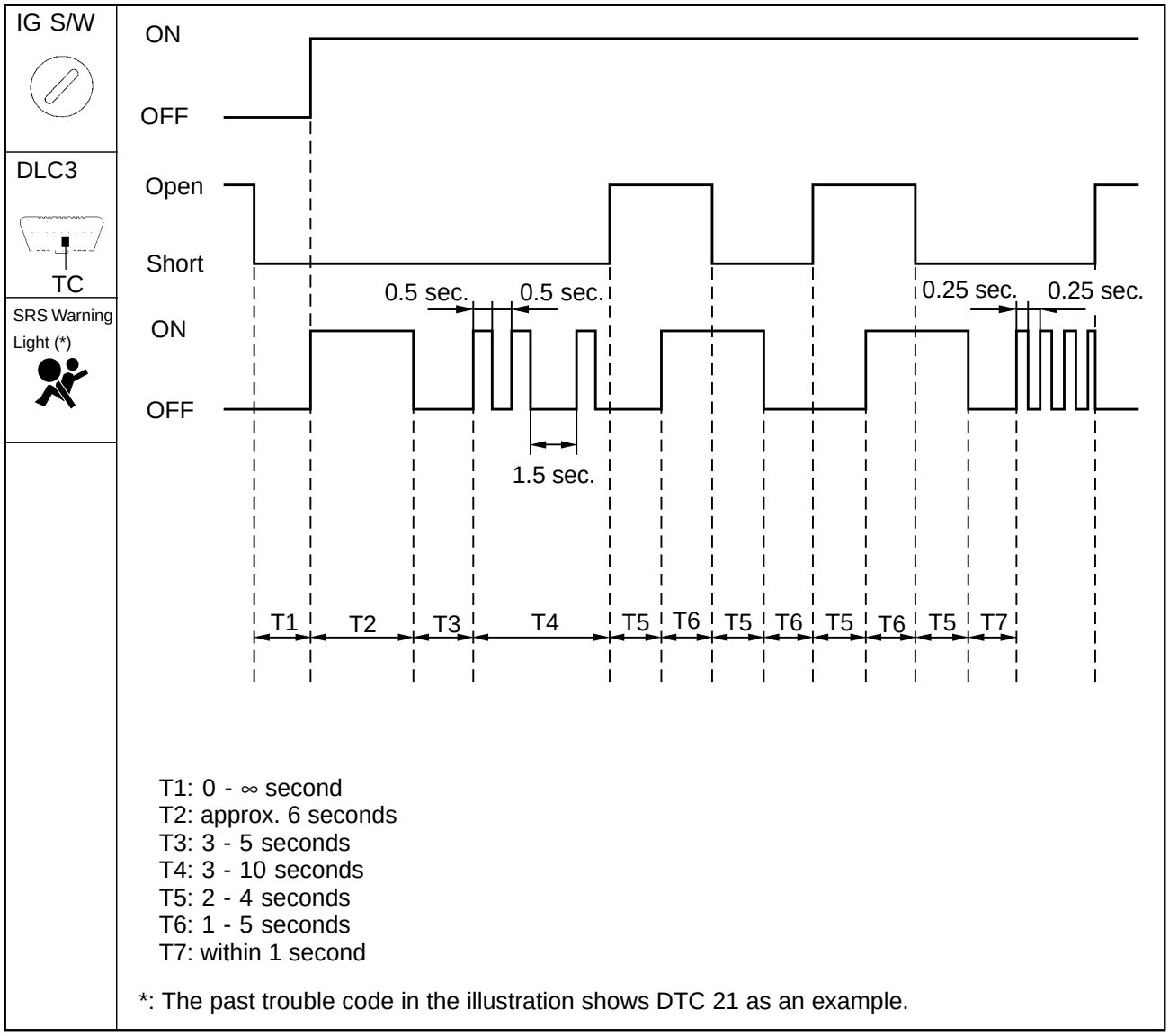
(e) The SRS warning light comes on 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal TC of the DLC3.

(f) The SRS warning light goes off 2 to 4 sec. after grounding terminal TC. Within 1 to 5 sec. after that, release ground from terminal TC again.

(g) The SRS warning light comes on again 2 to 4 sec. later. Within 1 to 5 sec. after that, ground terminal TC of the DLC3 again.

(h) The SRS warning light goes off 2 to 4 sec. later. Within 1 sec. after that, normal code is output indicating that DTC deletion is completed.

If DTCs are not cleared, repeat the above procedure until the codes are cleared.

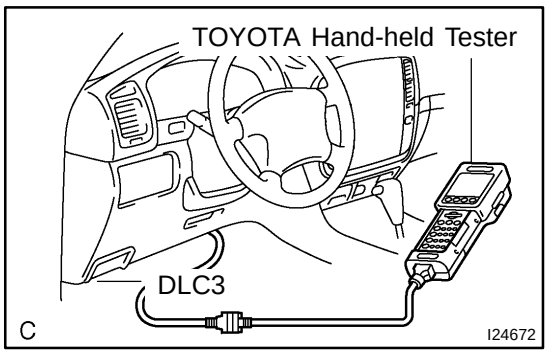


T1: 0 - ∞ second
T2: approx. 6 seconds
T3: 3 - 5 seconds
T4: 3 - 10 seconds
T5: 2 - 4 seconds
T6: 1 - 5 seconds
T7: within 1 second

*: The past trouble code in the illustration shows DTC 21 as an example.

N

H13049



7. DTC CLEARANCE (Using TOYOTA hand-held tester)

(a) Hook up the TOYOTA hand-held tester to the DLC3.

(b) Clear the DTCs by following the prompts on the tester screen.

HINT:

Please refer to the TOYOTA hand-held tester operation's manual for further details.

8. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

As explained in the troubleshooting later, insert a paper with the same thickness as the male terminal between the terminal and the short spring to release it (Refer to illustrations on next 4 pages).

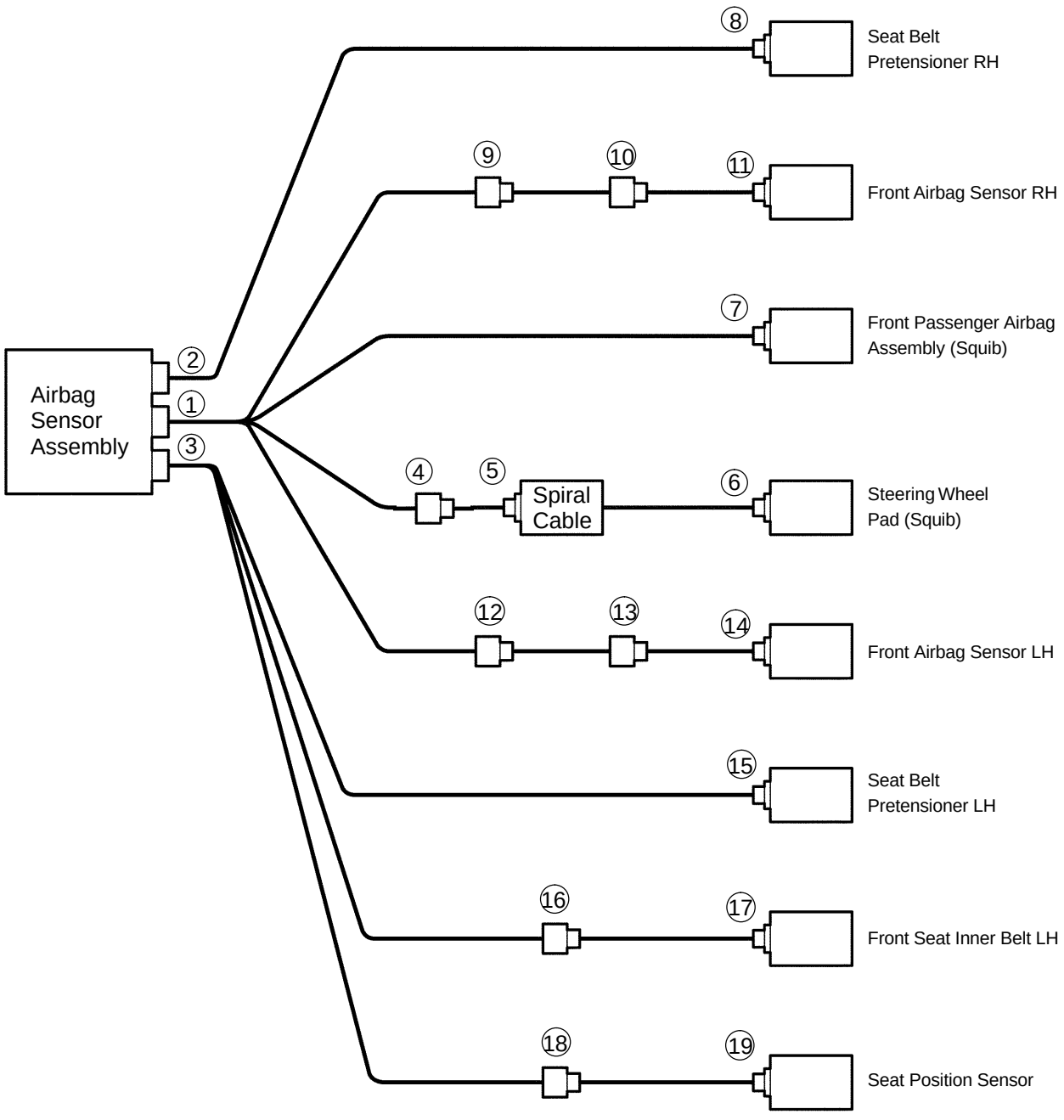
CAUTION:

Never release the airbag activation prevention mechanism on the squib connector.

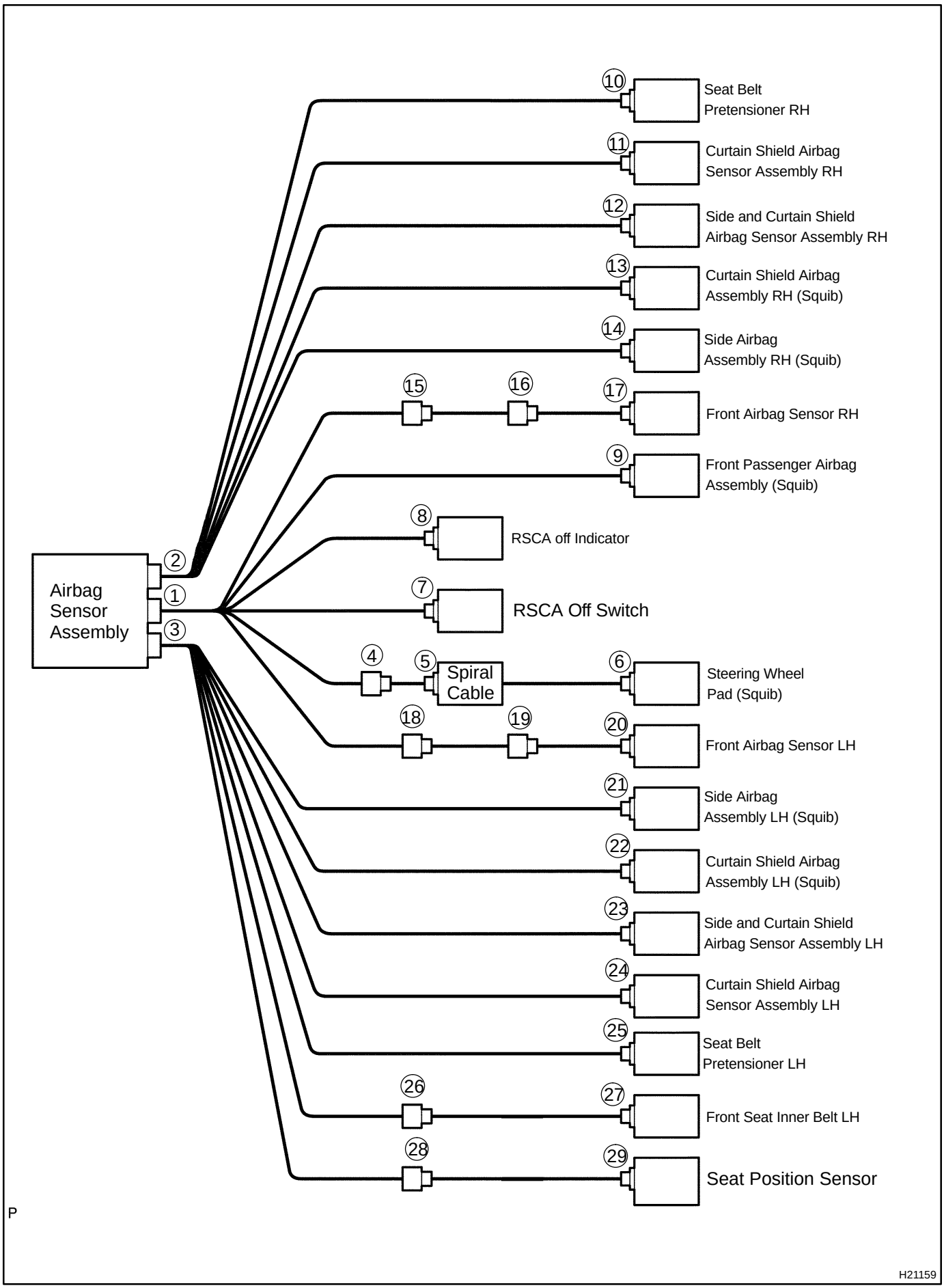
NOTICE:

- ★ **Do not release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.**
- ★ **To prevent the terminal and the short spring to be damaged, always use a paper with the same thickness as the male terminals.**

w/o Side Airbag:



P H21251


Airbag Sensor Assembly
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27
28
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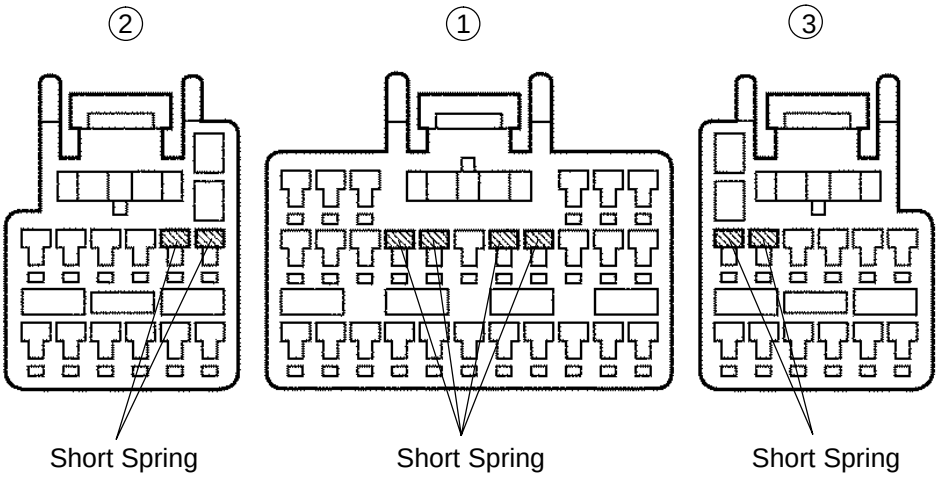
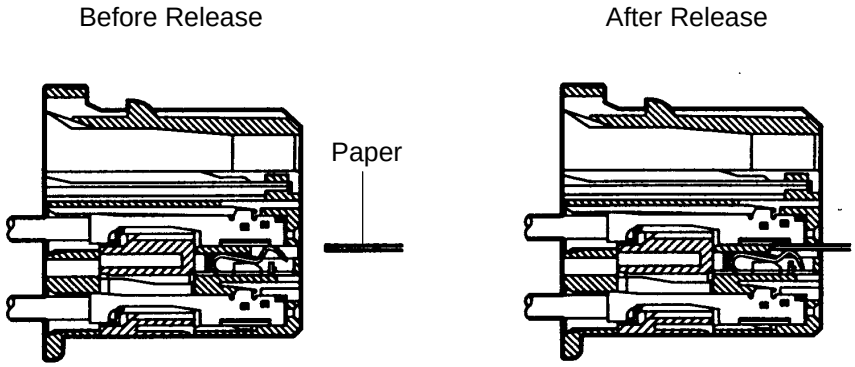
Spiral Cable
Seat Belt Pretensioner RH
Curtain Shield Airbag Sensor Assembly RH
Side and Curtain Shield Airbag Sensor Assembly RH
Curtain Shield Airbag Assembly RH (Squib)
Side Airbag Assembly RH (Squib)
Front Airbag Sensor RH
Front Passenger Airbag Assembly (Squib)
RSCA off Indicator
RSCA Off Switch
Steering Wheel Pad (Squib)
Front Airbag Sensor LH
Side Airbag Assembly LH (Squib)
Curtain Shield Airbag Assembly LH (Squib)
Side and Curtain Shield Airbag Sensor Assembly LH
Curtain Shield Airbag Sensor Assembly LH
Seat Belt Pretensioner LH
Front Seat Inner Belt LH
Seat Position Sensor
P
H21159

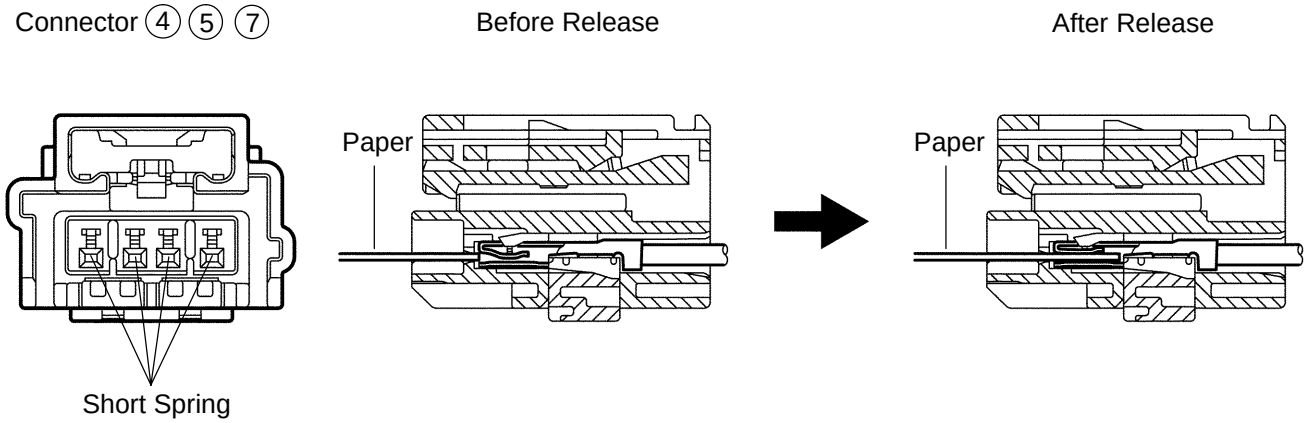
w/o Side Airbag:

Airbag Sensor Assembly Connector





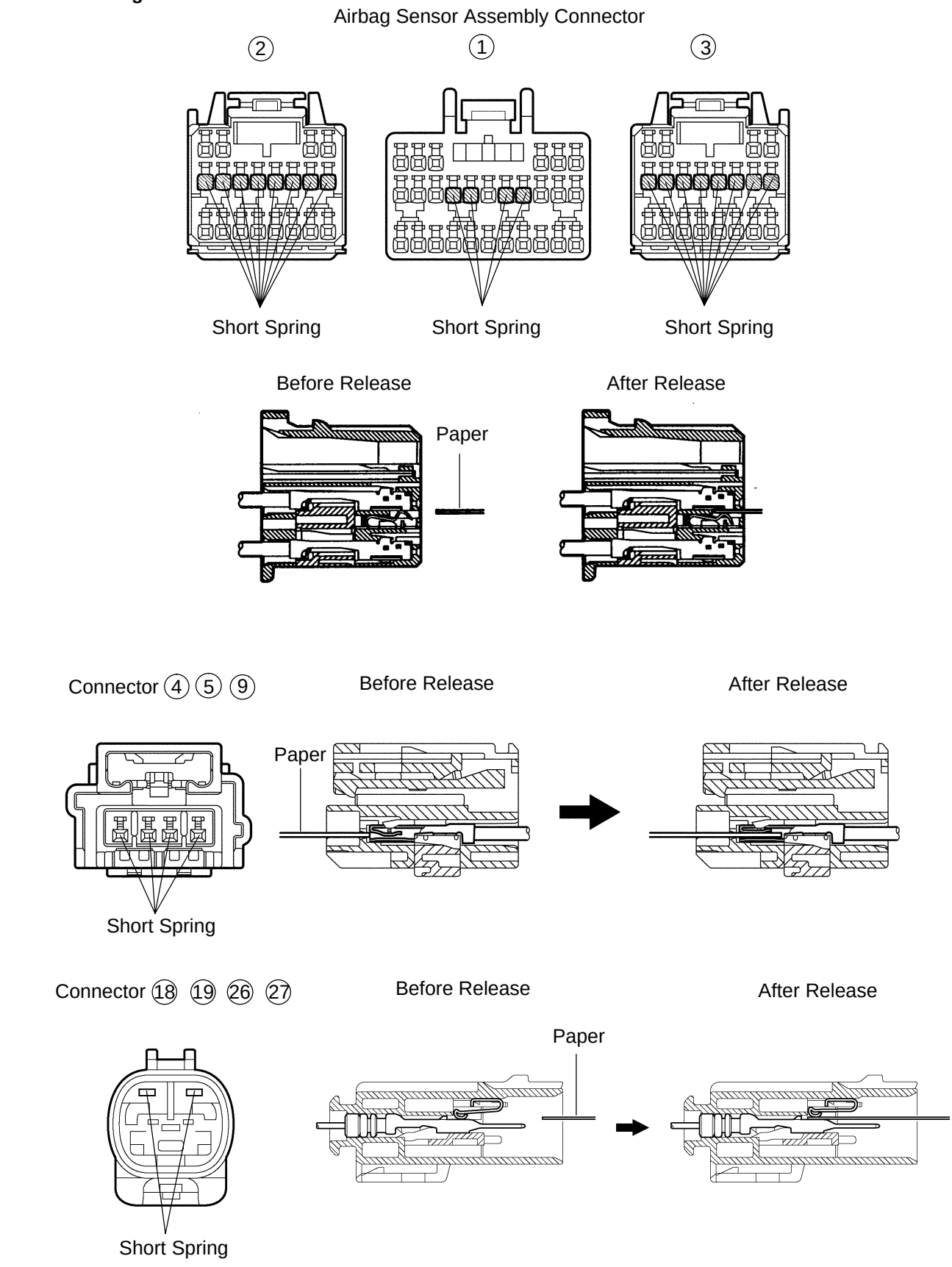
Connector ④ ⑤ ⑦



H02297
H01233
H16883

H21585

w/ Side Airbag:



H16882 H01233
H16883
H09672 H09658

H21759

DI8ES-03

PROBLEM SYMPTOMS TABLE

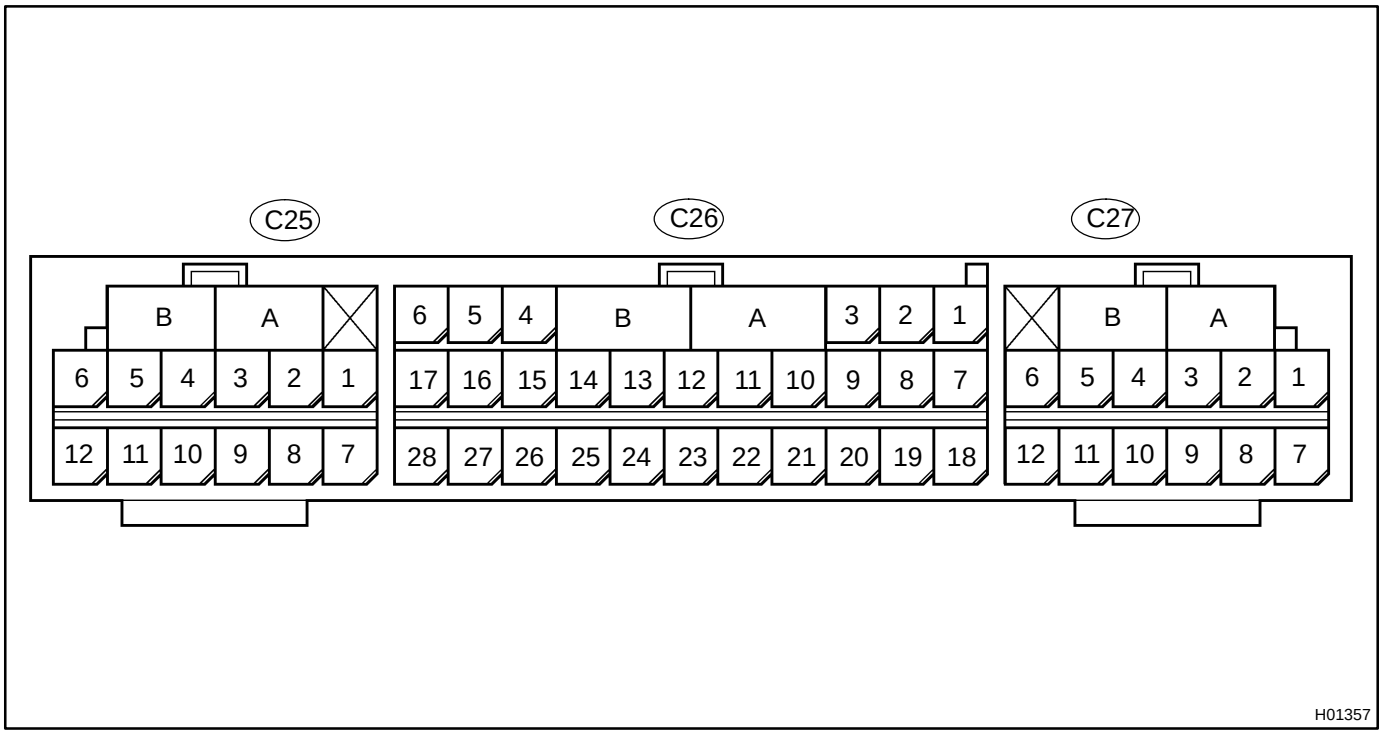
Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspected Area	See page
★With the ignition switch in ON position, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.	★SRS warning light circuit	DI-927
★SRS warning light is always lit up even when ignition switch is in the LOCK position.		
★With the ignition switch in ON position, the SRS warning light does not light up.		
★DTC is not displayed.	★TC terminal circuit	DI-932
★SRS warning light is always lit up at the time of DTC check procedure.		
★DTC is displayed without TC and CG terminal connection.		

DIB3Q-01

TERMINALS OF ECU

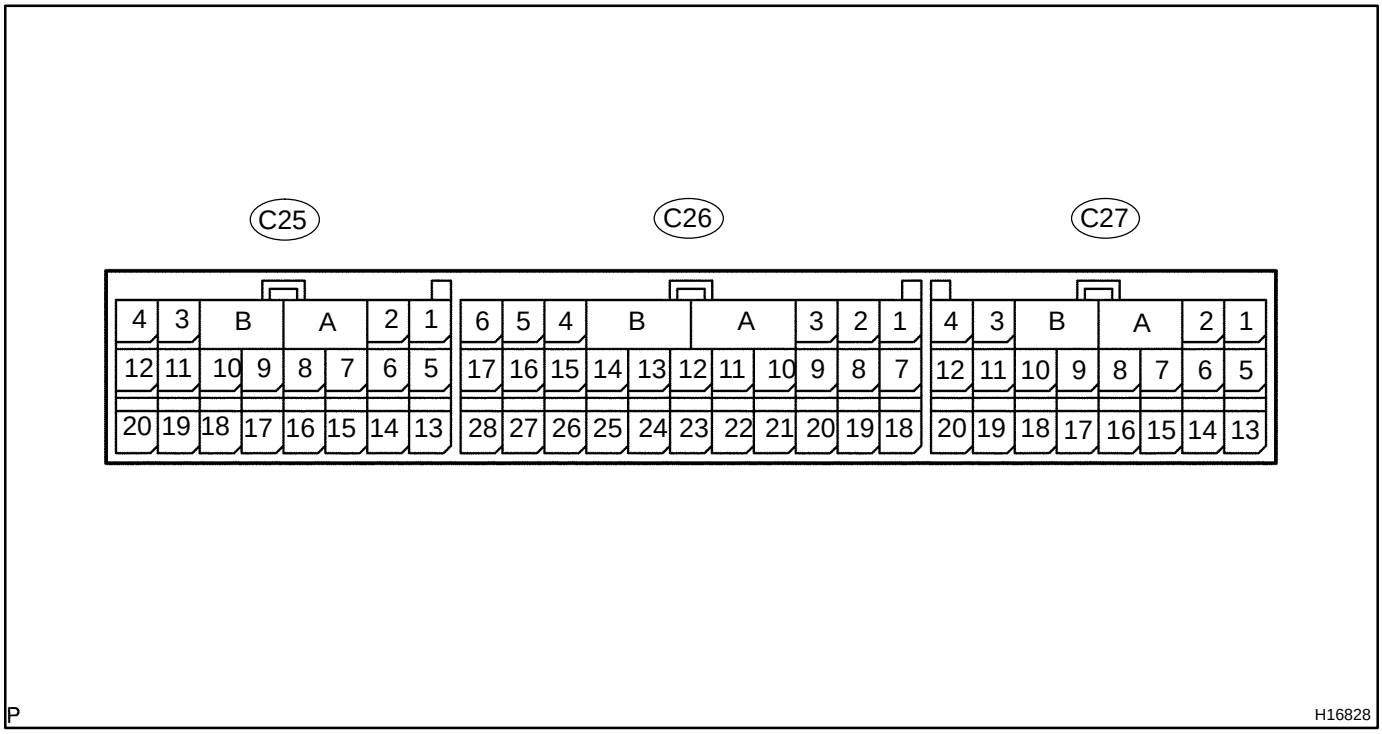
1. w/o Side Airbag:



No.	Symbol	Terminal Name
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
C26 - 3	LA	SRS Warning Light
C26 - 5	IG2	Power Source
C26 - 7	P2-	Squib (Passenger, 2nd step)
C26 - 8	P2+	Squib (Passenger, 2nd step)
C26 - 9	+SR	Front Airbag Sensor RH
C26 - 10	P+	Squib (Passenger)
C26 - 11	P-	Squib (Passenger)
C26 - 12	SIL	Diagnosis
C26 - 13	D-	Squib (Driver)
C26 - 14	D+	Squib (Driver)
C26 - 15	+SL	Front Airbag Sensor LH
C26 - 16	D2+	Squib (Driver, 2nd step)
C26 - 17	D2-	Squib (Driver, 2nd step)
C26 - 19	TC	Diagnosis
C26 - 20	-SR	Front Airbag Sensor RH
C26 - 23	GSW2	Engine ECU
C26 - 26	-SL	Front Airbag Sensor LH
C26 - 27	E1	Ground
C26 - 28	E2	Ground
C25 - 1	PL-	Squib (Seat Belt Pretensioner, LH)
C25 - 2	PL+	Squib (Seat Belt Pretensioner, LH)
C25 - 3	LSP+	Seat Position Sensor Assembly

No.	Symbol	Terminal Name
C25 - 8	LSP-	Seat Position Sensor Assembly
C25 - 11	LBE+	Seat Belt Buckle Switch LH
C27 - 5	PR+	Squib (Seat Belt Pretensioner, RH)
C27 - 6	PR-	Squib (Seat Belt Pretensioner, RH)

2. w/ Side Airbag:



No.	Symbol	Terminal Name
A	-	Electrical Connector Check Mechanism
B	-	Electrical Connector Check Mechanism
C26 - 3	LA	SRS Warning Light
C26 - 5	IG2	Power Source
C26 - 7	P2-	Squib (Passenger, 2nd step)
C26 - 8	P2+	Squib (Passenger, 2nd step)
C26 - 9	+SR	Front Airbag Sensor RH
C26 - 10	P+	Squib (Passenger)
C26 - 11	P-	Squib (Passenger)
C26 - 12	SIL	Diagnosis
C26 - 13	D-	Squib (Driver)
C26 - 14	D+	Squib (Driver)
C26 - 15	+SL	Front Airbag Sensor LH
C26 - 16	D2+	Squib (Driver, 2nd step)
C26 - 17	D2-	Squib (Driver, 2nd step)
C26 - 19	TC	Diagnosis
C26 - 20	-SR	Front Airbag Sensor RH
C26 - 21	RMSW	RSCA Off Switch
C26 - 22	MPX2	Instrument Panel Integration ECU
C26 - 23	GSW2	Diagnosis
C26 - 25	RMIL	RSCA Off Switch Indicator
C26 - 26	-SL	Front Airbag Sensor LH
C26 - 27	E1	Ground
C26 - 28	E2	Ground
C25 - 1	CSL-	Curtain Shield Airbag Sensor Assembly LH

No.	Symbol	Terminal Name
C25 - 3	LSP-	Seat Position Sensor Assembly
C25 - 4	LSP+	Seat Position Sensor Assembly
C25 - 7	PL-	Squib (Seat Belt Pretensioner, LH)
C25 - 8	PL+	Squib (Seat Belt Pretensioner, LH)
C25 - 9	ICL+	Squib (Curtain Shield, LH)
C25 - 10	ICL-	Squib (Curtain Shield, LH)
C25 - 11	SFL-	Squib (Side, LH)
C25 - 12	SFL+	Squib (Side, LH)
C25 - 13	ESCL	Curtain Shield Airbag Sensor Assembly LH
C25 - 14	VUCL	Curtain Shield Airbag Sensor Assembly LH
C25 - 15	CSL+	Curtain Shield Airbag Sensor Assembly LH
C25 - 16	VUPL	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 17	SSL+	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 18	ESL	Side and Curtain Shield Airbag Sensor Assembly LH
C25 - 19	LBE+	Seat Belt Buckle Switch LH
C25 - 20	SSL-	Side and Curtain Shield Airbag Sensor Assembly LH
C27 - 4	CSR-	Curtain Shield Airbag Sensor Assembly RH
C27 - 5	SFR+	Squib (Side, RH)
C27 - 6	SFR-	Squib (Side, RH)
C27 - 7	ICR-	Squib (Curtain Shield, RH)
C27 - 8	ICR+	Squib (Curtain Shield, RH)
C27 - 9	PR+	Squib (Seat Belt Pretensioner, RH)
C27 - 10	PR-	Squib (Seat Belt Pretensioner, RH)
C27 - 13	SSR-	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 15	ESR	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 16	SSR+	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 17	VUPR	Side and Curtain Shield Airbag Sensor Assembly RH
C27 - 18	CSR+	Curtain Shield Airbag Sensor Assembly RH
C27 - 19	VUCR	Curtain Shield Airbag Sensor Assembly RH
C27 - 20	ESCR	Curtain Shield Airbag Sensor Assembly RH

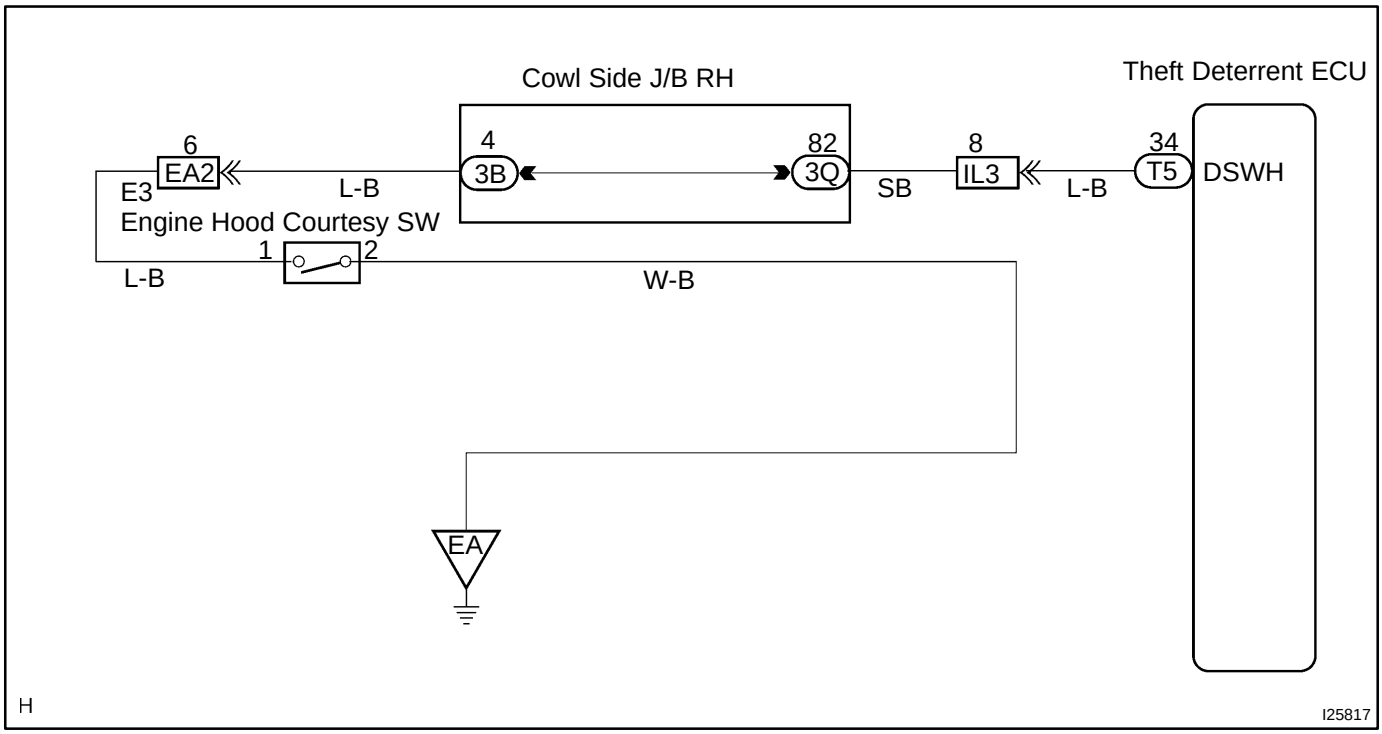
DIB4V-02

Engine hood courtesy switch circuit

CIRCUIT DESCRIPTION

The door courtesy light goes on when the door is opened and goes off when closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check engine hood courtesy switch using hand-held tester.**

PREPARATION:

Connect the hand-held tester to DLC 3.

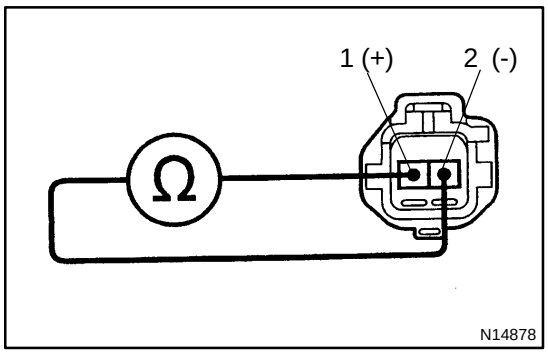
CHECK:

Check that the engine hood courtesy switch operate in DATA LIST (See page DI-1040).

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	**Check the engine hood courtesy switch.**



PREPARATION:

(a) Remove engine hood lock assembly.

(b) Disconnect engine hoood courtesy switch connector.

CHECK:

Check continuity between terminals 1 and 2 when engine hood lock is locked and inlocked.

Engine hood lock	Tester connection	Specified condition
LOCK	-	No continuity
UNLOCK	1 - 2	Continuity

NG → **Replace the engine hood courtesy switch.**

OK

3	**Check wireharness and connector between courtesy switch and theft deterrent ECU (See page IN-26).**

NG → **Repair or replace wireharness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

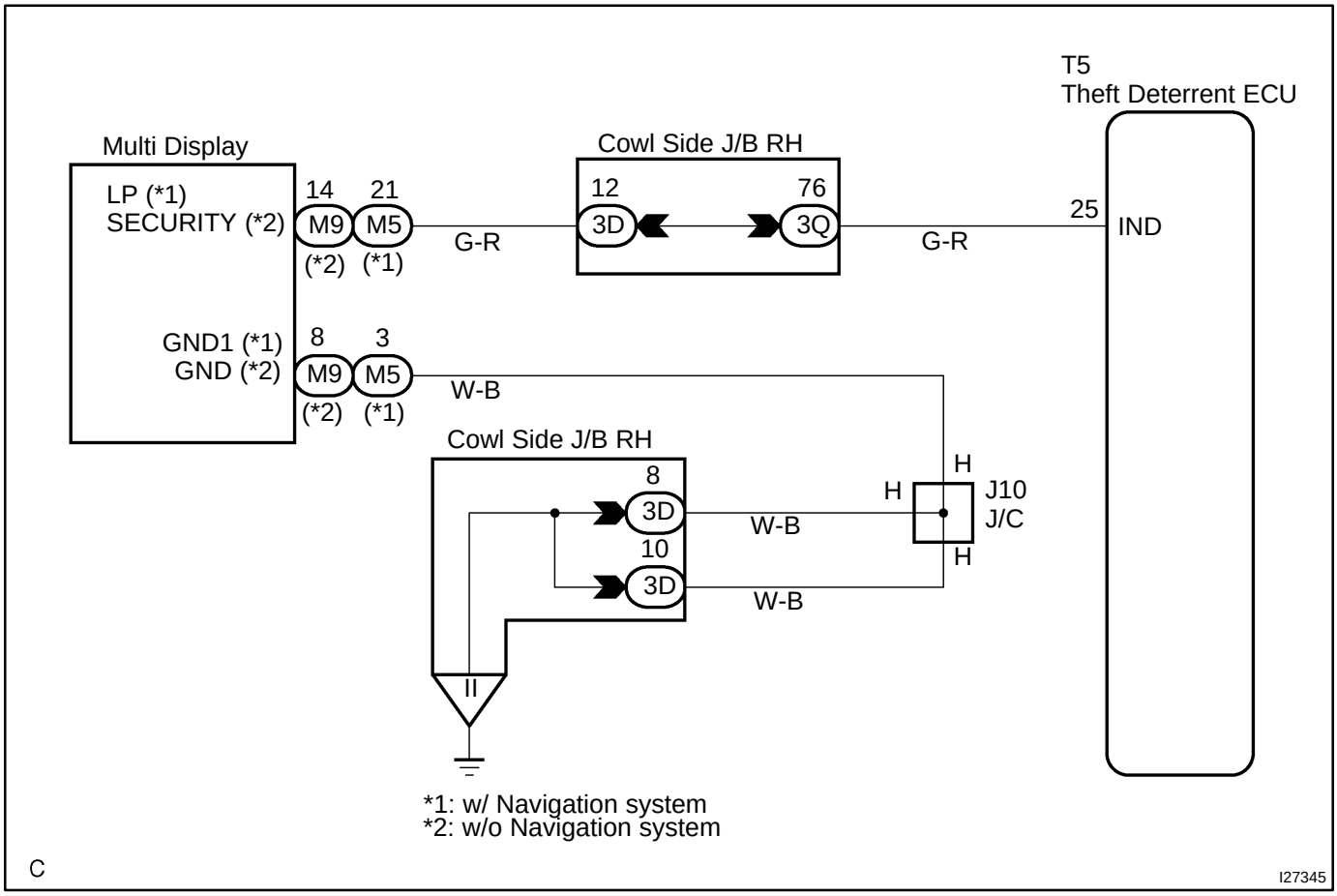
DIB4T-02

Security indicator circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is preparing to be set, this circuit lights up the indicator.
When the system is set, the indicator blinks.
It also indicates the condition of the immobiliser system according to the request from the Transponder Key ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check security indicator using hand-held tester.**

PREPARATION:

Connect the hand-held tester to the DLC 3.

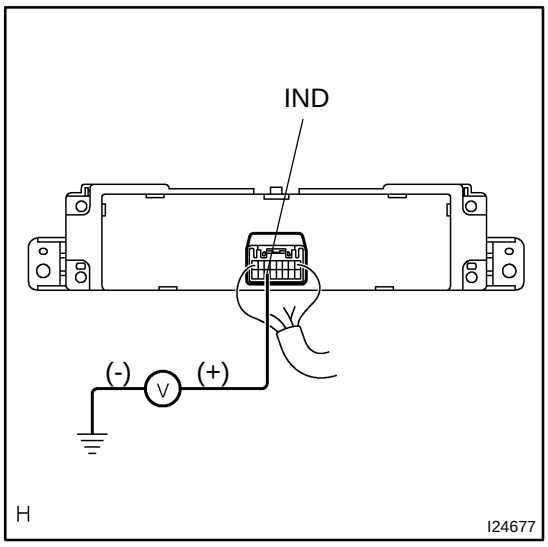
CHECK:

Check that the theft deterrent in the indicator lights in ACTIVE TEST (See page DI-955).

OK → **Proceed to next circuit inspection shown in problem symptoms table (See page DI-965).**

NG

2	**Check security indicator.**



CHECK:

Connect the positive lead from the battery to terminal 7 (14) and negative lead to terminal 6 (8), and check that the warning light lights up.

( ): w/o Navigation system

OK:

Indicator light lights up.

NG → **Replace multi-display.**

OK

3	**Check wire harness and connector between theft deterrent ECU and indicator, indicator and body ground (See page IN-36).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptoms table (See page DI-965).

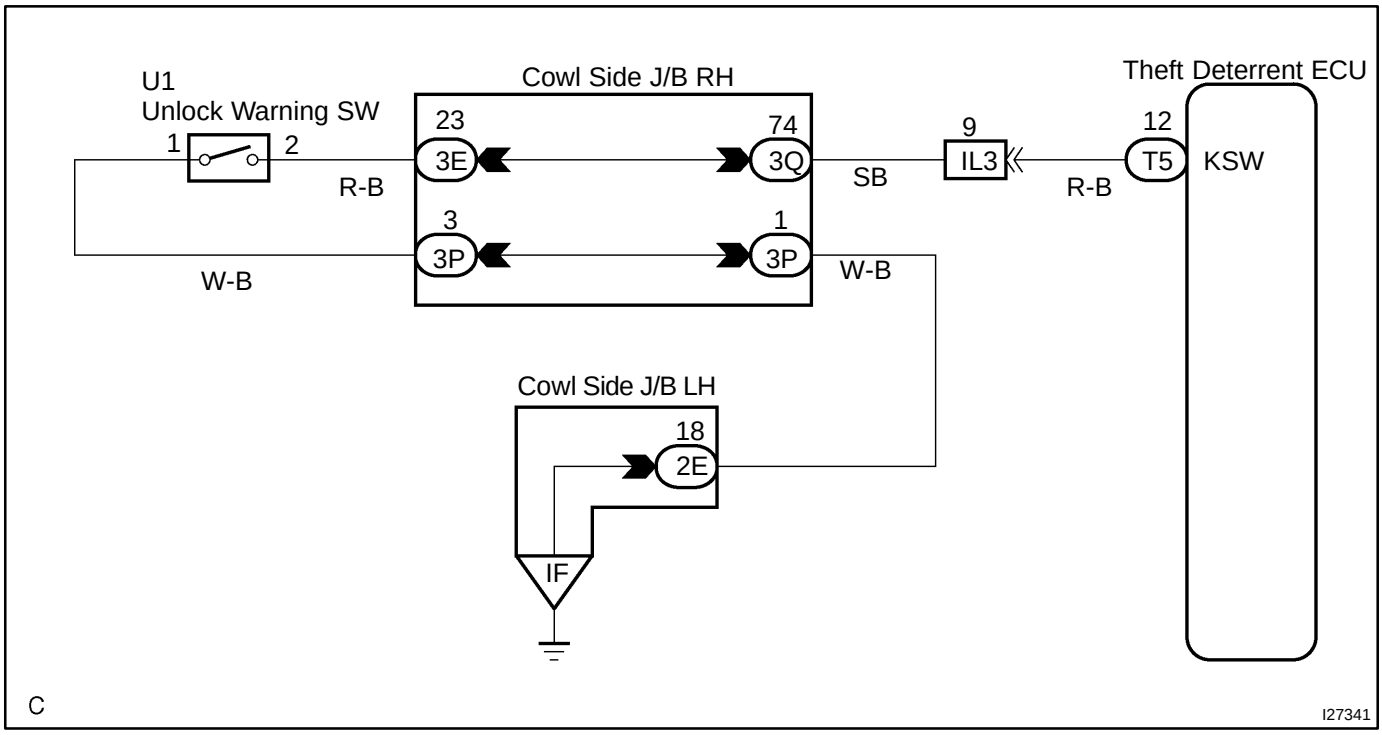
DIB4W-02

Key unlock warning switch circuit

CIRCUIT DESCRIPTION

The key unlock warning switch goes on when the ignition key is inserted the key cylinder and goes off when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check unlock warning switch using hand-held tester.**

PREPARATION:
Connect the hand-held tester to DLC 3.
CHECK:
Check that the unlock warning switch operate in DATA LIST (See page DI-1040).

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	Check key unlock warning switch (See page BE-29).

NG → Replace the key unlock warning switch.

OK

3	Check wireharness and connector between key unlock warning switch and theft deterrent ECU (See page IN-26).

OK → Repair or replace wireharness or connector.

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

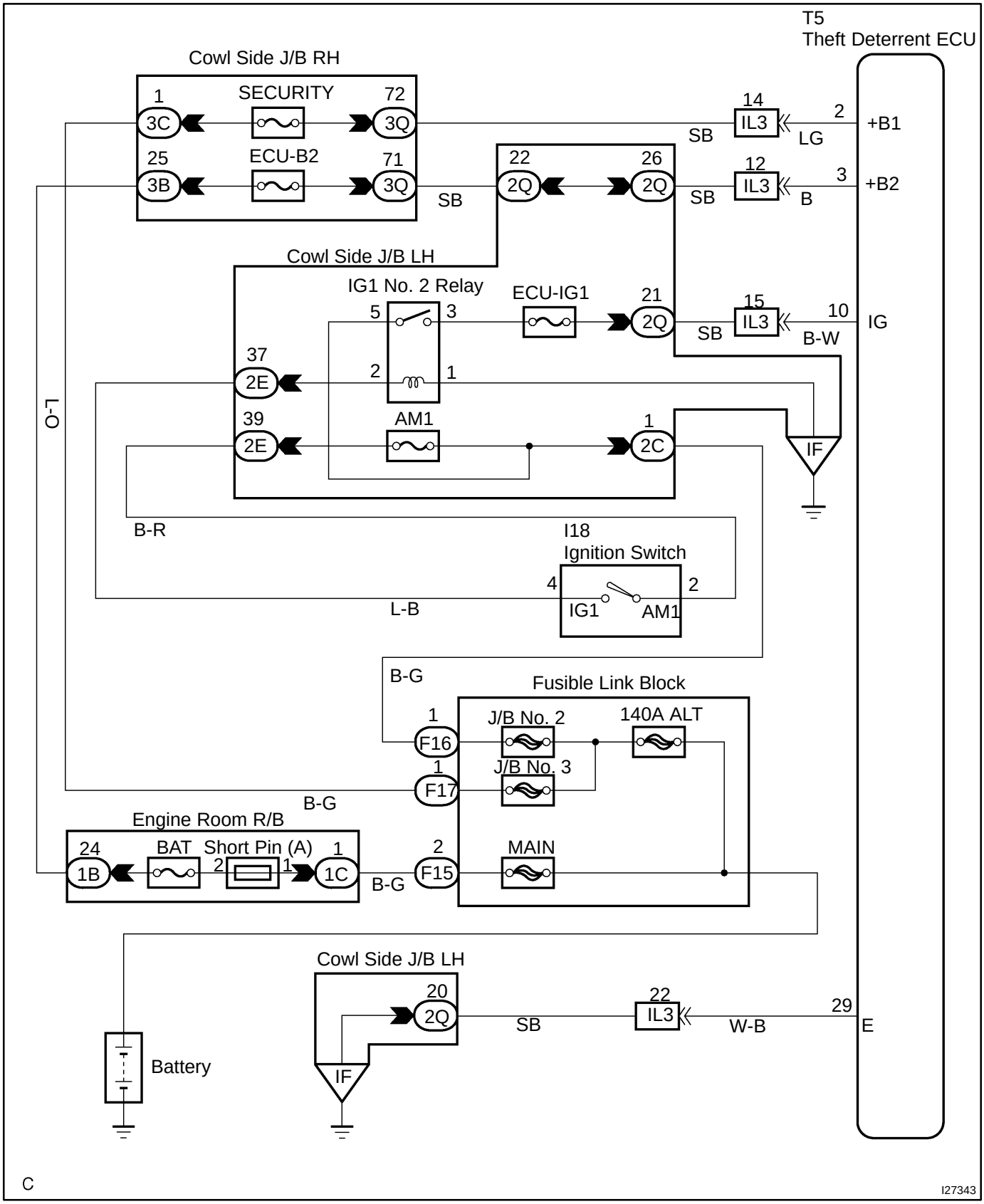
DIB4S-02

CIRCUIT INSPECTION

Power source circuit

CIRCUIT DESCRIPTION

When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU.
Also, if the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals ACC and IG of the ECU.
When the battery positive voltage is applied to the terminal IG of the ECU while the theft deterrent system is activated, the warning stops.
Furthermore, power supplied from the terminals ACC and IG of the ECU is used as power for the door courtesy switch, position switch, etc.


T5
Theft Deterrent ECU
Cowl Side J/B RH
1
SECURITY
72
3C
3Q
25
ECU-B2
71
3B
3Q
SB
22
26
2Q
2Q
SB
14
IL3
2
+B1
LG
12
IL3
3
+B2
B
Cowl Side J/B LH
IG1 No. 2 Relay
5
3
2
1
ECU-IG1
21
2Q
SB
15
IL3
10
IG
B-W
37
2E
39
2E
AM1
1
2C
IF
L-O
B-R
I18
Ignition Switch
4
2
IG1
AM1
L-B
B-G
Fusible Link Block
1
F16
J/B No. 2
140A ALT
1
F17
J/B No. 3
B-G
Engine Room R/B
24
1B
BAT
Short Pin (A)
2
1
1
1C
2
F15
MAIN
B-G
Cowl Side J/B LH
20
2Q
SB
22
IL3
29
E
W-B
Battery
IF
C
I27343

INSPECTION PROCEDURE

1	**Check ECU-B2 and SECURITY fuse.**

CHECK:

Check continuity of ECU-B2 and SECURITY fuse.

OK:

Continuity

NG → **Replace faulty fuse.**

OK

2	**Check voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.**

PREPARATION:

(a) Turn the ignition switch OFF.

(b) Disconnect the theft deterrent ECU connector.

CHECK:

Measure the voltage between terminals +B1, +B2 and E.

OK:

Voltage: 10 - 14V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

3	**Check wire harness and connector between theft deterrent ECU and body ground (See page IN-36).**

NG → **Repair or replace wire harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

DIB4U-02

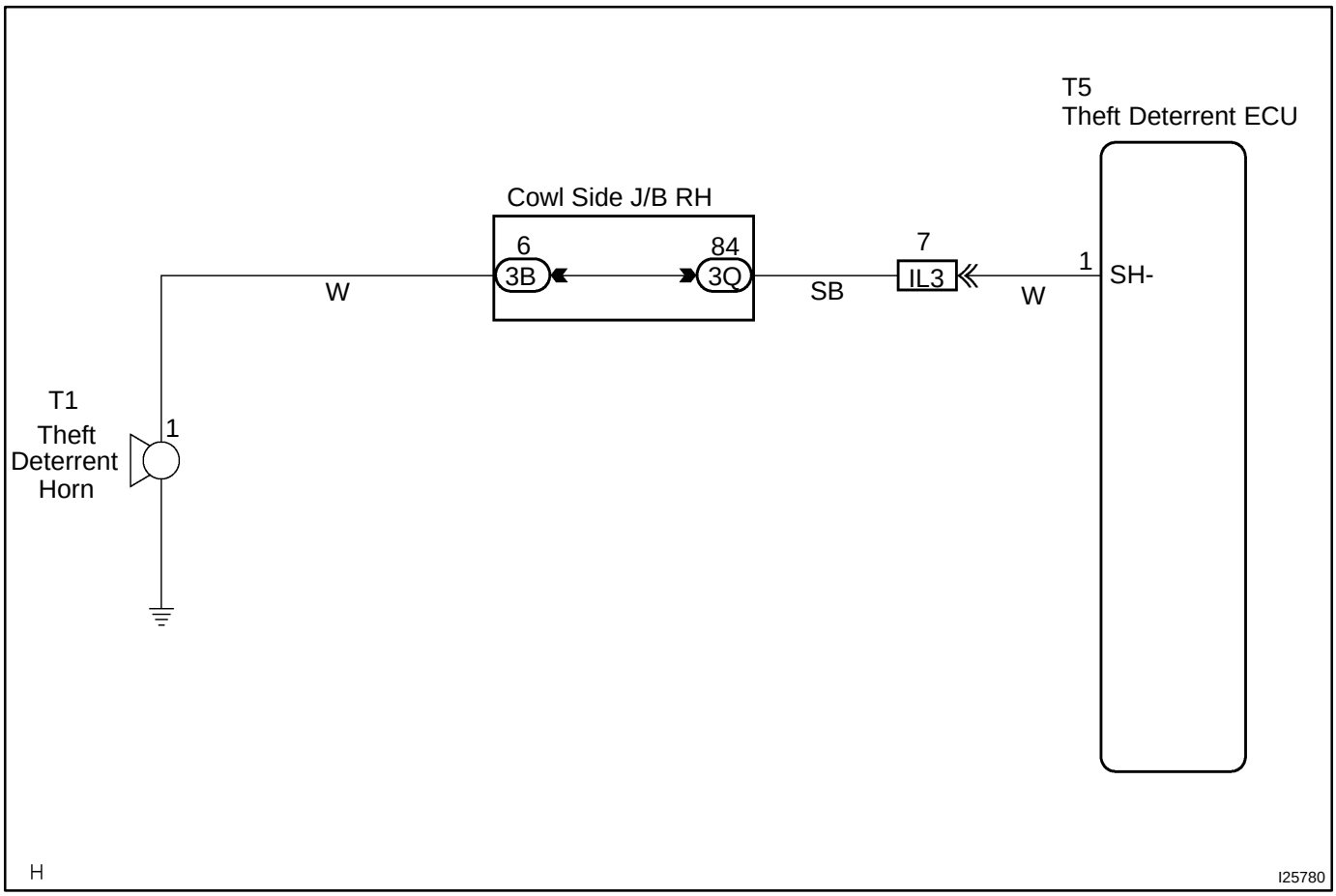
Theft deterrent horn circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, the relay in the ECU is turned ON and OFF at of approximately 0.2 sec. interval, causing the theft deterrent horn to sound (See the wiring diagram below).
In this condition, if any of the following operations is done, the relay in the ECU is turned OFF, thus stopping the theft deterrent horn from sounding:

(1) Unlock the driver door with key.
(2) Turn the ignition switch to ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.
(5) Press the panic switch of the wireless door lock control system.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand-held tester, start the inspection from step 1 and in case of not using the hand-held tester, start from step 2.

1	**Check theft deterrent horn using hand-held tester.**

PREPARATION:

Connect the hand-held tester to the DLC 3.

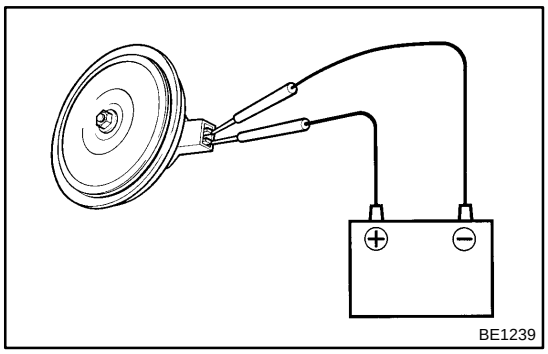
CHECK:

Check that the theft deterrent horn sounds in ACTIVE TEST (See page DI-955).

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).**

NG

2	**Check theft deterrent horn.**



CHECK:

Connect positive (+) lead to terminal 1 and negative (-) lead to body ground of theft deterrent horn connector, and that the theft deterrent horn blows.

OK:

Horn sounding.

NG → **Replace theft deterrent horn.**

OK

3	**Check wire harness and connector between theft deterrent ECU and theft deterrent horn (See page IN-26).**

NG → **Check and repair wire harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI-965).

DI01Q-07

CUSTOMER PROBLEM ANALYSIS CHECK

THEFT DETERRENT SYSTEM Check Sheet

Inspector's name: _____

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km Mile**

Date Problem First Occurred		/ /
Frequency Problem Occurs		★ Constantly ★ Sometimes (Times per day, month) ★ Once only
Weather Conditions When Problem Occurred	**Weather**	★ Fine ★ Cloudy ★ Rainy ★ Snowy ★ Various/Others
	Outdoor Temperature	★ Hot ★ Warm ★ Cool ★ Cold (Approx. °F (°C))

Problem Symptom			
	★ Theft deterrent system cannot be set.		
	★ Indicator light does not flash when the theft deterrent system is set. (It stays ON or does not light at all.)		
	★ Theft deterrent system does not operate.	★ When unlocked using the door lock knob. ★ When the engine hood is opened.	Malfunction ★ Horns only ★ Theft deterrent horn only ★ Headlights only ★ Taillights only ★ Starter cut only ★ Door lock operation only
	★ Once set system cannot be canceled.	★ When door is unlocked using key or wireless door lock control system. ★ When the key is inserted in the ignition key cylinder and turned to ACC or ON position. (However, only when the system has never operated) ★ When the luggage compartment door is opened with the key.	
	★ System cannot be canceled during warning operation.	★ When door is unlocked using key or wireless door lock control system. ★ When the key is inserted in the ignition key cylinder and turned to ACC or ON position.	
	★ Warning operation starts when the system is set and the door or luggage compartment door is opened with the key.		
	★ Others.		

THEFT DETERRENT SYSTEM

DI01P-16

HOW TO PROCEED WITH TROUBLESHOOTING

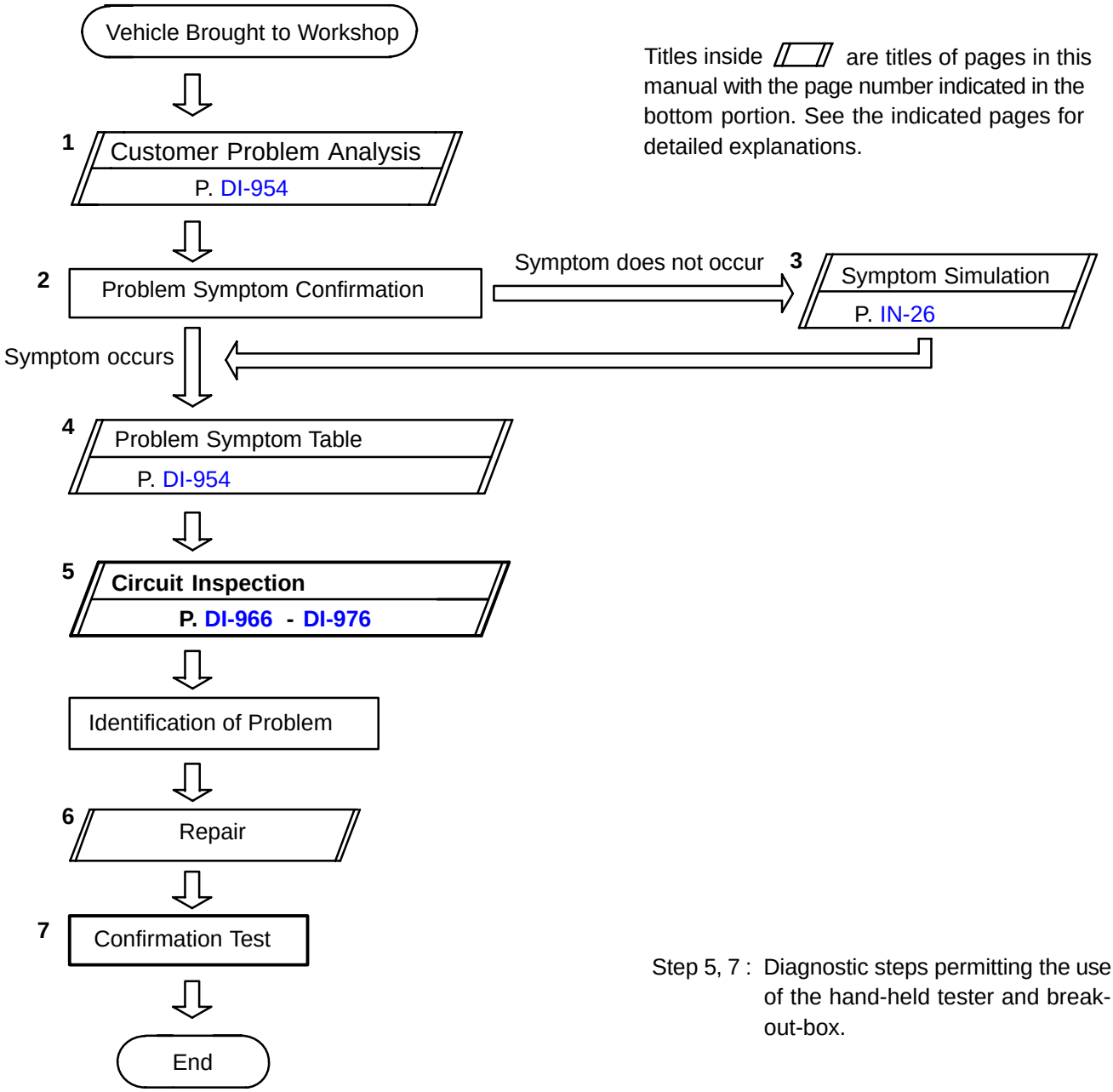
HINT:

Troubleshooting of the theft deterrent system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the theft deterrent system, first make certain that the door lock control system is operating normally.

For troubleshooting use a volt/ohm meter.

Be sure to use troubleshooting procedure appropriate to the diagnostic tool being used.

Perform troubleshooting in accordance with the procedure on the following page.

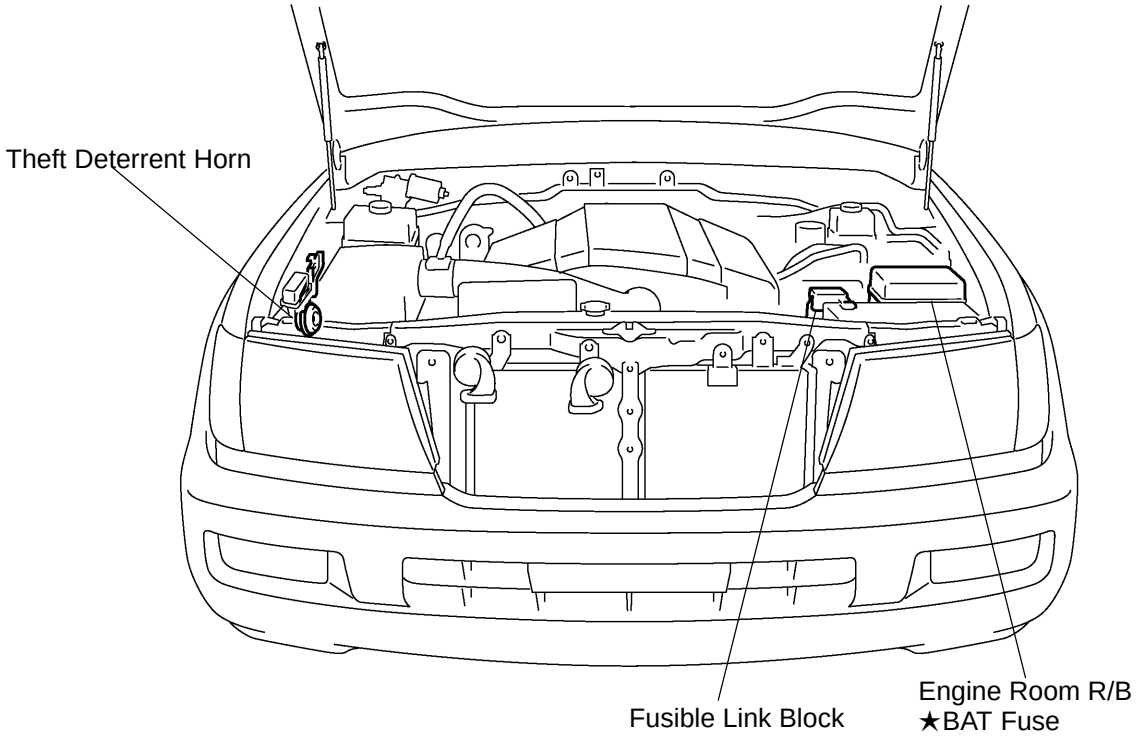


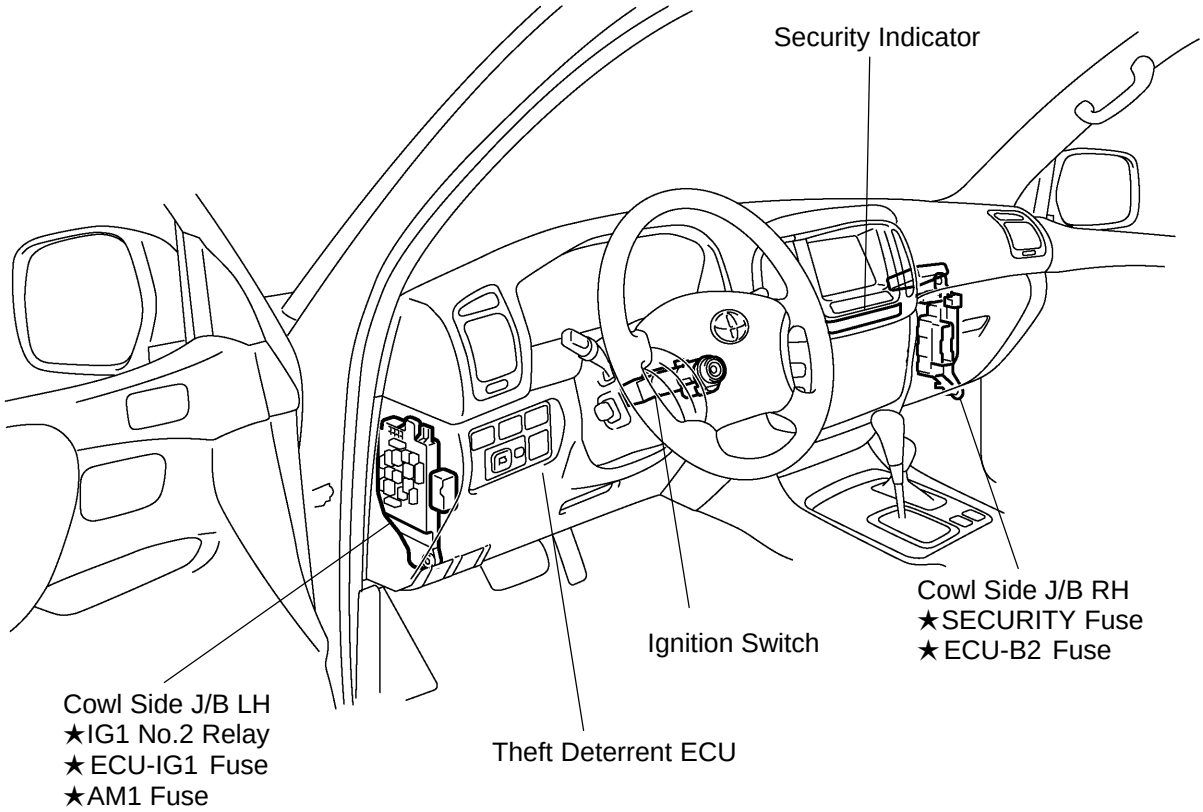
Titles inside ▱ are titles of pages in this manual with the page number indicated in the bottom portion. See the indicated pages for detailed explanations.

Step 5, 7 : Diagnostic steps permitting the use of the hand-held tester and break-out-box.

DI3CP-03

PARTS LOCATION





H

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DIB4R-01

PRE-CHECK

1. OUTLINE OF THEFT DETERRENT SYSTEM

The security has an ”Alarm Control” and the control consists of 2 modes.

Active mode

This mode begins ”Alarm Control” as the user locks the vehicle by intention (See the reference step 2).

Passive mode

This mode begins ”Alarm Control” even if the user forgets locking the vehicle (See the reference step 5). (This mode begins ”Alarm Control” when the user closed all doors and the engine hood.)

HINT:

”Alarm Control” refers to the function that detects intrusion into the vehicle and sounds an alarm.

Even when the ”Alarm Control” operates in the passive mode, it works as in the active mode if a condition to begin the active mode is met.

2. ACTIVE ARMING MODE

There are 4 modes in active mode.

(1) Disarmed state

The alarm system is not set (theft detection is impossible), and the alarm does not sound. The system does not detect any theft.

(2) Arming preparation (for 30 seconds)

The waiting period when the alarm set requirements are met to when the system is actually set.

(3) Armed state

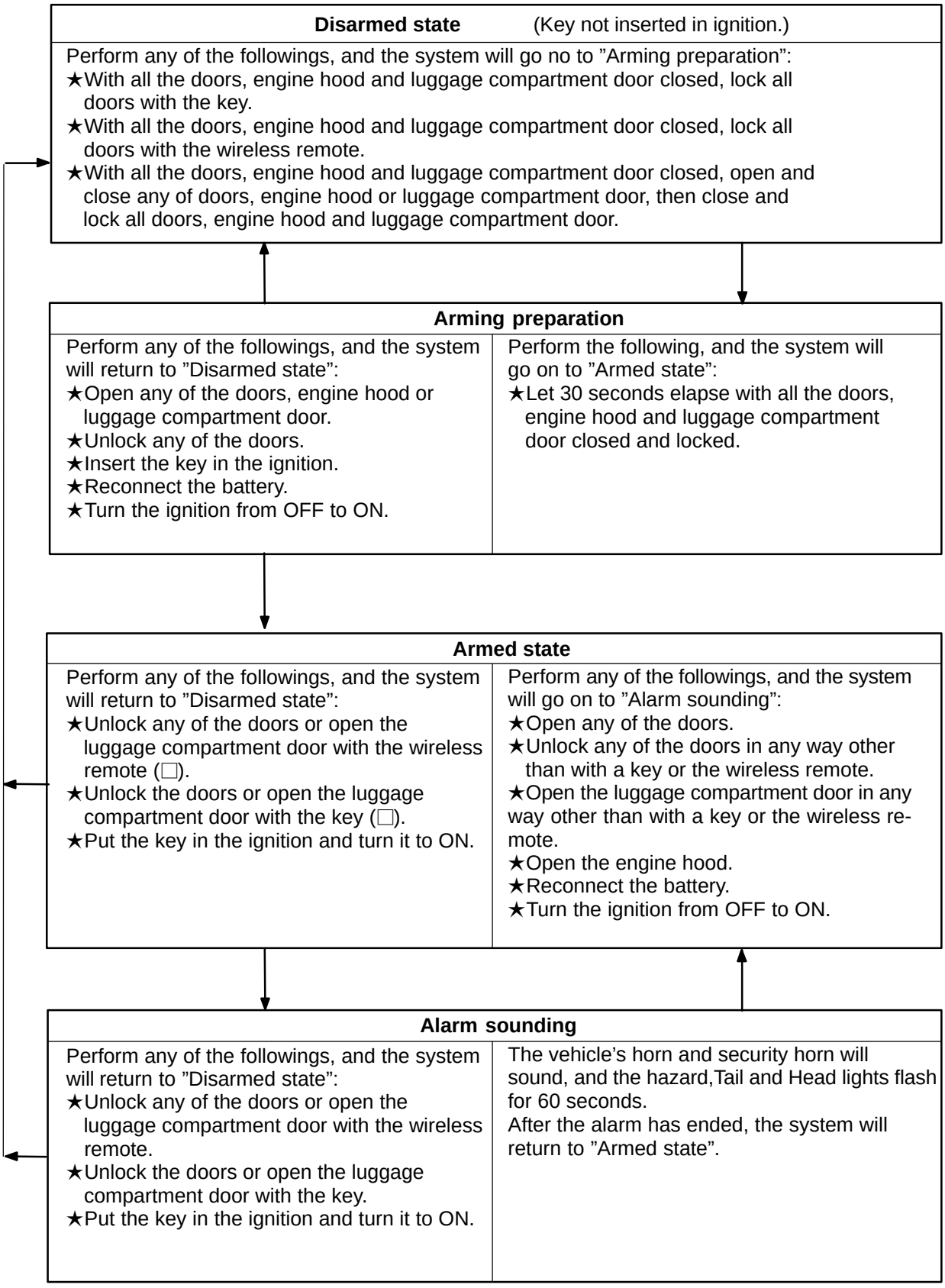
The state the alarm is set (operation is possible). The system can detect theft.

(4) Alarm sounding:

The system detects theft and informs using sounds and lights.

The state of waiting to switch to armed state again to have alarming interval after finishing alarming time.

Perform forced door lock when the door is unlocked.


Disarmed state (Key not inserted in ignition.)
Perform any of the followings, and the system will go no to ”Arming preparation”:
★With all the doors, engine hood and luggage compartment door closed, lock all doors with the key.
★With all the doors, engine hood and luggage compartment door closed, lock all doors with the wireless remote.
★With all the doors, engine hood and luggage compartment door closed, open and close any of doors, engine hood or luggage compartment door, then close and lock all doors, engine hood and luggage compartment door.
Arming preparation
Perform any of the followings, and the system will return to ”Disarmed state”:
★Open any of the doors, engine hood or luggage compartment door.
★Unlock any of the doors.
★Insert the key in the ignition.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Perform the following, and the system will go on to ”Armed state”:
★Let 30 seconds elapse with all the doors, engine hood and luggage compartment door closed and locked.
Armed state
Perform any of the followings, and the system will return to ”Disarmed state”:
★Unlock any of the doors or open the luggage compartment door with the wireless remote (□).
★Unlock the doors or open the luggage compartment door with the key (□).
★Put the key in the ignition and turn it to ON.
Perform any of the followings, and the system will go on to ”Alarm sounding”:
★Open any of the doors.
★Unlock any of the doors in any way other than with a key or the wireless remote.
★Open the luggage compartment door in any way other than with a key or the wireless remote.
★Open the engine hood.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Alarm sounding
Perform any of the followings, and the system will return to ”Disarmed state”:
★Unlock any of the doors or open the luggage compartment door with the wireless remote.
★Unlock the doors or open the luggage compartment door with the key.
★Put the key in the ignition and turn it to ON.
The vehicle’s horn and security horn will sound, and the hazard,Tail and Head lights flash for 60 seconds.
After the alarm has ended, the system will return to ”Armed state”.

3. PASSIVE ARMING MODE

There are 4 modes in active mode.

(1) Disarmed state (1)

The state is same as the disarmed state in active mode.

(2) Disarmed state (2)

The alarm is not set. Pulling out the key and any of the doors is/are opened. (= the state if the opened door(s) and the engine hood are closed, the alarm is set.)

(3) Arming preparation (for 30 seconds)

The state is same as the arming preparation in active mode.

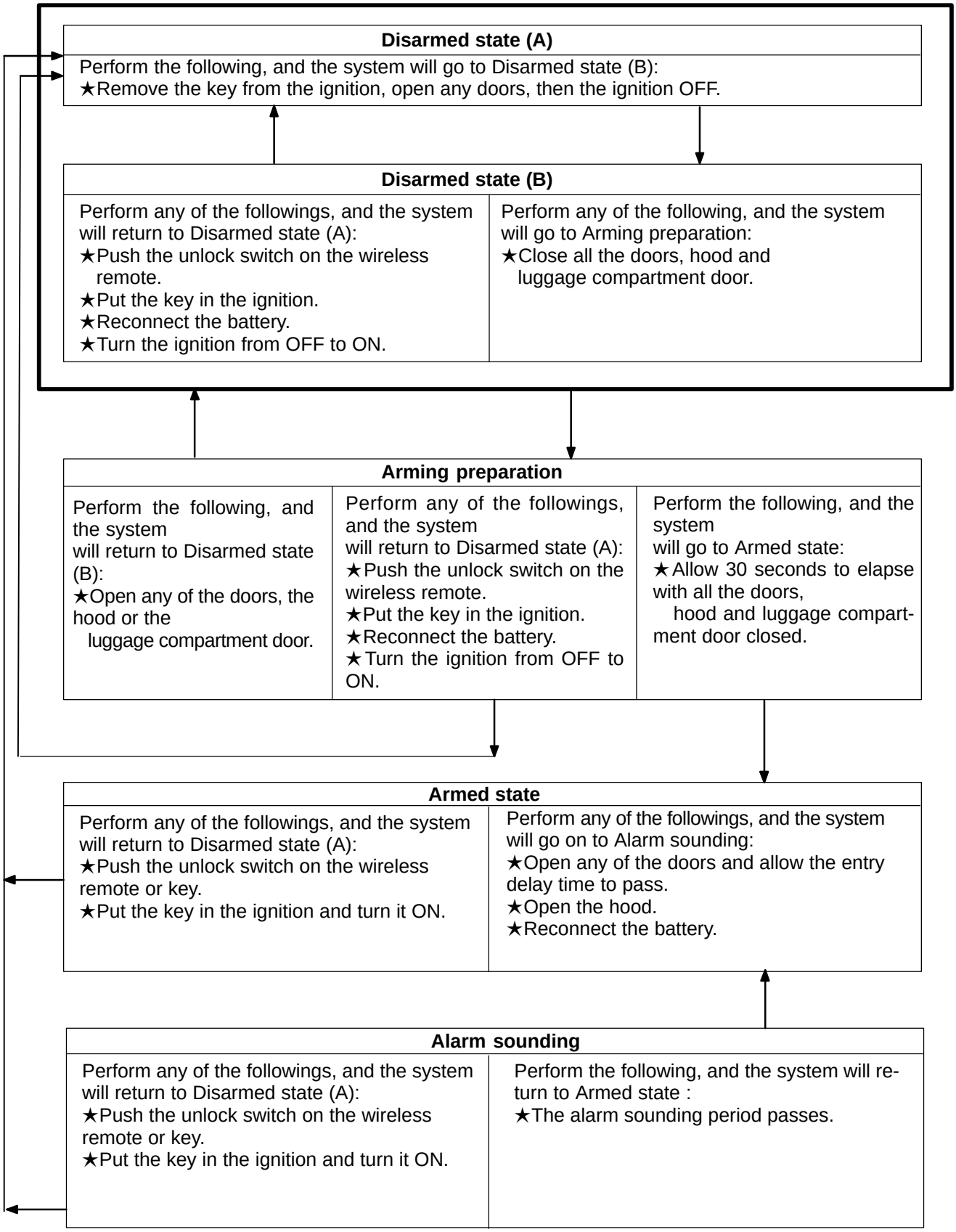
(4) Armed state

The state is same as the armed state in the active mode (However, it does not performs the theft deterrent by unlock operation).

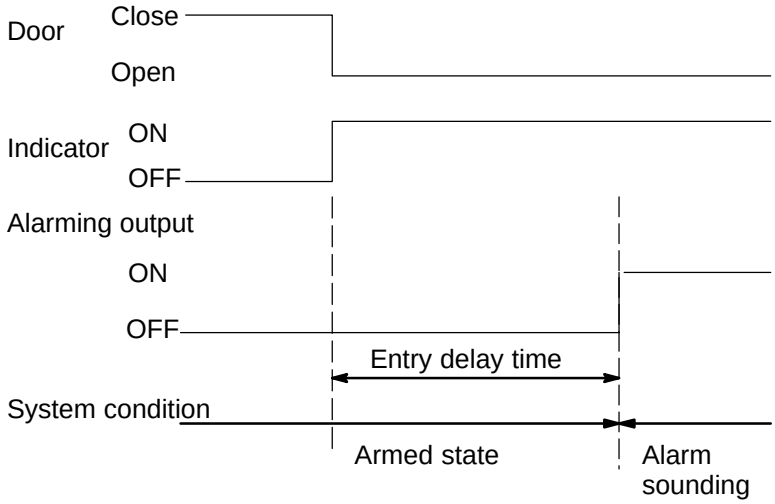
(5) Alarm sounding:

The system detects theft and informs using sounds and lights.

The state is same as the alarming sounding in the active mode (However, it does not performs forced door lock output).


Disarmed state (A)
Perform the following, and the system will go to Disarmed state (B):
★Remove the key from the ignition, open any doors, then the ignition OFF.
Disarmed state (B)
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote.
★Put the key in the ignition.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Perform any of the following, and the system will go to Arming preparation:
★Close all the doors, hood and luggage compartment door.
Arming preparation
Perform the following, and the system will return to Disarmed state (B):
★Open any of the doors, the hood or the luggage compartment door.
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote.
★Put the key in the ignition.
★Reconnect the battery.
★Turn the ignition from OFF to ON.
Perform the following, and the system will go to Armed state:
★Allow 30 seconds to elapse with all the doors, hood and luggage compartment door closed.
Armed state
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote or key.
★Put the key in the ignition and turn it ON.
Perform any of the followings, and the system will go on to Alarm sounding:
★Open any of the doors and allow the entry delay time to pass.
★Open the hood.
★Reconnect the battery.
Alarm sounding
Perform any of the followings, and the system will return to Disarmed state (A):
★Push the unlock switch on the wireless remote or key.
★Put the key in the ignition and turn it ON.
Perform the following, and the system will return to Armed state :
★The alarm sounding period passes.

HINT:
In the armed state, if one of the doors is opened, entry delay occurs. (14 secs.)
During this time, the mode transfers to the disarmed state when the condition described on the previous page (□) is met.
When the condition is not met, the system judges as a theft occurred, and the mode transfers to alarm sounding.



4. INDICATOR LIGHT OUTPUT

The indicator output the condition of the alarm control and the intrusion sensor control as shown below.

Condition	Indicator light
Disarmed state	OFF
Arming preparation	ON
Armed state (Entry delay time)	OFF (ON)
Alarm sounding	ON

HINT:

Even in disarmed state, the indicator light flashes. (Due to the signal output from immobiliser system). The indicator always flashes by receiving the signal from the immobiliser system at any time in the arming condition.

Flashing frequency:

0.2 seconds (ON)

1.8 seconds (OFF)

Response:

The hazard lights flash under the following conditions.

(1) When the system is set.
When arming preparation is set from disarmed state using the wireless door lock, the hazard lights flash once.

(2) When the system is released.
When disarmed state is set from either arming preparation, armed state or alarm sounding using the wireless door lock, the hazard lights flash twice.

5. SWITCH TO ACTIVE MODE

In each passive mode, when ”disarmed state of active mode → arming preparation switch condition” is met, the active mode switch to each condition. In this case, active mode continues till disarmed state.

Passive mode when transfer condition is met.	Active mode transfer condition
Disarmed state	Arming preparation condition
Arming preparation condition	Arming preparation condition
Armed state (During entry delay time)	Arming condition (After alarming time has elapsed, arming condition if all the doors, engine hood and luggage compartment door is closed, all the doors are locked.)
Alarm sounding	After alarming time has elapsed, arming condition if all the doors, engine hood and luggage compartment door is closed, all the doors are locked.

6. FORCED DOOR LOCK CONTROL

While detecting intrusion into the vehicle and sounding alarm, alarm control outputs the door lock at the moment the door is unlocked, and prevents intrusion into the vehicle.

(1) Condition for Starting Forced Door Lock

Detecting any of the following conditions activates the forced door lock.

Alarm system is in alarm status in active mode.

Except for the case that the key unlock/luggage unlock switch is turned on.

No key is in the ignition key cylinder.

Some of the doors are unlocked.

Since the start of the last forced lock, 0.38 sec. or more has been elapsed.

(2) Conditions for Stopping Forced Door Lock

Detecting any of the following conditions stops the forced door lock.

All doors are locked.

An alarm is stopped.

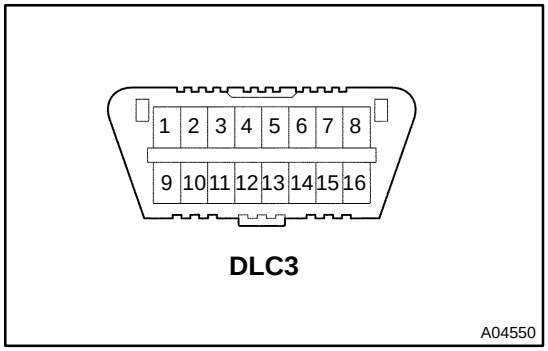
A key is inserted into the key cylinder.

7. PANIC CONTROL

The function to sound the alarm when the user presses the panic switch of the wireless key.

8. ALARM MEMORY CONTROL

If an alarm is activated while a user leaves the vehicle, when the user comes back to the vehicle and reset the security system, the tail lights will come on for 2 sec. to show the alarm occurrence.



DLC3

9. DTC CHECK (Using hand-held tester)

(a) Inspect the DLC3.

The vehicle's ECM uses ISO 9141-2 for communication. The terminal arrangement of DLC3 complies with SAEJ1962 and matches the ISO 9141-2 format.

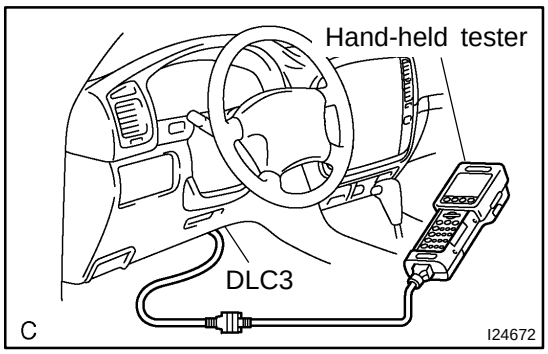
HINT:

If the display shows "UNABLE TO CONNECT TO VEHICLE" when the cable of hand-held tester is connected to DLC3, the ignition switch is turned ON and the scan tool is operated, there is a problem either on the vehicle side or the tool side.

If communication is normal when the tool is connected to another vehicle, inspect DLC3 on the original vehicle.

If communication does not function when the tool is connected to another vehicle, the problem is probably in the tool itself, so consult the Service Department listed in the tool's instruction manual.

(b) Make sure the details of the DLC3.



(c) Prepare the hand-held tester.
(d) Connect the hand-held to DLC3.
(e) Turn the ignition switch ON and the hand-held tester main switch ON.
(f) Use the hand-held tester to check the DTCs, note them down. (For opening instructions, see the hand-held tester's intrusion book).

10. DATA LIST

HINT:

By the DATA LIST displayed on the Hand-held tester, you can read the value of the switch, sensor, actuator and so on without removing any parts. Reading the DATA LIST as a first step of troubleshooting is one of the method to shorten the labor time.

(a) Turn the ignition switch OFF.
(b) Connect the hand-held tester to DLC3.
(c) Turn the ignition switch ON.
(d) According to the display on the tester, read the "DATA LIST".

THEFT DETERRENT ECU:

Item	Condition	Specified Condition
HOOD COURTSY SW	Engine hood Close → Open	OFF/ON
INTRS DETECT	Intrusion sensor detection OFF → ON	OFF/ON
GLS BRK DETECT	Glass broken sensor detection OFF → ON	OFF/ON
KEY UNLK WRN SW	Insert key	OFF/ON
IG SW	IG switch ON or other	OFF/ON
PASSIVE MODE	Passive mode → other mode	OFF/ON
WARN BY GLS SEN	Warning by glass broken sensor OFF → ON	OFF/ON
INTRUSION SEN	Intrusion sensor OFF → ON	OFF/ON
WARNING (HORN)	Warning by Horn OFF → ON	OFF/ON
ENTRY DELAY	Entry delay time	0 s/14 s /30 s

11. ACTIVE TEST

HINT:

Performing ACTIVE TEST using the Hand-held tester allows the relay, and so on to operate without removing any parts. Performing ACTIVE TEST as a first step of troubleshooting is one of the method to shorten the labor time.

DATA LIST can be displayed during ACTIVE TEST.

(a) Turn the ignition switch OFF.
(b) Connect the Hand-held tester to DLC3.
(c) Turn the ignition switch ON.
(d) According to the display on tester, perform the "ACTIVE TEST".

THEFT DETERRENT ECU:

Item	Test details	Diagnostic note
SECURITY INDIC	Turns security indicator ON/OFF	Connect terminals TC and E1 of DLC1
SECURITY HORN2	Turns security horn2 ON/OFF	-

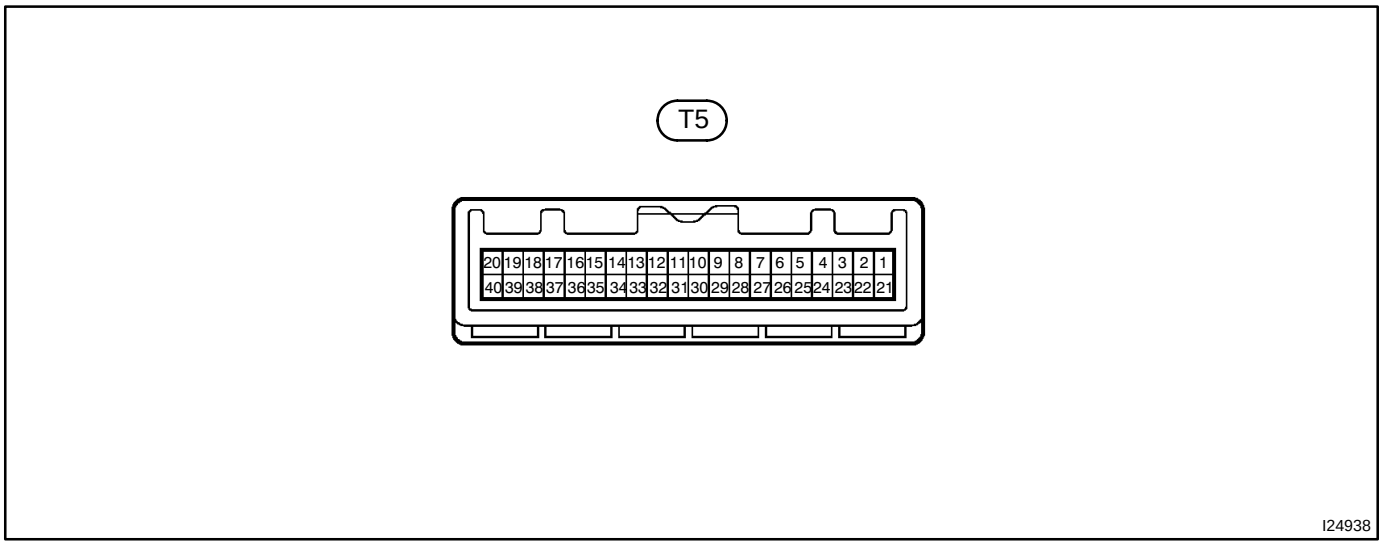
DI01U-14

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Theft deterrent system is not set.	1. Security indicator circuit 2. Key unlock warning switch circuit 3. Door courtesy switch circuit 4. Door unlock detection switch circuit 5. Engine hood courtesy switch circuit 6. Power source circuit 7. Theft deterrent ECU	DI-969 DI-974 DI-1062 DI-1110 DI-976 DI-966 -
Security indicator does not light up or blink.	1. Security indicator circuit 2. Theft deterrent ECU	DI-969 -
Theft deterrent system cannot be unset even if ignition switch is ON.	1. Key unlock warning switch circuit 2. Power source circuit 3. Theft deterrent ECU	DI-974 DI-966 -
During warning condition, horn does not operate.	1. Horn circuit 2. Theft deterrent ECU	DI-972 -

DI1AH-21

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	Specified condition
SH- ↔ Body Ground (T5-1 ↔ Body Ground)	W ↔ W-B	Always	10 - 14 V
+B1 ↔ Body ground (T5-2 ↔ Body ground)	LG ↔ Body Ground	Always	10 - 14 V
+B2 ↔ Body Ground (T5-3 ↔ Body Ground)	B ↔ Body Ground	Always	10 - 14 V
HORN ↔ E (T5-5 ↔ T5-29)	G-O ↔ W-B	Horn switch "OFF"	10 - 14 V
IG ↔ E (T5-10 ↔ T5-29)	B-W ↔ W-B	Ignition switch is turned to "ON" position	10 - 14 V
GBS ↔ E (T5-11 ↔ T5-29)	Y-G ↔ W-B	Glass sensor is "ON"	10 - 14 V
		Glass sensor is "OFF"	Below 1 Ω
KSW ↔ E (T5-12 ↔ T5-29)	R-B ↔ W-B	Key unlock warning switch "ON" (Key inserted)	Below 1 Ω
		Key unlock warning switch "OFF" (Key removed)	1 MΩ or higher
IND ↔ E (T5-25 ↔ T5-29)	G-R ↔ W-B	During set preparation	3 - 5 V
E ↔ Body ground (T5-29 ↔ Body Ground)	W-B ↔ Body Ground	Always	10 - 14 V
MPX1 (T5-31)	B	Multiplex communication circuit	-
DSWH ↔ E (T5-34 ↔ T5-29)	L-R ↔ W-B	Engine hood courtesy switch "ON" (Engine hood opened)	Below 1 Ω
		Engine hood courtesy switch "OFF" (Engine hood closed)	1 MΩ or higher

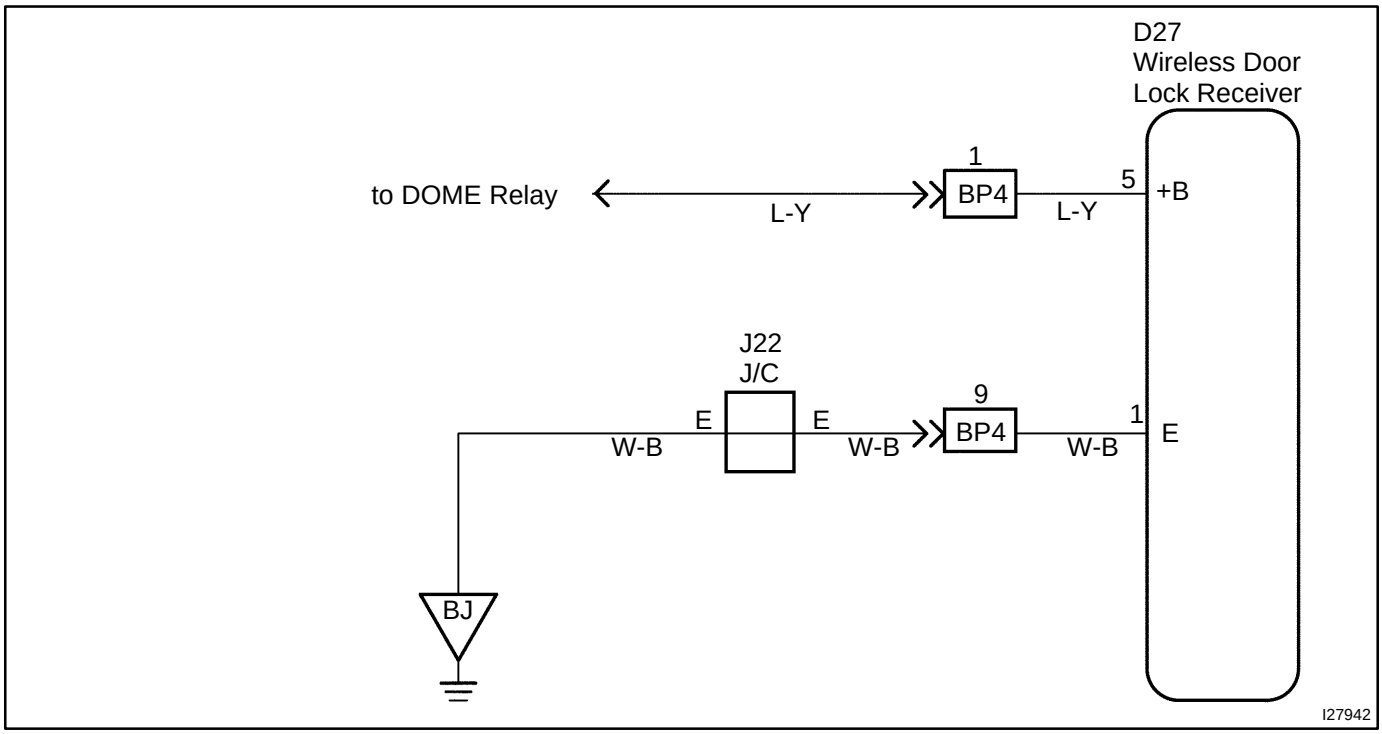
DIB5V-02

ECU Power Source Circuit

CIRCUIT DESCRIPTION

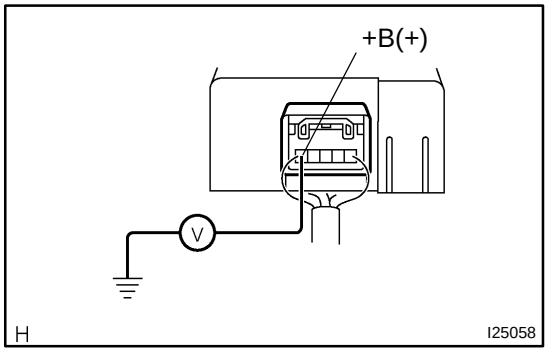
Battery positive voltage is always applied to the terminal +B of the wireless door lock ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal +B of ECU connector and ground.**



PREPARATION:

Remove the wireless door lock ECU.

CHECK:

Measure voltage between terminal +B of ECU connector and ground.

OK:

Voltage: 10 - 14 V

OK	**Proceed to next circuit inspection shown in problem symptom table (See page DI-948).**

NG

2	**Check wire harness and connector between wireless door lock ECU and body ECU (Main) (See page IN-36).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI-948).

DIB5U-01

CIRCUIT INSPECTION

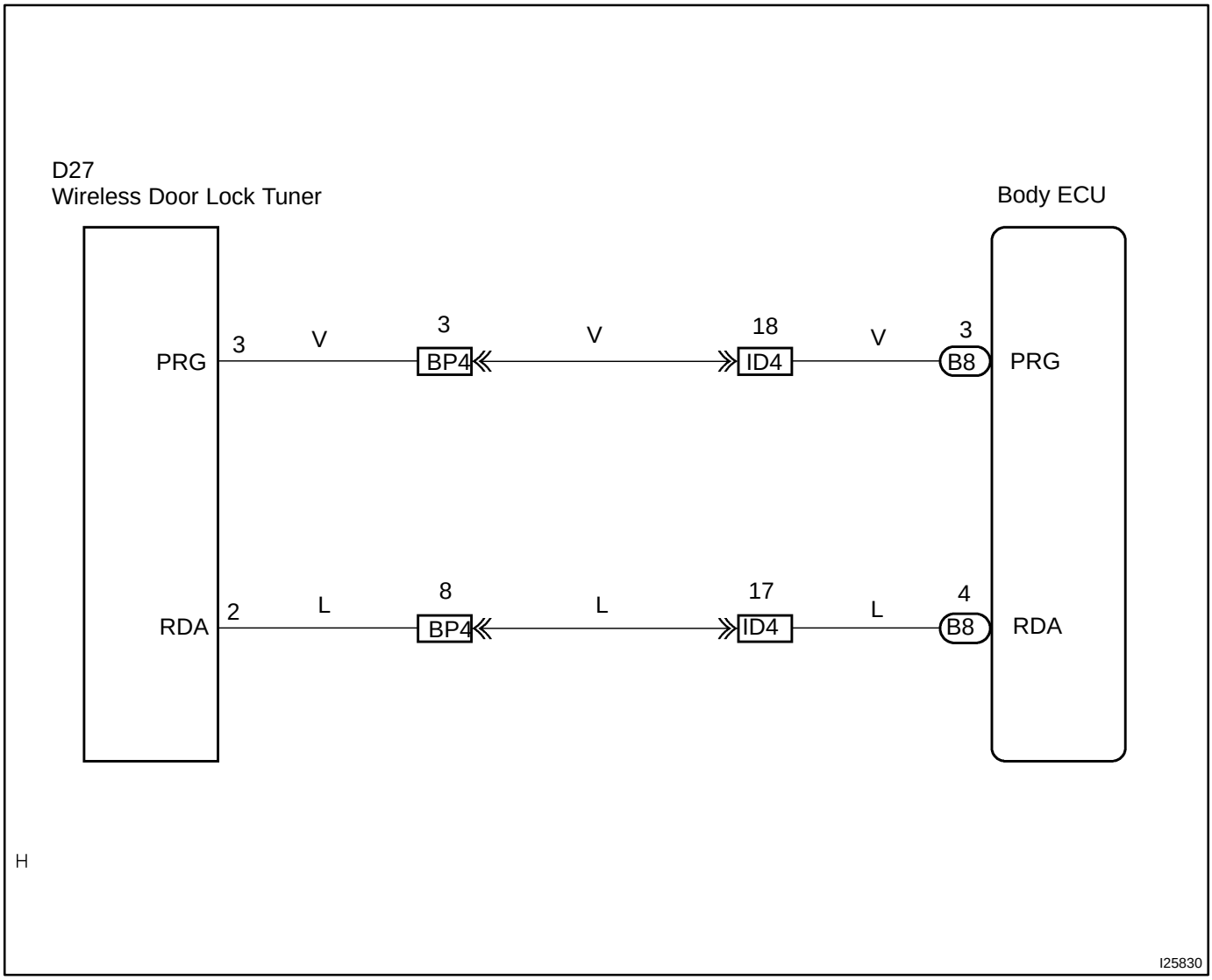
DTC	B1242	Wireless door lock receiver circuit malfunction

CIRCUIT DESCRIPTION

This DTC is output when GND short of RDA terminal is detected.

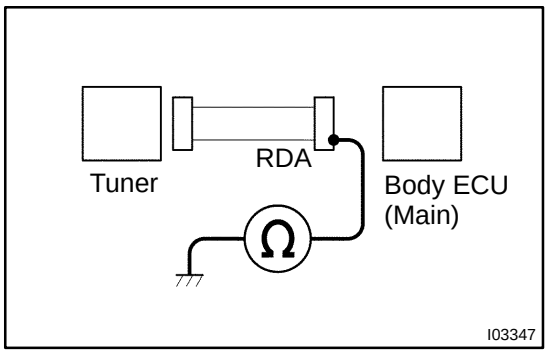
DTC No.	DTC Detecting Condition	Trouble Area
B1242/42	GND short of RDA terminal	★Wire harness ★Wireless door lock tuner ★Body ECU (Main)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check wire harness.**

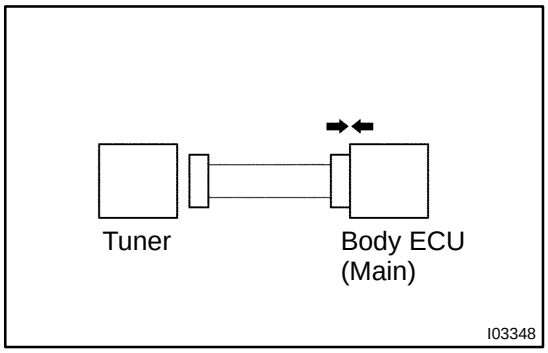


PREPARATION:
Disconnect the connector of tuner and body ECU.
CHECK:
Check the continuity between wireharness and body ground.
OK:
No continuity.

NG → **Repair or replace the wire harness.**

OK

2	**Check body ECU.**



PREPARATION:
Connect the connector of body ECU.
CHECK:
Check the DTC.
OK:
B1242 is not output.

NG → **Replace the body ECU (Main).**

OK

Replace the tuner.

DI0DR-04

CUSTOMER PROBLEM ANALYSIS CHECK

WIRELESS DOOR LOCK CONTROL System Check Sheet

Inspector's Name _____

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	**km Miles**

Date Problem First Occurred		/ /
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times/per day, month) ☐ Once only
Weather Conditions When Problem Occurred	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. ˚F (˚C))
	Place	☐ Everywhere ☐ Specific Locality( )
Date Transmitter Battery Last Replaced		/ /

Problem Symptom	☐ Whole wireless door lock control system does not operate.	
	☐ Only door unlock operation is not possible.	
	☐ Only door lock operation is not possible.	
	☐ Only key confinement prevention function is not possible.	
	☐ Wireless door lock function operates even when each door is opened.	
	☐ Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors become unlocked.)	☐ When RH door is unlocked ☐ When LH door is unlocked
	☐ Others	

DIB5T-01

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during DTC check, check the circuit corresponding to the code in the table below (Proceed to the page given for the circuit).

DTC No. (See Page)	Circuit Inspection	Trouble Area
B1242 (DI-949)	Wireless door lock tuner circuit malfunction	★Wire harness ★Wireless door lock tuner (door control receiver) ★Theft deterrent ECU

WIRELESS DOOR LOCK CONTROL SYSTEM

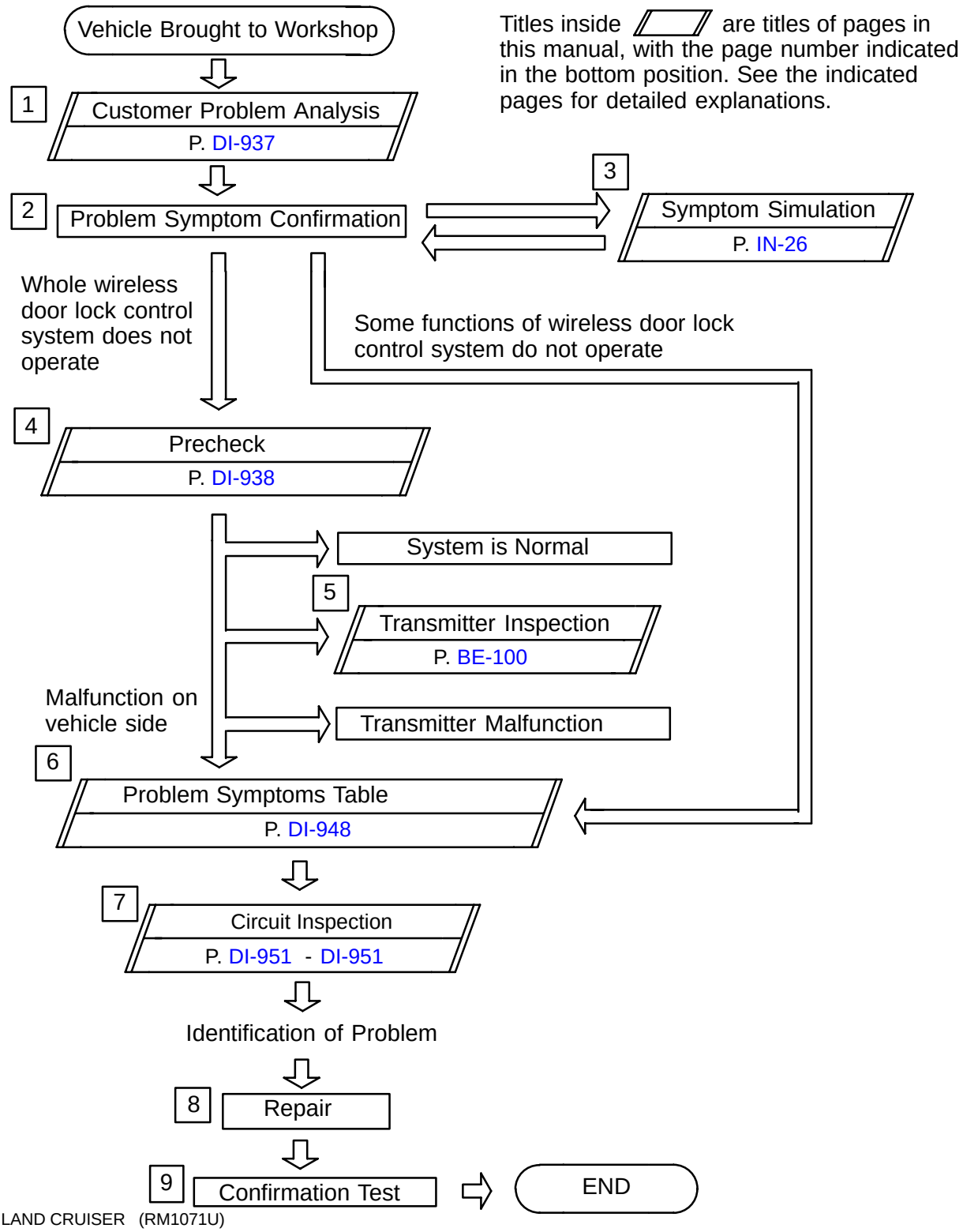
DI0DQ-13

HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

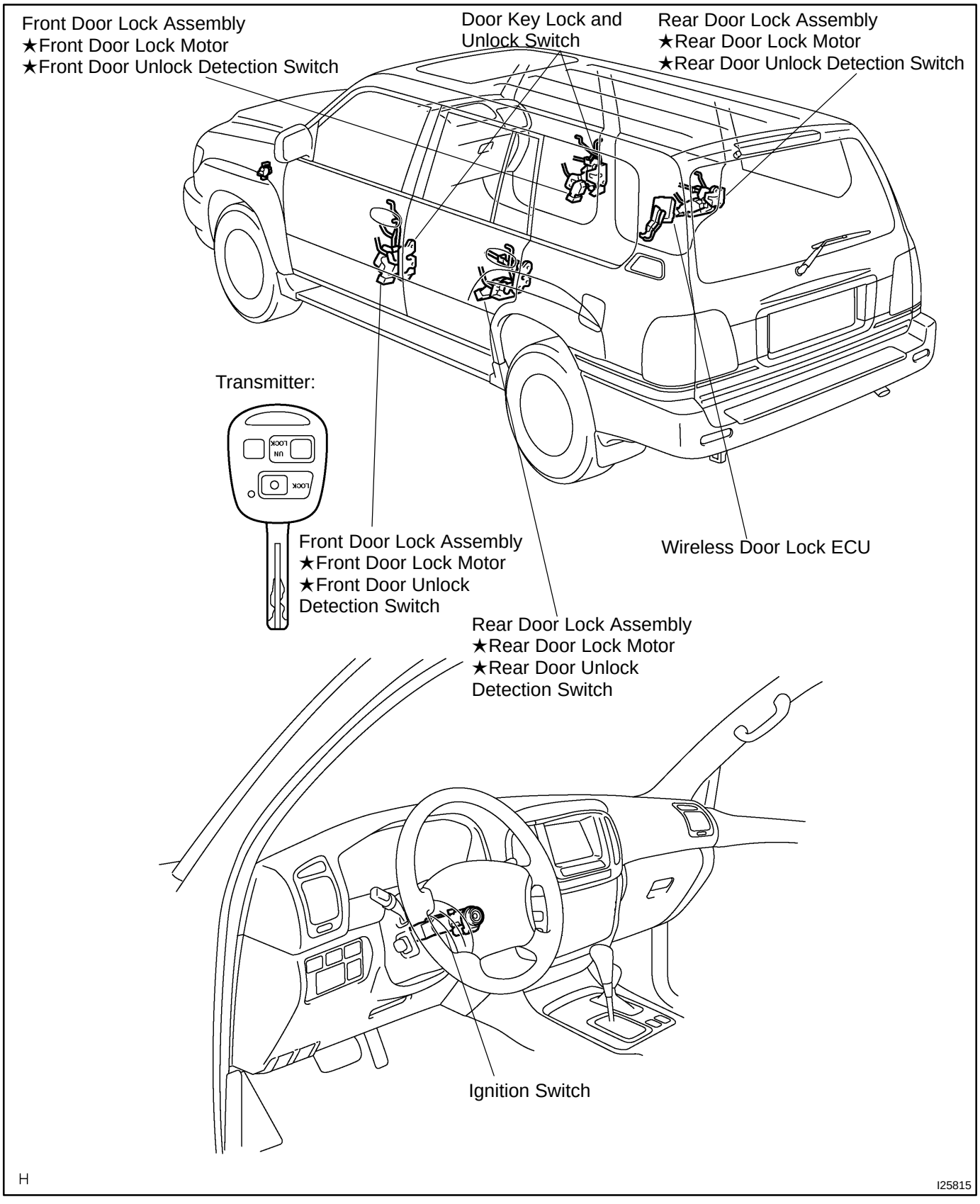
Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system is operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system is operating normally.

Perform troubleshooting in accodnce with procedure on the following page.



DI3CN-03

PARTS LOCATION



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DI89V-02

PRE-CHECK

1. CHARACTERS OF WIRELESS DOOR LOCK

(a) The operation distance changes according to how customers hold the transmitter or where it is used.

(b) Because of using the very weak radio wave, if there is a strong wave or noise on the frequency being used, the operation distance may become shorter.

2. WIRELESS DOOR LOCK BASIC FUNCTION

(a) Stand on the driver's side. Stay 1 m away from the vehicle.

(b) Turn the transmitter toward the vehicle and press any one of the transmission switched for 1 sec.

3. INSPECT WIRELESS DOOR LOCK DIAGNOSIS MODE

(a) Start up diagnosis mode.

HINT:

Follow the method below.

(1) Insert the ignition key into the ignition key cylinder.

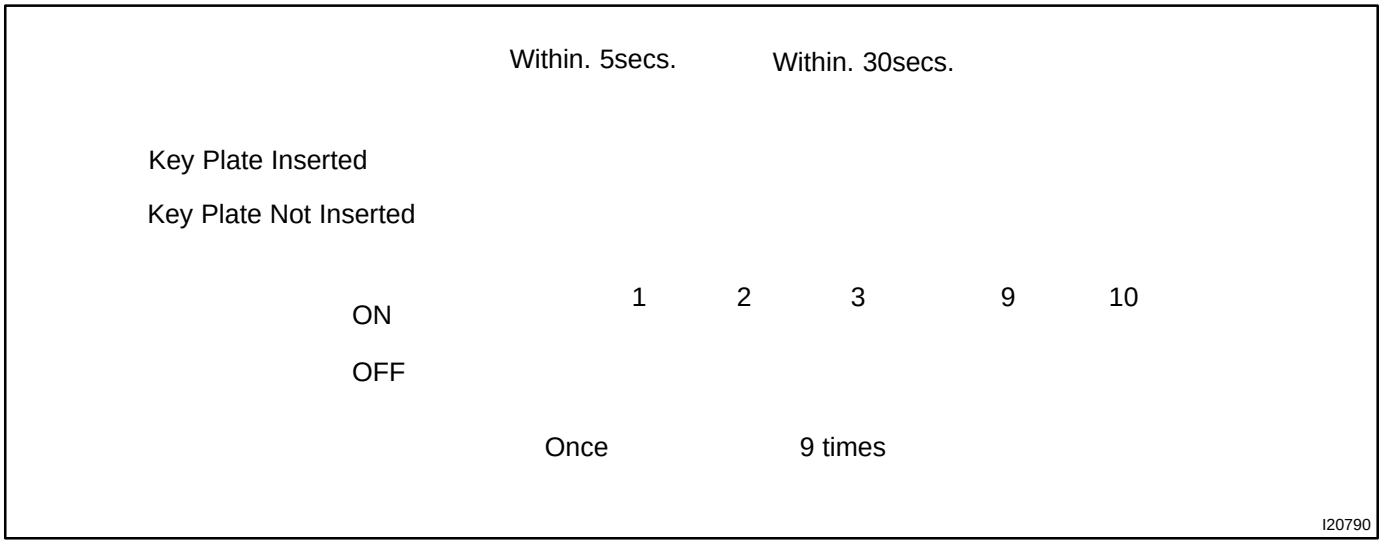
(2) Remove the ignition key from the ignition key cylinder.

(3) Insert the key into the ignition switch.

(4) Turn the ignition switch ON once within 5 sec.

(5) Repeat turning the ignition switch OFF → ON 9 times within 30 sec.

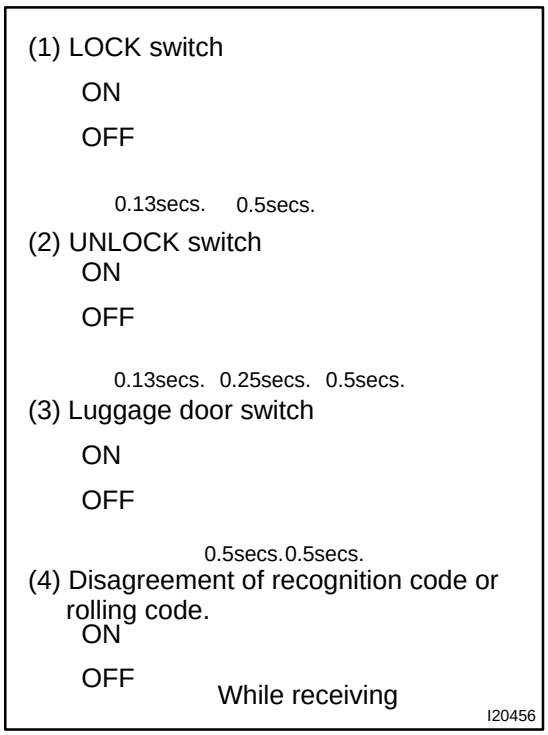
(6) Enter the diagnosis mode, and make sure that the taillight lights up.



(b) Finishing the Diagnosis Mode.

During the Diagnosis mode, turn the ignition switch OFF → ON to go back to the normal mode.

At this time make sure that the taillight lights up.



(c) Diagnosis Mode Check.

HINT:

Check how the taillight lights up when pressing each transmitter switch.

(1) LOCK switch
(2) UNLOCK switch
(3) Luggage door switch
(4) Disagreement of recognition code or rolling code.

HINT:

If (4) is detected in the Diagnosis Check, conduct the recognition code registration.

(5) No response from the taillight.

HINT:

Conduct the following checks.

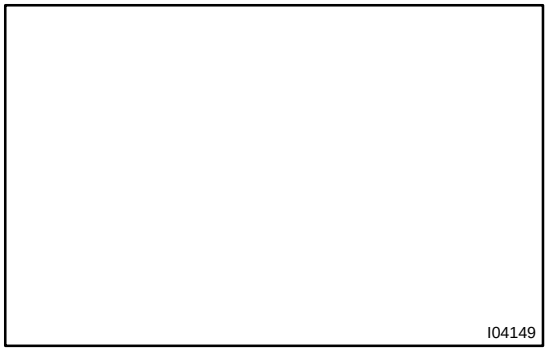
- □ Wireless door lock transmitter.
- □ Wireless door lock receiver.

4. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to ”3. REPLACE TRANSMITTER (LITHIUM) BATTERY”.

(a) Using a screwdriver, remove the 2 screws and cover.
(b) Remove the battery (lithium battery).



(c) Install a new or normal battery (lithium battery).

HINT:

When a new or normal battery can not be obtained, connect 2 new 1.5 V batteries in series, connect the battery (+) to the battery receptacle side terminal and battery (-) to the bottom terminal, then apply 3 V voltage to the transmitter.

(d) In the location where is approx. 1 m away from driver’s outside handle in the right direction, face the key plate of the transmitter to the vehicle, and check the transmitter operation when pressing transmission switch of the transmitter body.

Standard:

- □ Remote control of vehicle door lock can be operated.
- □ LED lights up more than once.

HINT:

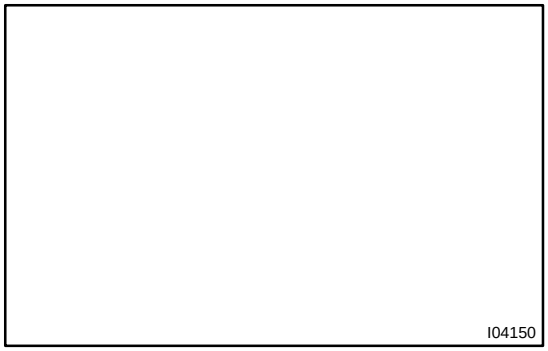
- ☐ The minimum operation distance differs according to operator, the way of holding the transmitter, and location.
- ☐ As weak wave is used, operation distance might be shortened when noise is detected in strong wave or used frequency.

(e) Install the battery (lithium battery).
(f) Install a cover so that O-ring is not distorted or slipped off.
(g) Using a screwdriver, tighten the 2 screws.

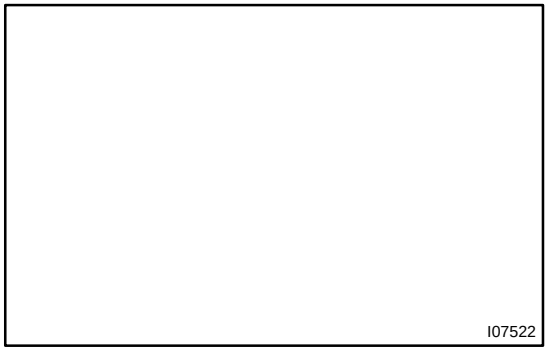
5. CHECK BATTERY CAPACITY

HINT:

- ☐ Make sure to use the TOYOTA electrical tester.
- ☐ With the battery unloaded, judge can not be made whether the battery is available or not on the test.
- ☐ When the transmitter is faulty, the energy amount left in the battery might not be checked correctly.
- ☐ On the lithium battery used for the transmitter, the voltage more than 2.5 V with the battery unloaded is shown on the tester until the energy is completely consumed.
  Accordingly when inspecting the energy amount left in the battery, it is necessary to measure the voltage when the battery is loaded. (1.2 kΩ).



(a) Remove the 2 screws and cover using a (-) driver.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (-) terminal of the transmitter and install the battery.



(d) Connect the (+) tester to the (+) battery (lithium battery), and (-) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard: 2.1 V or more

HINT:

- When the temperature of the battery is low, the judge can not be made correctly.
  When the outcome of the test is less than 2.1 V, conduct the test again after leaving the battery in the place at 18 ˚C for more than 30 minutes.
- By auto power off function, the voltage becomes no load voltage (more than 2.5 V) condition 20 seconds after the switch was pressed.
  Make sure to read the voltage before of it.
- High voltage might be shown 1 to 2 times after leaving the battery, judge should be made with the voltage shown at the 3rd time or later.

(g) Disconnect the lead.

(h) Set the battery (lithium battery) in the transmitter.

(i) Install the cover, so that the O-ring is not distorted or slipped off.

(j) Using a screwdriver, tighten the 2 screws.

6. REPLACE TRANSMITTER (LITHIUM) BATTERY

NOTICE:

Special caution should be taken for handling each component as they are precision electronic components.

(a) Using a screwdriver, remove the screw and cover.

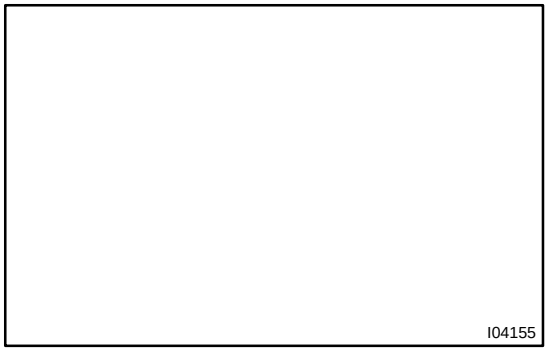
NOTICE:

Do not pry out the cover forcibly.

HINT:

Push the cover with a finger so that there becomes clearance, then pry out the cover from that clearance.

(b) Remove the transmitter.

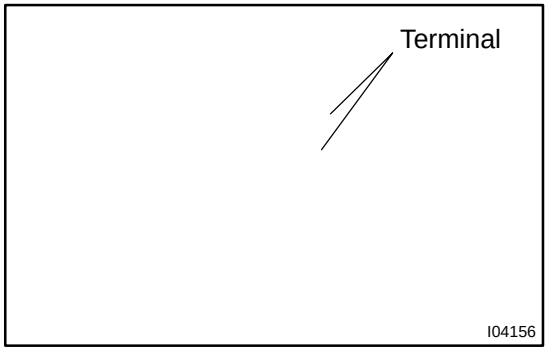


(c) Using a screwdriver, remove the 2 screws and cover.

(d) Remove the battery (lithium battery).

NOTICE:

- **Do not push the terminals with a finger.**
- **If prying up the battery (lithium battery) forcibly to remove, the terminals are deformed.**



(e) Install a battery (lithium battery) as shown in the illustration.

NOTICE:

Face the battery upward. Take care not to deform the terminals.

(f) Check that O-ring is not distorted or slipped off, and install the cover.

(g) Using a screwdriver, tighten the 2 screws.

NOTICE:

When the shrews are tightened loosely, it might cause faulty contact of battery (lithium battery) and terminals.

(h) Assemble the transmitter to the key plate and the cover.

(i) Using a screwdriver, tighten the screw.

7. REPLACE DOOR CONTROL RECEIVER AND TRANSMITTER

NOTICE:

When replacing the theft deterrent ECU or transmitter, registration of recognition code is necessary because they are provided as a single components.

(a) Select the operation mode to perform from the following operation modes.

- ☐ Add mode
- ☐ Rewrite mode
- ☐ Prohibition mode
- ☐ Confirmation mode

HINT:

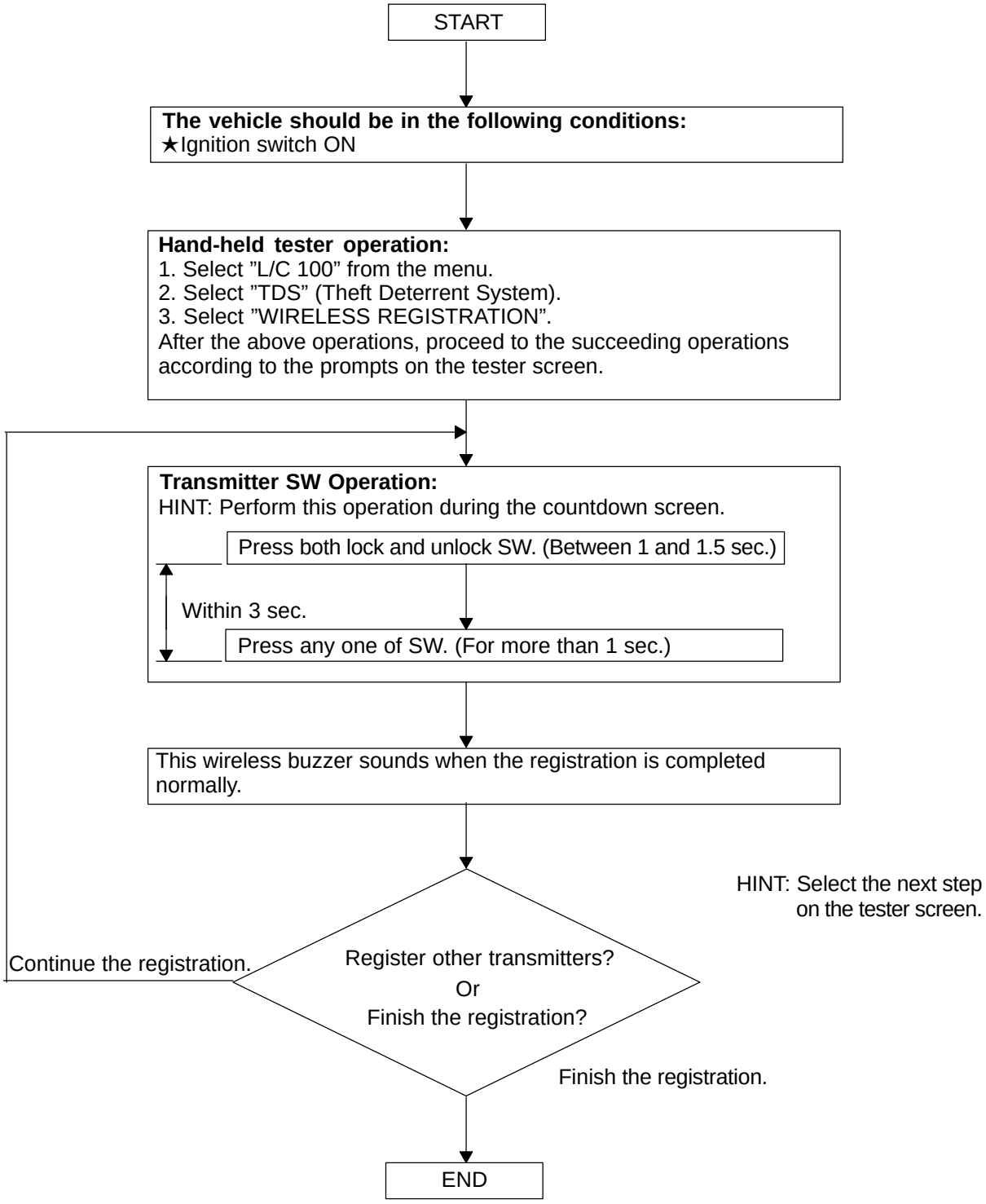
- ☐ The ”Add mode” is for adding the newly recognized codes for registration while the already registered codes are retained. This mode is used when the transmitter is added. When the number of the registered codes exceeds 4 codes, the previously registered codes will be erased in order, staring from the first registered code.
- ☐ The ”Rewrite mode” is for erasing all the registered codes and registering newly recognized codes only. This mode is used when the transmitter or the door control receiver is replaced.
- ☐ The ”Prohibition mode” is for erasing all the registered codes to prohibit the wireless door lock operation. This mode is used when the transmitter is lost.
- ☐ The ”Confirmation mode” is for confirming the number of recognition codes that are registered. This mode is used to check the number of registered codes when new codes are added to the registration, etc.

(b) Follow the chart on the following page to register the transmitter recognition code to the theft deterrent ECU.

HINT:

- ☐ When procedure is out of the specified, the registration operation is cancelled.
- ☐ Maximum 4 recognition codes can be registered.
- ☐ For the details of the registration procedure, see page BE-93 .

(c) By TOYOTA Hand-Held Tester



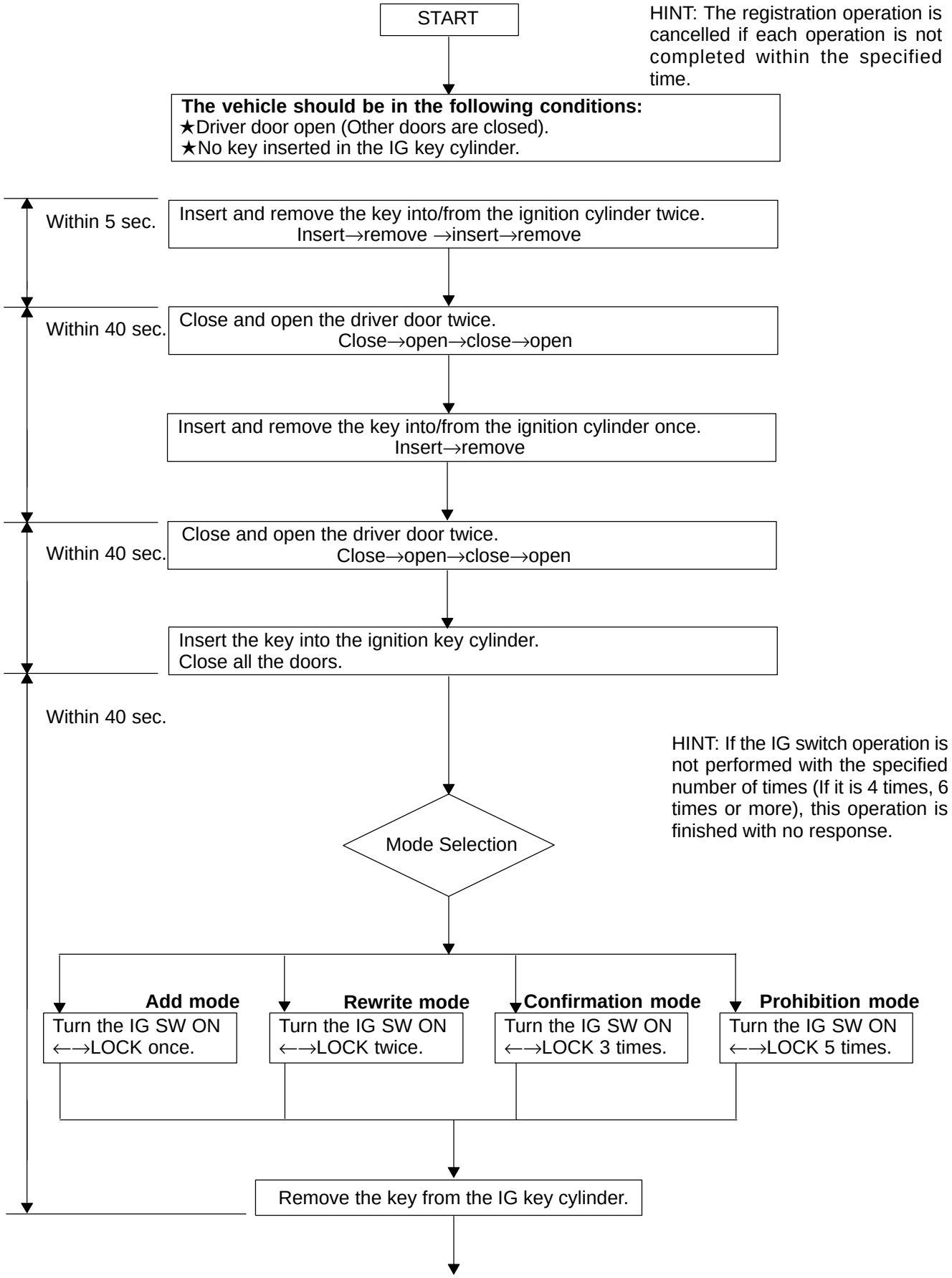
HINT:

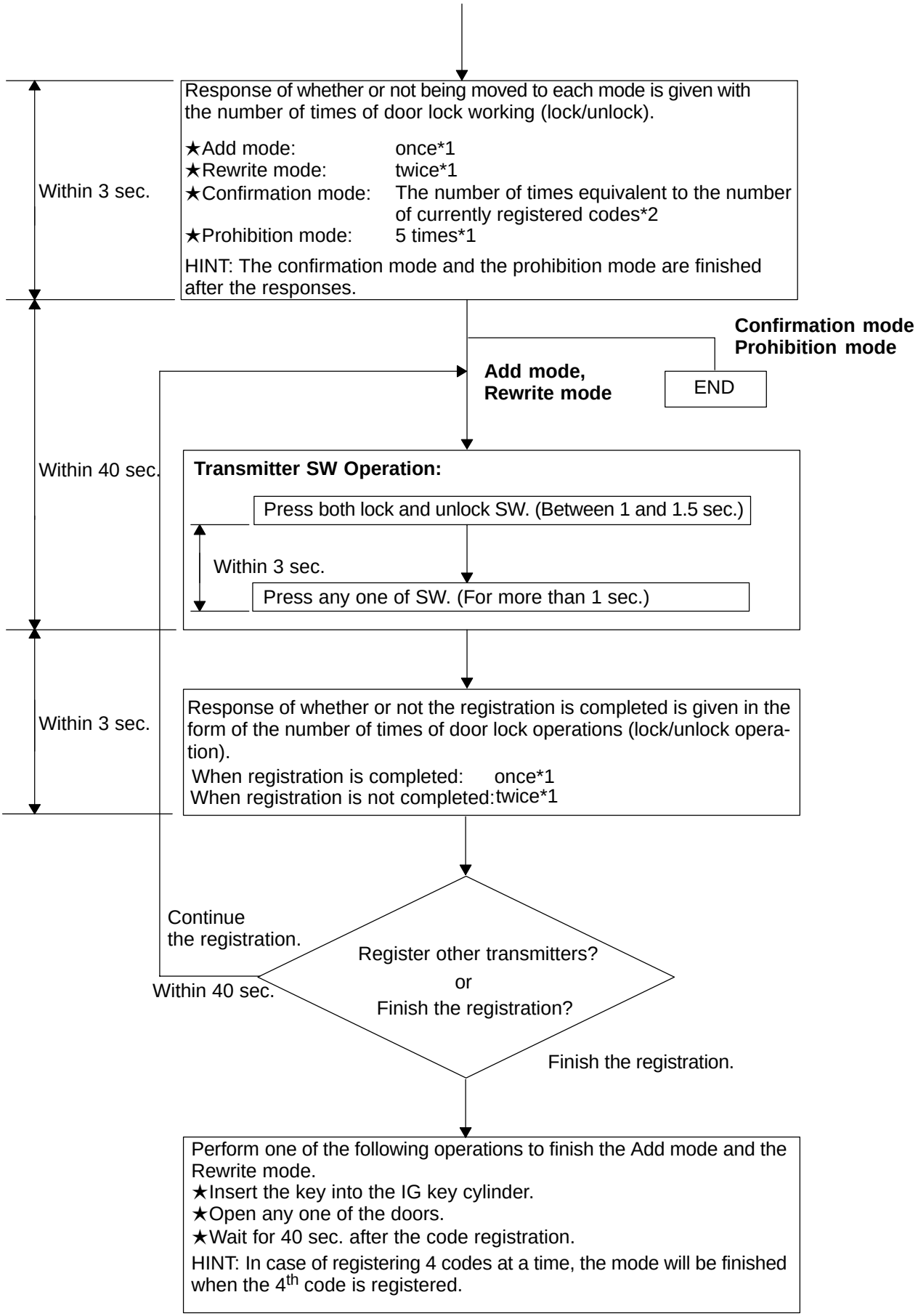
This page is to show briefly the registration procedure using the hand-held tester.

For detailed procedures, please refer to the prompts on the tester screen.

The number of currently registered codes can be checked out on the first screen of the WIRELESS REGISTRATION.

(d) By Switch Operation:




Response of whether or not being moved to each mode is given with the number of times of door lock working (lock/unlock).
★Add mode: once*1
★Rewrite mode: twice*1
★Confirmation mode: The number of times equivalent to the number of currently registered codes*2
★Prohibition mode: 5 times*1
HINT: The confirmation mode and the prohibition mode are finished after the responses.
Within 3 sec.
Confirmation mode
Prohibition mode
END
Add mode,
Rewrite mode
Within 40 sec.
Transmitter SW Operation:
Press both lock and unlock SW. (Between 1 and 1.5 sec.)
Within 3 sec.
Press any one of SW. (For more than 1 sec.)
Within 3 sec.
Response of whether or not the registration is completed is given in the form of the number of times of door lock operations (lock/unlock operation).
When registration is completed: once*1
When registration is not completed: twice*1
Continue
the registration.
Register other transmitters?
or
Finish the registration?
Within 40 sec.
Finish the registration.
Perform one of the following operations to finish the Add mode and the Rewrite mode.
★Insert the key into the IG key cylinder.
★Open any one of the doors.
★Wait for 40 sec. after the code registration.
HINT: In case of registering 4 codes at a time, the mode will be finished when the 4th code is registered.

DI0DV-12

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuit for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

★ Troubleshooting of the wireless door lock control system is based on the premise that the door lock control system and theft deterrent system are operating normally. Accordingly, before troubleshooting the wireless door lock control system, first make certain that the door lock control system and theft deterrent system are operating normally.

★ If the instruction ”Proceed to next circuit inspection shown on matrix chart” is given in the flow chart for each circuit, proceed to the circuit with the next highest number in the table to continue the check.

★ If the trouble still reappears even through there are no abnormalities in any of the other circuits, check and replace the Wireless Door Lock ECU as the last step.

Symptom	Suspect Area	See page
All function of wireless door lock control system do no operate.	1. ECU Power Source Circuit. 2. Door Courtesy Switch Circuit. 3. Door Key Lock and Unlock Switch Circuit. 4. Key Unlock Warning Switch Circuit. 5. Wireless Door Lock ECU. 6. Body ECU (Main).	DI-951 DI-1062 DI-1106 DI-1060 IN-36 IN-36
Only door unlock operation is not possible (Lock operation is possible).	1. Door Key Lock and Unlock Switch Circuit 2. Door Unlock Detection Switch Circuit 3. Wireless Door Lock ECU. 4. Body ECU (Main).	DI-1106 DI-1060 IN-36 IN-36
Only door lock operation is not possible (Unlock operation is possible).	1. Door Key Lock and Unlock Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1106 IN-36 IN-36
Only transmitter misoperation prevention function is not possible.	1. Key Unlock Warning Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1060 IN-36 IN-36
Wireless door lock function operates even when each door is opened.	1. Door Courtesy Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1062 IN-36 IN-36
Wireless door lock functions incorrectly. (Although one door is unlocked, when the transmitter switch is pressed, all doors unlock.)	1. Door Unlock Detection Switch Circuit 2. Wireless Door Lock ECU 3. Body ECU (Main).	DI-1060 IN-36 IN-36
Wireless door lock operates, but the taillight does not respond.	1. Taillight Relay Circuit 2. Taillight Circuit 3. Wireless Door Lock ECU 4. Body ECU (Main).	DI-1076 DI-1076 IN-36 IN-36

EMISSION CONTROL SYSTEM

EC07H-02

PURPOSE

The emission control systems are installed to reduce the amount of HC, CO and NOx exhausted from the engine ((3) and (4)), to prevent the atmospheric release of blow-by gas-containing HC (1) and evaporated fuel containing HC being released from the fuel tank (2).
The function of each system is shown in these table:

System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces HC
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Three-Way Catalytic Converter	TWC	Reduces HC, CO and NOx
(4) Sequential Multiport Fuel Injection*	SFI	Injects a precisely timed, optimum amount of fuel for reduced exhaust emissions

Remark: * For inspection and repair of the SFI system, refer to the SF section in this manual.

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

EC0MF-01

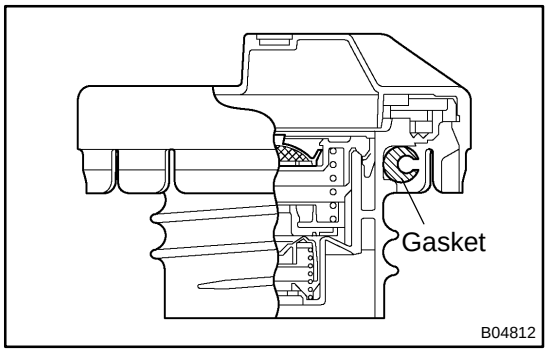
INSPECTION

1. INSPECT LINES AND CONNECTIONS

Visually check for loose connections, sharp bends or damage.

2. INSPECT FUEL TANK

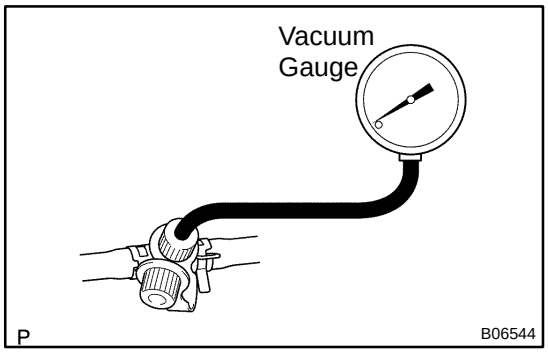
Visually check for deformation, cracks or fuel leakage.



3. INSPECT FUEL TANK CAP

Visually check if the cap and/or gasket are deformed or damaged.

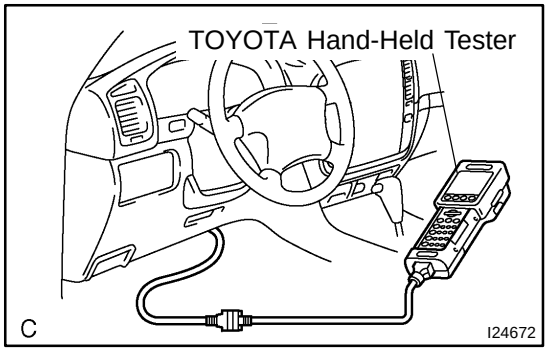
If necessary, repair or replace the cap.



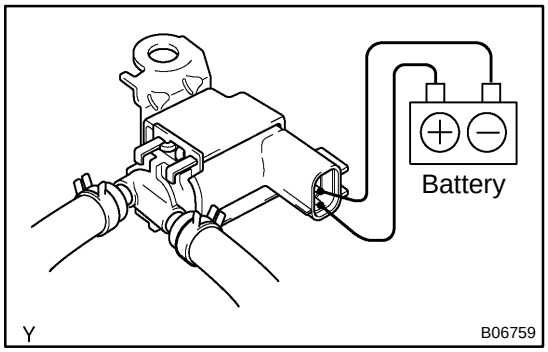
4. INSPECT EVAP SYSTEM LINE

(a) Warm up the engine and stop the engine.
Allow the engine to warm up to normal operating temperature.

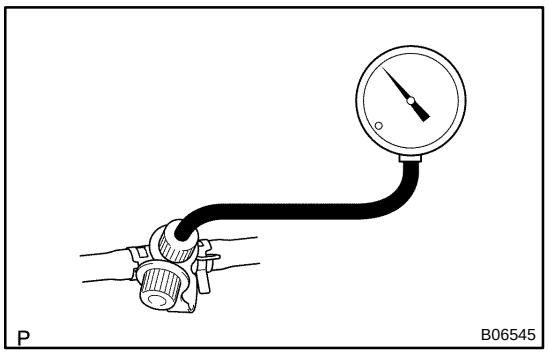
(b) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) to the EVAP service port on the purge line.



(c) TOYOTA Hand-Held tester:
Forced driving of the VSV for the EVAP.
(1) Connect a TOYOTA hand-held tester to the DLC3.
(2) Start the engine.
(3) Push the TOYOTA hand-held tester main switch ON.
(4) Use the ACTIVE TEST mode on the TOYOTA hand-held tester to operate the VSV for the EVAP.



(d) If you have no TOYOTA Hand-Held Tester:
Forced driving of the VSV for the EVAP.
(1) Disconnect the VSV connector for the EVAP.
(2) Connect the positive (+) and negative (-) leads from the battery to the VSV terminals for the EVAP.
(3) Start the engine.



(e) Check the vacuum at idle.
Vacuum:
Maintain at 0.368 - 19.713 in.Hg (5 - 268 in.Aq) for over 5 seconds

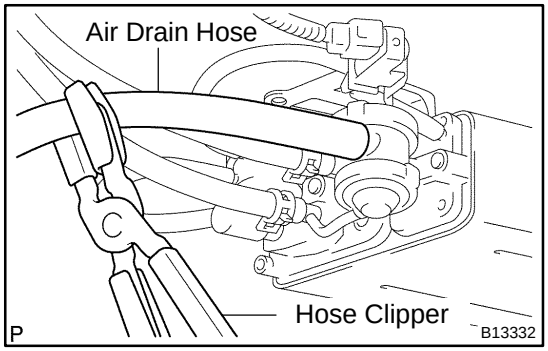
HINT:
If the vacuum does not change, you can conclude that the hose connecting the VSV to the service port has come loose or is blocked, or the VSV is malfunctioning.

(f) TOYOTA Hand-Held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the TOYOTA hand-held tester from the DLC3.

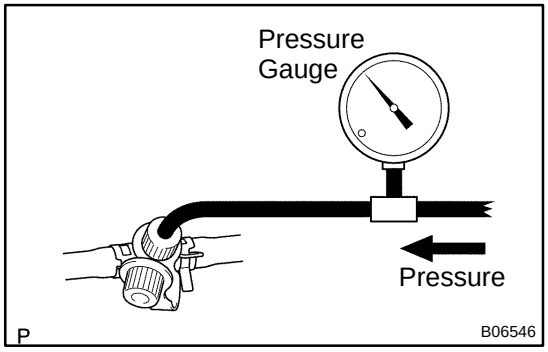
(g) If you have no TOYOTA Hand-Held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the positive (+) and negative (-) leads from the battery from the VSV terminals for the EVAP.
(3) Connect the VSV connector for the EVAP.

(h) Disconnect the vacuum gauge from the EVAP service port on the purge line.

(i) Connect a pressure gauge to the EVAP service port on the purge line.

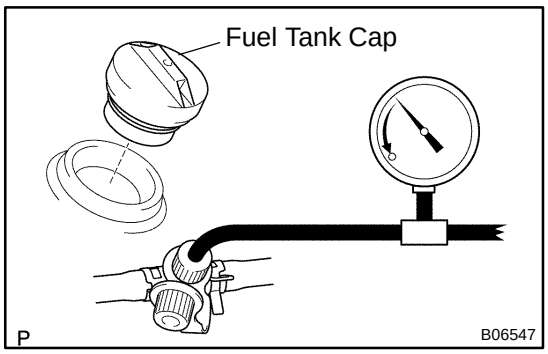


(j) Check the pressure.
(1) Close off the air drain hose at the marked position of the canister with a hose clipper or similar instrument.



(2) Add the pressure (13.5 - 15.5 in.Aq) from the EVAP service port.
Pressure:
2 minutes after the pressure is added, the gauge should be over 7.7 - 8.8 in.Aq.

HINT:
If you can't add pressure, you can conclude that the hose connecting the VSV～canister～fuel tank has slipped off or the VSV is open.

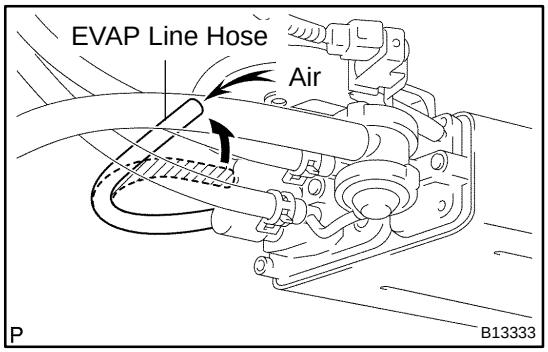


(3) Check if the pressure decreases when the fuel tank cap is removed while adding pressure.

HINT:

If the pressure does not decrease when the filler cap is removed, then you can conclude that the hose connecting the service port to the fuel tank is blocked, etc.

(k) Disconnect the pressure gauge from the EVAP service port on the purge line.



5. CHECK AIRTIGHTNESS IN FUEL TANK AND FILLER PIPE

(a) Disconnect the EVAP line hose from the charcoal canister side and then pressurize and make the internal pressure in the fuel tank 4 kPa (41 gf/cm^2, 0.58 psi).

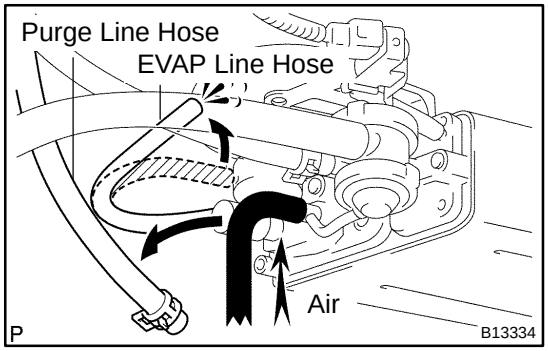
(b) Check that the internal pressure of the fuel tank can be hold for 1 minute.

(c) Check the connected portions of each hose and pipe.

(d) Check the installed parts on the fuel tank.

If there is no abnormality, replace the fuel tank and filler pipe.

(e) Reconnect the EVAP line hose to the charcoal canister.



6. INSPECT FUEL CUTOFF VALVE AND FILL CHECK VALVE

(a) Disconnect the purge line hose and EVAP line hose from the charcoal canister.

(b) Plug the cap to the air drain hose.

(c) Pressurize 4 kPa (41 gf/cm^2, 0.58 psi) to the purge port and check that there is ventilation through the EVAP line hose.

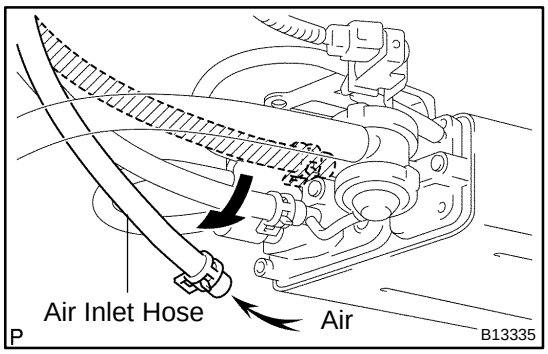
HINT:

In the condition that the fuel is full, as the float value of the fill check valve is closed and has no ventilation, it is necessary to check the fuel amount (volume).

(d) Check if there is any struck in the vent line hose and EVAP line hose.

If there is no stuck in hoses, replace the fuel cutoff valve and fill check valve.

(e) Reconnect the purge line hose and EVAP line hose to the charcoal canister.



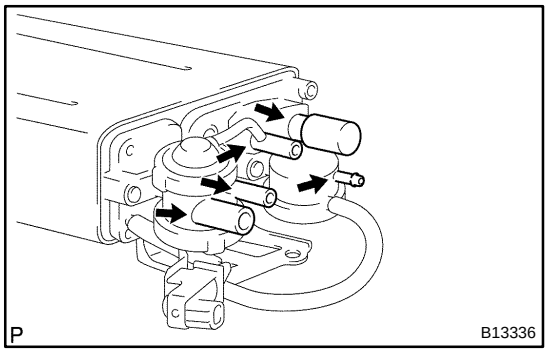
7. CHECK AIR INLET LINE

(a) Disconnect the air inlet line hose from the charcoal canister.

(b) Check that there is ventilation in the air inlet line.

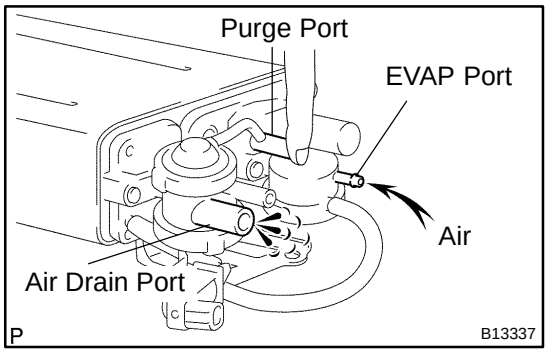
(c) Reconnect the air inlet line hose to the charcoal canister.

8. REMOVE CHARCOAL CANISTER ASSEMBLY



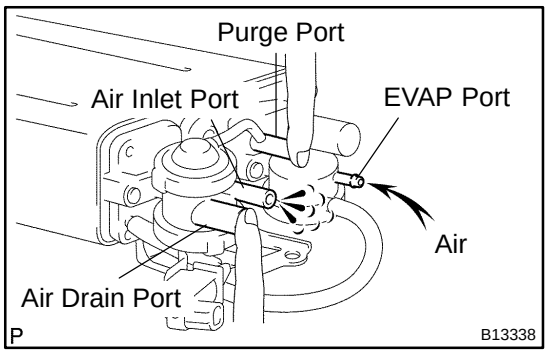
9. INSPECT CHARCOAL CANISTER

(a) Visually check the charcoal canister for cracks or damage.

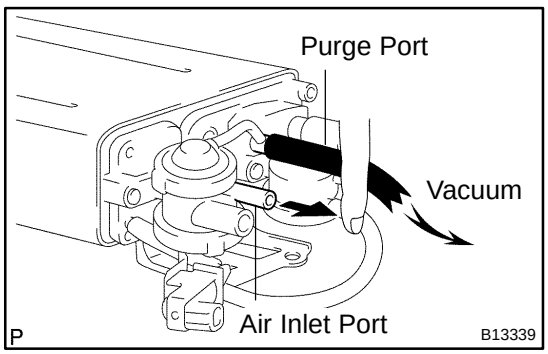


(b) Inspect the charcoal canister operation.

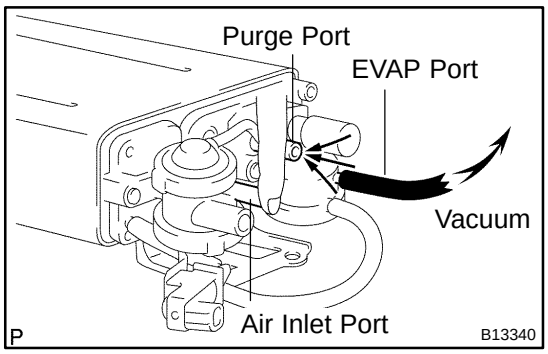
(1) While holding the purge port closed, blow air (1.76 kPa, 18 gf/cm^2, 0.26 psi) into the EVAP port and check that air flows from the air drain port.



(2) While holding the purge port and the air drain port closed, blow air (1.76 kPa, 18 gf/cm^2, 0.26 psi) into the EVAP port and check that air does not flow from the air inlet port.



(3) Apply vacuum (3.43 kPa, 25.7 mmHg, 1.01 in.Hg) to the purge port, check that the vacuum does not decrease when the air inlet port is closed, and check that the vacuum decreases when the air inlet port is released.



(4) While holding the air inlet port closed, apply vacuum (3.43 kPa, 25.7 mmHg, 1.01 in Hg) to the EVAP port and check that air flows into the purge port.

If operation is not as specified, replace the charcoal canister.

(5) Remove the cap from the vent port.

10. INSPECT VSV FOR EVAP (See page SF-44)

11. INSPECT VSV FOR CANISTER CLOSED VALVE (CCV) (See page SF-48)

12. INSPECT VSV FOR VAPOR PRESSURE SENSOR (See page SF-46)

13. INSPECT VAPOR PRESSURE SENSOR (See page SF-52)

14. REINSTALL CHARCOAL CANISTER ASSEMBLY

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

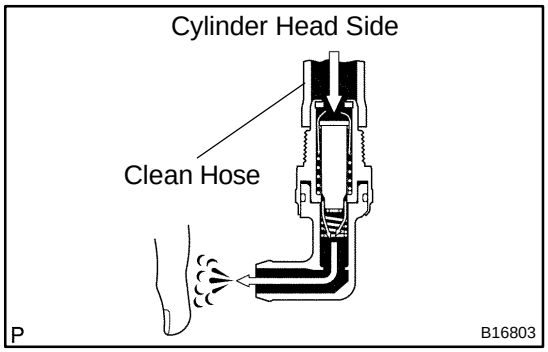
EC07K-04

INSPECTION

1. REMOVE V-BANK COVER

2. INSPECT PCV VALVE

(a) Remove the PCV valve.



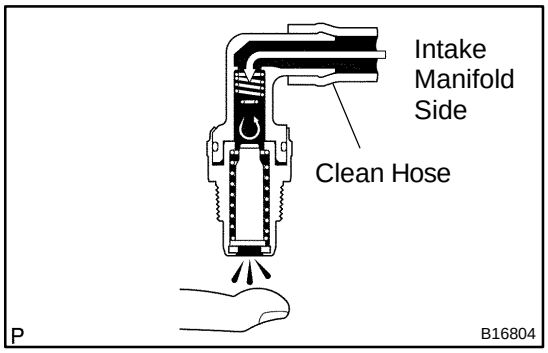
(b) Install a clean hose to the PCV valve.

(c) Inspect the PCV 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 harmful.

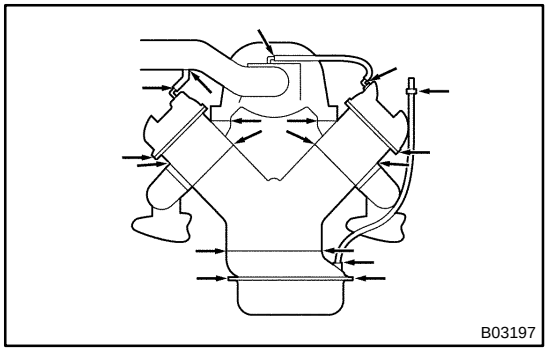


(2) Blow air into the intake manifold side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

(d) Remove the clean hose from the PCV valve.

(e) Reinstall the PCV valve.



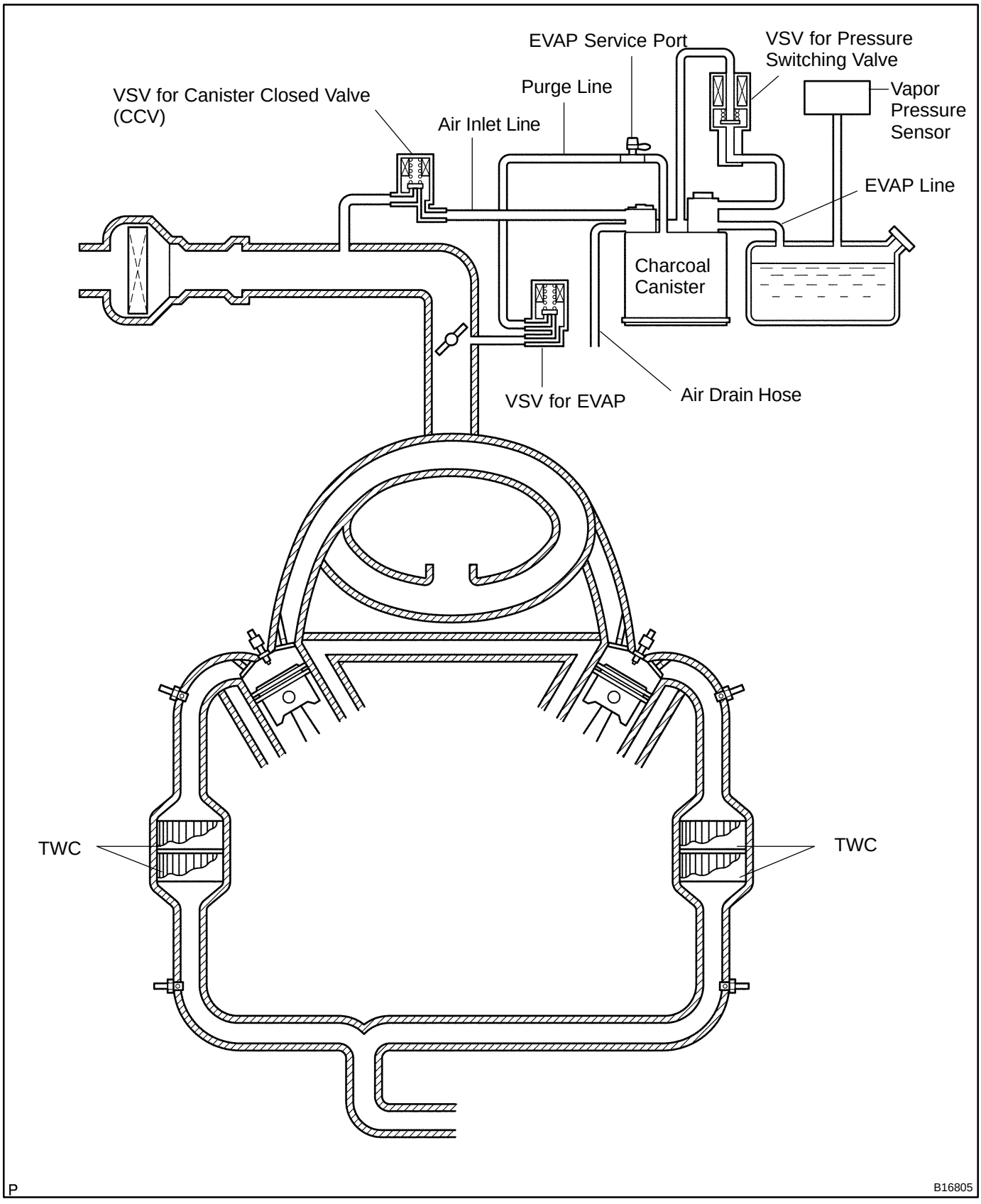
3. INSPECT HOSES, CONNECTIONS AND GASKETS

Visually for cracks, leaks or damage.

4. REINSTALL V-BANK COVER

EC07J-08

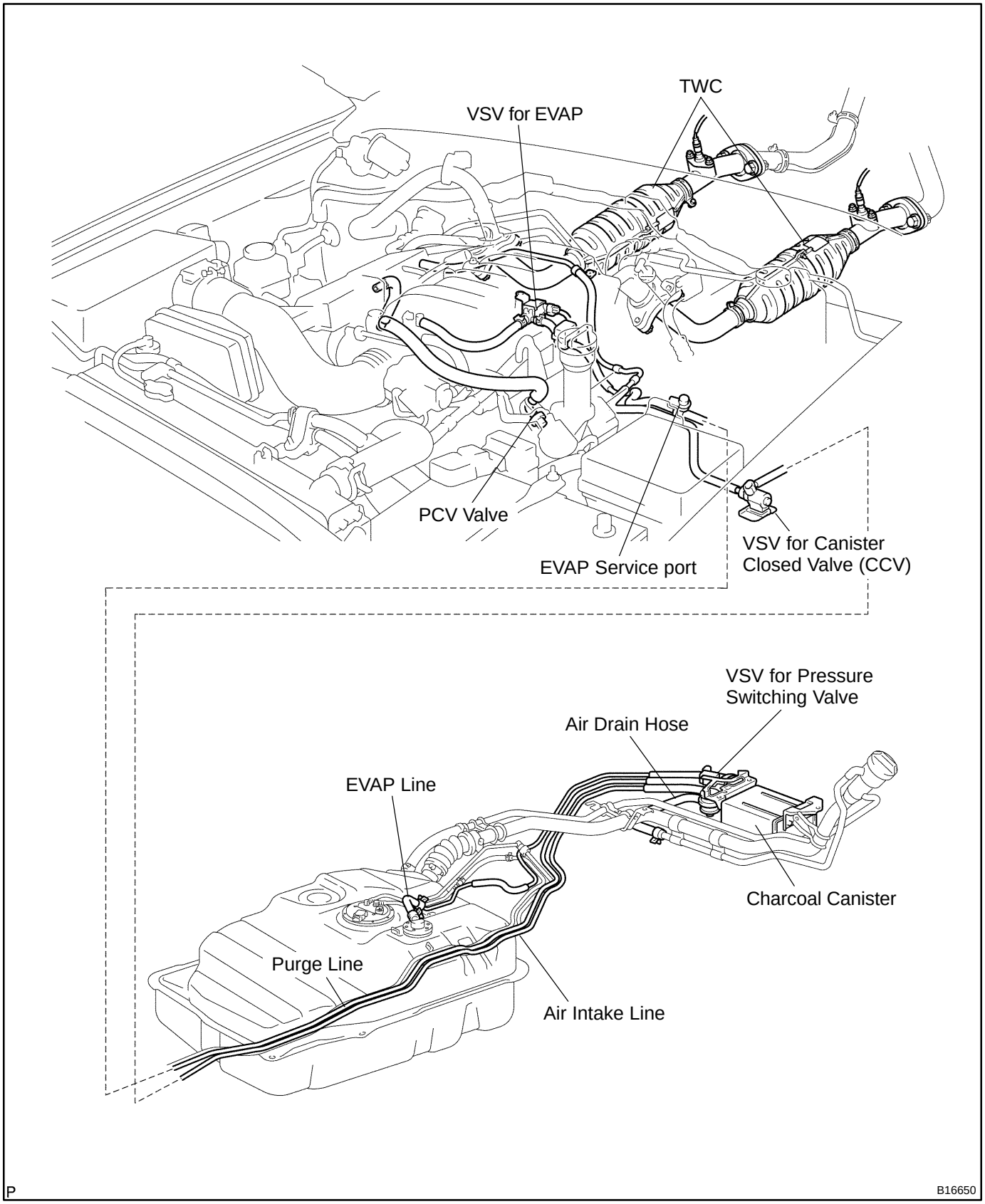
DRAWING



PARTS LAYOUT AND SCHEMATIC DRAWING

LOCATION

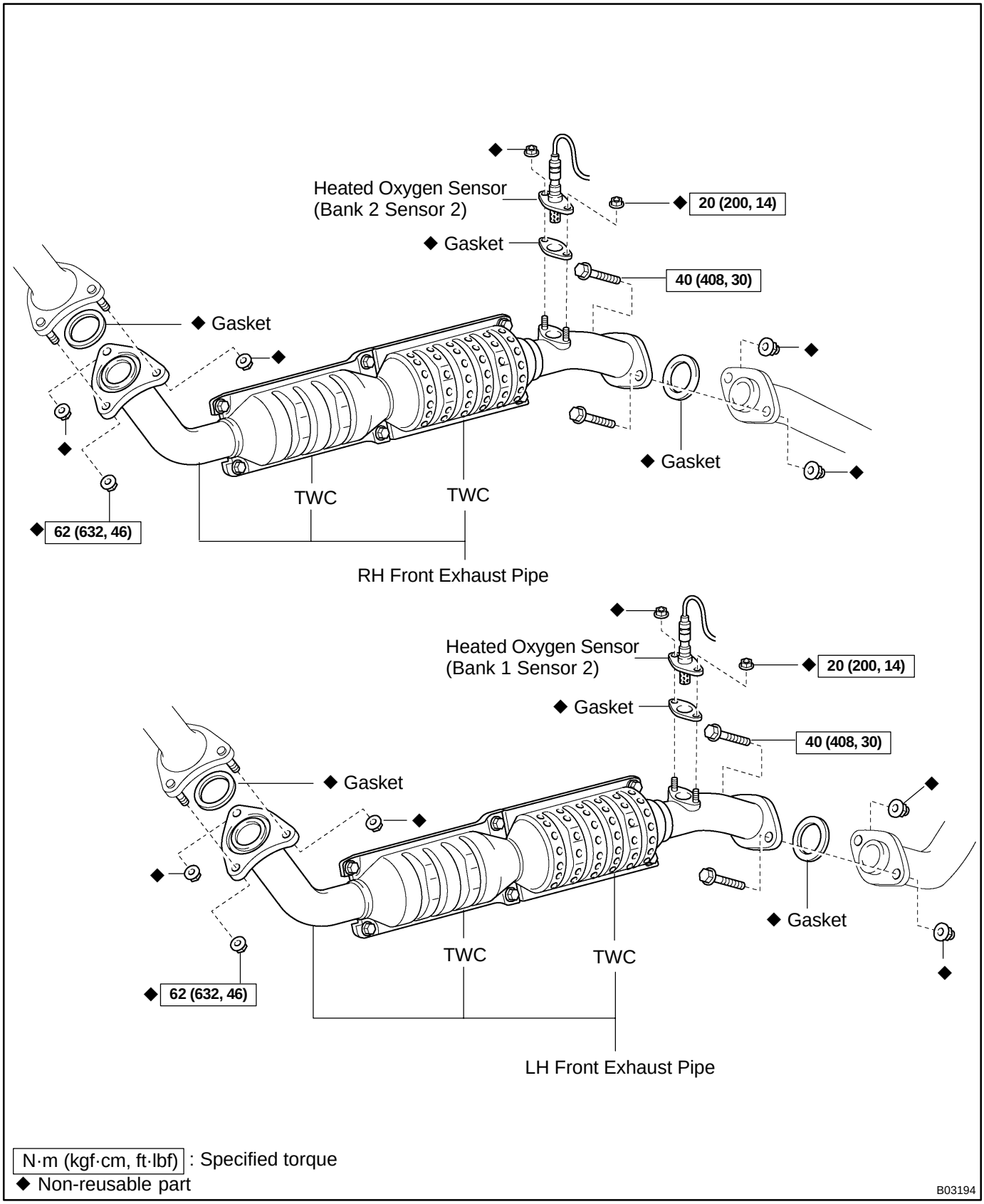
EC07I-09



THREE-WAY CATALYTIC CONVERTER (TWC) SYSTEM

COMPONENTS

EC07M-02



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

B03194

EC07N-01

INSPECTION

1. CHECK EXHAUST PIPE ASSEMBLY

(a) Check the connections for looseness or damage.

(b) Check the clamps for weakness, cracks or damage.

2. INSPECT TWC

Check for dents or damage.

If any part of protector is damaged or dented to the extent that it contacts the TWC, repair or replace it.

3. INSPECT HEAT INSULATOR

(a) Check the heat insulator for damage.

(b) Check for adequate clearance between the TWC and heat insulator.

CO/HC

EM0KQ-07

INSPECTION

HINT:

This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. INITIAL CONDITIONS

(a) The engine is at normal operating temperature.

(b) Air cleaner is installed.

(c) All pipes and hoses of the air induction system are connected.

(d) All accessories are switched OFF.

(e) All vacuum lines are properly connected.

HINT:

All vacuum hoses should be properly connected.

(f) SFI system wiring connectors are fully plugged.

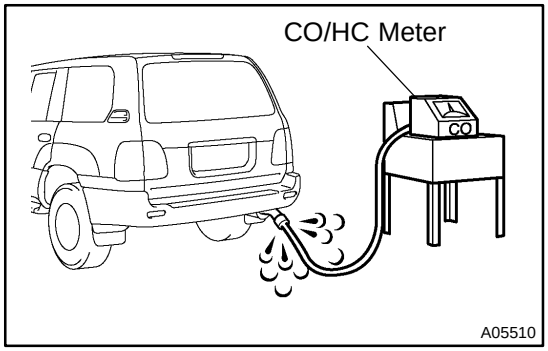
(g) Ignition timing is set correctly.

(h) Transmission is in neutral range.

(i) Tachometer and CO/HC meter are calibrated by hand.

2. START ENGINE

3. RACE ENGINE AT 2,500 RPM FOR APPROX. 180 SECONDS



4. INSERT CO/HC METER TESTING PROBE AT LEAST 40 cm (1.3 ft) INTO TAILPIPE DURING IDLING

5. IMMEDIATELY CHECK CO/HC CONCENTRATION AT IDLE AND/OR 2,500 RPM

HINT:

When performing the 2 mode (2,500 rpm and idle) test, follow the measurement order prescribed by the applicable local regulations.

6. TROUBLESHOOTING

HINT:

If the CO/HC concentration does not comply with the regulations, perform troubleshooting in the order given below.

See the table below for possible causes, and then inspect and correct the applicable causes if necessary.

CO	HC	Problems	Causes
Normal	High	Rough idle	1. Faulty ignitions: ★Incorrect timing ★Fouled, shorted or improperly gapped plugs 2. Incorrect valve clearance 3. Leaky intake and exhaust valves 4. Leaky cylinders
Low	High	Rough idle (fluctuating HC reading)	1. Vacuum leaks: ★PCV hoses ★Intake manifold ★Throttle body ★Brake booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2.Faulty SFI systems: ★Faulty pressure regulator ★Defective ECT sensor ★Faulty ECM ★Faulty injectors ★Faulty throttle position sensor ★Faulty MAF meter

COMPRESSION

EM0KR-09

INSPECTION

HINT:

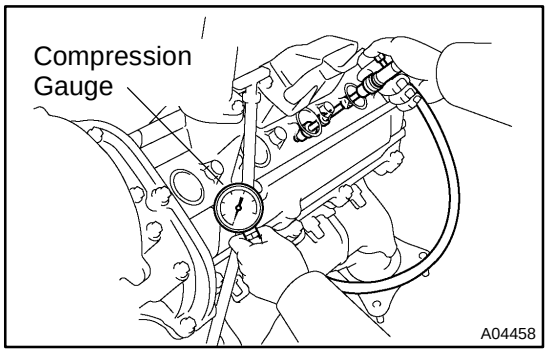
If there is a lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. WARM UP AND STOP ENGINE

Allow the engine to warm up to the normal operating temperature.

2. REMOVE SPARK PLUGS

(See page IG-1)



3. CHECK CYLINDER COMPRESSION PRESSURE

(a) Insert a compression gauge into the spark plug hole.

(b) Fully open the throttle.

(c) While cranking the engine, measure the compression pressure.

HINT:

Always use a fully charged battery to obtain the engine speed at 250 rpm or more.

(d) Repeat steps (a) to (c) for each cylinder.

NOTICE:

This measurement must be done as quickly as possible.

Compression pressure:
1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
Minimum pressure:
981 kPa (10.0 kgf/cm^2, 142 psi)
Difference between each cylinder:
98 kPa (1.0 kgf/cm^2, 14 psi) or less

(e) If the cylinder compression in one or more cylinders is lower than the specification, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) to (c) for the cylinders.

★ If adding oil helps the compression, chances are that the piston rings and/or cylinder bore are worn or damage.

★ If the pressure stays low, a valve may be sticking or the seating is improper, or there may be leakage past the gasket.

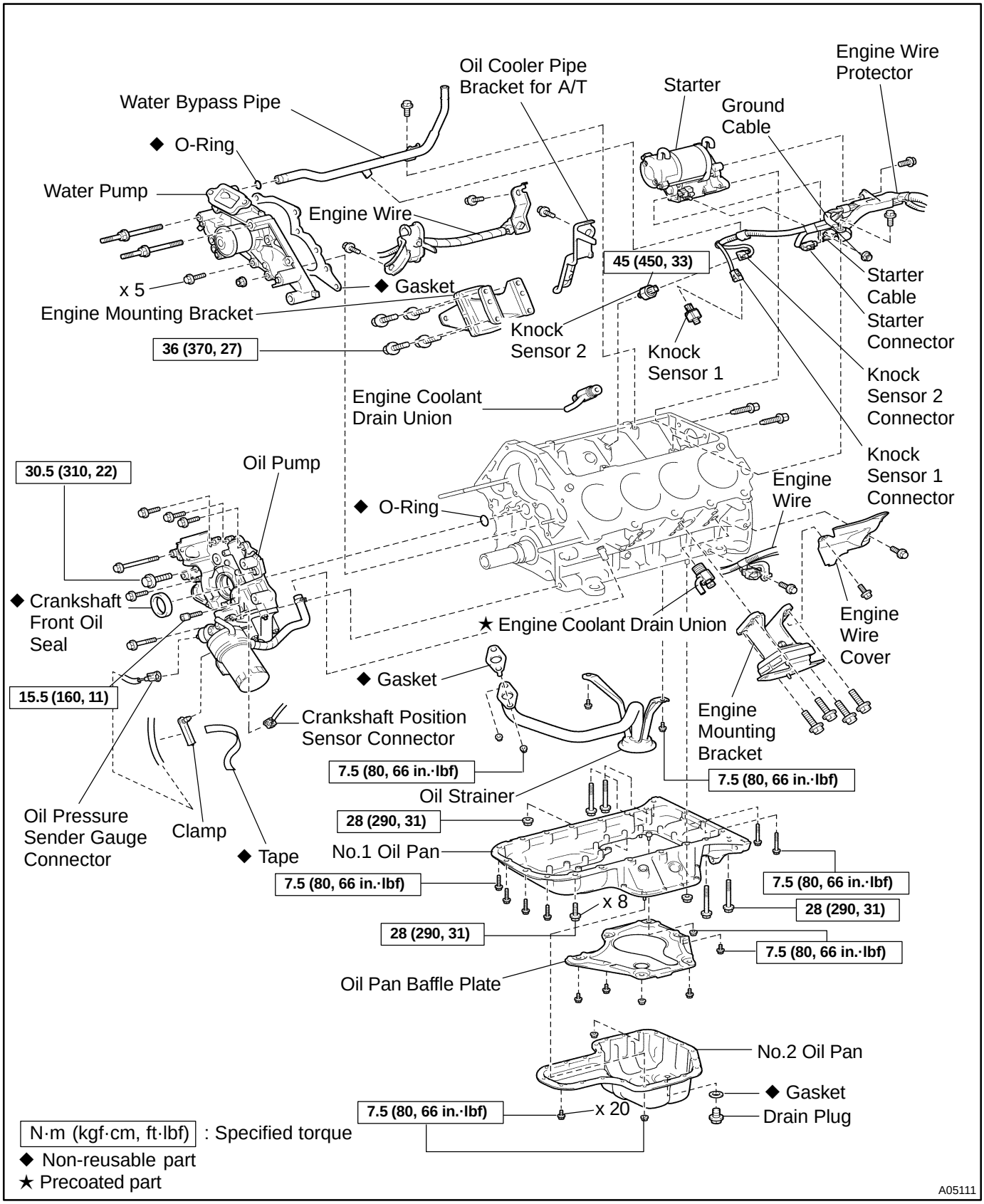
4. REINSTALL SPARK PLUGS

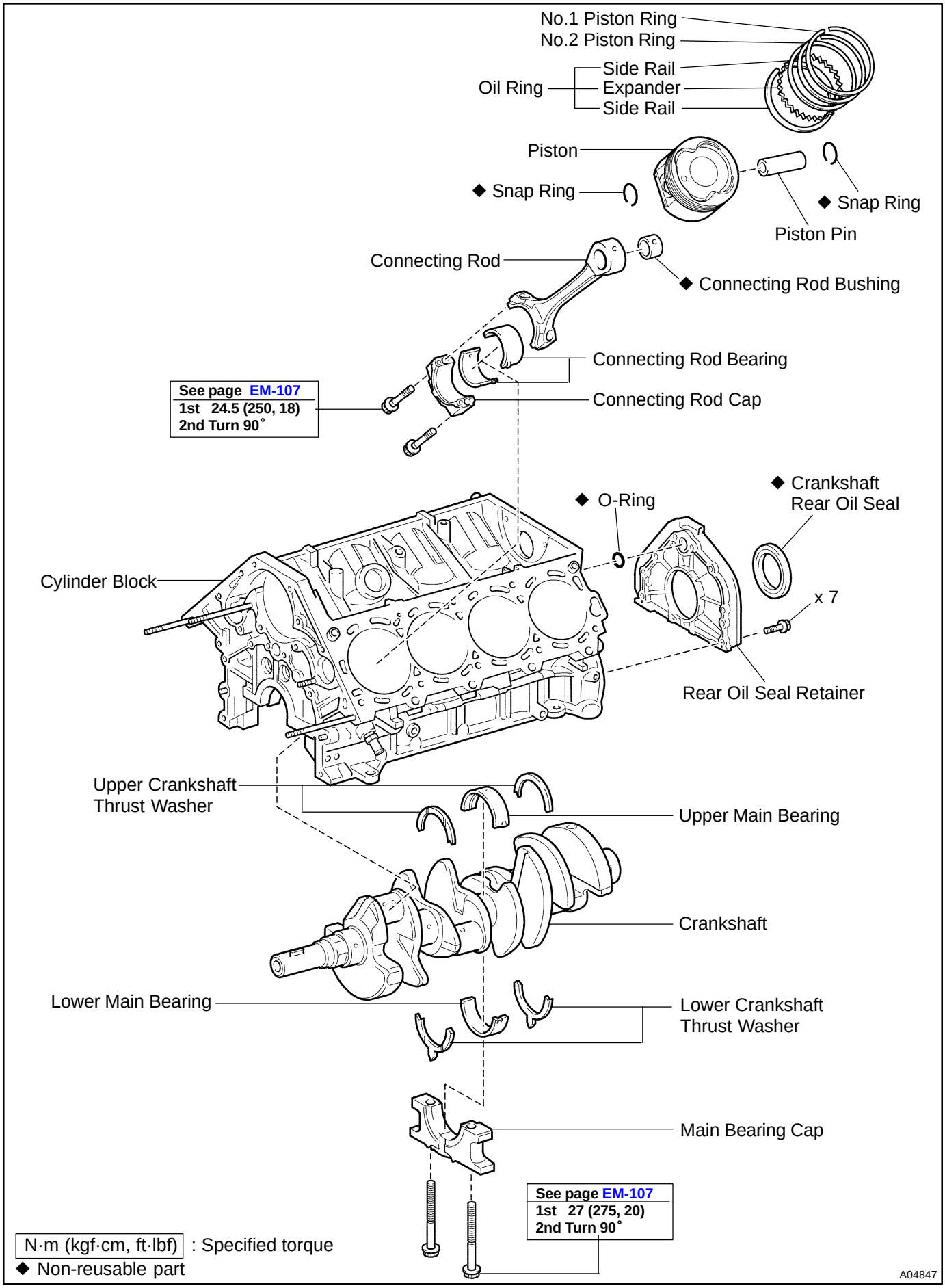
(See page IG-1)

CYLINDER BLOCK

COMPONENTS

EM0E9-15

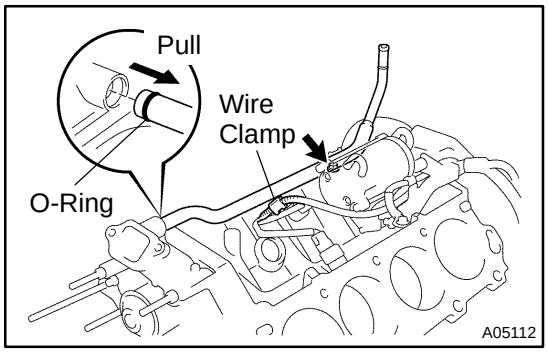



No.1 Piston Ring
No.2 Piston Ring
Oil Ring
Side Rail
Expander
Side Rail
Piston
◆ Snap Ring
◆ Snap Ring
Piston Pin
Connecting Rod
◆ Connecting Rod Bushing
Connecting Rod Bearing
See page EM-107
1st 24.5 (250, 18)
2nd Turn 90°
Connecting Rod Cap
◆ Crankshaft
Rear Oil Seal
◆ O-Ring
Cylinder Block
x 7
Rear Oil Seal Retainer
Upper Crankshaft
Thrust Washer
Upper Main Bearing
Crankshaft
Lower Main Bearing
Lower Crankshaft
Thrust Washer
Main Bearing Cap
See page EM-107
1st 27 (275, 20)
2nd Turn 90°
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
A04847

EM0L6-03

DISASSEMBLY

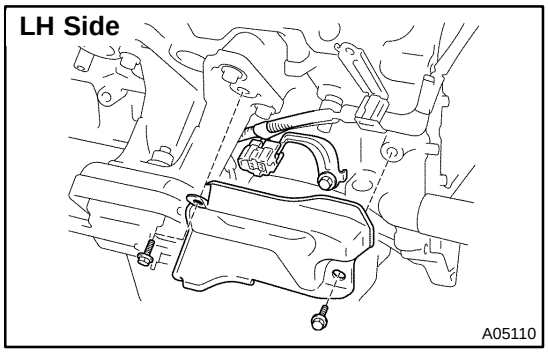
1. INSTALL ENGINE TO ENGINE STAND
2. REMOVE TIMING BELT AND PULLEYS (See page EM-15)
3. REMOVE CYLINDER HEAD (See page EM-35)



4. REMOVE WATER BYPASS PIPE

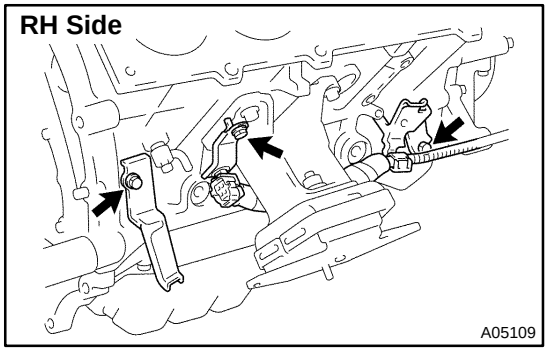
(a) Disconnect the wire clamp (for knock sensor 1, 2) from the bracket of the water bypass pipe.
(b) Remove the bolt.
(c) Pull out the water bypass pipe from the water pump.
(d) Remove the O-ring from the water bypass pipe.

5. REMOVE STARTER (See page ST-5)
6. REMOVE KNOCK SENSORS (See page SF-55)



7. DISCONNECT ENGINE WIRE FROM LH SIDE OF CYLINDER BLOCK

(a) Remove the 2 bolts and the engine wire cover from the LH side of the cylinder block.
(b) Remove the bolt, disconnect the bracket on the engine wire from the cylinder block.



8. DISCONNECT ENGINE WIRE FROM RH SIDE OF CYLINDER BLOCK

Remove the 2 bolts, and disconnect the 2 brackets on the engine wire from the cylinder block.

9. REMOVE OIL COOLER PIPE BRACKET FOR A/T

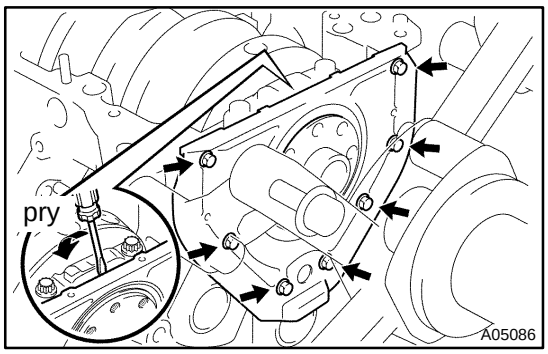
Remove the bolt and bracket.

10. REMOVE ENGINE MOUNTING BRACKETS

Remove the 4 bolts and the mounting bracket. Remove the 2 mounting brackets

11. REMOVE WATER PUMP (See page CO-6)
12. REMOVE NO.2 OIL PAN (See page LU-8)
13. REMOVE OIL PAN BAFFLE PLATE
14. REMOVE NO.1 OIL PAN (See page LU-8)
15. REMOVE OIL STRAINER
16. REMOVE OIL PUMP (See page LU-8)
17. REMOVE ENGINE COOLANT DRAIN UNIONS

Remove the 2 drain unions.

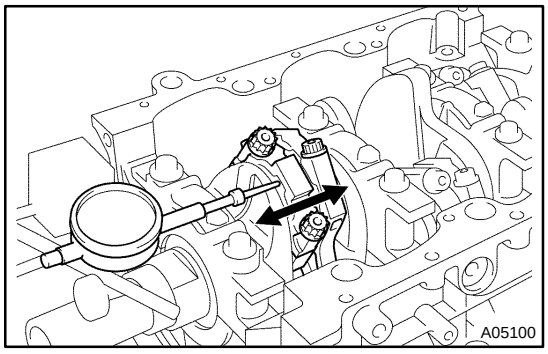


18. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 7 bolts.

(b) Using a screwdriver, ply off the oil seal retainer and the main bearing cap with a screwdriver.

(c) Remove the O-ring.



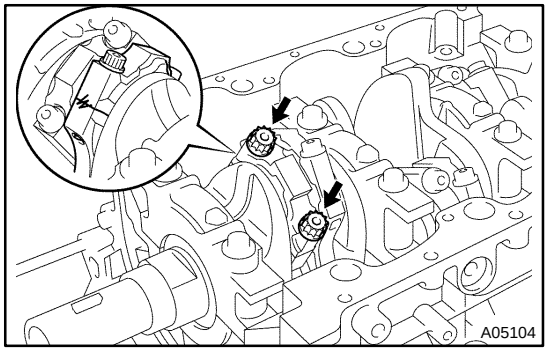
19. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back an a forth.

Standard thrust clearance:
0.160 - 0.290 mm (0.0063 - 0.0138 in.)
Maximum thrust clearance: 0.35 mm (0.0138 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

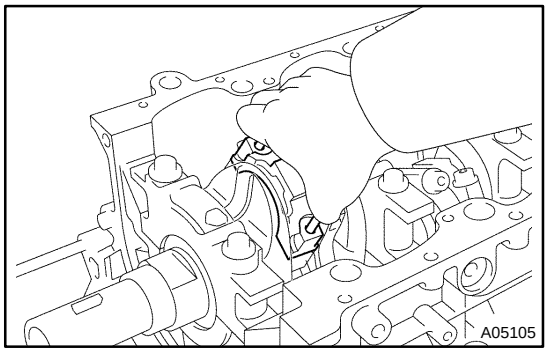
Connecting rod thickness:
22.880 - 22.920 mm (0.9008 - 0.9024 in.)



20. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap to ensure correct reassembly.

(b) Remove the 2 connecting rod cap bolts.



(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and the lower bearing by wiggling the connecting rod cap right and left.

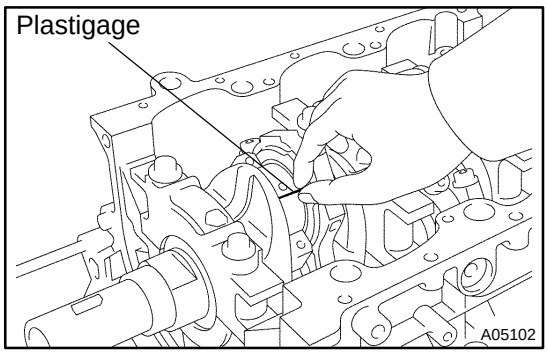
HINT:

Keep the lower bearing inserted with the connecting rod cap.

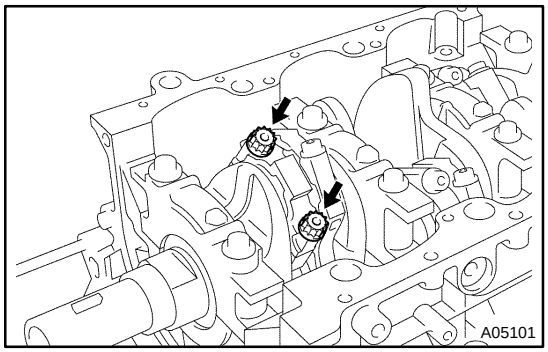
(d) Clean the crank pin and the bearing.

(e) Check the crank pin and the bearing for pitting and scratches.

If the crank pin or the bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



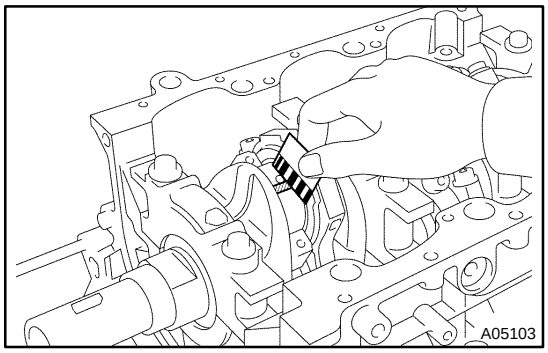
(f) Lay a strip of plastigage across the crank pin.



(g) Install the connecting rod cap with the 2 bolts.
(See page EM-107)

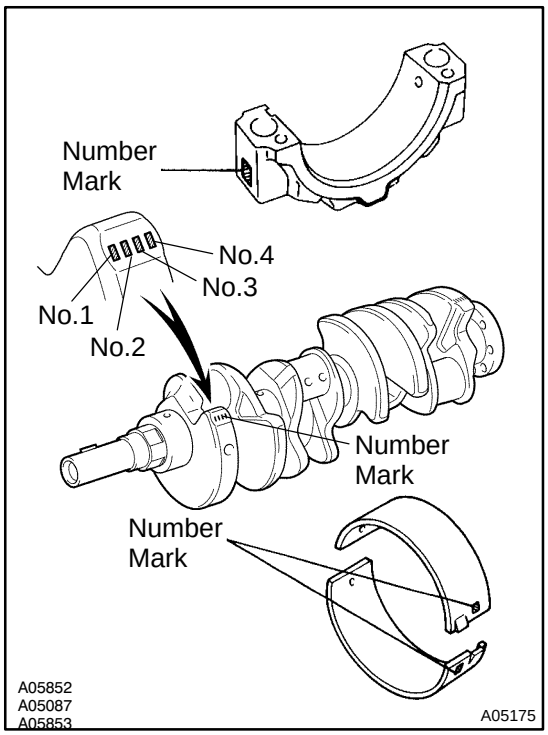
NOTICE:
Do not turn the crankshaft.

(h) Remove the 2 bolts, the connecting rod cap and the lower bearing. (See procedure (b) and (c) above)



(i) Measure the plastigage at its widest point.
Standard oil clearance:
0.027 - 0.053 mm (0.0011 - 0.0021 in.)
Maximum oil clearance: 0.065 mm (0.0026 in.)

If the oil clearance is greater than the maximum, replace the bearings. If necessary, replace the crankshaft.



HINT:
If using a standard bearing, replace it with the one having the same number. If the number of the bearing cannot be determined, sum up the numbers imprinted on the connecting rod cap and the crankshaft, then select the one with the same number as the total. There are 6 sizes of standard bearings, marked ”2”, ”3”, ”4”, ”5”, ”6” and ”7”.

	Number mark											
Connecting rod cap	1	1	2	1	2	3	2	3	4	3	4	4
Crankshaft	1	2	1	3	2	1	3	2	1	3	2	3
Use bearing	2	3		4			5			6		7

EXAMPLE:
Connecting rod cap ”3” + Crankshaft ”1”
= Total number 4 (Use bearing ”4”)

Reference

Connecting rod big end inside diameter:

Mark "1"	55.000 - 55.006 mm (2.1654 - 2.1656 in.)
Mark "2"	55.006 - 55.012 mm (2.1656 - 2.1658 in.)
Mark "3"	55.012 - 55.018 mm (2.1658 - 2.1661 in.)
Mark "4"	55.018 - 55.024 mm (2.1661 - 2.1663 in.)

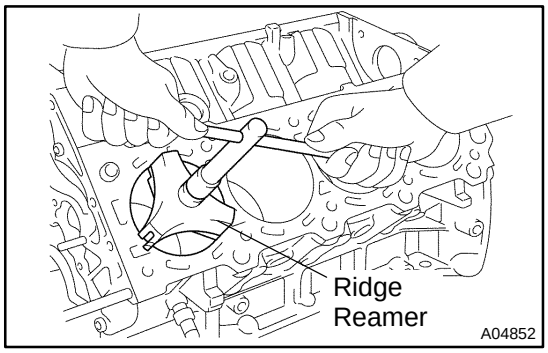
Crankshaft crank pin diameter:

Mark "1"	51.994 - 52.000 mm (2.0470 - 2.0472 in.)
Mark "2"	51.988 - 51.994 mm (2.0468 - 2.0470 in.)
Mark "3"	51.982 - 51.988 mm (2.0465 - 2.0468 in.)

Standard sized bearing center wall thickness:

Mark "2"	1.484 - 1.487 mm (0.0584 - 0.0585 in.)
Mark "3"	1.487 - 1.490 mm (0.0585 - 0.0587 in.)
Mark "4"	1.490 - 1.493 mm (0.0587 - 0.0588 in.)
Mark "5"	1.493 - 1.496 mm (0.0588 - 0.0589 in.)
Mark "6"	1.496 - 1.499 mm (0.0589 - 0.0590 in.)
Mark "7"	1.499 - 1.502 mm (0.0590 - 0.0591 in.)

(j) Completely remove the plastigage.



21. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

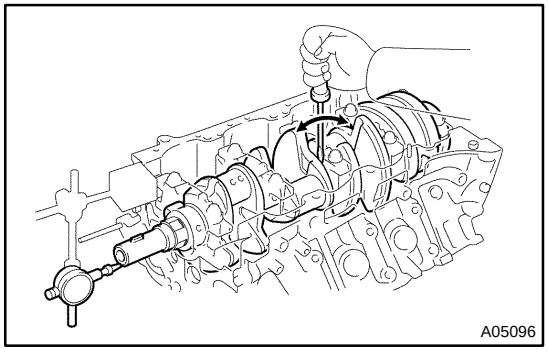
(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod assembly and upper bearing through the top of the cylinder block.

HINT:

★ Keep the bearings, the connecting rod and the cap together.

★ Arrange the piston and connecting rod assemblies in correct order.



22. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:

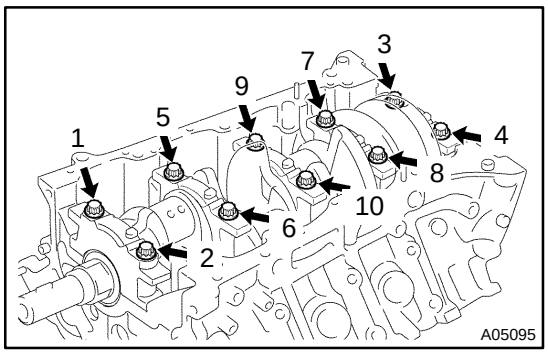
0.020 - 0.220 mm (0.0008 - 0.0087 in.)

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.

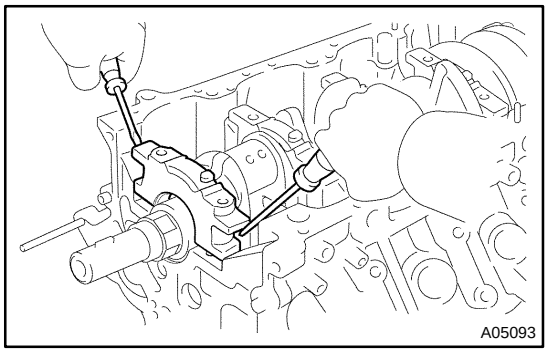
Thrust washer thickness:

2.440 - 2.490 mm (0.0961 - 0.0980 in.)



23. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

(a) Evenly loosen and remove the 10 main bearing cap bolts a little at time for several times, in the sequence shown.



(b) Using 2 screwdrivers, pry out the main bearing cap, and remove the 5 main bearing caps, the 5 lower bearings and the 2 lower thrust washers (No.3 main bearing cap only).

NOTICE:

Be careful not to damage the cylinder block.

HINT:

★ Keep the lower bearing and the main bearing cap together.

★ Arrange the main bearing caps and lower thrust washers in correct order.

(c) Lift out the crankshaft.

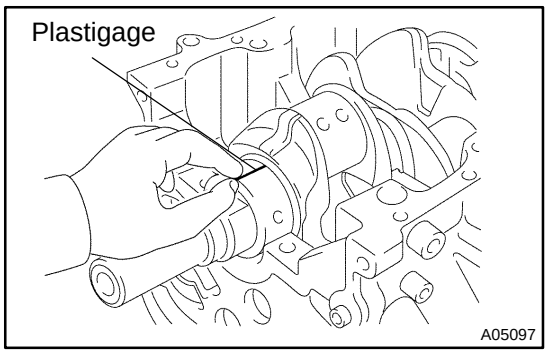
HINT:

Keep the upper bearings and the upper thrust washers together with the cylinder block.

(d) Clean each main journal and bearing.

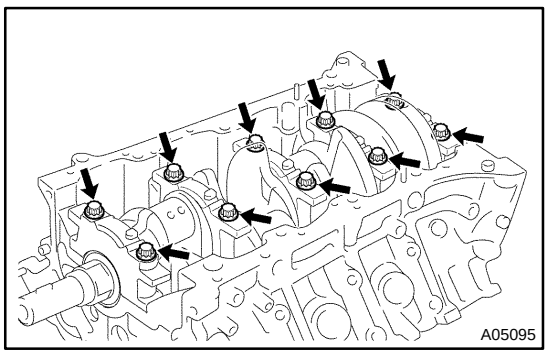
(e) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(f) Place the crankshaft on the cylinder block.

(g) Lay a strip of plastigage across each journal.

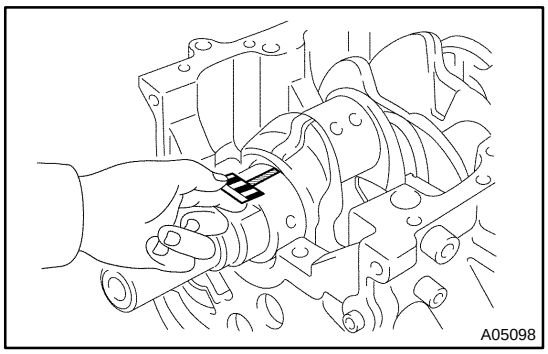


(h) Install the main bearing caps.
(See page EM-107)

NOTICE:

Do not turn the crankshaft.

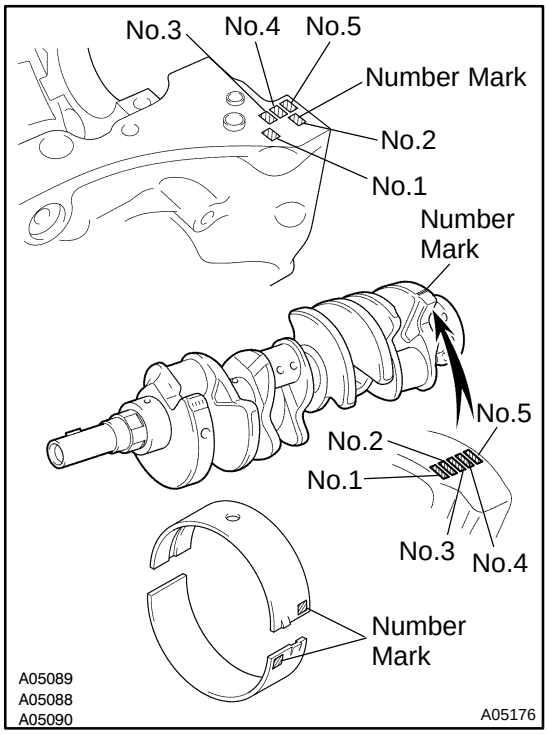
(i) Remove the main bearing caps.
(See procedure (a) and (b) above)



(j) Measure the plastigage at its widest point.

Standard clearance:
0.040 - 0.058 mm (0.0016 - 0.0023 in.)
Maximum clearance: 0.070 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the bearings. If necessary, replace the crankshaft.



HINT:
If using a standard bearing, replace it with the one having the same number. If the number of the bearing cannot be determined, sum up the numbers imprinted on the cylinder block and the crankshaft, then refer to the table below for the appropriate bearing number. There are 5 sizes of the standard bearings. For No.1 and No.5 position bearings, use bearings marked ”3”, ”4”, ”5”, ”6” and ”7”. For others position bearings, use bearings marked ”1”, ”2”, ”3”, ”4” and ”5”.

No.1, No.5:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 - 5	3
	6 - 11	4
	12 - 17	5
	18 - 23	6
	24 - 28	7

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”5”)

Others:

		Use bearing
Cylinder block (A) + Crankshaft (B)	0 - 5	1
	6 - 11	2
	12 - 17	3
	18 - 23	4
	24 - 28	5

EXAMPLE:
Cylinder block ”08” + Crankshaft ”06”
= Total number 14 (Use bearing ”3”)

Reference
Cylinder block main journal bore diameter (A):

Mark ”00”	72.000 mm (2.8346 in.)
Mark ”01”	72.001 mm (2.8347 in.)
Mark ”02”	72.002 mm (2.8347 in.)
Mark ”03”	72.003 mm (2.8348 in.)
Mark ”04”	72.004 mm (2.8348 in.)
Mark ”05”	72.005 mm (2.8348 in.)
Mark ”06”	72.006 mm (2.8349 in.)
Mark ”07”	72.007 mm (2.8349 in.)

Mark ”08”	72.008 mm (2.8350 in.)
Mark ”09”	72.009 mm (2.8350 in.)
Mark ”10”	72.010 mm (2.8350 in.)
Mark ”11”	72.011 mm (2.8351 in.)
Mark ”12”	72.012 mm (2.8351 in.)
Mark ”13”	72.013 mm (2.8352 in.)
Mark ”14”	72.014 mm (2.8352 in.)
Mark ”15”	72.015 mm (2.8352 in.)
Mark ”16”	72.016 mm (2.8353 in.)

Crankshaft main journal diameter (B):

Mark ”00”	67.000 mm (2.6378 in.)
Mark ”01”	66.999 mm (2.6378 in.)
Mark ”02”	66.998 mm (2.6377 in.)
Mark ”03”	66.997 mm (2.6377 in.)
Mark ”04”	66.996 mm (2.6376 in.)
Mark ”05”	66.995 mm (2.6376 in.)
Mark ”06”	66.994 mm (2.6376 in.)
Mark ”07”	66.993 mm (2.6375 in.)
Mark ”08”	66.992 mm (2.6375 in.)
Mark ”09”	66.991 mm (2.6374 in.)
Mark ”10”	66.990 mm (2.6374 in.)
Mark ”11”	66.989 mm (2.6374 in.)
Mark ”12”	66.988 mm (2.6373 in.)

Standard bearing center wall thickness:
No.1 and No.5

Mark ”3”	2.481 - 2.484 mm (0.0977 - 0.0978 in.)
Mark ”4”	2.484 - 2.487 mm (0.0978 - 0.0979 in.)
Mark ”5”	2.487 - 2.490 mm (0.0979 - 0.0980 in.)
Mark ”6”	2.490 - 2.493 mm (0.0980 - 0.0981 in.)
Mark ”7”	2.493 - 2.496 mm (0.0981 - 0.0983 in.)

Others:

Mark ”1”	2.481 - 2.484 mm (0.0977 - 0.0978 in.)
Mark ”2”	2.484 - 2.487 mm (0.0978 - 0.0979 in.)
Mark ”3”	2.487 - 2.490 mm (0.0979 - 0.0980 in.)
Mark ”4”	2.490 - 2.493 mm (0.0980 - 0.0981 in.)
Mark ”5”	2.493 - 2.496 mm (0.0981 - 0.0983 in.)

(k) Completely remove the plastigage.

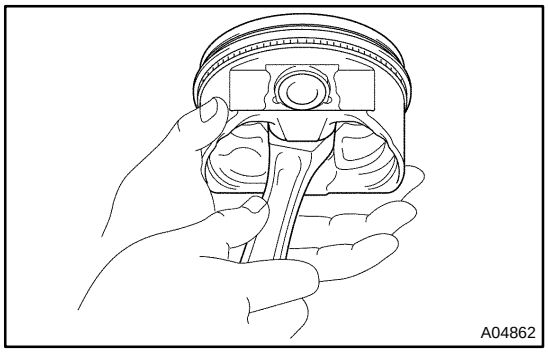
24. REMOVE CRANKSHAFT

(a) Lift up the crankshaft.

(b) Remove the 5 upper main bearings and the 2 upper thrust washers from the cylinder block.

HINT:

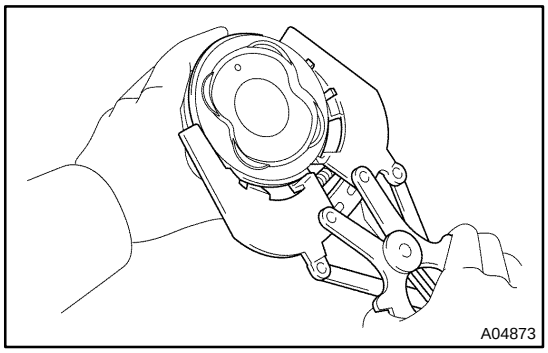
Arrange the main bearing caps, bearings and thrust washers in correct order for installation.



25. CHECK FIT BETWEEN PISTON AND PISTON PIN

Try to move the piston back and forth on the piston pin.

If any movement is felt, replace the piston and pin as a set.



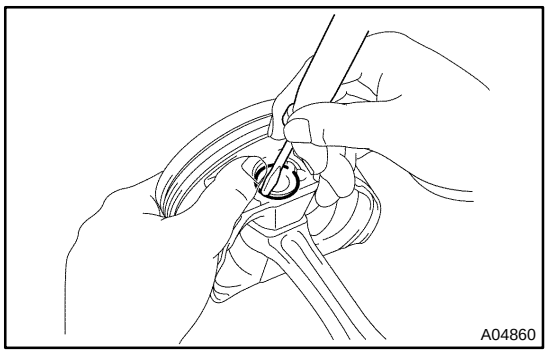
26. REMOVE PISTON RINGS

(a) Using a piston ring expander, remove the 2 compression rings.

(b) Remove the 2 side rails and the oil ring by hand.

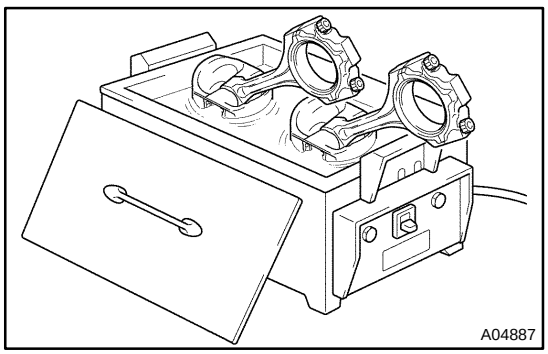
HINT:

Arrange the piston rings in correct order for installation.

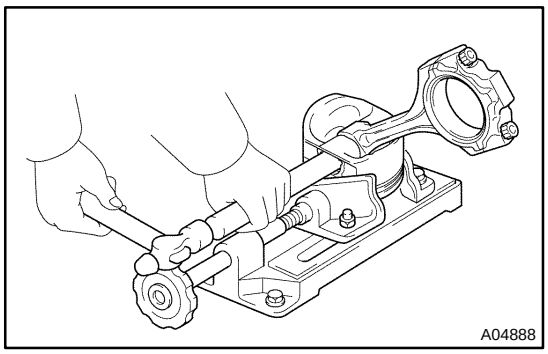


27. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60˚C (140˚F).



(c) Using a plastic-faced hammer and a brass bar, lightly tap out the piston pin and the pin and remove the connecting rod.

HINT:

★ The piston and the pin are the set.

★ Arrange the pistons, the pins, the rings, the connecting rods and the bearings in correct order for installation.

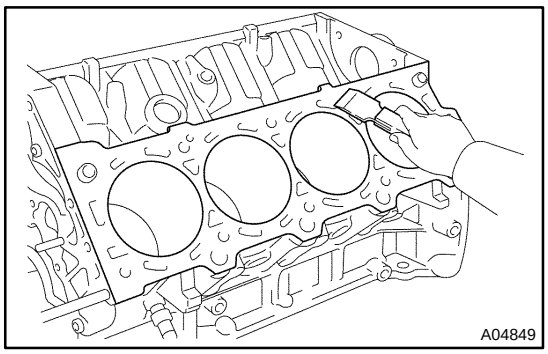
EM0EB-13

INSPECTION

1. CLEAN CYLINDER BLOCK

(a) Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

(b) Using a soft brush and solvent, thoroughly clean the cylinder block.



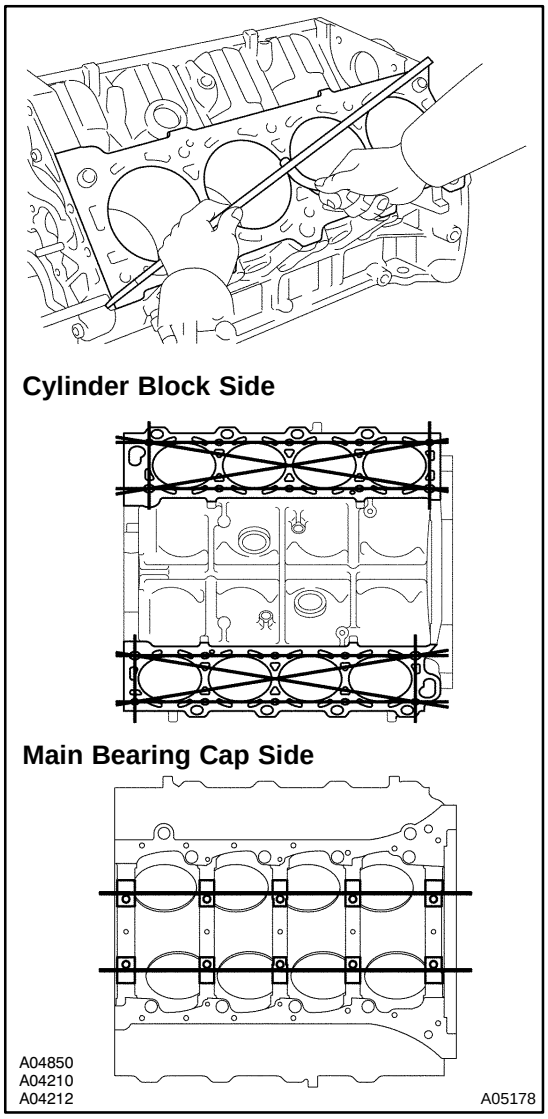
2. INSPECT CYLINDER BLOCK

(a) Inspect for flatness.

Using a precision straight edge and a feeler gauge, measure the surfaces contacting the cylinder head and main bearing cap for a warp.

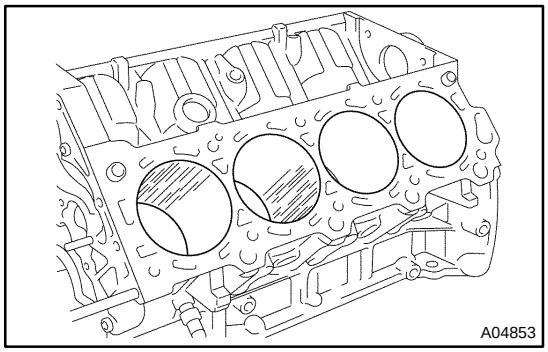
Maximum warpage: 0.07 mm (0.0028 in.)

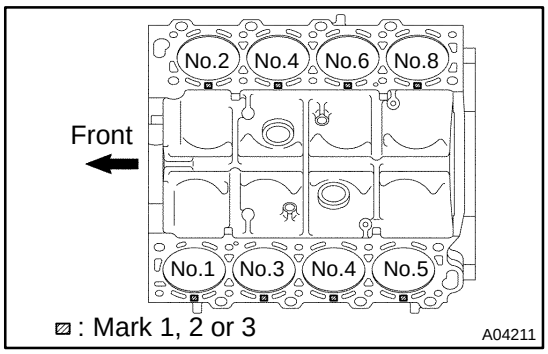
If the warp is greater than the maximum, replace the cylinder block.



(b) Visually check the cylinder for vertical scratches.

If deep scratches are found, rebore all the 8 cylinders and replace all the 8 pistons (See page EM-104). If necessary, replace the cylinder block.

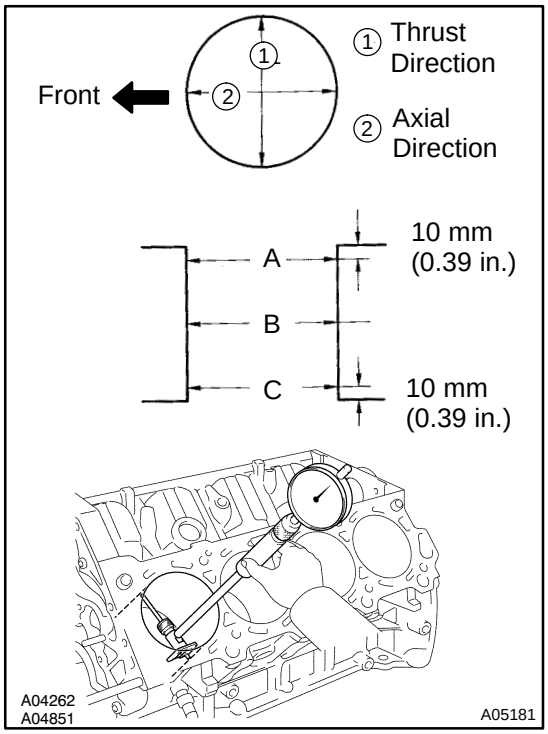




(c) Inspect the cylinder bore diameter.

HINT:

There are 3 sizes of the standard cylinder bore diameter, marked "1", "2" and "3" accordingly. The mark is stamped on the top of the cylinder block.



Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

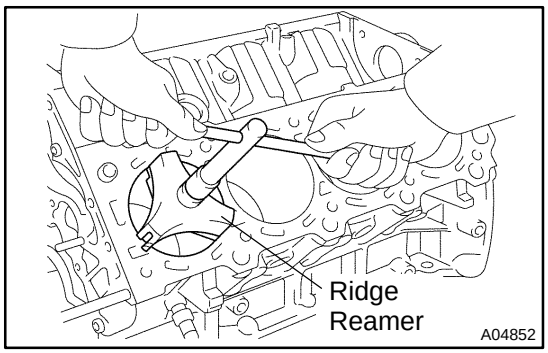
Standard diameter:

STD	Mark "1"	94.002 - 94.010 mm (3.7009 - 3.7012 in.)
	Mark "2"	94.010 - 94.023 mm (3.7012 - 3.7017 in.)
	Mark "3"	94.023 - 94.031 mm (3.7017 - 3.7020 in.)

Maximum diameter: 94.23 mm (3.7098 in.)

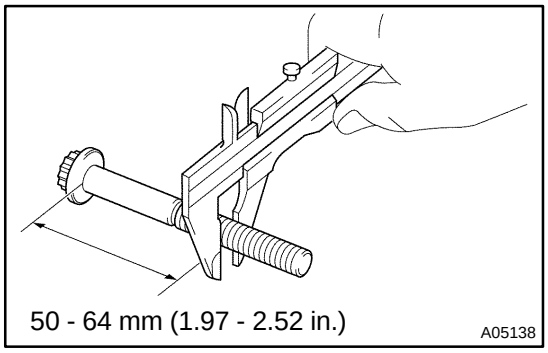
STD	94.231 mm (3.7099 in.)
O/S 0.50	94.731 mm (3.7296 in.)

If the diameter is greater than the maximum, rebore all the 8 cylinders and replace all the 8 pistons (See page EM-104). If necessary, replace the cylinder block.



(d) Remove the cylinder ridge.

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.



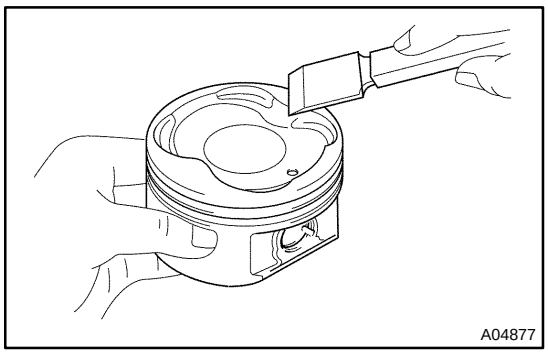
(e) Using vernier calipers, measure the thread outside diameter of the main bearing cap bolt.

Standard diameter:

10.760 - 10.970 mm (0.4236 - 0.4319 in.)

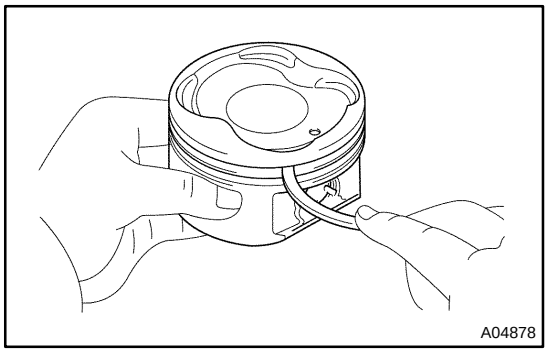
Minimum diameter: 10.40 mm (0.4094 in.)

If the diameter is less than the minimum, replace the cap bolt.

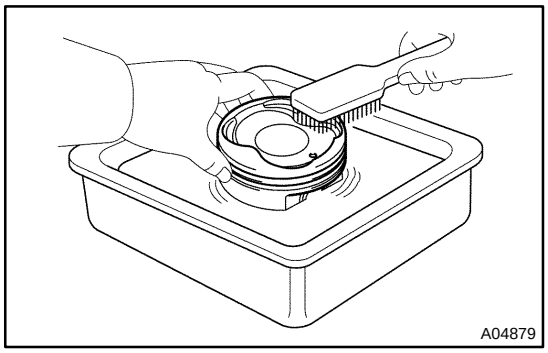


3. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



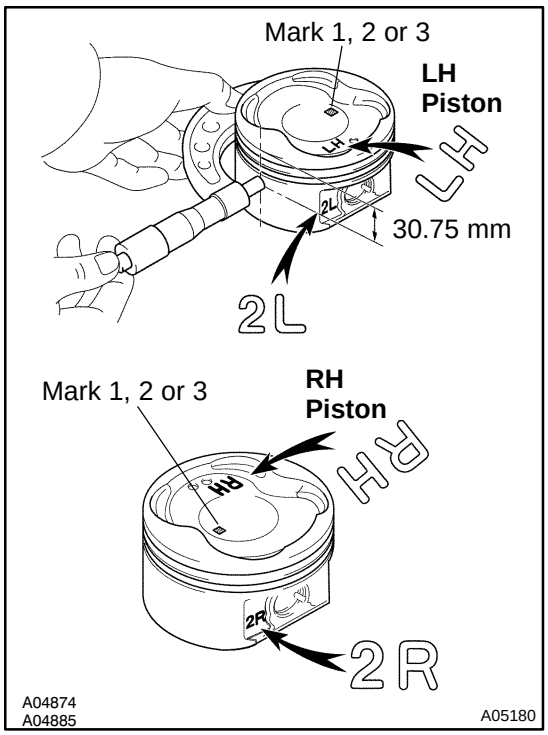
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



4. INSPECT PISTON AND CONNECTING ROD

(a) Inspect the piston oil clearance.

HINT:

There are 3 sizes of the standard piston diameter, marked ”1”, ”2” and ”3” accordingly. The mark is stamped on the piston top.

(1) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

Piston diameter:

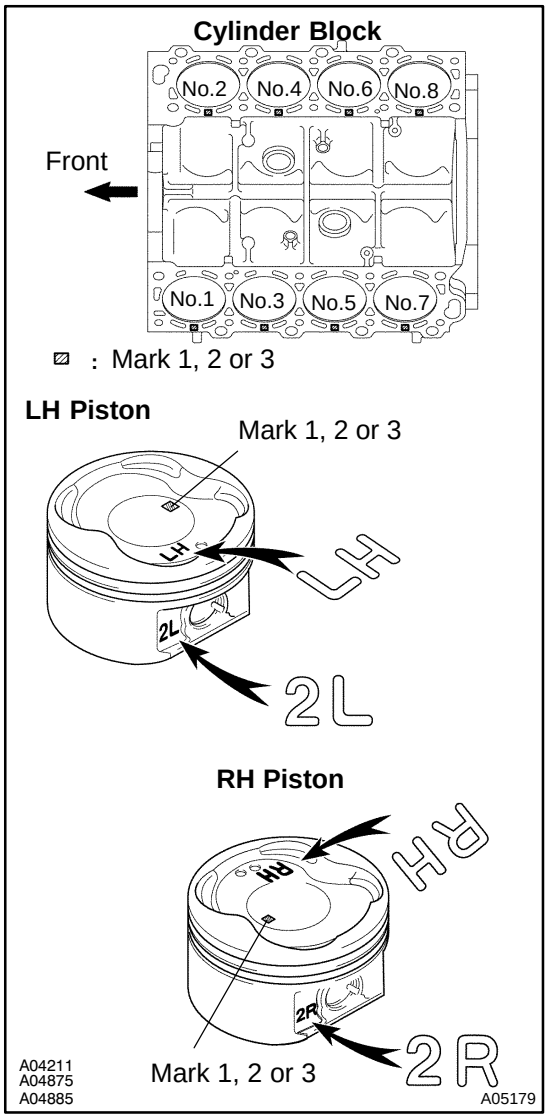
STD	Mark ”1”	93.902 - 93.912 mm (3.6969 - 3.6973 in.)
	Mark ”2”	93.912 - 93.920 mm (3.6973 - 3.6976 in.)
	Mark ”3”	93.920 - 93.930 mm (3.6976 - 3.6980 in.)
O/S 0.50		94.402 - 94.430 mm (3.7166 - 3.7177 in.)

(2) Measure the cylinder bore diameter in the thrust directions. (See step 2 above)

(3) Subtract the piston diameter from the cylinder bore diameter.

Standard oil clearance:
0.090 - 0.111 mm (0.0035 - 0.0044 in.)
Maximum oil clearance: 0.13 mm (0.0051 in.)

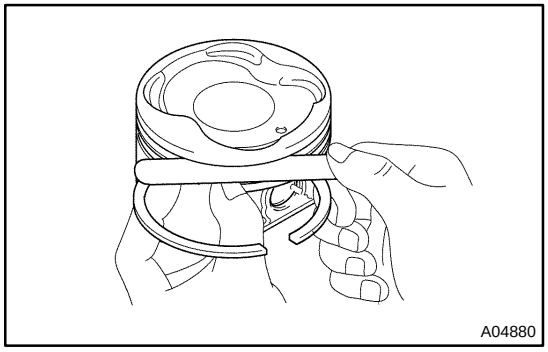
If the oil clearance is greater than the maximum, replace all the 8 pistons and rebore all the 8 cylinders. (See page EM-104) If necessary, replace the cylinder block.



HINT

Use new cylinder block:

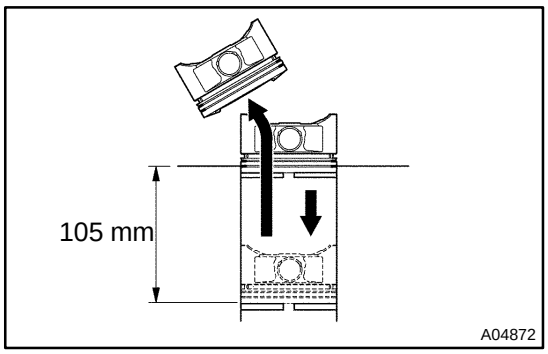
- ★ Use a piston with the same number mark as the cylinder diameter marked on the cylinder block.
- ★ The shape of the piston varies for the LH and the RH banks. The LH piston is marked as ”LH” and ”2L”, and the RH piston as ”RH” and ”2R”.



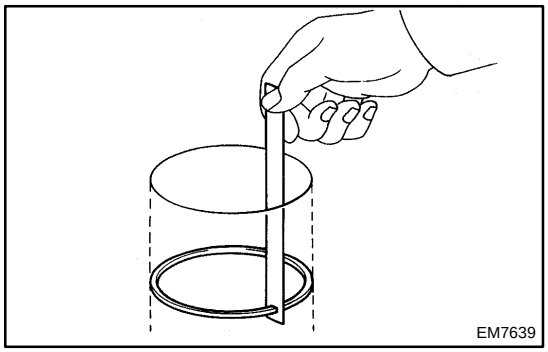
(b) Inspect the piston ring groove clearance.
Using a feeler gauge, measure the clearance between new piston ring and the wall of the ring groove.
Ring groove clearance:

No.1	0.030 - 0.080 mm (0.0012 - 0.0031 in.)
No.2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)

If the clearance is not as specified, replace the piston.



(c) Inspect the piston ring end gap.
(1) Insert the piston ring into the cylinder bore.
(2) Using a piston, push the piston ring to a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



(3) Using a feeler gauge, measure the end gap.

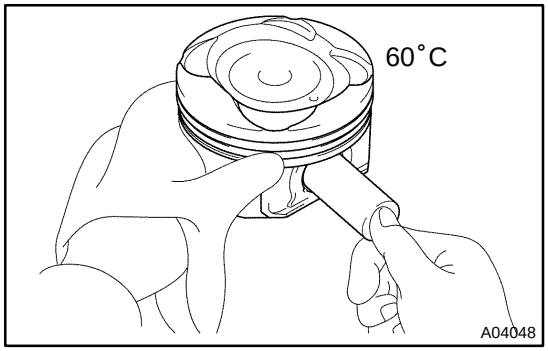
Standard end gap:

No.1	0.300 - 0.500 mm (0.0118 - 0.0197 in.)
No.2	0.400 - 0.650 mm (0.0157 - 0.0256 in.)
Oil (Side rail)	0.130 - 0.480 mm (0.0051 - 0.0189 in.)

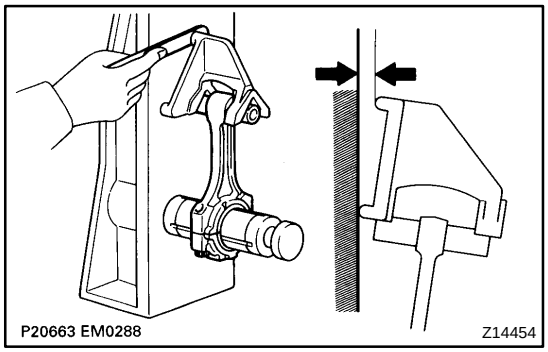
Maximum end gap:

No.1	1.10 mm (0.0433 in.)
No.2	1.20 mm (0.0472 in.)
Oil (Side rail)	1.15 mm (0.0453 in.)

If the end gap is greater than the maximum, replace the piston ring. If the end gap is greater than the maximum, even with a new piston ring, rebore all the 8 cylinders (See page EM-104) or replace the cylinder block.



(d) Inspect the piston pin fit.
At 60˚C (140˚F), you should be able to push the piston pin into the piston pin hole with your thumb.

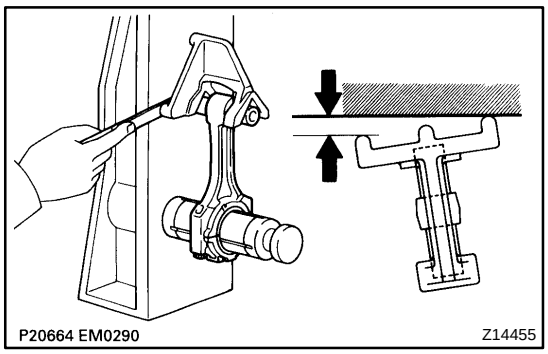


(e) Using a rod aligner and the feeler gauge, check the connecting rod alignment.
(1) Check for bend.

Maximum bend:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

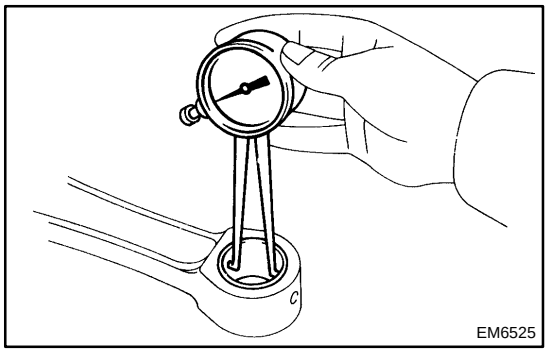


(2) Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than the maximum, replace the connecting rod assembly.

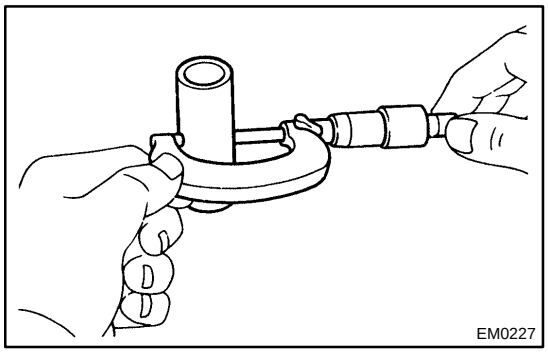


(f) Inspect the piston pin oil clearance.

(1) Using a caliper gauge, measure the inside diameter of the connecting rod bushing.

Bushing inside diameter:

22.005 - 22.014 mm (0.8663 - 0.8667 in.)



(2) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

21.997 - 22.009 mm (0.8660 - 0.8664 in.)

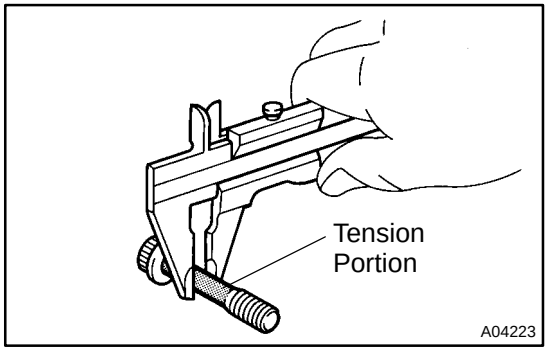
(3) Subtract the piston pin diameter from the bushing inside diameter.

Standard oil clearance:

0.005 - 0.011 mm (0.0002 - 0.0004 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)

If the oil clearance is greater than the maximum, replace the bushing. If necessary, replace the piston and the piston pin as a set.



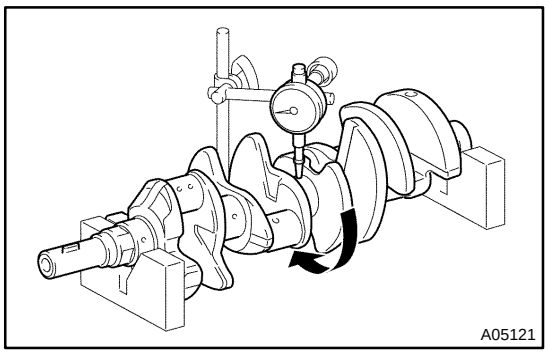
(g) Using vernier calipers, measure the tension portion of the connecting rod bolt.

Standard diameter:

7.200 - 7.300 mm (0.2835 - 0.2874 in.)

Minimum diameter: 7.00 mm (0.2756 in.)

If the diameter is less than the minimum, replace the bolt.



5. INSPECT CRANKSHAFT

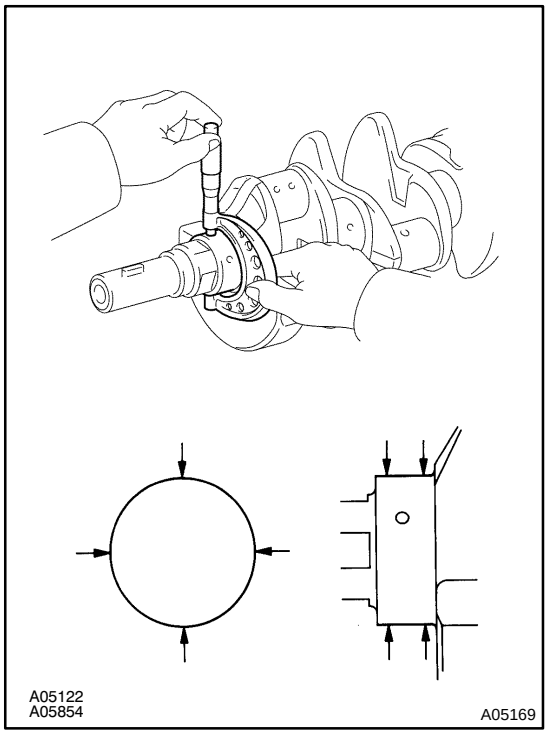
(a) Inspect for circle runout.

(1) Place the crankshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.08 mm (0.0031 in.)

If the circle runout is greater than the maximum, replace the crankshaft.



(b) Inspect the main journals and the crank pins.

(1) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:

66.988 - 67.000 mm (2.6373 - 2.6378 in.)

Crank pin diameter:

51.982 - 52.000 mm (2.0465 - 2.0472 in.)

If the diameter is not as specified, check the oil clearance (See page EM-88). If necessary, replace the crankshaft.

(2) Check each main journal and crank pin for taper and out-of-round as shown.

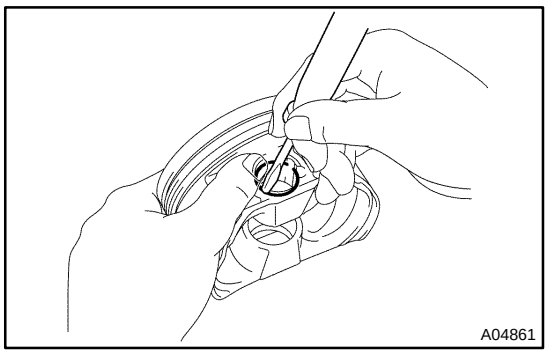
Maximum taper and out-of-round:

0.02 mm (0.0008 in.)

If the taper and out-of-round is greater than the maximum, replace the crankshaft.

EM0L8-03

REASSEMBLY

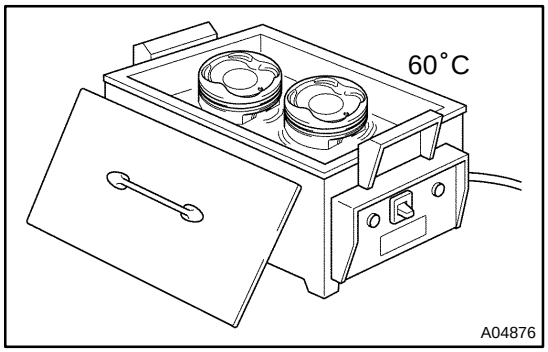


HINT:

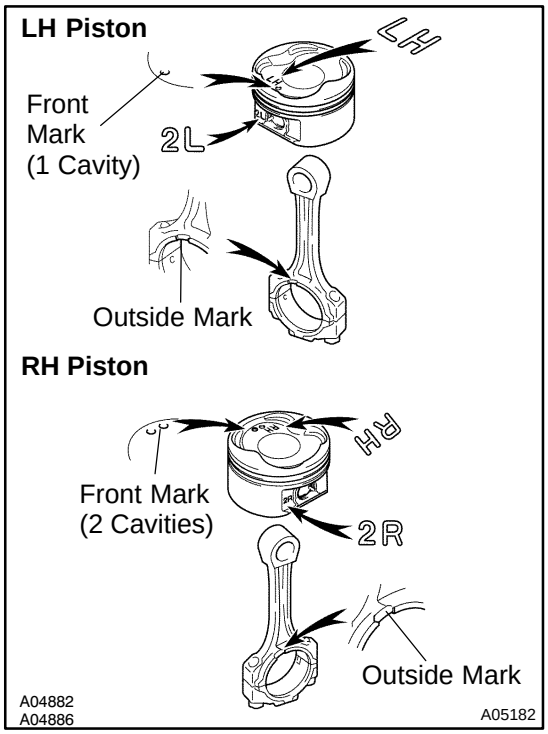
- ★ Thoroughly clean all parts to be assembled.
- ★ Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- ★ Replace all gaskets, O-rings and oil seals with new parts.

1. ASSEMBLE PISTON AND CONNECTING ROD

(a) Using a small screwdriver, install a new snap ring on one side of the piston pin hole.



(b) Gradually heat the piston to about 60˚C (140˚F).



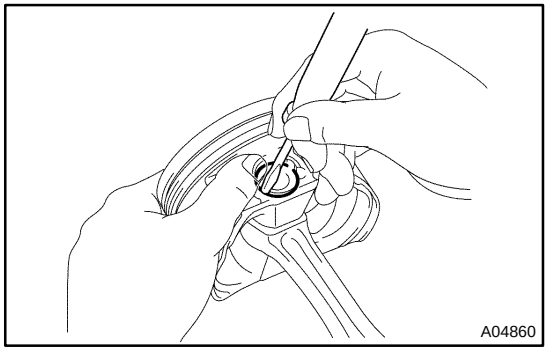
(c) Coat the piston pin with engine oil.

(d) Position the piston front mark to the outside mark on the connecting rod as shown in the diagram.

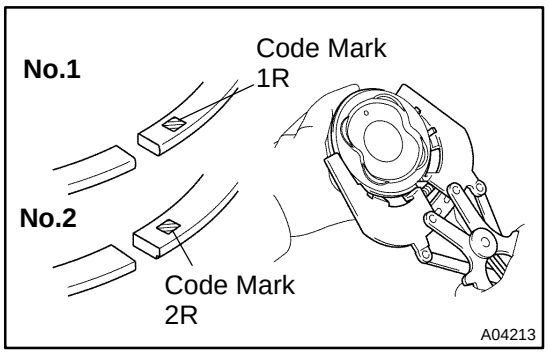
NOTICE:

The installation directions of the piston and connecting rod are different for the LH and RH banks. The LH piston is marked with ”LH” and ”2L”, the RH piston with ”RH” and ”2R”.

(e) Align the piston pin holes of the piston and connecting rod, and push in the piston pin with your thumb.



(f) Using a small screwdriver, install a new snap ring on the other side of the piston pin hole.



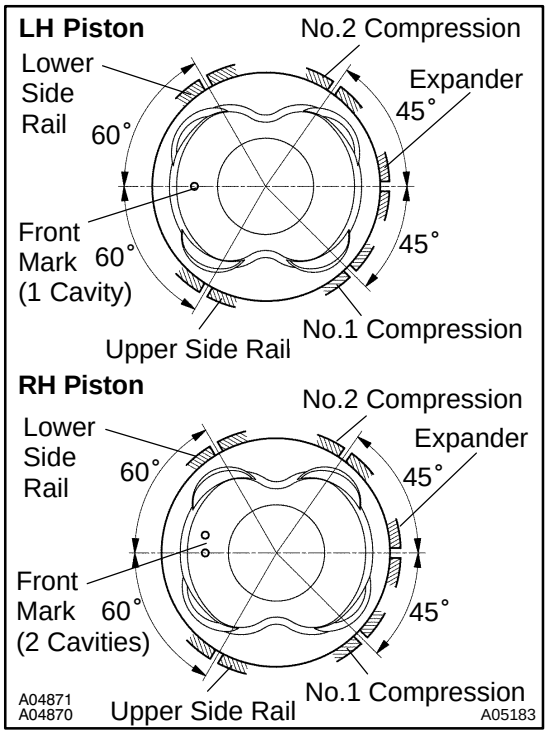
2. INSTALL PISTON RINGS

(a) Install the oil ring expander and the 2 side rails by hand.

(b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

Code mark:

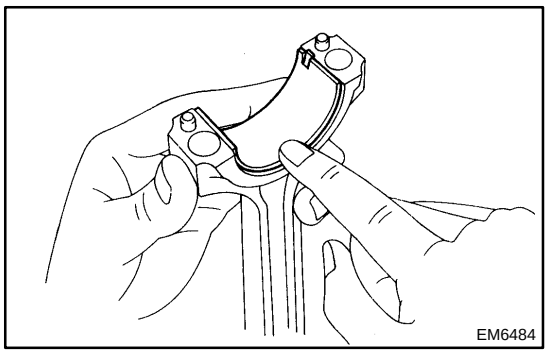
No.1	1R
No.2	2R



(c) Position the piston rings so that the ring ends are as shown.

NOTICE:

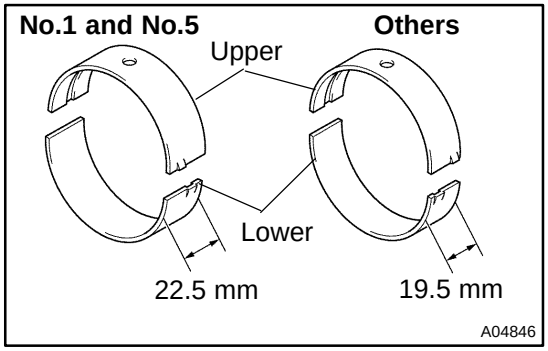
Do not align the ring ends.



3. INSTALL BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or the connecting cap.

(b) Install the bearings in the connecting rod and the connecting rod cap.

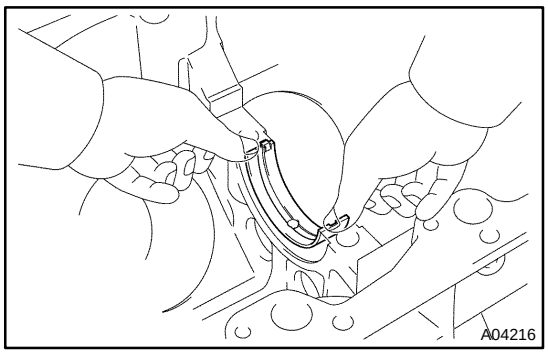


4. INSTALL MAIN BEARINGS

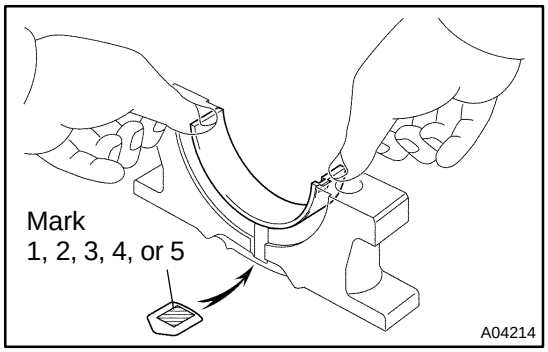
HINT:

★ Main bearings come in widths of 19.5 mm (0.768 in.) and 22.5 mm (0.886 in.). Install the 22.5 mm (0.886 in.) bearings in the No.1 and No.5 cylinder block journal positions with the main bearing cap. Install the 19.5 mm (0.768 in.) bearings in the other positions.

★ Upper bearings have an oil groove and an oil holes; lower bearings do not.



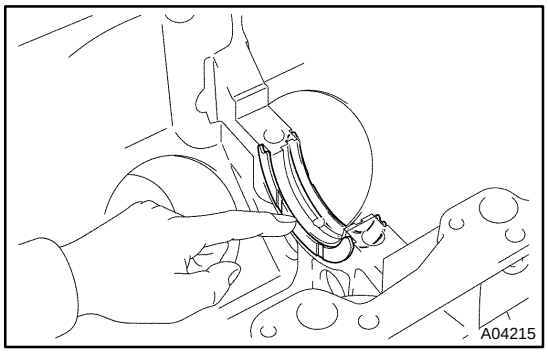
(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 5 upper bearings.



(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 5 lower bearings.

HINT:

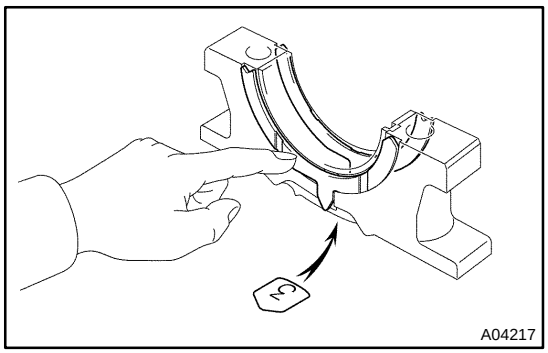
A number is marked on each main bearing cap to indicate the installation position.



5. INSTALL UPPER THRUST WASHERS

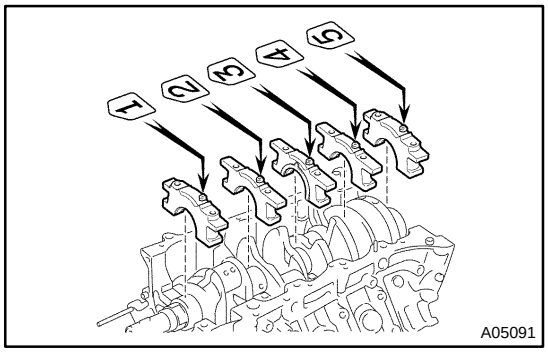
Install the 2 thrust washers under the No.3 journal position of the cylinder block with the oil grooves facing outward.

6. PLACE CRANKSHAFT ON CYLINDER BLOCK



7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK

(a) Install the 2 thrust washers on the No.3 bearing cap with the grooves facing outward.



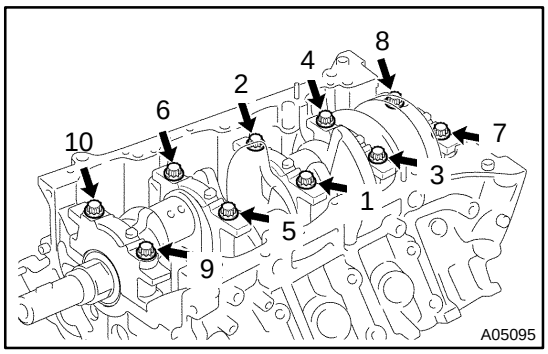
(b) Install the 5 main bearing caps in their proper locations.

8. INSTALL MAIN BEARING CAP BOLTS

HINT:

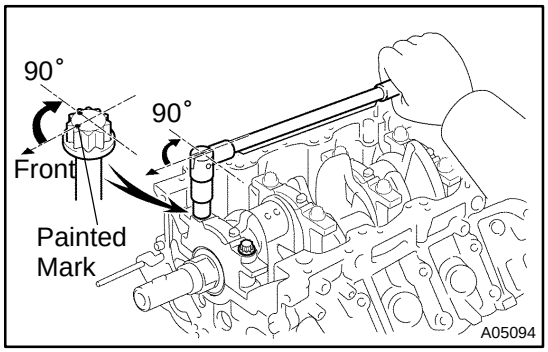
★ The main bearing cap bolts are tightened in 2 steps (steps (b) and (d)).

★ If any one of the main bearing cap bolts is broken or deformed, replace it.



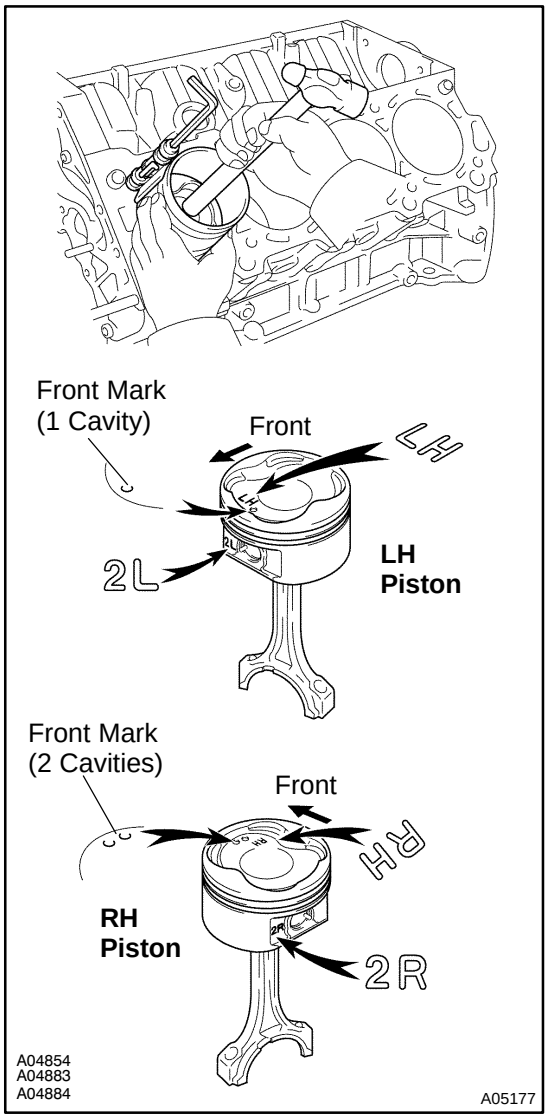
(a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.
(b) Install and evenly tighten the 10 main bearing cap bolts a little at a time for several times as in the sequence shown.
Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

If any one of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



(c) Mark the front of the main bearing cap bolt with paint.
(d) Retighten the main bearing cap bolts by 90° in the numerical order shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

9. CHECK CRANKSHAFT THRUST CLEARANCE
(See page EM-88)

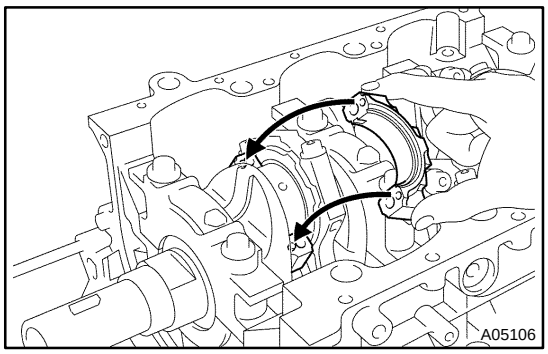


10. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

Using a piston ring compressor, push the correctly numbered piston and connecting rod assemblies into each cylinder with the front mark of the piston facing forward.

NOTICE:

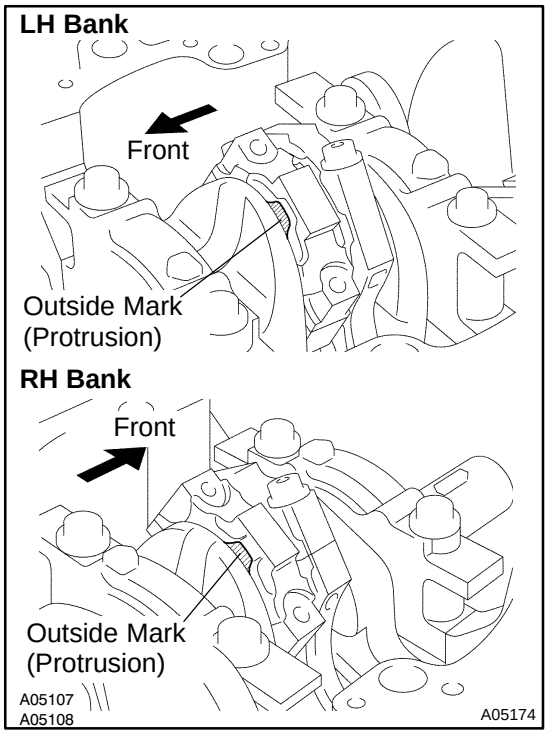
The shape of the piston varies for the LH and RH banks. The LH piston is marked with "LH" and "2R", the RH piston with "RH" and "2R".



11. PLACE CONNECTING ROD CAP ON CONNECTING ROD

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin groove of the connecting rod cap with the pins of the connecting rod, and install the connecting rod cap.



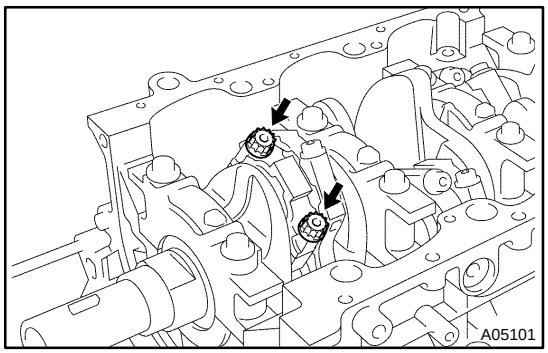
(c) Check that the outside mark of the connecting rod cap is facing in correct direction.

12. INSTALL CONNECTING ROD CAP BOLTS

HINT:

★ The connecting rod cap bolts are tightened in 2 steps (steps (b) and (d)).

★ If any one of the connecting rod cap bolts is broken or deformed, replace it.

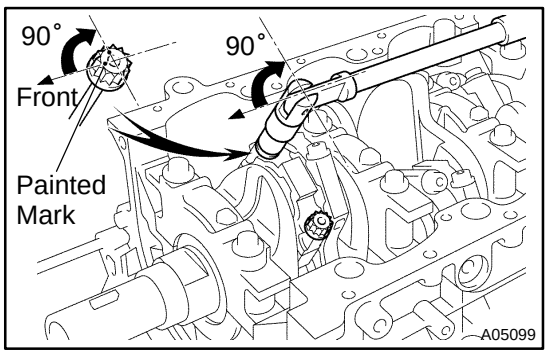


(a) Apply a light coat of engine oil on the threads and under the heads of the connecting rod cap bolts.

(b) Install and alternately tighten the 2 connecting rod cap bolts a little at a time for several times.

Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any one of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.



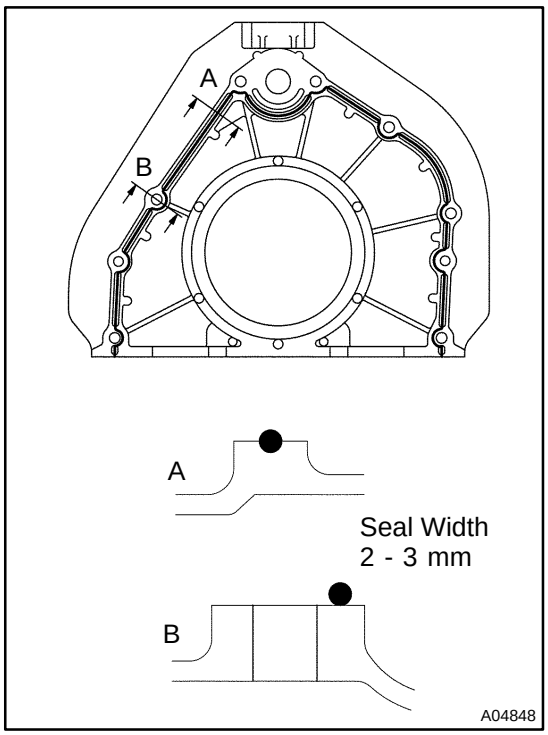
(c) Mark the front of the connecting cap bolt with paint.

(d) Retighten the cap bolts 90° as shown.

(e) Check that the painted mark is now at a 90° angle to the front.

(f) Check that the crankshaft turns smoothly.

13. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM-88)



14. INSTALL REAR OIL SEAL RETAINER

(a) Remove any old packing (FIPG) material, and be careful not to drop any oil on the contact surfaces of the oil seal retainer and the cylinder block.

★ Using a razor blade and a gasket scraper, remove old FIPG from the seal surface.

★ Clean all the components to remove the redundant FIPG completely.

★ Clean sealing surfaces with solvent so that any residue does not remain on the seal.

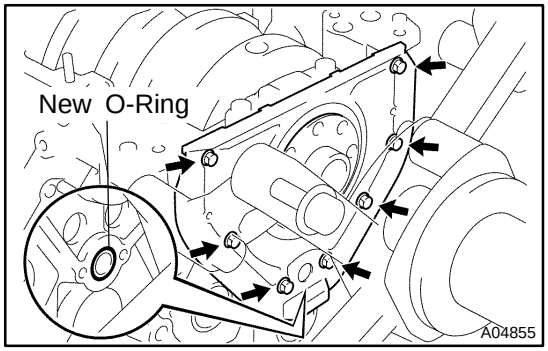
(b) Apply seal packing to the oil seal retainer as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

★ Install a nozzle that is cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

★ Parts must be assembled within 5 minutes after the seal packing application. Otherwise the material must be removed and the seal packing have to be reapplied.

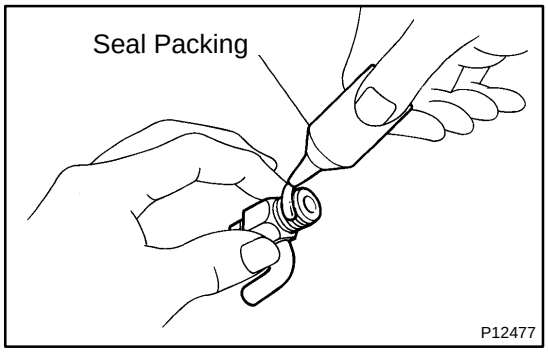
★ Immediately remove the nozzle from the tube and reinstall the cap.



(c) Install a new O-ring to the cylinder block.

(d) Install the oil seal retainer with the 7 bolts.

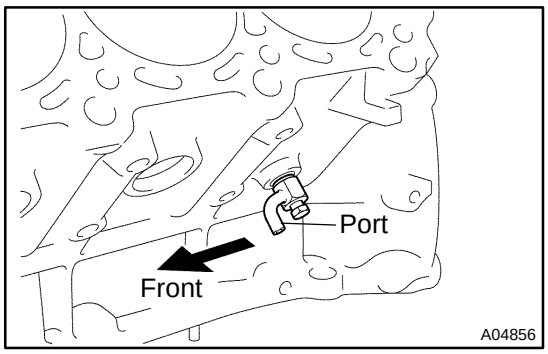
Torque: 8.0 N·m (80 kgf·cm, 71 in.·lbf)



15. INSTALL ENGINE COOLANT DRAIN UNIONS

(a) Apply seal packing to 2 or 3 threads from the end of the drain unions.

Seal packing: Part No. 08826-00100 or equivalent

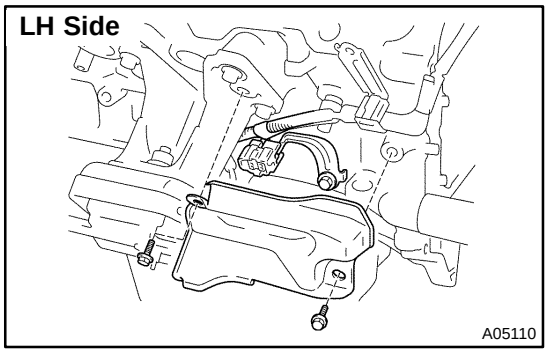


(b) Install the 2 drain unions.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

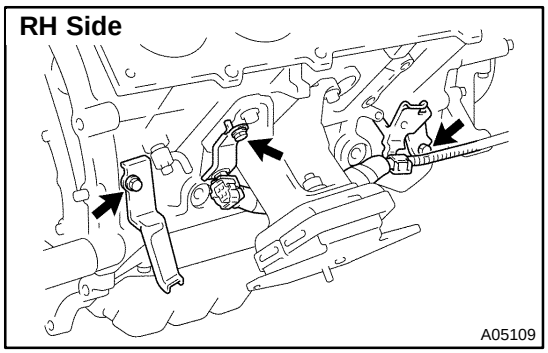
HINT:
After applying the specified torque, rotate the drain union clockwise until the drain port is facing forward.

16. INSTALL OIL PUMP (See page LU-15)
17. INSTALL OIL STRAINER (See page LU-15)
18. INSTALL NO.1 OIL PAN (See page LU-15)
19. INSTALL OIL PAN BAFFLE PLATE (See page LU-15)
20. INSTALL NO.2 OIL PAN (See page LU-15)
21. INSTALL WATER PUMP (See page CO-8)
22. INSTALL ENGINE MOUNTING BRACKETS

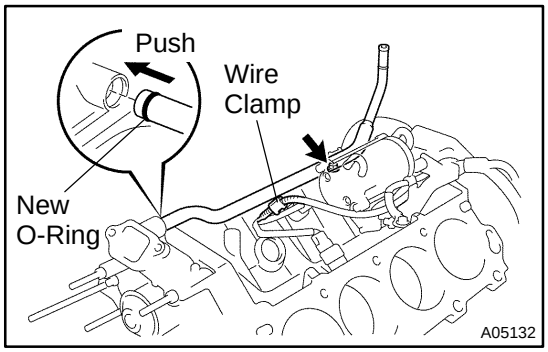
Install the mounting bracket with the 4 bolts. Install the 2 mounting brackets.
Torque: 36 N·m (370 kgf·cm, 27 ft·lbf)



23. INSTALL ENGINE WIRE TO LH SIDE OF CYLINDER BLOCK
(a) Install the bracket on the engine wire with the bolt.
(b) Install the engine wire cover with the 2 bolts.



24. INSTALL ENGINE WIRE TO RH SIDE OF CYLINDER BLOCK
Install the 2 brackets on the engine wire with the 2 bolts.
25. INSTALL OIL COOLER PIPE BRACKET FOR A/T
Install the bracket with the bolt.
26. INSTALL KNOCK SENSORS (See page SF-55)
27. INSTALL STARTER (See page ST-17)



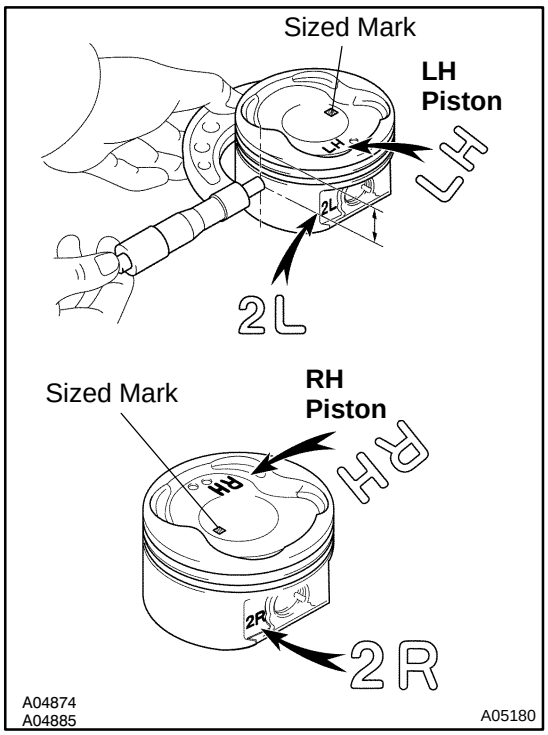
28. INSTALL WATER BYPASS PIPE
(a) Install a new O-ring to the water bypass pipe.
(b) Apply soapy water to the O-ring.
(c) Push the water bypass pipe end into the pipe hole of the water pump.
(d) Install the water bypass pipe with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)
(e) Install the wire clamp to the bracket of the water bypass pipe.
29. INSTALL CYLINDER HEADS (See page EM-59)

30. INSTALL TIMING BELT AND PULLEYS
(See page EM-22)

31. DISCONNECT ENGINE FROM ENGINE STAND

EM0L7-05

REPLACEMENT



1. REPLACE OVERSIZED (O/S) PISTONS FOR CYLINDER BORING

HINT:

★ Bore all the 8 cylinders to the oversized piston outside diameter.

★ Replace all the piston rings with the ones to match the oversized pistons.

(a) Keep 8 new O/S pistons.
O/S 0.50 piston diameter:
94.402 - 94.430 mm (3.7166 - 3.7177 in.)

HINT:

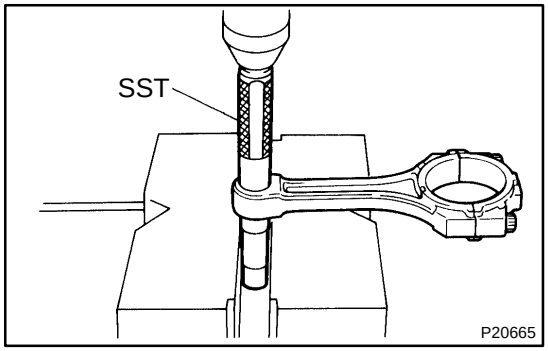
The shape of the piston varies for the LH and RH banks. The LH piston is marked with ”LH” and ”2L”, the RH piston with ”RH” and ”2R”.

(b) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 30.75 mm (1.2106 in.) from the piston head.

(c) Calculate the amount for each cylinder to be rebored as follows:
Size to be rebored = P + C - H
P = Piston diameter
C = Piston clearance:
0.090 - 0.111 mm (0.0035 - 0.0044 in.)
H = Allowance for honing: 0.02 mm (0.0008 in.) or less

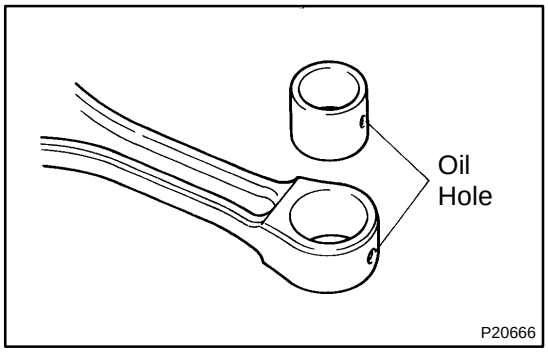
(d) Bore and hone the cylinders to calculated dimensions.
Maximum honing: 0.02 mm (0.0008 in.)

NOTICE:
Excess honing will destroy the finished roundness.



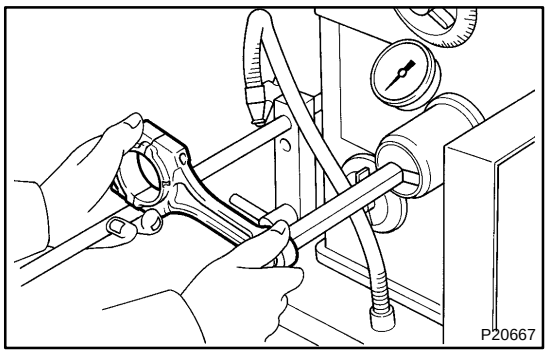
2. REPLACE CONNECTING ROD BUSHINGS

(a) Using SST and a press, press out the bushing.
SST 09222-30010

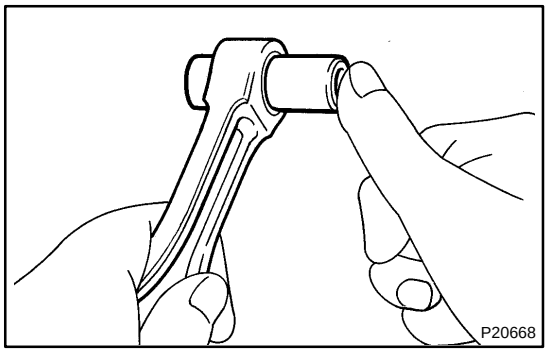


(b) Align the oil holes of a new bushing and the connecting rod.

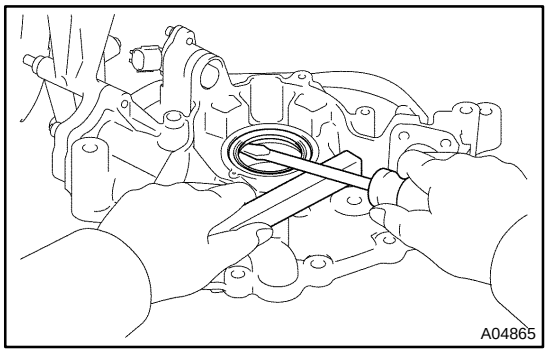
(c) Using SST and a press, press in the bushing.
SST 09222-30010



(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See page EM-97) between the bushing and piston pin.



(e) Check the piston pin fit at normal room temperature. Coat the piston pin with engine oil, and push it into the connecting rod with your thumb.



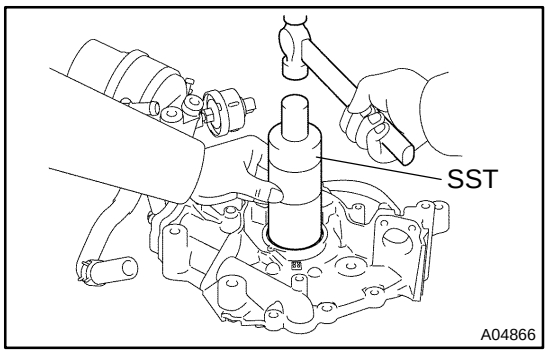
3. REPLACE CRANKSHAFT FRONT OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the oil pump is removed from the cylinder block:

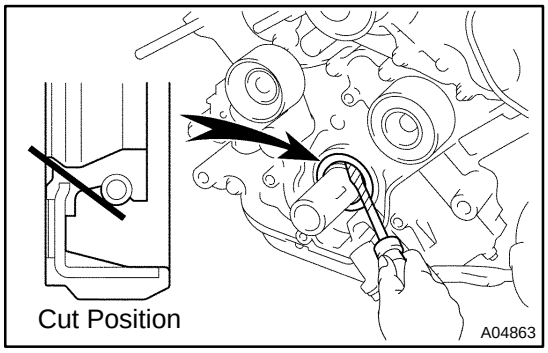
(1) Using a screwdriver, pry out the oil seal.



(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.

SST 09316-6001 1 (09316-00011)

(3) Apply MP grease to the oil seal lip.



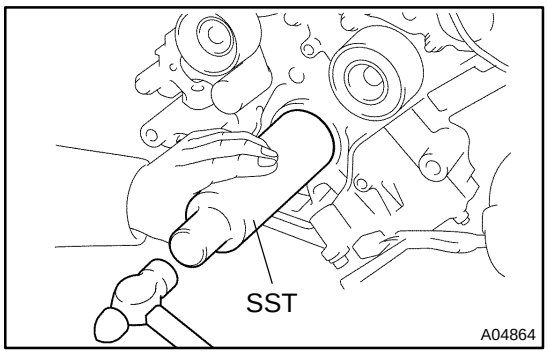
(b) If the oil pump is installed to the cylinder block:

(1) Using a knife, cut off the oil seal lip.

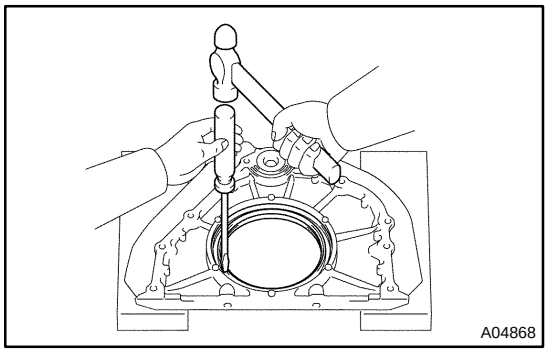
(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape up the screwdriver tip.



(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the oil pump body edge.
SST 09316-6001 1 (09316-00011)

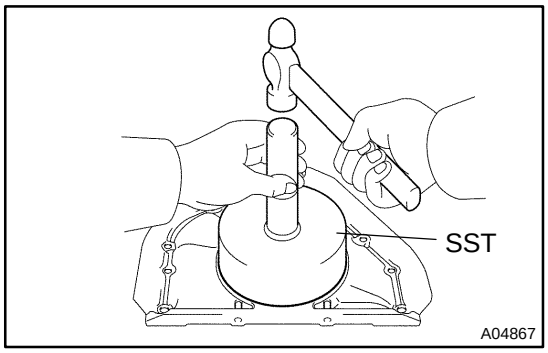


4. REPLACE CRANKSHAFT REAR OIL SEAL

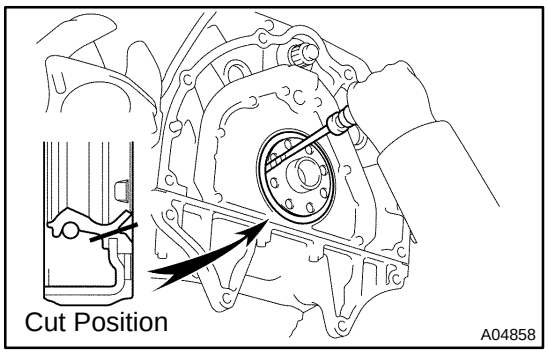
HINT:

There are 2 methods ((a) and (b)) to replace the oil seal.

(a) If the rear oil seal retainer is removed from the cylinder block:
(1) Using a screwdriver and hammer, tap out the oil seal.



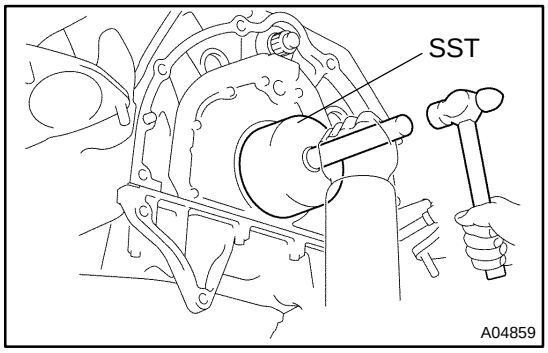
(2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-56010
(3) Apply MP grease to the oil seal lip.



(b) If the rear oil seal retainer is installed to the cylinder block:
(1) Using a knife, cut off the oil seal lip.
(2) Using a screwdriver, pry out the oil seal.

NOTICE:

Be careful not to damage the crankshaft. Tape up the screwdriver tip.

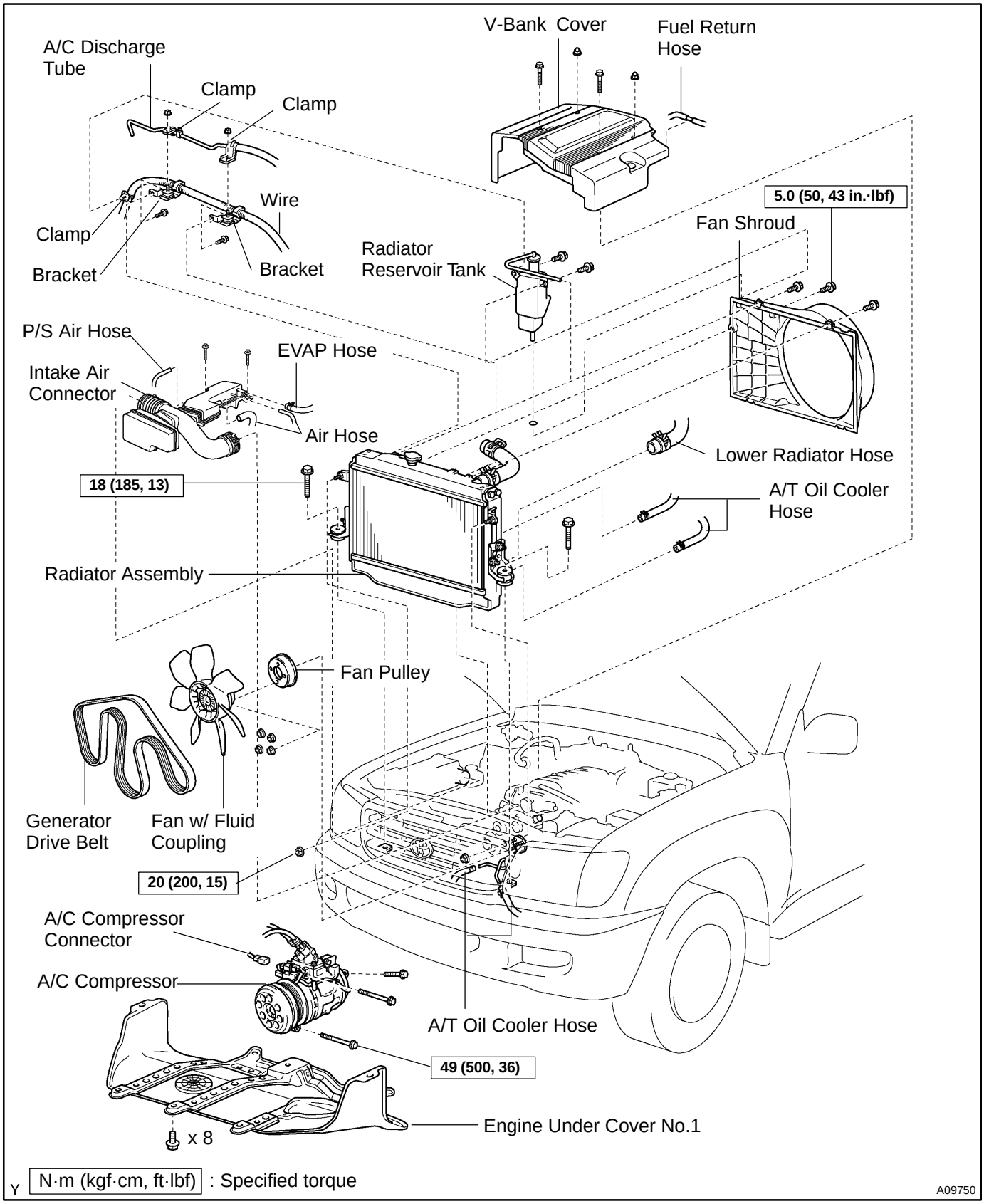


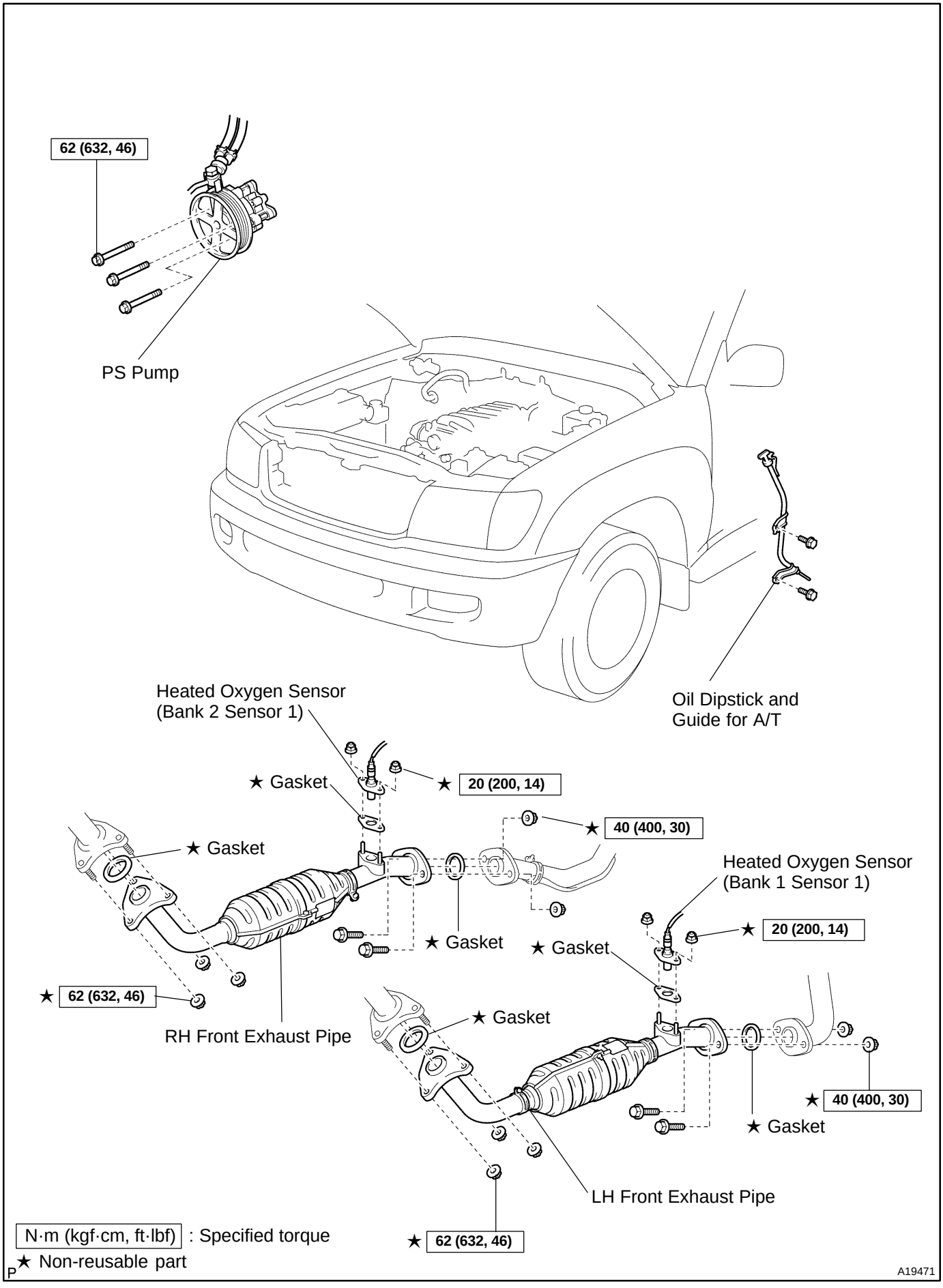
(3) Apply MP grease to a new oil seal lip.
(4) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.
SST 09223-56010

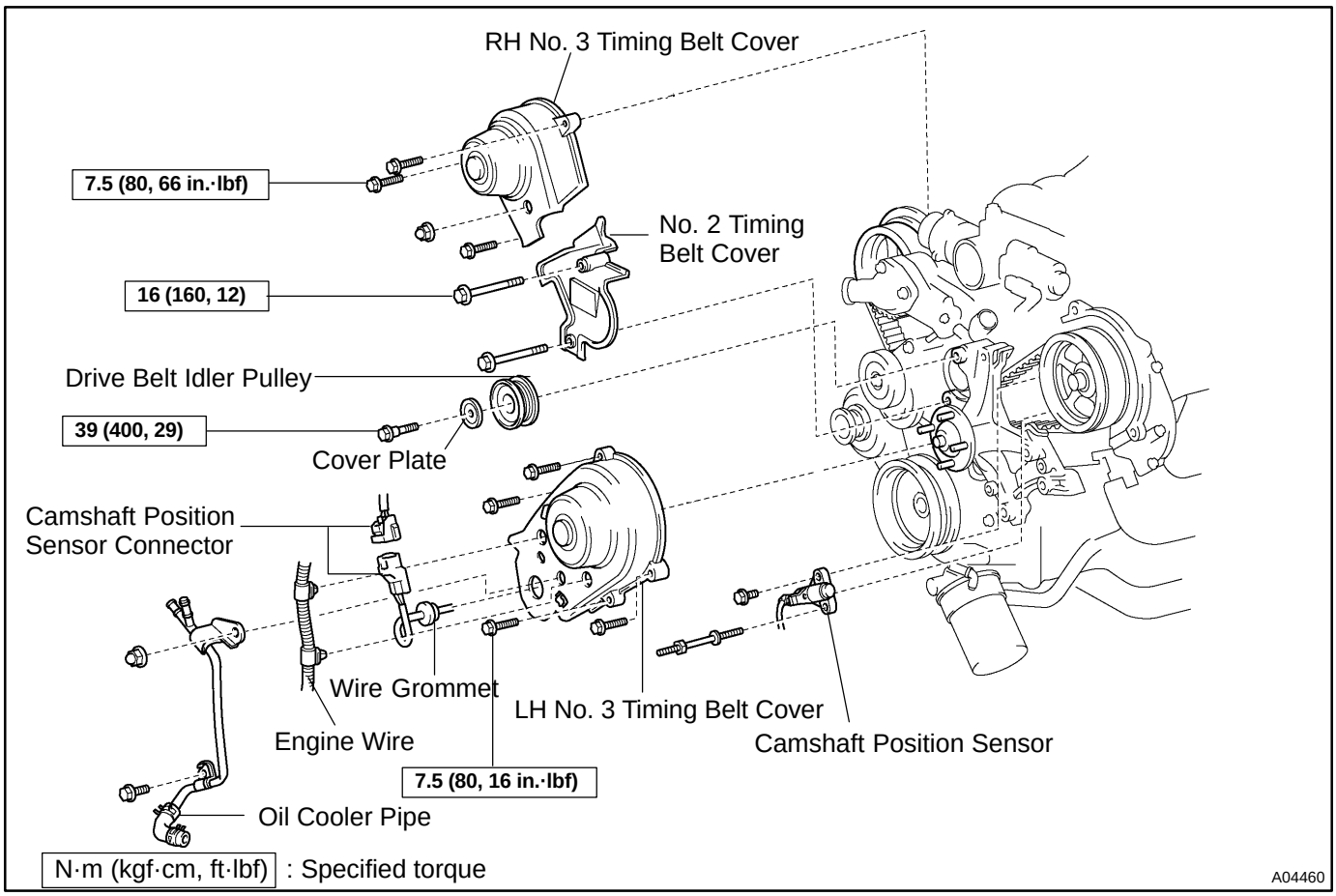
CYLINDER HEAD

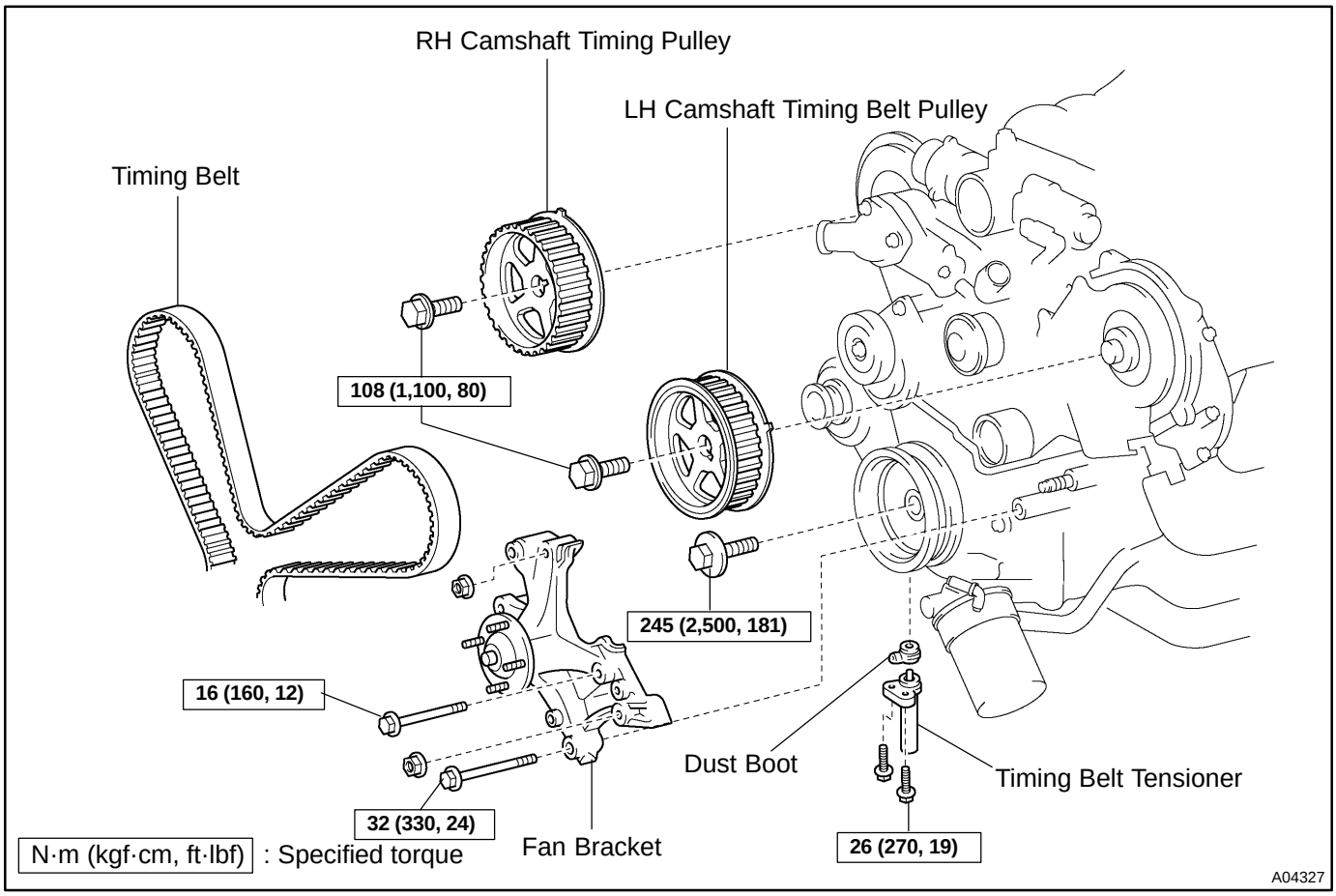
COMPONENTS

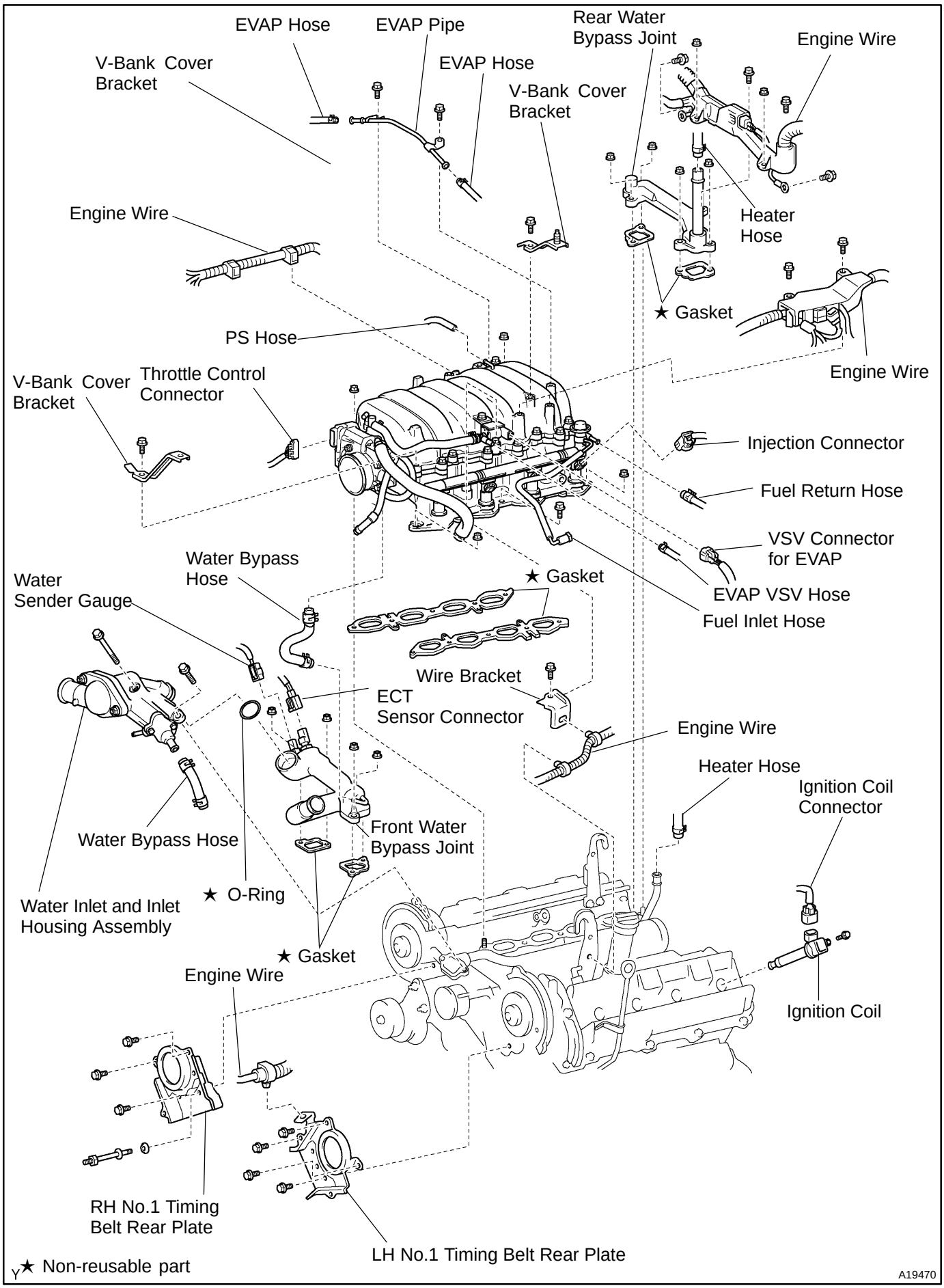
EM1V7-01

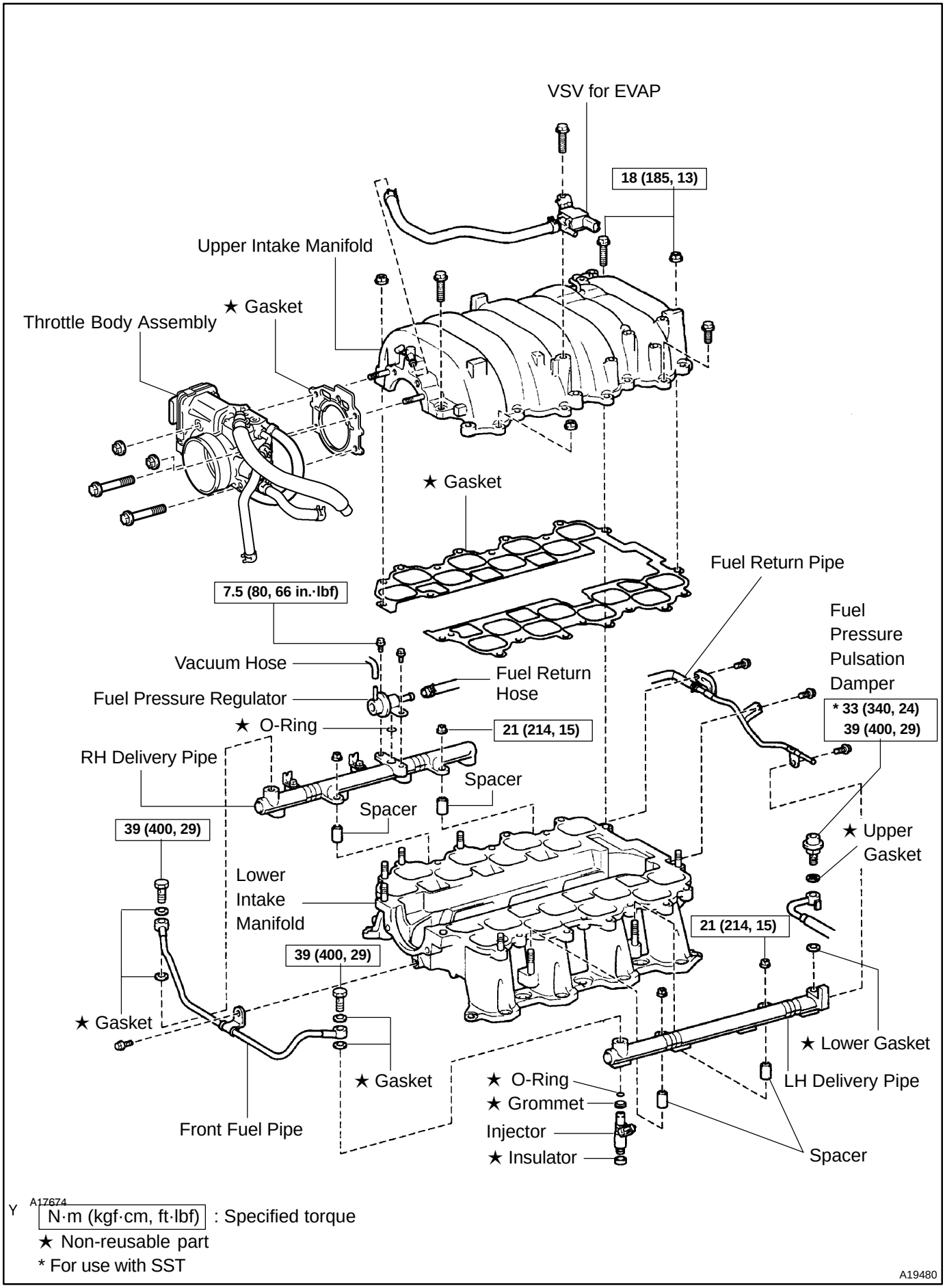


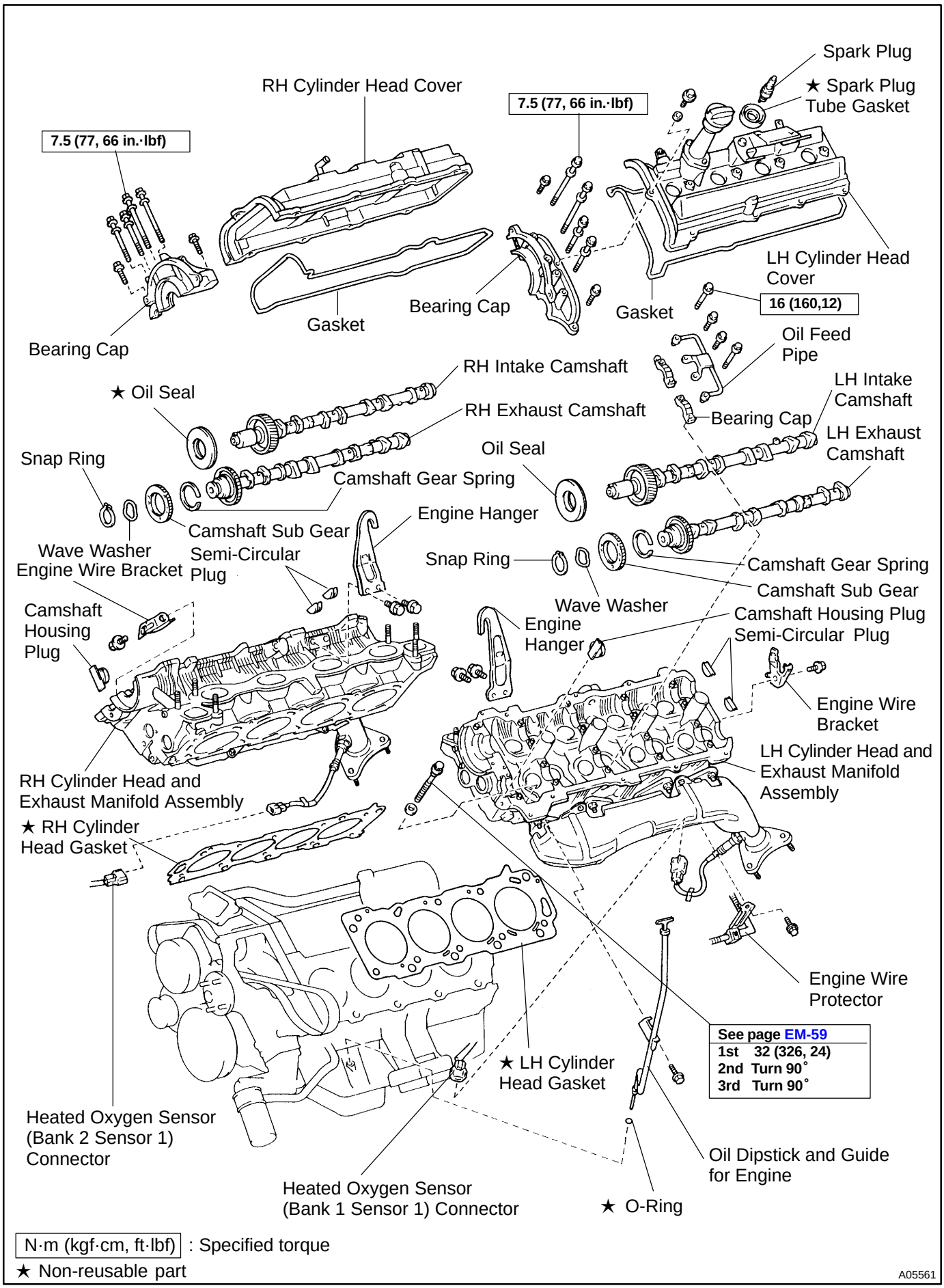

62 (632, 46)
PS Pump
Oil Dipstick and Guide for A/T
Heated Oxygen Sensor (Bank 2 Sensor 1)
★ Gasket
★ 20 (200, 14)
★ 40 (400, 30)
★ Gasket
Heated Oxygen Sensor (Bank 1 Sensor 1)
★ 20 (200, 14)
★ Gasket
★ Gasket
★ 62 (632, 46)
RH Front Exhaust Pipe
★ Gasket
★ 40 (400, 30)
★ Gasket
LH Front Exhaust Pipe
★ 62 (632, 46)
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A19471


RH No. 3 Timing Belt Cover
7.5 (80, 66 in.·lbf)
No. 2 Timing Belt Cover
16 (160, 12)
Drive Belt Idler Pulley
39 (400, 29)
Cover Plate
Camshaft Position Sensor Connector
Wire Grommet
LH No. 3 Timing Belt Cover
Camshaft Position Sensor
Engine Wire
7.5 (80, 16 in.·lbf)
Oil Cooler Pipe
N·m (kgf·cm, ft·lbf) : Specified torque
A04460


RH Camshaft Timing Pulley
LH Camshaft Timing Belt Pulley
Timing Belt
108 (1,100, 80)
245 (2,500, 181)
16 (160, 12)
Dust Boot
Timing Belt Tensioner
32 (330, 24)
Fan Bracket
26 (270, 19)
N·m (kgf·cm, ft·lbf) : Specified torque
A04327

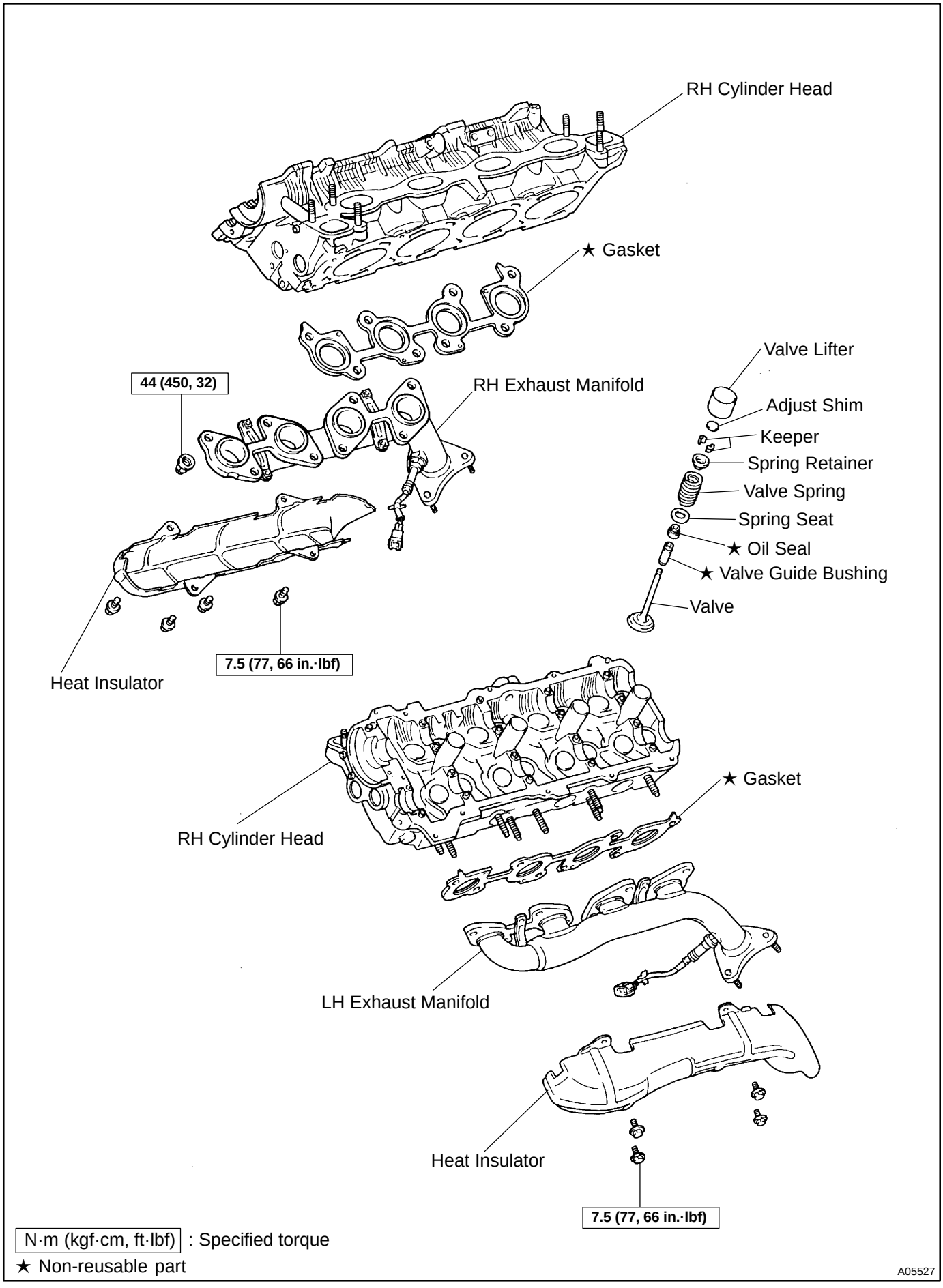

EVAP Hose
EVAP Pipe
Rear Water Bypass Joint
Engine Wire
V-Bank Cover Bracket
EVAP Hose
V-Bank Cover Bracket
Engine Wire
Heater Hose
★ Gasket
PS Hose
Engine Wire
V-Bank Cover Bracket
Throttle Control Connector
Injection Connector
Fuel Return Hose
VSV Connector for EVAP
EVAP VSV Hose
Fuel Inlet Hose
Water Bypass Hose
★ Gasket
Water Sender Gauge
Wire Bracket
ECT Sensor Connector
Engine Wire
Heater Hose
Ignition Coil Connector
Front Water Bypass Joint
Water Bypass Hose
★ O-Ring
Water Inlet and Inlet Housing Assembly
★ Gasket
Engine Wire
Ignition Coil
RH No.1 Timing Belt Rear Plate
LH No.1 Timing Belt Rear Plate
★ Non-reusable part
A19470


VSV for EVAP
18 (185, 13)
Upper Intake Manifold
★ Gasket
Throttle Body Assembly
★ Gasket
7.5 (80, 66 in.·lbf)
Fuel Return Pipe
Fuel Pressure Pulsation Damper
Vacuum Hose
Fuel Return Hose
Fuel Pressure Regulator
★ O-Ring
21 (214, 15)
* 33 (340, 24)
39 (400, 29)
RH Delivery Pipe
Spacer
Spacer
39 (400, 29)
★ Upper Gasket
Lower Intake Manifold
21 (214, 15)
39 (400, 29)
★ Gasket
★ Lower Gasket
★ Gasket
★ O-Ring
★ Grommet
Injector
★ Insulator
LH Delivery Pipe
Front Fuel Pipe
Spacer
A17674
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
* For use with SST
A19480

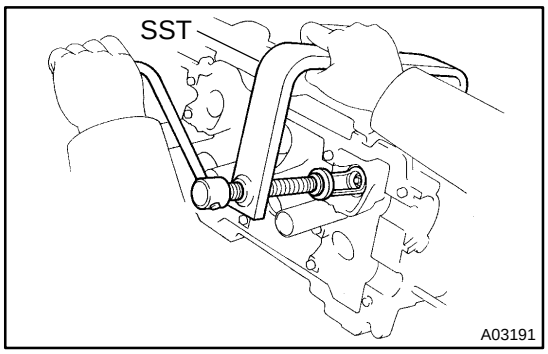


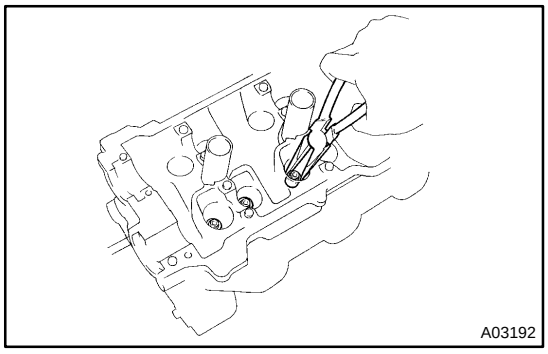
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part

A05561


RH Cylinder Head
★ Gasket
Valve Lifter
44 (450, 32)
RH Exhaust Manifold
Adjust Shim
Keeper
Spring Retainer
Valve Spring
Spring Seat
★ Oil Seal
★ Valve Guide Bushing
Valve
7.5 (77, 66 in.·lbf)
Heat Insulator
★ Gasket
RH Cylinder Head
LH Exhaust Manifold
Heat Insulator
7.5 (77, 66 in.·lbf)
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
A05527

EM0L1-08





DISASSEMBLY

1. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Arrange the valve lifters and the shims in correct order.

2. REMOVE VALVES

(a) Using SST, compress the valve spring and remove the 2 keepers.
SST 09202-70020

(b) Remove the spring retainer.

(c) Remove the valve spring.

(d) Remove the valve.

(e) Remove the spring seat.

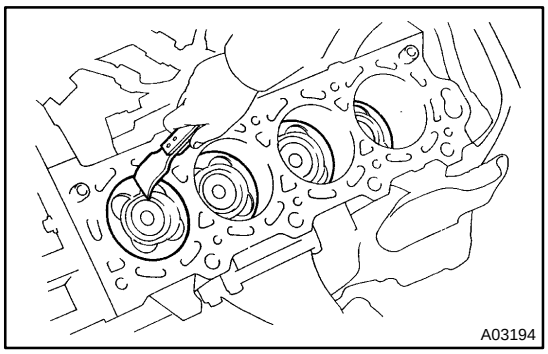
HINT:

Arrange the valves, the valve springs, the spring seats and the spring retainers incorrect order.

(f) Using needle-nose pliers, remove the oil seal.

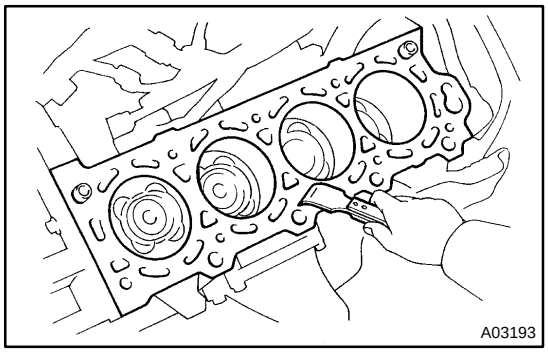
EM0L2-07

INSPECTION



1. CLEAN TOP SURFACES OF PISTONS AND CYLINDER BLOCK

(a) Turn the crankshaft, and bring each piston to top dead center (TDC). Using a gasket scraper, remove all the carbon from the piston top surface.

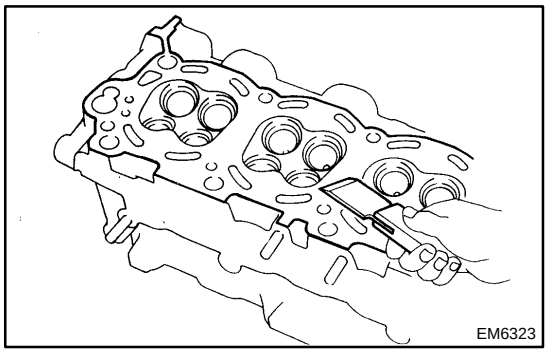


(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION:

Protect your eyes when using high pressure compressed air.

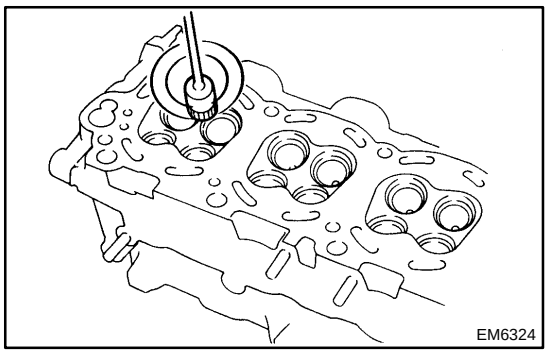


2. REMOVE GASKET MATERIAL

Using a gasket scraper, remove all the gasket material from the cylinder block contact surface.

NOTICE:

Be careful not to scratch the cylinder block contact surface.

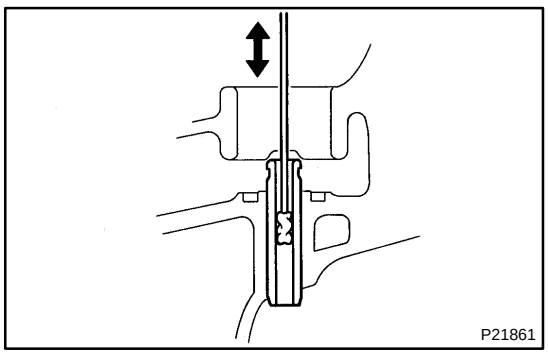


3. CLEAN COMBUSTION CHAMBERS

Using a wire brush, remove all the carbon from the combustion chambers.

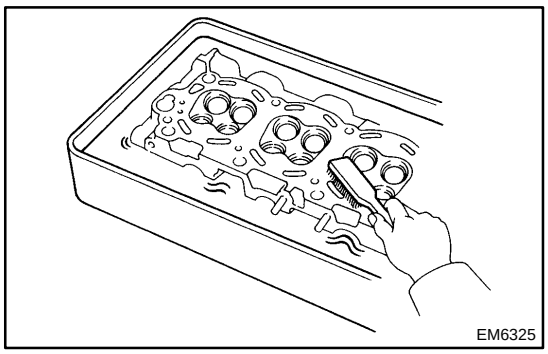
NOTICE:

Be careful not to scratch the cylinder block contact surface.



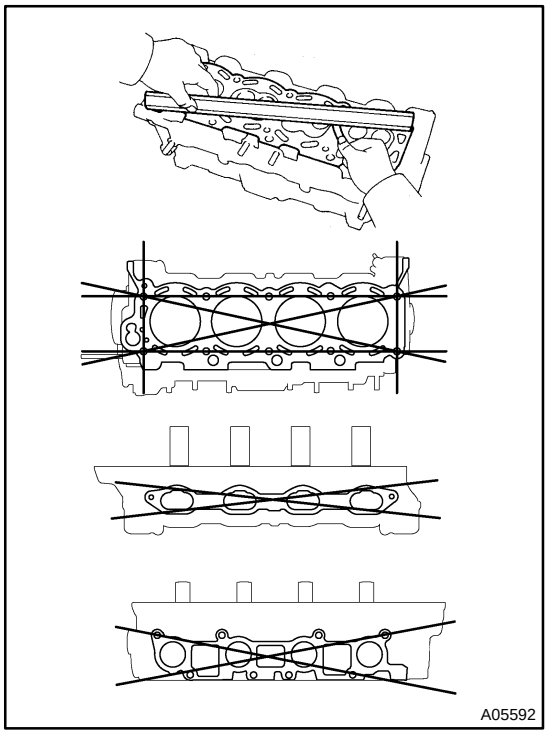
4. CLEAN VALVE GUIDE BUSHINGS

Using a valve guide bushing brush and solvent, clean all the guide bushings.



5. CLEAN CYLINDER HEAD

Using a soft brush and solvent, thoroughly clean the cylinder head.

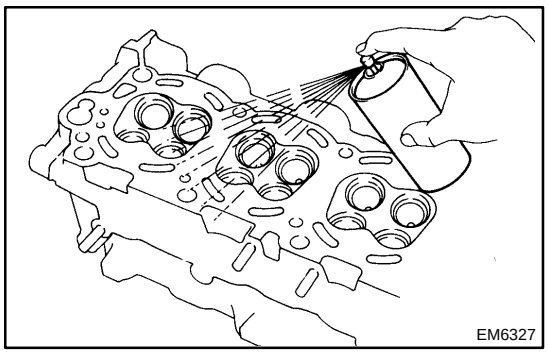


6. INSPECT FOR FLATNESS

Using a precision straight edge and a feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for a warp.

Maximum warpage:
0.10 mm (0.0039 in.)

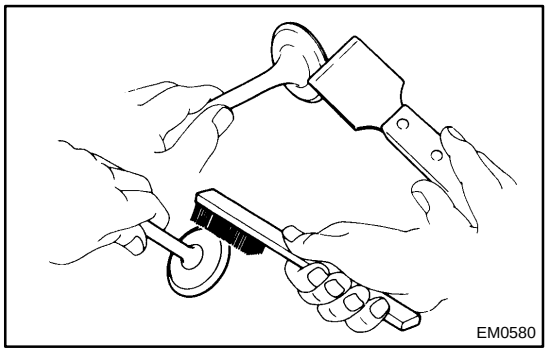
If the warp is greater than maximum, replace the cylinder head.



7. INSPECT FOR CRACKS

Using a dye penetrate, check the combustion chamber, the intake ports, the exhaust ports and the cylinder head surface for cracks.

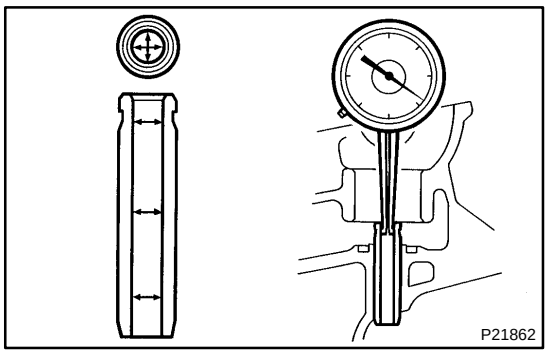
If there is a crack, replace the cylinder head.



8. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

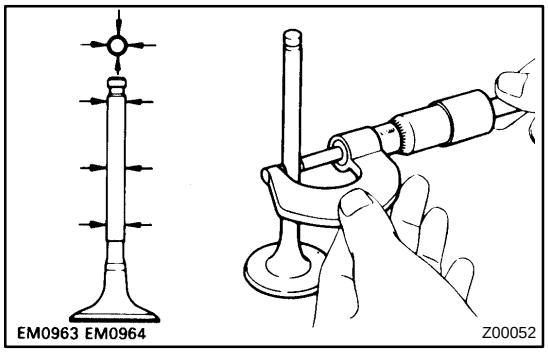
(b) Using a wire brush, thoroughly clean the valve.



9. INSPECT VALVE STEMS AND GUIDE BUSHINGS

(a) Using a caliper gauge, measure the inside diameter of the guide bushing.

Bushing inside diameter:
5.510 - 5.530 mm (0.2169 - 0.2177 in.)



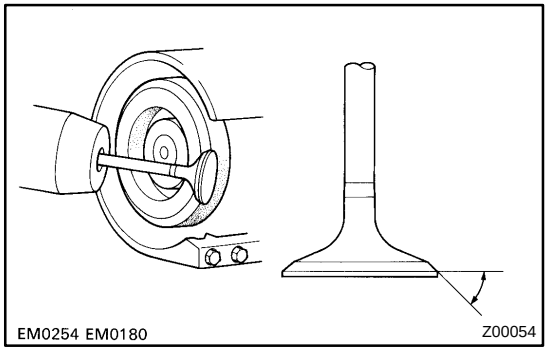
(b) Using a micrometer, measure the diameter of the valve stem.

Valve stem diameter:
Intake
5.470 - 5.485 mm (0.2154 - 0.2159 in.)
Exhaust
5.465 - 5.480 mm (0.2152 - 0.2157 in.)

(c) Subtract the valve stem diameter measurement from the guide bushing inside diameter measurement.

Standard oil clearance:
Intake
0.025 - 0.060 mm (0.0010 - 0.0024 in.)
Exhaust
0.030 - 0.065 mm (0.0012 - 0.0026 in.)
Maximum oil clearance:
Intake
0.08 mm (0.0031 in.)
Exhaust
0.10 mm (0.0039 in.)

If the clearance is greater than the maximum, replace the valve and the guide bushing. (See Page EM-55)

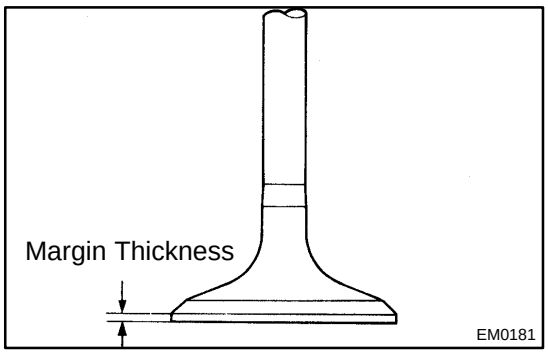


10. INSPECT AND GRIND VALVES

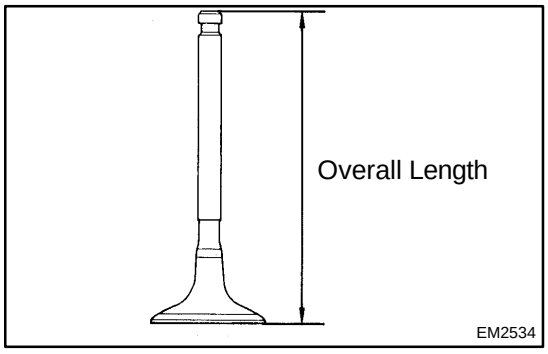
(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

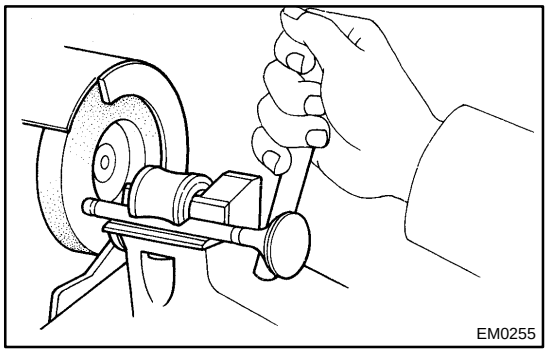
Valve face angle:
44.5°



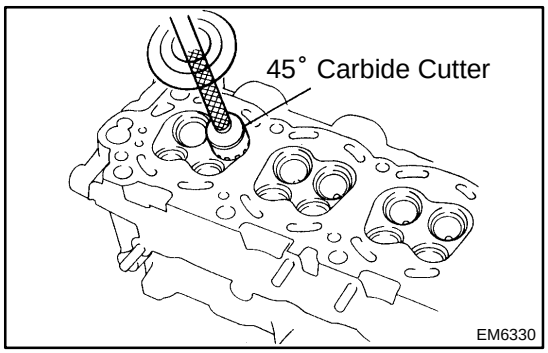
(c) Check the valve head margin thickness.
Standard margin thickness:
IN 1.25 mm (0.049 in.)
EX 1.40 mm (0.055 in.)
Minimum margin thickness:
0.5 mm (0.020 in.)
If the margin thickness is less than the minimum, replace the valve.



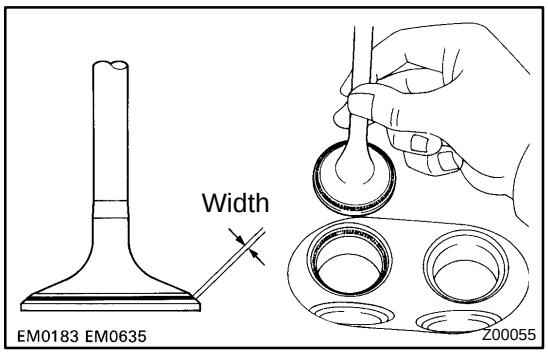
(d) Check the valve overall length.
Standard overall length:
Intake: 95.05 mm (3.7421 in.)
Exhaust: 95.10 mm (3.7441 in.)
Minimum overall length:
Intake: 94.55 mm (3.7224 in.)
Exhaust: 94.60 mm (3.7244 in.)
If the overall length is less than the minimum, replace the valve.



(e) Check the surface of the valve stem tip for wear.
If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.
NOTICE:
Do not grind off to below the minimum.



11. INSPECT AND CLEAN VALVE SEATS
(a) Using a 45° carbide cutter, resurface the valve seats. Remove just enough metal to clean the seats.

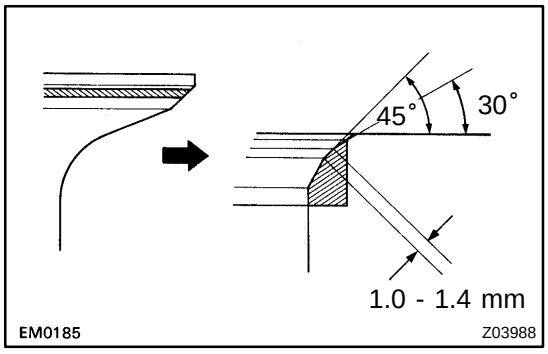


(b) Check the valve seating position.
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.

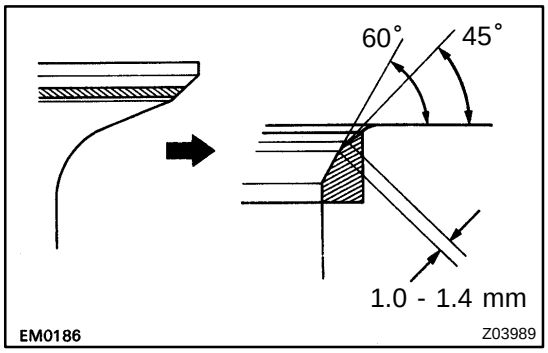
(c) Check the valve face and seat for the following:
- ★ If blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.
- ★ If blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.
- ★ Check that the seat contact is in the middle of the valve face with the following width:

1.0 - 1.4 mm (0.039 - 0.055 in.)

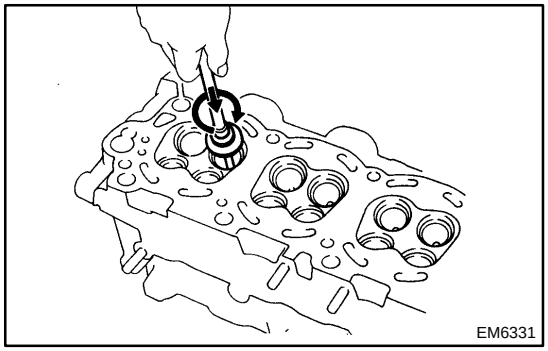
If not, correct the valve seats as follows:



- ★ If the seating is too high on the valve face, use 30˚ and 45˚ cutters to correct the seat.

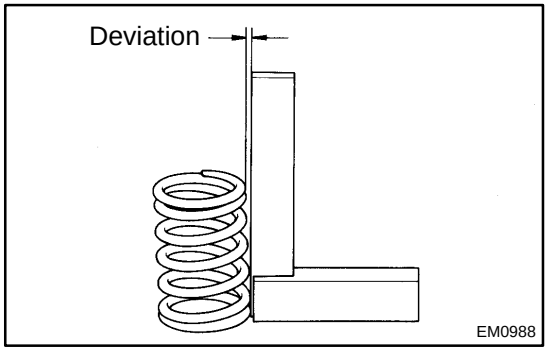


- ★ If the seating is too low on the valve face, use 60˚ and 45˚ cutters to correct the seat.



(d) Hand-lap the valve and valve seat with an abrasive compound.

(e) After hand-lapping, clean the valve and valve seat.



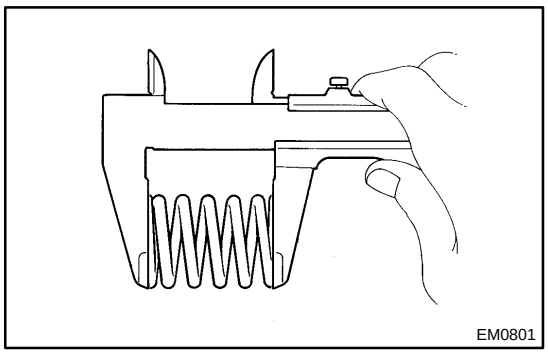
12. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation:

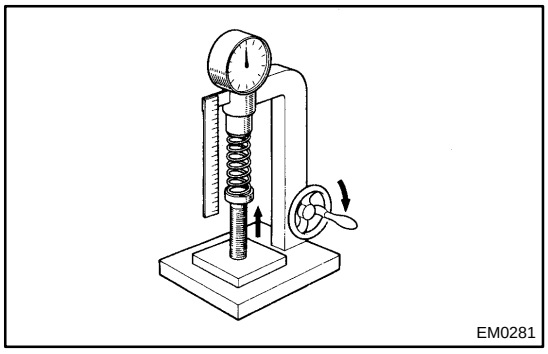
2.0 mm (0.079 in.)

If the deviation is greater than the maximum, replace the valve spring.


EM0801

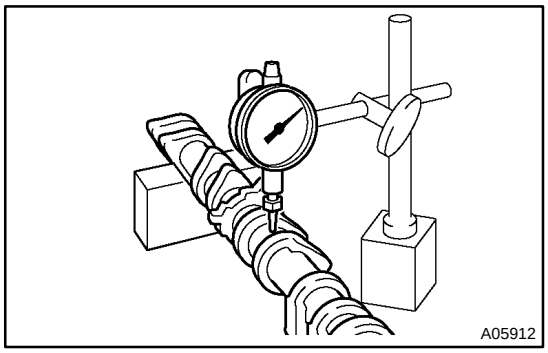
(b) Using vernier calipers, measure the free length of the valve spring.
Free length:
54.1 mm (2.130 in.)

If the free length is not as specified, replace the valve spring.


EM0281

(c) Using a spring tester, measure the tension of the valve spring at the installed length.
Installed tension:
204 - 226 N (20.8 - 23.0 kgf, 45.9 - 50.7 lbf)
at 35.0 mm (1.378 in.)

If the installed tension is not as specified, replace the valve spring.

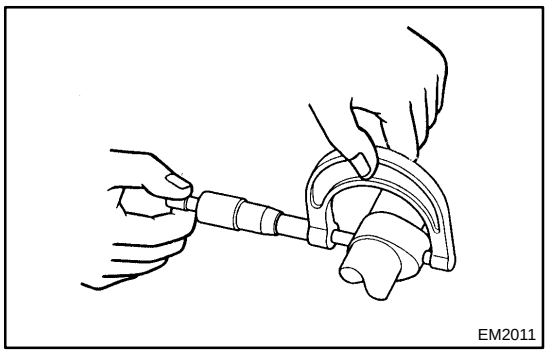

A05912

13. INSPECT CAMSHAFT FOR RUNOUT

(a) Place the camshaft on V-blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.
Maximum circle runout:
0.08 mm (0.0031 in.)

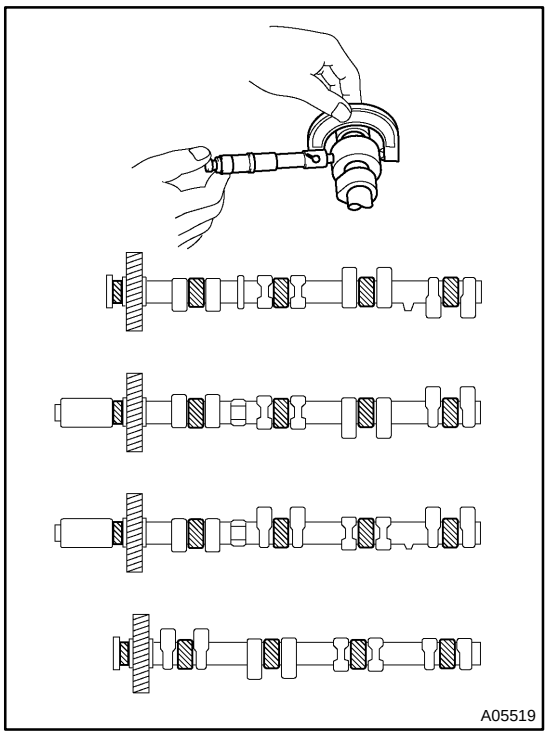
If the circle runout is greater than the maximum, replace the camshaft.


EM2011

14. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.
Standard cam lobe height:
Intake:
41.94 - 42.04 mm (1.6512 - 1.6551 in.)
Exhaust:
41.96 - 42.06 mm (1.6520 - 1.6559 in.)
Minimum cam lobe height:
Intake:
41.79 mm (1.6453 in.)
Exhaust:
41.81 mm (1.6461 in.)

If the cam lobe height is less than the minimum, replace the camshaft.



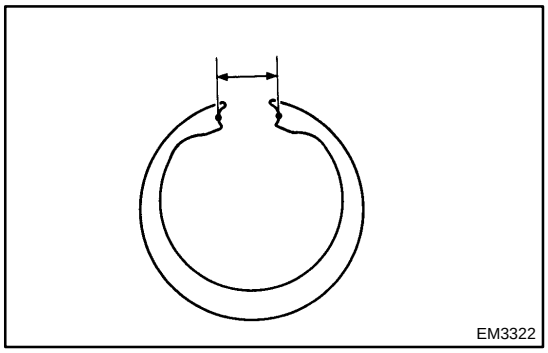
15. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

Journal diameter:

26.954 - 26.970 mm (1.0612 - 1.0618 in.)

If the journal diameter is not as specified, check the oil clearance.



16. INSPECT CAMSHAFT GEAR SPRING

Using vernier calipers, measure the free distance between the spring ends.

Free distance:

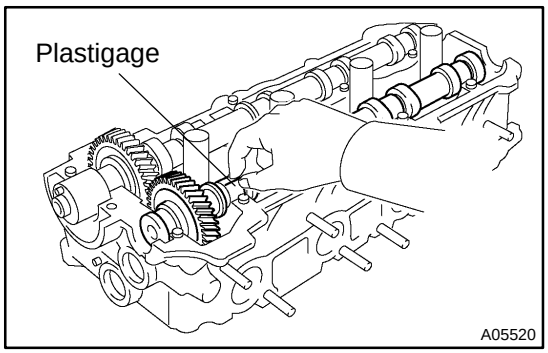
18.2 - 18.8 mm (0.712 - 0.740 in.)

If the free distance is not as specified, replace the gear spring.

17. INSPECT CAMSHAFT BEARINGS

Check that bearings for flaking and scoring.

If the bearings are damaged, replace the bearing caps and cylinder head as a set.

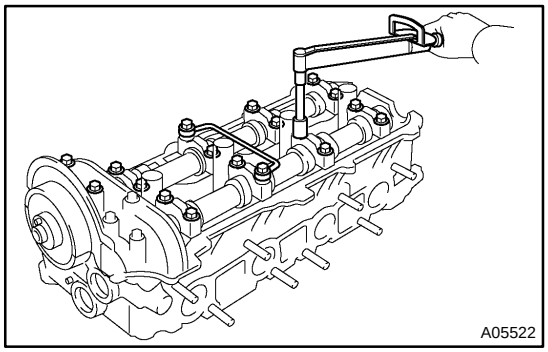


18. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

(a) Clean the bearing caps and the camshaft journals.

(b) Place the camshafts on the cylinder head.

(c) Lay a strip of plastigage across each of the camshaft journals.

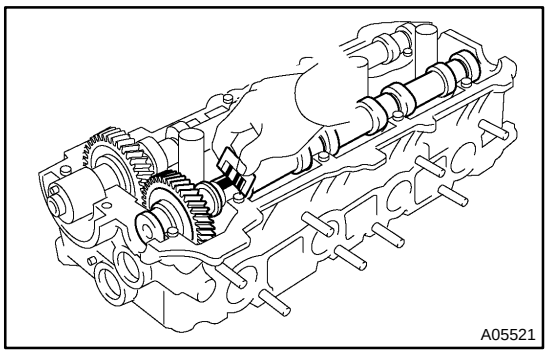


(d) Install the bearing caps.
(See page EM-59)
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

NOTICE:

Do not turn the camshaft.

(e) Remove the bearing caps.

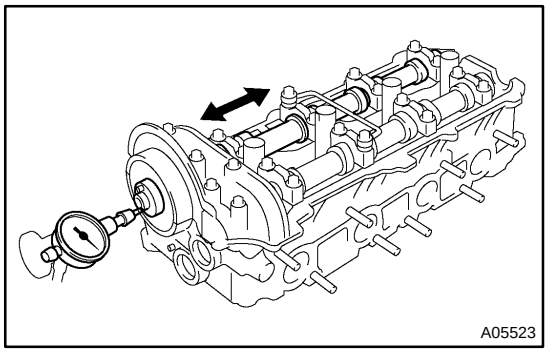


(f) Measure the Plastigage at its widest point.
Maximum oil clearance:
0.10 mm (0.0039 in.)

If the oil clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(g) Completely remove the plastigage.

(h) Remove the camshafts.



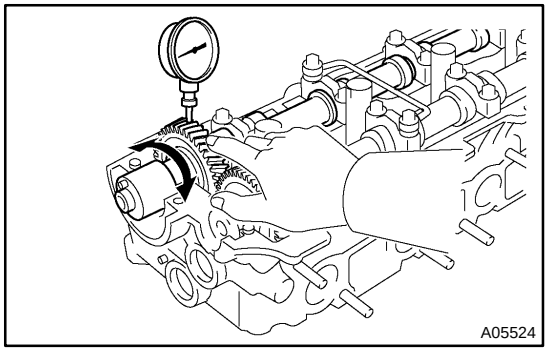
19. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshaft.
(See page EM-59)

(b) Using a dial indicator, measure the thrust clearance as moving the camshaft back and forth.
Standard thrust clearance:
Intake
0.040 - 0.090 mm (0.0016 - 0.0035 in.)
Exhaust
0.040 - 0.085 mm (0.0016 - 0.0033 in.)
Maximum thrust clearance:
0.12 mm (0.0047 in.)

If the thrust clearance is greater than the maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(c) Remove the camshafts.



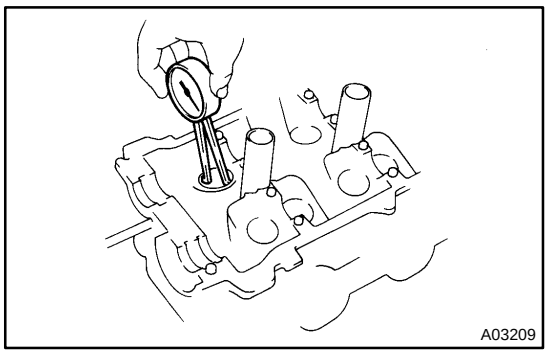
20. INSPECT CAMSHAFT GEAR BACKLASH

(a) Install the camshafts without installing the exhaust cam sub-gear and the front bearing cap.
(See page EM-59)

(b) Using a dial indicator, measure the backlash.
Standard backlash:
0.020 - 0.200 mm (0.0008 - 0.0079 in.)
Maximum backlash:
0.30 mm (0.0188 in.)

If the backlash is greater than the maximum, replace the camshafts.

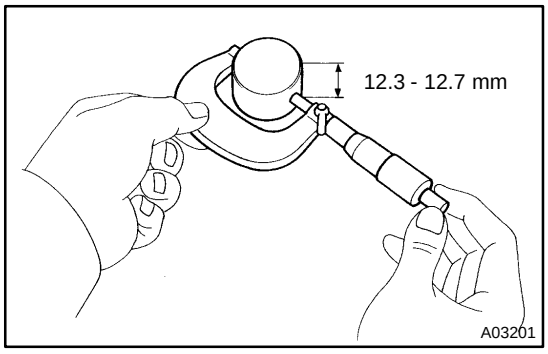
(c) Remove the camshafts.



21. INSPECT VALVE LIFTERS AND LIFTER BORES

(a) Using a caliper gauge, measure the lifter bore diameter of the cylinder head.

Lifter bore diameter:
31.000 - 31.016 mm (1.2205 - 1.2211 in.)



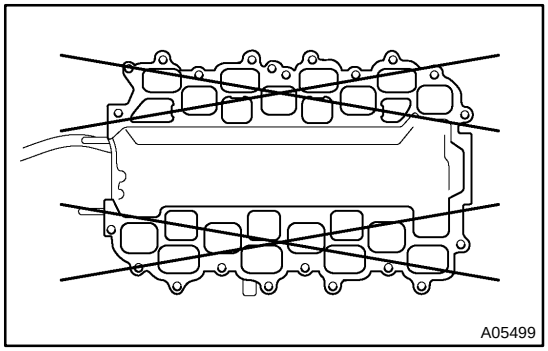
(b) Using a micrometer, measure the lifter diameter at the valve lifter center line, 12.3 - 12.7 mm (0.484 - 0.500 in.) from the valve lifter head.

Lifter diameter:
30.966 - 30.976 mm (1.2191 - 1.2195 in.)

(c) Subtract the lifter diameter from the lifter bore diameter.

Standard oil clearance:
0.024 - 0.050 mm (0.0009 - 0.0020 in.)
Maximum oil clearance:
0.07 mm (0.0028 in.)

If the oil clearance is greater than the maximum, replace the lifter. If necessary, replace the cylinder head.



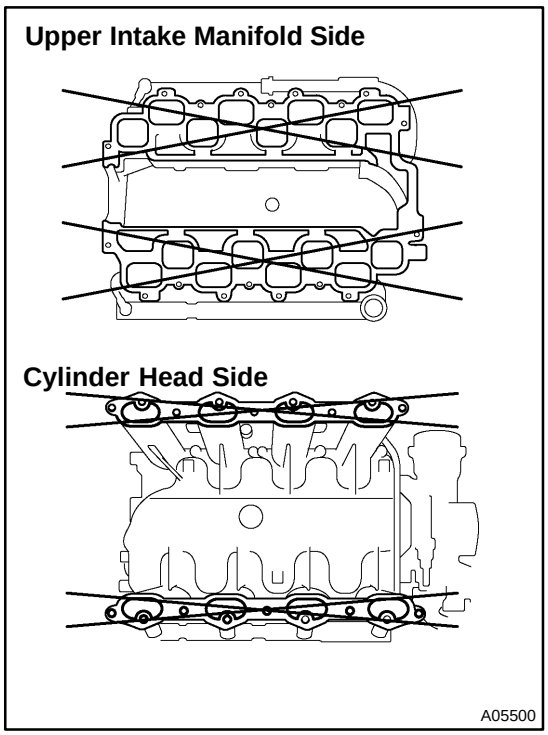
22. INSPECT INTAKE MANIFOLD

(a) Upper intake manifold:

Using a precision straight edge and a feeler gauge, measure the surface contacting of the lower intake manifold for a warp.

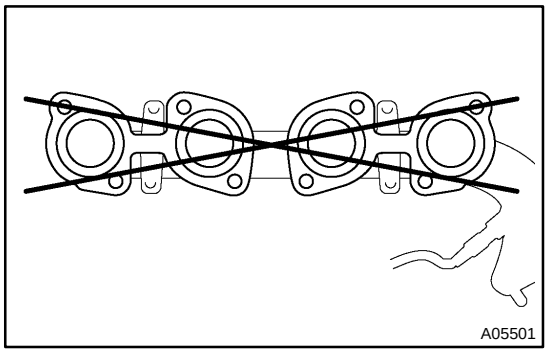
Maximum warpage: 0.15 mm (0.0059 in.)

If the warp is greater than the maximum, replace the upper intake manifold.



(b) Lower intake manifold:
Using a precision straight edge and a feeler gauge, measure the surface contacting of the cylinder head and the upper intake manifold for a warpage.
Maximum warpage:
0.15 mm (0.0059 in.)

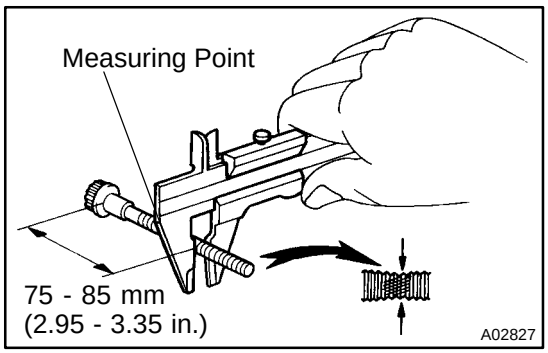
If the warp is greater than the maximum, replace the lower intake manifold.



23. INSPECT EXHAUST MANIFOLD

Using a precision straight edge and a feeler gauge, measure the surface contacting of the cylinder head for a warp.
Maximum warpage:
0.50 mm (0.0197 in.)

If the warp is greater than the maximum, replace the manifold.



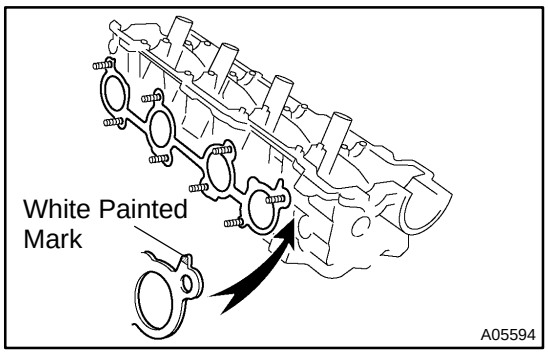
24. INSPECT CYLINDER HEAD BOLTS

Using vernier calipers, measure the thread outside diameter of the bolt.
Standard outside diameter:
9.810 - 9.960 mm (0.3862 - 0.3921 in.)
Minimum outside diameter:
9.700 mm (0.3819 in.)

If the diameter is less than the minimum, replace the bolt.

EM1V9-01

INSTALLATION

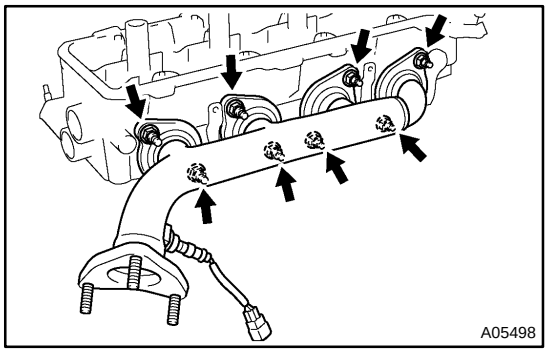


1. INSTALL RH EXHAUST MANIFOLD TO CYLINDER HEAD

(a) Place a new gasket on the cylinder head with the white painted marks facing the manifold side.

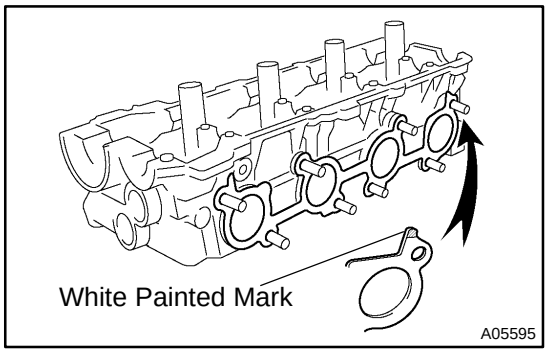
NOTICE:

Be careful of the installation direction.



(b) Install the exhaust manifold with 8 new nuts. Evenly tighten the nuts a little at a time for several times.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Install the heat insulator with the 4 bolts.
Torque: 7.5 N·m (77 kgf·cm, 66 in.·lbf)

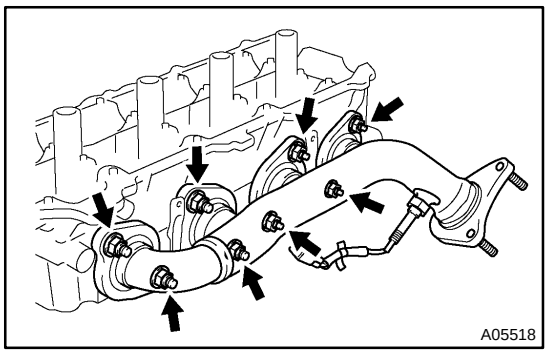


2. INSTALL LH EXHAUST MANIFOLD TO CYLINDER HEAD

(a) Place a new gasket on the cylinder head with the white painted marks facing the manifold side.

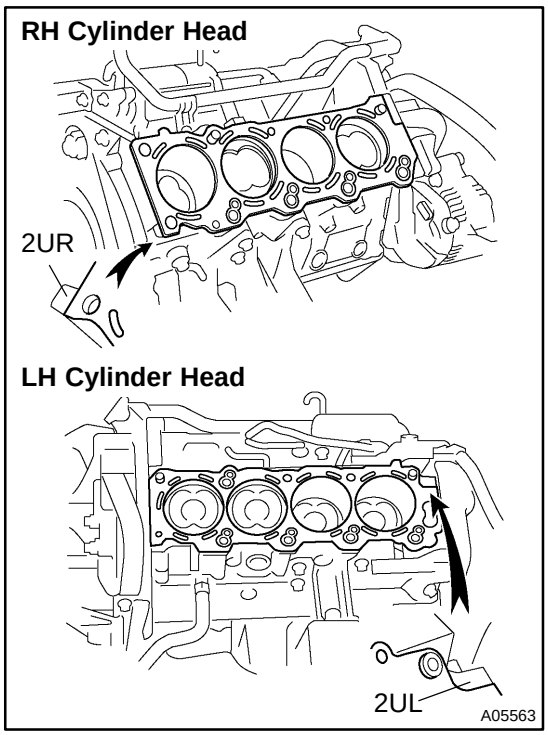
NOTICE:

Be careful of the installation direction.



(b) Install the exhaust manifold with 8 new nuts. Evenly tighten the nuts a little at a time for several times.
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Install the heat insulator with the 4 bolts.
Torque: 7.5 N·m (77 kgf·cm, 66 in.·lbf)



3. PLACE CYLINDER HEAD ON CYLINDER BLOCK

(a) Place 2 new cylinder head gaskets in position on the cylinder block.

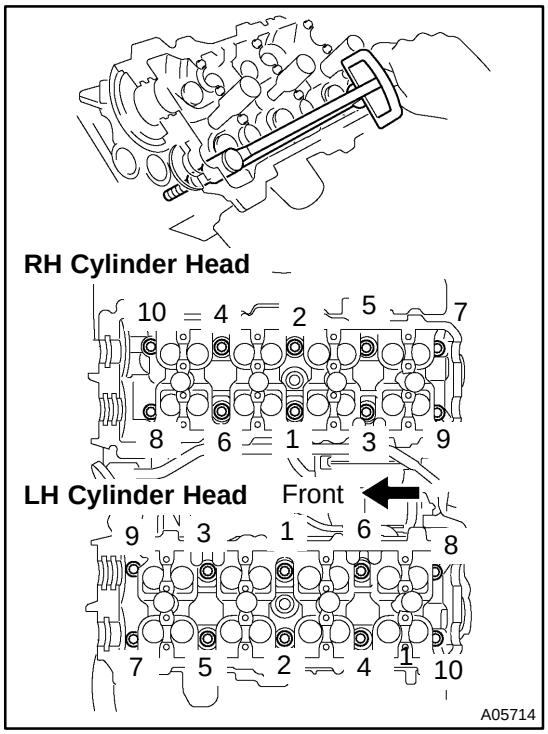
HINT:

On the rear side of the cylinder head gasket, there is a mark to distinguish the LH and RH banks, a ”2UR” for the RH bank and a ”2UL” for the LH bank.

NOTICE:

Be careful of the installation direction.

(b) Place the 2 cylinder heads in position on the cylinder head gaskets.



4. INSTALL CYLINDER HEAD BOLTS

HINT:

- ★ The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (e)).
- ★ If any cylinder head bolt is broken or deformed, replace it.

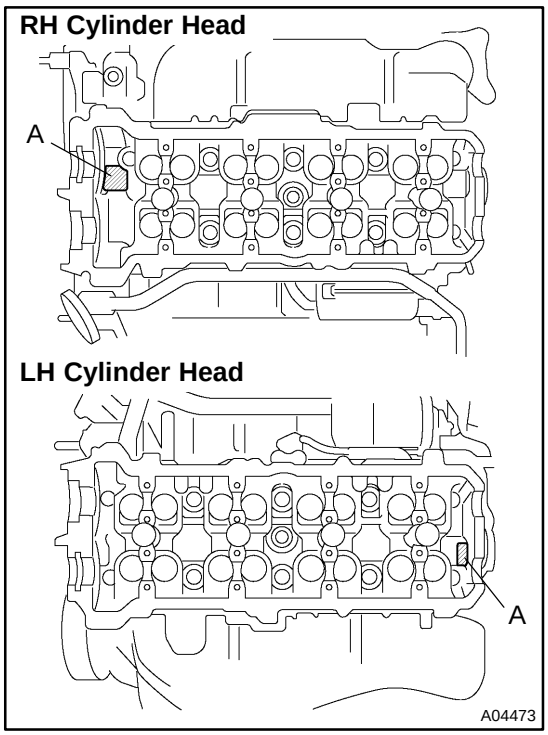
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the plate washer to the cylinder head bolt.

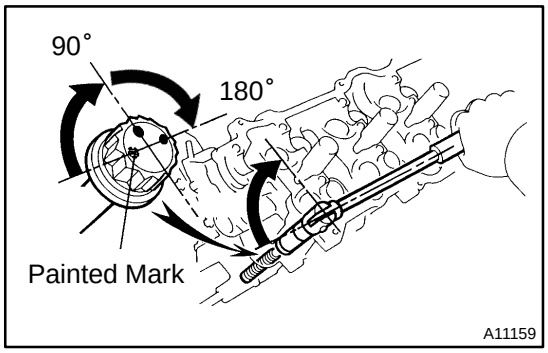
(c) Install and evenly tighten the 10 cylinder head bolts on one side of the cylinder head a little at a time for several times as in the order shown, then do the other side as shown.

Torque: 32 N·m (325 kgf·cm, 24 ft·lbf)

If any one of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.

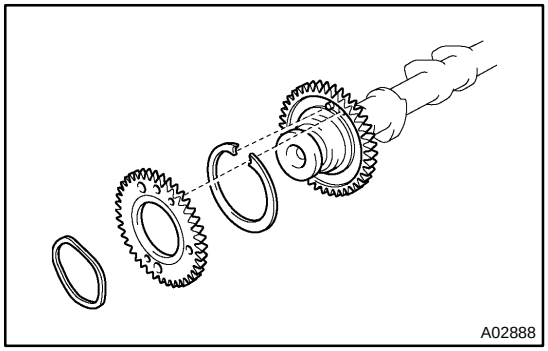


NOTICE:
Do not drop the plate washer of the cylinder head bolt into A area in the illustration. It will fall down to the oil pan through the cylinder head and the cylinder block.



(d) Mark the front of the cylinder head bolt head with paint.
(e) Retighten the cylinder head bolts by 90˚ only for the first time.
(f) Then retighten them by 90˚ further for the second time.
(g) Check that the painted mark is now at a 180˚ angle to the front.

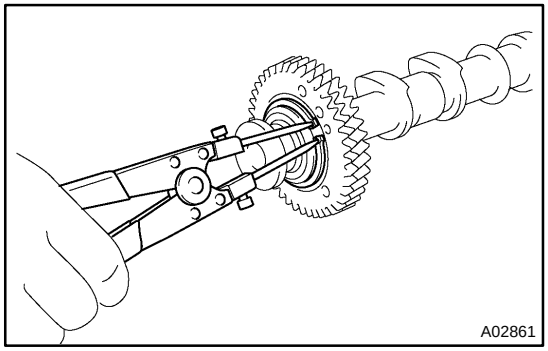
5. INSTALL SPARK PLUGS



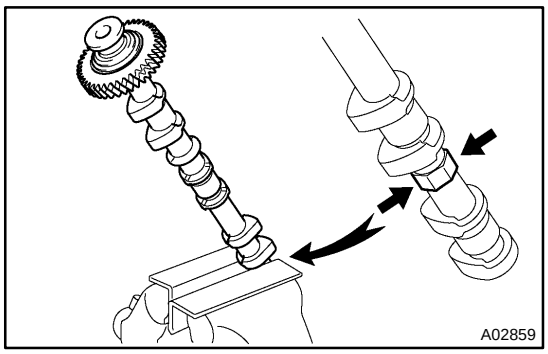
6. ASSEMBLE EXHAUST CAMSHAFT

(a) Install the camshaft gear spring, the camshaft sub-gear and the wave washer.

HINT:
Attach the pins on the gears to the gear spring ends.



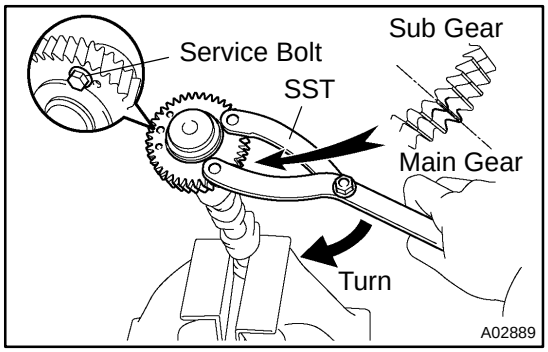
(b) Using snap ring pliers, install the snap ring.



(c) Mount the hexagon shaped part of the camshaft in a vise.

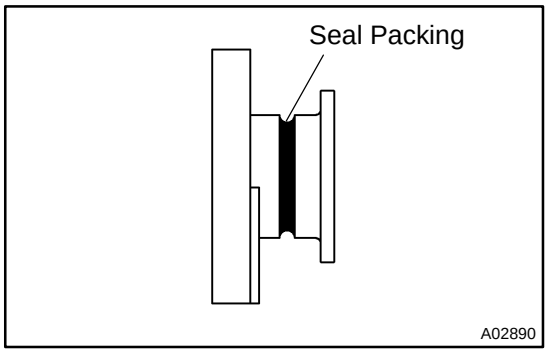
NOTICE:

Be careful not to damage the camshaft.



(d) Using SST, align the holes of the camshaft main gear and sub-gear by turning camshaft sub-gear counterclockwise, and temporarily install a service bolt.
SST 09960-10010 (09962-01000, 09963-00500)

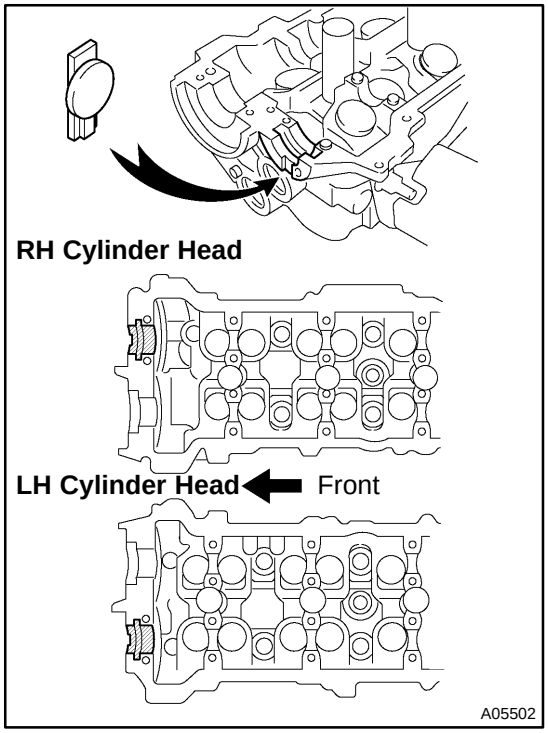
(e) Align the gear teeth of the main gear and sub-gear, and tighten the service bolt.



7. INSTALL CAMSHAFT HOUSING PLUGS

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the camshaft housing plug grooves.
Seal packing:
Part No. 08826-00080 or equivalent



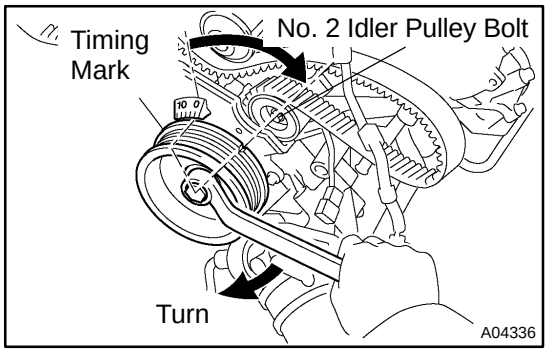
(c) Install the 2 camshaft housing plugs to the cylinder heads.

8. INSTALL CAMSHAFTS

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. Otherwise, excessive pressure is put on the cylinder head journal thrust, causing a burr on the journal and damage on the camshaft. To avoid this, follow the steps below.

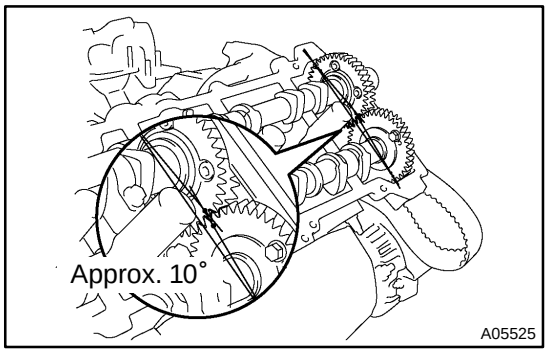
(a) Set the crankshaft pulley position.
Turn the crankshaft pulley clockwise or counterclockwise, and put the timing mark of the crankshaft pulley in line with the centers of the crankshaft pulley bolt and the idler pulley bolt.



NOTICE:

Having the crankshaft pulley at the wrong angle can cause the piston head and the valve head to come into contact with each other when removing the camshaft, causing damage on them. So always set the crankshaft pulley at the correct angle.

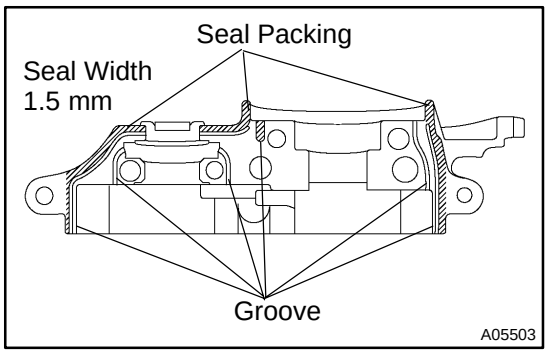
(b) Install the RH camshafts.
(1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.
(2) Place the intake and exhaust camshafts.
(3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10˚ angle.



(4) Remove any old packing (FIPG) material from the front bearing cap.
(5) Apply seal packing to the front bearing cap as shown in the illustration.

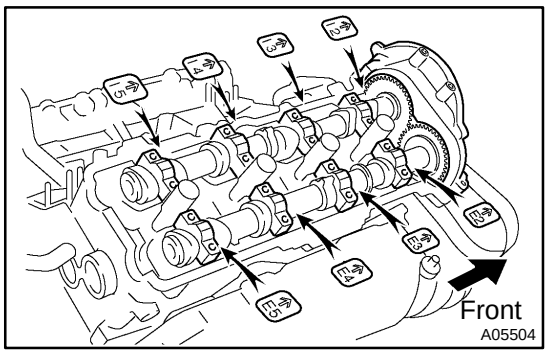
Seal packing:
Part No. 08826-00080 or equivalent

- ★ Install a nozzle that is cut to a 1.5 mm (0.06 in.) opening.
- ★ Parts must be assembled within 5 minutes the seal packing application. Otherwise the material must be removed and the packing have to be reapplied.
- ★ Immediately remove nozzle from the tube and reinstall cap.



NOTICE:

Do not apply seal packing to the front bearing cap grooves.

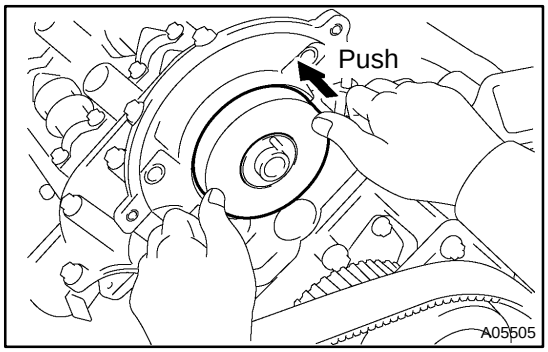


(6) Install the front bearing cap.

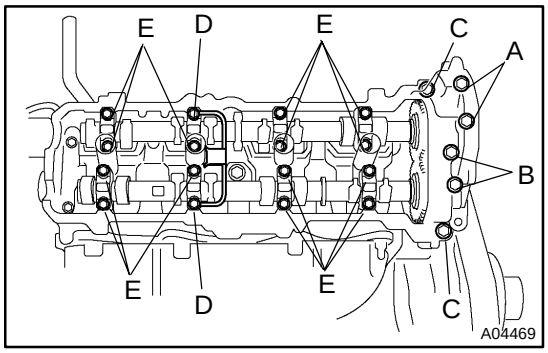
HINT:
Installing the front bearing cap will determine the thrust portion of the camshaft.

(7) Install the other bearing cap in the sequence shown with the arrow mark facing forward.

HINT:
Align the arrow marks at the front and rear of the cylinder head with the mark on the bearing cap.



(8) Push in the camshaft oil seal.

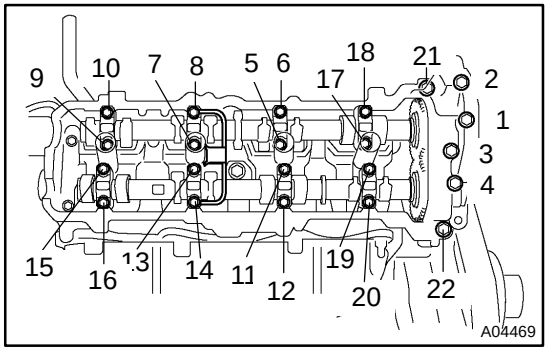


(9) Apply a light coat of engine oil on the threads and under the heads (D and E) of the bearing cap bolts.

HINT:
Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

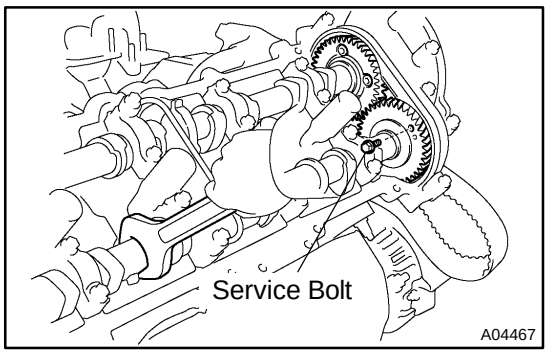
(10) Install the oil feed pipe and the 22 bearing cap bolts as shown.

HINT:
Bolt length:
94 mm (3.70 in.) for A
72 mm (2.83 in.) for B
25 mm (0.98 in.) for C
52 mm (2.05 in.) for D
38 mm (1.50 in.) for E

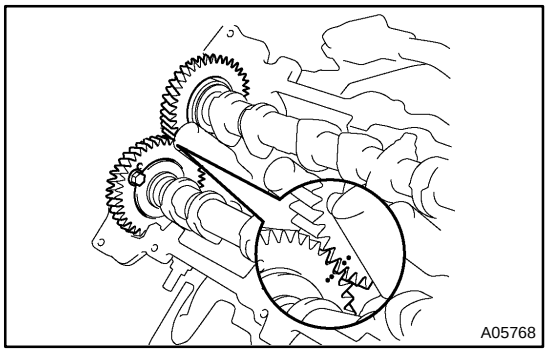


(11) Evenly tighten the 22 bearing cap bolts a little at a time for several times as in the sequence shown.

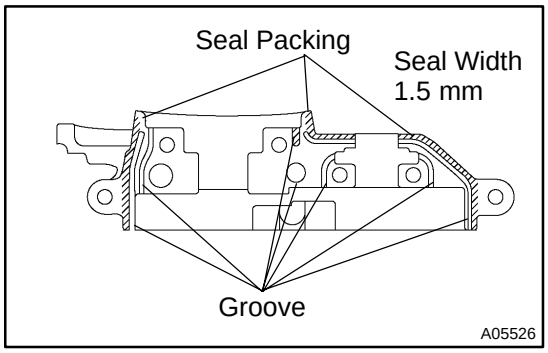
Torque:
Bolt C:
7.5 N·m (80 kgf·cm, 69 in.·lbf)
Others
16 N·m (160 kgf·cm, 12 ft·lbf)



(12) Move a service bolt of the sub-gear upward by turning the hexagon shaped port of the exhaust camshaft with a wrench.
(13) Remove the service bolt.



(c) Install the LH camshafts.
(1) Apply MP grease to the thrust portion of the intake and exhaust camshafts.
(2) Place the intake and exhaust camshafts.
(3) Engage the intake to the exhaust gear by putting the timing marks (2 dot marks) on each gear.

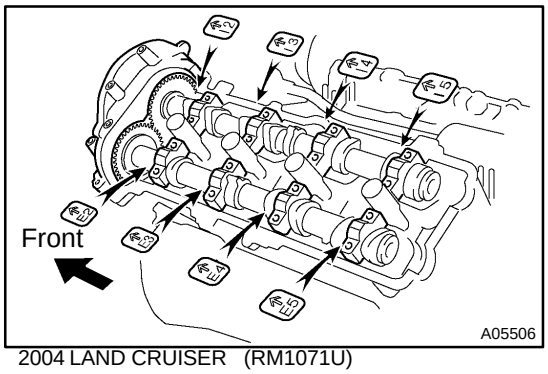


(4) Remove any old packing (FIPG) material.
(5) Apply seal packing to the front bearing cap.

Seal packing:
Part No. 08826-00080 or equivalent

★ Install a nozzle that is cut to a 1.5 mm (0.06 in.) opening.
★ Parts must be assembled within 5 minutes the seal packing application. Otherwise the material must be removed and the packing have to be reapplied.
★ Immediately remove nozzle from the tube and reinstall cap.

NOTICE:
Do not apply seal packing to the front bearing cap grooves.

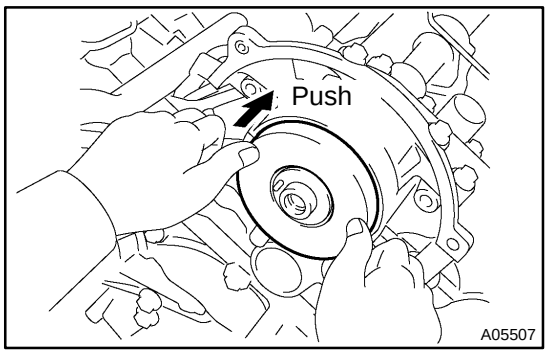


(6) Install the front bearing cap.

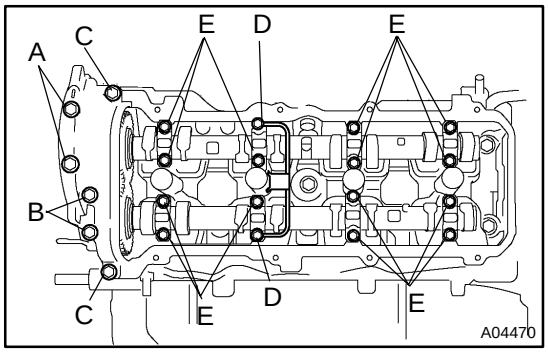
HINT:
Installing the front bearing cap will determine the thrust portion of the camshaft.

(7) Install the other bearing cap in the sequence shown with the arrow mark facing forward.

HINT:
Align the arrow marks at the front and rear of the cylinder head with the mark on the bearing cap.



(8) Push in the camshaft oil seal.



(9) Apply a light coat of engine oil on the threads and under the heads (D and E) of the bearing cap bolts.

HINT:

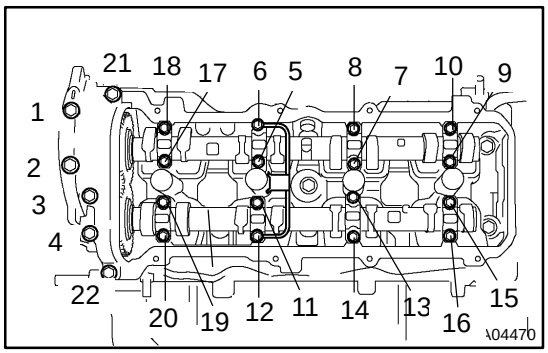
Do not apply engine oil under the heads of the bearing cap bolt (A), (B) and (C).

(10) Install the oil feed pipe and the 22 bearing cap bolts as shown.

HINT:

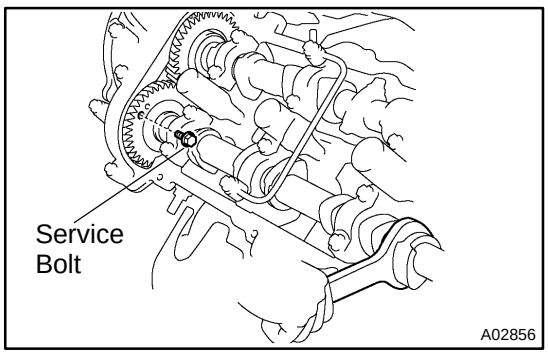
Bolt length:

94 mm (3.70 in.) for A
72 mm (2.83 in.) for B
25 mm (0.98 in.) for C
52 mm (2.05 in.) for D
38 mm (1.50 in.) for E



(11) Uniformly tighten the 22 bearing cap bolts in several passes, in the sequence shown.

Torque:
Bolt C:
7.5 N·m (80 kgf·cm, 69 in.·lbf)
Others
16 N·m (160 kgf·cm, 12 ft·lbf)

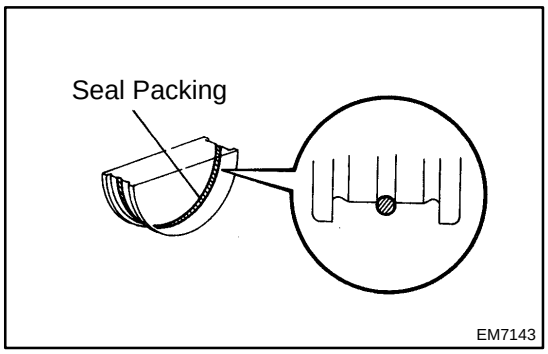


(12) Move a service bolt of the sub-gear upward by turning the hexagon shaped port of the exhaust camshaft with a wrench.

(13) Remove the service bolt.

9. CHECK AND ADJUST VALVE CLEARANCE (See page EM-4)

Turn the camshaft and the position the cam lobe upward, and check and adjust the valve clearance.

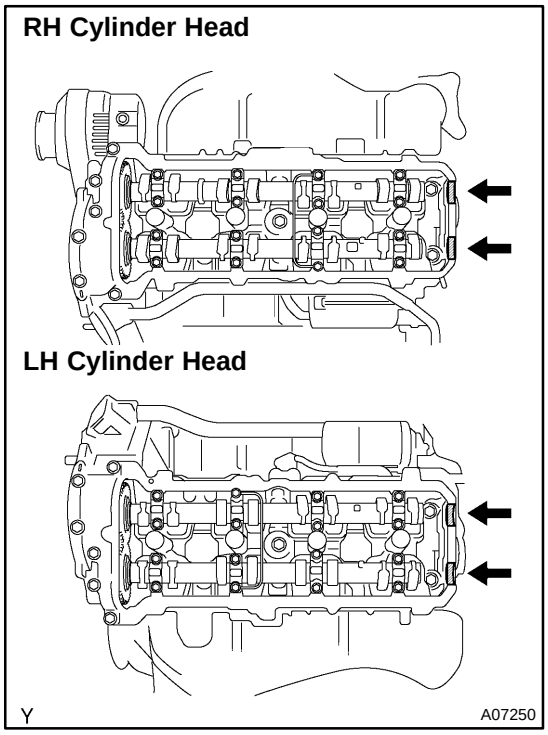


10. INSTALL SEMI-CIRCULAR PLUGS

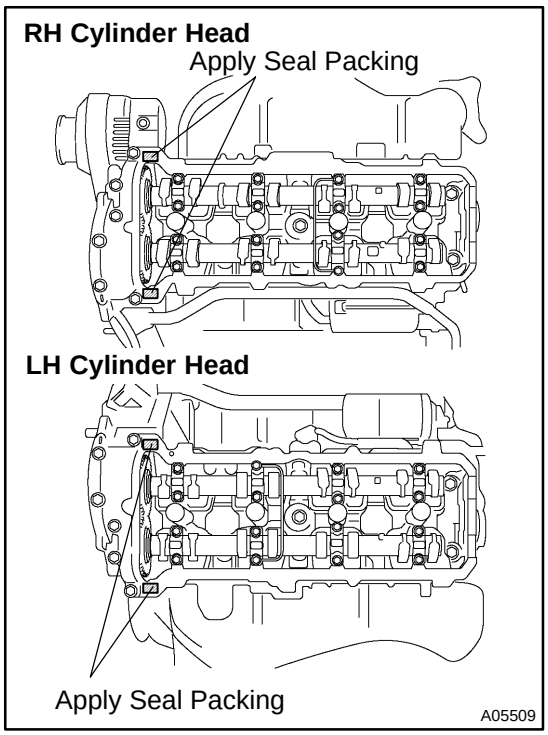
(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the semi-circular plug grooves.

Seal packing:
Part No. 08826-00080 or equivalent



(c) Install the 4 semi-circular plugs to the cylinder heads.



11. INSTALL CYLINDER HEAD COVER

(a) Remove any old packing (FIPG) material.

(b) Apply seal packing to the cylinder heads as shown in the illustration.

Seal packing:
Part No. 08826-00080 or equivalent

(c) Install the gasket to the cylinder head cover.

(d) Install the seal washer to the bolt.

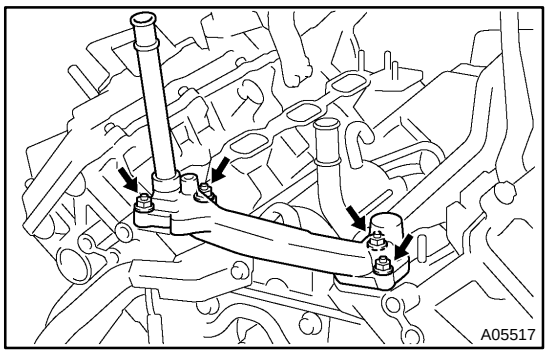
(e) Install the cylinder head cover with the 18 bolts. Evenly tighten the bolts a little at a time for several times. Install the 2 cylinder head covers.

Torque: 6.0 N·m (60 kgf·cm, 53 in.·lbf)

12. INSTALL ENGINE HANGERS

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

13. INSTALL OIL DIPSTICK AND GUIDE FOR ENGINE

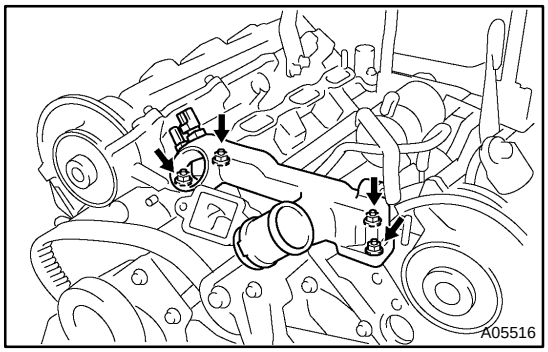


14. INSTALL REAR WATER BYPASS JOINT

(a) Install 2 new gaskets to the cylinder head.

(b) Install the 4 nuts holding the water bypass joint to the cylinder heads. Alternately tighten the nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

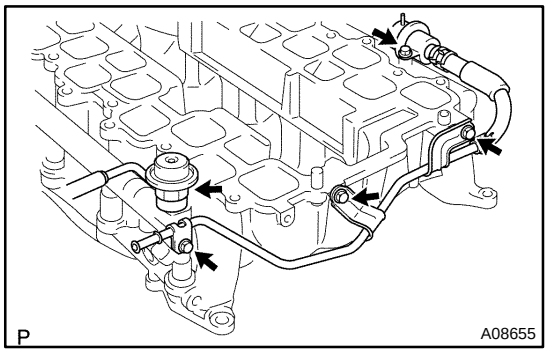


15. INSTALL FRONT WATER BYPASS JOINT

Install 2 new gaskets and the water bypass joint with the 4 nuts. Alternately tighten the nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

16. INSTALL WATER INLET AND INLET HOUSING ASSEMBLY (See page CO-8)



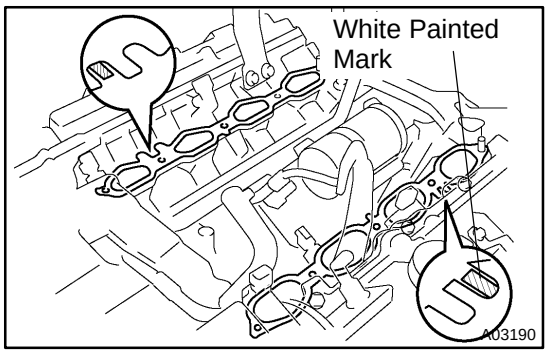
17. ASSEMBLE UPPER AND LOWER INTAKE MANIFOLDS

(a) Install the 2 delivery pipes and the 8 injectors (See page SF-27).

(b) Install new 2 gaskets, the fuel pressure regulator and the fuel pulsation damper.

(c) Install the fuel return hose to the lower intake manifold with the 3 bolts.

(d) Connect the fuel return hose to the fuel pressure regulator.



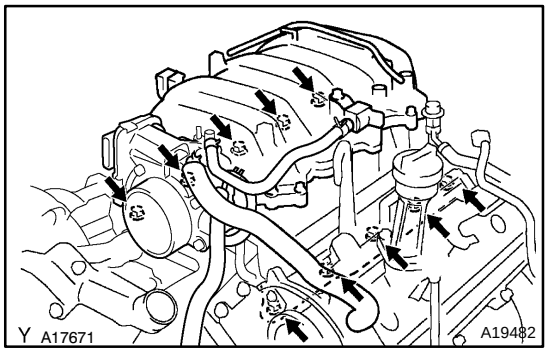
18. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Place 2 new gaskets on the cylinder heads with white painted mark facing upward.

NOTICE:

★ **Align the port holes of the gasket and cylinder head.**

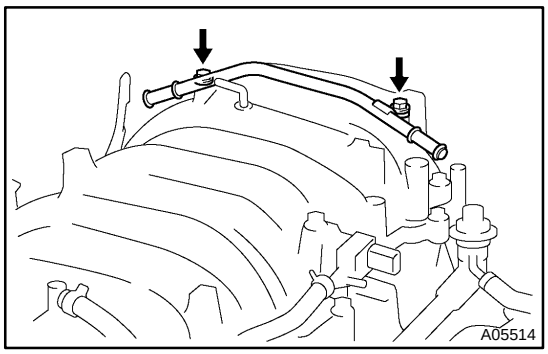
★ **Be careful of the installation direction.**



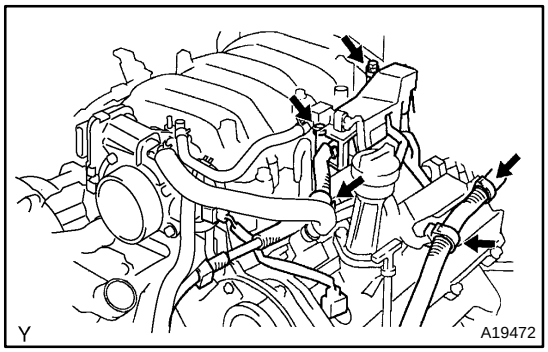
(b) Place the intake manifold assembly on the cylinder heads.

(c) Install and uniformly tighten the 6 bolts and the 4 nuts in several passes.

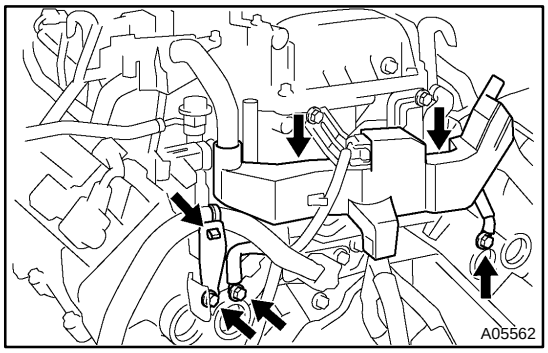
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



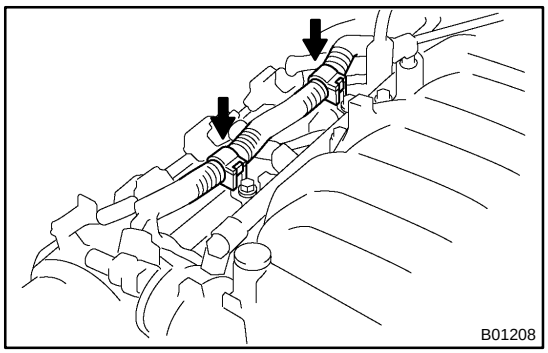
(d) Install the EVAP pipe to the intake manifold with the 2 bolts.



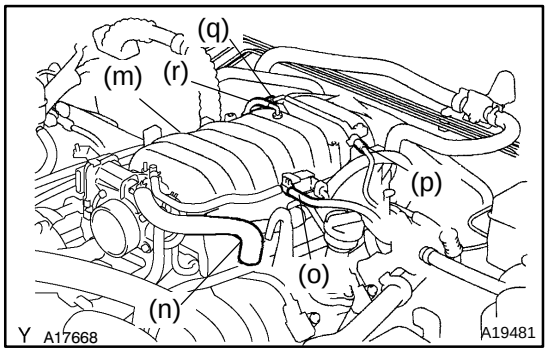
(e) Connect the wire protector to the intake manifold with the 2 bolts.
(f) Install the engine wire to the engine hanger.
(g) Install the engine wire to the LH No.1 timing belt rear plate.
(h) Install the engine wire to the bracket.



(i) Connect the wire protector to the rear water bypass joint and RH cylinder head with the 2 bolts.
(j) Install the 2 ground cables to the RH and LH cylinder head.
(k) Install the guide for A/T bracket to the LH cylinder head.

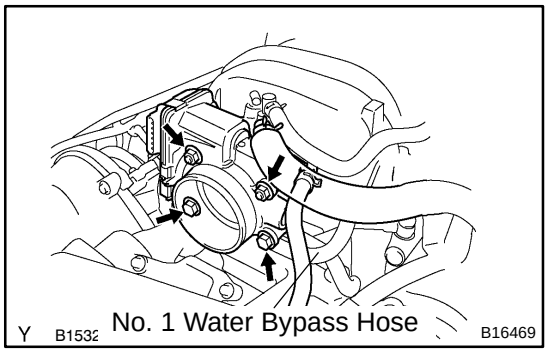


(l) Connect the 2 wire clamps to the wire clamp bracket on the RH delivery pipe.



(m) Connect the fuel pressure regulator vacuum hose to the fuel pressure regulator pipe.
(n) Connect the PCV hose to the PCV valve on the LH cylinder head.
(o) Connect the EVAP hose (from charcoal canister) to the VSV for EVAP.
(p) Connect the EVAP hose (from charcoal canister) to the EVAP pipe on the intake manifold.
(q) Connect the EVAP hose (from intake air connector) to EVAP pipe on the the intake manifold.

(r) Connect the PS air hose to intake manifold.



(s) Connect the No.1 water bypass hose (from water inlet housing) to throttle body.
(t) Connect the throttle control connector.
(u) Connect the VSV connector for EVAP.
(v) Connect the 8 injector connectors.
(w) Connect the ECT sensor.
(x) Connect the water sender gauge.
(y) Connect the 8 ignition coil connectors.
(z) Connect the 2 oxygen sensor connectors.

19. CONNECT FUEL INLET HOSE (See page SF-24)

20. INSTALL TIMING BELT REAR PLATES

(a) Install the RH timing belt rear plates.
Install the No.1 timing belt rear plate to the cylinder head with the 3 bolts and the stud bolt.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(b) Install the LH timing belt rear plates.
(1) Connect the wire clamp to the No.1 timing belt rear plate.
(2) Install the No.1 timing belt rear plate to the cylinder head with the 3 bolts.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

21. INSTALL V-BANK COVER

Install the 3 V-bank covers.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

22. INSTALL IGNITION COILS (See page IG-6)

23. INSTALL OIL DIPSTICK AND GUIDE FOR A/T

24. INSTALL FRONT EXHAUST PIPE (See page EM-1 15)

25. INSTALL PS PUMP (See page EM-81)

26. INSTALL CAMSHAFT POSITION SENSOR (See page IG-10)

27. INSTALL CAMSHAFT TIMING PULLEYS (See page EM-22)

28. CONNECT TIMING BELT TO CAMSHAFT TIMING PULLEYS (See page EM-22)

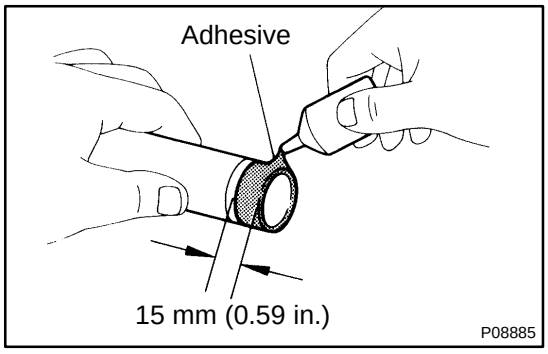
29. CHECK ENGINE OIL LEVEL

EM0L4-08

REASSEMBLY

HINT:

- ★ Thoroughly clean all parts to be assembled.
- ★ Before installing the parts, apply new engine oil to all sliding and rotating surfaces.
- ★ Replace all gaskets and oil seals with new ones.

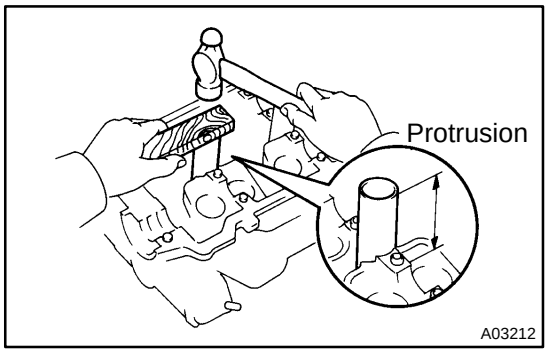


1. INSTALL SPARK PLUG TUBES

HINT:

When using a new cylinder head, the spark plug tubes must be installed.

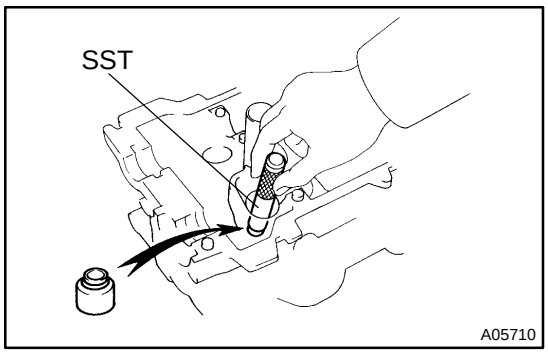
(a) Apply adhesive to the end of the spark plug tube.
Adhesive:
Part No. 08833-00070, THREE BOND 1324
or equivalent



(b) Using a wooden block and hammer, tap in a new spark tube until the protrusion from the camshaft bearing cap installation surface of the cylinder head becomes 48.4 - 49.6 mm (1.906 - 1.953 in.).

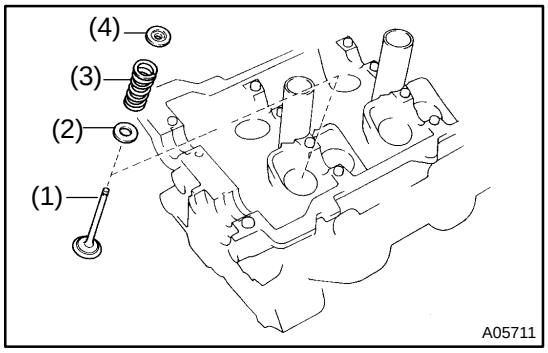
NOTICE:

Avoid tapping a new spark plug tube in too far by measuring the amount of the protrusion as tapping.

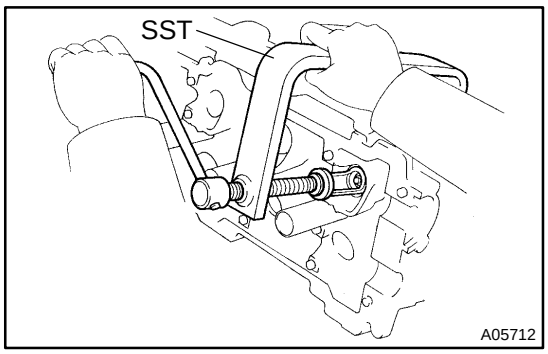


2. INSTALL VALVES

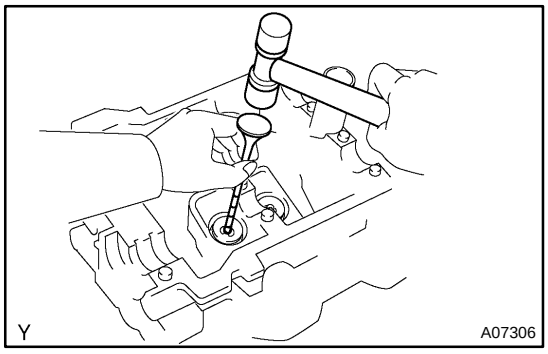
(a) Using SST, push in a new oil seal.
SST 09201-41020



(b) Install the valve (1), the spring seat (2), the valve spring (3),and the spring retainer (4).



(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202-70020



(d) Using a plastic-faced hammer and the valve stem tip taped up with vinyl tape, lightly tap the valve stem tip to assure proper fit.

NOTICE:

Be careful not to damage the valve stem tip.

3. INSTALL SHIMS AND VALVE LIFTERS

(a) Install the shim and the valve lifter.

(b) Check that the valve lifter rotates smoothly by hand.

EM1V8-01

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE V-BANK COVER

Remove the V-bank covers.

3. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS (See page EM-15)

4. REMOVE CAMSHAFT TIMING PULLEYS (See page EM-15)

5. REMOVE CAMSHAFT POSITION SENSOR (See page IG-9)

6. DISCONNECT PS PUMP FROM ENGINE (See page EM-77)

7. REMOVE FRONT EXHAUST PIPE (See page EM-1 15)

8. REMOVE OIL DIPSTICK AND GUIDE FOR A/T

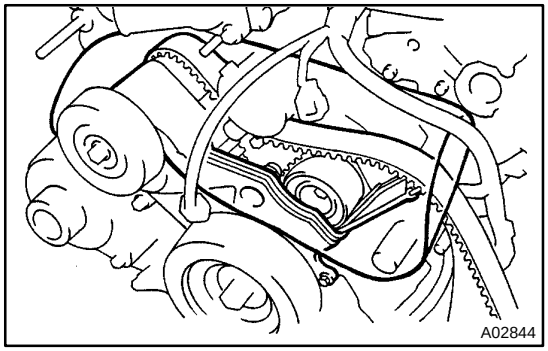
9. REMOVE IGNITION COILS (See page IG-6)

10. REMOVE TIMING BELT REAR PLATES

(1) Remove the 3 bolts, the stud bolt, and the RH No.1 timing belt rear plates.

(2) Disconnect the wire clamp from the LH timing belt rear plate.

(3) Remove the 3 bolts, the stud bolt, the LH No.1 and the timing belt rear plates.



NOTICE:

★ **Be careful not to drop anything inside the timing belt cover.**

★ **Do not allow the belt to contact correct with oil, water or dust.**

11. DISCONNECT FUEL INLET HOSE (See page SF-24)

12. REMOVE INTAKE MANIFOLD ASSEMBLY

(a) Disconnect the throttle control connector.

(b) Disconnect the VSV connector for EVAP.

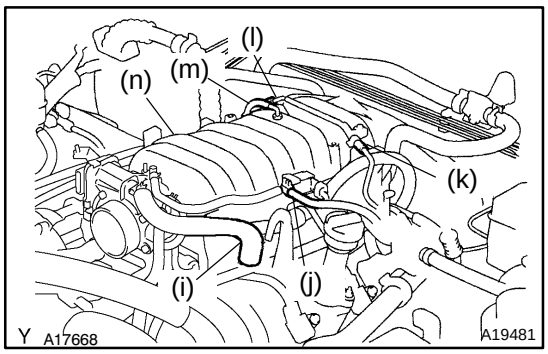
(c) Disconnect the 8 injector connectors.

(d) Disconnect the ECT sensor connector.

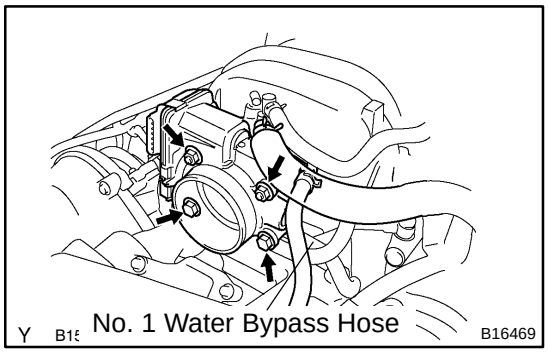
(e) Disconnect the water sender gauge connector.

(f) Disconnect the 8 ignition coil connectors.

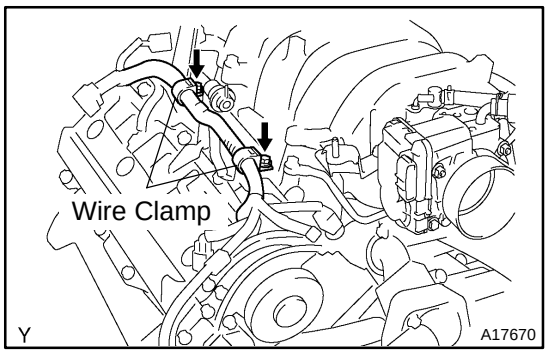
(g) Disconnect the 2 oxygen sensor connectors.



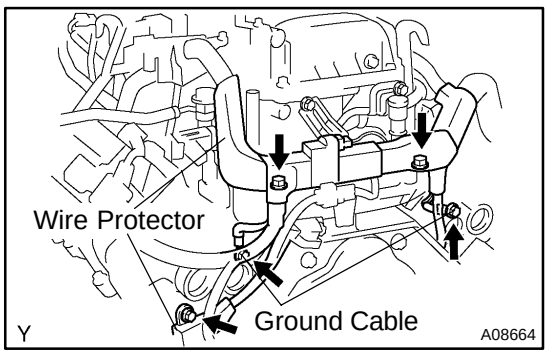
(h) Disconnect the fuel pressure regulator vacuum hose from the fuel pressure regulator pipe.
(i) Disconnect the PCV hose from the PCV valve on the LH cylinder head.
(j) Disconnect the EVAP hose (from charcoal canister) from VSV for EVAP.
(k) Disconnect the EVAP hose (from charcoal canister) from the EVAP pipe on the intake manifold.
(l) Disconnect the EVAP hose (from intake air connector) from the EVAP pipe on the intake manifold.
(m) Disconnect the PS air hose from the intake manifold.



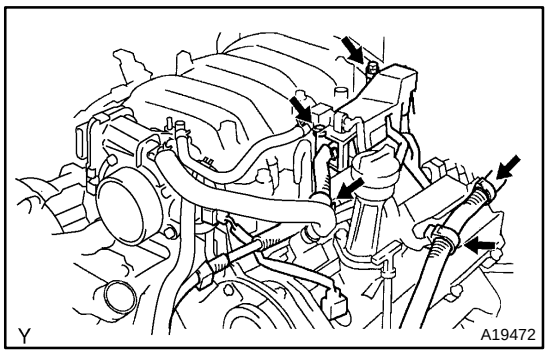
(n) Disconnect the No.1 water bypass hose from the front water by-pass joint.



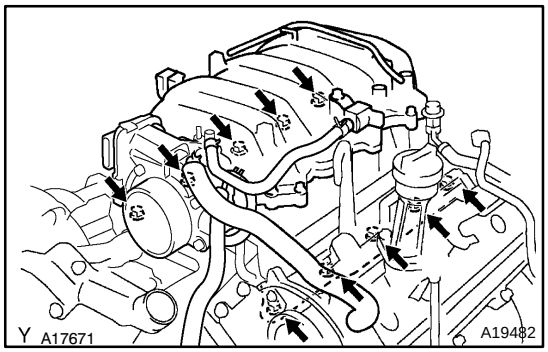
(o) Disconnect the 2 wire clamps from the wire clamp bracket on the RH delivery pipe.



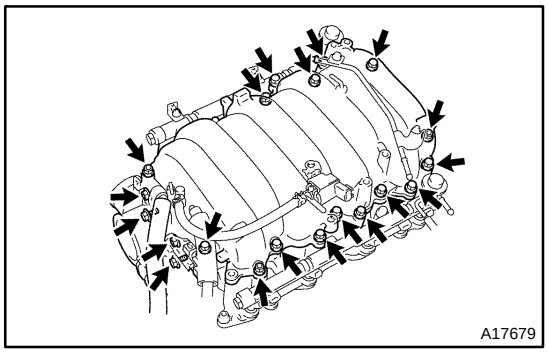
(p) Remove the 2 bolts and disconnect the engine wire protector from the rear water bypass joint and the RH cylinder head.
(q) Remove the guide for A/T bracket from the LH cylinder head.
(r) Remove the 2 ground cables from the RH and LH cylinder head.



(s) Remove the 2 bolts and disconnect the engine wire protector from the intake manifold.
(t) Remove the engine wire from the engine hanger.
(u) Remove the engine wire from the wire bracket.
(v) Remove the RH rear and the LH front V-bank cover brackets.

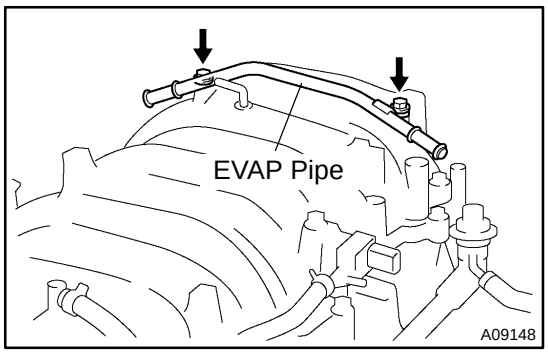


(w) Remove the 6 bolts, the 4 nuts, the intake manifold assembly and the 2 gaskets.

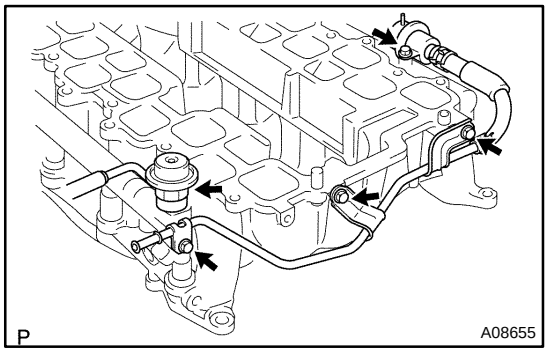


13. DISASSEMBLE UPPER AND LOWER INTAKE MANIFOLDS

(a) Remove the throttle body (See page SF-36).
(b) Remove the 13 bolts, the 3 nuts, the upper intake manifold and the gasket.
(c) Disconnect the EVAP hose from the upper intake manifold, and remove the accelerator cable clamp and VSV for EVAP.
(d) Remove the bolt, the union, the 2 gaskets and the brake booster tube from the upper intake manifold.

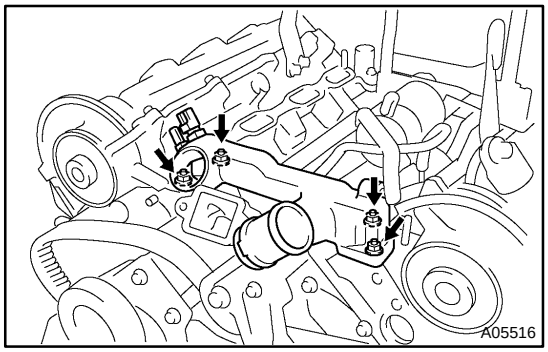


(e) Remove the 2 bolts and the EVAP pipe from the intake manifold.



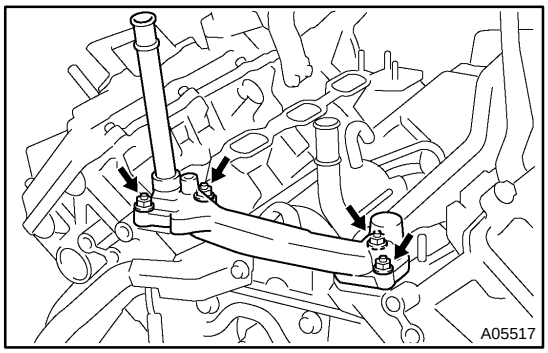
(f) Disconnect the fuel return hose from the fuel pressure regulator.
(g) Remove the 3 bolts holding the fuel return hose from the lower intake manifold.
(h) Remove the fuel pressure regulator, the fuel pressure pulsation damper and the 2 gaskets.
(i) Remove the bolt and the rear fuel pipe.
(j) Remove the 2 delivery pipes and the 8 injectors (See page SF-22).

14. REMOVE WATER INLET AND INLET HOUSING ASSEMBLY (See page CO-6)



15. REMOVE FRONT WATER BYPASS JOINT

Remove the 4 nuts, the water bypass joint and the 2 gaskets.

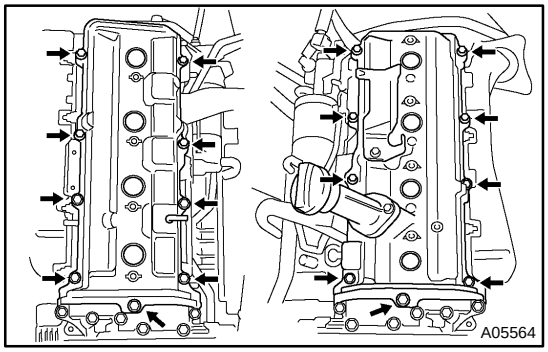


16. REMOVE REAR WATER BYPASS JOINT

Remove the 4 nuts, the water bypass joint and the 2 gaskets.

17. REMOVE ENGINE HANGERS

18. REMOVE OIL DIPSTICK AND GUIDE FOR A/T



19. REMOVE CYLINDER HEAD COVERS

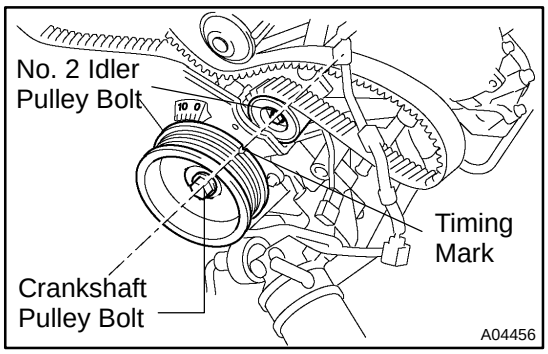
Remove the 18 bolts, the 18 seal washers, the cylinder head cover and gasket. Remove the 2 cylinder head covers.

20. IF NECESSARY, REMOVE SEMI-CIRCULAR PLUGS AND CAMSHAFT HOUSING PLUGS

21. REMOVE CAMSHAFTS

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept level while it is being removed. Otherwise, excessive pressure is put on the cylinder head journal thrust, causing a burr on the journal and damage on the camshaft. To avoid this, follow the steps below.



(a) Check the crankshaft pulley position.
Check that the timing mark of the crankshaft pulley is aligned with the centers of the crankshaft pulley bolt and the idler pulley bolt.

NOTICE:

Having the crankshaft pulley at the wrong angle can cause the piston head and the valve head to come into contact with each other when removing the camshaft, causing damage on them. So always set the crankshaft pulley at the correct angle.

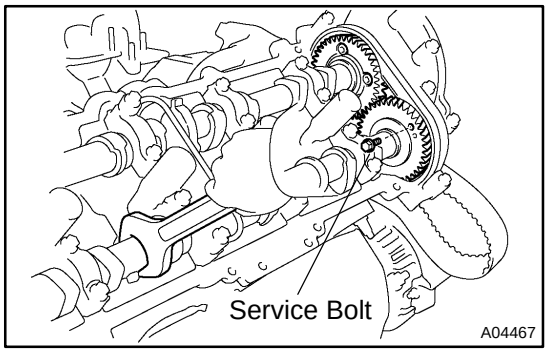
(b) Remove the RH camshafts.

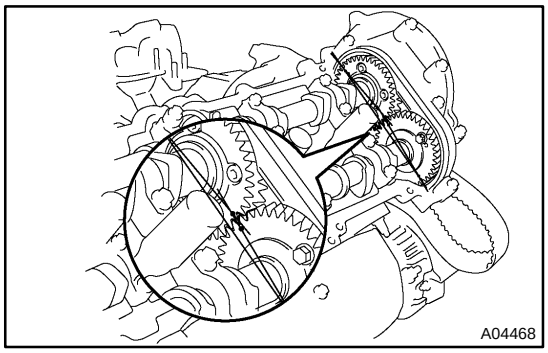
(1) Move a service bolt of the sub-gear upward by turning the hexagon shaped port of the exhaust camshaft with a wrench.

(2) Secure the sub-gear to the main gear with a service bolt.

Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm

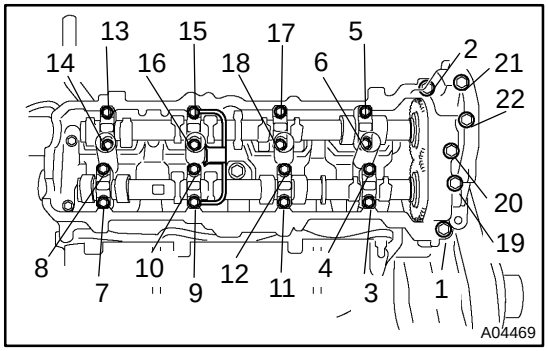




HINT:

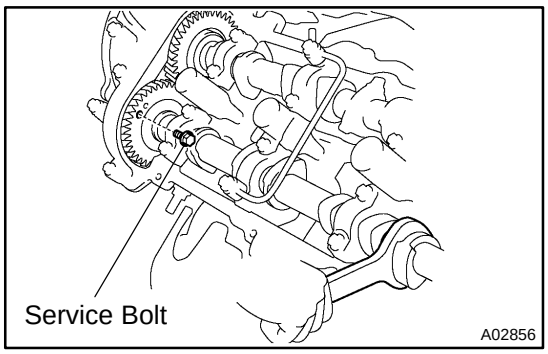
When removing the camshafts, make sure that the torsional spring force of the sub-gear is eliminated by the above operation.

(3) Set the timing mark (1 dot mark) of the camshaft main gear at approx. 10° angle by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.



(4) Uniformly loosen and remove the 22 bearing cap bolts a little at a time for several times in the sequence shown.

(5) Remove the oil feed pipe, 9 bearing caps, cam shaft timing oil control valve and camshafts.



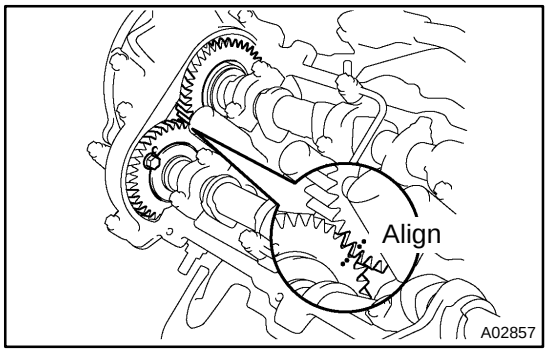
(c) Remove the LH camshafts.

(1) Move a service bolt of the sub-gear upward by turning the hexagon shaped port of the exhaust camshaft with a wrench.

(2) Secure the sub-gear to the main gear with a service bolt.

Recommended service bolt:

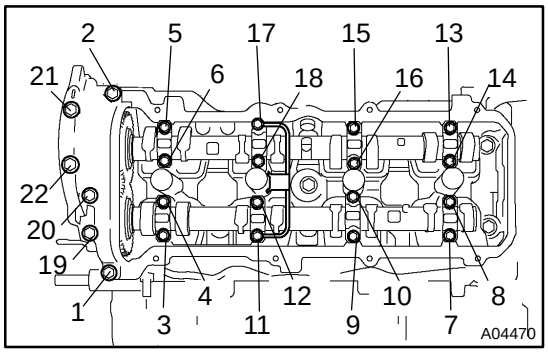
Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 - 20 mm



HINT:

When removing the camshaft, make sure that the torsional spring force of the sub-gear is eliminated by the above operation.

(3) Align the timing mark (2 dot marks) of the camshaft drive gear by turning the hexagon wrench head portion of the exhaust camshaft with a wrench.

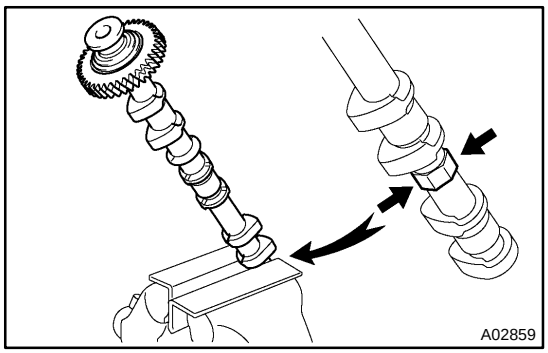


(4) Evenly loosen and remove the 22 bearing cap bolts a little at a time for several times as in the sequence shown.

(5) Remove the oil feed pipe, 9 bearing caps, and camshafts.

HINT:

Arrange the bearing caps in correct order for installation.

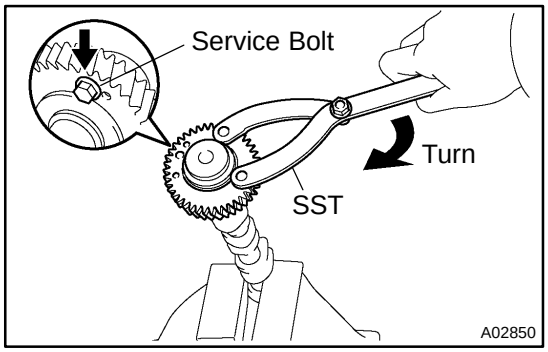


22. DISASSEMBLE EXHAUST CAMSHAFTS

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

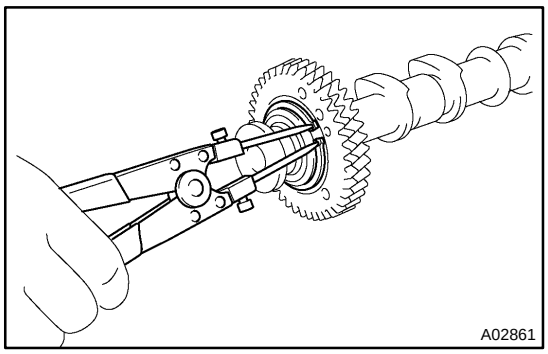
NOTICE:

Be careful not to damage the camshaft.



(b) Using SST, turn the sub-gear clockwise, and remove the service bolt.

SST 09960-10010 (09962-01000, 09963-00500)



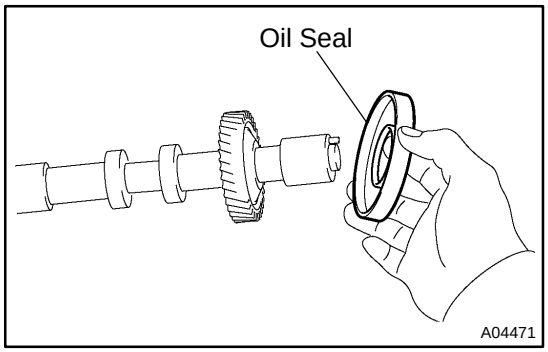
(c) Using snap ring pliers, remove the snap ring.
(d) Remove the wave washer.
(e) Remove the camshaft sub-gear.
(f) Remove the camshaft gear spring.

HINT:

Arrange the camshaft sub-gears and gear spring (RH and LH sides).

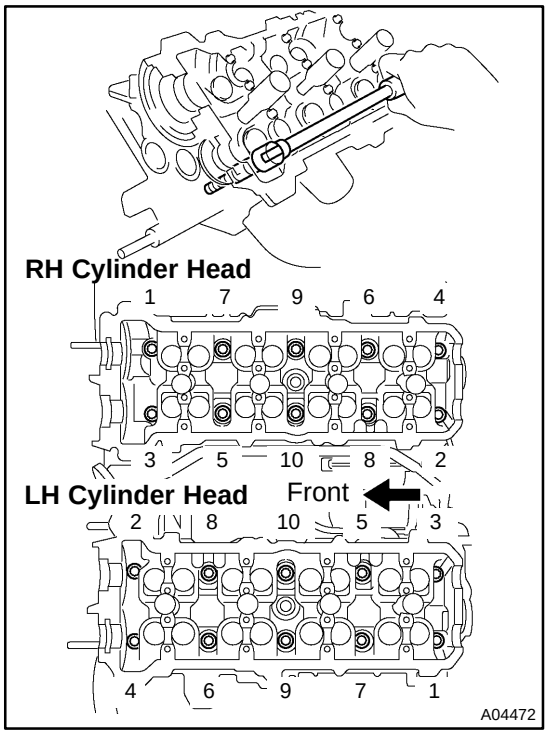
NOTICE:

Be careful not to damage the camshaft timing tube.



23. REMOVE OIL SEAL FROM INTAKE CAMSHAFT

24. REMOVE SPARK PLUGS

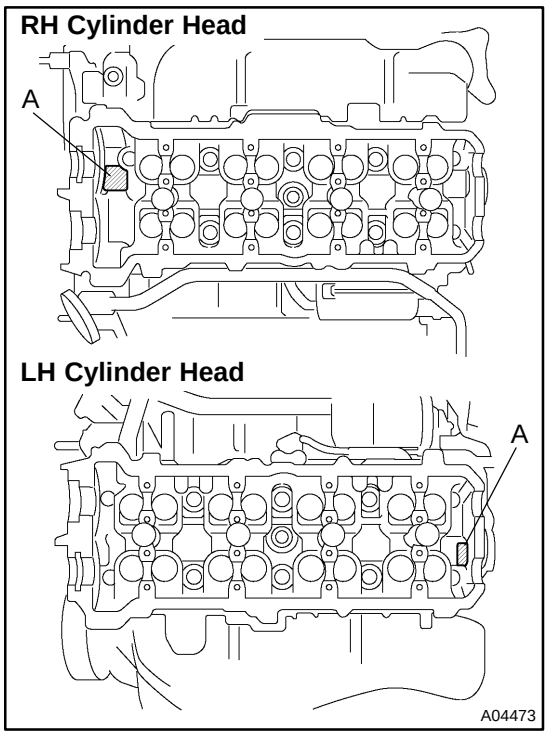


25. REMOVE CYLINDER HEAD AND EXHAUST MANIFOLD ASSEMBLIES

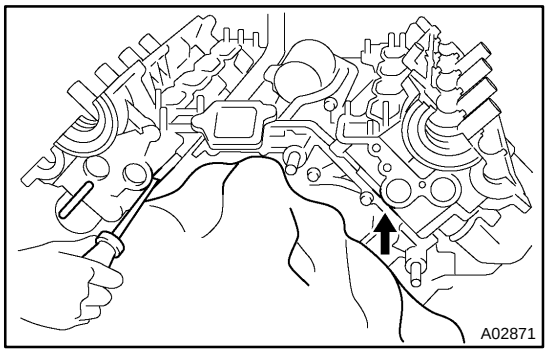
(a) Uniformly loosen the 10 cylinder head bolts on one side of each cylinder head in a little at a time for several times as in the sequence shown, then do the other side as shown. Remove the 20 cylinder head bolts and the plate washers.

NOTICE:

★ **Removing the bolts in incorrect order could cause a warp or cracks in the cylinder head.**



★ **Do not drop the plate washer of the cylinder head bolt into A area in the illustration. It will fall down to the oil pan through the cylinder head and the cylinder block.**



(b) Lift the cylinder head from the dowels on the cylinder block, and place the 2 cylinder heads on wooden blocks.

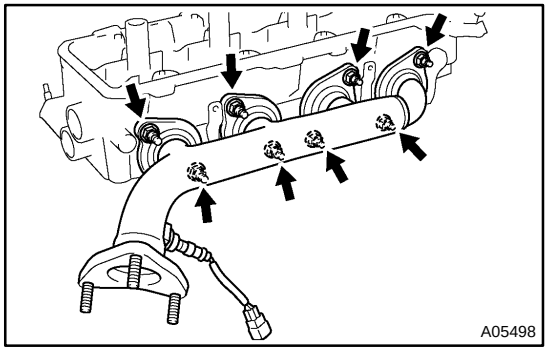
HINT:

After lifting off the cylinder head, pry off the cylinder head and the cylinder block with a screwdriver.

NOTICE:

★ **Be careful not to damage the contact surfaces of the cylinder head and the cylinder block.**

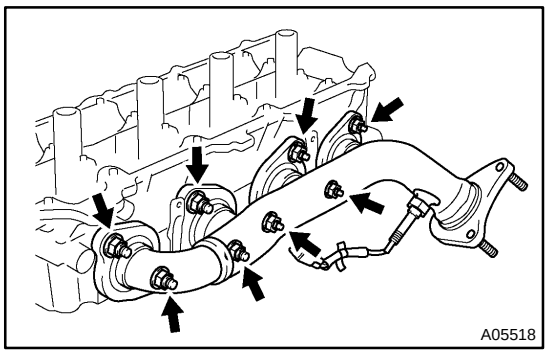
★ **The cylinder head should not be tilted so to secure the valve lifter. If the cylinder head is tilted, remove the valve lifter and check that the adjusting shim is set correctly.**



26. REMOVE RH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and the heat insulator.

(b) Remove the 8 nuts, the exhaust manifold and the gasket.



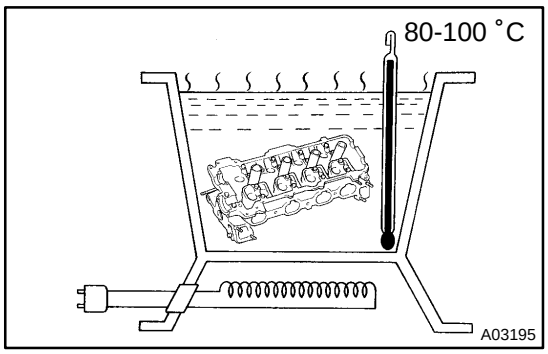
27. REMOVE LH EXHAUST MANIFOLD FROM CYLINDER HEAD

(a) Remove the 4 bolts and the heat insulator.

(b) Remove the 8 nuts, the exhaust manifold and the gasket.

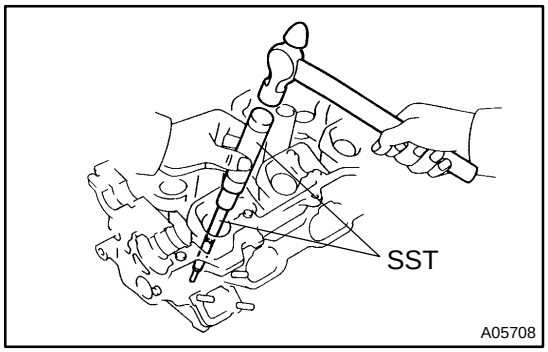
EM0L3-07

REPLACEMENT

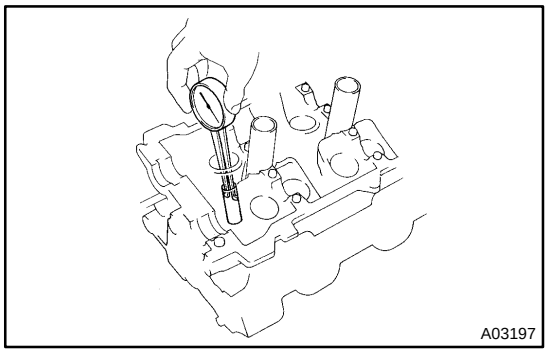


1. REPLACE VALVE GUIDE BUSHINGS

(a) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).



(b) Using SST and a hammer, tap out the guide bushing.
SST 09201-10000 (09201-01060),
09950-70010 (09951-07100)



(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

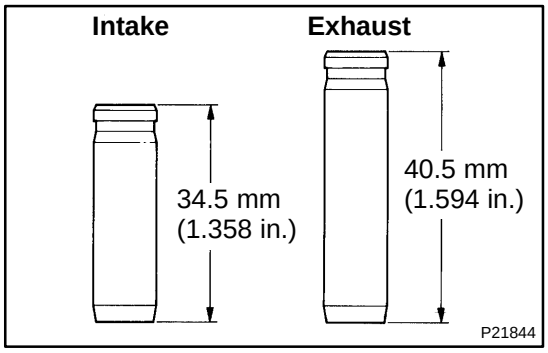
Bushing bore diameter mm (in.)	Bushing size
10.285 - 10.306 (0.4049 - 0.4057)	Use STD
10.335 - 10.356 (0.4069 - 0.4077)	Use O/S STD

(d) Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 10.306 mm (0.4057 in.), machine the bushing bore to the following dimension:

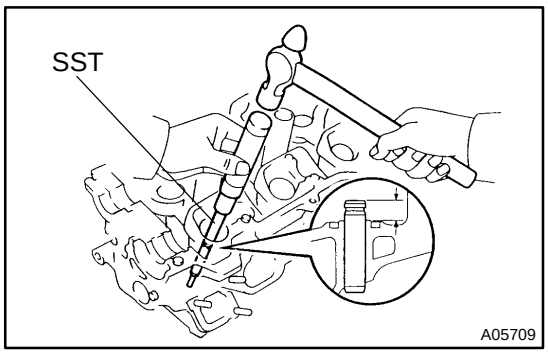
10.335 - 10.356 mm (0.4069 - 0.4077 in.)

If the bushing bore diameter of the cylinder head is greater than 10.356 mm (0.4077 in.), replace the cylinder head.



HINT:

The intake bushing and the exhaust bushing differ in their sizes.



(e) Gradually heat the cylinder head to 80 - 100˚C (176 - 212˚F).

(f) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.

Protrusion height:

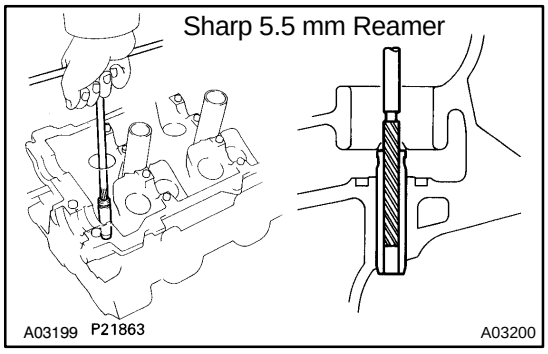
Intake

9.2 - 9.8 mm (0.362 - 0.386 in.)

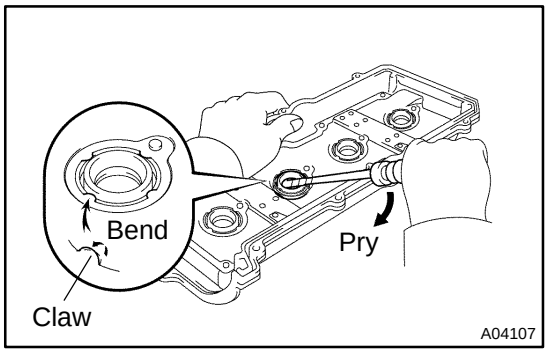
Exhaust

8.2 - 8.8 mm (0.323 - 0.346 in.)

SST 09201-10000 (09201-01060), 09950-70010 (09951-07100)



(g) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance (See page EM-45) between the guide bushing and the valve stem.



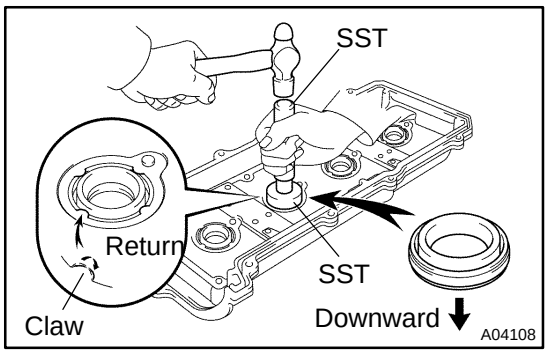
2. REPLACE SPARK PLUG TUBE GASKETS

(a) Bend the 4 ventilation case claws installed on the cylinder head cover to an angle of 90˚ or more.

(b) Using a screwdriver, pry out the gasket.

NOTICE:

Be careful not to damage the cylinder head cover. Tape up the screwdriver tip.



(c) Using SST and a hammer, tap in a new gasket until its surface is flush with the upper edge of the cylinder head cover.

SST 09950-60010 (09551-00240, 09951-00440, 09952-06010) 09950-70010 (09951-07100)

NOTICE:

Be careful of the installation direction.

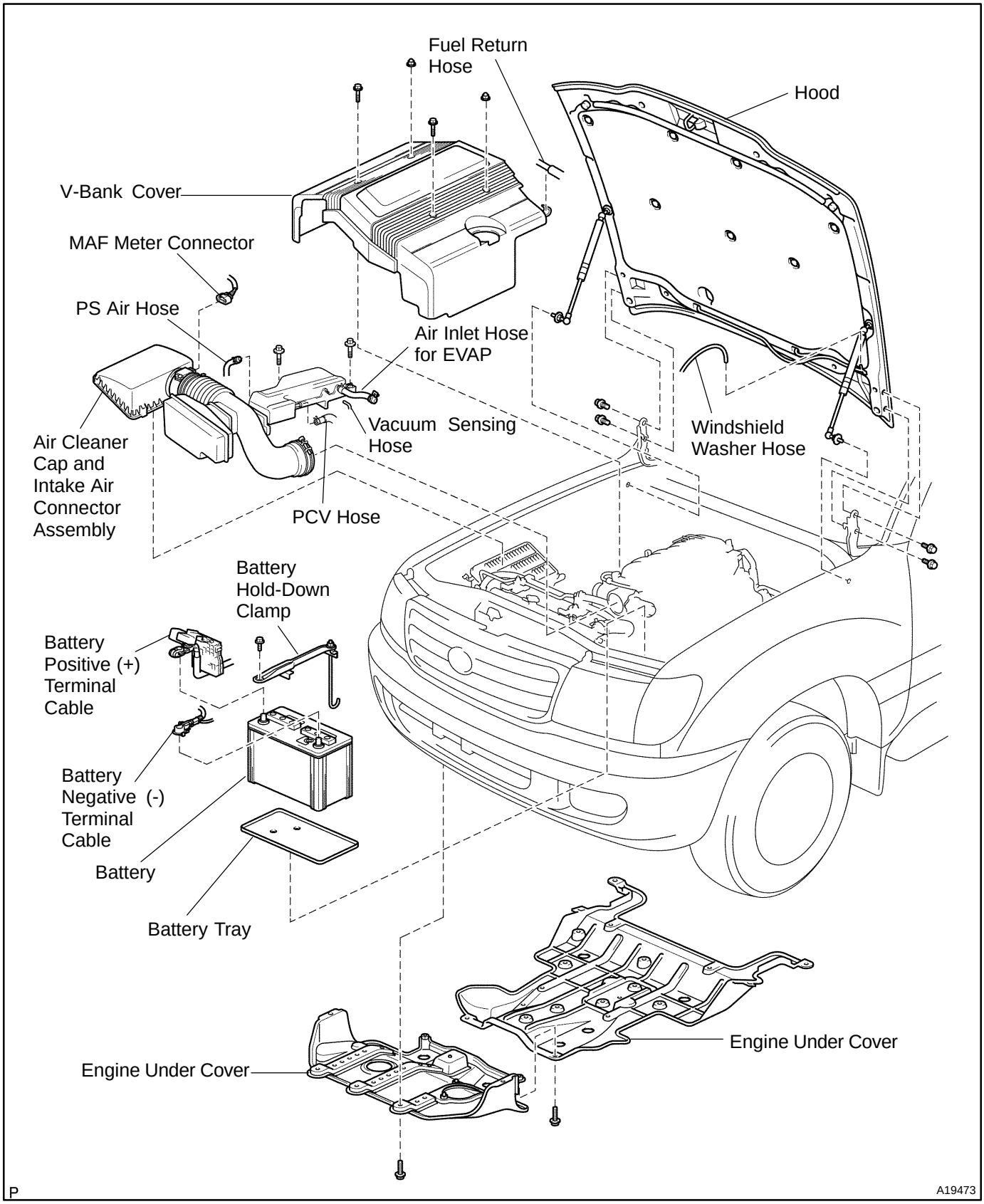
(d) Apply a light coat of MP grease to the gasket lip.

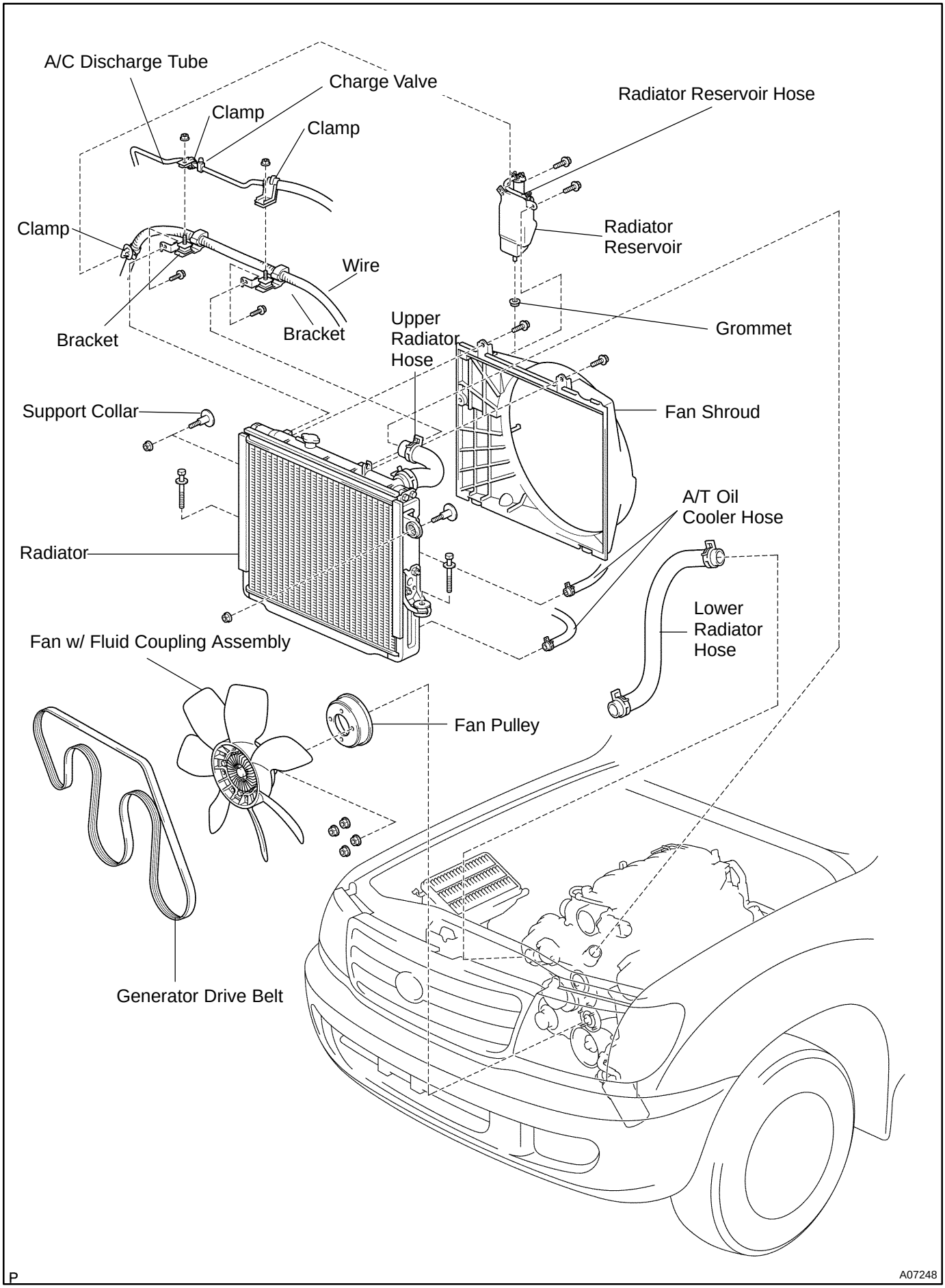
(e) Put the 4 ventilation case claws back to its original position.

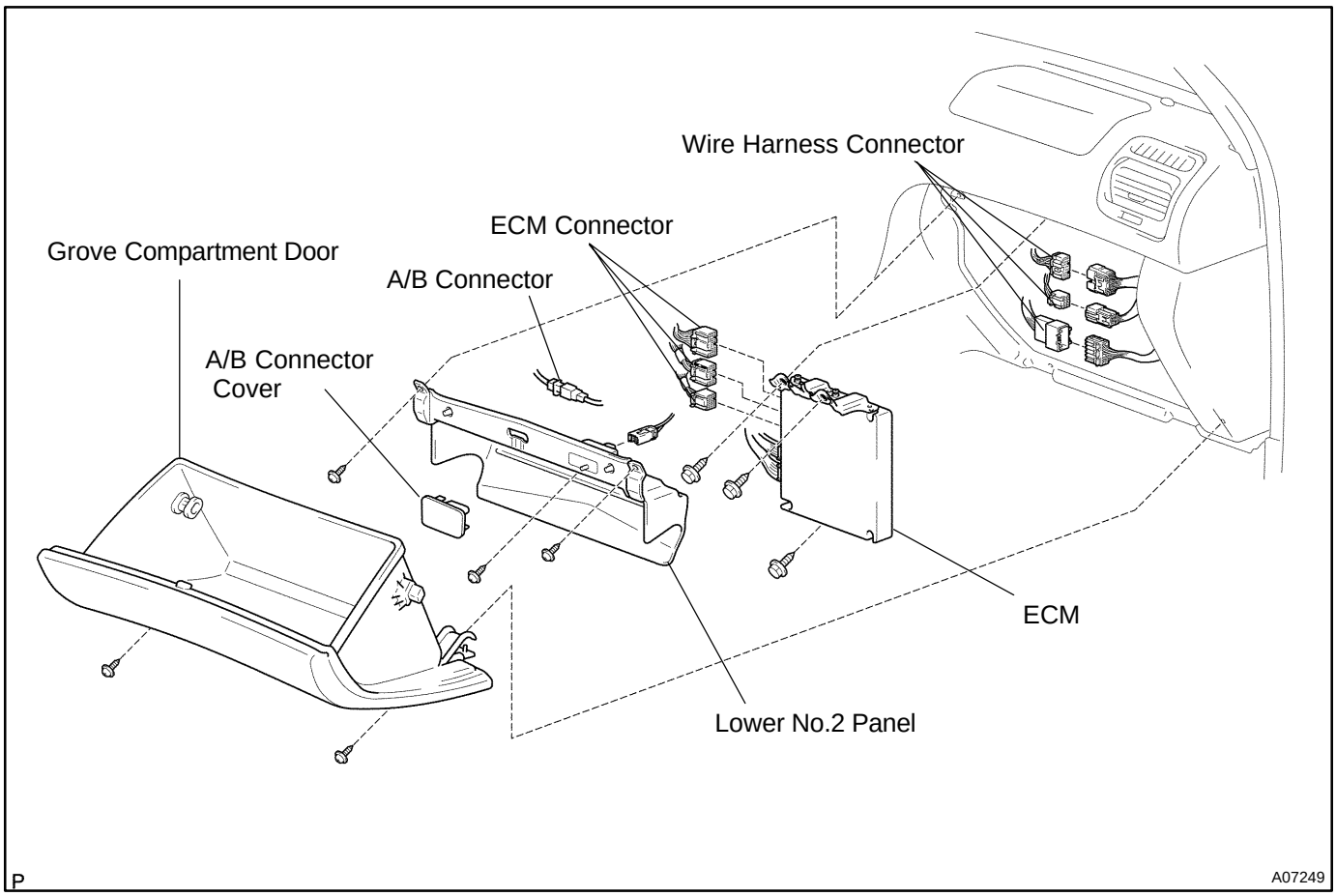
ENGINE UNIT

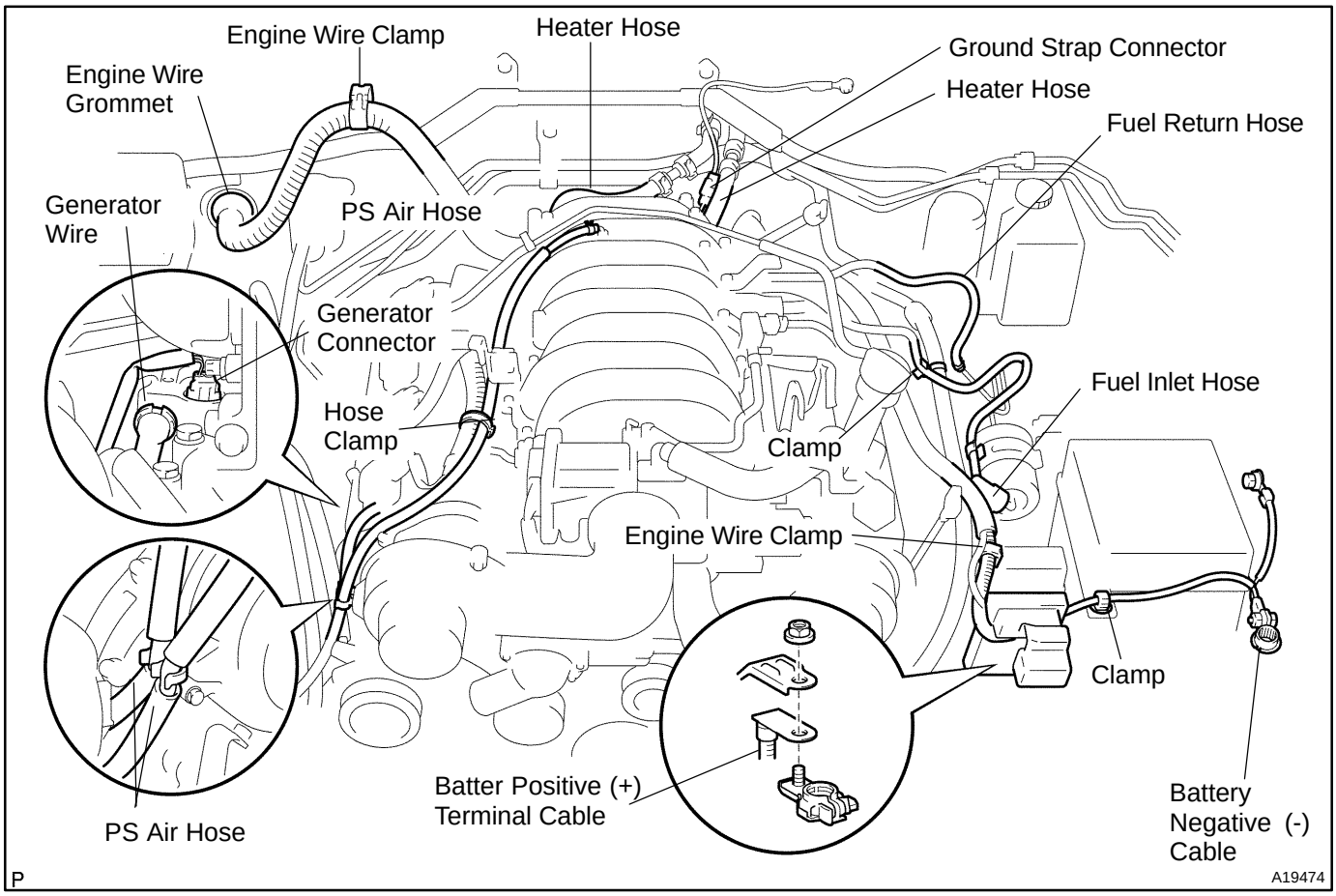
COMPONENTS

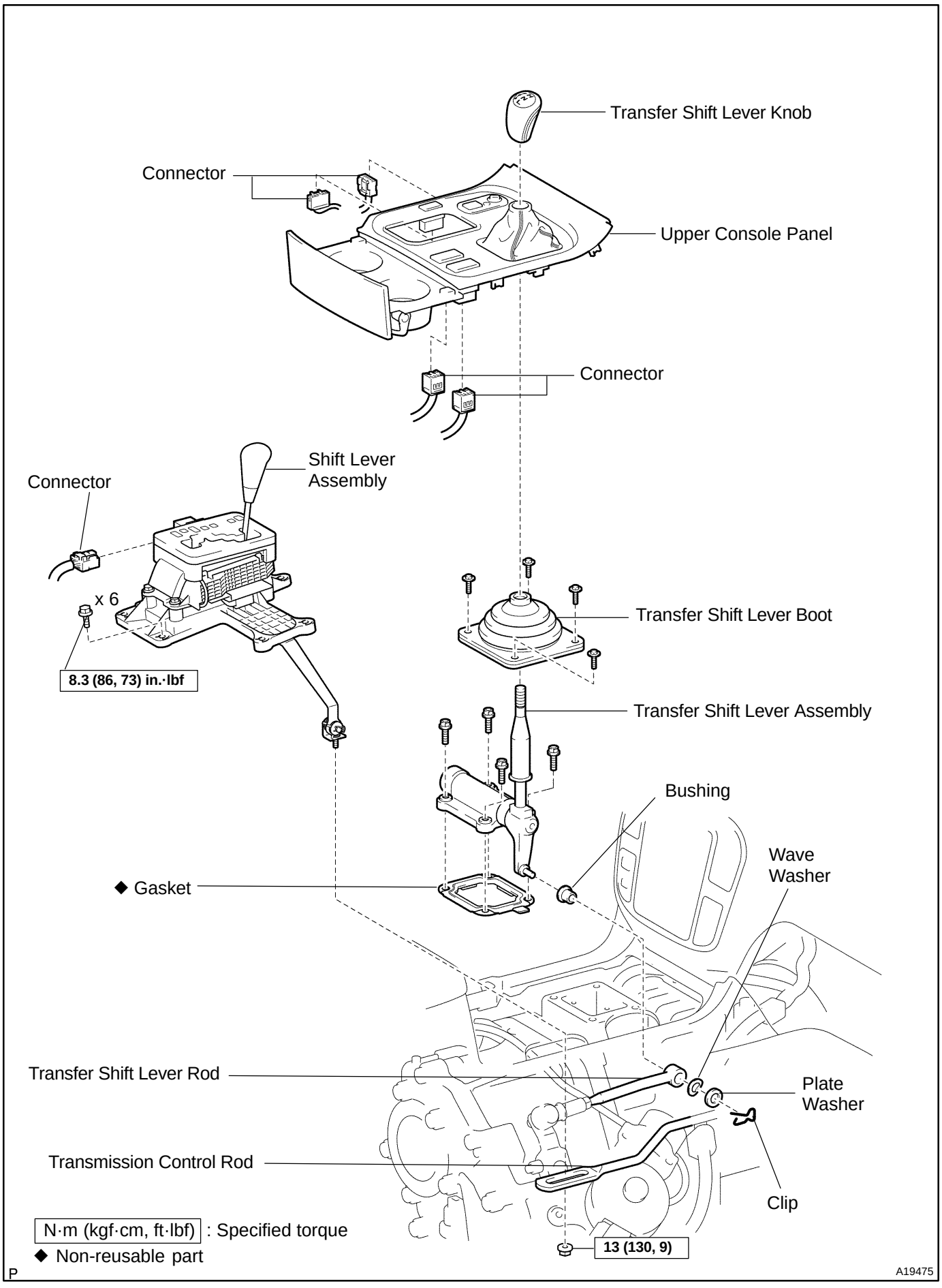
EM0LB-09

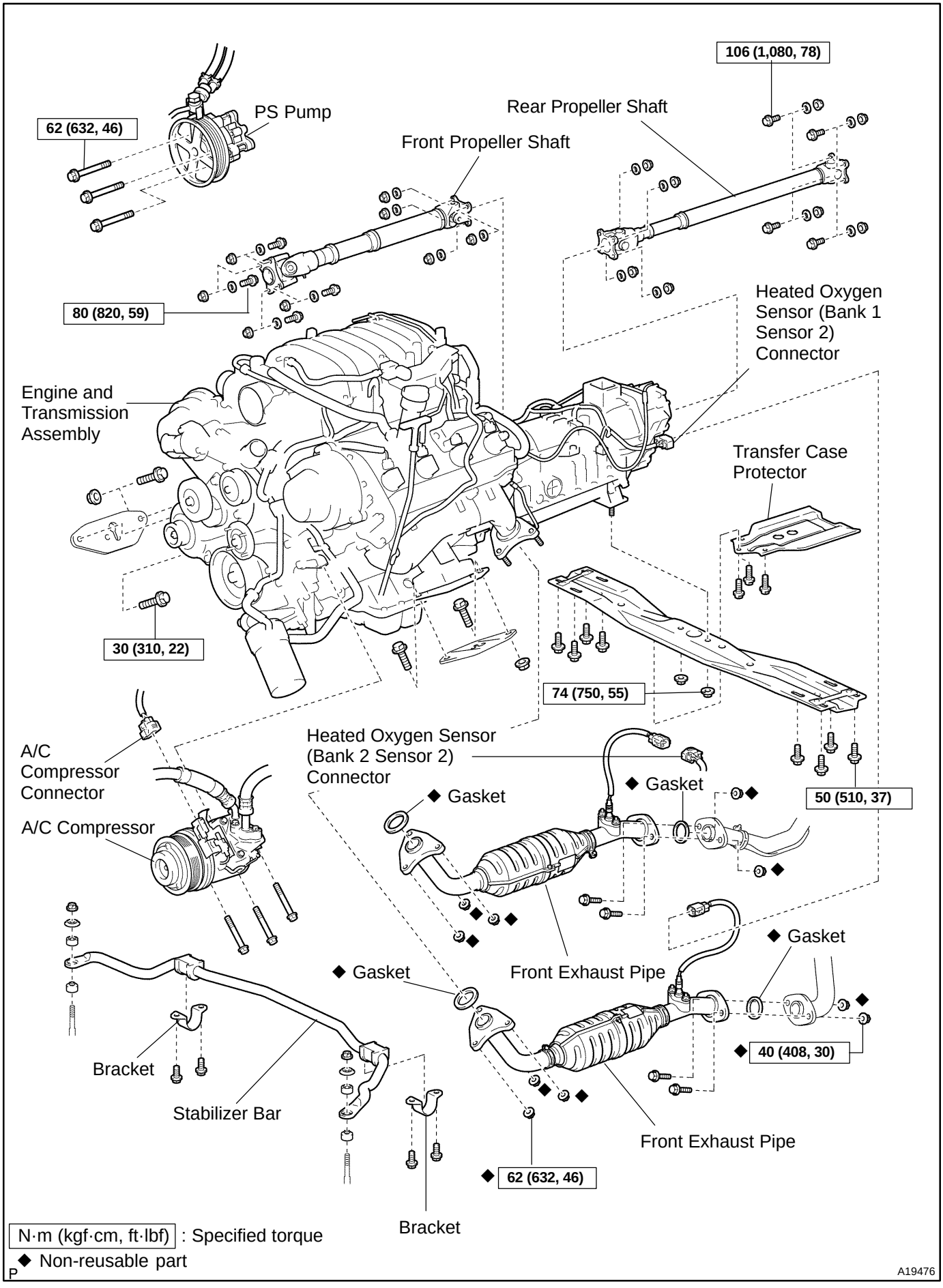


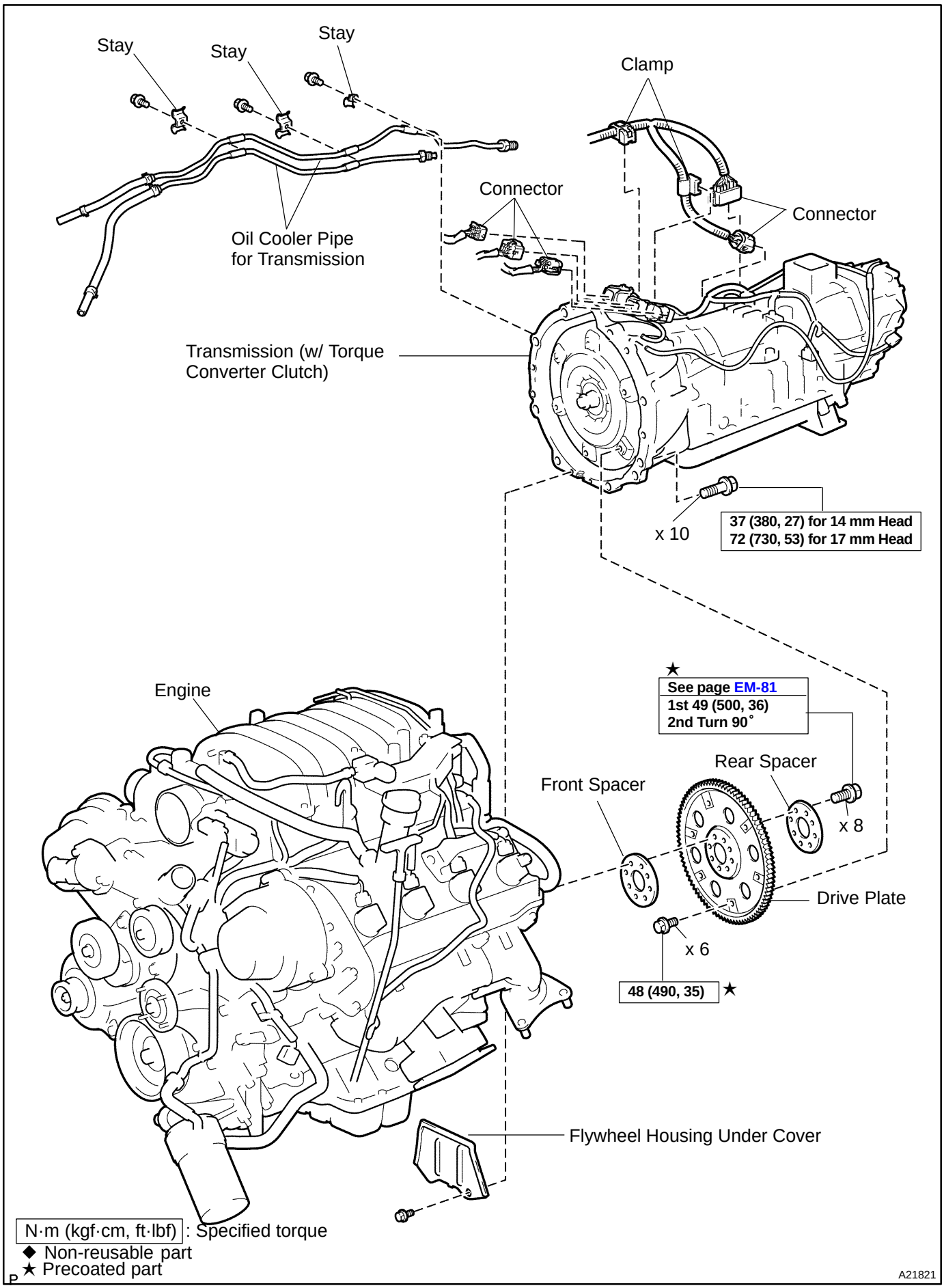

A/C Discharge Tube
Charge Valve
Clamp
Clamp
Radiator Reservoir Hose
Clamp
Radiator Reservoir
Wire
Bracket
Bracket
Upper Radiator Hose
Grommet
Support Collar
Fan Shroud
A/T Oil Cooler Hose
Radiator
Lower Radiator Hose
Fan w/ Fluid Coupling Assembly
Fan Pulley
Generator Drive Belt
P
A07248


Wire Harness Connector
ECM Connector
Grove Compartment Door
A/B Connector
A/B Connector Cover
ECM
Lower No.2 Panel
P
A07249


Engine Wire Clamp
Heater Hose
Ground Strap Connector
Engine Wire Grommet
Heater Hose
Fuel Return Hose
Generator Wire
PS Air Hose
Generator Connector
Hose Clamp
Clamp
Fuel Inlet Hose
Engine Wire Clamp
Clamp
Batter Positive (+) Terminal Cable
Battery Negative (-) Cable
PS Air Hose
P
A19474


Transfer Shift Lever Knob
Connector
Upper Console Panel
Connector
Shift Lever Assembly
Connector
x 6
8.3 (86, 73) in.·lbf
Transfer Shift Lever Boot
Transfer Shift Lever Assembly
Bushing
Wave Washer
◆ Gasket
Transfer Shift Lever Rod
Plate Washer
Transmission Control Rod
Clip
13 (130, 9)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P
A19475


106 (1,080, 78)
PS Pump
62 (632, 46)
Rear Propeller Shaft
Front Propeller Shaft
80 (820, 59)
Heated Oxygen Sensor (Bank 1 Sensor 2) Connector
Engine and Transmission Assembly
Transfer Case Protector
30 (310, 22)
74 (750, 55)
A/C Compressor Connector
Heated Oxygen Sensor (Bank 2 Sensor 2) Connector
◆ Gasket
◆ Gasket
50 (510, 37)
A/C Compressor
◆ Gasket
◆ Gasket
Front Exhaust Pipe
Bracket
Stabilizer Bar
40 (408, 30)
Front Exhaust Pipe
◆ 62 (632, 46)
Bracket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
P
A19476


Stay
Stay
Stay
Clamp
Connector
Connector
Oil Cooler Pipe
for Transmission
Transmission (w/ Torque
Converter Clutch)
x 10
37 (380, 27) for 14 mm Head
72 (730, 53) for 17 mm Head
Engine
★
See page EM-81
1st 49 (500, 36)
2nd Turn 90°
Rear Spacer
Front Spacer
x 8
Drive Plate
x 6
48 (490, 35) ★
Flywheel Housing Under Cover
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
A21821

EM0LA-07

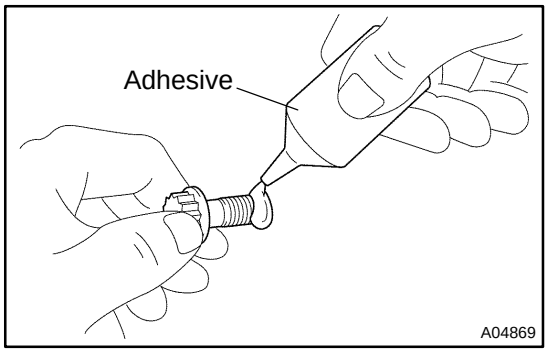
INSTALLATION

1. INSTALL DRIVE PLATE

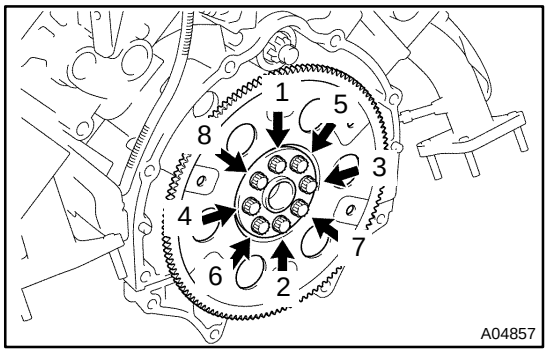
HINT:

★ The mounting bolts are tightened in 2 steps (steps (c) and (e)).

★ If any one of the mounting bolts is broken or deformed, replace it.



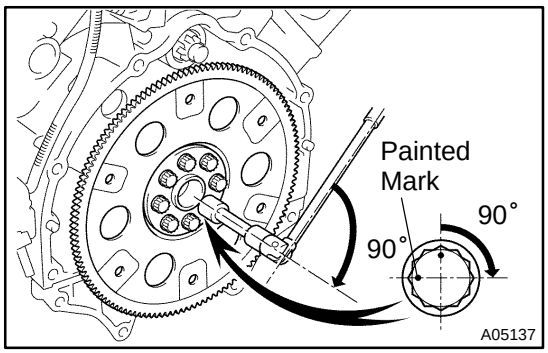
(a) Apply adhesive to 2 or 3 threads of the mounting bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(b) Install the front spacer, the drive plate and the rear spacer on the crankshaft.

(c) Hold the crankshaft pulley bolt with a wrench, and install and evenly tighten the 8 mounting bolts, a little at a time for several times as in the sequence shown.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

If any one of the mounting bolts does not meet the torque specification, replace the mounting bolt.



(d) Mark the mounting bolt with paint.

(e) Retighten the mounting bolts by 90° in the numerical order shown.

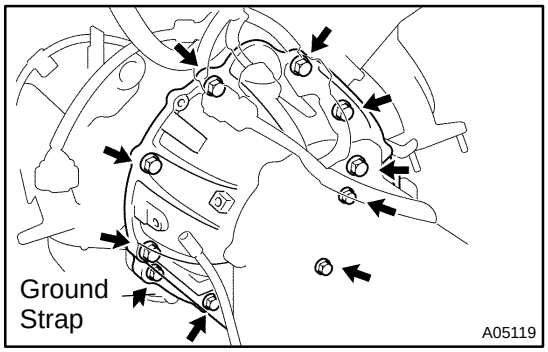
(f) Check that the painted mark is now at a 90° angle to (e).

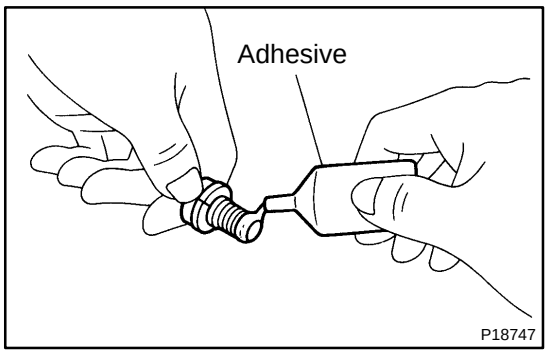
2. INSTALL TRANSMISSION TO ENGINE

(a) Check the torque converter clutch installation.
(See page AT-33)

(b) Attach the transmission to the engine.

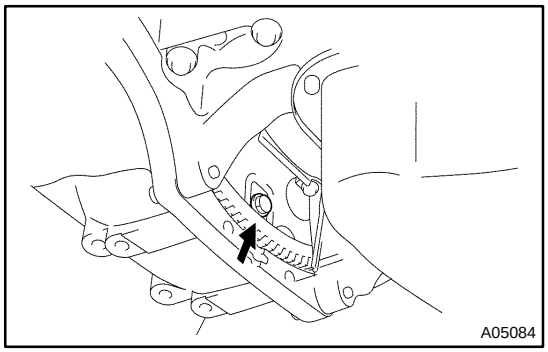
(c) Install the ground strap and 10 bolts.
Torque:
37 N·m (380 kgf·cm, 27 ft·lbf) for 14 mm head
72 N·m (730 kgf·cm, 53 ft·lbf) for 17 mm head





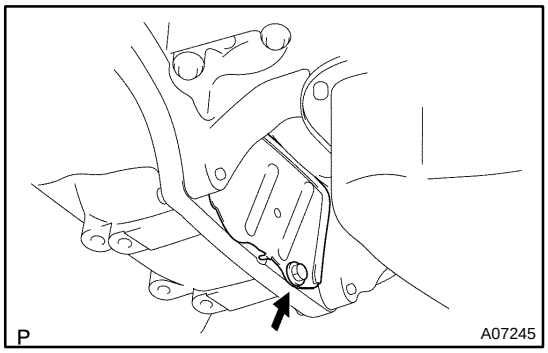
3. INSTALL TORQUE CONVERTER CLUTCH BOLTS

(a) Apply adhesive to 2 or 3 threads from the bolt end.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent



(b) Hold the crankshaft pulley bolt with a wrench, and install the 6 bolts evenly.
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

HINT:
First install the black colored bolt, install the other bolts.



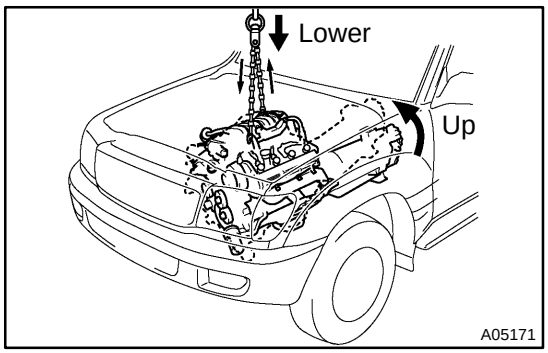
(c) Install the flywheel housing under cover with the bolt.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

4. INSTALL OIL COOLER PIPE FOR TRANSMISSION

5. CONNECT ENGINE WIRE TO TRANSMISSION

(a) Connect the 5 connectors.

(b) Connect the 2 wire clamps.

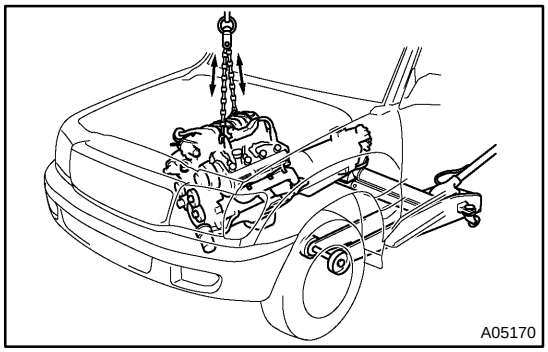


6. INSTALL ENGINE AND TRANSMISSION ASSEMBLY IN VEHICLE

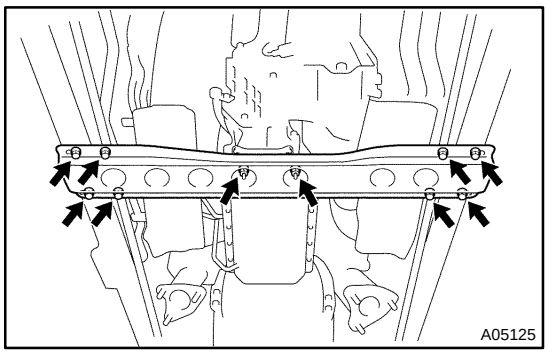
(a) Attach the engine chain hoist to the engine hangers.

(b) Slowly lower the engine and the transmission assembly into the engine compartment.

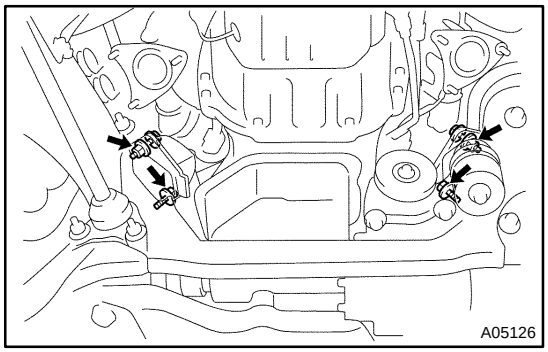
(c) Attach the engine mounting brackets to the frame brackets.



(d) Keep the engine level with a jack.



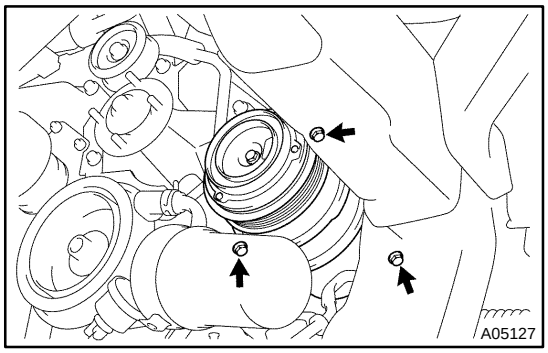
(e) Install the frame crossmember with the 8 bolts and the 4 nuts.
Torque:
50 N·m (510 kgf·cm, 37 ft·lbf) for bolts
74 N·m (750 kgf·cm, 55 ft·lbf) for nuts
(f) Install the transfer case protector with the 3 bolts.



(g) Install the 2 nuts and the 4 bolts holding the engine mounting brackets to the frame brackets.
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)
(h) Remove the engine chain hoist.

7. INSTALL PS PUMP

Install the PS pump with the 3 bolts.
Torque: 62 N·m (632 kgf·cm, 46 ft·lbf)



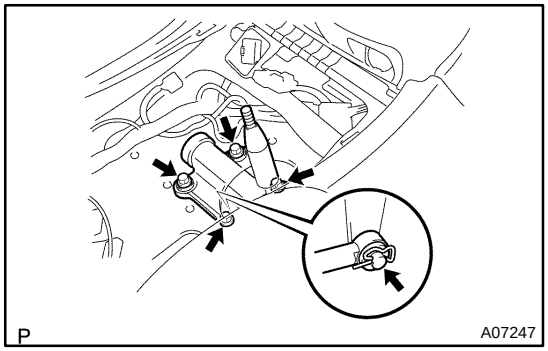
8. INSTALL A/C COMPRESSOR

(a) Install the A/C compressor with the 3 bolts.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
(b) Connect the A/C compressor connector.

9. INSTALL STABILIZER BAR (See page SA-82)

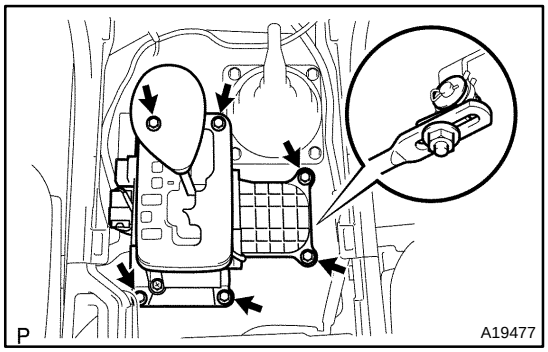
10. INSTALL PROPELLER SHAFT (See page PR-7)

11. INSTALL FRONT EXHAUST PIPES



12. INSTALL SHIFT LEVER ASSEMBLY AND TRANSFER SHIFT LEVER ASSEMBLY

(a) Install the transfer shift lever.
(1) Install a new gasket and the shift lever with the 4 bolts.
(2) Connect the transfer shift lever rod to the shift lever with the bushing, the wave washer, the plate washer and the clip.
(b) Install the transfer shift lever boot with the 4 bolts.



(c) Install the shift lever assembly.
(1) Connect the transmission control rod to the shift lever assembly with the nut.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)
(2) Install the shift lever assembly with the 6 bolts.
Torque: 8.3 N·m (86 kgf·cm, 73 in.·lbf)
(3) Connect the connector.
(d) Install the console upper cover.
(e) Install the transfer shift lever knob.

13. CONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

(a) Connect the 2 PS air hoses to the hose clamp on the No.3 RH timing belt cover.
(b) Connect the generator wire.
(c) Connect the generator connector.
(d) Connect the hose clamp for the PS air hose.
(e) Connect the PS air hose to upper intake manifold.
(f) Connect the 2 heater hoses.
(g) Connect the engine wire clamp to the bracket on the cowl panel.
(h) Connect the engine wire grommet to the cowl panel.
(i) Connect the ground strap connector.
(j) Connect the fuel main hose and the clamps.
(k) Connect the fuel return hose and the clamp.
(l) Connect the air inlet hose to the charcoal canister.
(m) Connect the EVAP hose to the charcoal canister.
(n) Connect the engine wire to the clamp on the right fender apron.
(o) Connect the clamp on battery negative (-) cable to the relay box.
(p) Connect the battery negative (-) cable to the right fender apron.
(q) Connect the battery positive (+) terminal cable.

14. CONNECT ENGINE WIRE TO CABIN

(a) Connect the 3 wire harness connectors.
(b) Install the ECM with the 3 screws.
(c) Connect the 3 connectors to the ECM.
(d) Install the glove compartment door.
(e) Install the lower No.2 panel.

15. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND GENERATOR DRIVE BELT

(a) Temporarily install the fan pulley, the fan and the fluid coupling assembly with the 4 nuts.
(b) Install the generator drive belt. (See page CH-16)
(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.

16. INSTALL RADIATOR AND FAN SHROUD

(a) Place the fan shroud in the installation position.
(b) Install the radiator with the 2 support collars, the 2 nuts and the 2 bolts.
(c) Connect the 2 A/T oil cooler hoses to the radiator.
(d) Install the lower radiator hose.
(e) Attach the lower side of the fan shroud to the brackets of the radiator, and install the fan shroud with the 2 bolts.
(f) Install the 2 brackets on the wire to the radiator with the 2 bolts.
(g) Install the 2 clamps on the A/C discharge tube to the brackets on the wire with the 2 nuts.

(h) Connect the upper radiator hose to the front water bypass joint.

17. INSTALL RADIATOR RESERVOIR

(a) Install the grommet to the reservoir.
(b) Attach the lower side of the reservoir to the fan shroud.
(c) Install the reservoir with the 2 bolts.
(d) Connect the reservoir hose to the radiator.
(e) Install the clamp on the wire to the reservoir.

18. INSTALL AIR CLEANER CAP AND INTAKE AIR CONNECTOR PIPE ASSEMBLY

19. INSTALL BATTERY

20. FILL WITH ENGINE COOLANT (See page CO-2)

21. FILL WITH ENGINE OIL (See page LU-2)

22. START ENGINE AND CHECK FOR LEAKS

23. INSTALL V-BANK COVER

24. INSTALL ENGINE UNDER COVERS

25. INSTALL HOOD

26. PERFORM ROAD TEST

Check for abnormal noise, shock, slippage, and make sure the shift points is correct and operation is smooth.

27. RECHECK ENGINE COOLANT AND OIL LEVELS

EM0L9-07

REMOVAL

1. REMOVE HOOD

2. REMOVE ENGINE UNDER COVERS

3. DRAIN ENGINE COOLANT

4. DRAIN ENGINE OIL

5. REMOVE V-BANK COVER

6. REMOVE BATTERY

7. REMOVE AIR CLEANER CAP AND INTAKE AIR CONNECTOR PIPE ASSEMBLY

8. REMOVE RADIATOR RESERVOIR

(a) Disconnect the clamp on the wire from the reservoir.

(b) Disconnect the reservoir hose from the radiator.

(c) Remove the 2 bolts, the reservoir and the grommet.

9. REMOVE RADIATOR AND FAN SHROUD

(a) Disconnect the upper radiator hose from the front water bypass joint.

(b) Remove the 2 nuts, and disconnect the 2 clamps on the A/C discharge tube from the bracket.

(c) Remove the 2 bolts, and disconnect the 2 brackets on the wire from the radiator.

(d) Remove the 3 bolts, and disconnect the fan shroud from the radiator.

(e) Remove the lower radiator hose.

(f) Disconnect the 2 A/T oil cooler hoses from the radiator.

(g) Remove the 2 bolts, the 2 nuts, the 2 support collars and the radiator.

(h) Remove the fan shroud.

10. REMOVE GENERATOR DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

(b) Remove the generator drive belt. (See page CH-7)

(c) Remove the 4 nuts, the fan, the fluid coupling assembly and the fan pulley.

11. DISCONNECT ENGINE WIRE FROM CABIN

(a) Remove the glove compartment door.

(b) Remove the lower No.2 panel.

(c) Disconnect the 3 connectors from the ECM.

(d) Remove the 3 screws, and disconnect ECM from the body bracket.

(e) Disconnect the 3 wire harness connectors.

12. DISCONNECT HOSES, WIRES, CONNECTORS, CLAMPS, GROMMET AND CABLES

(a) Disconnect the 2 PS air hoses from the hose clamp on the No.3 RH timing belt cover.

(b) Disconnect the generator wire.

(c) Disconnect the generator connector.

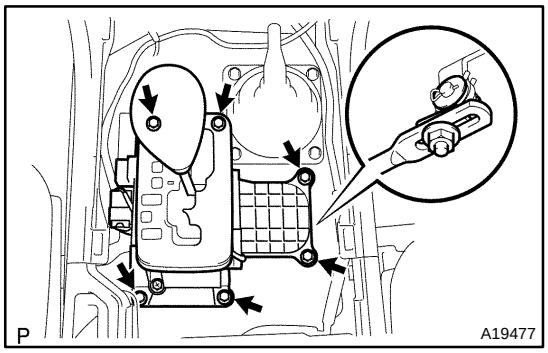
(d) Disconnect the hose clamp for PS air hose.

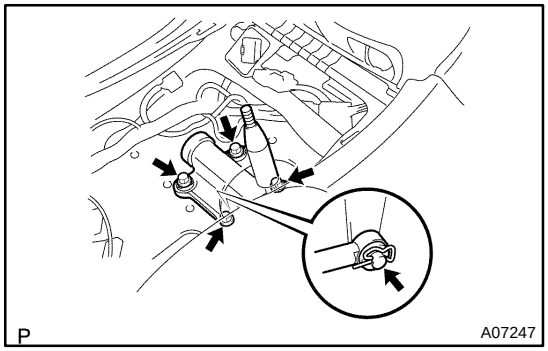
(e) Disconnect the PS air hose from upper intake manifold.

(f) Disconnect the 2 heater hoses.
(g) Disconnect the engine wire clamp from the bracket on the cowl panel.
(h) Disconnect the engine wire grommet from cowl panel.
(i) Disconnect the ground strap connector.
(j) Disconnect the fuel main hose and the clamps.
(k) Disconnect the fuel return hose and the clamp.
(l) Disconnect the air inlet hose from the charcoal canister.
(m) Disconnect the EVAP hose from the charcoal canister.
(n) Disconnect the engine wire from the clamp on the right fender apron.
(o) Disconnect the clamp on battery negative (-) cable from the relay box.
(p) Disconnect the battery negative (-) cable from the right fender apron.
(q) Disconnect the battery positive (+) terminal cable.

13. REMOVE SHIFT LEVER ASSEMBLY AND TRANSFER SHIFT LEVER ASSEMBLY

(a) Remove the transfer shift lever knob.
(b) Remove the upper console panel.
(c) Remove the shift lever assembly.
  (1) Disconnect the connector.
  (2) Remove the 6 bolts.
  (3) Remove the nut and disconnect the transmission control rod from the shift lever assembly.
  (4) Remove the shift lever assembly.
(d) Remove the 4 bolts and the transfer shift lever boot.



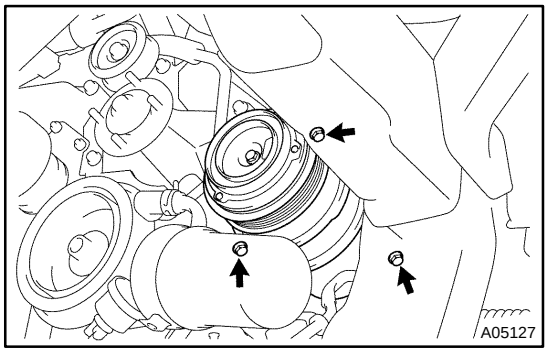


(e) Remove the transfer shift lever assembly.
  (1) Remove the clip, the plate washer and the wave washer, and disconnect the transfer rod from the shift lever.
  (2) Remove the bushing.
  (3) Remove the 4 bolts, the shift lever and the gasket.

14. REMOVE FRONT EXHAUST PIPES

15. REMOVE PROPELLER SHAFT (See page PR-4)

16. REMOVE STABILIZER BAR (See page SA-81)



17. DISCONNECT A/C COMPRESSOR FROM ENGINE

(a) Disconnect the A/C compressor connector.
(b) Remove the 3 bolts, and disconnect the A/C compressor from the engine.

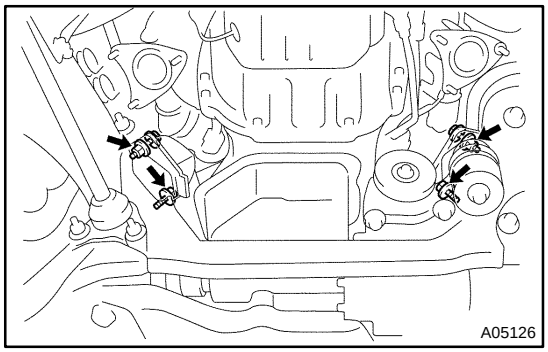
HINT:
Suspend the A/C compressor securely.

18. DISCONNECT PS PUMP FROM ENGINE

Remove the 3 bolts, and disconnect the PS pump from the engine.

HINT:

Suspend the PS pump securely.

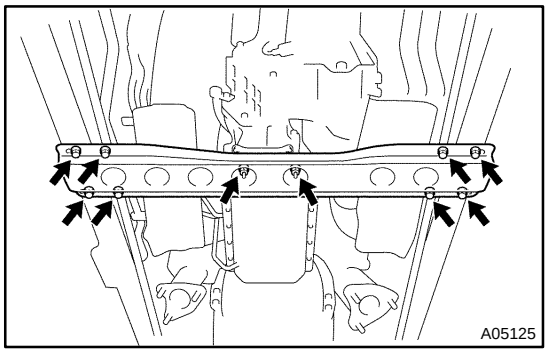


19. REMOVE ENGINE AND TRANSMISSION ASSEMBLY FROM VEHICLE

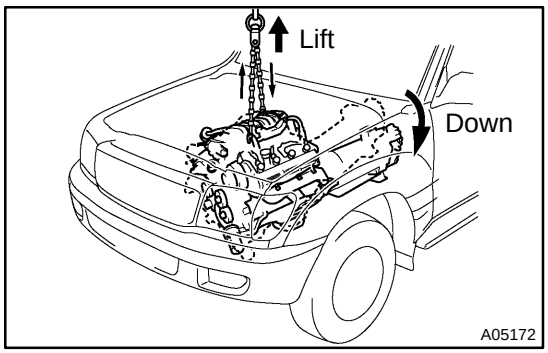
(a) Attach the engine chain hoist to the engine hangers.

(b) Remove the 2 nuts and the 4 bolts holding the engine mounting brackets to the frame brackets.

(c) Remove the 3 bolts and the transfer case protector.



(d) Remove the 8 bolts, the 2 nuts and the frame crossmember.



(e) Lift the engine and take out from the vehicle slowly and carefully.

HINT:

Make sure the engine is clear of all wiring, hoses and cables.

(f) Place the engine and transmission assembly onto a stand.

20. DISCONNECT ENGINE WIRE FROM TRANSMISSION

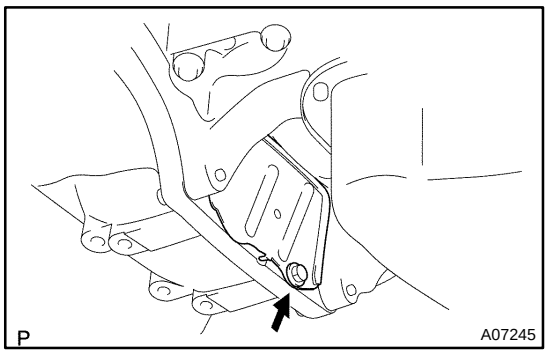
(a) Disconnect the 5 connectors.

(b) Disconnect the 2 wire clamps.

21. REMOVE OIL COOLER PIPES FOR TRANSMISSION

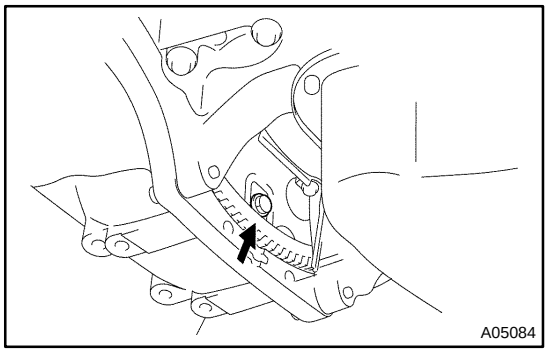
(a) Remove the 3 bolts and the 3 stays.

(b) Loosen the 2 union nuts, and remove the 2 oil cooler pipes.



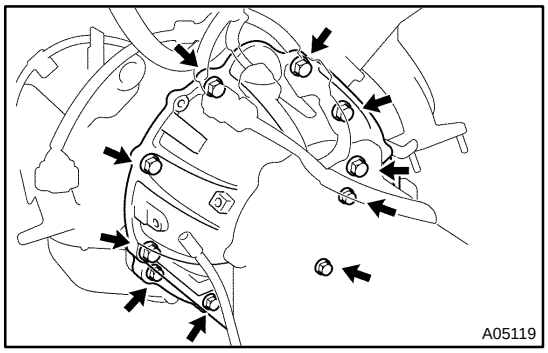
22. REMOVE TORQUE CONVERTER CLUTCH BOLTS

(a) Remove the bolt and the flywheel housing under cover.



(b) Turn the crankshaft pulley bolt to gain access to each bolt.

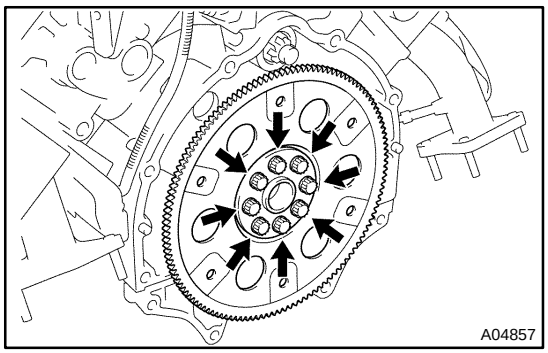
(c) Hold the crankshaft pulley bolt with a wrench, and remove the 6 bolts.



23. REMOVE TRANSMISSION

(a) Remove the 10 bolts.

(b) Remove the transmission together with the torque converter clutch from the engine.



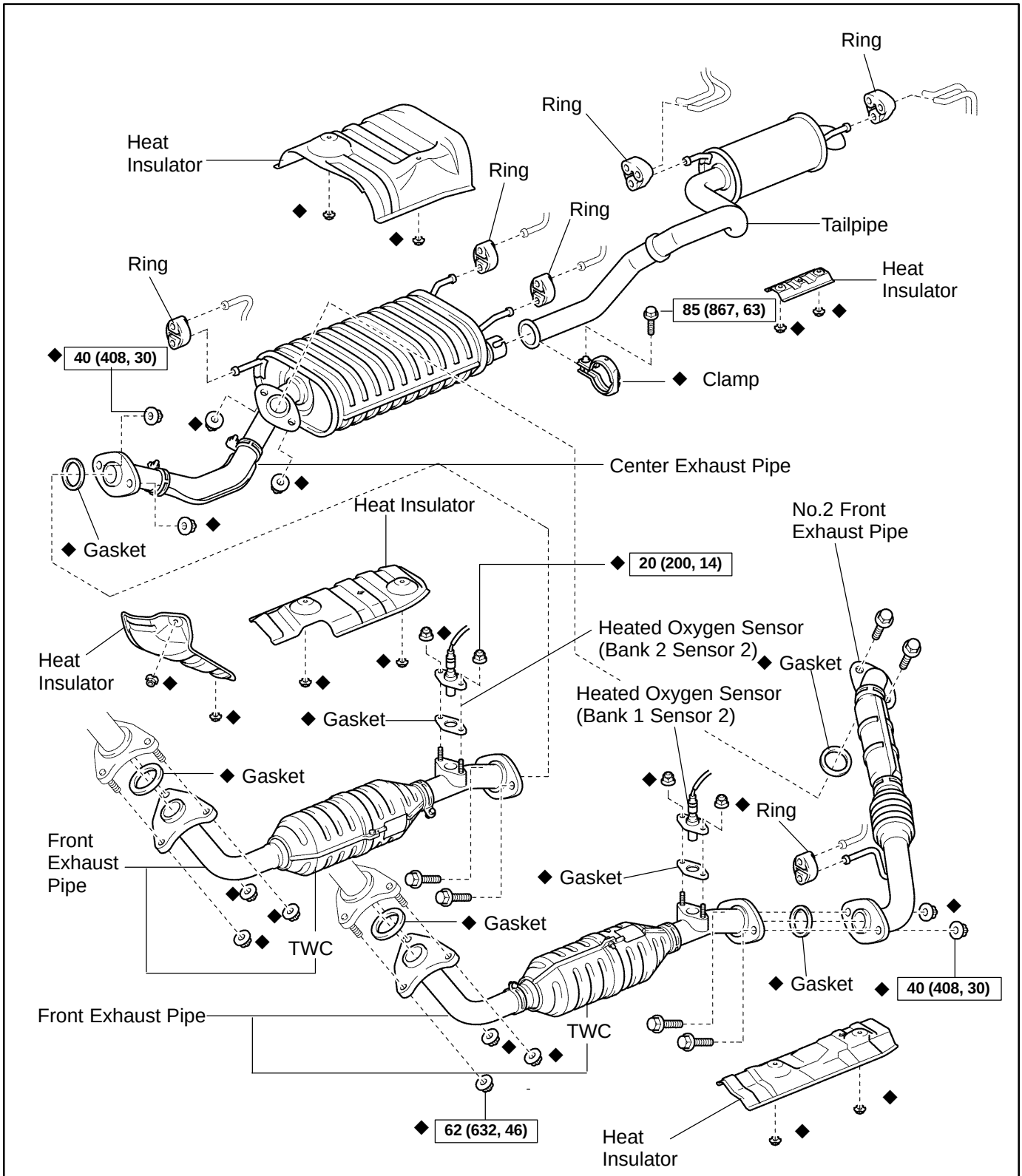
24. REMOVE DRIVE PLATE

Hold the crankshaft pulley bolt with a wrench, and remove the 8 bolts, the front spacer, the drive plate and the rear spacer.

EXHAUST SYSTEM

COMPONENTS

EM0EE-18



IDLE SPEED

EM0KU-10

INSPECTION

1. INITIAL CONDITIONS

(a) Engine is at normal operating temperature
(b) Air cleaner is installed
(c) All pipes and hoses of air induction systems are connected
(d) All accessories are switched OFF
(e) All vacuum lines are properly connected

HINT:

All vacuum hoses should be properly connected.

(f) SFI system wiring connectors are fully plugged
(g) Ignition timing is set correctly
(h) Transmission is in neutral position
(i) Air conditioning switches are OFF

2. CONNECT TOYOTA HAND-HELD TESTER OR OBD II SCAN TOOL
(See page EM-9)

3. INSPECT IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
(b) Check the idle speed.
Idle speed: 700 ± 50 rpm

If the idle speed is not as specified, check the air intake system.

4. DISCONNECT TOYOTA HAND-HELD TESTER OR OBD II SCAN TOOL

IGNITION TIMING

EM0KT-10

INSPECTION

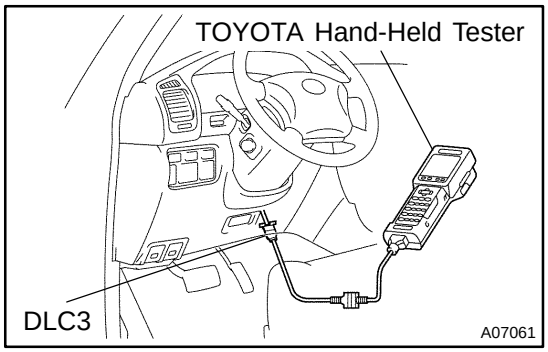
1. REMOVE BATTERY CLAMP COVER

2. REMOVE INTAKE AIR CONNECTOR

3. REMOVE V-BANK COVER

4. WARM UP ENGINE

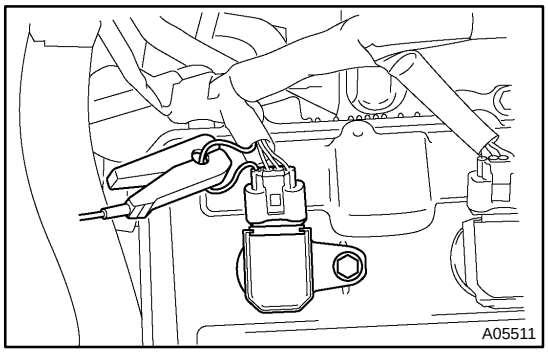
Allow the engine to warm up to the normal operating temperature.



5. CONNECT TOYOTA HAND-HELD TESTER OR OBD II SCAN TOOL

(a) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.

(b) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator's manual for further details.



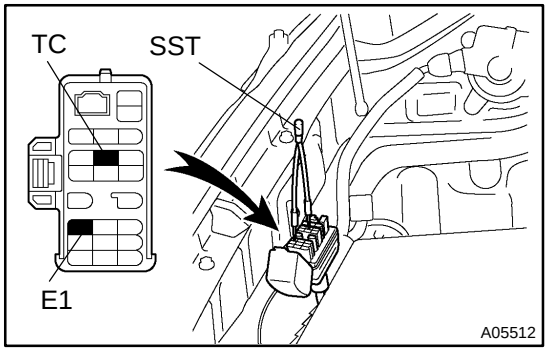
6. CONNECT TIMING LIGHT TO ENGINE

Connect the tester probe of a timing light to the wire of the ignition coil connector for No.1 cylinder.

7. CHECK IDLE SPEED

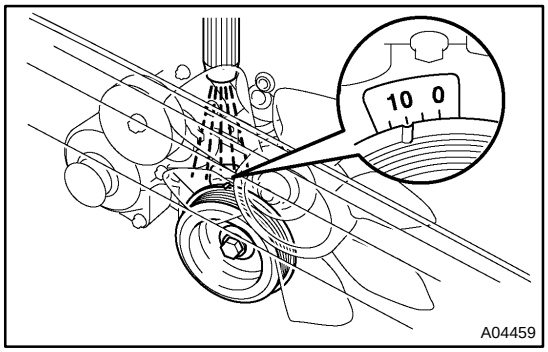
(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.

(b) Check the idle speed.
Idle speed:
700 ± 50 rpm



8. INSPECT IGNITION TIMING

(a) Using SST, connect terminal TC and E1 of the DLC1.
SST 09843-18020



(b) Using a timing light, check the ignition timing.
Ignition timing:
5 - 15° BTDC @ idle
(Transmission in neutral position)

(c) Remove SST from the DLC1.
SST 09843-18020

9. DISCONNECT TIMING LIGHT FROM ENGINE

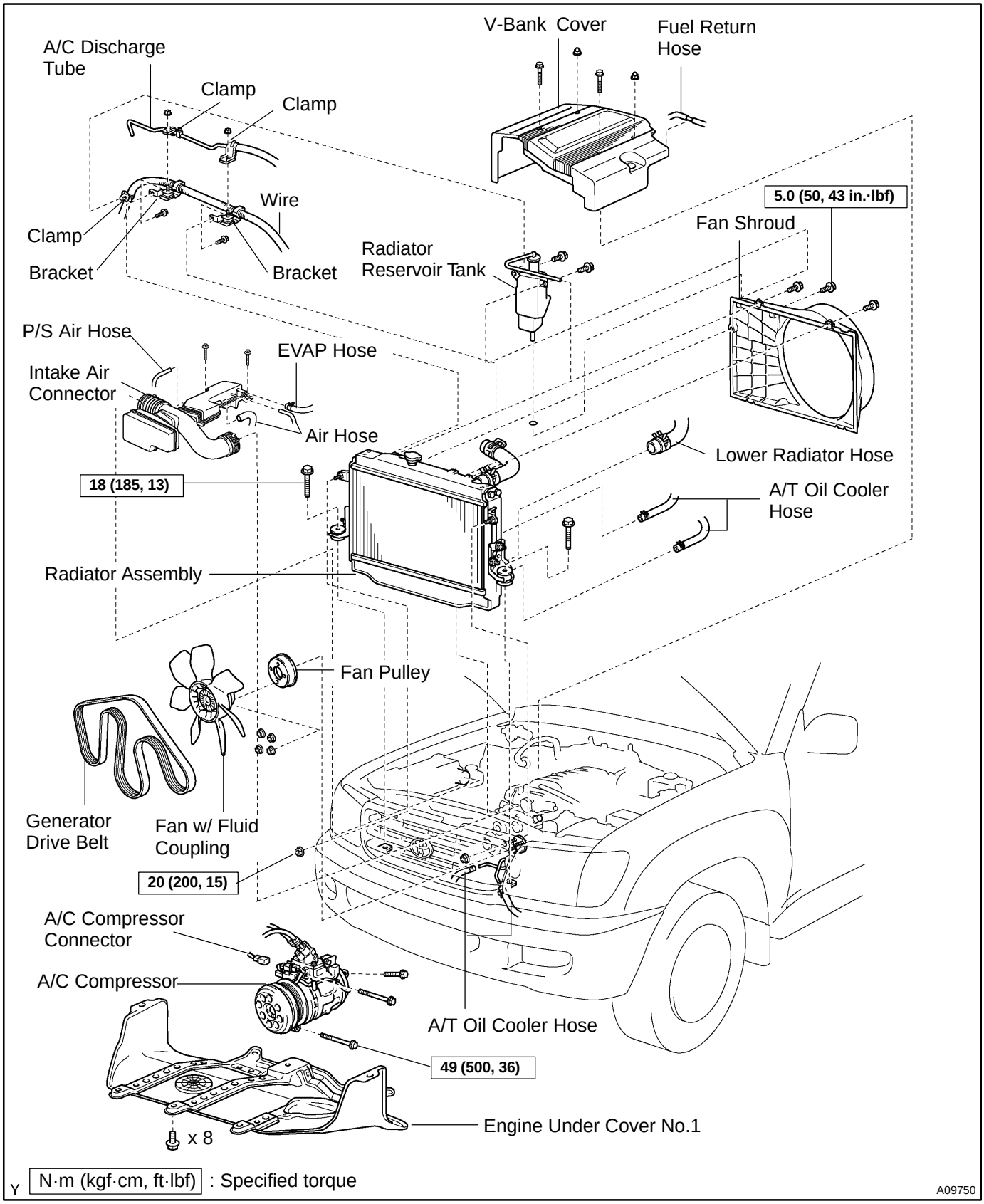
10. DISCONNECT TOYOTA HAND-HELD TESTER OR OBD II SCAN TOOL

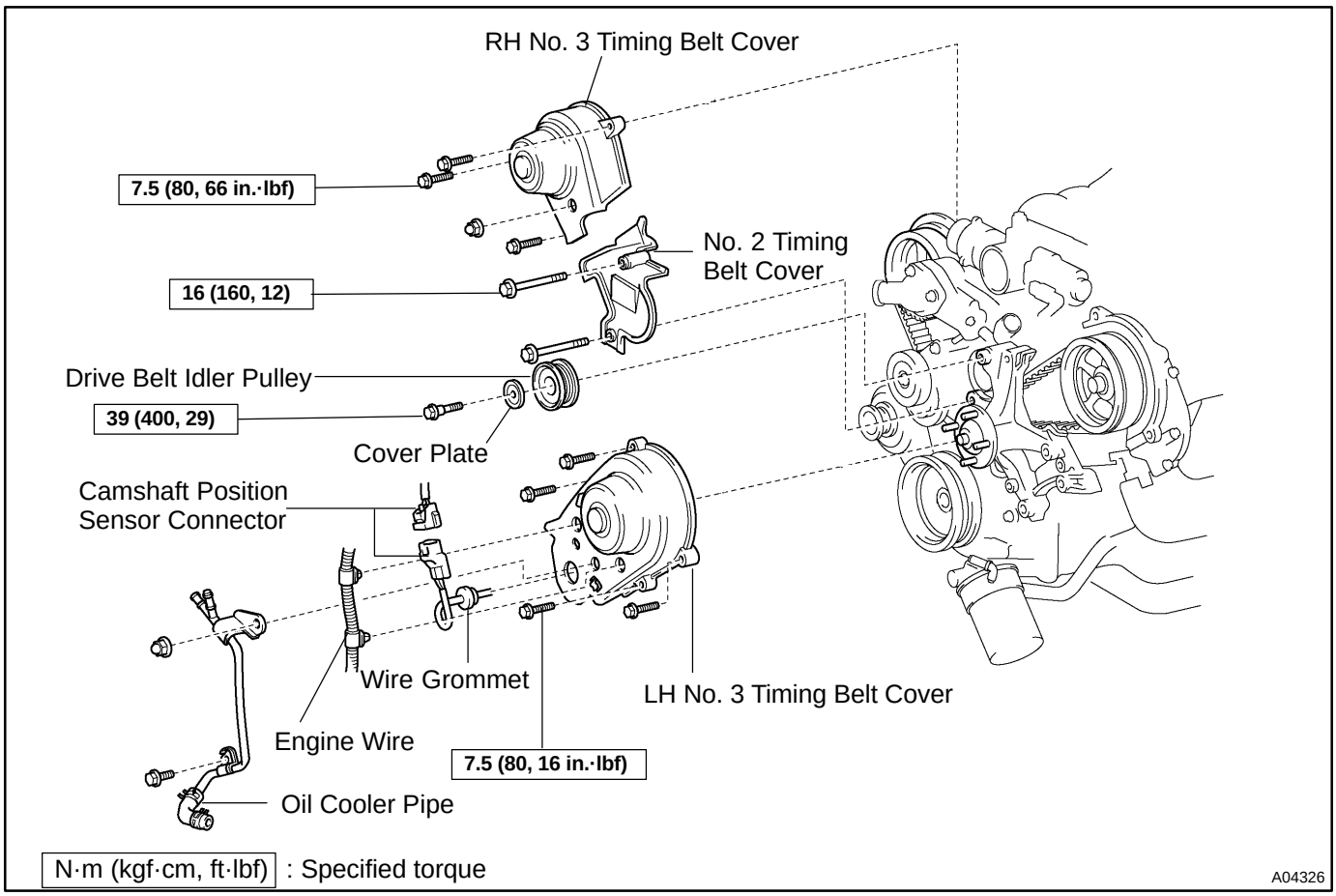
11. REINSTALL V-BANK COVER
12. REINSTALL INTAKE AIR CONNECTOR
13. REINSTALL BATTERY CLAMP COVER

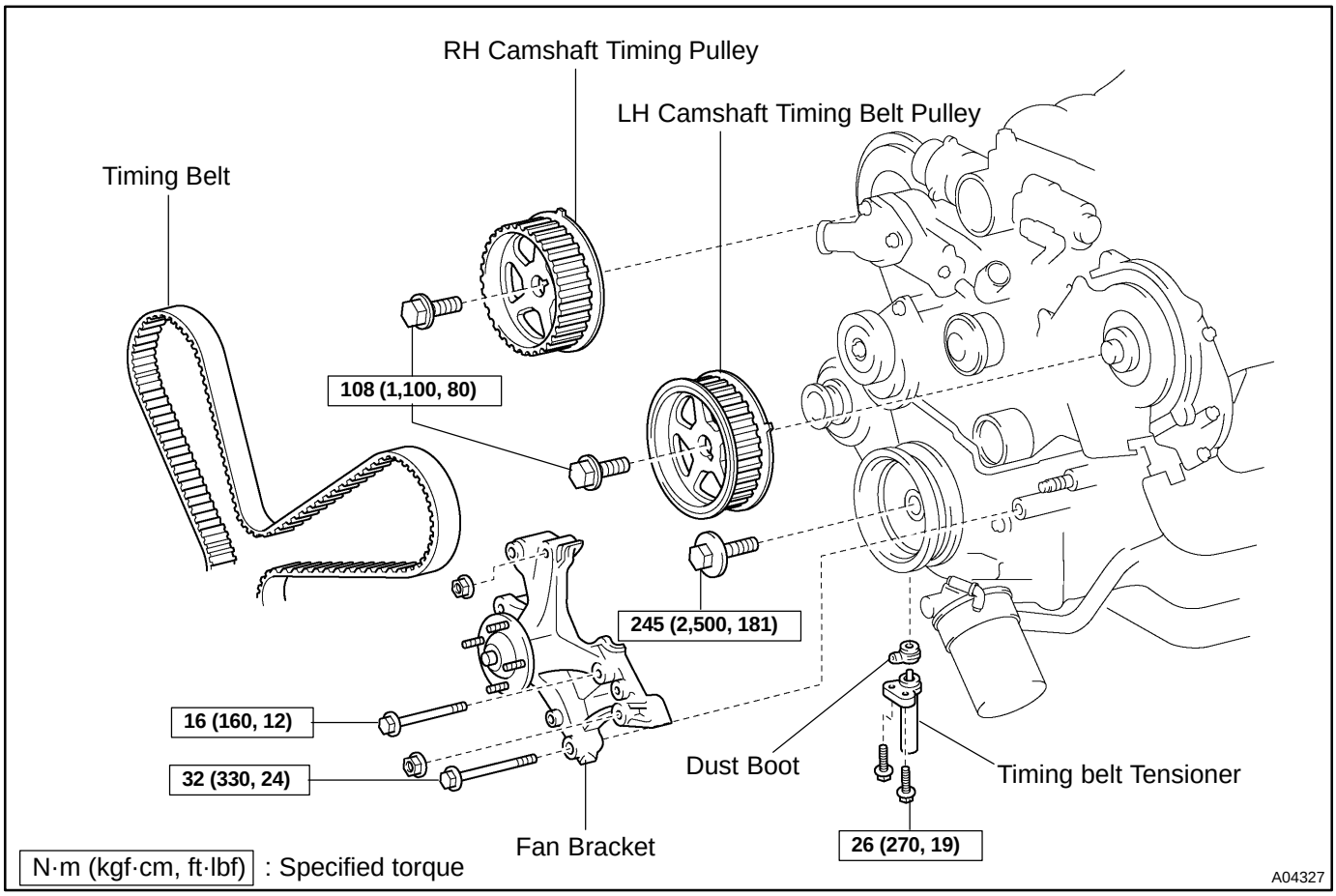
TIMING BELT

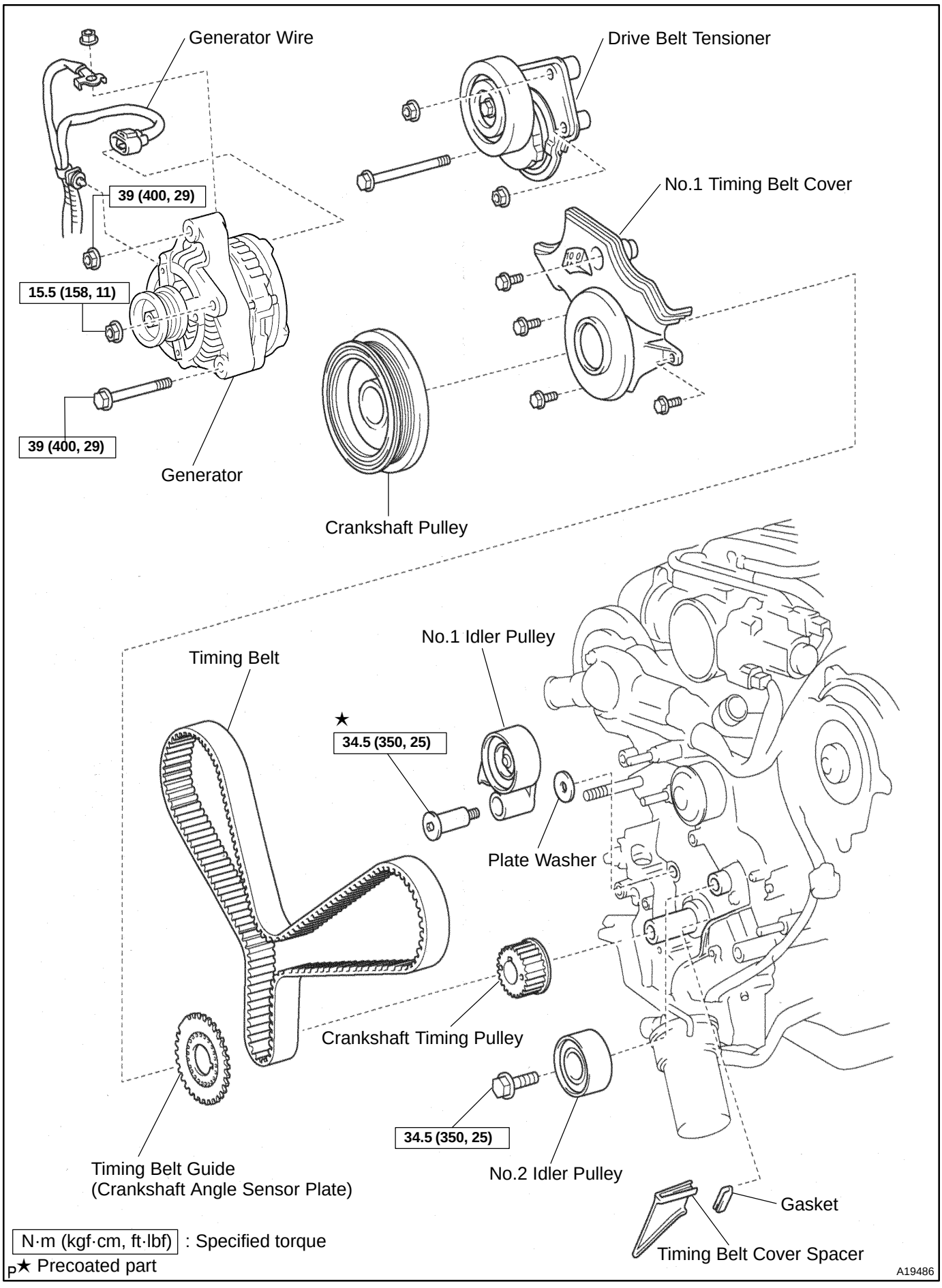
COMPONENTS

EM0KV-11

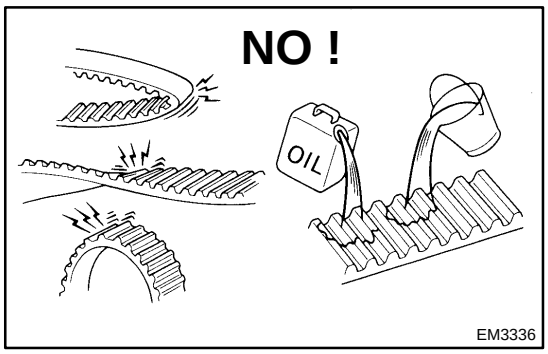



RH No. 3 Timing Belt Cover
7.5 (80, 66 in.·lbf)
No. 2 Timing Belt Cover
16 (160, 12)
Drive Belt Idler Pulley
39 (400, 29)
Cover Plate
Camshaft Position Sensor Connector
Wire Grommet
LH No. 3 Timing Belt Cover
Engine Wire
7.5 (80, 16 in.·lbf)
Oil Cooler Pipe
N·m (kgf·cm, ft·lbf) : Specified torque
A04326


RH Camshaft Timing Pulley
LH Camshaft Timing Belt Pulley
Timing Belt
108 (1,100, 80)
245 (2,500, 181)
16 (160, 12)
32 (330, 24)
Dust Boot
Timing belt Tensioner
Fan Bracket
26 (270, 19)
N·m (kgf·cm, ft·lbf) : Specified torque
A04327


Generator Wire
Drive Belt Tensioner
39 (400, 29)
No.1 Timing Belt Cover
15.5 (158, 11)
39 (400, 29)
Generator
Crankshaft Pulley
No.1 Idler Pulley
Timing Belt
★
34.5 (350, 25)
Plate Washer
Crankshaft Timing Pulley
34.5 (350, 25)
Timing Belt Guide
(Crankshaft Angle Sensor Plate)
No.2 Idler Pulley
Gasket
Timing Belt Cover Spacer
N·m (kgf·cm, ft·lbf) : Specified torque
P★ Precoated part
A19486

EM0KX-06



INSPECTION

1. INSPECT TIMING BELT

NOTICE:

- ★ **Do not bend, twist or turn the timing belt inside out.**
- ★ **Do not allow the timing belt to contact with oil, water or steam.**
- ★ **Do not utilize timing belt tension when installing or removing the mount bolt of the camshaft timing pulley.**

If there any defects as shown in the illustrations, check these points:

(a) Premature parting
- ★ Check for proper installation.
- ★ Check the timing cover gasket for damage and proper installation.

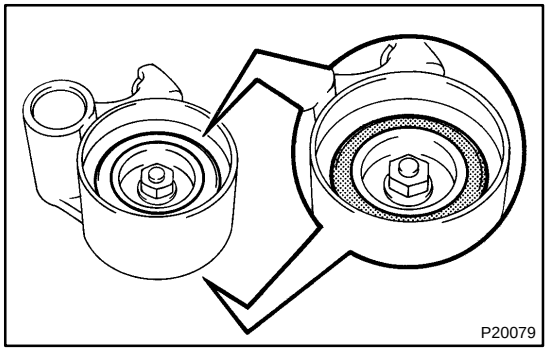
(b) If the belt teeth are cracked or damaged, check if either camshaft is locked.

(c) If there is noticeable wear or cracks on the belt face, check if there are nicks on the side of the idler pulley lock and the water pump.

(d) Even if there is wear or damage on only one side of the belt, check the belt guide and the alignment of each pulley.

(e) If there is noticeable wear on the belt teeth, check timing cover for damage and for foreign materials on the pulley teeth.

If necessary, replace the timing belt.



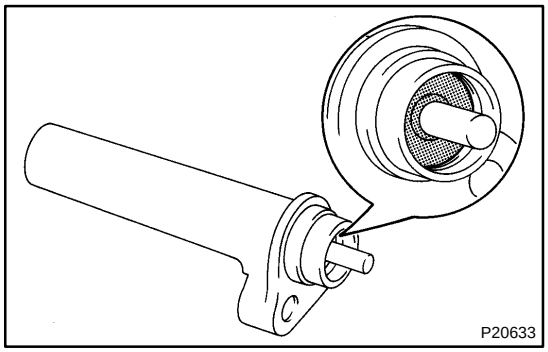
2. INSPECT IDLER PULLEYS

(a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.

(b) Check that the idler pulley turns smoothly.

If necessary, replace the idler pulley.



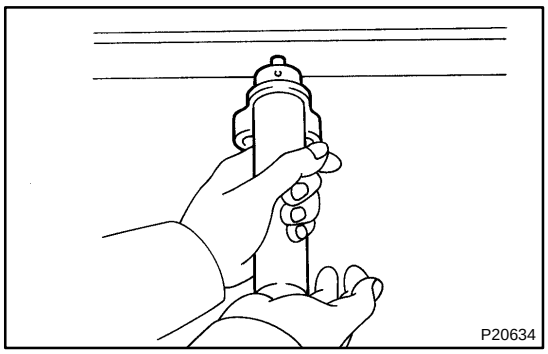
3. INSPECT TIMING BELT TENSIONER

(a) Visually check the seal portion of the tensioner for oil leakage.

HINT:

If there is only the faintest trace of oil on the seal on the push rod side, the tensioner is all right.

If leakage is found, replace the tensioner.

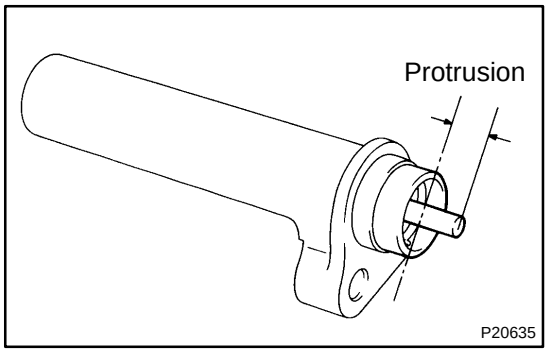


(b) Hold the tensioner with both hands, and push the push rod strongly to check that it doesn't move.

If the push rod moves, replace the tensioner.

NOTICE:

Never hold the tensioner push rod facing downward.



(c) Measure the protrusion of the push rod from the housing end.

Protrusion:

10.5 - 11.5 mm (0.413 - 0.453 in.)

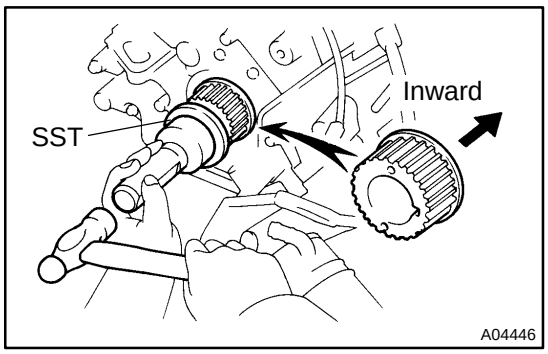
If the protrusion is not as specified, replace the tensioner.

4. INSPECT WATER PUMP

(See page CO-7)

EM0KY-09

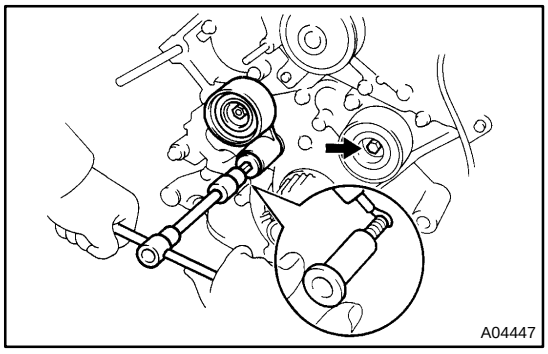
INSTALLATION



1. INSTALL CRANKSHAFT TIMING PULLEY

(a) Align the timing pulley set key with the key groove of the pulley.

(b) Using SST and a hammer, tap in the timing pulley, facing the flange side inward.
SST 09223-4601 1



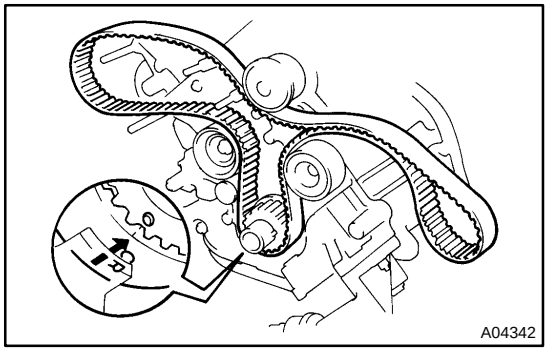
2. INSTALL NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Apply adhesive 2 or 3 threads from the end of the pivot bolt.
Adhesive:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Using a 10 mm hexagon wrench, install the plate washer and the No.1 idler pulley with the pivot bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(c) Install the No.2 idler pulley with the bolt.
Torque: 34.5 N·m (350 kgf·cm, 25 ft·lbf)

(d) Check that the No.1 and No.2 idler pulley moves smoothly.



3. TEMPORARILY INSTALL TIMING BELT

NOTICE:

The engine should be cold.

(a) Remove any oil or water on and clean the crankshaft pulley, the oil pump pulley, the water pump pulley, the No.1 idler pulley and the No.2 idler pulley.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

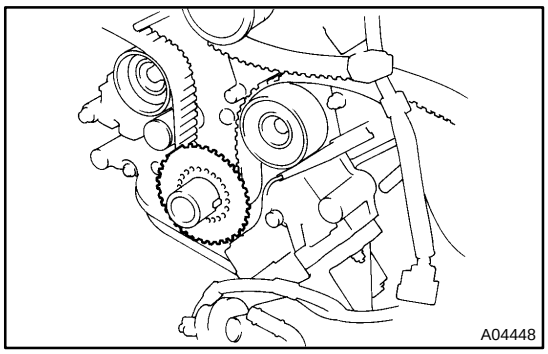
(b) Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.

(c) Install the timing belt on the crankshaft timing pulley, the No.1 idler pulley and the No.2 idler pulley.

4. INSTALL TIMING BELT COVER SPACER

(a) Install the gasket to the cover spacer.

(b) Install the cover spacer.

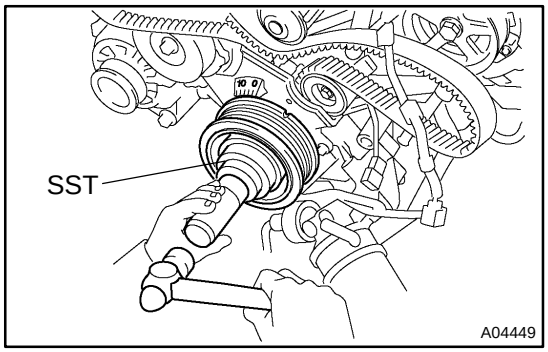


5. INSTALL TIMING BELT GUIDE

Install the belt guide, facing the cup side outward.

6. INSTALL NO.1 TIMING BELT COVER

Install the timing belt cover with the 4 bolts.



7. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the crankshaft pulley.

(b) Using SST and a hammer, tap in the crankshaft pulley.
SST 09223-4601 1

8. INSTALL DRIVE BELT TENSIONER

Install the belt tensioner with the bolt and the 2 nuts.

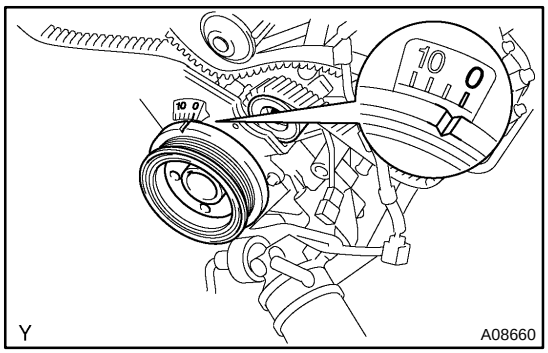
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

HINT:

Use a bolt of 106 mm (4.18 in.) in length.

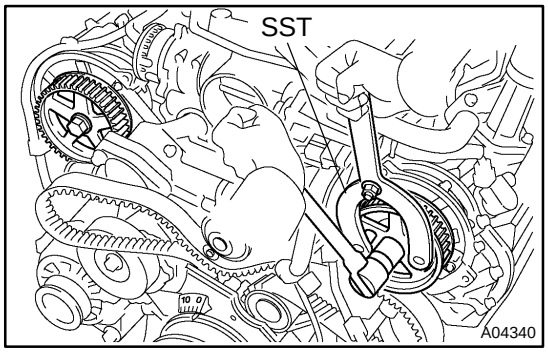
9. INSTALL GENERATOR

(See page CH-16)



10. CHECK CRANKSHAFT PULLEY POSITION

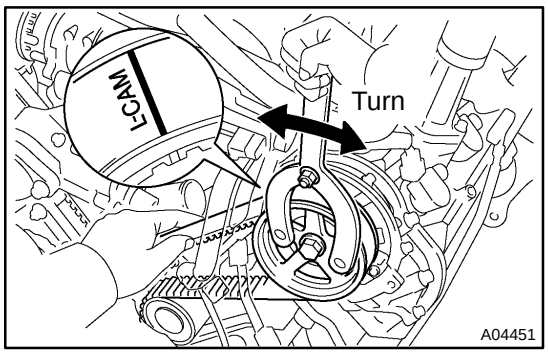
Check that the timing mark of the crankshaft pulley is aligned with the timing mark ”0” of the No.1 timing belt cover.



11. INSTALL RH, LH CAMSHAFT TIMING PULLEYS

(a) Align the camshaft knock pin with the knock pin grove of the timing pulley, and slide on the timing pulley.

(b) Using SST, install the pulley bolt.
SST 09960-10010 (09962-01000, 09963-01000)
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



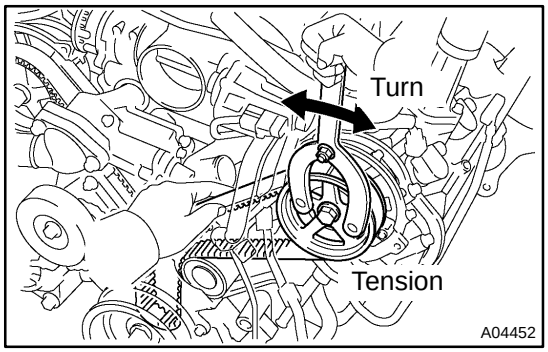
12. CONNECT TIMING BELT TO LH CAMSHAFT TIMING PULLEY

(a) Remove any oil or water on the LH camshaft timing pulley, and clean it up.

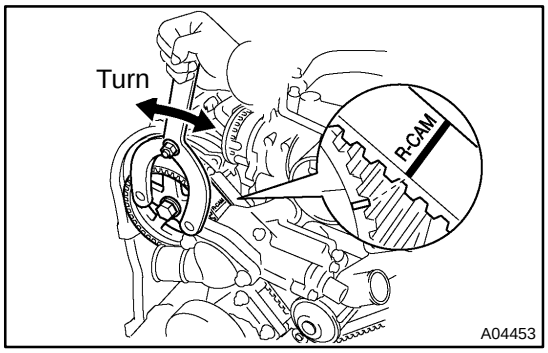
NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Turn the LH camshaft timing pulley. Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley, and hang the timing belt on the LH camshaft timing pulley.



(c) Turn the LH camshaft timing pulley counterclockwise until there is tension between the crankshaft timing pulley and the LH camshaft timing pulley.



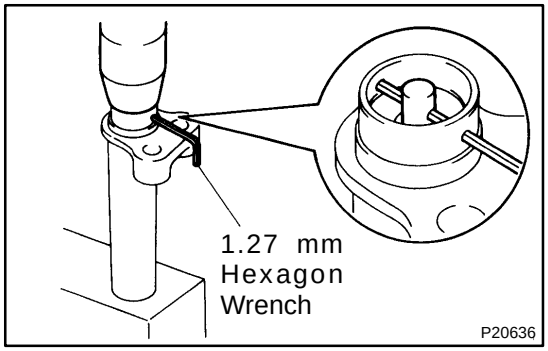
13. CONNECT TIMING BELT TO RH CAMSHAFT TIMING PULLEY

(a) Remove any oil or water on the RH camshaft timing pulley and water pump pulley, and clean them up.

NOTICE:

Only wipe the pulleys; do not use any cleansing agent.

(b) Turn the RH camshaft timing pulley. Align the installation mark on the timing belt with the timing mark of the camshaft timing pulley, and hang the timing belt on the RH camshaft timing pulley.



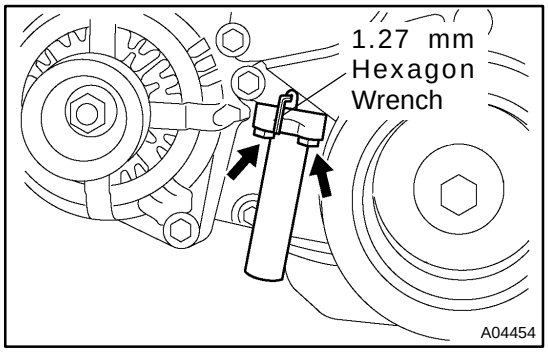
14. SET TIMING BELT TENSIONER

(a) Using a press, slowly press in the push rod using 981 - 9,807 N (100 - 1,000 kgf, 220 - 2,205 lbf) of pressure.

(b) Align the holes of the push rod and the housing, pass a 1.27 mm (0.050 in.) hexagon wrench through the holes to keep the setting position of the push rod.

(c) Release the press.

(d) Install the dust boot to the belt tensioner.



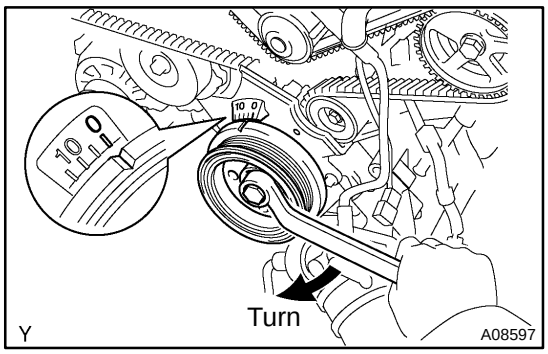
15. INSTALL TIMING BELT TENSIONER

(a) Temporarily install the belt tensioner with the 2 bolts.

(b) Alternately tighten the 2 bolts.

Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)

(c) Using pliers, remove the 1.27 mm (0.050 in.) hexagon wrench from the belt tensioner.



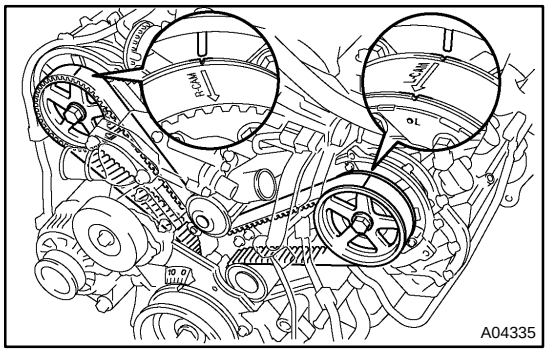
16. CHECK VALVE TIMING

(a) Temporarily install the crankshaft pulley bolt.

(b) Slowly turn the crankshaft pulley 2 revolutions from TDC to TDC.

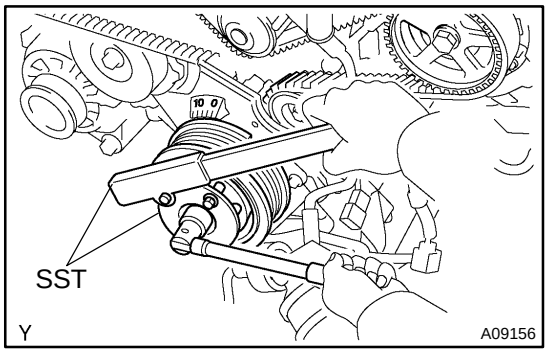
NOTICE:

Always turn the crankshaft pulley clockwise.



(c) Check that each pulley aligns with the timing marks as shown in the illustration.

If the timing marks do not align, remove the timing belt and reinstall it.

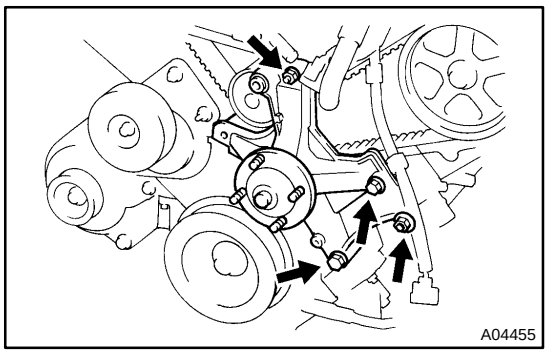


17. TIGHTEN CRANKSHAFT PULLEY BOLT

Using SST, install the pulley bolt.

SST 09213-7001 1 (90105-70020), 09330-00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



18. INSTALL FAN BRACKET

Install the fan bracket with the 2 bolts and the 2 nuts.

Torque:

12 mm head

16 N·m (160 kgf·cm, 12 ft·lbf)

14 mm head

32 N·m (330 kgf·cm, 24 ft·lbf)

HINT:

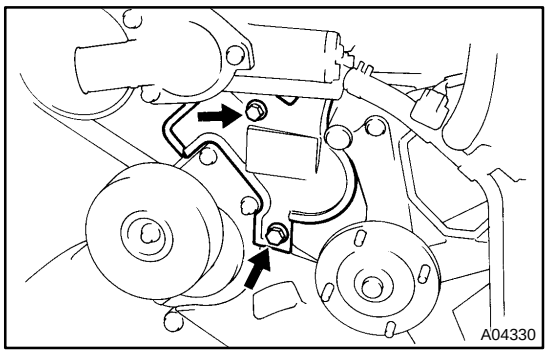
Bolt Length:

106 mm (4.17 in.) for 12 mm head (A)

114 mm (4.49 in.) for 14 mm head (B)

19. INSTALL A/C COMPRESSOR

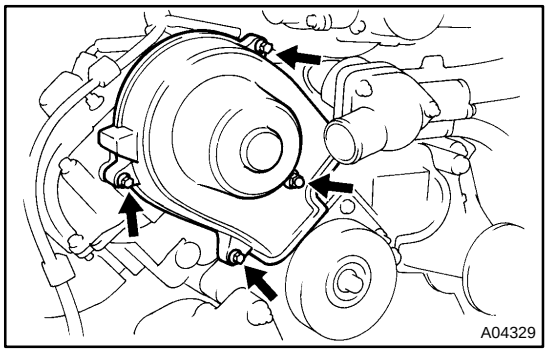
(See page EM-81)



20. INSTALL NO.2 TIMING BELT COVER

Install the No.2 timing belt cover with the 2 bolts.

Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)

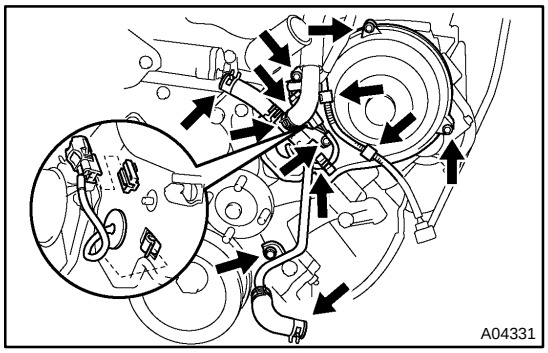


21. INSTALL RH NO.3 TIMING BELT COVER

(a) Fit the RH No.3 timing belt cover, matching it with the fan bracket.

(b) Install the RH No.3 timing belt cover with the 3 bolts and nut.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



22. INSTALL LH NO.3 TIMING BELT COVER

(a) Install the oil cooler pipe and the bolt.

(b) Run the camshaft position sensor wire through the LH No.3 timing belt cover hole.

(c) Fit the LH No.3 timing belt cover, matching it with the fan bracket.

(d) Install the LH No.3 timing belt cover with the 4 bolts and the nut.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(e) Install the wire grommet to the LH No.3 timing belt cover.

(f) Install the sensor connector to the connector bracket.

(g) Connect the sensor connector.

(h) Install the sensor wire to the wire clamp on the LH No.3 timing belt cover.

(i) Install the engine wire to the 2 wire clamps on the LH No.3 timing belt cover.

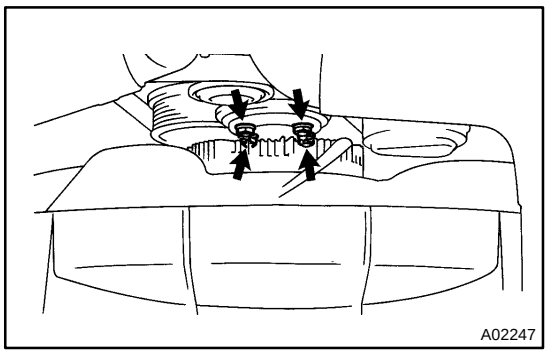
23. INSTALL DRIVE BELT IDLER PULLEY

Install the idler pulley and the cover plate with the bolt.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

24. INSTALL RADIATOR ASSEMBLY

(See page CO-19)



25. INSTALL FAN PULLEY, FAN, FLUID COUPLING AND DRIVE BELT

(a) Temporarily install the fan pulley, the fan, fluid coupling assembly with the 4 nuts.

(b) Install the generator drive belt.
(See page CH-16)

(c) Tighten the 4 nuts holding the fluid coupling to the fan bracket.
Torque: 21 N·m (215 kgf·cm, 16 ft·lbf)

26. INSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

27. INSTALL V-BANK COVER

28. FILL WITH ENGINE COOLANT

29. START ENGINE AND CHECK FOR LEAKS

30. RECHECK ENGINE COOLANT LEVEL

31. INSTALL BATTERY CLAMP COVER

32. INSTALL ENGINE UNDER COVER

33. INSTALL OIL PAN PROTECTOR

EM1VA-01

REMOVAL

1. REMOVE OIL PAN PROTECTOR

2. REMOVE ENGINE UNDER COVER

3. DRAIN ENGINE COOLANT

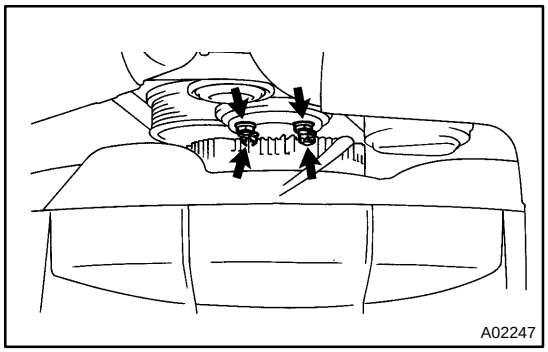
4. REMOVE BATTERY CLAMP COVER

5. REMOVE V-BANK COVER

(a) Remove the fuel return hose from the V-bank cover.

(b) Remove the 2 bolt, 2 cap nuts and V-bank cover.

6. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY


A02247

7. REMOVE DRIVE BELT, FAN, FLUID COUPLING AND FAN PULLEY

(a) Loosen the 4 nuts holding the fluid coupling to the fan bracket.

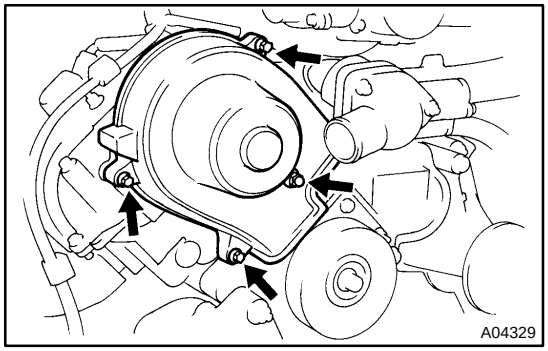
(b) Remove the generator drive belt.
(See page CH-7)

(c) Remove the 4 nuts, the fan, the fluid coupling assembly and the fan pulley.

8. REMOVE RADIATOR ASSEMBLY
(See page CO-17)

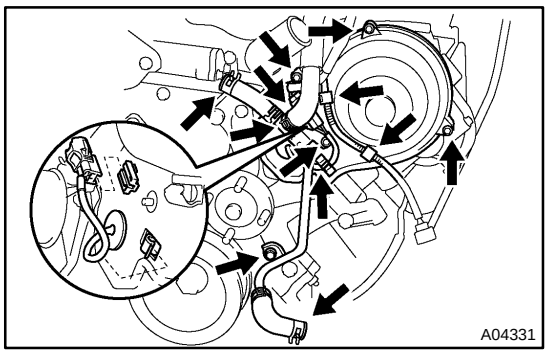
9. REMOVE DRIVE BELT IDLER PULLEY

Remove the pulley bolt, the cover plate and the idler pulley.


A04329

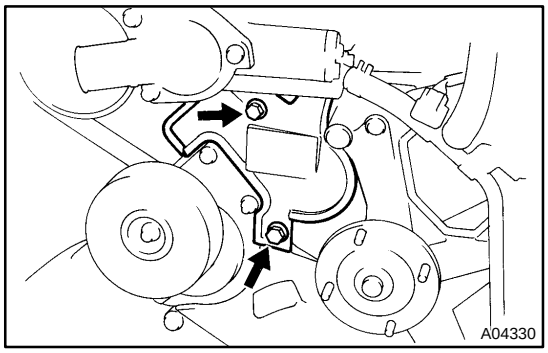
10. REMOVE RH NO.3 TIMING BELT COVER

Remove the 3 bolts, the nut and the RH No.3 timing belt cover.



11. REMOVE LH NO.3 TIMING BELT COVER

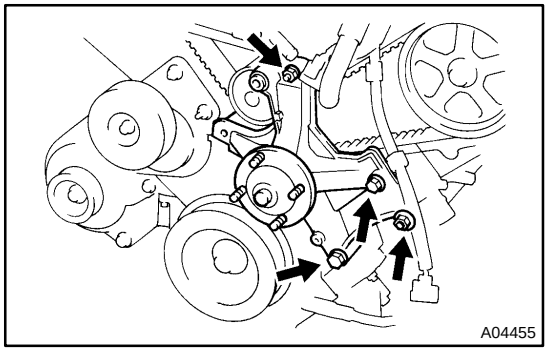
(a) Disconnect the engine wire from the 2 wire clamps.
(b) Remove the 4 bolts and the nut.
(c) Disconnect the camshaft position sensor wire from the wire clamp on the LH No.3 timing belt cover.
(d) Disconnect the sensor connector from the connector bracket.
(e) Disconnect the camshaft position sensor connector.
(f) Remove the wire grommet from the LH No.3 timing belt cover.
(g) Remove the LH No.3 timing belt cover.
(h) Remove the oil cooler pipe and the 2 bolts.



12. REMOVE NO.2 TIMING BELT COVER

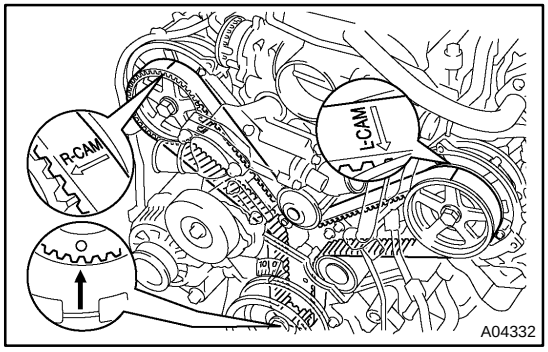
Remove the 2 bolts and the No.2 timing belt cover.

13. DISCONNECT A/C COMPRESSOR FROM ENGINE (See page EM-77)



14. REMOVE FAN BRACKET

Remove the 2 bolts, the 2 nuts and the fan bracket.

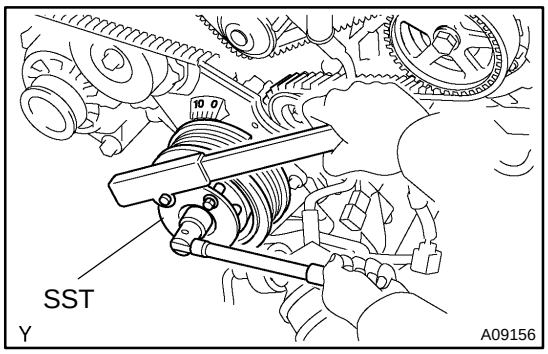


15. IF RE-USING TIMING BELT, CHECK INSTALLATION MARKS ON TIMING BELT

Check that there are 3 installation marks on the timing belt as turning the crankshaft pulley as shown in the illustration.

HINT:

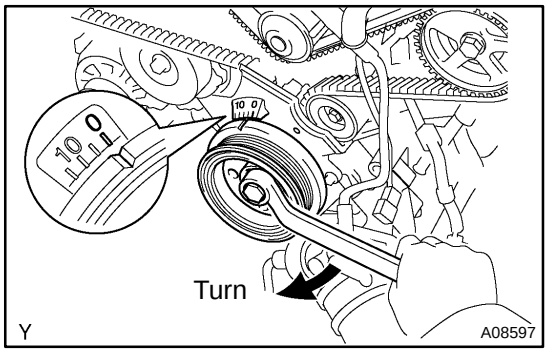
If the installation marks are disappeared, place a new installation mark on the timing belt before removing each part.



16. LOOSEN CRANKSHAFT PULLEY BOLT

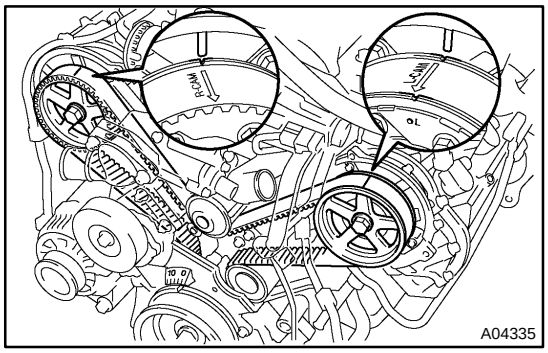
Using SST, loosen the pulley bolt.

SST 09213-7001 1 (90105-70020), 09330-00021



17. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley and align its groove with the timing mark ”0” of the No.1 timing belt cover.



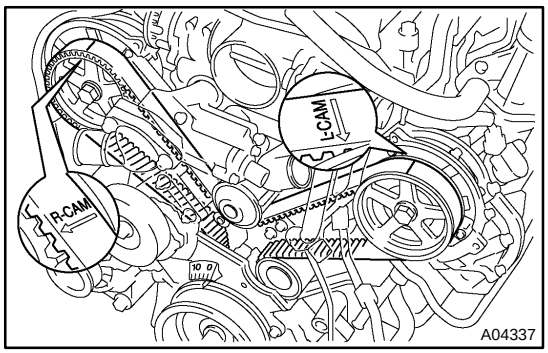
(b) Check that the timing marks of the camshaft timing pulleys and that of the timing belt rear plates aligned.

If not, turn the crankshaft 1 revolution (360˚).

(c) Remove the crankshaft pulley bolt.

NOTICE:

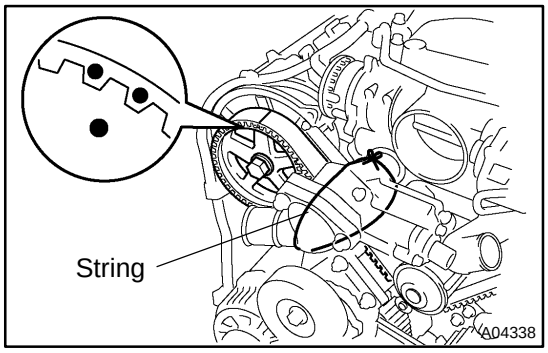
Do not turn the crankshaft pulley.



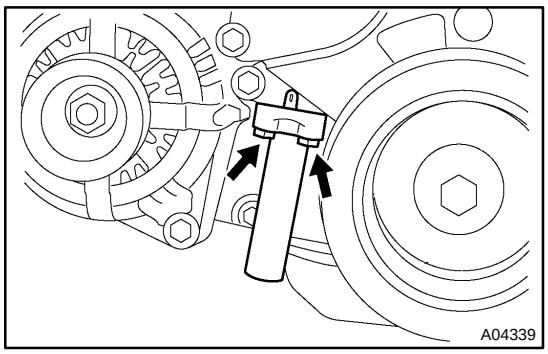
18. REMOVE TIMING BELT TENSIONER

HINT:

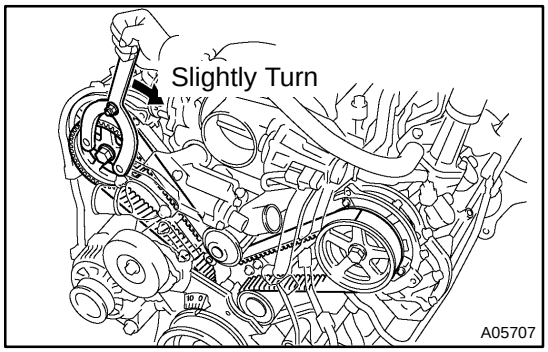
★ When re-using timing belt:
If the installation marks are disappeared, place 2 new installation marks on the timing belt to match the timing marks of the camshaft timing pulleys before the removal.



★ When replacing timing belt tensioner only:
To avoid meshing of the timing pulley and the timing belt, secure one of them with string, and then place matchmarks on the timing belt and the RH camshaft timing pulley.



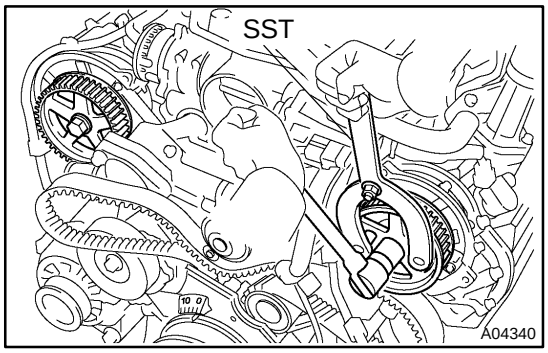
Alternately loosen the 2 bolts, and remove the belt tensioner and the dust boot.



19. DISCONNECT TIMING BELT FROM CAMSHAFT TIMING PULLEYS

(a) Using SST, loosen the tension spring between the LH and RH camshaft timing pulleys by slightly turning the LH camshaft timing pulley clockwise.
SST 09960-10010 (09962-01000, 09963-01000)

(b) Disconnect the timing belt from the camshaft timing pulleys.



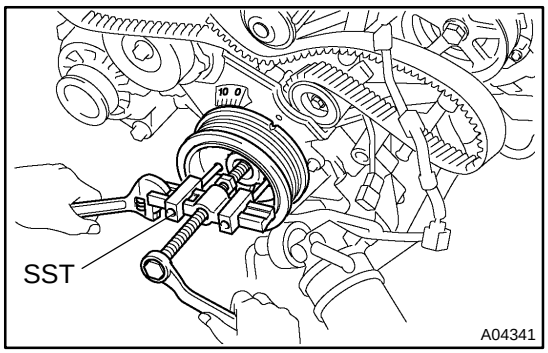
20. REMOVE CAMSHAFT TIMING PULLEYS

Using SST, remove the bolt and the timing pulley. Remove the 2 timing pulleys.
SST 09960-10010 (09962-01000, 09963-01000)

21. REMOVE GENERATOR
(See page CH-7)

22. REMOVE DRIVE BELT TENSIONER

Remove the bolt, 2 nuts and the belt tensioner.



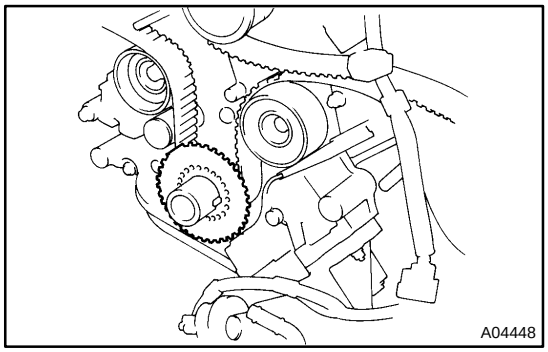
23. REMOVE CRANKSHAFT PULLEY

Using SST, remove the crankshaft pulley.
SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09954-05011, 09953-05020, 09954-05021)

NOTICE:
Do not turn the crankshaft pulley.

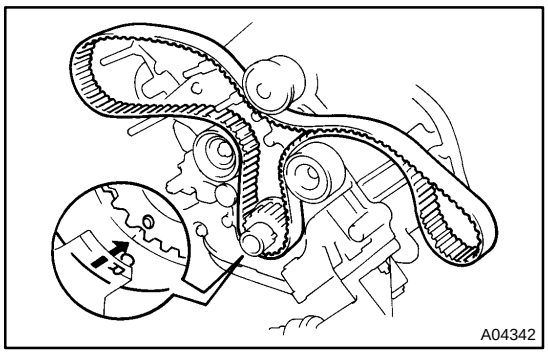
24. REMOVE NO.1 TIMING BELT COVER

Remove the 4 bolts and the timing belt cover.



25. REMOVE TIMING BELT GUIDE

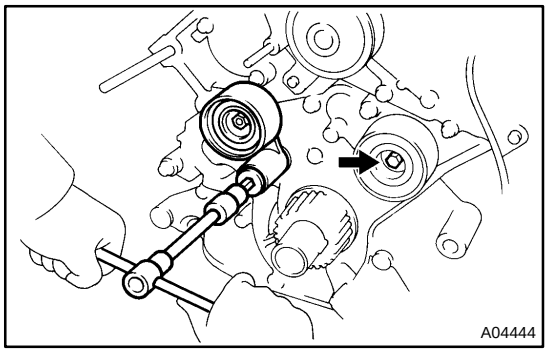
26. REMOVE TIMING BELT COVER SPACER



27. REMOVE TIMING BELT

HINT:

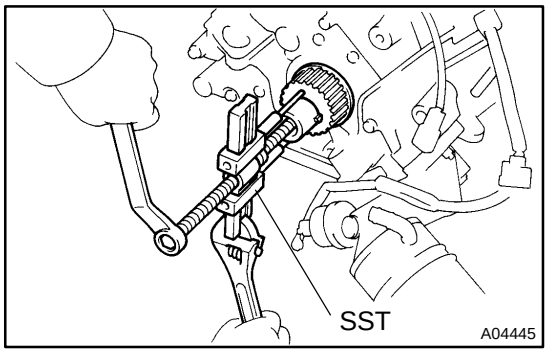
If re-using the belt and the installation mark is disappeared from it, place a new installation mark on the timing belt to the match the dot mark on the crankshaft timing pulley.



28. REMOVE NO.1 IDLER PULLEY AND NO.2 IDLER PULLEY

(a) Using a 10 mm hexagon wrench, remove the bolt, the No.1 idler pulley and the plate washer.

(b) Remove the bolt and the No.2 idler pulley.



29. REMOVE CRANKSHAFT TIMING PULLEY

Using SST, remove the timing pulley.

SST 09950-50013 (09951-05010, 09952-05010, 09953-05010, 09953-05020, 09954-05011, 09954-05021)

NOTICE:

Do not turn the timing pulley.

VALVE CLEARANCE

EM0KS-08

INSPECTION

HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. DRAIN ENGINE COOLANT

2. REMOVE BATTERY CLAMP COVER

3. REMOVE V-BANK COVER

4. REMOVE AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

5. REMOVE NO.3 TIMING BELT COVERS
(See page EM-15)

6. REMOVE IGNITION COILS (See page IG-6)

7. REMOVE RH CYLINDER HEAD COVER

Remove the 9 bolts, the 9 seal washers and the cylinder head cover.

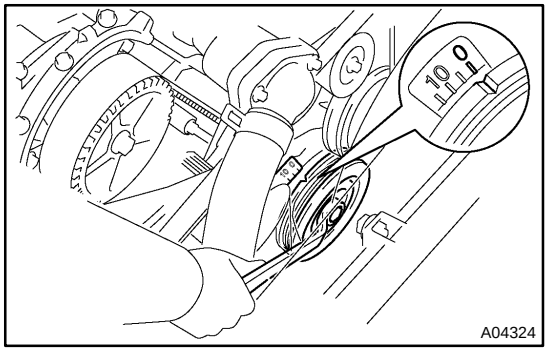
8. REMOVE LH CYLINDER HEAD COVER

(a) Remove the oil dipstick for the transmission.

(b) Disconnect the PCV hose.

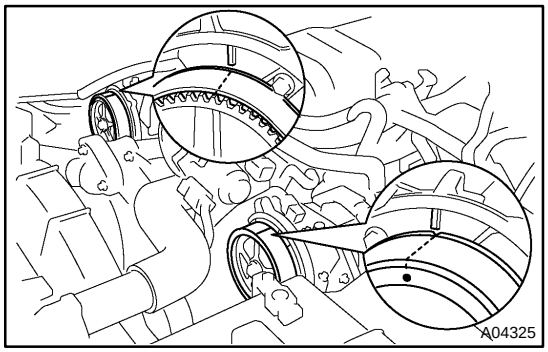
(c) Disconnect the engine wire clamp from the wire bracket on the cylinder head cover.

(d) Remove the 9 bolts, the 9 seal washers and the cylinder head cover.



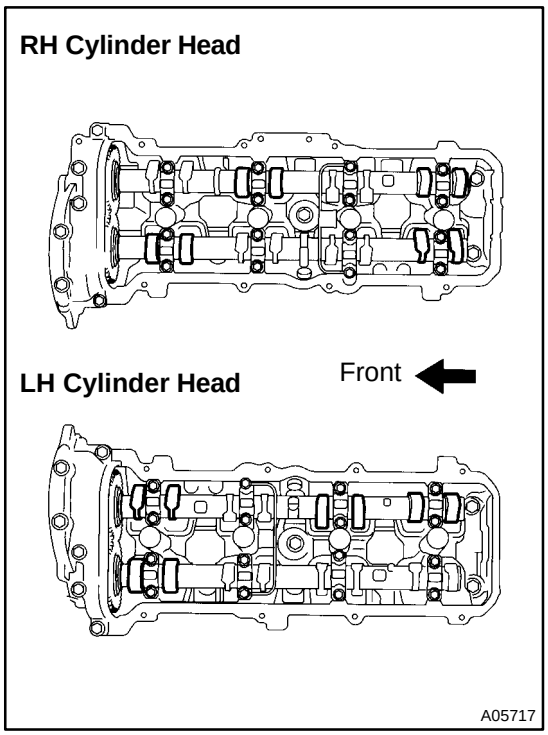
9. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley, and align its groove with timing mark ”0” of the No.1 timing belt cover.



(b) Check that the timing marks of the camshaft timing pulleys and that of the timing belt rear plates are aligned.

If not, turn the crankshaft 1 revolution (360˚) and align the mark as above.



10. INSPECT VALVE CLEARANCE

(a) Check only the valves indicated.

★ Using a feeler gauge, measure the clearance between the valve lifter and the camshaft.

★ Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

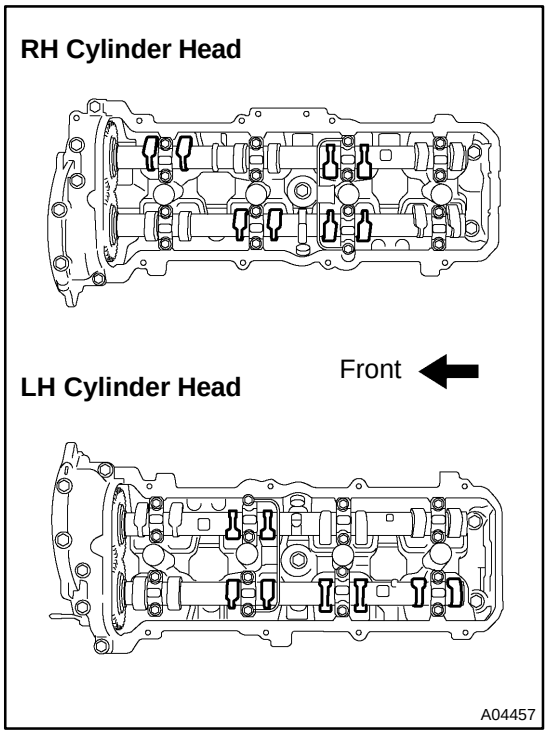
Valve clearance (Cold):

Intake

0.15 - 0.25 mm (0.006 - 0.010 in.)

Exhaust

0.25 - 0.35 mm (0.010 - 0.014 in.)



(b) Turn the crankshaft 1 revolution (360˚) and align the mark as above (See procedure in step 9).

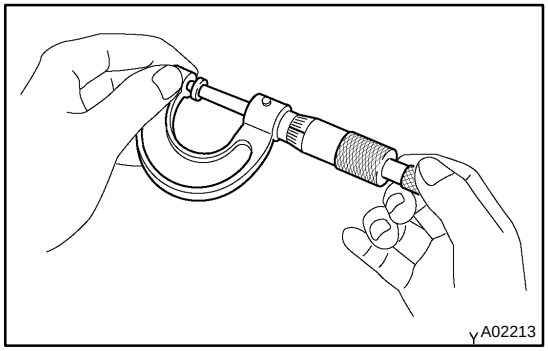
(c) Check only the valves indicated as shown. Measure the valve clearance. (See procedure in step (a))

11. ADJUST VALVE CLEARANCE

(a) Remove the timing belt (See page EM-15).

(b) Remove the camshafts (See page EM-35).

(c) Remove the valve lifter and adjusting shim.



(d) Determine the replacement adjusting shim size according to the following Formula and Charts:

★ Using a micrometer, measure the thickness of the removed shim.

★ Calculate the thickness of a new shim so that the valve clearance comes within the specified value.

T ..... Thickness of removed shim

A ..... Measured valve clearance

N ..... Thickness of new shim

Intake:

N = T + (A - 0.20 mm (0.008 in.))

Exhaust:

N = T + (A - 0.30 mm (0.012 in.))

★ Select a new shim with the closest thickness as close as possible to the calculated value.

HINT:

Shims are available in 41 increments of 0.020 mm (0.0008 in.), from 2.00 mm (0.0787 in.) to 2.80 mm (0.1102 in.).

(e) Place a new adjusting shim on the valve.

(f) Place the valve lifter.

(g) Reinstall the camshafts (See page EM-57).

(h) Reinstall the timing belt (See page EM-22).

(i) Recheck the valve clearance.

12. REINSTALL CYLINDER HEAD COVERS

13. REINSTALL IGNITION COILS

14. REINSTALL NO.3 TIMING BELT COVERS (See page EM-22)

15. REINSTALL AIR CLEANER AND INTAKE AIR CONNECTOR ASSEMBLY

16. REFILL WITH ENGINE COOLANT

17. START ENGINE AND CHECK FOR LEAKS

18. RECHECK ENGINE COOLANT LEVEL

19. REINSTALL V-BANK COVER

20. REINSTALL BATTERY CLAMP COVER

Adjusting Shim Selection Chart (Intake)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000−0.030 (0.0000−0.0012)							00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	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	56	58	60	62
0.031−0.050 (0.0012−0.0020)						00	00	00	00	02	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	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	60	62	64
0.051−0.070 (0.0020−0.0028)					00	00	00	00	02	04	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	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	62	64	66
0.071−0.090 (0.0028−0.0035)				00	00	00	00	02	04	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	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	64	66	68
0.091−0.110 (0.0036−0.0043)			00	00	00	00	02	04	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	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	66	68	70
0.111−0.130 (0.0044−0.0051)		00	00	00	00	02	04	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	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	68	70	72
0.131−0.149 (0.0052−0.0059)		00	00	00	02	04	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	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	70	72	74
0.150−0.250 (0.0059−0.0098)						

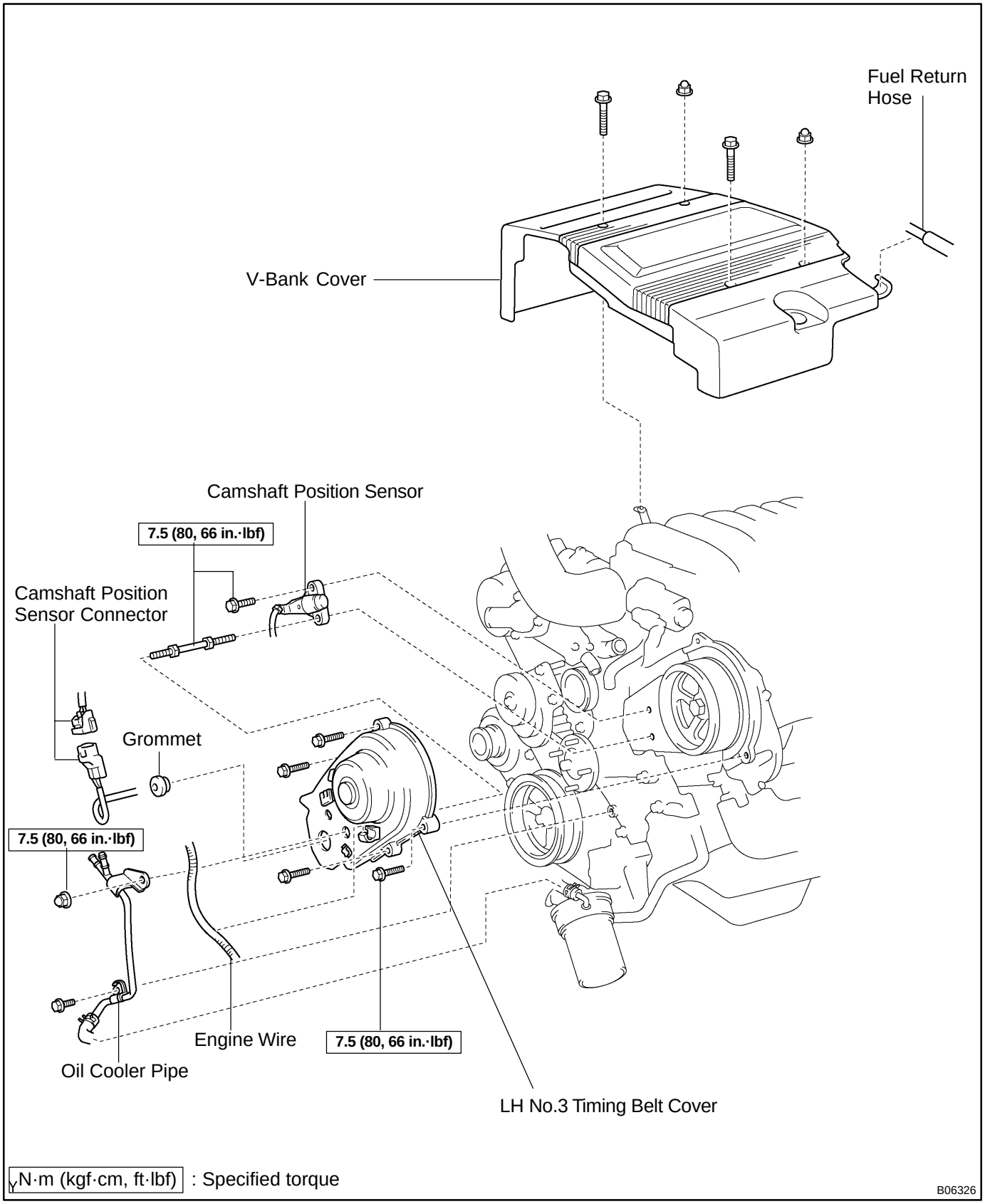
Adjusting Shim Selection Chart (Exhaust)

Measured clearance mm (in.) \ Installed shim thickness mm (in.)	2.000 (0.0787)	2.020 (0.0795)	2.040 (0.0803)	2.060 (0.0811)	2.080 (0.0819)	2.100 (0.0827)	2.120 (0.0835)	2.140 (0.0843)	2.160 (0.0850)	2.180 (0.0858)	2.200 (0.0866)	2.210 (0.0870)	2.220 (0.0874)	2.230 (0.0878)	2.240 (0.0882)	2.250 (0.0886)	2.260 (0.0890)	2.270 (0.0894)	2.280 (0.0898)	2.290 (0.0902)	2.300 (0.0906)	2.310 (0.0909)	2.320 (0.0913)	2.330 (0.0917)	2.340 (0.0921)	2.350 (0.0925)	2.360 (0.0929)	2.370 (0.0933)	2.380 (0.0937)	2.390 (0.0941)	2.400 (0.0945)	2.410 (0.0949)	2.420 (0.0953)	2.430 (0.0957)	2.440 (0.0961)	2.450 (0.0965)	2.460 (0.0969)	2.470 (0.0972)	2.480 (0.0976)	2.490 (0.0980)	2.500 (0.0984)	2.510 (0.0988)	2.520 (0.0992)	2.530 (0.0996)	2.540 (0.1000)	2.550 (0.1004)	2.560 (0.1008)	2.570 (0.1012)	2.580 (0.1016)	2.590 (0.1020)	2.600 (0.1024)	2.620 (0.1031)	2.640 (0.1039)	2.660 (0.1047)	2.680 (0.1055)	2.700 (0.1063)	2.720 (0.1071)	2.740 (0.1079)	2.760 (0.1087)	2.780 (0.1094)	2.800 (0.1102)
0.000−0.030 (0.0000−0.0012)											00	00	00	00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	34	36	38	40	42	44	46	48	50	52
0.031−0.050 (0.0012−0.0020)											00	00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	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	50	52	54
0.051−0.070 (0.0020−0.0028)										00	00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	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	52	54	56
0.071−0.090 (0.0028−0.0035)									00	00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	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	54	56	58
0.091−0.110 (0.0036−0.0043)								00	00	00	00	02	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	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	56	58	60
0.111−0.130 (0.0044−0.0051)							00	00	00	00	02	04	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	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	58	60	62
0.131−0.150 (0.0052−0.0059)						00	00	00	00	02	04	06	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	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	60	62	64
0.151−0.170 (0.0059−0.0067)					00	00	00	00	02	04	06	08	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	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	62	64	66
0.171−0.190 (0.0067−0.0075)				00	00	00	00	02	04	06	08	10	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	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	64	66	68
0.191−0.210 (0.0075−0.0083)			00	00	00	00	02	04	06	08	10	12	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	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	66	68	70
0.211−0.230 (0.0083−0.0091)		00	00	00	00	02	04	06	08	10	12	14	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	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	68	70	72
0.231−0.249 (0.0091−0.0098)		00	00	00	02	04	06	08	10	12	14	16	16	18	18	20	20	22	22	24	24	26	26	28	28	30	30	32	32	34	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	70	72	74
0.250−0.350 (0.0098−0.0138)										

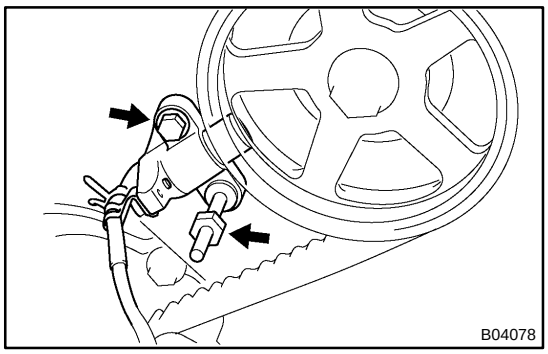
CAMSHAFT POSITION SENSOR

IG08T-03

COMPONENTS



IG08V-01



INSTALLATION

1. INSTALL CAMSHAFT POSITION SENSOR

Install the camshaft position sensor with the bolt and stud bolt

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

2. INSTALL LH NO.3 TIMING BELT COVER
(See page EM-22)

3. CONNECT RADIATOR HOSE

4. INSTALL V-BANK COVER

5. FILL ENGINE COOLANT (See page CO-2)

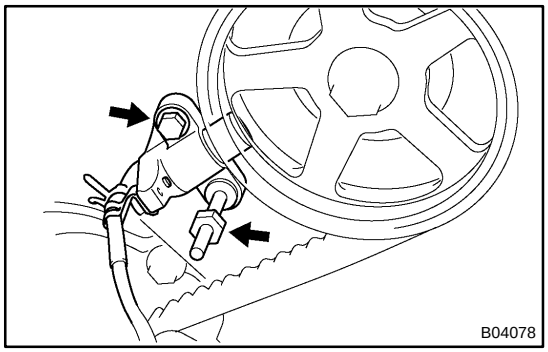
6. CHECK ENGINE COOLANT FOR LEAKS

7. CHECK IGNITION TIMING (See page EM-9)

IG08U-01

REMOVAL

1. REMOVE V-BANK COVER
2. DRAIN ENGINE COOLANT
3. DISCONNECT UPPER RADIATOR HOSE
4. REMOVE LH NO.3 TIMING BELT COVER
   (See page EM-15)



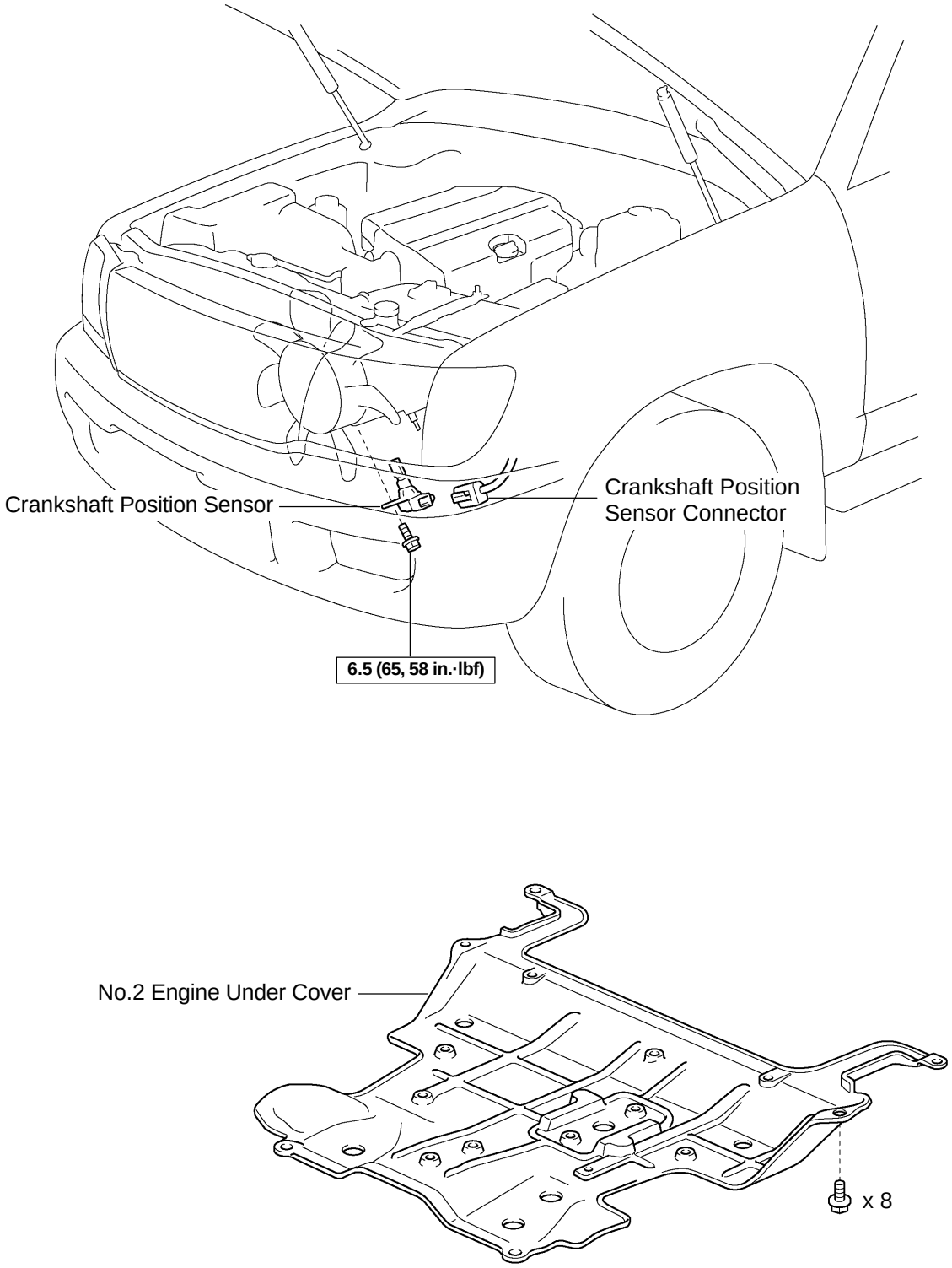
5. REMOVE CAMSHAFT POSITION SENSOR

Remove the bolt, stud bolt and camshaft position sensor.

CRANKSHAFT POSITION SENSOR

IG08W-01

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

B03154

IG08Y-01

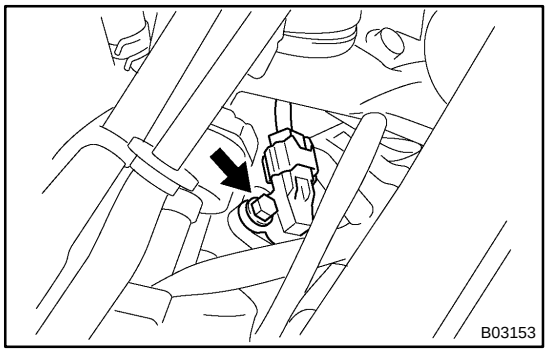
INSTALLATION

Installation is in the reverse order of removal. (See page IG-12)

IG08X-01

REMOVAL

1. REMOVE NO.2 ENGINE UNDER COVER



2. REMOVE CRANKSHAFT POSITION SENSOR

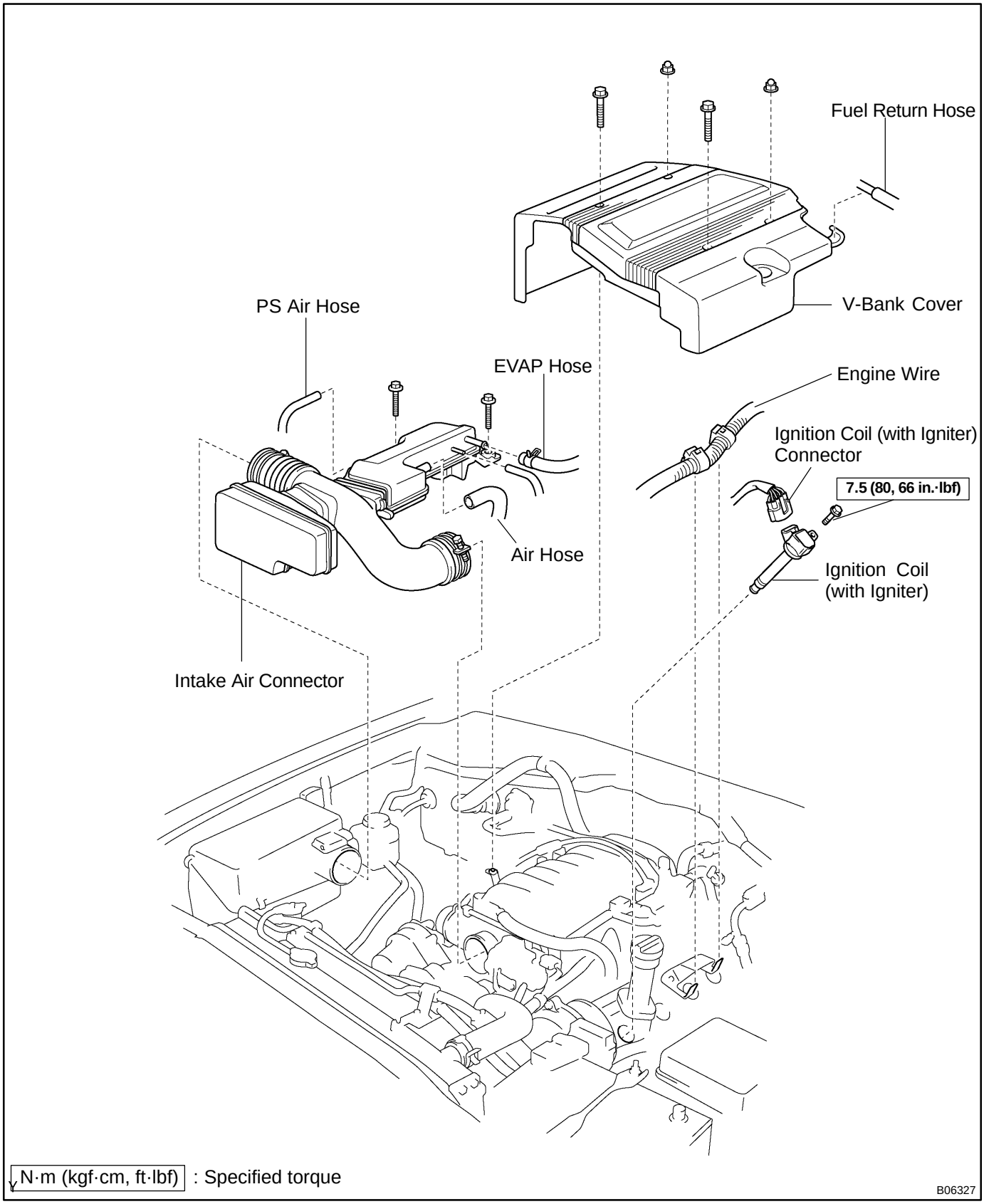
(a) Disconnect the crankshaft position sensor connector.

(b) Remove the bolt and crankshaft position sensor.
Torque: 6.5 N·m (65 kgf·cm, 58 in.·lbf)

IGNITION COIL

COMPONENTS

IG08Q-02



IG08S-01

INSTALLATION

Installation is in the reverse order of removal. (See page IG-6)

IG08R-01

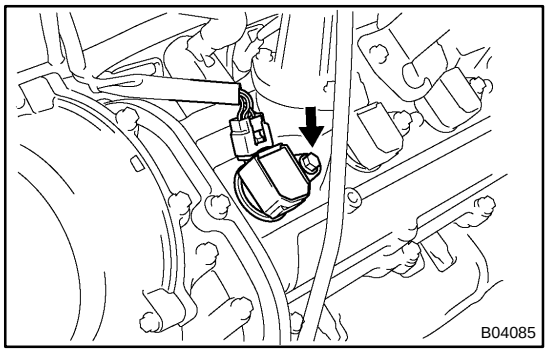
REMOVAL

1. REMOVE V-BANK COVER

2. REMOVE INTAKE AIR CONNECTOR

3. DISCONNECT ENGINE WIRE FROM LH CYLINDER HEAD COVER

Disconnect the 2 wire clamps and engine wire.



4. DISCONNECT IGNITION COIL (WITH IGNITER) CONNECTORS

5. REMOVE IGNITION COILS (WITH IGNITER) FROM SPARK PLUGS

Remove the bolt, and pull out the ignition coil (with igniter). Remove the 8 ignition coils (with igniter).

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

IGNITION SYSTEM

IG08P-03

ON-VEHICLE INSPECTION

NOTICE:

"Cold" and "Hot" in these sentences express the temperature of the coils themselves. "Cold" is from -10˚C (14˚F) to 50˚C (122˚F) and "Hot" is from 50˚C (122˚F) to 100˚C (212˚F).

1. INSPECT IGNITION COIL (WITH IGNITER) AND SPARK TEST

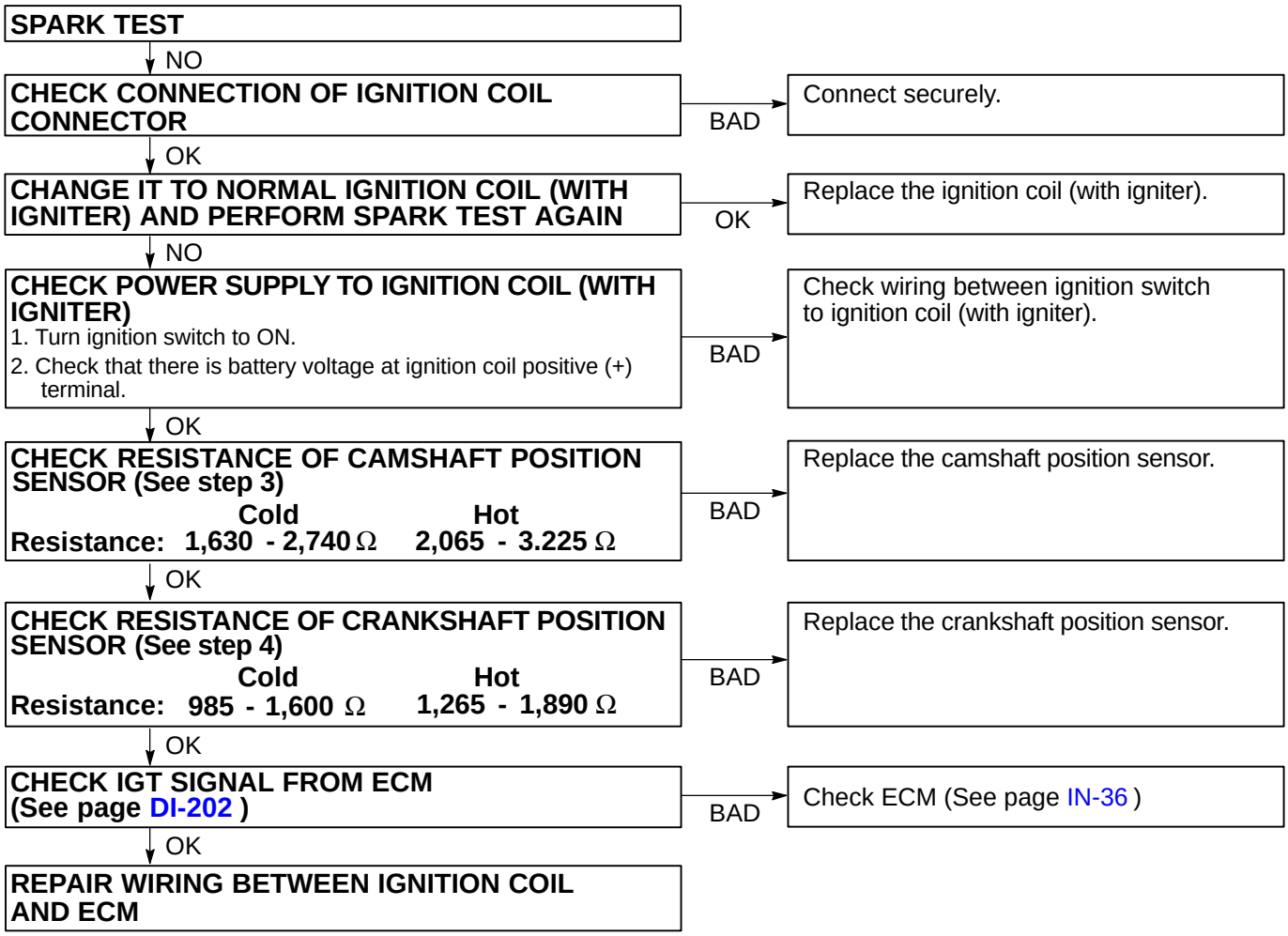
Check that the spark occurs.

(1) Remove the ignition coils (with igniter) (See page IG-6).
(2) Remove the spark plugs.
(3) Install the spark plugs to each ignition coil (with igniter), and connect the ignition coil (with igniter) connector.
(4) Disconnect the 8 injector connectors.
(5) Ground the spark plug.
(6) Check if spark occurs while engine is being cranked.

NOTICE:

To prevent gasoline from being injected from injectors during this test, crank the engine for no more than 5 - 10 seconds at time.

If the spark does not occur, do the test as follows:



(7) Using a 16 mm plug wrench, install the spark plugs.
Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)

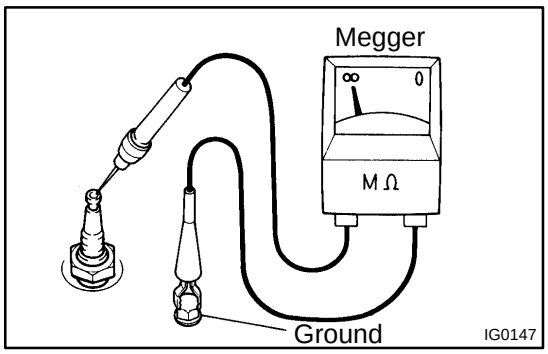
(8) Reinstall the ignition coils (with igniter) (See page IG-6).

2. INSPECT SPARK PLUGS

NOTICE:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on used spark plug.**
- **Spark plug should be replaced every 100,000 km (60,000 miles).**

(a) Remove the ignition coils (with igniter) (See page IG-6).



(b) Check the electrode.

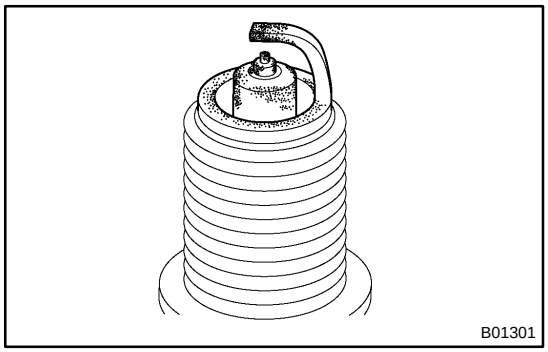
- Using a megger (insulation resistance meter), measure the insulation resistance.

Correct insulation resistance: 10 MΩ or more

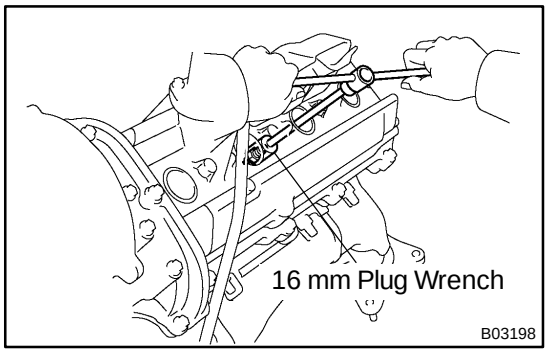
If the resistance is less than specified, proceed to step (d).

HINT:

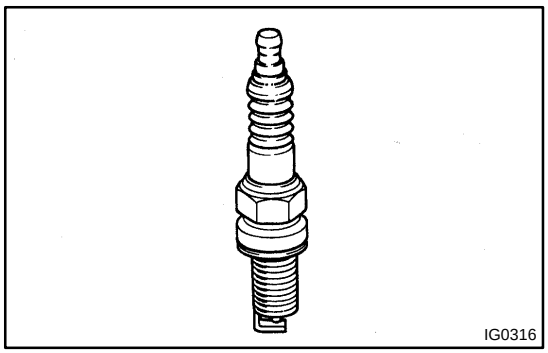
If a megger is not available, the following simple method of inspection provides fairly accurate results.



- Simple Method:
  - Quickly race the engine to 4,000 rpm 5 times.
  - Remove the spark plug. (See step (c))
  - Visually check the spark plug.
    If the electrode is dry ... OK.
    If the electrode is wet ... Proceed to step (d).
  - Reinstall the spark plug. (See step (g))



(c) Using a 16 mm plug wrench, remove the spark plugs.

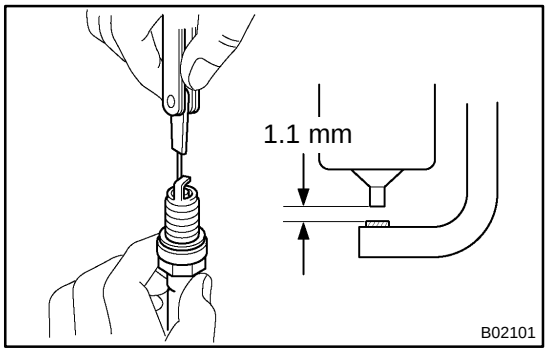


(d) Check the spark plug for thread damage and insulator damage.

If abnormal, replace the spark plug.

Recommended spark plug:

DENSO made	SK20R11
NGK made	IFR6A11



(e) Check the spark plug electrode gap.

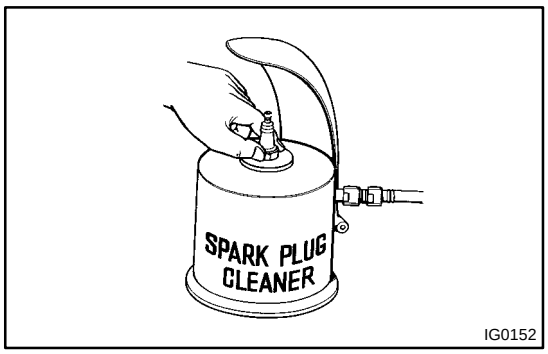
Maximum electrode gap for used spark plug:
1.3 mm (0.051 in.)

If the gap is greater than maximum, replace the spark plug.

Correct electrode gap for new spark plug:
1.1 mm (0.043 in.)

NOTICE:

If adjusting the gap of a new spark plug, bend only the base of the ground electrode. Do not touch the tip. Never attempt to adjust the gap on a used plug.



(f) Clean the spark plugs.

If the electrode has traces of wet carbon, allow it to dry and then clean with a spark plug cleaner.

Air pressure: Below 588 kPa (6 kgf/cm^2, 85 psi)
Duration: 20 seconds or less

HINT:

If there are traces of oil, remove it with gasoline before using the spark plug cleaner.

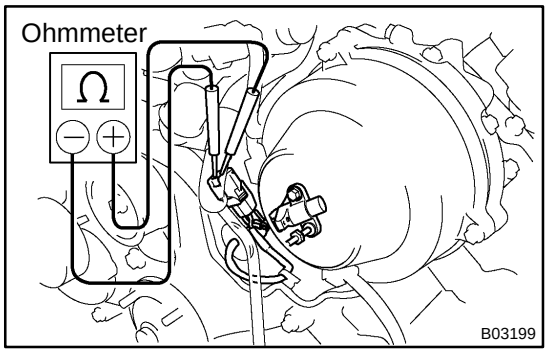
(g) Using a 16 mm plug wrench, install the spark plugs.
Torque: 17.5 N·m (180 kgf·cm, 13 ft·lbf)

(h) Reinstall the ignition coils (with igniter) (See page IG-6).

3. INSPECT CAMSHAFT POSITION SENSOR

(a) Remove the V-bank cover.

(b) Disconnect the camshaft position sensor connector.



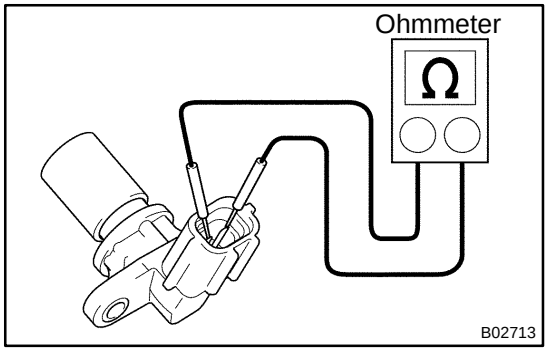
(c) Using an ohmmeter, measure the resistance between terminals.
Resistance:

Cold	835 - 1,400 Ω
Hot	1,060 - 1,645 Ω

If the resistance is not as specified, replace the camshaft position sensor.

(d) Reconnect the camshaft position sensor connector.

(e) Reinstall the V-bank cover.



4. INSPECT CRANKSHAFT POSITION SENSOR

(a) Remove the crankshaft position sensor (See page IG-12).

(b) Using an ohmmeter, measure the resistance between the terminals.
Resistance:

Cold	1,630 - 2,740 Ω
Hot	2,065 - 3,225 Ω

If the resistance is not as specified, replace the crankshaft position sensor.

(c) Reinstall the crankshaft position sensor.

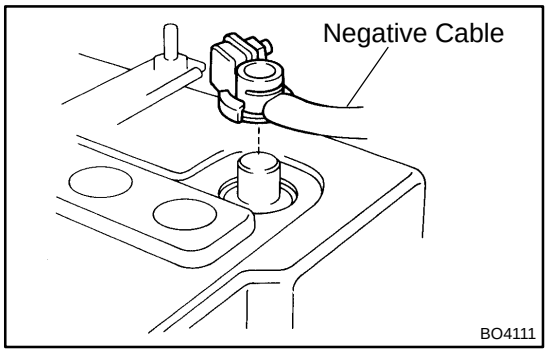
FOR ALL OF VEHICLES

IN0JF-01

PRECAUTION

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

(a) The LAND CRUISER is equipped with an SRS (Supplemental Restraint System), such as the driver airbag, front passenger airbag assembly and seat belt pretensioner.
Failure to carry out service operations in the correct sequence could cause the supplemental restraint system to unexpectedly deploy during servicing, possibly leading to a serious accident.
Further, if a mistake is made in servicing the supplemental restraint system, it is possible the SRS may fail to operate when required. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedure described in this manual.



(b) GENERAL NOTICE

(1) Malfunction symptoms of the supplemental restraint system are difficult to confirm, so the diagnostic trouble codes become the most important source of information when troubleshooting. When troubleshooting the supplemental restraint system, always inspect the diagnostic trouble codes before disconnecting the battery (See page DI-692).

(2) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (-) terminal cable is disconnected from the battery.
(The supplemental restraint system is equipped with a back-up power source so that if work is started within 90 seconds of disconnecting the negative (-) terminal cable from the battery, the SRS may deploy.)
When the negative (-) terminal cable is disconnected from the battery, memory of the clock and audio systems will be cancelled. So before starting work, make a record of the contents memorized by the each memory system. Then when work is finished, reset the clock and audio systems as before.
To avoid erasing the memory of each memory system, never use a back-up power supply from another battery.

(3) Even in cases of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly and seat belt pretensioner should be inspected (See page RS- 18, RS-32 , RS-47 , RS-60 and BO-143).

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

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

(6) Never disassemble and repair the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly or seat belt pretensioner in order to reuse them.

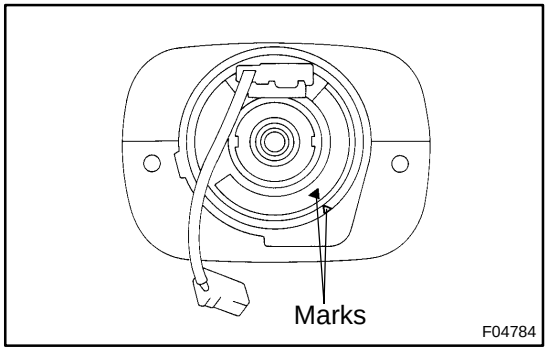
(7) If the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly or seat belt pretensioner have been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace them with new ones.

(8) Do not directly expose the airbag sensor assembly, steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly or seat belt pretensioner to hot air or flames.

(9) Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting of the electrical circuit.

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

(11) After work on the supplemental restraint system is completed, check the SRS warning light (See page DI-692).



(c) SPIRAL CABLE (in Combination Switch)

The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position, otherwise cable disconnection and other troubles may result. Refer to SR-37 of this manual concerning correct steering wheel installation.

(d) STEERING WHEEL PAD (with Airbag)

(1) When removing the steering wheel pad or handling a new steering wheel pad, it should be placed with the pad top surface facing up.
Storing the pad with its metallic surface facing upward may lead to a serious accident if the airbag inflates for some reason. In addition do not store a steering wheel pad on top of another one.

(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

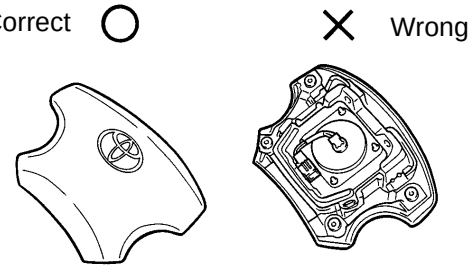
(3) Grease should not be applied to the steering wheel pad and the pad should not be cleaned with detergents of any kind.

(4) Store the steering wheel pad where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the steering column near the combination switch connector before starting work.

(6) When disposing of a vehicle or the steering wheel pad alone, the airbag should be deployed using an SST before disposal (See page RS-20).
Carry out the operation in a safe place away from electrical noise.

Example:



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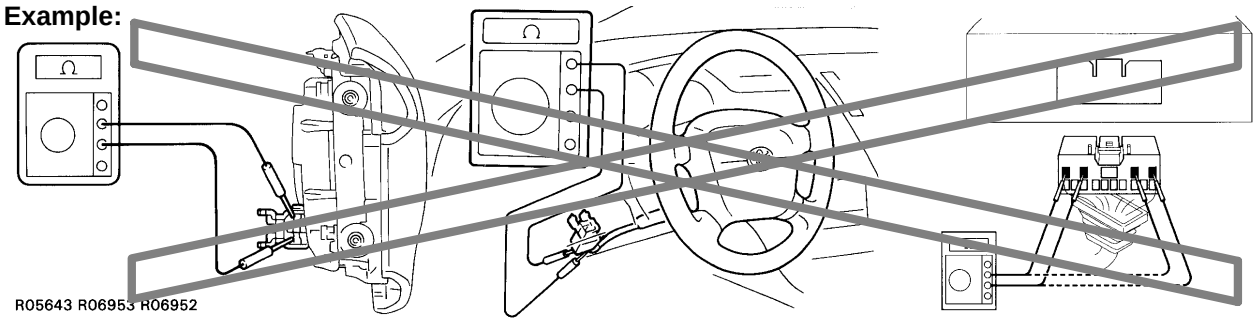
Example:



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Z13950

(e) FRONT PASSENGER AIRBAG ASSEMBLY

(1) Always store a removed or new front passenger airbag assembly with the airbag deployment direction facing up.
Storing the airbag assembly with the airbag deployment direction facing down could cause a serious accident if the airbag inflates.

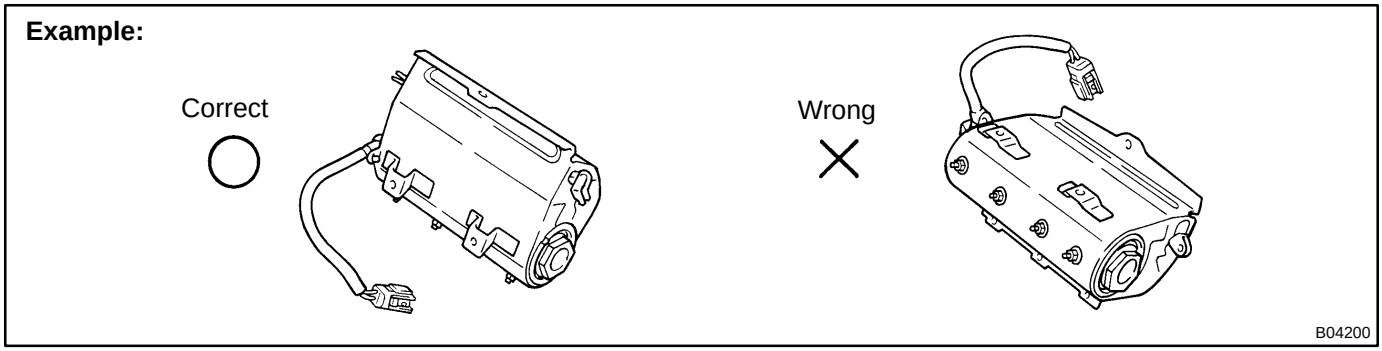
(2) Never measure the resistance of the airbag squib. (This may cause the airbag to deploy, which is very dangerous.)

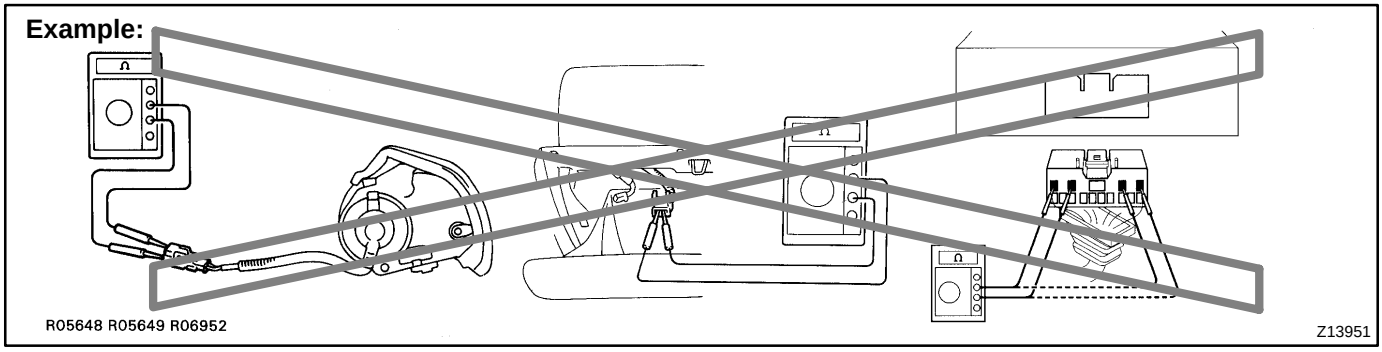
(3) Grease should not be applied to the front passenger airbag assembly and the airbag door should not be cleaned with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) installed on the assembly before starting work.

(6) When disposing of a vehicle or the airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS-34).
Perform the operation in a safe place away from electrical noise.





(f) SIDE AIRBAG ASSEMBLY

(1) Always store a removed or new side airbag assembly with the airbag deployment direction facing up. Storing the airbag assembly with the airbag deployment direction facing downward may lead to a serious accident if the airbag deploys for some.

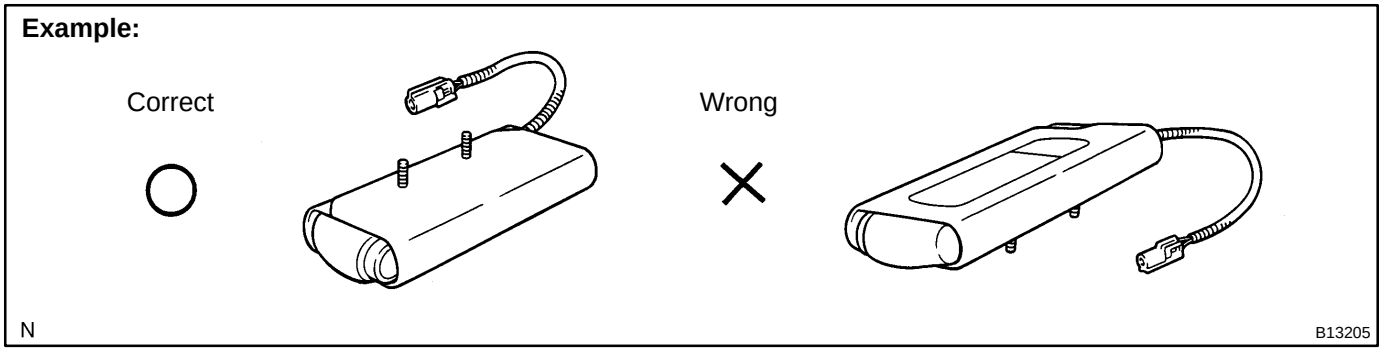
(2) Never measure the resistance of the airbag squib reason (This may cause the airbag to deploy, which is very dangerous.).

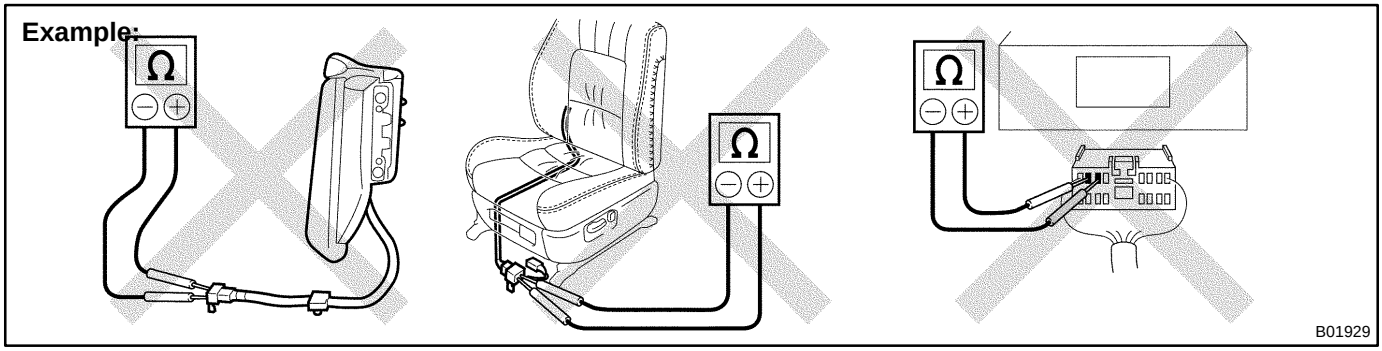
(3) Grease should not be applied to the side airbag assembly and the surface should not be cleaned with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93˚C (200˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) under the seat before starting work.

(6) When disposing of a vehicle or the side airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS-48). Perform the operation in a safe place away from electrical noise.





(g) CURTAIN SHIELD AIRBAG ASSEMBLY

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

NOTICE:

Protection bag is not reuse.

CAUTION:

Never disassemble the curtain shield airbag assembly.

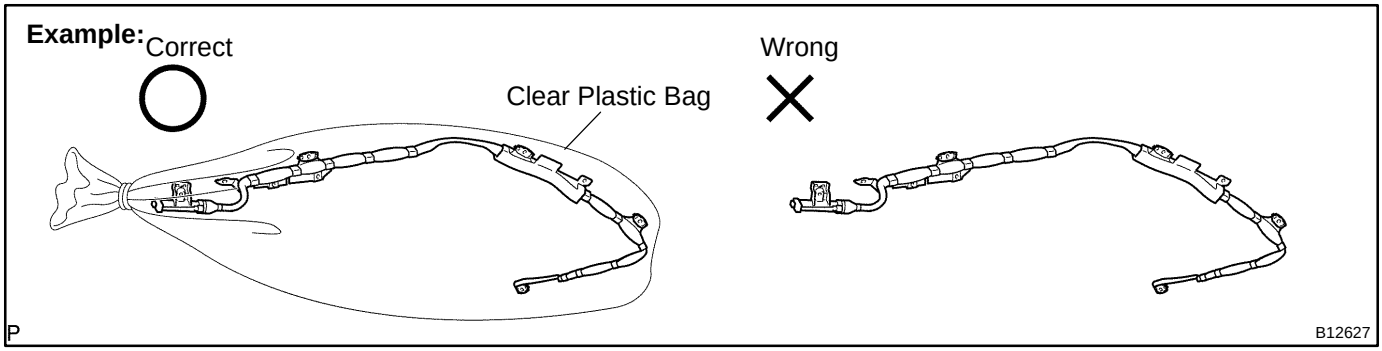
(2) Never measure the resistance of the airbag squib (This may cause the airbag to deploy, which is very dangerous.).

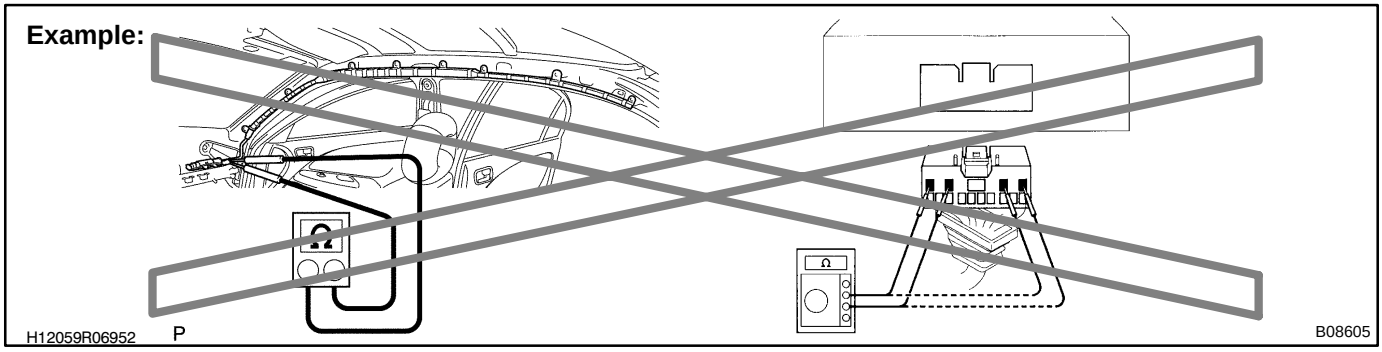
(3) Grease should not be attached to the curtain shield airbag assembly and the surface should not be cleared with detergents of any kind.

(4) Store the airbag assembly where the ambient temperature remains below 93 ˚C (200 ˚F), without high humidity and away from electrical noise.

(5) When using electric welding, first disconnect the airbag connector (yellow color and 2 pins) into the instrument panel before starting work.

(6) When disposing of a vehicle or the curtain shield airbag assembly alone, the airbag should be deployed using an SST before disposal (See page RS-61). Perform the operation in a safe place away from electrical noise.





(h) SEAT BELT PRETENSIONER

(1) Never measure the resistance of the seat belt pretensioner. (This may cause the seat belt pretensioner activation which is very dangerous.)

(2) Never disassemble the seat belt pretensioner.

(3) Never install the seat belt pretensioner in another vehicle.

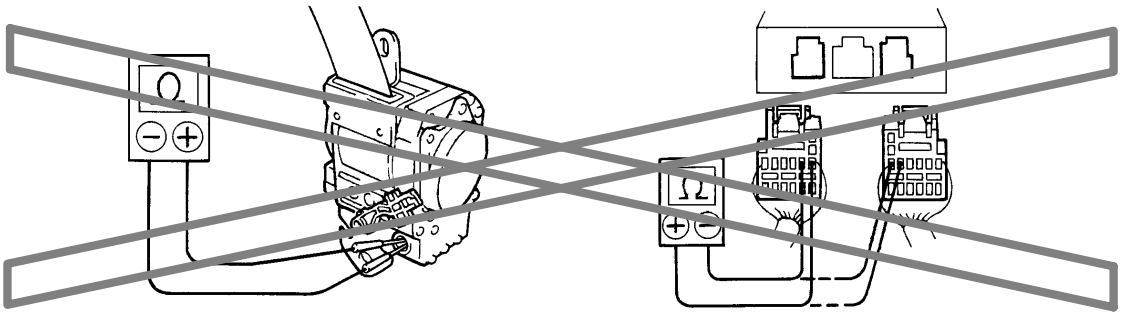
(4) Store the seat belt pretensioner where the ambient temperature remains below 80°C (176°F) and away from electrical noise without high humidity.

(5) When using electric welding, first disconnect the connector (yellow color and 2 pins) before starting work.

(6) When disposing of a vehicle or the seat belt pretensioner alone, the seat belt pretensioner should be activated before disposal (See page BO-144). Perform the operation in a safe place away from electrical noise.

(7) The seat belt pretensioner is hot after activation, so let it cool down sufficiently before the disposal. However never apply water to the seat belt pretensioner.

Example:



(i) AIRBAG SENSOR ASSEMBLY

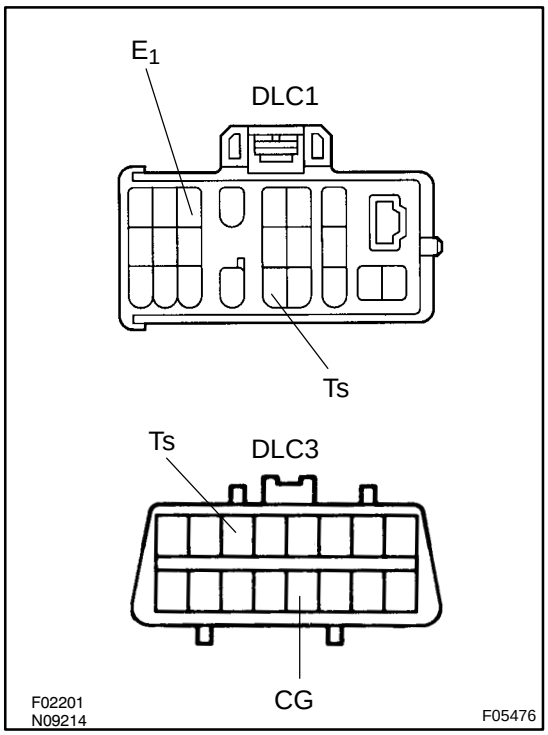
(1) Never reuse the airbag sensor assembly involved in a collision when the SRS has deployed.

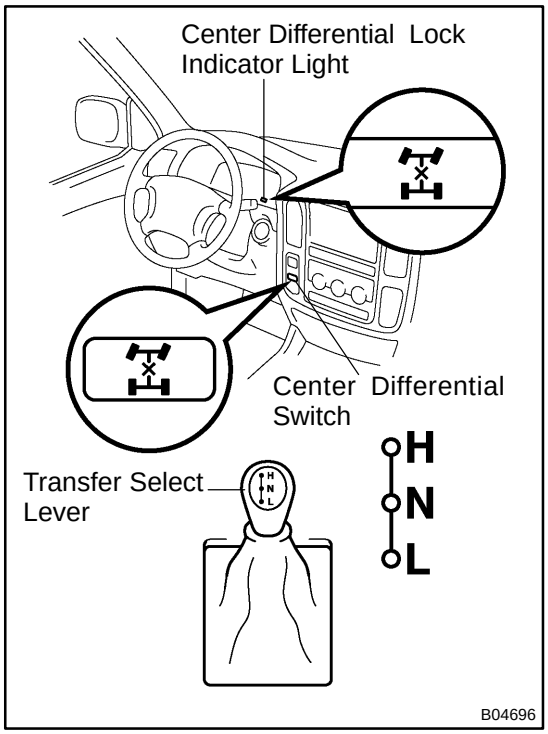
(2) The connectors to the airbag sensor assembly should be connected or disconnected with the sensor mounted on the floor. If the connectors are connected or disconnected while the airbag sensor assembly is not mounted to the floor, it could cause undesired ignition of the supplemental restraint system.

(3) Work must be started after 90 seconds from the time the ignition switch is turned to the ”LOCK” position and the negative (-) terminal cable is disconnected from the battery, even if only loosing the set bolts of the airbag sensor assembly.

(j) WIRE HARNESS AND CONNECTOR

The SRS wire harness is integrated with the instrument panel wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube and all the connectors in the system are a standard yellow color. If the SRS wire harness becomes disconnected or the connector becomes broken due to an accident, etc., repair or replace it as shown on page RS-96 .





2. FOR VEHICLE EQUIPPED WITH VEHICLE SKID CONTROL (VSC) SYSTEM

(a) Precaution when using drum tester:
When using a drum tester, make sure that the ignition switch is OFF, start the engine with the diagnosis connector short-circuited between Ts and E_1 (CG) and take a measurement.

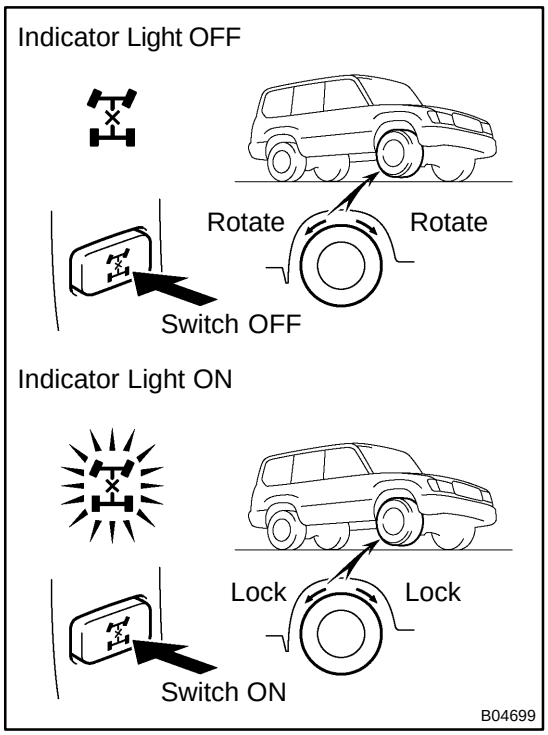
NOTICE:

- **Check that VSC warning light is blinking.**
- **Ensure that the vehicle does not move using wires.**
- **After the measurement, disconnect the short circuit and check that the VSC warning light is turned off when restarting the engine.**

(b) Precaution during VSC operation:
(1) Since VSC may be affected by the removal/installation of the VSC-related parts, do not remove/install those parts unless absolutely necessary.
(2) When operating on VSC, follow the instructions in BR section in this manual to surely make preparations or check after operations.

3. WHEN SERVICING FULL-TIME 4WD VEHICLES

The Full-time 4WD LAND CRUISER is equipped with the mechanical lock type center differential system.
During tests using a brake tester or chassis dynamometer, such as braking force tests or speedometer tests, if only the front or rear wheels are to be rotated, it is necessary to set the position of the center differential to FREE or LOCK depending on the type of the test being performed.



Center differential FREE condition:

	Condition	Wheel
Center differential switch	OFF	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	OFF	
Transfer select lever (H/L)	w/ VSC: Either will do w/o VSC: H position only	

Center differential LOCK conditions (w/ VSC):

	Condition	Wheel
Center differential switch	ON	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	ON	
Transfer select lever (H/L)	Either will do	

Center differential LOCK conditions (w/o VSC):

	Condition	Wheel
Center differential switch	ON	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	ON	
Transfer select lever (H/L)	H position	

	Condition	Wheel
Center differential switch	ON or OFF	A lifted wheel cannot be rotated even if only one wheel is lifted up, as long as transmission is in N position.
Indicator light	ON	
Transfer select lever (H/L)	L position	

HINT:

w/o Vehicle skid control (VSC) system:

When the transfer select lever is put in ”L” position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.

CAUTION:

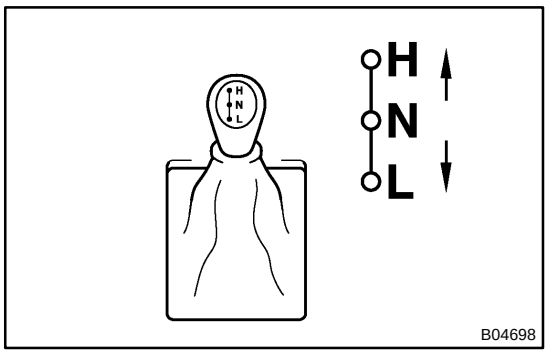
Center differential ”LOCK” ↔ ”FREE” selecting procedure:

- **Operate the switch only when all of 4 wheels are stopped or driven in a straight line.**
- **Never operate the switch when any wheel is slipping.**
- **Never operate the switch when any wheel is spinning freely.**
- **Never operate the switch when swerving or cornering.**

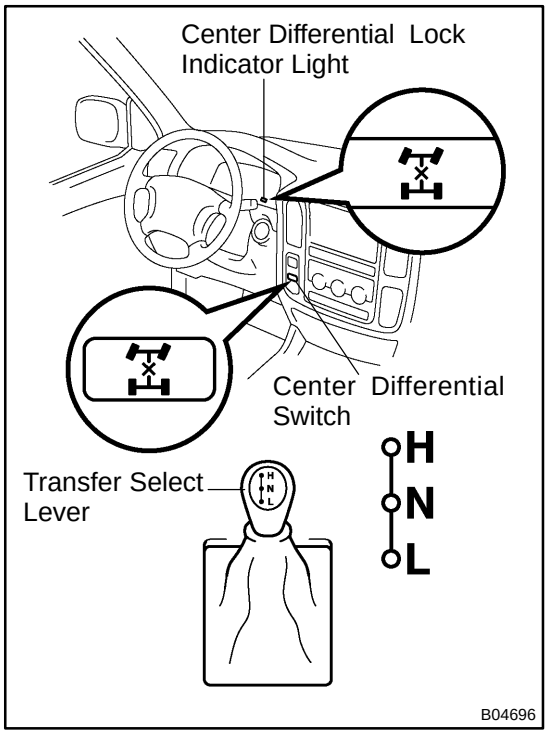
HINT:

- Center differential ”LOCK” ↔ ”FREE” selecting procedure:

  Move the vehicle forward or backward slightly if the indicator light does not operate correctly when the center differential lock switch is turned ON or OFF.



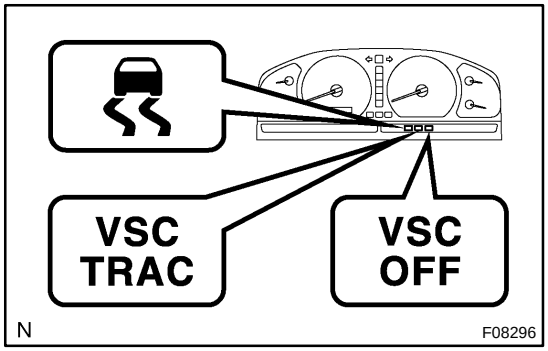
◆ Transfer gear ”H” ↔ ”L” gear shifting procedure:
When shifting, always put the shift lever of the transmission in N position. In other positions, the gears of the transfer clash, and switching cannot be performed.



4. WHEN TESTING BRAKES, SPEEDOMETER, ETC.

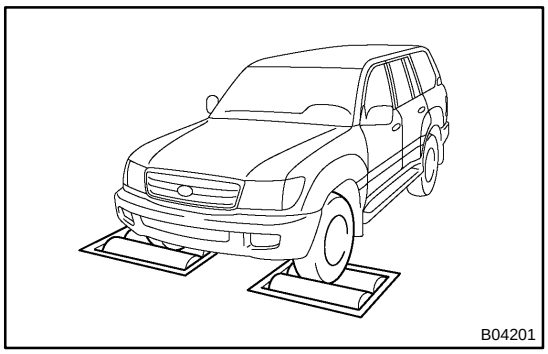
(a) When carrying out any kind of servicing or testing on a Full-time 4WD in which the front or rear wheels are to be rotated (braking test, speedometer test), be sure to observe the precautions given below.
Incorrect preparations or test procedures may cause danger as well as unsuccessful test results.
Before starting any such servicing or test, be sure to check the following items:

◆ Center differential mode position (FREE or LOCK)



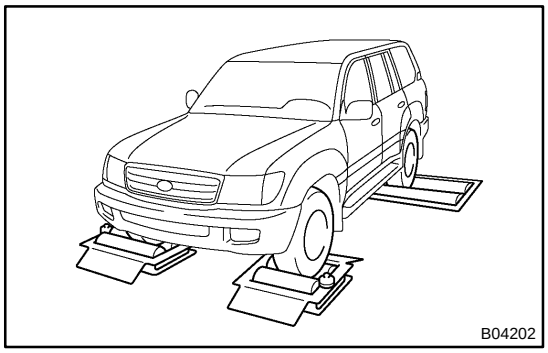
◆ Vehicle skid control (VSC) system (with or without):
If the vehicle is equipped with the system, the slip indicator light, the VSC/TRAC indicator light and the VSC OFF indicator light come on with the ignition key turned to ”ON”. They will go off after about a few seconds.
◆ Whether wheels should be touching ground or jacked up
◆ Transmission gear position (N position)
◆ Transfer gear position (H or L position)
◆ Maximum testing vehicle speed
◆ Maximum testing time

HINT:
w/o Vehicle skid control (VSC) system:
When the transfer select lever is put in ”L” position, the center differential is put in LOCK condition regardless of the position of the center differential lock switch.


B04201

(b) Using Braking Tester:
Measure by low-speed type (Vehicle Speed: Below 0.5 km/h or 0.3 mph) brake tester and observe the following instructions before performing the test.
(1) Position the wheels to be tested (front or rear) on the tester.
(2) Put the center differential in FREE position.
(3) If the vehicle is equipped with Vehicle Skid Control (VSC) system, prohibit the system from the activation (See step 2.).
(4) Shift the transmission shift lever to ”N” position.

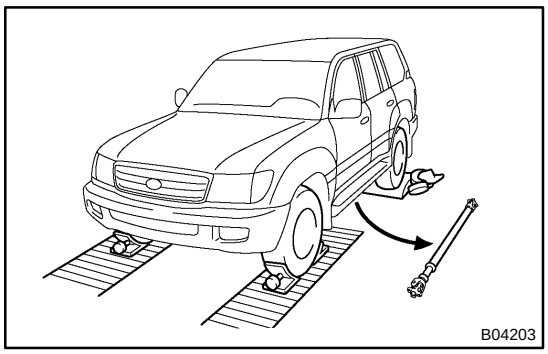
HINT:
Do not forget to change the Vehicle Skid Control (VSC) & Traction Control (TRAC) system to operational condition after the test. Check that the VSC warning indicator light goes off when restarting the engine.


B04202

(c) Using Speedometer Tester:
Observe the following instructions and then measure with the rear wheels.
(1) Position the rear wheels on the tester roller.
(2) Position the front wheels on the free roller or jack them up.
(3) Put the center differential in FREE position.
(4) If the vehicle is equipped with Vehicle Skid Control (VSC) & Traction Control (TRAC) system, prohibit the system from the activation (See step 2.).
(5) Ensure that the vehicle does not move using wires.

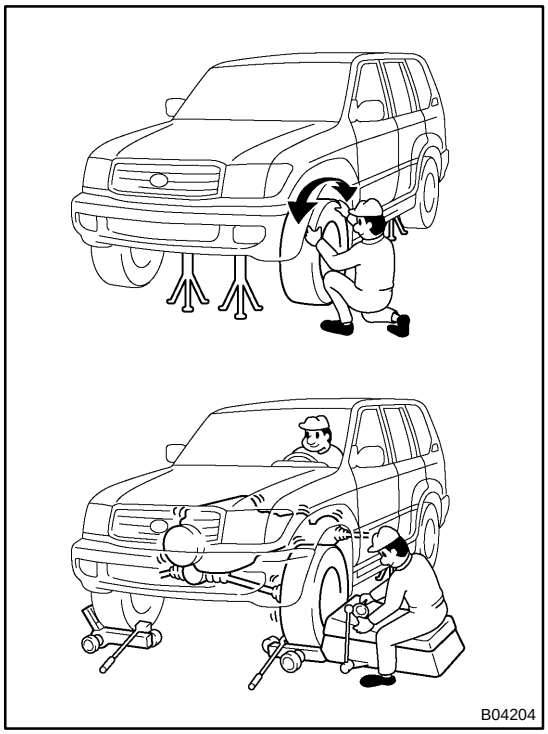
CAUTION:
The maximum speed should be less than 60 km/h (37 mph) and maximum driving time should be 1 minute.

HINT:
- Sudden shifting, braking, acceleration or deceleration is not allowed.
- Do not forget to change the Vehicle Skid Control (VSC) & Traction Control (TRAC) system to operational condition after the test. Check that the VSC warning indicator light goes off when restarting the engine.



(d) Using Chassis Dynamometer:
Observe the following instructions and then measure with the rear wheels.
(1) Remove the front propeller shaft.
(2) Put the center differential in LOCK position.
(3) If the vehicle is equipped with Vehicle Skid Control (VSC) & Traction Control (TRAC) system, prohibit the system from the activation (See step 2.).
(4) Ensure that the vehicle is securely fixed.

HINT:
- Sudden shifting, braking, acceleration or deceleration is not allowed.
- Do not forget to change the Vehicle Skid Control (VSC) & Traction Control (TRAC) system to operational condition after the test. Check that the VSC warning indicator light goes off when restarting the engine.

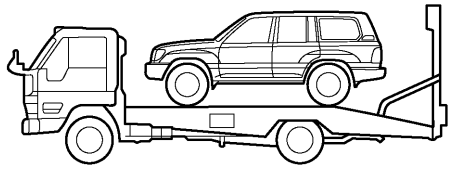
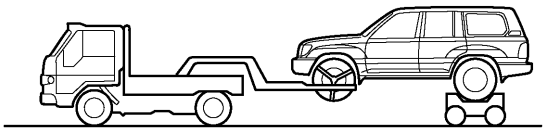
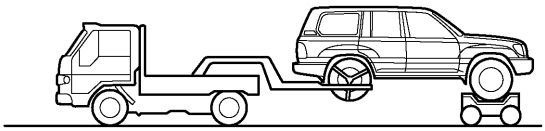


(e) On-V ehicle Wheel Balancing:
When doing on-vehicle wheel balancing on a full-time 4WD vehicle, to prevent each wheel from being rotated at different speed in different directions (which could damage the center differential), always be sure to observe the following precautions.
(1) All of 4 wheels should be jacked up, being apart from the ground completely.
(2) Put the center differential in LOCK position.
(3) If the vehicle is equipped with Vehicle Skid Control (VSC) & Traction Control (TRAC) system, prohibit the system from the activation (See step 2.).
(4) The parking brake lever should be fully released.
(5) None of the brakes should be applied.
(6) The wheels should be driven on the wheel balancer with the engine running.
(7) Carry out the wheel balancing with the transmission position in D position.

HINT:
- When doing this balancing, pay attention to the other wheels rotating at the same time.
- Sudden acceleration, deceleration or braking is not allowed.
- Do not forget to change the Vehicle Skid Control (VSC) & Traction Control (TRAC) system to operational condition after the test. Check that the VSC warning indicator light goes off when restarting the engine.

5. WHEN TOWING FULL-TIME 4WD VEHICLES

- Use one of the methods shown below to tow the vehicle.
- If the vehicle has trouble in the chassis and drive train, use method 1 (flat bed truck).

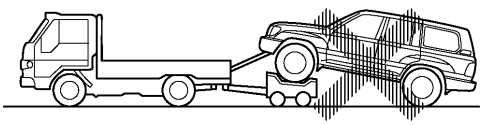
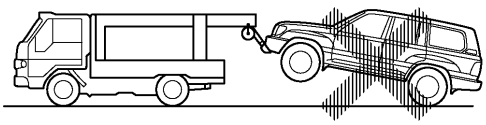
Conditions / Towing Method	Parking Brake	Transmission Shift Lever Position
1. Flat Bed Truck 	Applied	Any Position
2. Wheel Lift Type Truck From Front  From Rear 	Applied	Any Position

B04205

NOTICE:

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

- For example, the towing methods shown below are dangerous or damage the vehicle, so do not use them.

NO 	★ Never tow the vehicle using a method where the lifted-up wheel cannot rotate. ★ If this towing method is used, either from the front or rear: (a) There is a danger of the drive train heating up and causing break-down, or of the wheels flying off the dolly. (b) In addition, if the vehicle is equipped with the Vehicle Skid Control (VSC) & Traction Control (TRAC) system, the system will apply the rotating wheels brake unless the engine isn't shut off.
NO 	Do not use the sling type towing method, either from the front or rear, as this method causes damage to the body.

B04206

6. FOR VEHICLES EQUIPPED WITH A CATALYTIC CONVERTER

CAUTION:

If large amount of unburned gasoline flows into the converter, it may overheat and create a fire hazard. To prevent this, observe the following precautions and explain them to your customer.

(a) Use only unleaded gasoline.

(b) Avoid prolonged idling.
Avoid running the engine at idle speed for more than 20 minutes.

(c) Avoid spark jump test.
   (1) Perform spark jump test only when absolutely necessary. Perform this test as rapidly as possible.
   (2) While testing, never race the engine.

(d) Avoid prolonged engine compression measurement.
Engine compression tests must be done as rapidly as possible.

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

(f) Avoid coasting with ignition turned off and prolonged braking.

(g) Do not dispose of used catalyst along with parts contaminated with gasoline or oil.

7. IF VEHICLE IS EQUIPPED WITH MOBILE COMMUNICATION SYSTEM

For vehicles with mobile communication systems such as two-way radios and cellular telephones, observe the following precautions.

(1) Install the antenna as far as possible away from the ECU and sensors of the vehicle's electronic system.

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

(3) Do not wind the antenna feeder together with the other wiring as much as possible, also avoid running the antenna feeder parallel with other wire harnesses.

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

(5) Do not install powerful mobile communications system.

8. FOR USING OBD II SCAN TOOL OR TOYOTA HAND-HELD TESTER

CAUTION:

Observe the following items for safety reasons:

- **Before using the OBD II scan tool or TOYOTA hand-held tester, the OBD II scan tool's instruction book or TOYOTA hand-held tester's operator manual should be read thoroughly.**
- **Be sure to route all cables securely when driving with the OBD II scan tool or TOYOTA hand-held tester connected to the vehicle. (i.e. Keep cables away from feet, pedals, steering wheel and shift lever.)**
- **Two persons are required when test driving with the OBD II scan tool or TOYOTA hand-held tester, one person to drive the vehicle and the other person to operate the OBD II scan tool or TOYOTA hand-held tester.**

HOW TO TROUBLESHOOT ECU CONTROLLED SYSTEMS

IN04S-46

GENERAL INFORMATION

A large number of ECU controlled systems are used in the LAND CRUISER. In general, the ECU controlled system is considered to be a very intricate system requiring a high level of technical knowledge and expert skill to troubleshoot. However, the fact is that if you proceed to inspect the circuits one by one, troubleshooting of these systems is not complex. If you have adequate understanding of the system and a basic knowledge of electricity, accurate diagnosis and necessary repair can be performed to locate and fix the problem. This manual is designed through emphasis of the above standpoint to help service technicians perform accurate and effective troubleshooting, and is compiled for the following major ECU controlled systems: The troubleshooting procedure and how to make use of it are described on the following pages.

System	Page
1. Engine	DI-1
2. Automatic Transmission	DI-358
3. ABS & Vehicle Stability Control (VSC) & Brake Assist (BA) System	DI-502
4. Power Tilt and Power Telescopic Steering Column	DI-656
5. Supplemental Restraint System	DI-690
6. Wireless Door Lock Control System	DI-936
7. Theft Deterrent System	DI-953
8. Cruise Control System	DI-979
9. Engine Immobiliser System	DI-1002
10.Body Control System	DI-1038
11.Driver Door Control System	DI-1089
12.Multiplex Communication System	DI-1127
13.Navigation System	DI-1151
14.Rear View Monitor System	DI-1268
15.Air Conditioning System	DI-1300

FOR USING OBD II SCAN TOOL OR TOYOTA HAND-HELD TESTER

★ Before using the scan tool or tester, the scan tool's instruction book or tester's operator manual should be read thoroughly.

★ If the scan tool or tester cannot communicate with ECU controlled systems when you have connected the cable of the scan tool or tester to DLC3, turned the ignition switch ON and operated the scan tool, there is a problem on the vehicle side or tool side.

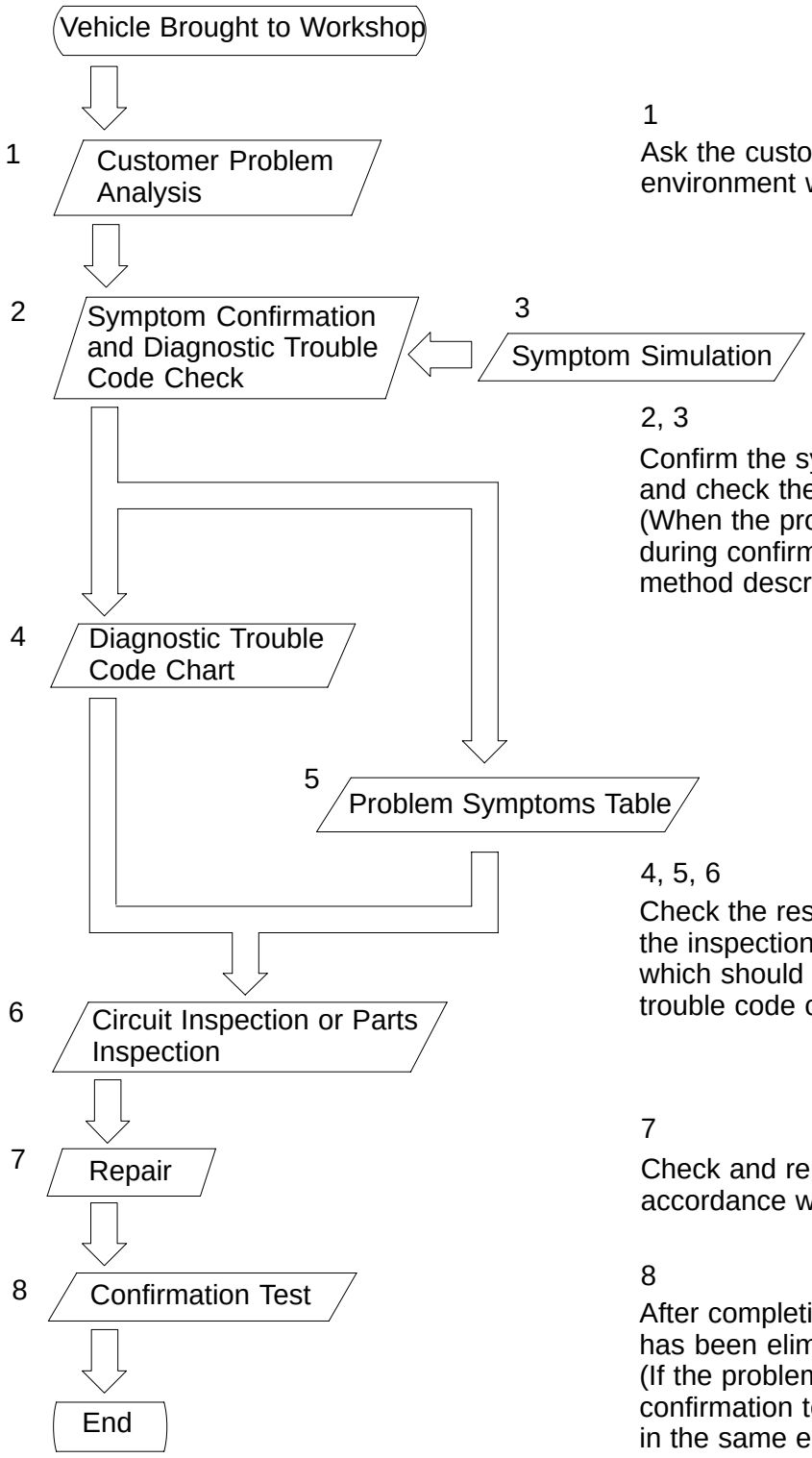
(1) If communication is normal when the tool is connected to another vehicle, inspect the diagnosis data link line (Bus⊕line) or ECU power circuit of the vehicle.

(2) If communication is still not possible when the tool is connected to another vehicle, the problem is probably in the tool itself, so perform the Self Test procedures outline in the Tester Operator's Manual.

IN04T-23

HOW TO PROCEED WITH TROUBLESHOOTING

Carry out troubleshooting in accordance with the procedure on the following page. Here, only the basic procedure is shown. Details are provided in Diagnostics section, showing the most effective methods for each circuit. Confirm the troubleshooting procedures first for the relevant circuit before beginning troubleshooting of that circuit.



1

Ask the customer about the conditions and the environment when the problem occurred.

2, 3

Confirm the symptoms and the problem conditions, and check the diagnostic trouble codes.
(When the problem symptoms do not appear during confirmation, use the symptom simulation method described later on.)

4, 5, 6

Check the results obtained in Step 2, then confirm the inspection procedure for the system or the part which should be checked using the diagnostic trouble code chart or the problem symptoms table.

7

Check and repair the affected system or part in accordance with the instructions in Step 6.

8

After completing repairs, confirm that the problem has been eliminated.
(If the problem is not reproduced, perform the confirmation test under the same conditions and in the same environment as when it occurred for the first time.)

1. CUSTOMER PROBLEM ANALYSIS

In troubleshooting, the problem symptoms must be confirmed accurately and all preconceptions must be cleared away in order to give an accurate judgment. To ascertain just what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time it occurred.

Important Point in the Problem Analysis:

The following 5 items are important points in the problem analysis. Past problems which are thought to be unrelated and the repair history, etc. may also help in some cases, so as much information as possible should be gathered and its relationship with the problem symptoms should be correctly ascertained for reference in troubleshooting. A customer problem analysis table is provided in Diagnostics section for each system for your use.

Important Points in the Customer 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

(Sample) Engine control system check sheet.

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name _____

Customer's Name		**Model and Model Year**	
Driver's Name		**Frame No.**	
Data Vehicle Brought in		**Engine Model**	
License No.		**Odometer Reading**	km miles

Problem Symptoms	☐ **Engine does not Start**	☐ **Engine does not crank** ☐ **No initial combustion** ☐ **No complete combustion**
	☐ **Difficult to Start**	☐ **Engine cranks slowly** ☐ **Other** _____
	☐ **Poor Idling**	☐ **Incorrect first idle** ☐ **Idling rpm is abnormal** ☐ **High (rpm)** ☐ **Low (rpm)** ☐ **Rough idling** ☐ **Other** _____
	☐ **Poor Drive ability**	☐ **Hesitation** ☐ **Back fire** ☐ **Muffler explosion (after-fire)** ☐ **Surging** ☐ **Knocking** ☐ **Other** _____
	☐ **Engine Stall**	☐ **Soon after starting** ☐ **After accelerator pedal depressed** ☐ **After accelerator pedal released** ☐ **During A/C operation** ☐ **Shifting from N to D** ☐ **Other** _____
	☐ **Others**	

☐ **onstant** ☐ **Sometimes (times per day/month)**

2. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE CHECK

The diagnostic system in the LAND CRUISER fulfills various functions. The first function is the Diagnostic Trouble Code Check in which a malfunction in the signal circuits to the ECU is stored in code in the ECU memory at the time of occurrence, to be output by the 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 check functions, the problem areas can be narrowed down quickly and troubleshooting can be performed effectively. Diagnostic functions are incorporated in the following systems in the LAND CRUISER.

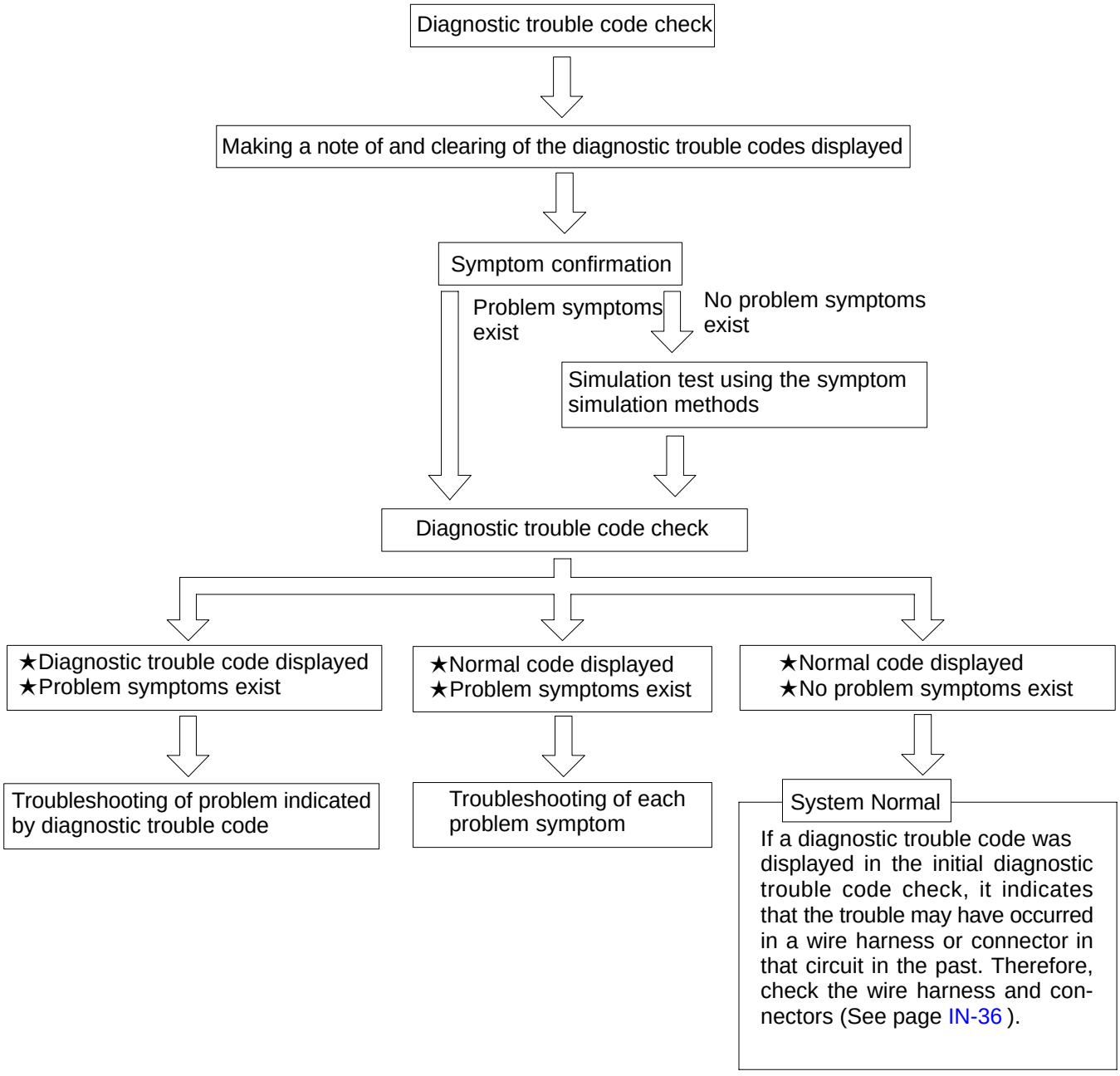
System	Diagnostic Trouble Code Check	Input Signal Check (Sensor Check)	Other Diagnosis Function
Engine	◆(with Test Mode)	◆	◆
Automatic Transmission	◆(with Test Mode)	◆	◆
ABS & Vehicle Stability Control (VSC) & Brake Assist (BA) System	◆	◆	◆
Power Tilt and Power Telescopic Steering Column	◆	◆	
Supplemental Restraint System	◆		
Theft Deterrent System	◆		◆
Cruise Control System	◆		Cancel Signal Check
Engine Immobiliser System	◆		◆
Driver Door Control System	◆		◆
Navigation System	◆		
Air Conditioning System	◆	◆	◆

In diagnostic trouble code check, it is very important to determine whether the problem indicated by the diagnostic trouble code is still occurring or occurred in the past but returned to normal at present. In addition, it must be checked in the problem symptom check whether the malfunction indicated by the diagnostic trouble code is directly related to the problem symptom or not. For this reason, the diagnostic trouble codes should be checked before and after the symptom confirmation to determine the current conditions, as shown in the table below. If this is not done, it may, depending on the case, result in unnecessary troubleshooting for normally operating systems, thus making it more difficult to locate the problem, or in repairs not pertinent to the problem. Therefore, always follow the procedure in correct order and perform the diagnostic trouble code check.

DIAGNOSTIC TROUBLE CODE CHECK PROCEDURE

Diagnostic Trouble Code Check (Make a note of and then clear)	**Confirmation of Symptoms**	**Diagnostic Trouble Code Check**	**Problem Condition**
Diagnostic Trouble Code Display	Problem symptoms exist	Same diagnostic trouble code is displayed	Problem is still occurring in the diagnostic circuit
		Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit (The diagnostic trouble code displayed first is either for a past problem or it is a secondary problem)
	No problem symptoms exist		The problem occurred in the diagnostic circuit in the past
Normal Code Display	Problem symptoms exist	Normal code is displayed	The problem is still occurring in a place other than in the diagnostic circuit
	No problem symptoms exist	Normal code is displayed	The problem occurred in a place other than in the diagnostic circuit in the past

Taking into account the above points, a flow chart showing how to proceed with troubleshooting using the diagnostic trouble code check is shown below. This flow chart shows how to utilize the diagnostic trouble code check effectively, then by carefully checking the results, indicates how to proceed either to diagnostic trouble code troubleshooting or to troubleshooting of problem symptoms table.

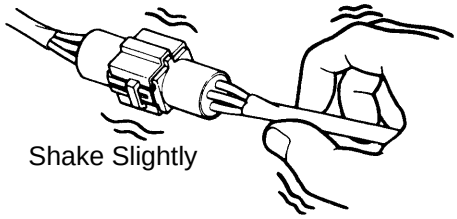
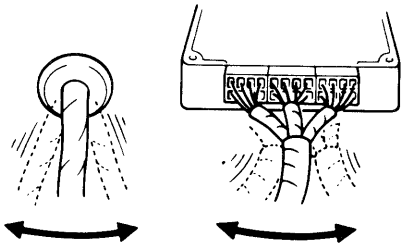
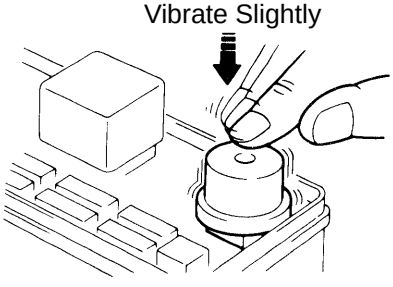


3. SYMPTOM SIMULATION

The most difficult case in troubleshooting is when there are no problem symptoms occurring. In such cases, a thorough customer problem analysis must be carried out, then simulate the same or similar conditions and environment in which the problem occurred in the customer's vehicle. No matter how much experience a technician has, or how skilled he may be, if he proceeds to troubleshoot without confirming the problem symptoms he will tend to overlook something important in the repair operation and make a wrong guess somewhere, which will only lead to a standstill. For example, for a problem which only occurs when the engine is cold, or for a problem which occurs due to vibration caused by the road during driving, etc., the problem can never be determined so long as the symptoms are confirmed with the engine hot condition or the vehicle at a standstill. Since vibration, heat or water penetration (moisture) is likely cause for problem which is difficult to reproduce, the symptom simulation tests introduced here are effective measures in that the external causes are applied to the vehicle in a stopped condition.

Important Points in the Symptom Simulation Test:

In the symptom simulation test, the problem symptoms should of course be confirmed, but the problem area or parts must also be found out. To do this, narrow down the possible problem circuits according to the symptoms before starting this test and connect a tester beforehand. After that, carry out the symptom simulation test, judging whether the circuit being tested is defective or normal and also confirming the problem symptoms at the same time. Refer to the problem symptoms table for each system to narrow down the possible causes of the symptom.

1	**VIBRATION METHOD: When vibration seems to be the major cause.**
CONNECTORS Slightly shake the connector vertically and horizontally. **WIRE HARNESS** Slightly shake the wire harness vertically and horizontally. The connector joint, fulcrum of the vibration, and body through portion are the major areas to be checked thoroughly.	  FI2331 FI2332
PARTS AND SENSOR Apply slight vibration with a finger to the part of the sensor considered to be the problem cause and check that the malfunction occurs. HINT: Applying strong vibration to relays may result in open relays.	 FI2330

V07268

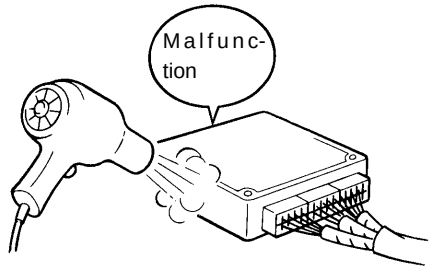
2	HEAT METHOD: When the problem seems to occur when the suspect area is heated.

Heat the component that is the likely cause of the malfunction with a hair dryer or similar object. Check to see if the malfunction occurs.

NOTICE:

(1) Do not heat to more than 60 ˚C (140 ˚F). (Temperature is limited not to damage the components.)

(2) Do not apply heat directly to parts in the ECU.



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3	WATER SPRINKLING METHOD: When the malfunction seems to occur on a rainy day or in a high-humidity condition.

Sprinkle water onto the vehicle and check to see if the malfunction occurs.

NOTICE:

(1) Never sprinkle water directly into the engine compartment, but indirectly change the temperature and humidity by applying water spray onto the radiator front surface.

(2) Never apply water directly onto the electronic components.

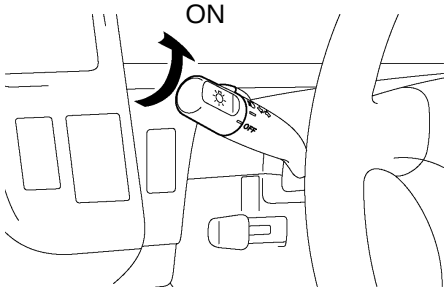
HINT:

If a vehicle is subject to water leakage, the leaked water may contaminate the ECU. When testing a vehicle with a water leakage problem, special caution must be taken.

FI6649

4	OTHER: When a malfunction seems to occur when electrical load is excessive.

Turn on all electrical loads including the heater blower, head lights, rear window defogger, etc. and check to see if the malfunction occurs.



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4. DIAGNOSTIC TROUBLE CODE CHART

The inspection procedure is shown in the table below. This table permits efficient and accurate troubleshooting using the diagnostic trouble codes displayed in the diagnostic trouble code check. Proceed with troubleshooting in accordance with the inspection procedure given in the diagnostic chart corresponding to the diagnostic trouble codes displayed. The engine diagnostic trouble code chart is shown below as an example.

★DTC No.
Indicates the diagnostic trouble code.
★Page or Instructions
Indicates the page where the inspection procedure for each circuit is to be found, or gives instructions for checking and repairs.

★Trouble Area
Indicates the suspect area of the problem.

★Detection Item
Indicates the system of the problem or contents of the problem.

DTC CHART (SAE Controlled)

HINT:
Parameters listed in the chart may not be exactly the same as your reading due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check mode, check the circuit for that code listed in the table below. For details of each code, turn to the page referred to under the "See page" for the respective "DTC No." in the DTC chart.

DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P0100 (DI-24)	Mass Air Flow Circuit Malfunction	★Open or short in mass air flow meter circuit ★Mass air flow meter ★ECM	○	○
P0101 (DI-28)	Mass Air Flow Circuit Range/ Performance Problem	★Mass air flow meter	○	○
P0110 (DI-29)	Intake Air Temp. Circuit Malfunction	★Open or short in intake air temp. sensor circuit ★Intake air temp. sensor ★ECM	○	○
P0115 (DI-33)	Engine Coolant Temp. Circuit Malfunction	★Open or short in engine coolant temp. sensor circuit ★Engine coolant temp. sensor ★ECM	○	○
P0116 (DI-37)	Engine Coolant Temp. Circuit Range/ Performance Problem	★Engine coolant temp. sensor ★Cooling system	○	○
	/Pedal Position Sensor/Switch nction	★Open or short in throttle position sensor circuit ★Throttle position sensor ★ECM		
	osition Sensor/ Switch rformance Prob-	★Throttle position sensor		

5. PROBLEM SYMPTOMS TABLE

The suspected circuits or parts for each problem symptom are shown in the table below. Use this table to troubleshoot the problem when a ”Normal” code is displayed in the diagnostic trouble code check but the problem is still occurring. Numbers in the table indicate the inspection order in which the circuits or parts should be checked.

HINT:

When the problem is not detected by the diagnostic system even though the problem symptom is present, it is considered that the problem is occurring outside the detection range of the diagnostic system, or that the problem is occurring in a system other than the diagnostic system.

★Page
Indicates the page where the flow chart for each circuit is located.

★Circuit Inspection, Inspection Order
Indicates the circuit which needs to be checked for each problem symptom. Check in the order indicated by the numbers.

★Problem Symptom

★Circuit or Part Name
Indicates the circuit or part which needs to be checked.

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	1. Starter and starter relay	ST-2 ST-17
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. Engine control module (ECM)	DI-147 DI-151 IN-29
No complete combustion (Does not start)	1. Fuel pump control circuit	DI-151
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI-144 DI-151 EM-3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
Hot engine	1. Starter signal circuit 2. Fuel pump control circuit	DI-144 DI-151
idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	AC-88
ling)	1. A/C signal circuit 2. Fuel pump control circuit	
	1. Compression 2. Fuel pump control circuit	

6. CIRCUIT INSPECTION

How to read and use each page is shown below.

★Diagnostic Trouble Code No. and Detection Item

★Circuit Description
The major role and operation, etc. of the circuit and its component parts are explained.

DTC	P0325	Knock Sensor 1 Circuit Malfunction

CIRCUIT DESCRIPTION

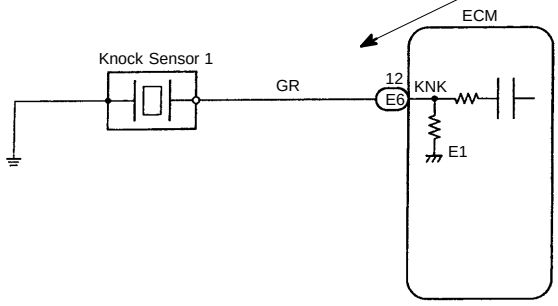
Knock sensor is fitted to the cylinder block to detect engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If engine knocking occurs, ignition timing is retarded to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed, 1,200 rpm or more.	★Open or short in knock sensor1 circuit ★Knock sensor 1 (looseness) ★ECM

If the ECM detects the above diagnosis conditions, it operates the fail safe function in which the corrective retard angle value is set to the maximum value.

★Indicates the diagnostic trouble code, diagnostic trouble code set parameter and suspect area of the problem.

WIRING DIAGRAM



★Wiring Diagram
This shows a wiring diagram of the circuit.
Use this diagram together with 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.

V08423

★Indicates the position of the ignition switch during the check.

LOCK
Ignition Switch LOCK (OFF)

ON
Ignition Switch ON

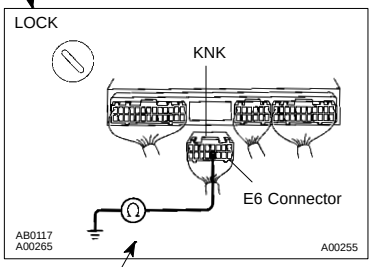
START
Ignition Switch START

ACC
Ignition Switch ACC

★Inspection Procedure
Use the inspection procedure to determine if the circuit is normal or abnormal, and, if it is abnormal, use it to determine whether the problem is located in the sensors, actuators, wire harness or ECU.

INSPECTION PROCEDURE

1	**Check continuity between terminal KNK of ECM connector and body ground.**



PREPARATION:
(a) Remove the glove compartment (See page SF-68).
(b) Disconnect the E6 connector of ECM.

CHECK:
Measure resistance between terminal KNK of ECM connector and body ground.

OK:
Resistance: 1 MΩ or higher

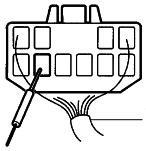
OK	**Go to step 3.**

NG

2	**Check knock sensor (See page SF-61).**

OK	**Replace knock sensor.**

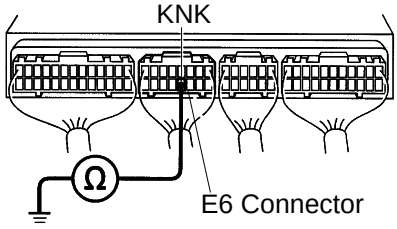
★Indicates the place to check the voltage or resistance.
★Indicates the connector position to be checked, from the front or back side.



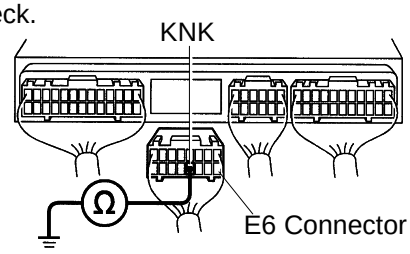
Check from the connector back side.
(with harness)

Check from the connector front side. (without harness)
In this case, care must be taken not to bend the terminals.

★Indicates the condition of the connector of ECU during the check.



Connector being checked is connected.

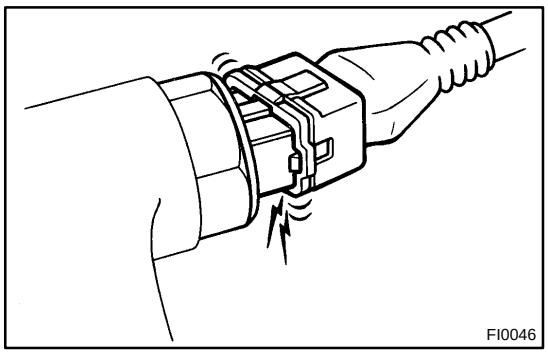


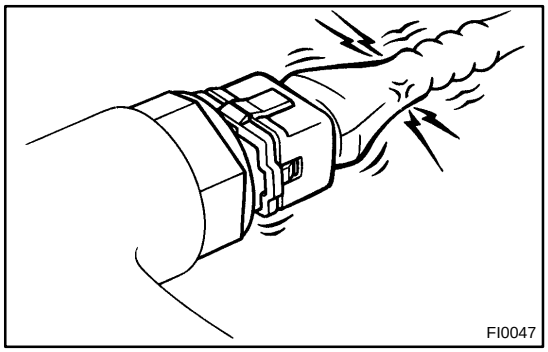
Connector being checked is disconnected.

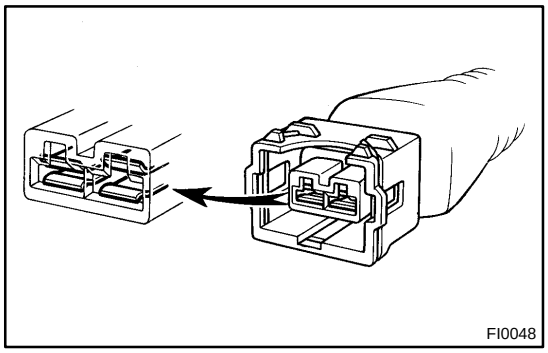
V08425

IN011-07

HOW TO USE THE DIAGNOSTIC CHART AND INSPECTION PROCEDURE


FI0046


FI0047


FI0048

1. CONNECTOR CONNECTION AND TERMINAL INSPECTION

★ For troubleshooting, diagnostic trouble code charts or problem symptom table are provided for each circuit with detailed inspection procedures on the following pages.

★ When all the component parts, wire harnesses and connectors of each circuit except the ECU are found to be normal in troubleshooting, then it is determined that the problem is in the ECU. Accordingly, if diagnosis is performed without the problem symptoms occurring, refer to Step 8 to replace the ECU. So always confirm that the problem symptoms are occurring, or proceed with inspection while using the symptom simulation method.

★ The instructions ”Check wire harness and connector” and ”Check and replace ECU” which appear in the inspection procedure, are common and applicable to all diagnostic trouble codes. Follow the procedure outlined below whenever these instructions appear.

OPEN CIRCUIT:

This could be due to a disconnected wire harness, faulty contact in the connector, and a connector terminal pulled out, etc.

HINT:

★ It is rarely the case that a wire is broken in the middle of it. Most cases occur at the connector. In particular, carefully check the connectors of sensors and actuators

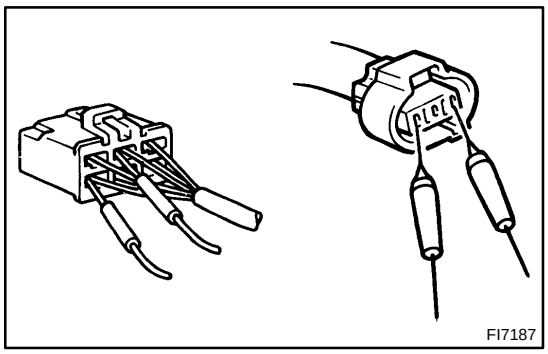
★ Faulty contact could be due to rusting of the connector terminals, to foreign materials entering terminals or a deformation of connector terminals. Simply disconnecting and reconnecting the connectors once changes the condition of the connection and may result in a return to normal operation. Therefore, in troubleshooting, if no abnormality is found in the wire harness and connector check, but the problem disappears after the check, then the cause is considered to be in the wire harness or connectors.

SHORT CIRCUIT:

This could be due to a contact between wire harness and the body ground or to a short circuit occurred inside the switch, etc.

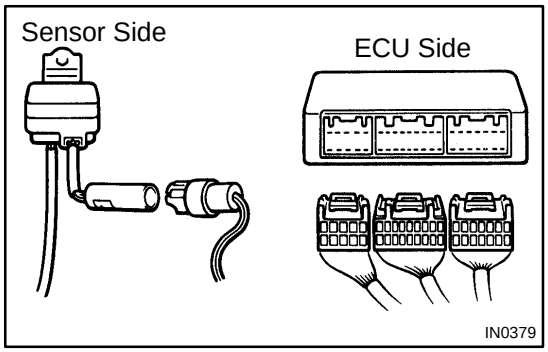
HINT:

When there is a short circuit between the wire harness and body ground, check thoroughly whether the wire harness is caught in the body or is clamped properly.



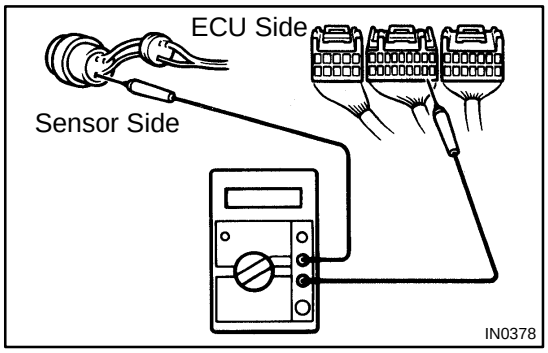
2. CONNECTOR HANDLING

When inserting tester probes into a connector, insert them from the rear of the connector. When necessary, use mini test leads. For water resistant connectors which cannot be accessed from behind, take good care not to deform the connector terminals.



3. CONTINUITY CHECK (OPEN CIRCUIT CHECK)

(a) Disconnect the connectors at both ECU and sensor sides.

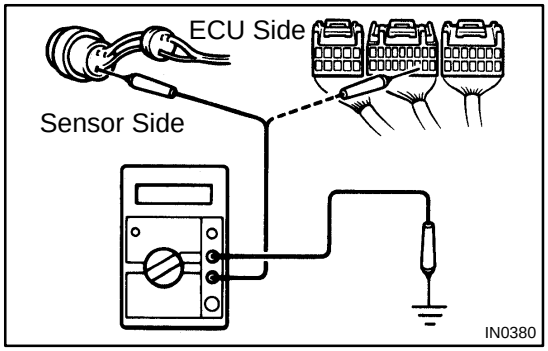


(b) Measure the resistance between the applicable terminals of the connectors.

Resistance: 1 Ω or less

HINT:

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



4. RESISTANCE CHECK (SHORT CIRCUIT CHECK)

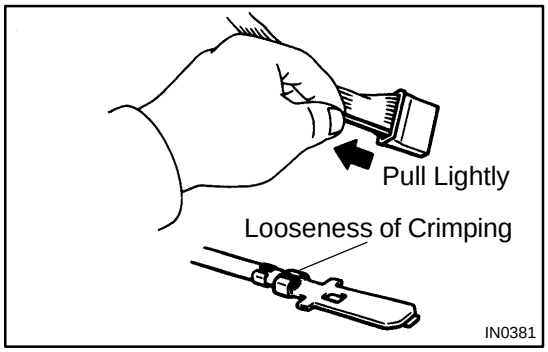
(a) Disconnect the connectors on both ends.

(b) Measure the resistance between the applicable terminals of the connectors and body ground. Be sure to carry out this check on the connectors on both ends.

Resistance: 1 MΩ or higher

HINT:

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



5. VISUAL CHECK AND CONTACT PRESSURE CHECK

(a) Disconnect the connectors at both ends.

(b) Check for rust or foreign material, etc. in the terminals of the connectors.

(c) Check crimped portions for looseness or damage and check that the terminals are secured in lock portion.

HINT:

The terminals should not come out when pulled lightly from the back.

(d) Prepare a test male terminal and insert it in the female terminal, then pull it out.

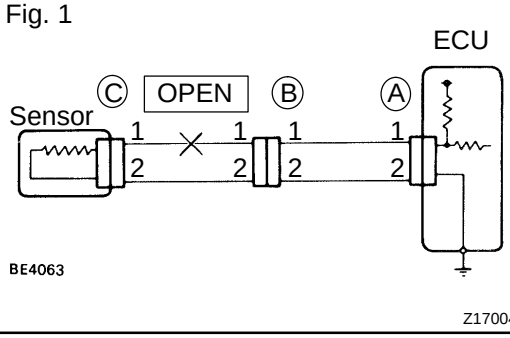
NOTICE:

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

HINT:

When the test terminal is pulled out more easily than others, there may be poor contact in that section.

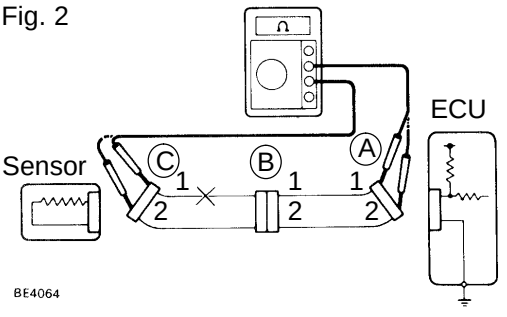
Fig. 1



6. CHECK OPEN CIRCUIT

For the open circuit in the wire harness in Fig. 1, perform "(a) Continuity Check" or "(b) Voltage Check" to locate the section.

Fig. 2



(a) Check the continuity.

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

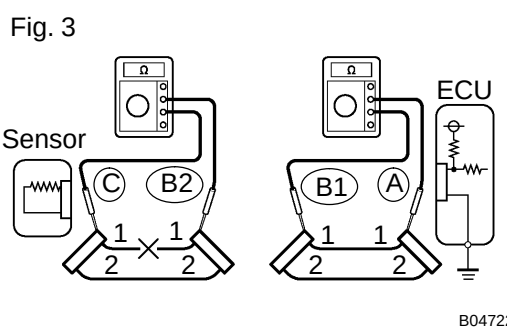
In the case of Fig. 2,

Between terminal 1 of connector "A" and terminal 1 of connector "C" → No continuity (open)

Between terminal 2 of connector "A" and terminal 2 of connector "C" → Continuity

Therefore, it is found out that there is an open circuit 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.

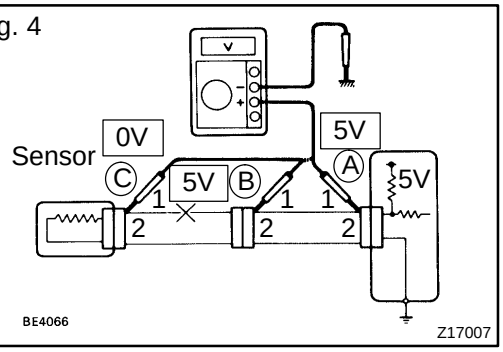
In the case of Fig. 3,

Between terminal 1 of connector "A" and terminal 1 of connector "B1" → Continuity

Between terminal 1 of connector "B2" and terminal 1 of connector "C" → No continuity (open)

Therefore, it is found out that there is an open circuit between terminal 1 of connector "B2" and terminal 1 of connector "C".

Fig. 4



(b) Check the voltage.

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

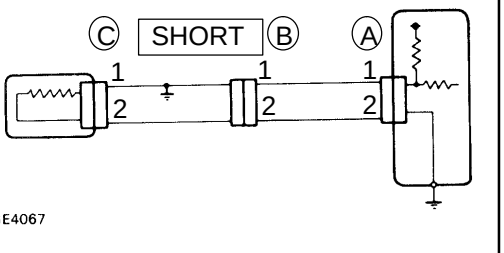
As shown in Fig. 4, with each connector still connected, measure the voltage between body ground and terminal 1 of connector "A" at the ECU 5V output terminal, terminal 1 of connector "B", and terminal 1 of connector "C", in that order.

If the results are:

5V: Between Terminal 1 of connector "A" and Body Ground
5V: Between Terminal 1 of connector "B" and Body Ground
0V: Between Terminal 1 of connector "C" and Body Ground

Then it is found out that there is an open circuit in the wire harness between terminal 1 of "B" and terminal 1 of "C".

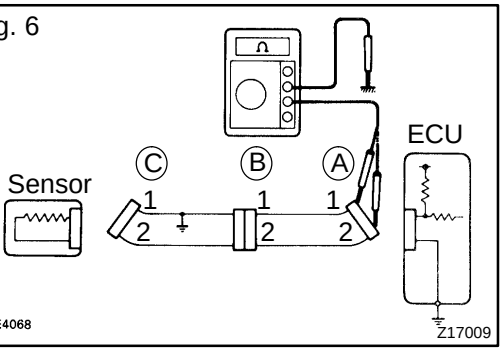
Fig. 5



7. CHECK SHORT CIRCUIT

If the wire harness is ground shorted as in Fig. 5, locate the section by conducting a "continuity check with ground".

Fig. 6



Check the continuity with ground.

(1) Disconnect connectors "A" and "C" and measure the resistance between terminal 1 and 2 of connector "A" and body ground.

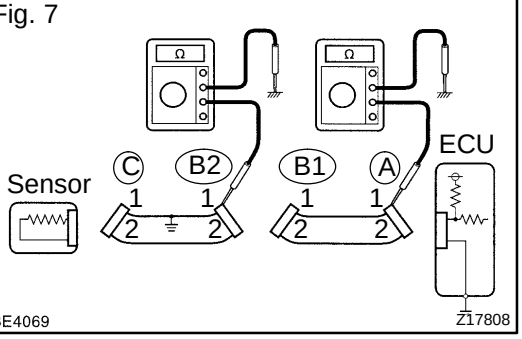
In the case of Fig. 6

Between terminal 1 of connector "A" and body ground → Continuity (short)

Between terminal 2 of connector "A" and body ground → No continuity

Therefore, it is found out that there is a short circuit between terminal 1 of connector "A" and terminal 1 of connector "C".

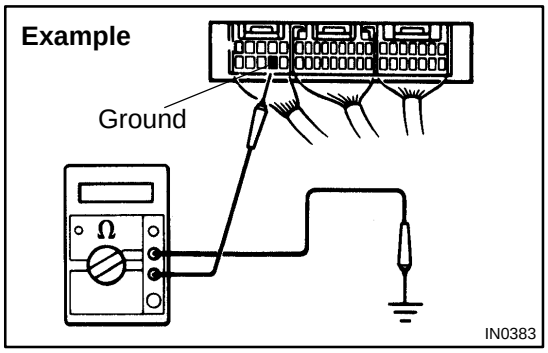
Fig. 7



(2) Disconnect connector ”B” and measure the resistance between terminal 1 of connector ”A” and body ground, and terminal 1 of connector ”B2” and body ground.
Between terminal 1 of connector ”A” and body ground → No continuity
Between terminal 1 of connector ”B2” and body ground → Continuity (short)
Therefore, it is found out that there is a short circuit between terminal 1 of connector ”B2” and terminal 1 of connector ”C”.

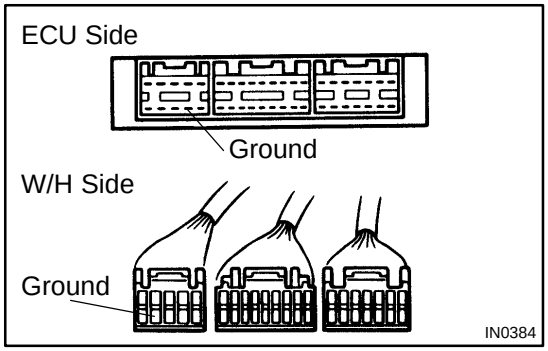
8. CHECK AND REPLACE ECU

First check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty, so replace the ECU with a normal functioning one and check that the symptoms appear.



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

Resistance: 1 Ω or less



(2) Disconnect the ECU connector, check the ground terminals on the ECU side and the wire harness side for bend and check the contact pressure.

HOW TO USE THIS MANUAL

IN00U-13

GENERAL INFORMATION

1. INDEX

An INDEX is provided on the first page of each section to guide you to the item to be repaired. To assist you in finding your way through the manual, the Section Title and major heading are given at the top of every page.

2. GENERAL DESCRIPTION

At the beginning of each section, a General Description is given that pertains to all repair operations contained in that section.

Read these precautions before starting any repair task.

3. TROUBLESHOOTING

TROUBLESHOOTING tables are included for each system to help you diagnose the problem and find the cause. The fundamentals of how to proceed with troubleshooting are described on page IN-26 .

Be sure to read this before performing troubleshooting.

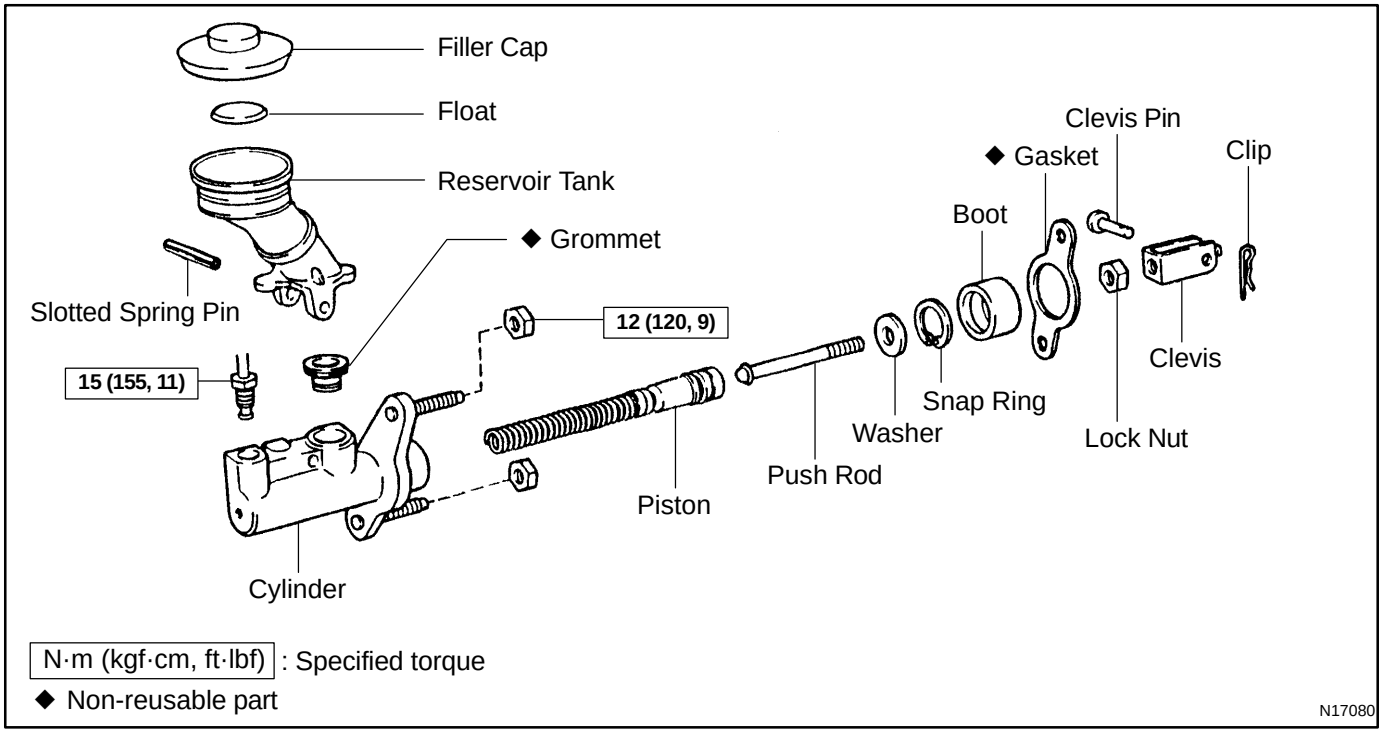
4. PREPARATION

Preparation lists the SST (Special Service Tools), recommended tools, equipment, lubricant and SSM (Special Service Materials) which should be prepared before beginning the operation and explains the purpose of each one.

5. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

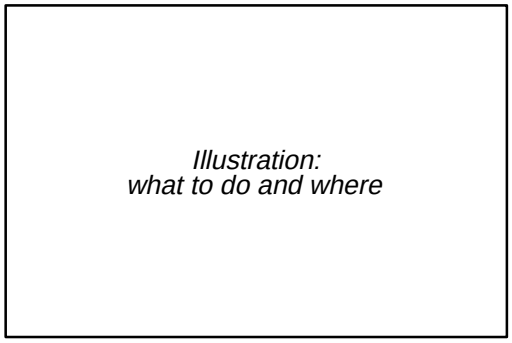
Example:



The procedures are presented in a step-by-step format:

- ★ The illustration shows what to do and where to do it.
- ★ The task heading tells what to do.
- ★ The detailed text tells how to perform the task and gives other information such as specifications and warnings.

Example:



Task heading : what to do

21. CHECK PISTON STROKE OF OVERDRIVE BRAKE

(a) Place SST and a dial indicator onto the overdrive brake piston as shown in the illustration.

SST 09350-30020 (09350-06120)

Set part No. *Component part No.*

Detailed text : how to do task

(b) Measure the stroke applying and releasing the compressed air (392 — 785 kPa, 4 — 8 kgf/cm^2 or 57 — 114 psi) as shown in the illustration.

Piston stroke: 1.40 — 1.70 mm (0.0551 — 0.0669 in.)

Specification

This format provides the experienced technician with a FAST TRACK to the information needed. The upper case task heading can be read at a glance when necessary, and the text below it provides detailed information. Important specifications and warnings always stand out in bold type.

6. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

7. SPECIFICATIONS

Specifications are presented in bold type throughout the text where needed. You never have to leave the procedure to look up your specifications. They are also found in Service Specifications section for quick reference.

8. CAUTIONS, NOTICES, HINTS:

- ★ CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- ★ NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- ★ HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

9. SI UNIT

The UNITS given in this manual are primarily expressed according to the SI UNIT (International System of Unit), and alternately expressed in the metric system and in the English System.

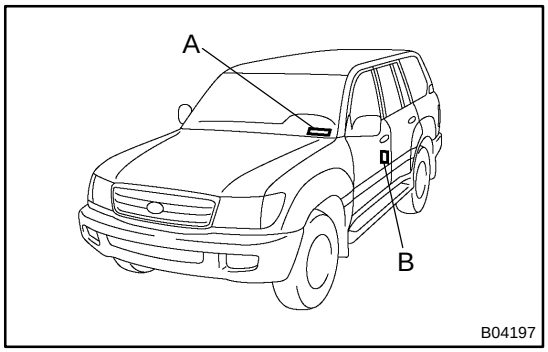
Example:

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

IDENTIFICATION INFORMATION

IN04P-02

VEHICLE IDENTIFICATION AND ENGINE SERIAL NUMBER



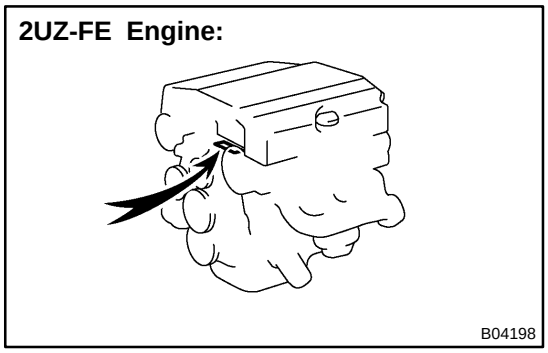
1. VEHICLE IDENTIFICATION NUMBER

The vehicle identification number is stamped on the vehicle identification number plate and the certification label, as shown in the illustration.

A: Vehicle Identification Number Plate

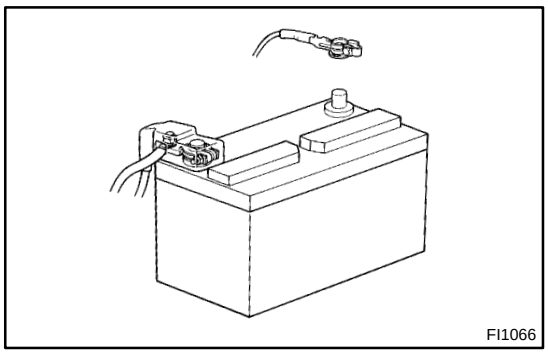
B: Certification Label

2UZ-FE Engine:



2. ENGINE SERIAL NUMBER

The engine serial number is stamped on the engine block, as shown in the illustration.


FI1066

REPAIR INSTRUCTIONS

IN07M-02

GENERAL INFORMATION

BASIC REPAIR HINT

(a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Installation and removal of battery terminal:

(1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.

(2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.

(3) When disconnecting the terminal cable to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.

(4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.

(5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.

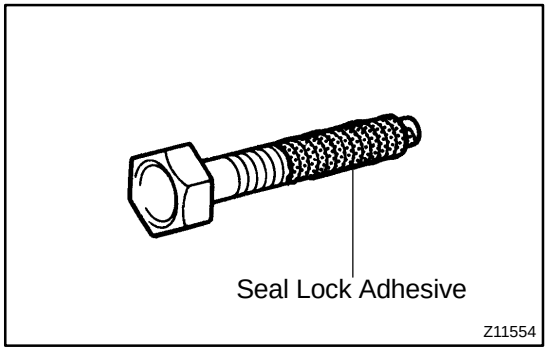
(6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non-reusable parts

(1) Always replace cotter pins, gaskets, O-rings and oil seals, etc. with new ones.

(2) Non-reusable parts are indicated in the component illustrations by the " " symbol.



Z11554

(f) Precoated parts

Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.

(1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

(2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

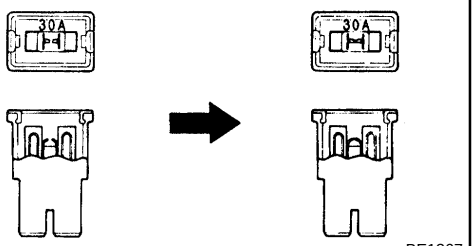
(3) Precoated parts are indicated in the component illustrations by the "★" symbol.

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

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

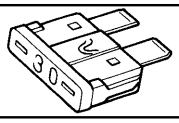
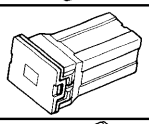
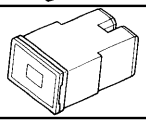
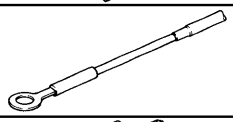
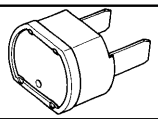
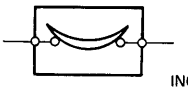
(i) Use of special service tools (SST) and special service materials (SSM) may be required, depending on the nature of the repair. Be sure to use SST and SSM where specified and follow the proper work procedure. A list of SST and SSM can be found in Preparation section in this manual.

Medium Current Fuse and High Current Fuse Equal Amperage Rating



BE1367

(j) When replacing fuses, be sure the new fuse has the correct amperage rating. DO NOT exceed the rating or use one with a lower rating.

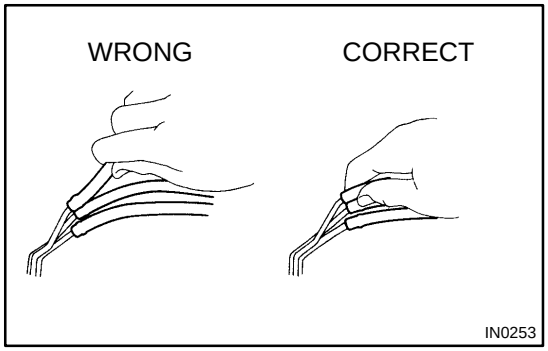
Illustration	Symbol	Part Name	Abbreviation
 BE5594	IN0365	FUSE	FUSE
 BE5595	IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

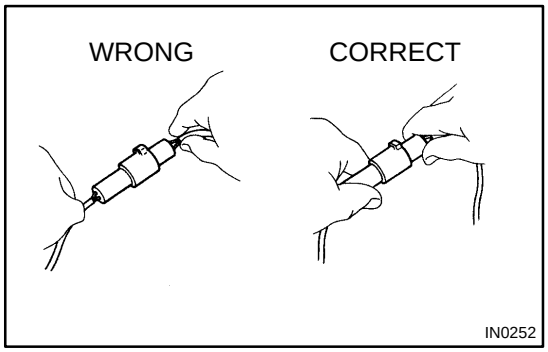
V00076

(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-8).
- Cancel the parking brake on the level place and shift the transmission in N position.
- When jacking up the front wheels of the vehicle at first place stoppers behind the rear wheels.
- When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
- When either the front or rear wheels only should be jacked up, set rigid racks and place stoppers in front and behind the other wheels on the ground.
- After the vehicle is jacked up, be sure to support it on rigid racks. It is extremely dangerous to do any work on a vehicle raised on a jack alone, even for a small job that can be finished quickly.

(l) Observe the following precautions to avoid damage to the following 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 destroyed by static electricity.)





(2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.

(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

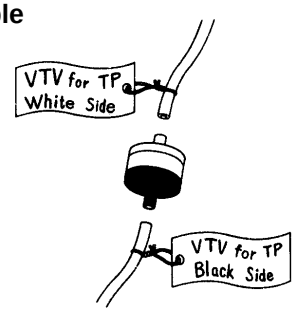
(5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.

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

(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

Example



IN0002

(m) Installation and removal of vacuum hose:
(1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
(2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

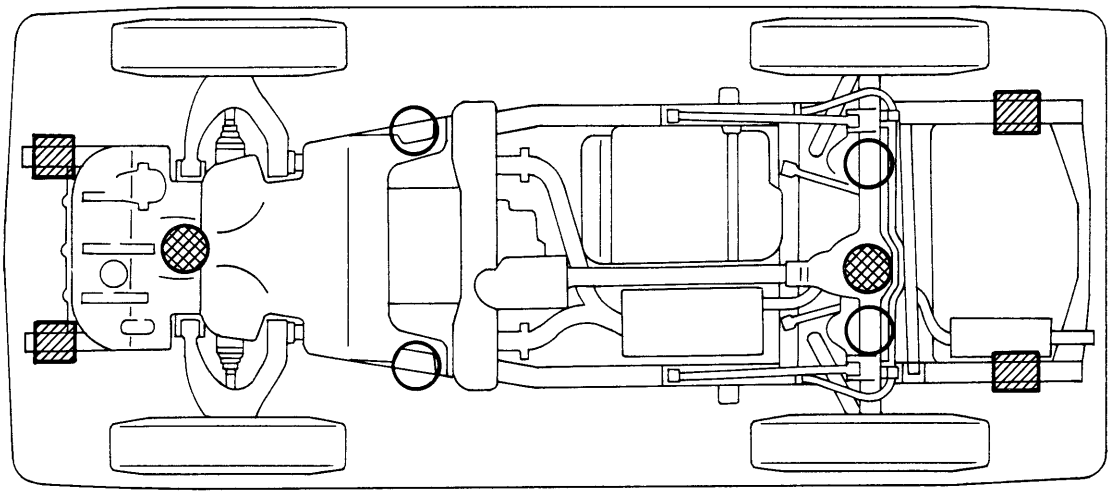
(n) Bleeding of hydraulic brake booster system
When repairing the hydraulic brake booster or ABS, bleeding the air out of the hydraulic brake booster
(See page BR-4).

(o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20˚C (68˚F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

IN04O-02

VEHICLE LIFT AND SUPPORT LOCATIONS

FRONT



JACK POSITION

Front ..... Engine under cover

Rear ..... Rear differential carrier

CAUTION : When jacking-up the front and rear, make sure the car is not carrying any extra weight.

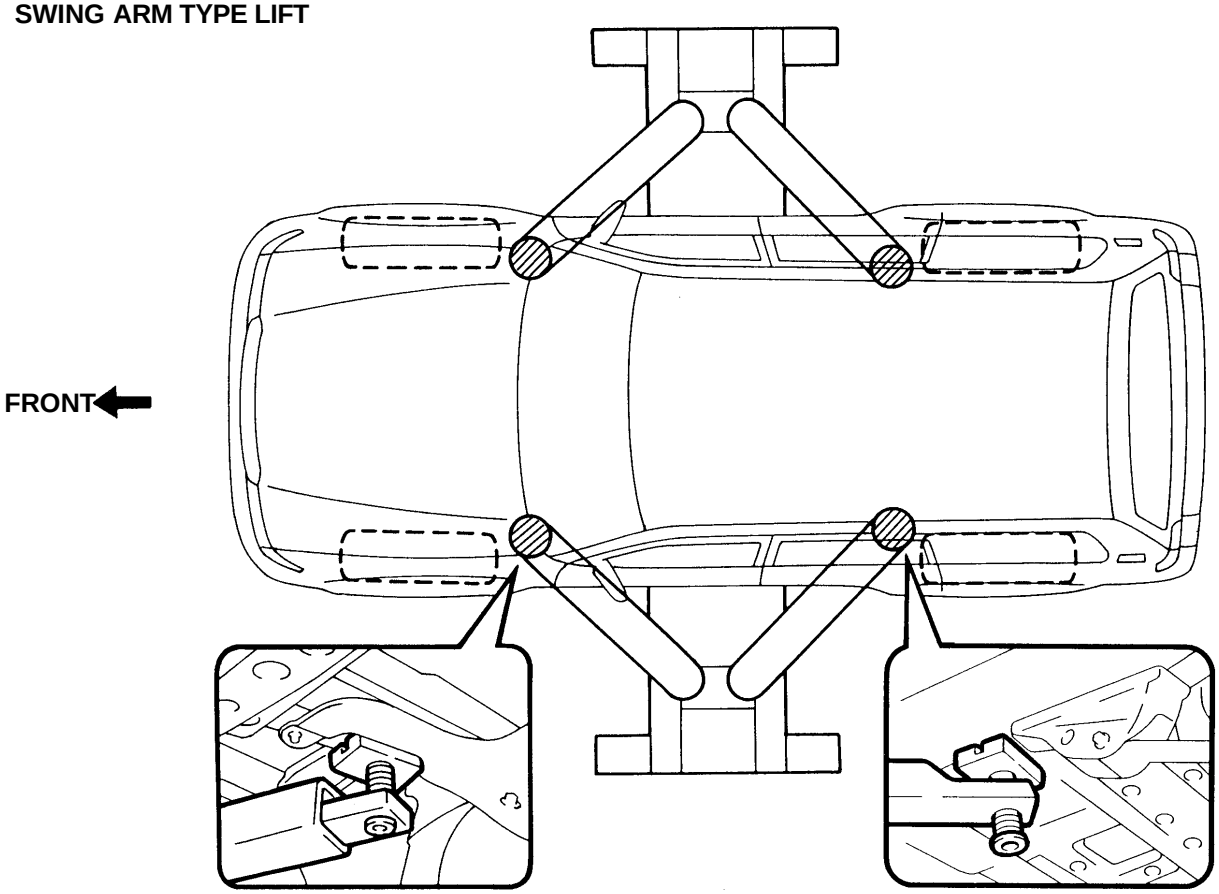
SCREW TYPE JACK POSITION

SUPPORT POSITION

Safety stand .....

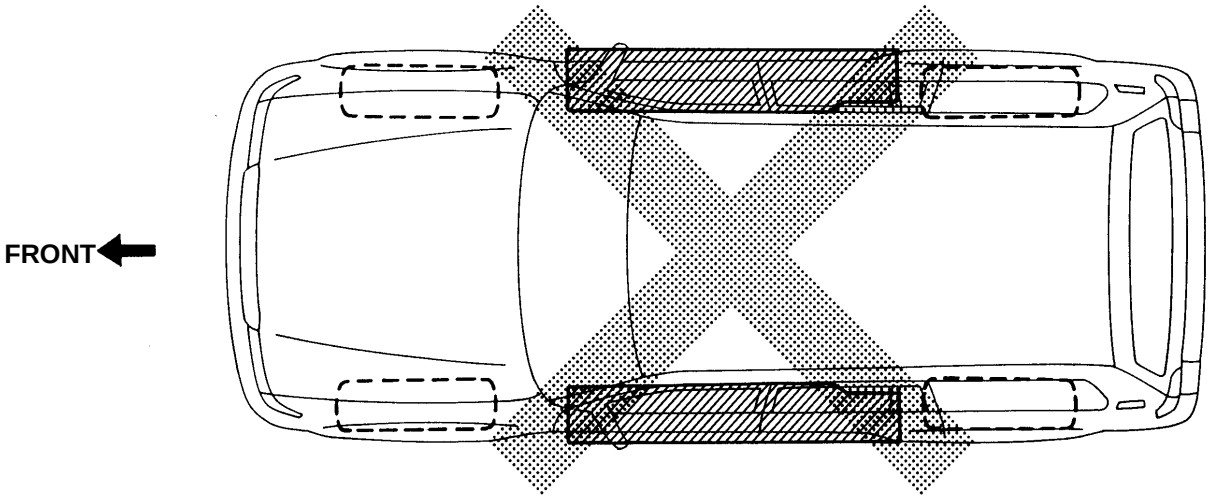
B04208

SWING ARM TYPE LIFT



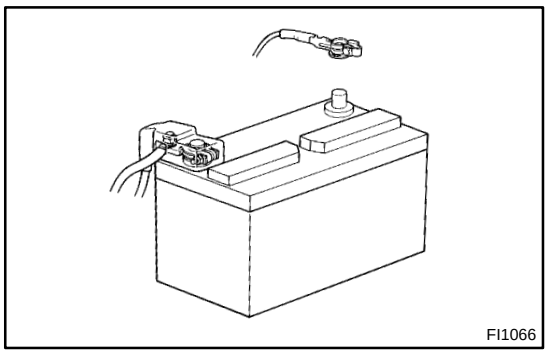
NOTICE: **When lifting the vehicle, place the supports correctly at the positions shown above.**

PLATE TYPE LIFT (DO NOT USE.)



NOTICE: **Never use the plate type lift-using it to lift up the vehicle will cause the body shape to warp.**

B04209


FI1066

REPAIR INSTRUCTIONS

IN07M-02

GENERAL INFORMATION

BASIC REPAIR HINT

(a) Use fender, seat and floor covers to keep the vehicle clean and prevent damage.

(b) During disassembly, keep parts in the appropriate order to facilitate reassembly.

(c) Installation and removal of battery terminal:

(1) Before performing electrical work, disconnect the negative (-) terminal cable from the battery.

(2) If it is necessary to disconnect the battery for inspection or repair, first disconnect the negative (-) terminal cable.

(3) When disconnecting the terminal cable to prevent damage to battery terminal, loosen the cable nut and raise the cable straight up without twisting or prying it.

(4) Clean the battery terminals and cable ends with a clean shop rag. Do not scrape them with a file or other abrasive objects.

(5) Install the cable ends to the battery terminals after loosening the nut, and tighten the nut after installation. Do not use a hammer to tap the cable ends onto the terminals.

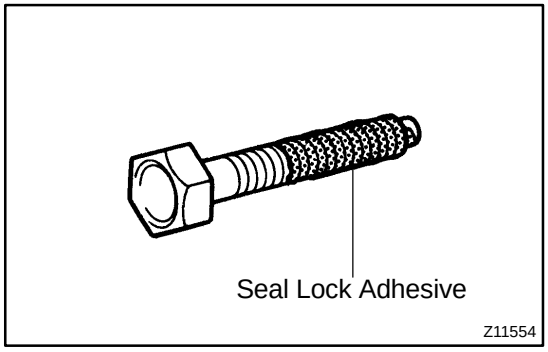
(6) Be sure the cover for the positive (+) terminal is properly in place.

(d) Check hose and wiring connectors to make sure that they are connected securely and correctly.

(e) Non-reusable parts

(1) Always replace cotter pins, gaskets, O-rings and oil seals, etc. with new ones.

(2) Non-reusable parts are indicated in the component illustrations by the " " symbol.



Z11554

(f) Precoated parts

Precoated parts are bolts and nuts, etc. that are coated with a seal lock adhesive at the factory.

(1) If a precoated part is retightened, loosened or caused to move in any way, it must be recoated with the specified adhesive.

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

(h) Carefully observe all specifications for bolt tightening torques. Always use a torque wrench.

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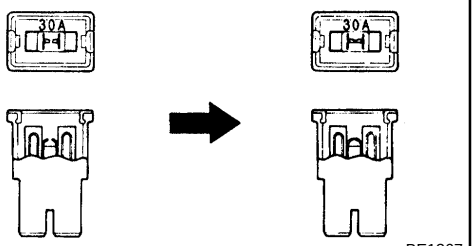
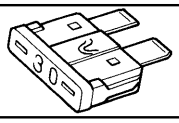
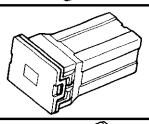
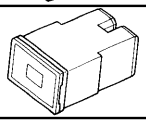
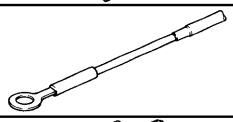
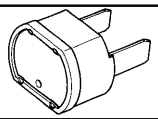
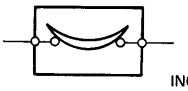
Medium Current Fuse and High Current Fuse Equal Amperage Rating



BE1367

(j) When replacing fuses, be sure 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
 BE5594	IN0365	FUSE	FUSE
 BE5595	IN0366	MEDIUM CURRENT FUSE	M-FUSE
 BE5596	IN0367	HIGH CURRENT FUSE	H-FUSE
 BE5597	IN0367	FUSIBLE LINK	FL
 BE5598	 IN0368	CIRCUIT BREAKER	CB

V00076

(k) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations (See page IN-8).
- Cancel the parking brake on the level place and shift the transmission in N position.
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- When jacking up the rear wheels of the vehicle at first place stoppers before the front wheels.
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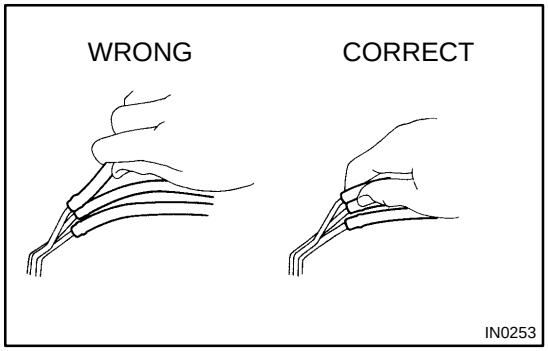
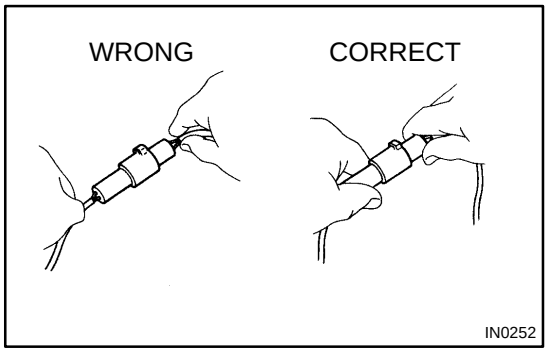
(1) Do not open the cover or case of the ECU unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)





(2) To disconnect vacuum hoses, pull off the end, not the middle of the hose.

(3) To pull apart electrical connectors, pull on the connector itself, not the wires.

(4) Be careful not to drop electrical components, such as sensors or relays. If they are dropped on a hard floor, they should be replaced and not reused.

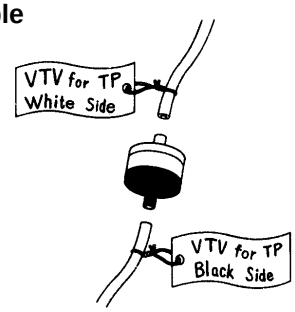
(5) When steam cleaning an engine, protect the electronic components, air filter and emission-related components from water.

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

(7) When checking continuity at the wire connector, insert the tester probe carefully to prevent terminals from bending.

(8) When using a vacuum gauge, never force the hose onto a connector that is too large. Use a step-down adapter for adjustment. Once the hose has been stretched, it may leak air.

Example



IN0002

(m) Installation and removal of vacuum hose:
(1) When disconnecting vacuum hoses, use tags to identify how they should be reconnected to.
(2) After completing a job, double check that the vacuum hoses are properly connected. A label under the hood shows the proper layout.

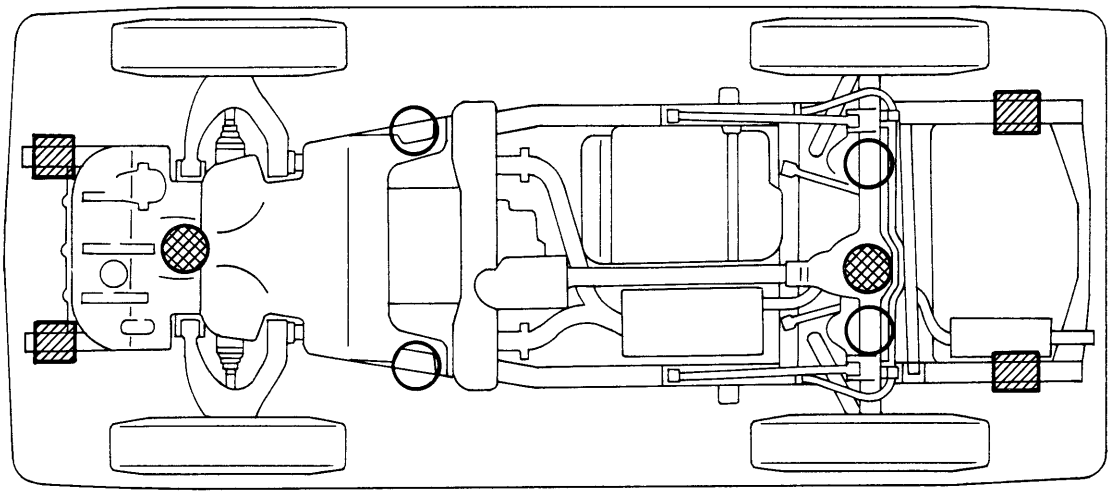
(n) Bleeding of hydraulic brake booster system
When repairing the hydraulic brake booster or ABS, bleeding the air out of the hydraulic brake booster
(See page BR-4).

(o) Unless otherwise stated, all resistance is measured at an ambient temperature of 20˚C (68˚F). Because the resistance may be outside specifications if measured at high temperatures immediately after the vehicle has been running, measurement should be made when the engine has cooled down.

IN04O-02

VEHICLE LIFT AND SUPPORT LOCATIONS

FRONT



JACK POSITION

Front ..... Engine under cover

Rear ..... Rear differential carrier

CAUTION : When jacking-up the front and rear, make sure the car is not carrying any extra weight.

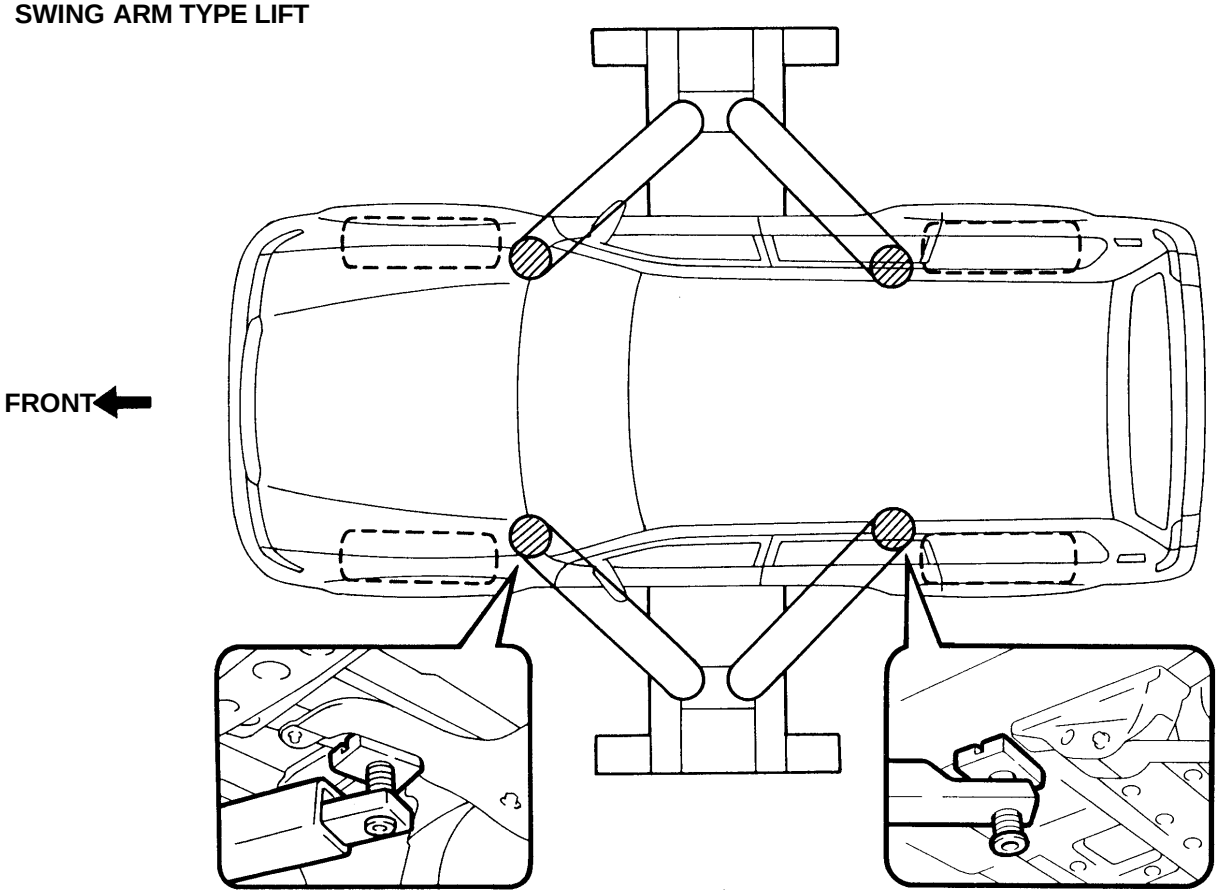
SCREW TYPE JACK POSITION

SUPPORT POSITION

Safety stand .....

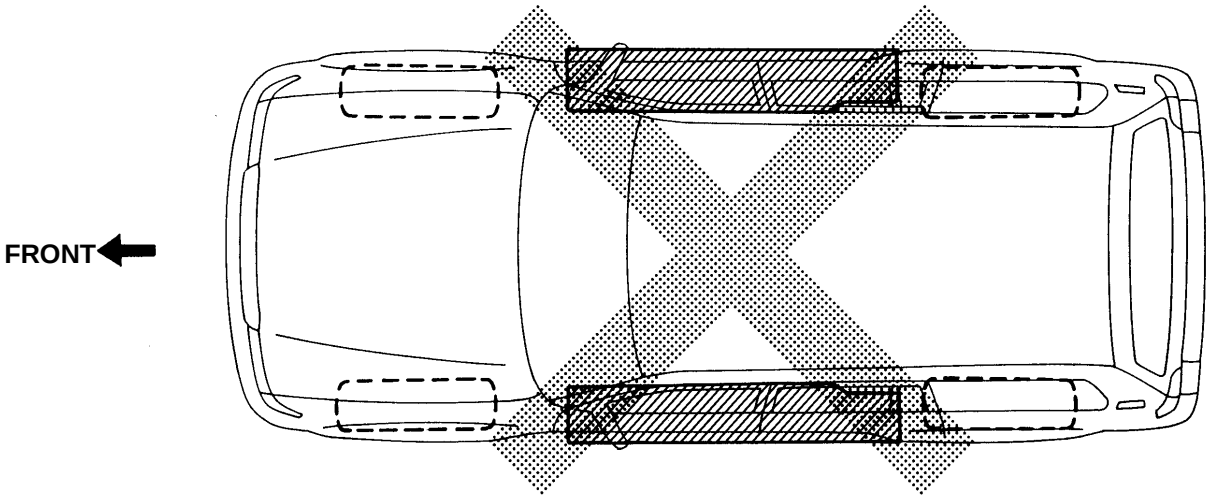
B04208

SWING ARM TYPE LIFT



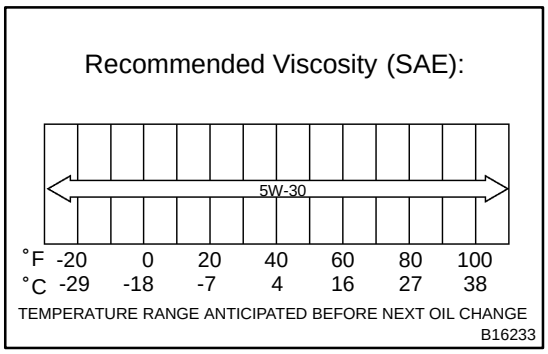
NOTICE: **When lifting the vehicle, place the supports correctly at the positions shown above.**

PLATE TYPE LIFT (DO NOT USE.)



NOTICE: **Never use the plate type lift-using it to lift up the vehicle will cause the body shape to warp.**

B04209



OIL AND FILTER

LU08N-04

INSPECTION

1. CHECK ENGINE OIL QUALITY

Check the oil for deterioration, entry of water, discoloring or thinning.

If the quality is visibly poor, replace the oil.

Oil grade:

API grade SL Energy-Conserving or ILSAC multi-grade engine oil.

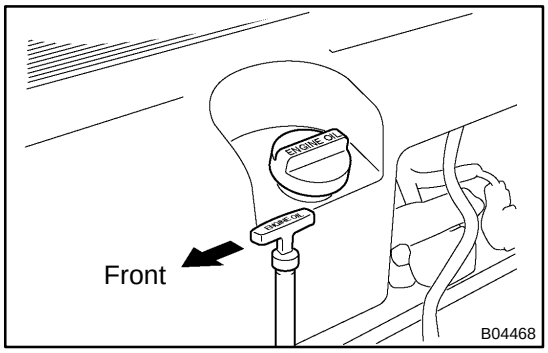
2. CHECK ENGINE OIL LEVEL

The oil level should be between the "L" and "F" marks on the dipstick.

If low, check for leakage and add oil up to the "F" mark.

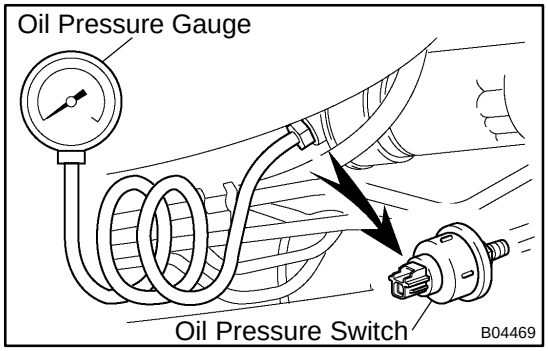
NOTICE:

★ **Do not fill with engine oil above the "F" mark.**



★ **Install the oil dipstick facing the direction shown in the illustration.**

3. REMOVE ENGINE UNDER COVER NO.1



4. REMOVE OIL PRESSURE SWITCH

5. INSTALL OIL PRESSURE GAUGE

6. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

7. CHECK OIL PRESSURE

Oil pressure:

At idle: 29 kPa (0.3 kgf/cm^2, 4.2 psi) or more

At 3,000 rpm:

294 - 588 kPa (3.0 - 6.0 kgf/cm^2, 43 - 85 psi)

8. REMOVE OIL PRESSURE GAUGE

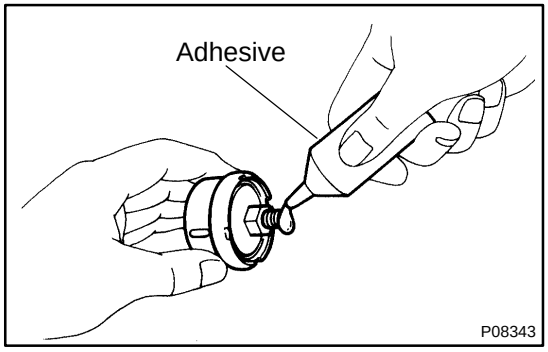
9. REINSTALL OIL PRESSURE SWITCH

(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) Reinstall the oil pressure switch.



10. START ENGINE, AND CHECK FOR ENGINE OIL LEAKS

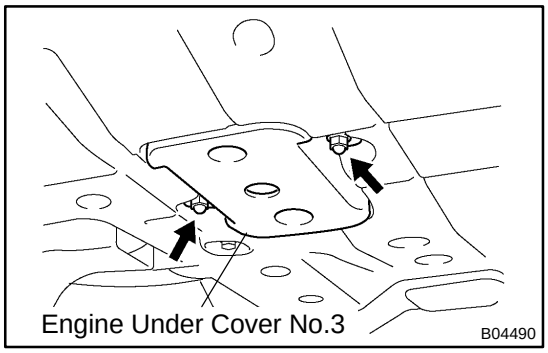
11. REINSTALL ENGINE UNDER COVER NO.1

LU08O-02

REPLACEMENT

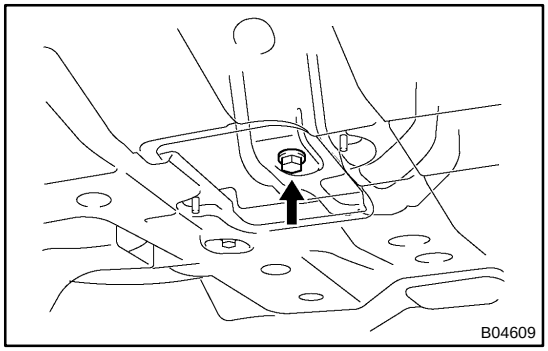
CAUTION:

- ★ **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- ★ **Care should be taken, therefore, when changing engine oil to minimize the frequency and length of time your skin is exposed to used engine oil. Protective clothing and gloves that cannot be penetrated by oil should be worn. The skin should be thoroughly washed with soap and water, or use water-less hand cleaner, to remove any used engine oil. Do not use gasoline, thinners, or solvents.**
- ★ **In order to preserve the environment, used oil and used oil filters must be disposed of only at designated disposal sites.**



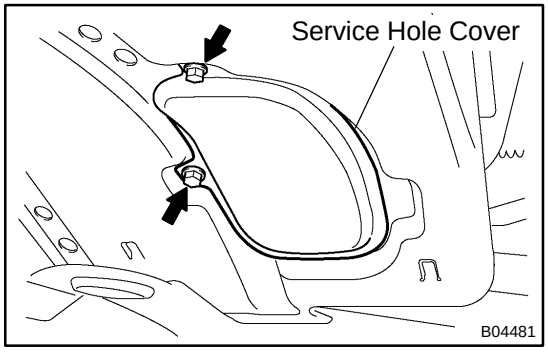
1. DRAIN ENGINE OIL

(a) Remove the 2 nuts and engine under cover No.3.



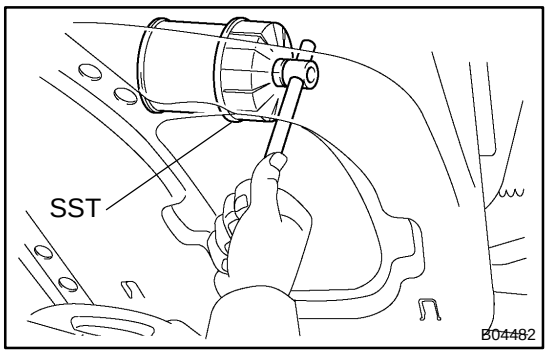
(b) Remove the oil filler cap.

(c) Remove the oil drain plug, and drain the oil into a container.



2. REPLACE OIL FILTER

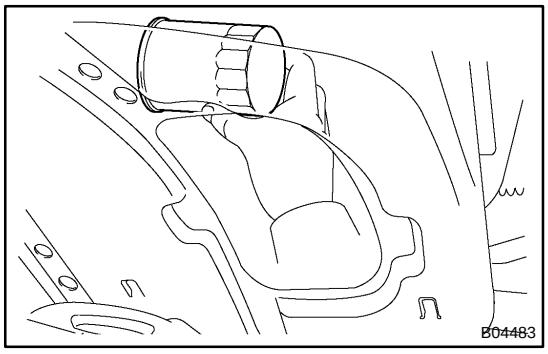
(a) Remove the 2 bolts and service hole cover.



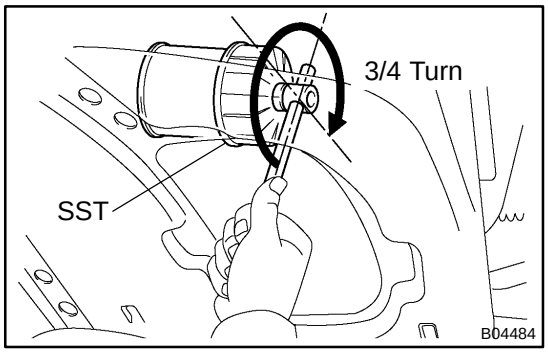
(b) Using SST, remove the oil filter.
SST 09228-07501

(c) Clean the oil filter contact surface on the oil filter mounting.

(d) Lubricate the filter rubber gasket with clean engine oil.



(e) Tighten the oil filter by hand until the rubber gasket contacts the seat of the filter mounting.



(f) Using SST, give it an additional 3/4 turn to seat the filter.
SST 09228-07501

3. REFILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Fill with new engine oil.
Capacity:
Drain and refill:
w/ Oil filter change: 6.8 liters (7.2 US qts, 6.0 Imp. qts)
w/o Oil filter change: 6.4 liters (6.8 US qts, 5.6 Imp. qts)
Dry fill: 8.0 liters (8.5 US qts, 7.0 Imp. qts)

(c) Reinstall the oil filler cap.

4. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

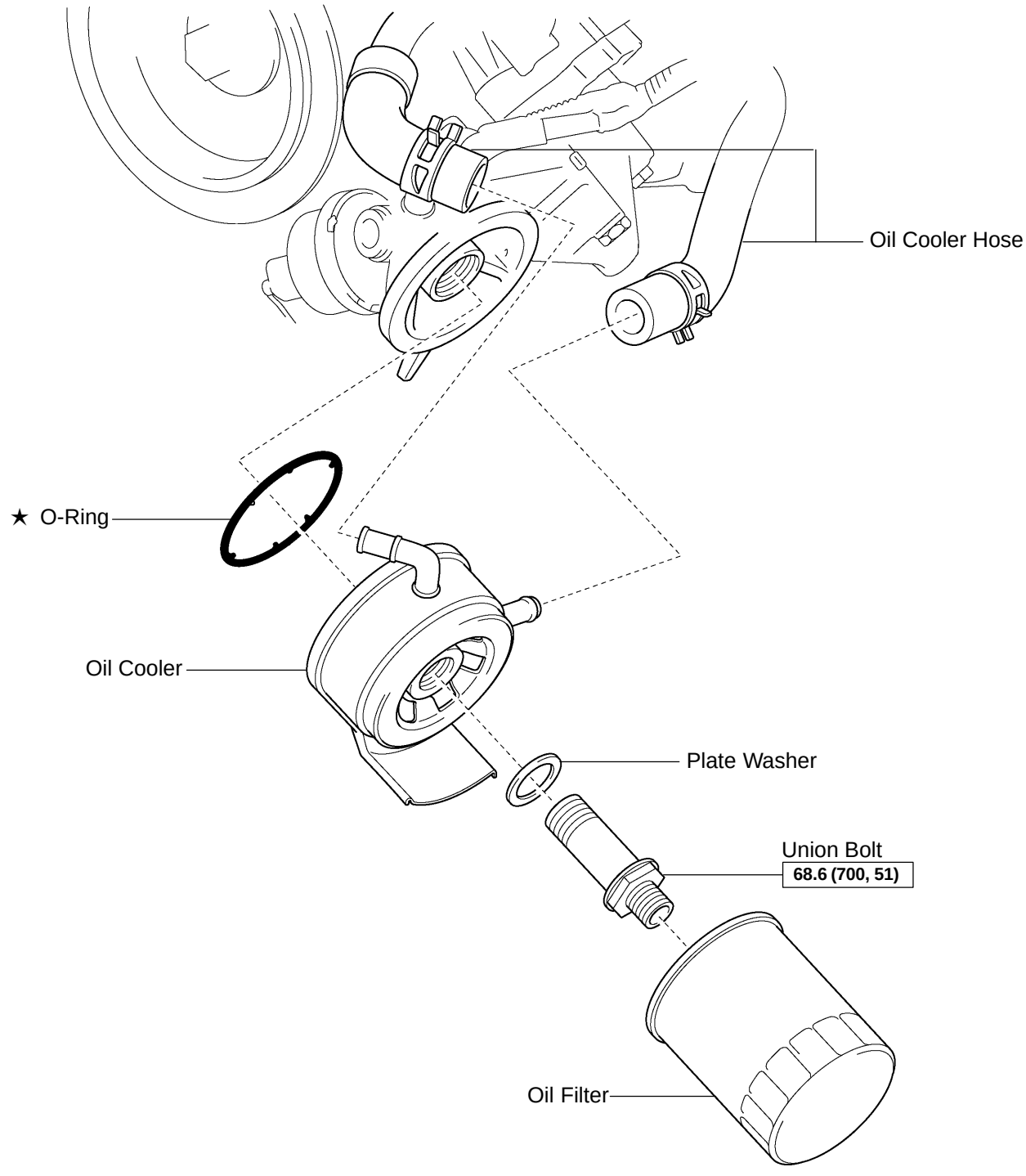
5. RECHECK ENGINE OIL LEVEL

6. REINSTALL ENGINE UNDER COVER NO.3 AND SERVICE HOLE COVER

OIL COOLER

COMPONENTS

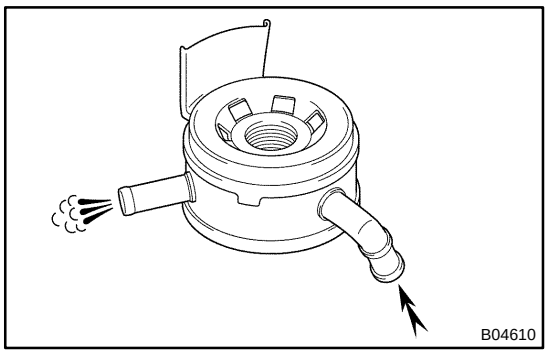
LU08W-08



N·m (kgf·cm, ft·lbf): Specified torque
★ Non-reusable part

B04473

LU08Y-06



INSPECTION

INSPECT OIL COOLER

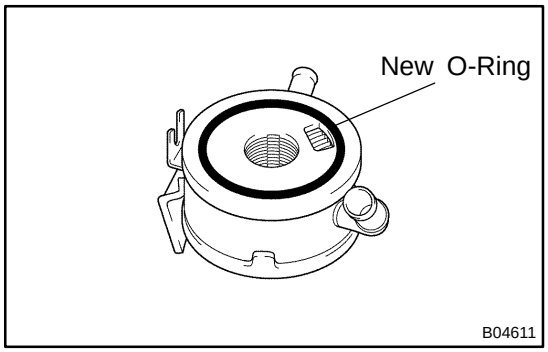
Check the oil cooler for damage or clogging.
If necessary, replace the oil cooler.

LU08Z-08

INSTALLATION

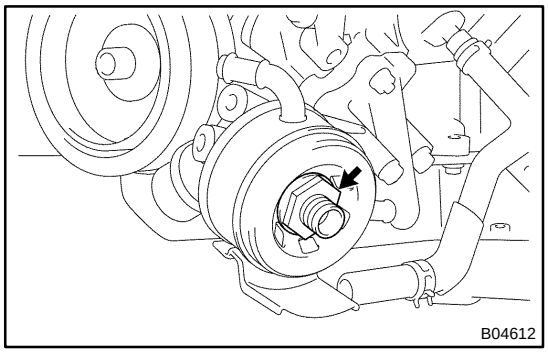
1. INSTALL OIL COOLER

(a) Clean the oil cooler contact surface on the cooler mounting.



(b) Install a new O-ring to the oil cooler.

(c) Apply a light coat of engine oil on the threads and under the head of the union bolt.



(d) Install the plate washer and union bolt.
Torque: 68.6 N·m (700 kgf·cm, 51 ft·lbf)

(e) Connect the 2 oil cooler hoses to the oil cooler.

2. INSTALL OIL FILTER (See page LU-2)

3. FILL WITH ENGINE COOLANT

4. START ENGINE AND CHECK FOR ENGINE OIL LEAKS

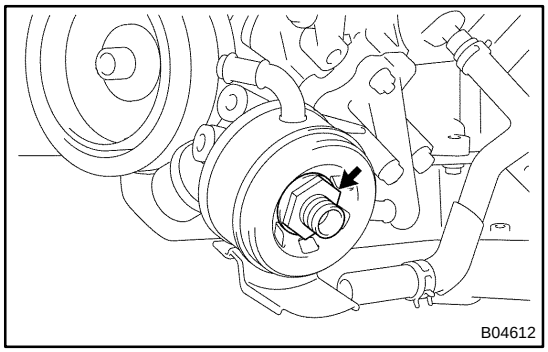
5. CHECK ENGINE OIL LEVEL

LU08X-06

REMOVAL

1. DRAIN ENGINE COOLANT

2. REMOVE OIL FILTER (See page LU-2)



3. REMOVE OIL COOLER

(a) Disconnect the 2 oil cooler hoses from the oil cooler.

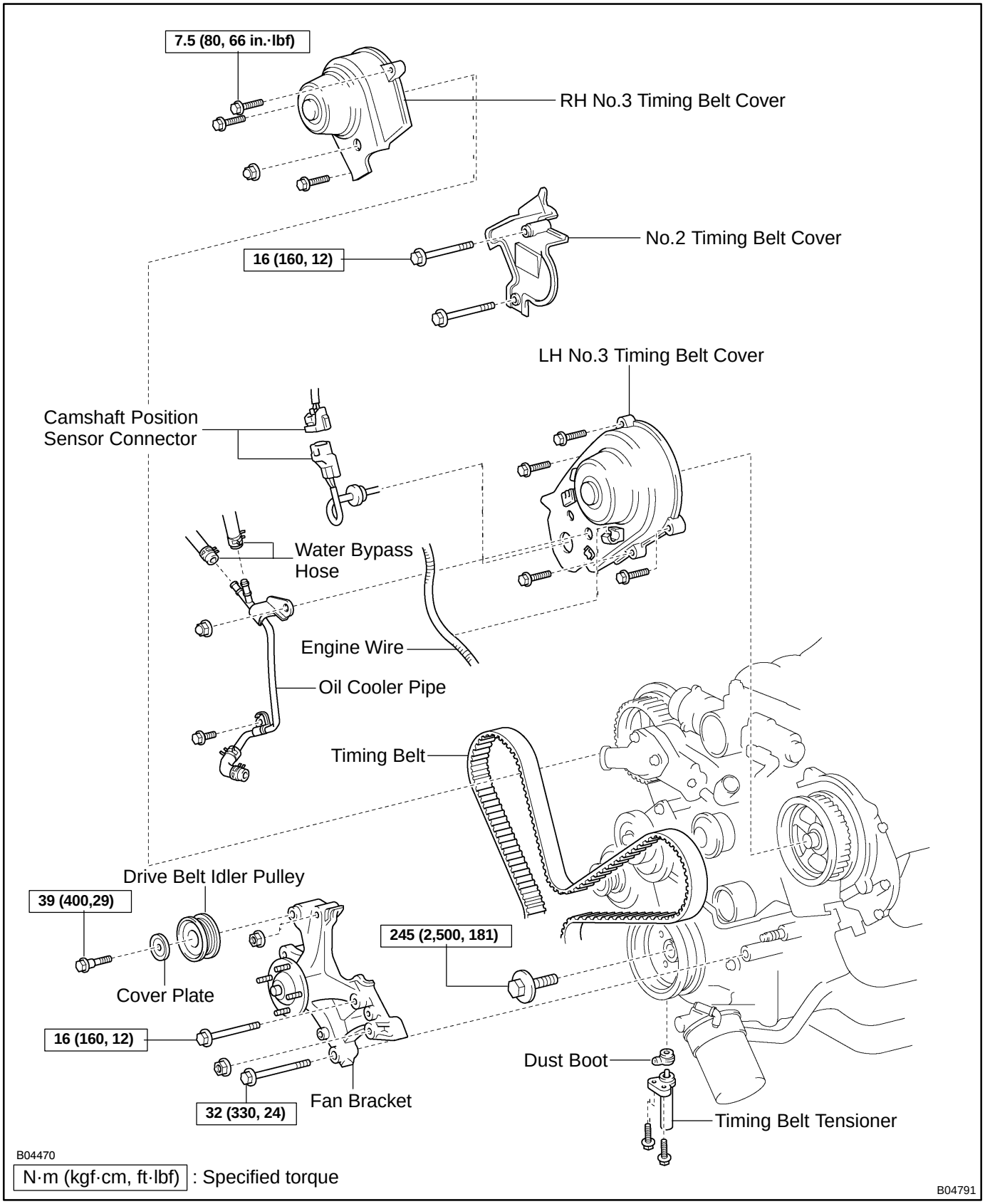
(b) Remove the union bolt, plate washer and the oil cooler.

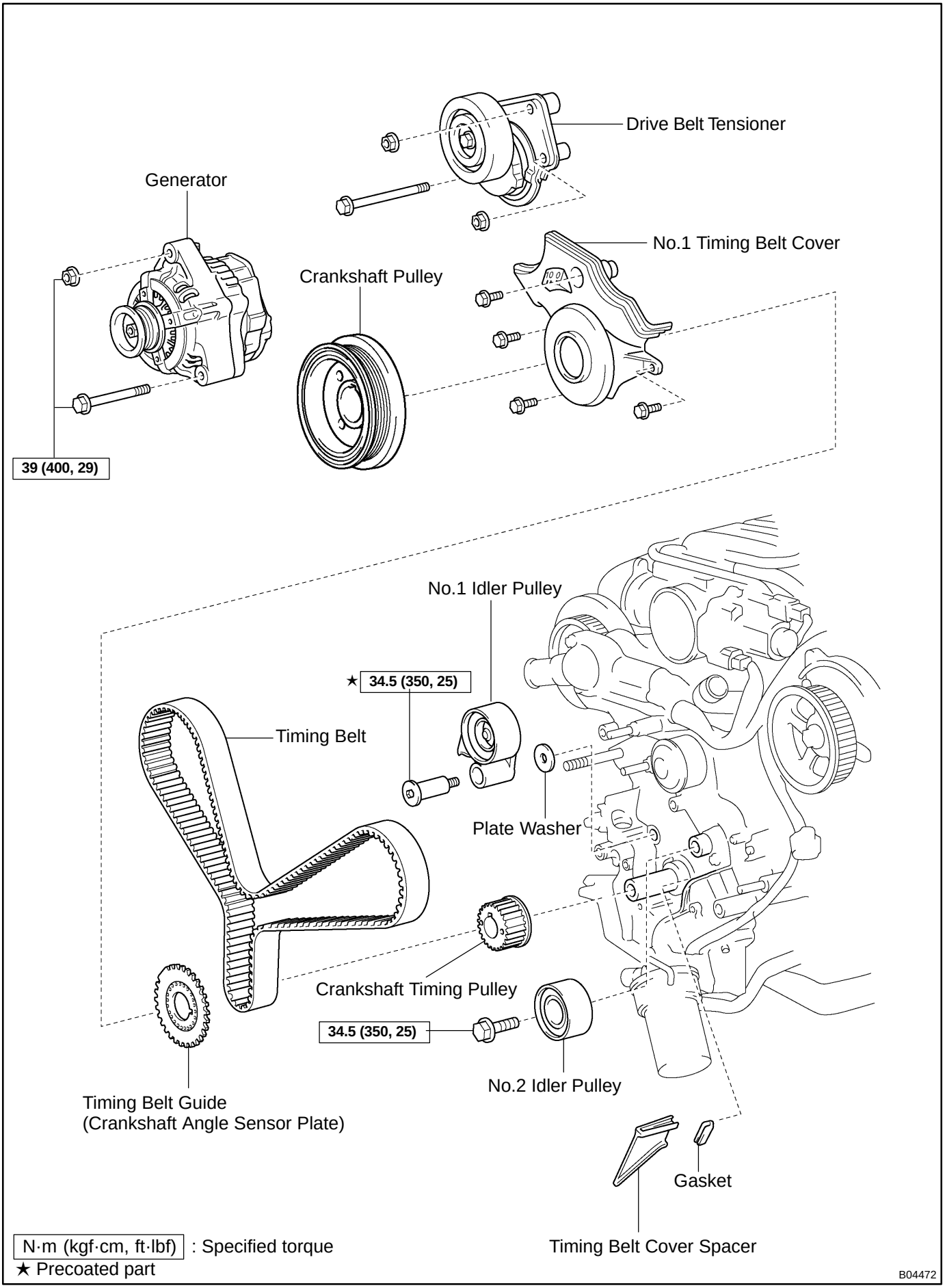
(c) Remove the O-ring from the oil cooler.

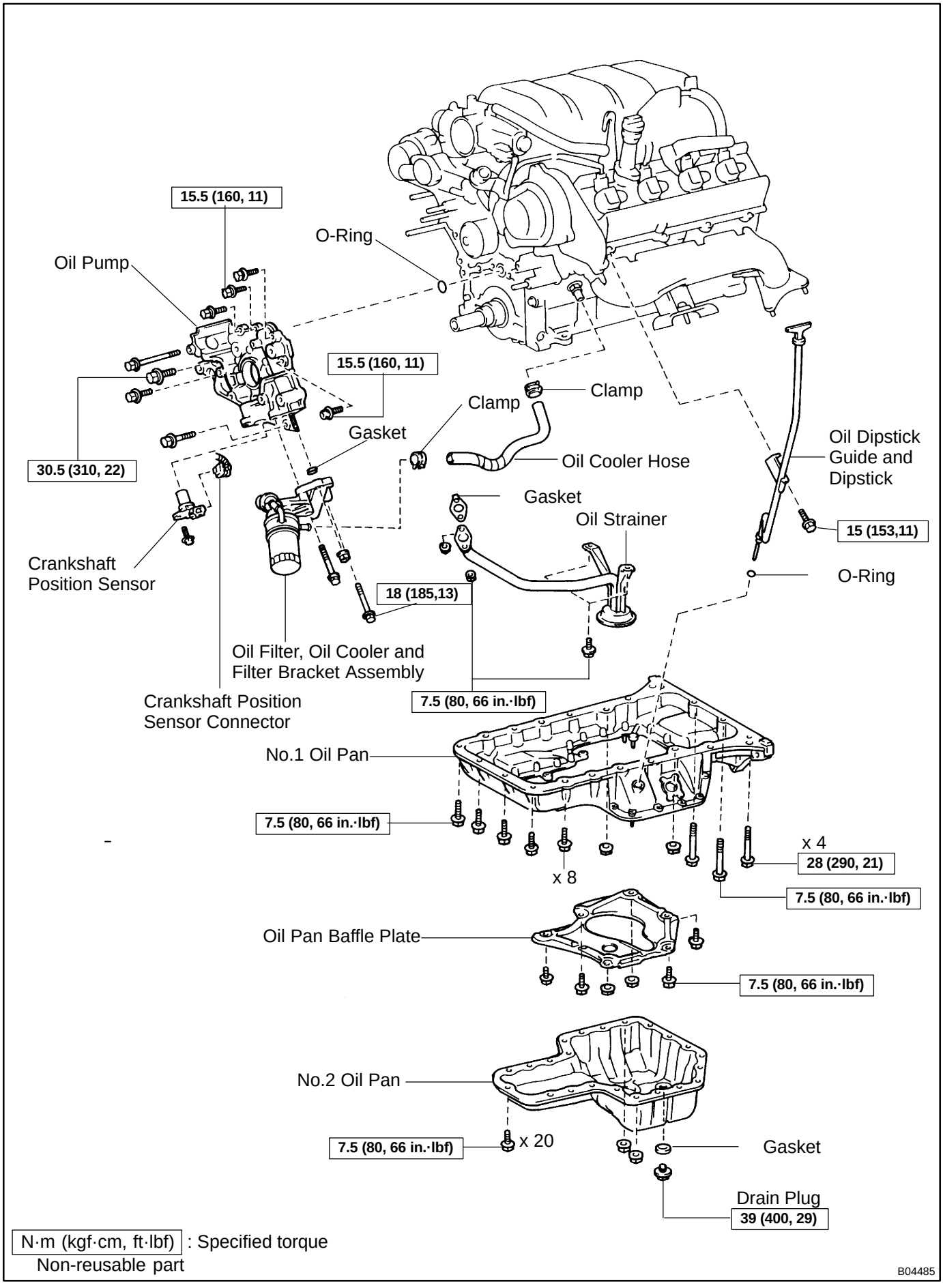
OIL PUMP

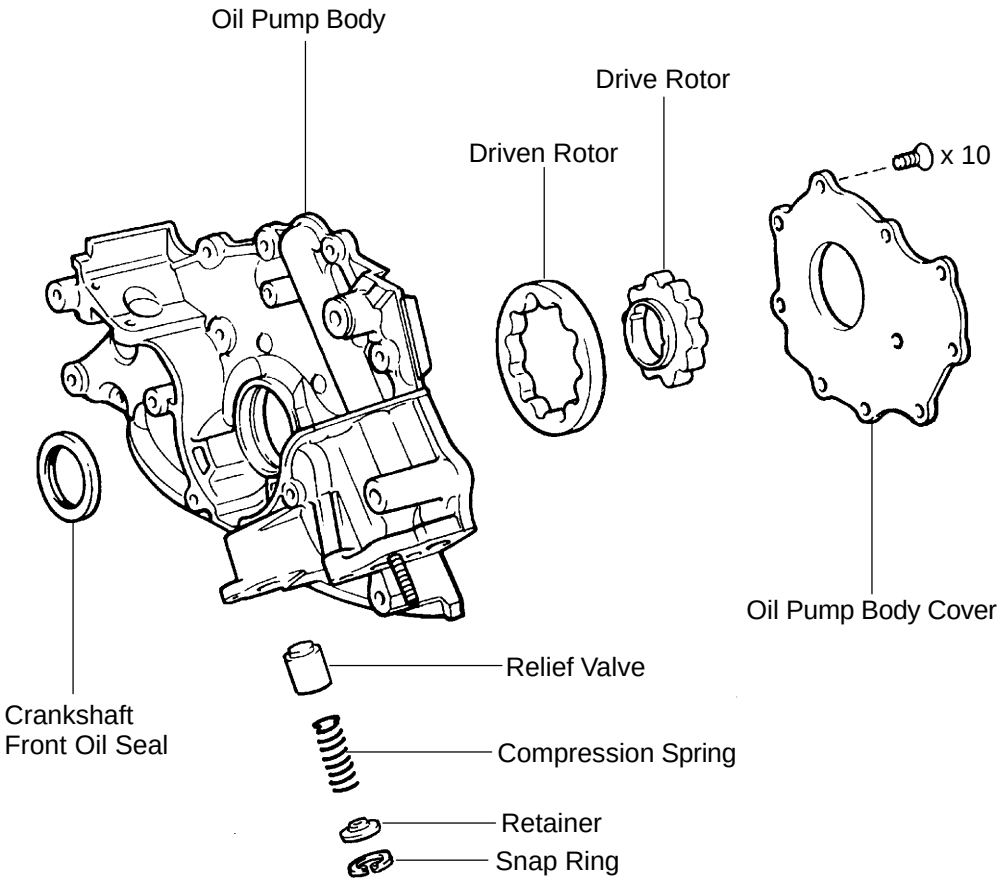
COMPONENTS

LU08P-07




Drive Belt Tensioner
Generator
No.1 Timing Belt Cover
Crankshaft Pulley
39 (400, 29)
No.1 Idler Pulley
★ 34.5 (350, 25)
Timing Belt
Plate Washer
Crankshaft Timing Pulley
34.5 (350, 25)
No.2 Idler Pulley
Timing Belt Guide
(Crankshaft Angle Sensor Plate)
Gasket
Timing Belt Cover Spacer
N·m (kgf·cm, ft·lbf) : Specified torque
★ Precoated part
B04472

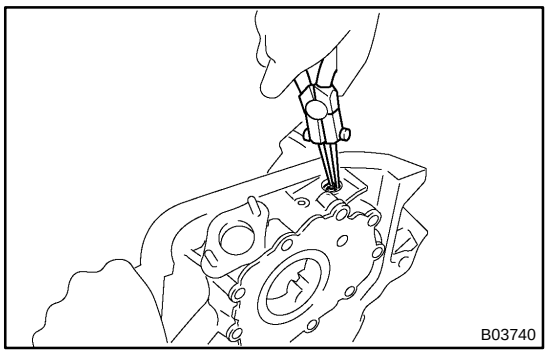

15.5 (160, 11)
O-Ring
Oil Pump
15.5 (160, 11)
Clamp
Clamp
Gasket
Oil Dipstick Guide and Dipstick
30.5 (310, 22)
Oil Cooler Hose
Gasket
Oil Strainer
15 (153,11)
Crankshaft Position Sensor
O-Ring
18 (185,13)
Oil Filter, Oil Cooler and Filter Bracket Assembly
Crankshaft Position Sensor Connector
7.5 (80, 66 in.·lbf)
No.1 Oil Pan
7.5 (80, 66 in.·lbf)
x 4
28 (290, 21)
x 8
7.5 (80, 66 in.·lbf)
Oil Pan Baffle Plate
7.5 (80, 66 in.·lbf)
No.2 Oil Pan
7.5 (80, 66 in.·lbf)
x 20
Gasket
Drain Plug
39 (400, 29)
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
B04485



Non-reusable part

B03735

LU08R-07

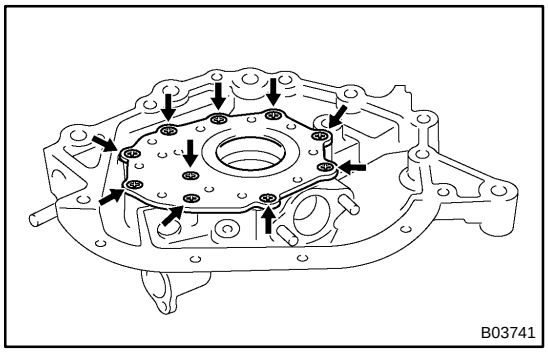


DISASSEMBLY

1. REMOVE RELIEF VALVE

(a) Using snap ring pliers, remove the snap ring.

(b) Remove the retainer, spring and relief valve.

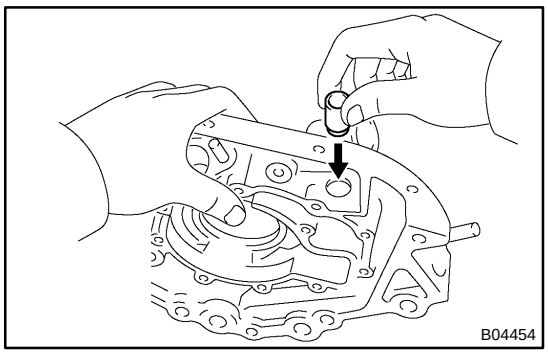


2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, the drive and driven rotors.

LU08S-05

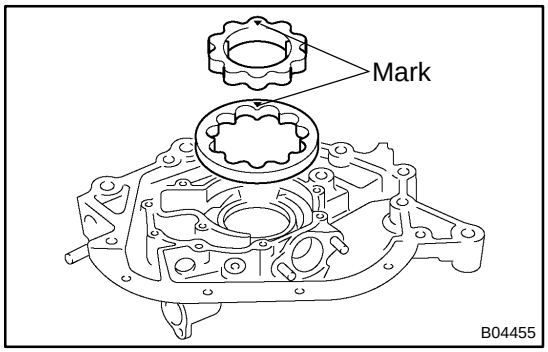
INSPECTION



1. INSPECT RELIEF VALVE

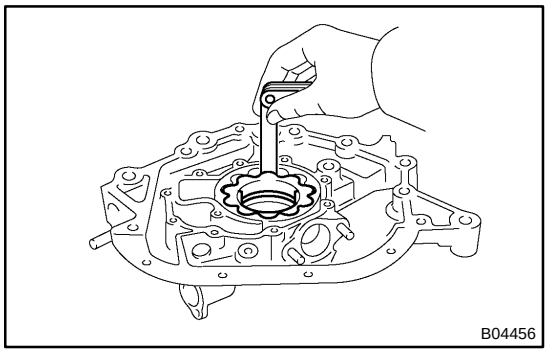
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If it doesn't, replace the relief valve. If necessary, replace the oil pump assembly.



2. INSPECT DRIVE AND DRIVEN ROTORS INTO OIL PUMP BODY

Place the drive and driven rotors into the oil pump body with the mark facing upward.

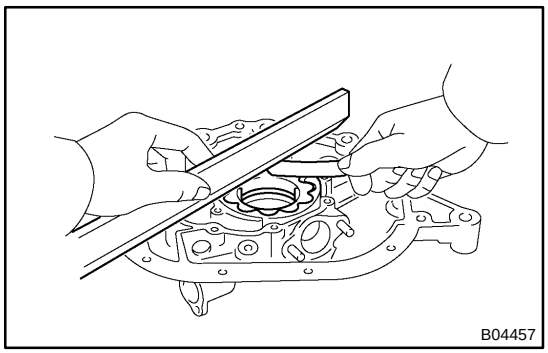


3. INSPECT ROTORS FOR TIP CLEARANCE

Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:
0.110 - 0.240 mm (0.0043 - 0.0094 in.)
Maximum tip clearance: 0.35 mm (0.0138 in.)

If the tip clearance is greater than maximum, replace the rotors as a set.

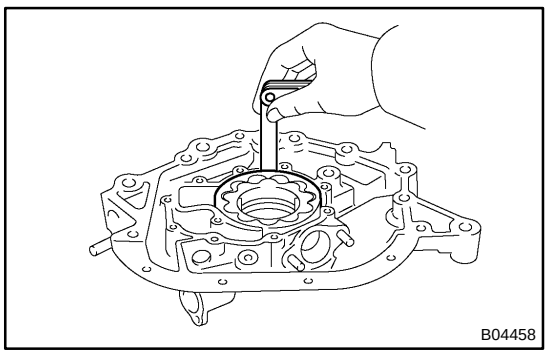


4. INSPECT ROTORS FOR SIDE CLEARANCE

Using a feeler gauge and precision straight edge, measure the clearance between the rotors and precision straight edge.

Standard side clearance:
0.030 - 0.090 mm (0.0012 - 0.0035 in.)
Maximum side clearance: 0.15 mm (0.0059 in.)

If the side clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.



5. INSPECT ROTOR FOR BODY CLEARANCE

Using a feeler gauge, measure the clearance between the driven rotor and body.

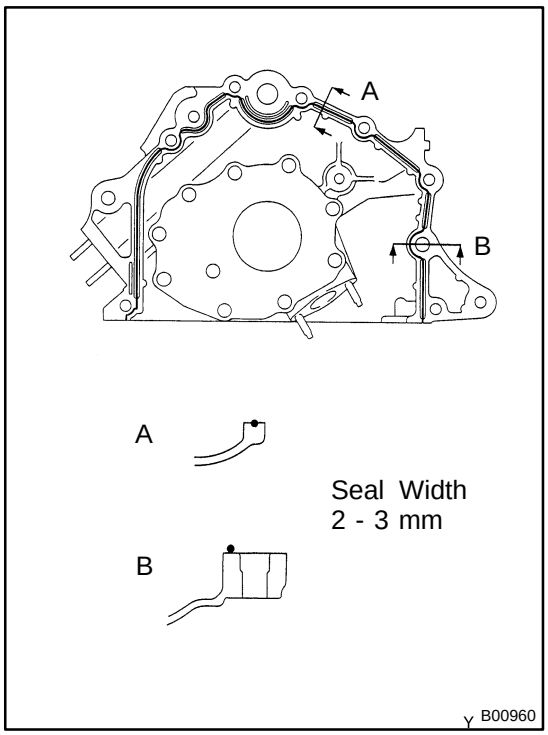
Standard body clearance:
0.100 - 0.175 mm (0.0039 - 0.0069 in.)
Maximum body clearance: 0.30 mm (0.0118 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

6. REMOVE DRIVE AND DRIVE ROTORS

LU08V-03

INSTALLATION



1. INSTALL OIL PUMP

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the oil pump and cylinder block.

★ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.

★ Thoroughly clean all components to remove all the loose material.

★ Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the oil pump as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

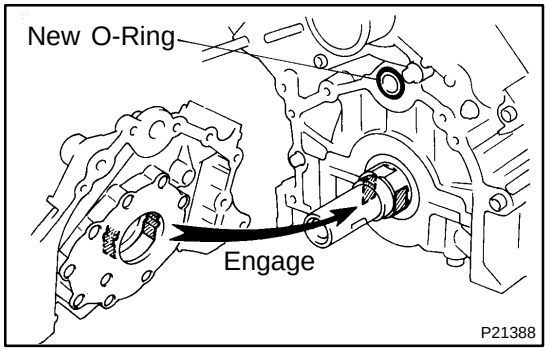
NOTICE:

Avoid applying an excessive amount to the surface. Be particularly careful near oil passage.

★ Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.

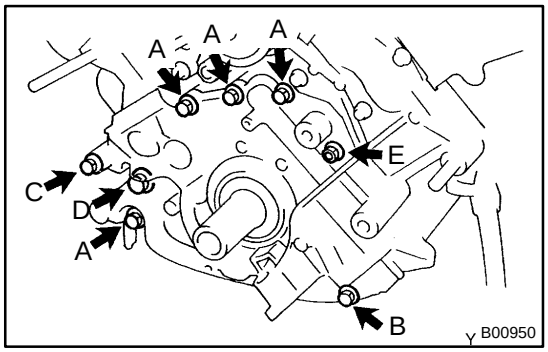
★ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

★ Immediately remove nozzle from the tube and reinstall cap.



(c) Install a new O-ring to the cylinder block.

(d) Engage the spline teeth of the oil pump drive gear with the large teeth of the crankshaft, and slide the oil pump on the crankshaft.



(e) Install the oil pump with the 8 bolts. Uniformly tighten the bolts in several passes.

Torque:

15.5 N·m (160 kgf·cm, 11 ft·lbf)

for 12 mm head and 6 mm hexagon head

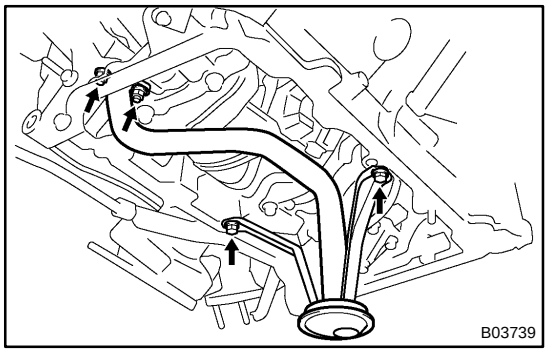
30.5 N·m (310 kgf·cm, 22 ft·lbf) for 14 mm head

HINT:

★ Use a 6 mm hexagon wrench for the hexagon head bolt.

★ Each bolt length is indicated in the illustration.

Bolt length:
35 mm (1.38 in.) for A of 12 mm head
50 mm (1.97 in.) for B of 12 mm head
106 mm (4.17 in.) for C of 12 mm head
40 mm (1.57 in.) for D of 14 mm head
30 mm (1.18 in.) for E of 6 mm hexagon head

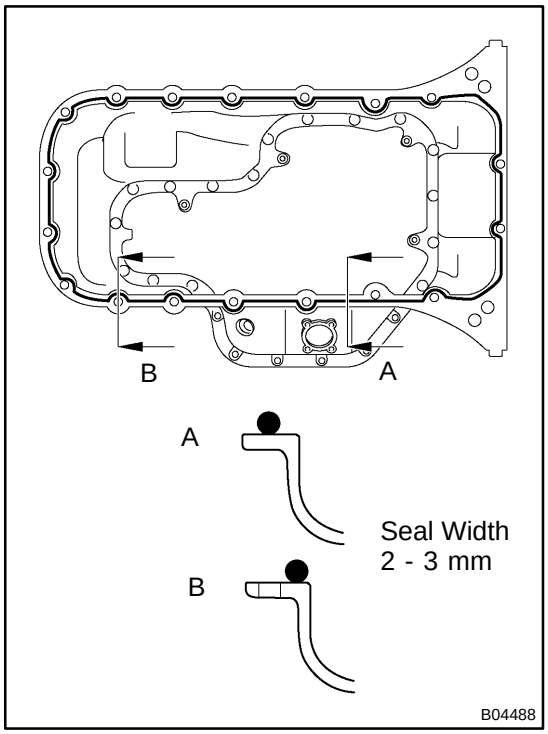


2. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the 2 bolts and 2 nuts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:
Use bolt 12 mm (0.47 in.) in length.

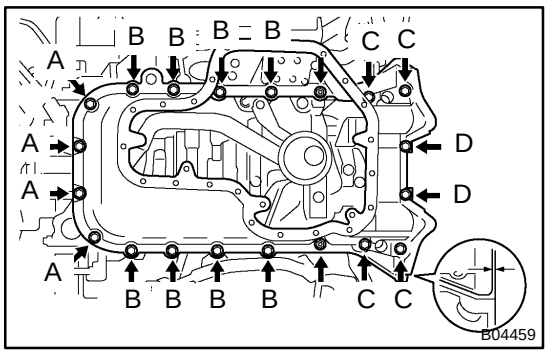


3. INSTALL NO.1 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 oil pan, cylinder block, oil pump and rear oil seal retainer.
- ★ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.
- ★ Thoroughly clean all components to remove all the loose material.
- ★ Using a non-residue solvent, clean both sealing surfaces.

(b) Apply seal packing to the No.1 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent
- ★ Install a nozzle that has been cut to a 2 - 3 mm (0.08 - 0.12 in.) opening.
- ★ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.
- ★ Immediately remove nozzle from the tube and reinstall cap.



(c) Temporarily install the No.1 oil pan with the 19 bolts, stud bolt and 2 nuts.

HINT:

Each bolt length is indicated in the illustration.

Bolt length:

20 mm (0.79 in.) for A of 10 mm head

25 mm (0.98 in.) for B of 12 mm head

60 mm (2.36 in.) for C of 12 mm head

35 mm (1.38 in.) for D of 10 mm head

(d) Set the No.1 oil pan as shown in the illustration.

NOTICE:

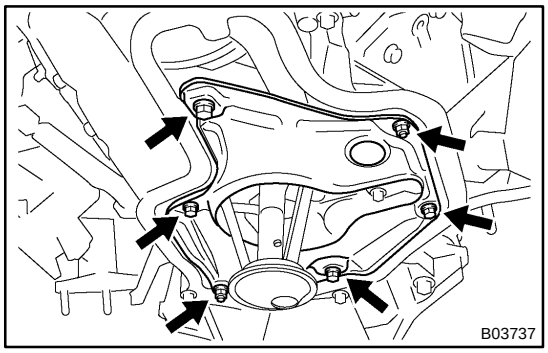
Make sure the clearance between the rear ends of the No.1 oil pan and cylinder block is 0.2 mm (0.008 in.) or less. If the clearance is more than 0.2 mm (0.008 in.), the No.1 oil pan will be stretched.

(e) Uniformly tighten the bolts, and nuts in several passes.

Torque:

7.5 N·m (80 kgf·cm, 66 in.·lbf) for 10 mm head

28 N·m (290 kgf·cm, 21 ft·lbf) for 12 mm head



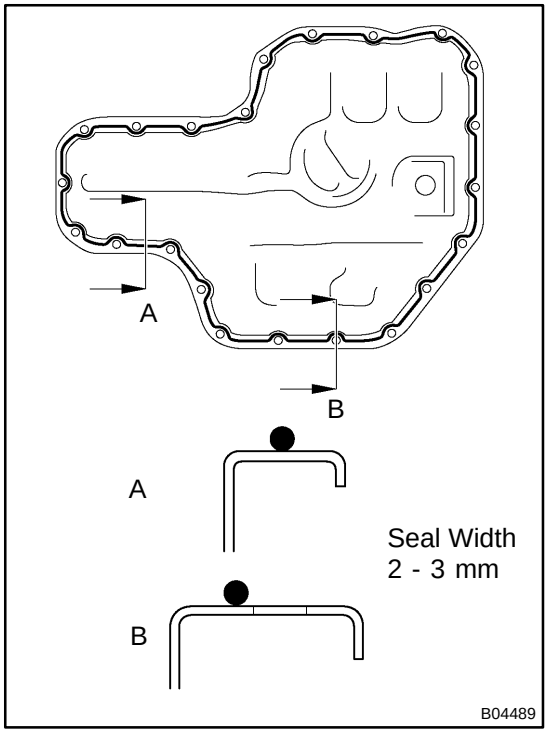
4. INSTALL OIL PAN BAFFLE PLATE

Install the baffle plate with the 4 bolts and 2 nuts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:

Use bolts 12 mm (0.55 in.) in length.



5. INSTALL NO.2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the No.1 and No.2 oil pans.

★ Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing groove.

★ Thoroughly clean all components to remove all the loose material.

★ Using a non-residue solvent, clean both sealing surfaces.

NOTICE:

Do not use a solvent which will affect the painted surfaces.

(b) Apply seal packing to the No.2 oil pan as shown in the illustration.

Seal packing: Part No. 08826-00080 or equivalent

★ Install a nozzle that has been cut to a 3 - 4 mm (0.12 - 0.16 in.) opening.

★ Parts must be assembled within 5 minutes of application. Otherwise the material must be removed and reapplied.

★ Immediately remove nozzle from the tube and reinstall cap.

(c) Install the No.2 oil pan with the 20 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

HINT:
Use bolts 14 mm (0.55 in.) in length.

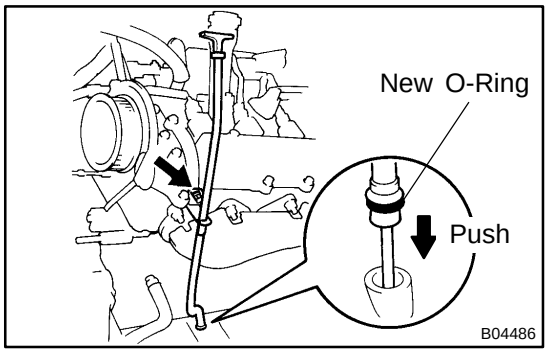
6. INSTALL CRANKSHAFT POSITION SENSOR
(See page IG-13)

7. INSTALL OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY

(a) Install the a new gasket to the oil filter bracket.

(b) Install the oil filter, oil cooler and filter bracket assembly with the 2 bolts and nut.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Connect the oil pressure switch connector.



8. INSTALL OIL DIPSTICK GUIDE AND DIPSTICK

(a) Install a new O-ring to the dipstick guide.

(b) Apply soapy water to the O-ring.

(c) Push in the dipstick guide end into the guide hole of the No.1 oil pan.

(d) Install the dipstick guide with the bolt.
Torque: 15 N·m, (155 kgf·cm, 11 ft·lbf)

(e) Install the dipstick.

9. INSTALL CRANKSHAFT TIMING PULLEY
(See page EM-22)

10. INSTALL NO.1 IDLER PULLEY (See page EM-22)

11. INSTALL NO.2 IDLER PULLEY (See page EM-22)

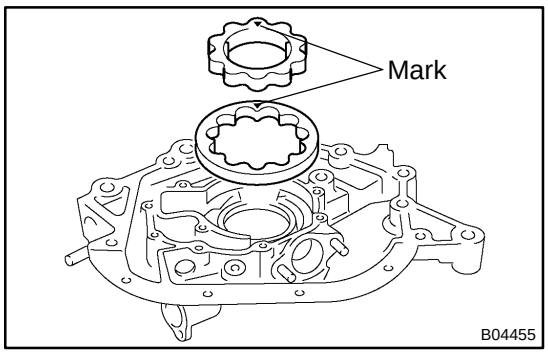
12. INSTALL TIMING BELT (See page EM-22)

13. DISCONNECT ENGINE FROM ENGINE STAND

14. INSTALL ENGINE TO VEHICLE (See page EM-81)

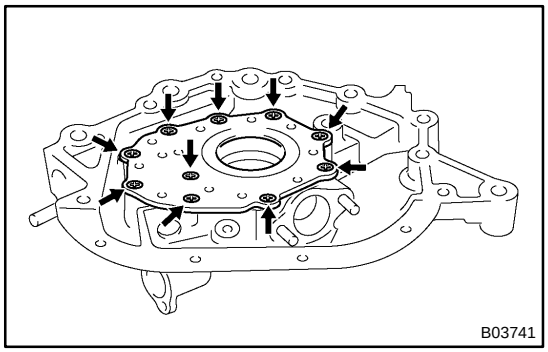
LU08U-05

REASSEMBLY

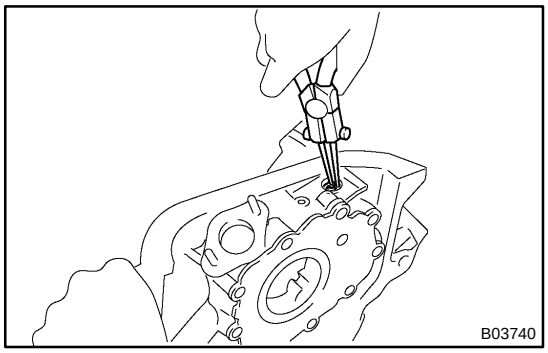


1. INSTALL DRIVE AND DRIVEN ROTORS

(a) Place the drive and driven rotors into pump body with the marks facing the pump body cover side.



(b) Install the pump body cover with the 10 screws.
Torque: 10 N·m (105 kgf·cm, 7 ft·lbf)



2. INSTALL RELIEF VALVE

(a) Insert the relief valve, spring and retainer into the oil pump body hole.

(b) Using snap ring pliers, install the snap ring.

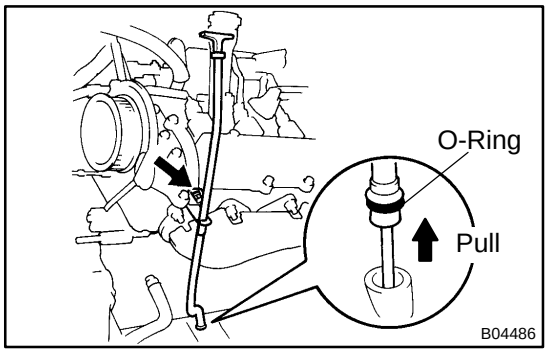
LU08Q-08

REMOVAL

HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **REMOVE ENGINE FROM VEHICLE**
   (See page EM-77)
2. **INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY**
3. **REMOVE TIMING BELT (See page EM-15)**
4. **REMOVE NO.1 IDLER PULLEY (See page EM-15)**
5. **REMOVE NO.2 IDLER PULLEY (See page EM-15)**
6. **REMOVE CRANKSHAFT TIMING PULLEY**
   (See page EM-15)

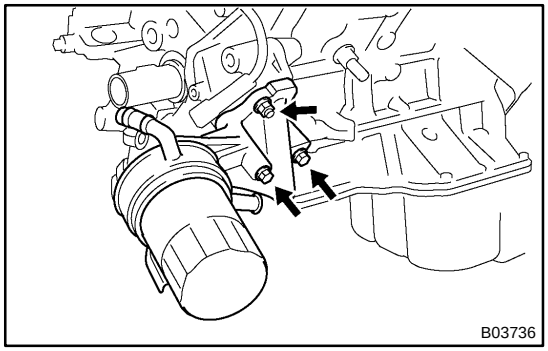


7. **REMOVE OIL DIPSTICK AND GUIDE**

(a) Remove the bolt holding the oil dipstick to the LH cylinder head.

(b) Pull out the dipstick guide together with the dipstick from the No.1 oil pan.

(c) Remove the O-ring from the dipstick guide.



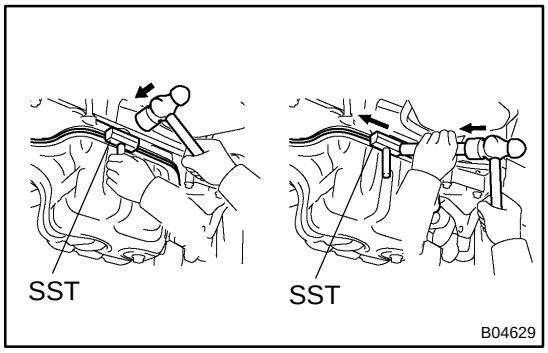
8. **REMOVE OIL FILTER, OIL COOLER AND FILTER BRACKET ASSEMBLY**

(a) Disconnect the oil pressure switch connector.

(b) Remove the 2 bolts, nut, and oil filter, oil cooler and filter bracket assembly.

(c) Remove the gasket from the filter bracket.

9. **REMOVE CRANKSHAFT POSITION SENSOR**
   (See page IG-12)



10. **REMOVE NO.2 OIL PAN**

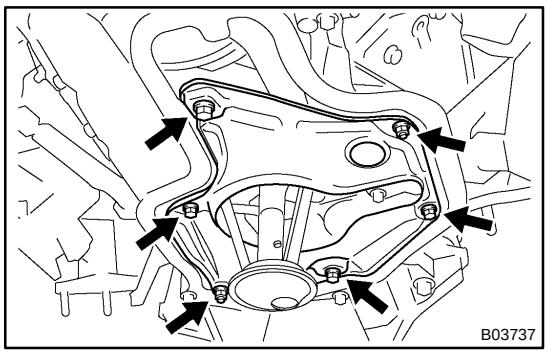
(a) Remove the 20 bolts and 2 nuts.

(b) Insert the blade of SST between the No.1 and No.2 oil pans, cut off applied sealer and remove the No.2 oil pan.
SST 09032-00100

NOTICE:

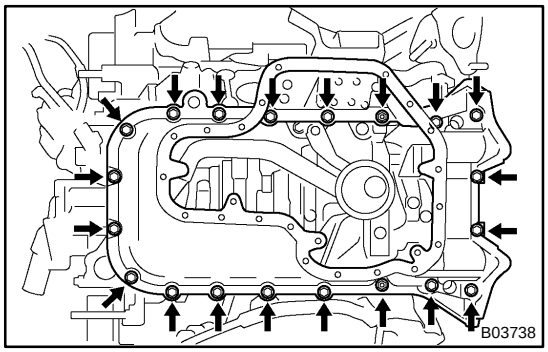
★ **Be careful not to damage the No.2 oil pan contact surface of the No.1 oil pan.**

★ **Be careful not to damage the No.2 oil pan flange.**



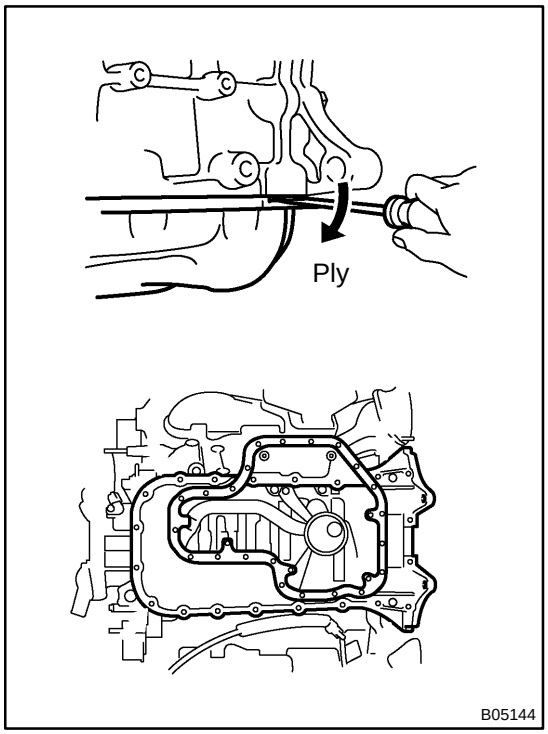
11. REMOVE OIL PAN BAFFLE PLATE

Remove the 4 bolts, 2 nuts and baffle plate.



12. REMOVE NO.1 OIL PAN

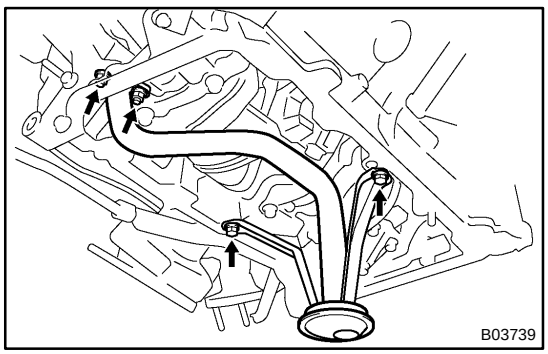
(a) Remove the 18 bolts and 2 nuts.



(b) Using a screwdriver, remove the No.1 oil pan by prying between the oil pan and cylinder block in the sequence shown.

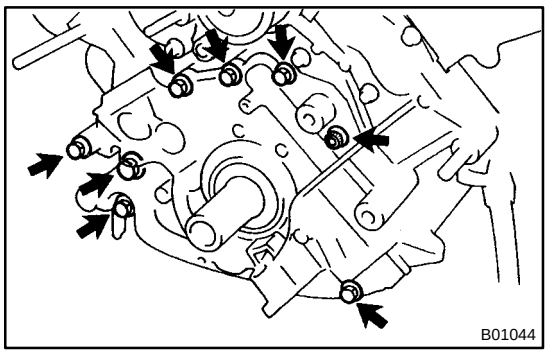
NOTICE:

Be careful not to damage the contact surface of the cylinder block and No.1 oil pan.



13. REMOVE OIL STRAINER

Remove the 2 bolt, 2 nuts, oil strainer and gasket.

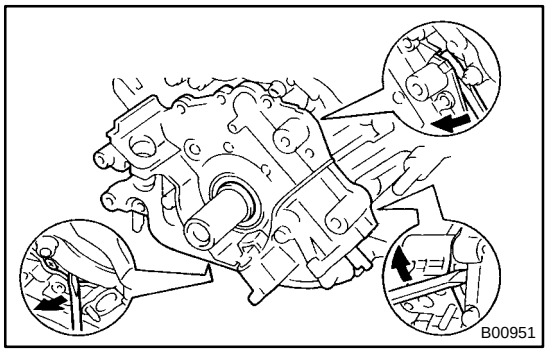


14. REMOVE OIL PUMP

(a) Remove the 8 bolts.

HINT:

Use a 6 mm hexagon wrench for the hexagon head bolt.



(b) Using a screwdriver, remove the oil pump by prying the portions between the oil pump and cylinder block.

NOTICE:

Be careful not to damage the contact surface of the cylinder block and oil pump.

(c) Remove the O-ring from the cylinder block.

LU08T-02

REPLACEMENT

REPLACE CRANKSHAFT FRONT OIL SEAL (See page EM-104)

BODY

MA02V-02

INSPECTION

1. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

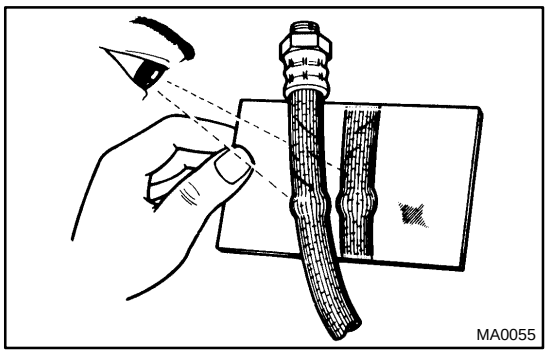
2. FINAL INSPECTION

(a) Check the operation of the body parts:

- Hood:
  - Auxiliary catch operates properly
  - Hood locks securely when closed
- Front and rear doors:
  - Door locks operate properly
  - Doors close properly
- Back door:
  - Door lock operates properly
- Seats:
  - Seat adjusts easily and locks securely in any position
  - Front seat back locks securely in any position
  - Folding-down rear seat backs look securely.

(b) Be sure to deliver a clean car. Especially check:

- Steering wheel
- Shift lever knob
- All switch knobs
- Door handles
- Seats



BRAKE

MA02T-02

INSPECTION

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Check in a well lighted area. Check the entire circumference and length of the brake hoses using a mirror as required. Turn the front wheels fully right or left before checking the front brake.

(a) Check the all brake lines and hoses for damage.
(b) Check the all brake lines and hoses for wear.
(c) Check the all brake lines and hoses for deformation.
(d) Check the all brake lines and hoses for cracks.
(e) Check the all brake lines and hoses for corrosion.
(f) Check the all brake lines and hoses for leaks.
(g) Check the all brake lines and hoses for bends.
(h) Check the all brake lines and hoses for twists.
(i) Check all clamps for tightness and connections for leakage.
(j) Check that the hoses and lines are clear of sharp edges, moving parts and the exhaust system.
(k) Check that the lines installed in grommets pass through the center of the grommets.

2. INSPECT FRONT AND REAR BRAKE PADS AND DISCS

(FRONT PADS: See page BR-16)
(REAR PADS: See page BR-25)
(FRONT DISCS: See page BR-21)
(REAR DISCS: See page BR-30)

3. INSPECT PARKING BRAKE LININGS AND DRUMS

(See page BR-36)

CHASSIS

MA02U-07

INSPECTION

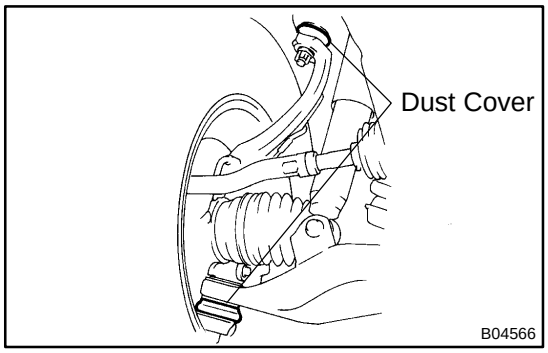
1. INSPECT STEERING LINKAGE

(a) Check the steering linkage for looseness or damage.
(b) Check the tie rod ends do not have excessive play.
(c) Check the dust seals and boots are not damaged.
(d) Check the boot clamps are not loose.
(e) Check the inspect the dust cover for damage.

2. INSPECT SRS AIRBAG (See pages RS-18 , RS-32)

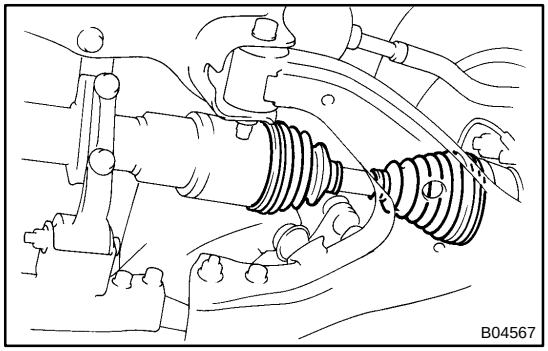
3. INSPECT STEERING GEAR HOUSING OIL

Check the steering gear housing for oil leakage.
If leakage is found, check for cause and repair.



4. INSPECT BALL JOINTS AND DUST COVERS

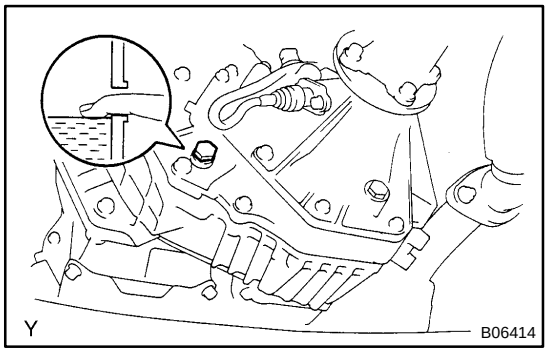
(a) Jack up the front of the vehicle and support it with stands.
(b) Make sure the front wheels are in a straight-ahead position, and depress the brake pedal.
(c) Jack up the lower suspension arm until there is about half a load on the front suspension.
(d) Inspect the dust cover for damage.



5. INSPECT DRIVE SHAFT BOOTS

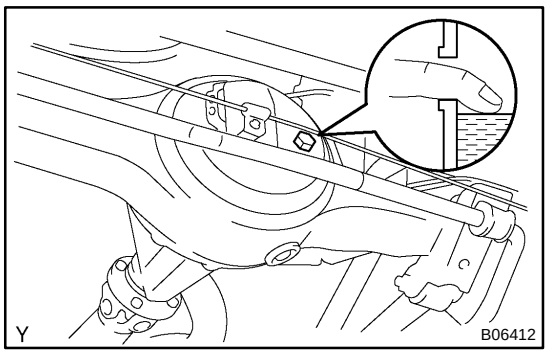
Inspect the drive shaft boots for clamp looseness, grease leakage or damage.

6. INSPECT AUTOMATIC TRANSMISSION OIL LEVEL (See page AT-3-1)



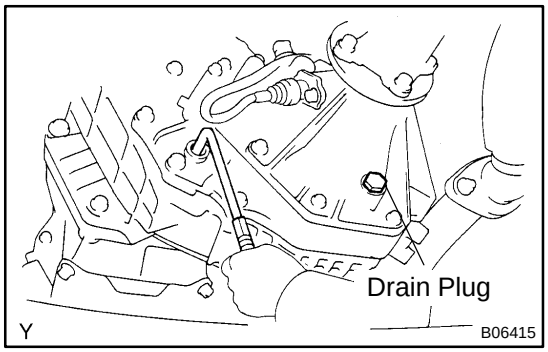
7. INSPECT TRANSFER AND DIFFERENTIAL OIL LEVEL

(a) Transfer:
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.
Transfer oil: See page TR-6

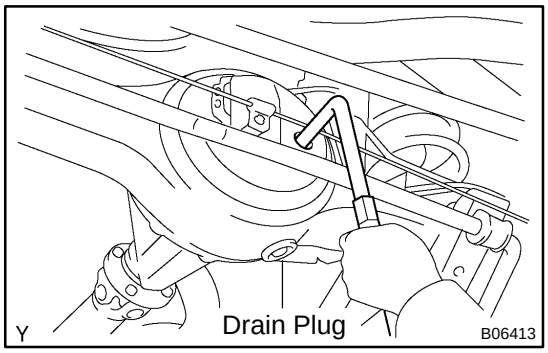


(b) Differential:
Remove the filler plug and feel inside the hole with your finger. Check that the oil comes to within 5 mm (0.20 in.) of the bottom edge of the hole. If the level is low, add oil until it begins to run out of the filler hole.
Front differential oil: See page SA-35
Rear differential oil: See page SA-95

8. REPLACE AUTOMATIC TRANSMISSION FLUID (See page AT-3-1)



9. REPLACE TRANSFER AND DIFFERENTIAL OIL
(a) Remove the drain plug and drain the oil.
(b) Reinstall the drain plug securely.
(c) Add new oil until it begins to run out of the filler hole.
Transfer oil: See page TR-6
Front differential oil: See page SA-35
Rear differential oil: See page SA-95



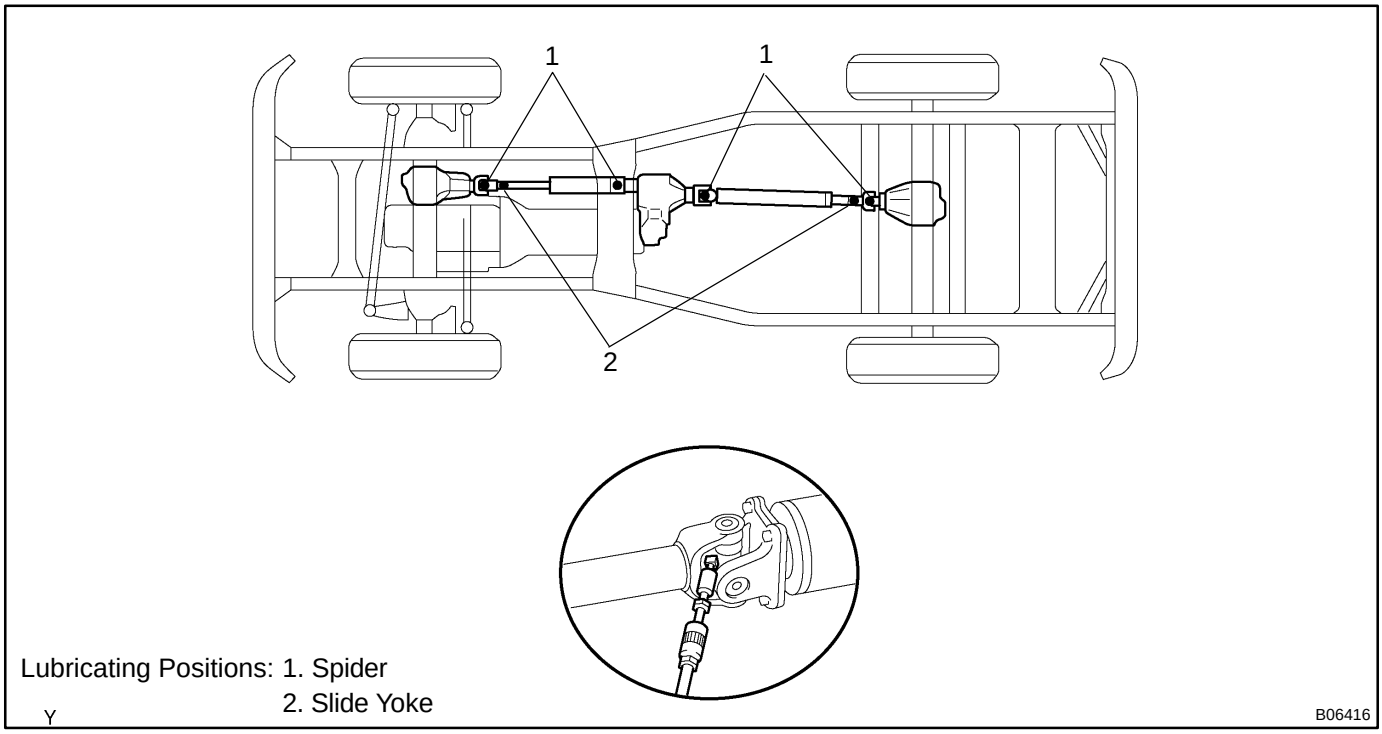
10. REPACK FRONT WHEEL BEARINGS AND DRIVE SHAFT BUSHING GREASE
(a) Change the front wheel bearing grease (See page SA-16).

NOTICE:
Maintenance free for rear wheel bearing.

(b) Repack the drive shaft bushing grease (See page SA-33).

11. LUBRICATE PROPELLER SHAFT AND TIGHTEN BOLTS
(a) Lubricate chassis components, referring to the lubrication chart. Before pumping in grease, wipe off any mud and dust on the grease fitting.

Grease grade:
Lithium base chassis grease (NLGI No.2)



(b) Tightening bolts for propeller shaft (See page PR-7).

ENGINE

MA02S-01

INSPECTION

HINT:

Inspect these items when the engine is cold.

1. **REPLACE TIMING BELT (See page EM-15)**
2. **INSPECT VALVE CLEARANCE (See page EM-4)**
3. **INSPECT DRIVE BELT (See page CH-2)**
4. **REPLACE ENGINE OIL AND OIL FILTER (See page LU-2)**
5. **REPLACE ENGINE COOLANT (See page CO-2)**
6. **INSPECT EXHAUST PIPES AND MOUNTINGS**

Visually inspect the pipes, hangers and connections for severe corrosion, leaks or damage.

7. **REPLACE AIR CLEANER FILTER**

Replace the air cleaner filter with a new one.

8. **INSPECT FUEL LINES, CONNECTIONS AND FUEL VAPOR CONTROL VALVE (See page EC-5)**

Visually inspect the fuel lines for cracks, leakage loose connections, deformation or tank band looseness.

9. **INSPECT GASKET IN FUEL TANK CAP (See page EC-5)**
10. **REPLACE SPARK PLUGS (See page IG-1)**
11. **California, Massachusetts and New York:**
    INSPECT CHARCOAL CANISTER (See page EC-5)

INSIDE VEHICLE

MA02Q-01

GENERAL MAINTENANCE

These are the maintenance and inspection items which are considered to be owner's responsibility. They can be done by the owner or be can have them done at a service shop. These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do. Items and procedures for general maintenance are as follows.

1. GENERAL NOTES

- Maintenance items may very from country and country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service items in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same time interval as before unless otherwise noted.
- Failure to do even one item an cause the engine to run poorly and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights are all working.
(b) Check the headlights aim.

3. WARNING LIGHTS AND BUZZERS

Check that all warning lights and buzzers function properly.

4. HORN

Check that it is working.

5. WINDSHIELD GLASS

Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check operation of the wipers and washer.
(b) Check that the wipers do not streak.

7. WINDSHIELD DEFROSTER

Check that air comes out from the defroster outlet when operating the heater or air conditioner at defroster mode.

8. REAR VIEW MIRROR

Check that it is mounted securely.

9. SUN VISORS

Check that they move freely and mounted securely.

10. STEELING WHEEL

Check that it has the specified freeplay. Be alert for changes in steering condition, such as hard steering, excessive freeplay or strange noises.

11. SEATS

(a) Check that all front seat controls such as seat adjusters, seatback recliner, etc. operate smoothly.
(b) Check that all latches lock securely in any position.
(c) Check that the head restraints move up and down smoothly and that the locks hold securely in any latch position.
(d) For folding-down rear seat backs, check that the latches look securely.

12. SEAT BELTS

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

13. ACCELERATOR PEDAL

Check the pedal for smooth operation and uneven pedal effort or catching.

14. BRAKE PEDAL (See page BR-9)

(a) Check that pedal for smoothly operation.

(b) Check that the pedal has the proper reserve distance and freeplay.

15. BRAKE BOOSTER (See page BR-40)

Check the brake booster function.

16. BRAKES

At a safe place, check that the brakes do not pull to one side when applied.

17. PARKING BRAKE (See page BR-14)

(a) Check that the lever has the proper travel.

(b) On a safe incline, check that the vehicle is held securely with only the parking brake applied.

18. AUTOMATIC TRANSMISSION ”PARK” MECHANISM

(a) Check the lock release button of the selector level for proper and smooth operation.

(b) On a safe incline, check that the vehicle is held securely with the selector lever in the ”P” position and all brakes released.

OUTSIDE VEHICLE

MA02P-02

GENERAL MAINTENANCE

These are some maintenance and inspection items which are considered to be the owner's responsibility. They can be done by the owner or they can have them done at a service shop. These items include those which should be checked on a daily basis, those which, in most cases, do not require (special) tools and those which are considered to be reasonable for the owner to do. Items and procedures for general maintenance are as follows.

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- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance service after the last period should be performed at the same time interval as before unless otherwise noted.
- Failure to do even one item an cause the engine to run poorly and increase exhaust emissions.

2. TIRES

(a) Check the pressure with a gauge. If necessary, adjust.

(b) Check for cuts, damage or excessive wear.

3. WHEEL NUTS

When checking the tires, check the nuts for looseness or for missing nuts. If necessary, tighten them.

4. TIRE ROTATION

Check the owner's manual supplement in which the maintenance schedule is shown.

5. WINDSHIELD WIPER BLADES

Check for wear or cracks whenever they do not wipe clean. If necessary, replace.

6. FLUID LEAKS

(a) Check underneath for leaking fuel, oil, water or other fluid.

(b) If you smell gasoline fumes or notice any leak, have the cause found and corrected.

7. DOORS AND ENGINE HOOD

(a) Check that all doors and the tailgate operate smoothly, and that all larches lock securely.

(b) Check that the engine hood secondary latch secures the hood from opening when the primary latch is released.

UNDER HOOD

MA02R-05

GENERAL MAINTENANCE

1. GENERAL NOTICE

- Maintenance items may vary from country to country. Check the owner's manual supplement in which the maintenance schedule is shown.
- Every service item in the periodic maintenance schedule must be performed.
- Periodic maintenance service must be performed according to whichever interval in the periodic maintenance schedule occurs first, the odometer reading (miles) or the time interval (months).
- Maintenance services after the last period should be performed at the same interval as before unless otherwise noted.
- Failure to do even one item can cause the engine to run poorly and increase exhaust emissions.

2. WINDSHIELD WASHER FLUID

Check that there is sufficient fluid in the tank.

3. ENGINE COOLANT LEVEL

Check that the coolant level is between the LEVEL lines on the see-through reservoir at normal temperature (20˚C (68˚F)).

4. RADIATOR AND HOSES

(a) Check that the front of the radiator is clean and not blocked with leaves, dirt or bugs.
(See page CO-14)

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

5. BATTERY ELECTROLYTE LEVEL

- Check the indicator.
- When the indicator color is blue, the condition is satisfactory. A red color indicates that distilled water must be added, and white indicates that charging is necessary.

6. BRAKE FLUID LEVELS

Check that the brake fluid level is near the upper level line on the see-through reservoir.
(See page BR-4)

7. ENGINE DRIVE BELTS

Check drive belt for fraying, cracks, wear or oiliness.

8. ENGINE OIL LEVEL

Check the level on the dipstick with the engine turned off.

9. POWER STEERING FLUID LEVEL

- Check the level on the dipstick.
- The level should be in the "HOT" or "COLD" range depending on the fluid temperature.

10. AUTOMATIC TRANSMISSION FLUID LEVEL

Visually check the overflow plug and oil pan for fluid leaks or traces of fluid.

11. EXHAUST SYSTEM

Visually inspect for cracks, holes or loose supports.

If any change in the sound of the exhaust or smell of the exhaust fumes is noticed, have the cause located and corrected.

PP1AG-01

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Thermometer	Sernsor
Torque wrench	
Dial indicator	Magnetic clutch
Plastic hammer	Magnetic clutch

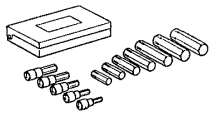
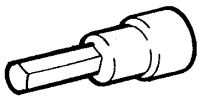
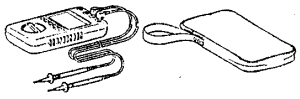
PP1AH-01

LUBRICANT

Item	Capacity	Classification
Compressor oil	-	ND-OIL 8 or equivalent
When replacing condenser	40 cc (1.4 fl. oz.)	
When replacing evaporator	40 cc (1.4 fl. oz.)	

PP1AF-04

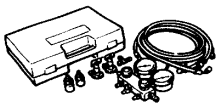
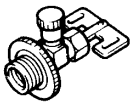
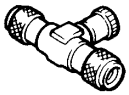
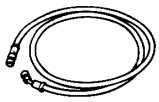
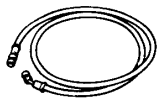
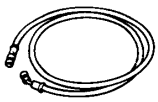
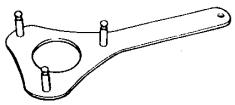
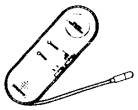
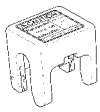
RECOMMENDED TOOLS

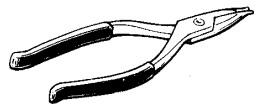
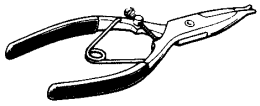
	09040-0001 1	Hexagon Wrench Set .	Expansion valve
	(09043-20050)	Socket Hexagon Wrench 5.	5.0 mm (0.20 in.)
	09082-00040	TOYOTA Electrical Tester.	

AIR CONDITIONING

PP1AE-03

SST (Special Service Tools)

	07110-58060	Air Conditioner Service Tool Set	
	(07117-58060)	Refrigerant Drain Service Valve	
	(07117-58070)	T-Joint	
	(07117-58080)	Quick Disconnect Adapter	High pressure side
	(07117-58090)	Quick Disconnect Adapter	Low pressure side
	(07117-88060)	Refrigerant Charging Hose	High pressure side (Color: Red)
	(07117-88070)	Refrigerant Charging Hose	Low pressure side (Color: Blue)
	(07117-88080)	Refrigerant Charging Hose	Utility (Color: Green)
	07112-66040	Magnetic Clutch Remover	
	07112-76060	Magnetic Clutch Stopper	
	07116-38360	Gas Leak Detector Assembly	
	09870-00015	A/C Quick Joint Puller No.1	Suction tube

	09870-00025	A/C Quick Joint Puller No.2	Liquid tube
	95994-10010	Snap Ring Pliers (DENSO Part No.)	
	95994-10020	Snap Ring Pliers (DENSO Part No.)	

PP1BQ-02

EQUIPMENT

OBD II scan tool	
Torque wrench	
Calipers	Torque converter clutch
Straight edge	Torque converter clutch
Dial indicator	Drive plate runout

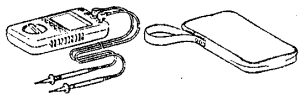
PP1BR-03

LUBRICANT

Item	Capacity	Classification
Automatic transmission fluid		
Dry fill	10.6 liters (11.2 US qts, 9.3 lmp qts)	ATF WS
Drain and refill	3.0 liters (3.2 US qts, 2.6 lmp qts)	

PP1BP-02

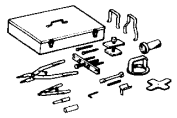
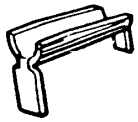
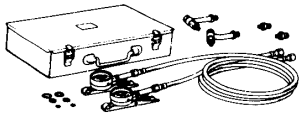
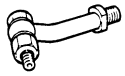
RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	

AUTOMATIC TRANSMISSION

PP3XT-01

SST (Special Service Tools)

	09350-30020	TOYOTA Automatic Transmission Tool Set	
	(09351-32020)	Stator Stopper	
	09992-00095	Automatic Transmission Oil Pressure Gauge Set	
	(09992-00231)	Adaptor C	
	(09992-00271)	Gauge Assy	

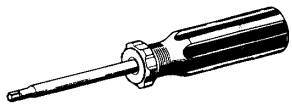
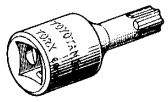
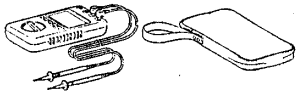
PP0O2-26

EQUIPMENT

Voltmeter	
Ammeter	
Ohmmeter	
Test lead	
Heat light	Seat heater
Hexagon wrench (6 mm)	Power seat
Torque wrench	
Masking tape	Rear window defogger wire
Tin foil	Rear window defogger wire

PP0O1-19

RECOMMENDED TOOLS

	09041-00030	Torx Driver T30 .	For removing and installing steering wheel pad
	09042-00010	Torx Socket T30 .	For removing and installing steering wheel pad
	09082-00040	TOYOTA Electrical Tester.	

BODY ELECTRICAL

PP0O0-18

SST (Special Service Tools)

	09843-18020 Diagnosis Check Wire	

PP0SI-06

EQUIPMENT

Clip remover	
Torque wrench	
Hexagon wrench (6 mm)	
Torx driver	
Hog ring pliers	
Hand riveter	
Tape	To avoid surface damage
Adhesive tape	To avoid surface damage
Double-stick tape	
Adhesive	
Cleaner	
Shop rag	
Knife	
Sealer gun	
Brush	
Putty spatula	
Glass plate or similar object	
Wooden block or similar object	
Heat light	
Piano wire	
Plastic sheet	To avoid surface damage
Tacker	BANZAI 303XT
Tack pin	BANZAI UX-7
Rope (no projections, difficult to break)	Seat belt pretensioner
Tire with disk wheel Width: 185 mm (7.28 in.) Inner diam: 360 mm (14.17 in.)	Seat belt pretensioner
Vinyl bag	Seat belt pretensioner

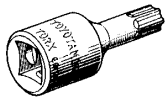
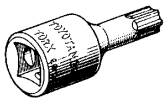
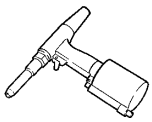
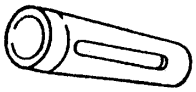
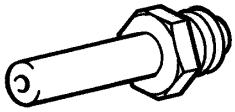
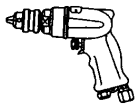
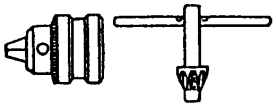
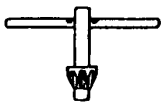
PP0B0-01

LUBRICANT

Item	Capacity	Classification
MP grease	-	-

PP1AO-05

RECOMMENDED TOOLS

	09042-00010	Torx Socket T30 .	
	09042-00020	Torx Socket T40 .	
	09050-20010	Air Riveter.	
	(09050-02010)	Dust Cap.	
	09050-02050	Nose Piece No.4.	
	09050-00032	Air Drill	
	(09050-00210)	Chuck Set	
	(09050-00220)	Handle	
	09060-60350	Revet Cutter.	
	09070-20010	Moulding Remover .	

PP1AP-01

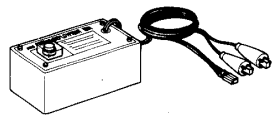
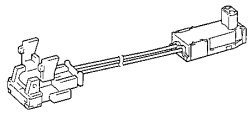
SSM (Special Service Materials)

08833-00030	Three cement black or equivalent	
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08850-00801	Windshield Glass Adhesive Set or equivalent	

BODY

PP0SG-01

SST (Special Service Tools)

	09082-00700	SRS Airbag Deployment Tool	
	09082-00740	Airbag Deployment Wire Sub-harness No.2	
	09812-00010	Door Hinge Set Bolt Wrench	

PP0CJ-04

EQUIPMENT

Torque wrench	
Micrometer	Brake disc
Dial indicator	Brake disc
Brake drum gauge	Brake disc
Brake pedal effort gauge	

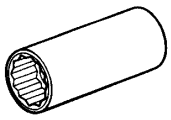
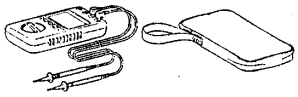
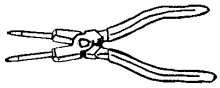
PP0CK-03

LUBRICANT

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

PP2CU-02

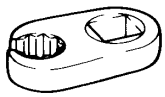
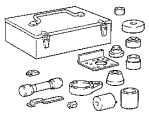
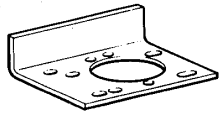
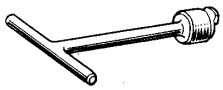
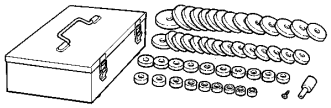
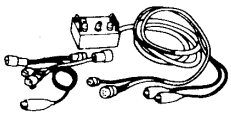
RECOMMENDED TOOLS

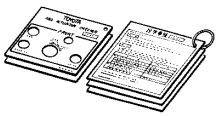
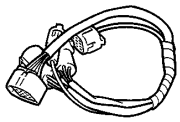
	09017-12301	Deep Socket Wrench 30 mm .	
	09082-00040	TOYOTA Electrical Tester.	
	09905-00013	Snap Ring Pliers .	

BRAKE

PP2AA-02

SST (Special Service Tools)

	09023-00100	Union Nut Wrench 10 mm	
	09318-12010	Transfer Bearing Adjusting Nut Wrench	
	09630-00014	Power Steering Gear Housing Overhaul Tool Set	
	(09631-00142)	Overhaul Stand	
	09709-29018	LSPV Gauge Set	
	09717-20010	Brake Shoe Return Spring Remover	
	09718-20010	Brake Shoe Return Spring Replacer	
	09843-18020	Diagnosis Check Wire	
	09950-60010	Replacer Set	
	(09951-00180)	Replacer 18	
	(09951-00190)	Replacer 19	
	09990-00150	ABS Actuator Checker and Sub-harness	

	09990-00240	ABS Actuator Checker Sheet ”G”	
	09990-00480	ABS Actuator Checker Sub-harness ”S”	

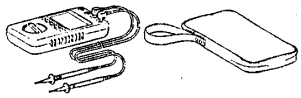
PP1B4-01

EQUIPMENT

Ammeter(A)	
Torque wrench	
Vernier calipers	Rotor (Slip ring)

PP1B3-01

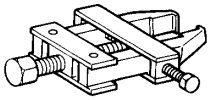
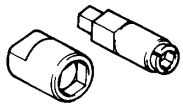
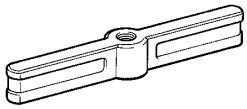
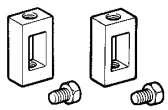
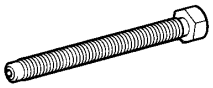
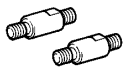
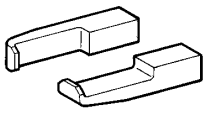
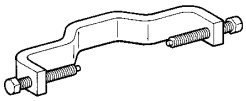
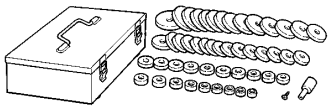
RECOMMENDED TOOLS

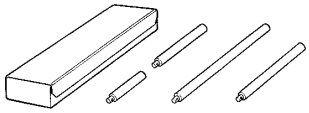
	09082-00040 TOYOTA Electrical Tester.	

CHARGING

PP3Y4-01

SST (Special Service Tools)

	09285-76010	Injection Pump Camshaft Bearing Cone Replacer	
	09820-00021	Alternator Rear Bearing Puller	
	09820-00031	Alternator Rear Bearing Replacer	
	09820-6301 1	Alternator Pulley Set Nut Wrench Set	
	09950-4001 1	Puller B Set	
	(09951-04020)	Hanger 200	
	(09952-04010)	Slide Arm	
	(09953-04020)	Center Bolt 150	
	(09954-04010)	Arm 25	
	(09955-04071)	Claw No.7	
	(09958-0401 1)	Holder	
	09950-60010	Replacer Set	

	(09951-00250) Replacer 25	
	(09951-00470) Replacer 47	
	09950-70010 Handle Set	
	(09951-07100) Handle 100	

PP1AR-01

COOLANT

Item	Capacity	Classification
Engine coolant		TOYOTA LONG LIFE Antifreeze Coolant or equivalent
w/ Front heater	14.8 liters (15.6 US qts, 13.0 lmp. qts)	
w/ Front heater and rear heater	15.3 liters (16.2 US qts, 13.4 lmp qts)	

COOLING

EQUIPMENT

PP1AQ-01

Heater	Thermostat
Radiator cap tester	
Thermometer	Thermostat
Torque wrench	

PP1AS-01

SSM (Special Service Materials)

	08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Water pump Water inlet housing

EMISSION CONTROL

PP1AK-05

EQUIPMENT

Torque wrench	
MITYVAC (Hand-held vacuum pump)	
Vacuum Gauge	
Hose Clipper	

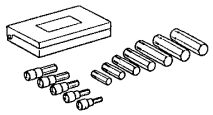
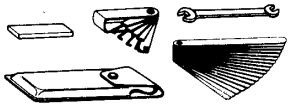
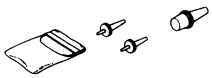
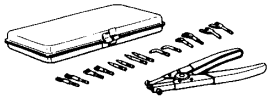
PP1BM-01

EQUIPMENT

Caliper gauge	
CO/HC meter	
Compression gauge	
Connecting rod aligner	
Cylinder gauge	
Dial indicator	
Dye penetrant	
Engine tune-up tester	
Groove cleaning tool	
Heater	
Magnetic finger	
Micrometer	
Pin hole grinder	
OBD II scan tool	
Piston ring compressor	
Piston ring expander	
Plastigage	
Precision straight edge	
Press	
Soft brush	
Ridge reamer	
Solvent	
Spring tester	Valve spring
Steel square	Valve spring
Thermometer	
Torque wrench	
Valve seat cutter	
V-block	
Vernier calipers	
Wire brush	Valve

PP1BL-06

RECOMMENDED TOOLS

	09040-0001 1	Hexagon Wrench Set .	
	09090-04020	Engine Sling Device	For suspension engine
	09200-00010	Engine Adjust Kit .	
	09258-00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.
	09904-00010	Expander Set .	

PP1BN-01

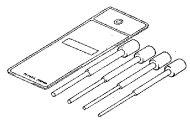
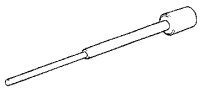
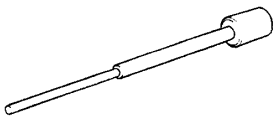
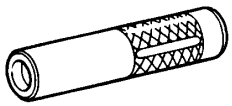
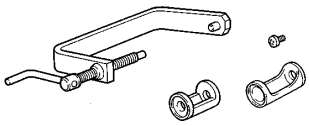
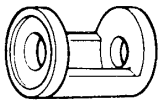
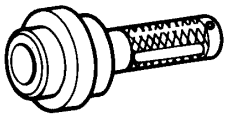
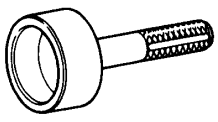
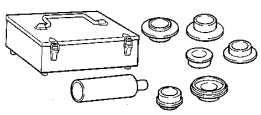
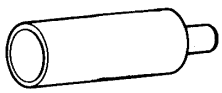
SSM (Special Service Materials)

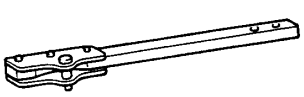
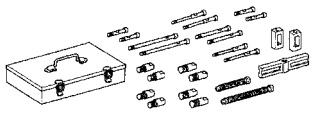
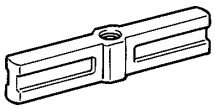
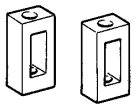
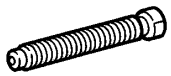
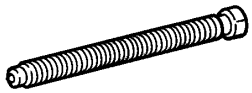
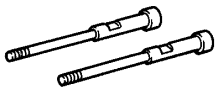
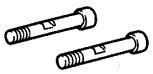
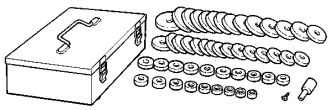
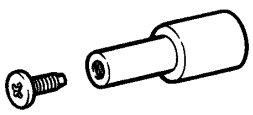
08826-00080	Seal Packing Black or equivalent (FIPG)	Camshaft bearing cap Cylinder head semi-circular plug Cylinder head cover Rear oil sear retainer
08826-00080	Seal Packing Black or equivalent (FIPG)	Camshaft housing plug
08826-00100	Seal Packing 1282B, THREE BOND 1282B or equivalent (FIPG)	Coolant drain union
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	Drive plate bolt Torque converter clutch bolt
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	No.1 idler pulley bolt

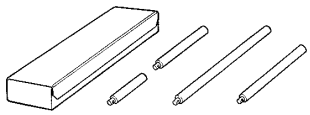
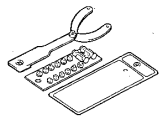
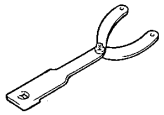
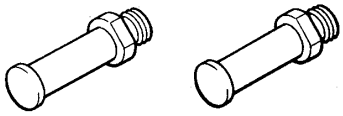
ENGINE MECHANICAL

PP3X6-01

SST (Special Service Tools)

	09201-10000	Valve Guide Bushing Remover & Replacer Set	
	(09201-01060)	Valve Guide Bushing Remover & Replacer 6	
	09201-01055	Valve Guide Bushing Remover & Re placer 5.5	
	09201-41020	Valve Stem Oil Seal Replacer	
	09202-70020	Valve Spring Compressor	
	(09202-00010)	Attachment	
	09213-7001 1	Crankshaft Pully Holding Tool	
	09222-30010	Connecting Rod Bushing Remover & Replacer	
	09223-4601 1	Crankshaft Front Oil Seal Replacer	Crankshaft pulley Crankshaft timing pulley
	09223-56010	Crankshaft Rear Oil Seal Replacer	
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Crankshaft front oil seal

	09330-00021	Companion Flange Holding Tool	Crankshaft pulley
	09843-18020	Diagnosis Check Wire	
	09950-50013	Puller C Set	
	(09951-05010)	Hanger 150	Crankshaft pulley Crankshaft timing pulley
	(09952-05010)	Slide Arm	Crankshaft pulley Crankshaft timing pulley
	(09953-05010)	Center Bolt 100	Crankshaft pulley Crankshaft timing pulley
	(09953-05020)	Center Bolt 150	Crankshaft pulley Crankshaft timing pulley
	(09954-0501 1)	Claw No.1	Crankshaft timing pulley
	(09954-05021)	Claw No.2	Crankshaft pulley
	09950-60010	Replacer Set	
	(09951-00240)	Replacer 24	
	(09951-00440)	Replacer 44	
	(09952-06010)	Adapter	

	09950-70010	Handle Set	
	(09951-07100)	Handle 100	Spark plug tube Valve guide bushing
	09960-10010	Variable Pin Wrench Set	
	(09962-01000)	Variable Pin Wrench Arm Assy	Camshaft sub-gear
	(09963-01000)	Pin 10	Camshaft sub-gear
	(09963-00500)	Pin 5	Camshaft sub-gear

PP1AM-01

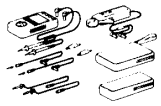
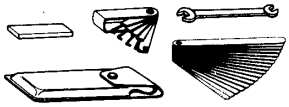
EQUIPMENT

Megger (Insulation resistance meter)	Spark plug
Spark plug cleaner	
Torque wrench	

IGNITION

PP1AL-01

RECOMMENDED TOOLS

	09082-00050	TOYOTA Electrical Tester Set.	
	09200-00010	Engine Adjust Kit .	

PP1AV-01

EQUIPMENT

Oil pressure gauge	
Precision straight edge	
Torque wrench	

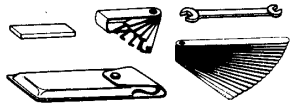
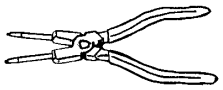
PP1AW-07

LUBRICANT

Item	Capacity	Classification
Engine oil		
Dry fill	8.0 liters (8.5 US qts, 7.0 Imp. qts)	API grade SL Energy-Conserving or ILSAC multigrade engine oil.
Drain and refill		
w/ Oil filter change	6.8 liters (7.2 US qts, 6.0 Imp. qts)	
w/o Oil filter change	6.4 liters (6.8 US qts, 5.6 Imp qts)	

PP1AU-05

RECOMMENDED TOOLS

	09200-00010	Engine Adjust Kit .	
	09905-00013	Snap Ring Pliers .	

PP1AX-01

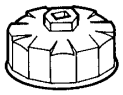
SSM (Special Service Materials)

	08826-00080	Seal Packing Black or equivalent (FIPG)	Oil pump No.1 oil pan No.2 oil pan
	08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Oil pressure switch

LUBRICATION

PP1AT-02

SST (Special Service Tools)

	09032-00100 Oil Pan Seal Cutter	
	09228-07501 Oil Filter Wrench	

MAINTENANCE

EQUIPMENT

PP1AY-01

Mirror	Brake hose

PP19M-02

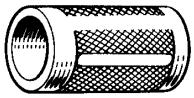
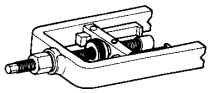
EQUIPMENT

Torque wrench	
Dial indicator	

PROPELLER SHAFT

PP19L-02

SST (Special Service Tools)

	09636-20010	Upper Ball Joint Dust Cover Replacer	
	09332-25010	Universal Joint Bearing Remover & Replacer	

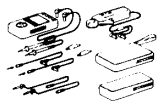
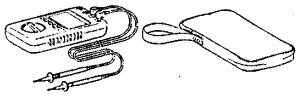
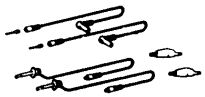
PP0MS-13

EQUIPMENT

Torque wrench	
Bolt: Length: 35 mm (1.387 in.) Pitch: 1.0 mm (0.039 in.) Diam.: 6.0 mm (0.236 in.)	Airbag disposal
Tire Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Tire with disc wheel Width: 185 mm (7.28 in.) Inner diam.: 360 mm (14.17 in.)	Airbag disposal
Plastic bag	Airbag disposal

PP3X8-01

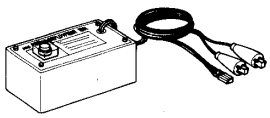
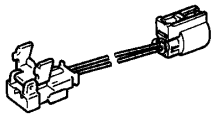
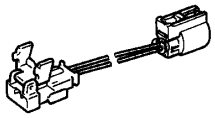
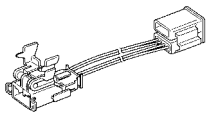
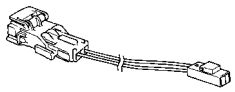
RECOMMENDED TOOLS

	09082-00050	TOYOTA Electrical Tester Set.	
	09082-00040	TOYOTA Electrical Tester.	
	(09083-00150)	Test Lead Set	Seat belt pretensioner connector

SUPPLEMENTAL RESTRAINT SYSTEM

PP3X7-01

SST (Special Service Tools)

	09082-00700	SRS Airbag Deployment Tool	
	09082-00750	Airbag Deployment Wire Sub-harness No.3	
	09082-00760	Airbag Deployment Wire Sub-harness No.4	
	09082-00780	Airbag Deployment Wire Sub-Harness No.6	
	09082-00802	Airbag Deployment Wire Sub-Harness No.8	
	(09082-10801)	Wire A	
	(09082-30801)	Wire C	
	09843-18040	Diagnosis Check Wire No.2	

PP1BC-03

EQUIPMENT

Dial indicator with magnetic base	
Drill	
Micrometer	
Torque wrench	
Vernier calipers	

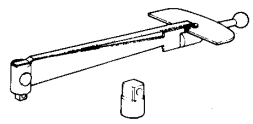
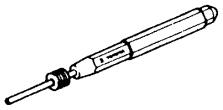
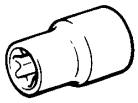
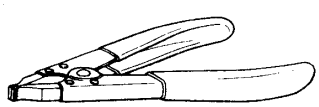
PP1BD-03

LUBRICANT

FRONT DRIVE SHAFT		
Item	Capacity	Classification
Outboard joint grease Inboard joint grease	368 - 378 g (13.0 - 13.3 oz.) 293 - 303 g (10.3 - 10.7 oz.)	
FRONT DIFFERENTIAL		
Item	Capacity	Classification
Hypoid gear oil	1.70 liters (1.80 US qts, 1.50 lmp.qts)	Hypoid gear oil API GL-5 Above -18 ˚C (0˚F) SAE 90 Below -18 ˚C (0˚F) SAE 80W-90 or 80W
REAR DIFFERENTIAL		
Item	Capacity	Classification
Hypoid gear oil Normal w/ Diff. lock	3.30 liters (3.49 US qts, 2.90 lmp.qts) 3.20 liters (3.38 US qts, 2.82 lmp.qts)	Hypoid gear oil API GL-5 Above -18 ˚C (0˚F) SAE 90 Below -18 ˚C (0˚F) SAE 80W-90 or 80W
Hypoid gear oil LSD w/ LSD	3.30 liters (3.49 US qts, 2.90 lmp.qts)	Hypoid gear oil LSD API GL-5 Above -18 ˚C (0˚F) SAE 90 Below -18 ˚C (0˚F) SAE 80W-90 or 80W

PP1BB-03

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	
	09031-00030	Pin Punch .	
	09044-00020	Torx Socket E10 .	
	09905-00012	Snap Ring No.1 Expander .	

PP1BE-01

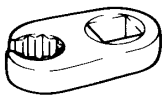
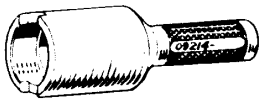
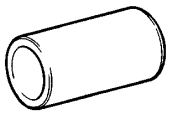
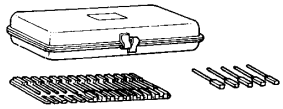
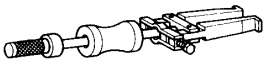
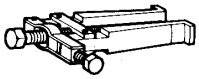
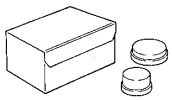
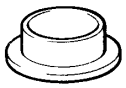
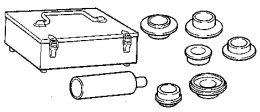
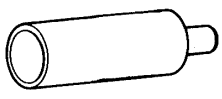
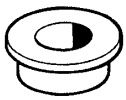
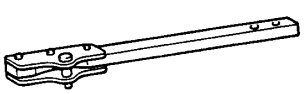
SSM (Special Service Materials)

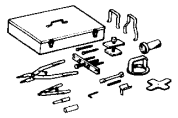
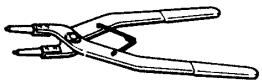
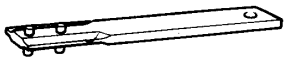
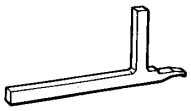
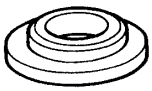
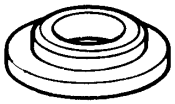
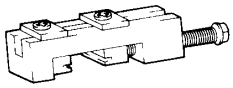
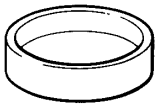
08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	
08833-00070	Adhesive 1324, THREE BOND 1324 or equivalent	
08833-00100	THREE BOND 1360K or equivalent	

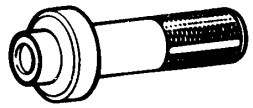
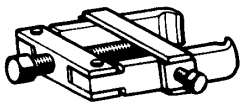
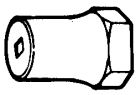
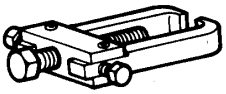
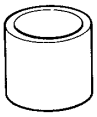
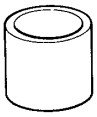
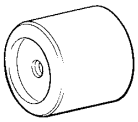
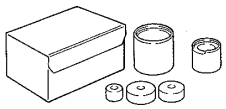
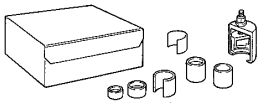
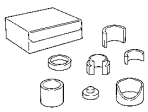
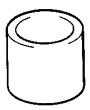
SUSPENSION AND AXLE

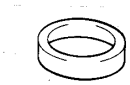
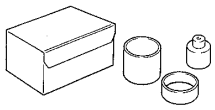
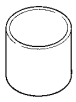
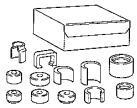
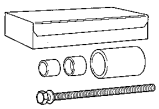
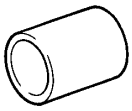
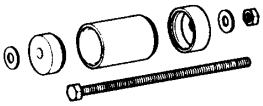
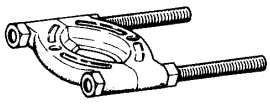
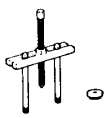
PP1VL-03

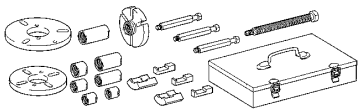
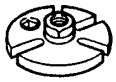
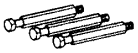
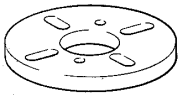
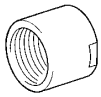
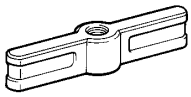
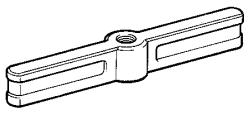
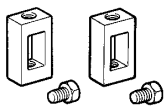
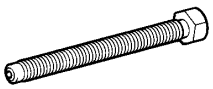
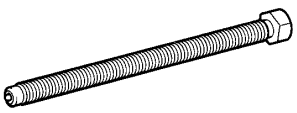
SST (Special Service Tools)

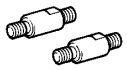
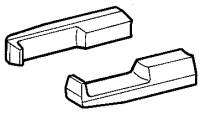
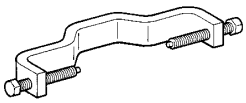
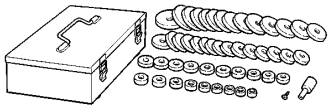
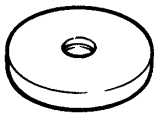
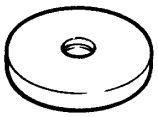
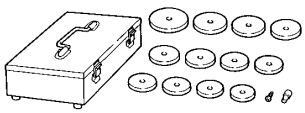
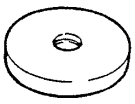
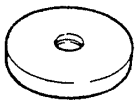
	09023-00100	Union Nut Wrench 10 mm	Rear axle Rear differential
	09214-7601 1	Crankshaft Pulley Replacer	Rear differential
	09223-00010	Cover & Seal Replacer	Front differential
	09240-00020	Wire Gauge Set	Front drive shaft
	09308-00010	Oil Seal Puller	Front differential Rear axle Rear differential
	09308-10010	Oil Seal Puller	Front differential Rear differential
	09315-00022	Clutch Release Bearing Remover & Replacer	Front differential
	09316-2001 1	Transfer Bearing Replacer	Front drive shaft Front suspension
	09316-6001 1	Transmission & Transfer Bearing Replacer	Front differential Rear differential
	(09316-0001 1)	Replacer Pipe	
	(09316-00021)	Replacer "A"	
	09330-00021	Companion Flange Holding Tool	Front differential Rear differential

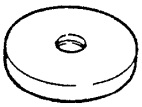
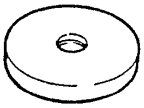
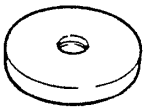
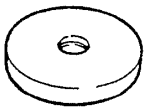
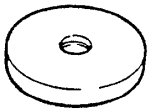
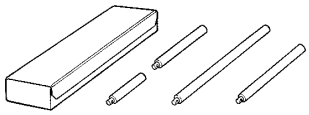
	09350-30020	TOYOTA Automatic Transmission Tool Set	Front differential
	(09350-07060)	No.1 Snap Ring Expander	
	09502-12010	Differential Bearing Replacer	Front differential
	09504-0001 1	Differential Side Bearing Adjusting Nut Wrench	Rear differential
	09504-22012	Differential Side Bearing Replacer	Front differential Rear differential (w/ Diff. lock)
	09506-30012	Differential Drive Pinion Rear Bearing Cone Replacer	Front differential
	09506-35010	Differential Drive Pinion Rear Bearing Replacer	Front differential Rear differential
	09521-24010	Drive Shaft Boot Clamping Tool	Front drive shaft
	09521-2501 1	Rear Axle Shaft Puller	Rear axle
	09521-25021	Rear Axle Shaft Puller Attachment	Rear axle
	09527-1701 1	Rear Axle Shaft Bearing Remover	Front suspension
	09550-00032	Replacer	Front differential
	09550-60010	Differential Side Bearing Replacer	Rear differential (w/ Diff. lock)

	09554-3001 1	Differential Oil Seal Replacer	Front differential
	09556-22010	Drive Pinion Front Bearing Remover	Front differential Rear differential
	09607-60020	Front Wheel Adjusting Nut Wrench	Front axle
	09628-6201 1	Ball Joint Puller	Front axle Front drive shaft Front suspension
	09631-12090	Seal Ring Tool	Rear axle
	09631-32020	Seal Ring Tool	Front suspension
	09649-17010	Steering Knuckle Tool	Rear differential (w/ LSD)
	09710-14013	Rear Suspension Bushing Tool Set	Rear suspension
	(09710-00061)	Replacer	
	09710-22021	Front Suspension Bushing Tool Set	Front suspension
	(09710-01071)	Lower Arm Bushing Remover	
	09710-28012	Front Suspension Bushing Tool Set	Front suspension Rear suspension
	(09710-07031)	Bushing Replacer	

	(09710-07062)	Bushing Replacer	
	09710-28021	Front Suspension Bushing Tool Set	Front suspension
	(09710-08031)	Base	
	09710-30021	Suspension Bushing Tool Set	Front suspension
	(09710-03101)	Bushing Replacer	
	09710-30050	Suspension Arm Bushing Replacer	Rear differential
	09726-3501 1	Front Lower Arm Bushing Remover & Replacer	Front suspension
	(09726-05021)	Gate	
	09726-36010	Lower Control Arm Bushing Replacer	Front suspension
	09726-40010	Lower Control Shaft Bearing Replacer	Rear differential
	09830-36010	Front Mounting Cushion Remover & Replacer	Front suspension
	09950-00020	Bearing Remover	Front drive shaft Front differential Front suspension Rear differential
	09950-00030	Bearing Remover Attachment	Front suspension Rear differential

	09950-30012	Puller A Set	Front differential Rear differential
	(09951-03010)	Upper Plate	
	(09953-03010)	Center Bolt	
	(09954-03010)	Arm	
	(09955-03030)	Lower Plate 130	
	(09956-03020)	Adapter 18	
	(09956-03040)	Adapter 22	
	09950-4001 1	Puller B Set	Front suspension Front differential Rear differential
	(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	
	(09957-04010)	Attachment	
	(09958-0401 1)	Holder	
	09950-60010	Replacer Set	Front axle Rear differential
	(09951-00400)	Replacer 40	
	(09951-00410)	Replacer 41	
	(09951-00480)	Replacer 48	
	(09951-00540)	Replacer 54	
	(09951-00580)	Replacer 58	
	09950-60020	Replacer Set No.2	Front axle Front differential Rear axle Rear differential
	(09951-00710)	Replacer 71	
	(09951-00730)	Replacer 73	

	(09951-00780) Replacer 78	
	(09951-00810) Replacer 81	
	(09951-00890) Replacer 89	
	(09951-00910) Replacer 91	
	(09951-01030) Replacer 103	
	09950-70010 Handle Set	Front axle Front and rear differential Front and rear suspension Rear axle
	(09951-07100) Handle 100	
	(09951-07150) Handle 150	

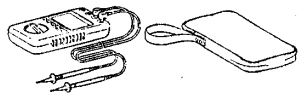
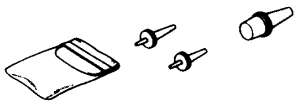
PP0NI-02

EQUIPMENT

Graduated cylinder	Injector
OBD II scan tool	
Sound scope	Injector
Torque wrench	
Vacuum gauge	

PP0U4-02

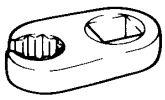
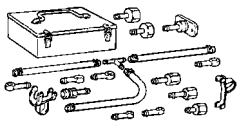
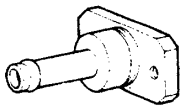
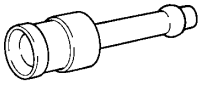
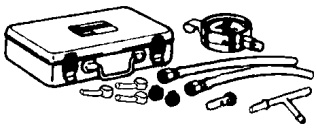
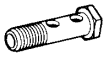
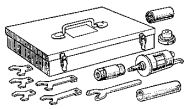
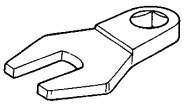
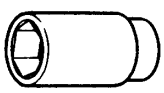
RECOMMENDED TOOLS

	09082-00040	TOYOTA Electrical Tester.	
	09258-00030	Hose Plug Set .	Plug for vacuum hose, fuel hose etc.

SFI

SST (Special Service Tools)

PP0U3-05

	09023-12700	Union Nut Wrench 17mm	Fuel line flare nut
	09268-41047	Injection Measuring Tool Set	
	(09268-41091)	NO.7 Union	
	(09268-41 110)	Adaptor	
	(09268-41300)	Clamp	
	09268-45014	EFI Fuel Pressure Gauge	
	(09268-41 190)	Adaptor	
	(90405-06167)	I Union	
	09612-24014	Steering Gear Housing Overhaul Tool Set	
	(09617-2401 1)	Steering Rack Wrench	Fuel pressure pulsation damper
	09816-30010	Oil Pressure Switch Socket	Knock sensor
	09842-30070	Wiring "F" EFI Inspection	

PP1B7-04

EQUIPMENT

Caliper gauge	PS vane pump
Vernier Calipers	PS vane pump
Dial indicator	PS gear
Feeler gauge	PS vane pump
Micrometer	PS vane pump
Torque wrench	

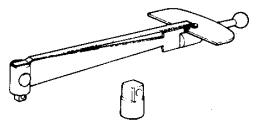
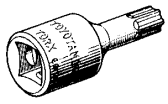
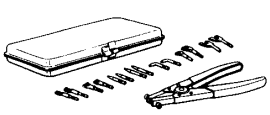
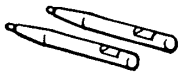
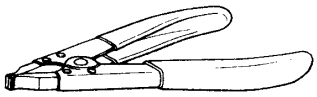
PP1B8-04

LUBRICANT

Item	Capacity	Classification
Power steering fluid Total	0.8 liters (0.9 US qts, 0.7 lmp.qts)	ATF DEXRON® II or III

PP1B6-05

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	PS vane pump PS gear
	09042-00010	Torx Socket T30 .	Tilt steering column Power tilt and power telescopic steering column
	09904-00010	Expander Set .	
	(09904-00050)	No. 4 Claw	
	09905-00012	Snap Ring No.1 Expander .	

PP1B9-04

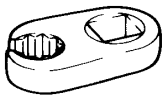
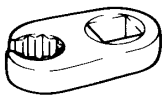
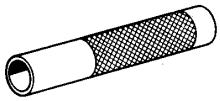
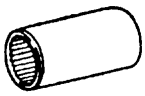
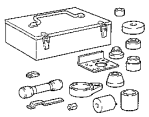
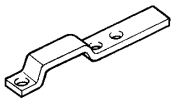
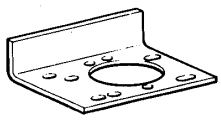
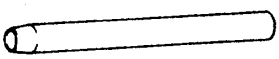
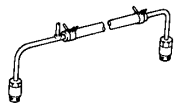
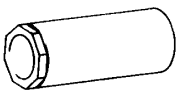
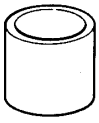
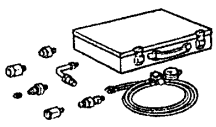
SSM (Special Service Materials)

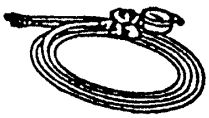
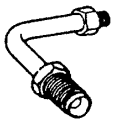
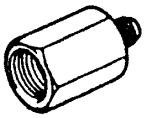
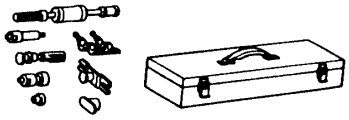
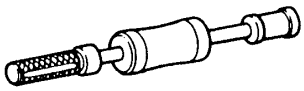
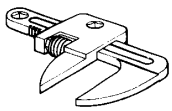
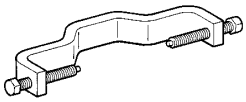
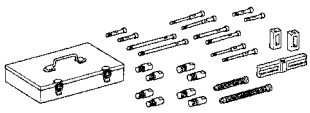
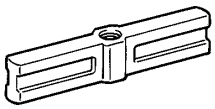
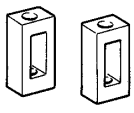
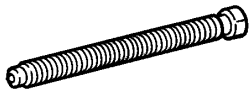
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	PS gear

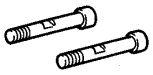
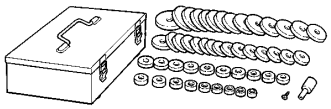
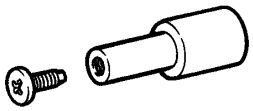
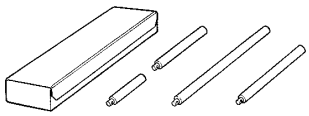
STEERING

PP3X9-01

SST (Special Service Tools)

	09023-38200	Union Nut Wrench 12mm	POWER STEERING GEAR
	09023-38400	Union Nut Wrench 14mm	POWER STEERING GEAR
	09612-2201 1	Tilt Handle Bearing Replacer	TILT STEERING COLUMN
	09616-0001 1	Steering Worm Bearing Adjusting Socket	POWER STEERING GEAR
	09630-00014	Power Steering Gear Housing Overhaul Tool Set	POWER STEERING GEAR POWER STEERING VANE PUMP
	(09631-00132)	Vane Pump Bracket	POWER STEERING VANE PUMP
	(09631-00142)	Overhaul Stand	POWER STEERING GEAR
	09631-00350	Steering Rack Cover 35	POWER STEERING GEAR
	09631-12071	Steering Rack Oil Seal Test Tool	POWER STEERING GEAR
	09631-20060	Bearing Guide Nut Wrench	POWER STEERING GEAR
	09631-20081	Seal Ring Tool	POWER STEERING GEAR
	09640-10010	Power Steering Pressure Gauge Set	POWER STEERING FLUID

	(09641-01010)	Gauge Assy	POWER STEERING FLUID
	(09641-01030)	Attachment B	POWER STEERING FLUID
	(09641-01060)	Attachment E	POWER STEERING FLUID
	09910-00015	Puller Set	POWER TILT AND POWER TELESCOPIC STEERING COLUMN
	(09911-0001 1)	Puller Clamp	POWER TILT AND POWER TELESCOPIC STEERING COLUMN
	(09912-00010)	Puller Slide Hammer	POWER TILT AND POWER TELESCOPIC STEERING COLUMN
	09922-10010	Variable Open Wrench	POWER STEERING GEAR
	09950-4001 1	Puller B Set	POWER TILT AND POWER TELESCOPIC STEERING COLUMN TILT STEERING COLUMN
	(09958-0401 1)	Holder	POWER TILT AND POWER TELESCOPIC STEERING COLUMN TILT STEERING COLUMN
	09950-50013	Puller C Set	TILT STEERING COLUMN
	(09951-05010)	Hanger 150	TILT STEERING COLUMN
	(09952-05010)	Slide Arm	TILT STEERING COLUMN
	(09953-05020)	Center Bolt 150	TILT STEERING COLUMN

	(09954-05021)	Claw No.2	TILT STEERING COLUMN
	09950-60010	Replacer Set	POWER STEERING GEAR POWER STEERING VANE PUMP
	(09951-00180)	Replacer 18	POWER STEERING GEAR
	(09951-00260)	Replacer 26	POWER STEERING GEAR
	(09951-00280)	Replacer 28	POWER STEERING GEAR POWER STEERING VANE PUMP
	(09951-00320)	Replacer 32	POWER STEERING GEAR
	(09951-00330)	Replacer 33	POWER STEERING GEAR
	(09951-00360)	Replacer 36	POWER STEERING GEAR
	(09952-06010)	Adapter	POWER STEERING GEAR
	09950-70010	Handle Set	POWER STEERING GEAR POWER STEERING VANE PUMP
	(09951-07100)	Handle 100	POWER STEERING GEAR POWER STEERING VANE PUMP

	(09951-07150) Handle 150	POWER STEERING GEAR
	(09951-07200) Handle 200	POWER STEERING GEAR

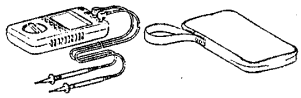
PP1B1-01

EQUIPMENT

Dial indicator	Commutator
Magnetic finger	Steel ball
Pull scale	Brush spring
Sandpaper	Commutator
Torque wrench	
V-block	Commutator
Vernier calipers	Commutator, Brush

PP1B0-01

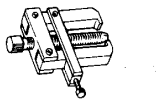
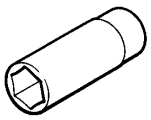
RECOMMENDED TOOLS

	09082-00040 TOYOTA Electrical Tester.	

STARTING

PP1AZ-06

SST (Special Service Tools)

	09286-4601 1	Injection Pump Spline Shaft Puller	Armature front bearing
	09810-38140	Starter Magnet Switch Nut Wrench 14	
	09820-00031	Alternator Rear Bearing Replacer	Armature bearing

PP1BH-03

EQUIPMENT

Dial indicator	Cylinder gauge
Straight edge	
Torque wrench	
Magnetic finger	
Feeler gauge	
Vernier calipers	
Micrometer	

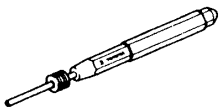
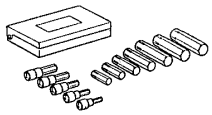
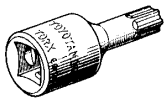
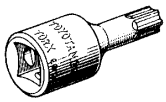
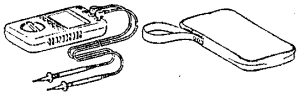
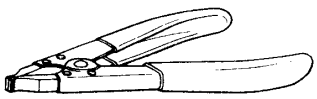
PP1BI-03

LUBRICANT

Item	Capacity	Classification
Transfer oil	1.3 liters (1.4 US qts, 1.1 lmp. qts)	API GL-4 or GL-5 SAE 75W-90

PP1BG-04

RECOMMENDED TOOLS

	09031-00030	Pin Punch .	
	09040-0001 1	Hexagon Wrench Set .	
	09042-00010	Torx Socket T30 .	
	09042-00020	Torx Socket T40 .	
	09082-00040	TOYOTA Electrical Tester.	
	09905-00012	Snap Ring No.1 Expander .	

PP1BJ-03

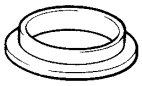
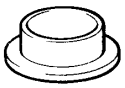
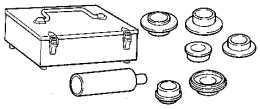
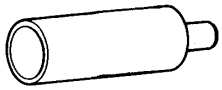
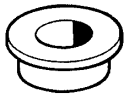
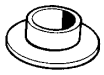
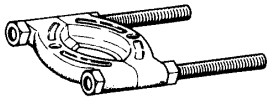
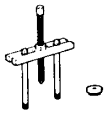
SSM (Special Service Materials)

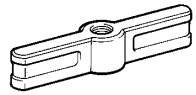
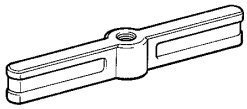
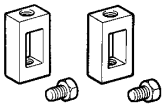
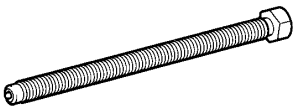
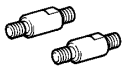
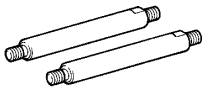
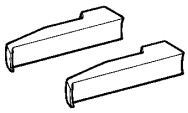
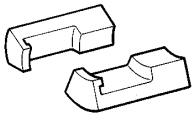
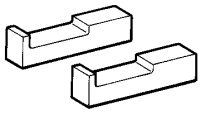
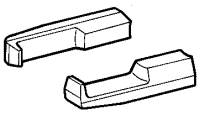
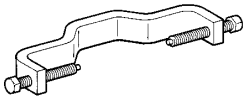
08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)	Front case x Rear case Rear case x Case cover Case x Extension housing Motor actuator x Front case
08833-00080	Adhesive 1344 THREE BOND 1344 LOCTITE 242 or equivalent	Straight Screw plug Case cover set bolt Rear case set bolt

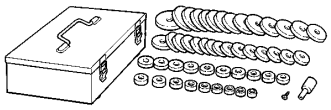
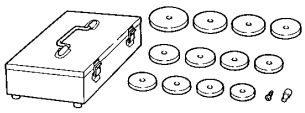
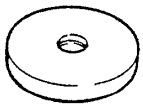
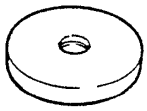
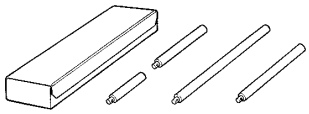
TRANSFER

PP1YS-02

SST (Special Service Tools)

	09316-12010	Transfer Bearing Replacer	Center differential
	09316-2001 1	Transfer Bearing Replacer	Front extension housing, Rear extension housing
	09316-6001 1	Transmission & Transfer Bearing Replacer	
	(09316-0001 1)	Replacer Pipe	Front extension housing, Rear extension housing, Idler gear, Transfer assembly, Center differential, Input shaft
	(09316-00021)	Replacer ”A”	Rear extension housing
	(09316-00031)	Replacer ”B”	Frant extension housing, Rear extension housing, Idler gear, Transfer assembly, Input shaft
	(09316-00041)	Replacer ”C”	Front extension housing, Rear extension housing
	(09316-00061)	Replacer ”E”	Front extension housing
	(09316-00071)	Replacer ”F”	Idler gear, Front extension housing
	09325-12010	Transmission Oil Plug	Rear extension housing
	09950-00020	Bearing Remover	Idler gear, Center differential
	09950-00030	Bearing Remover Attachment	Center differential

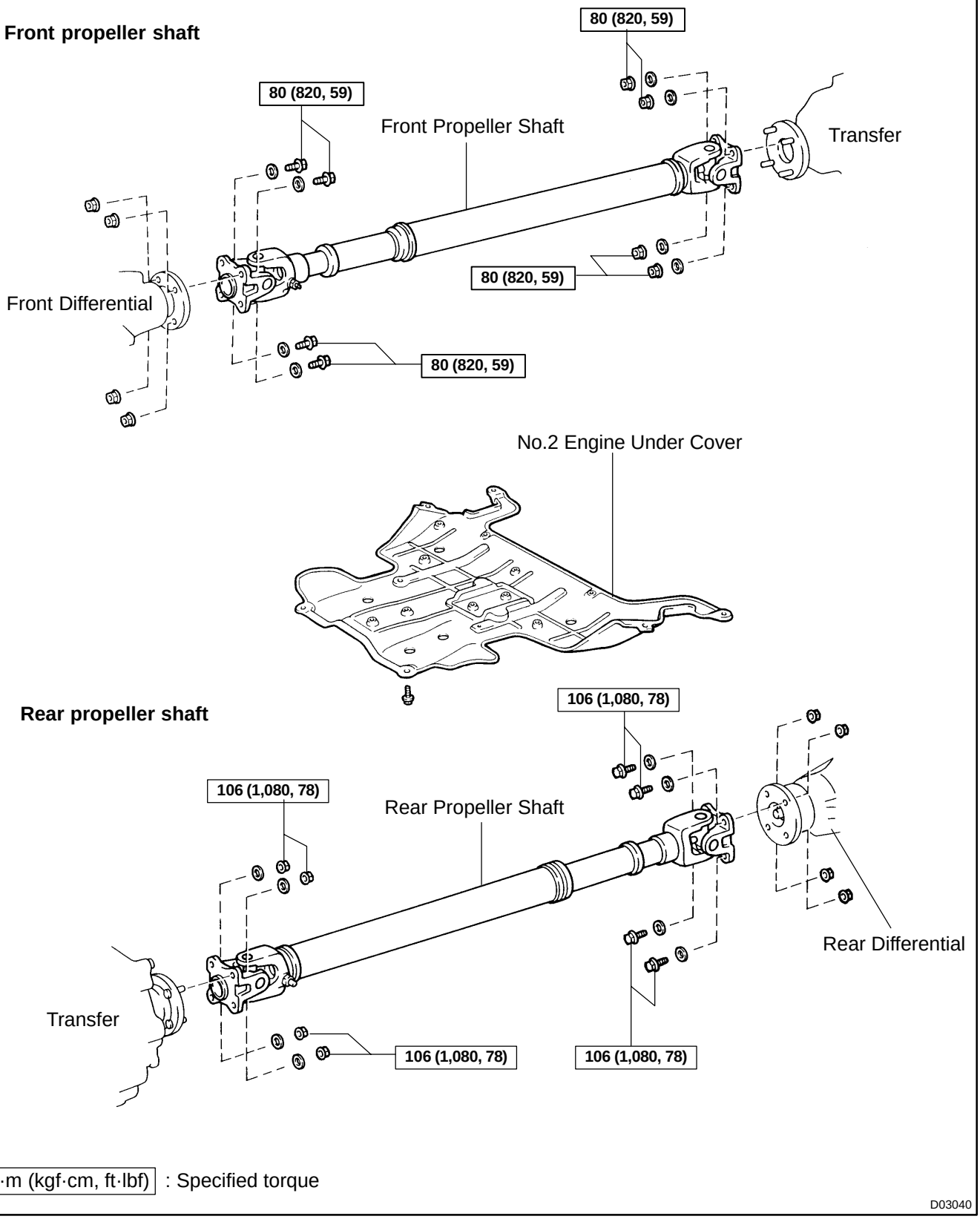
	09950-4001 1	Puller B Set	
	(09951-04010)	Hanger 150	Idler gear
	(09951-04020)	Hanger 200	Input shaft, Front extension housing, Transfer assembly
	(09952-04010)	Slide Arm	Input shaft, Idler gear, Front extension housing, Transfer assembly
	(09953-04030)	Center Bolt 200	Input shaft, Idler gear, Front extension housing, Transfer assembly
	(09954-04010)	Arm 25	Input shaft, Front extension housing, Transfer assembly, Idler gear
	(09954-04020)	Arm 100	Front extension housing
	(09955-0401 1)	Claw No.1	Input shaft
	(09955-04021)	Claw No.2	Front extension housing
	(09955-04051)	Claw No.5	Front extension housing
	(09955-04061)	Claw No.6	Idler gear, Transfer assembly
	(09957-04010)	Attachment	Input shaft, Idler gear, Front extension housing, Transfer assembly
	(09958-0401 1)	Holder	Input shaft, Idler gear, Front extension housing

	09950-60010	Replacer Set	
	(09951-00270)	Replacer 27	Transfer assembly
	(09951-00320)	Replacer 32	Transfer assembly, Center differential
	(09951-00330)	Replacer 33	Idler gear
	(09951-00400)	Replacer 40	Input shaft
	09950-60020	Replacer Set No.2	
	(09951-00790)	Replacer 79	Transfer assembly
	(09951-00890)	Replacer 89	Transfer assembly
	09950-70010	Handle Set	Transfer assembly, Center differential
	(09951-07150)	Handle 150	Transfer assembly

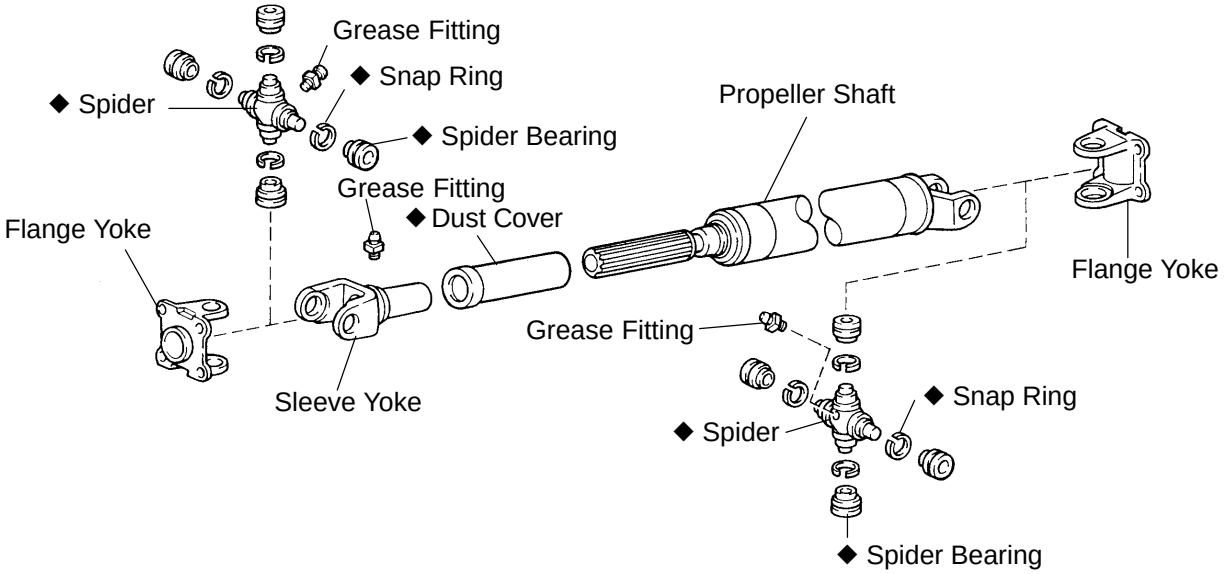
PROPELLER SHAFT ASSEMBLY

COMPONENTS

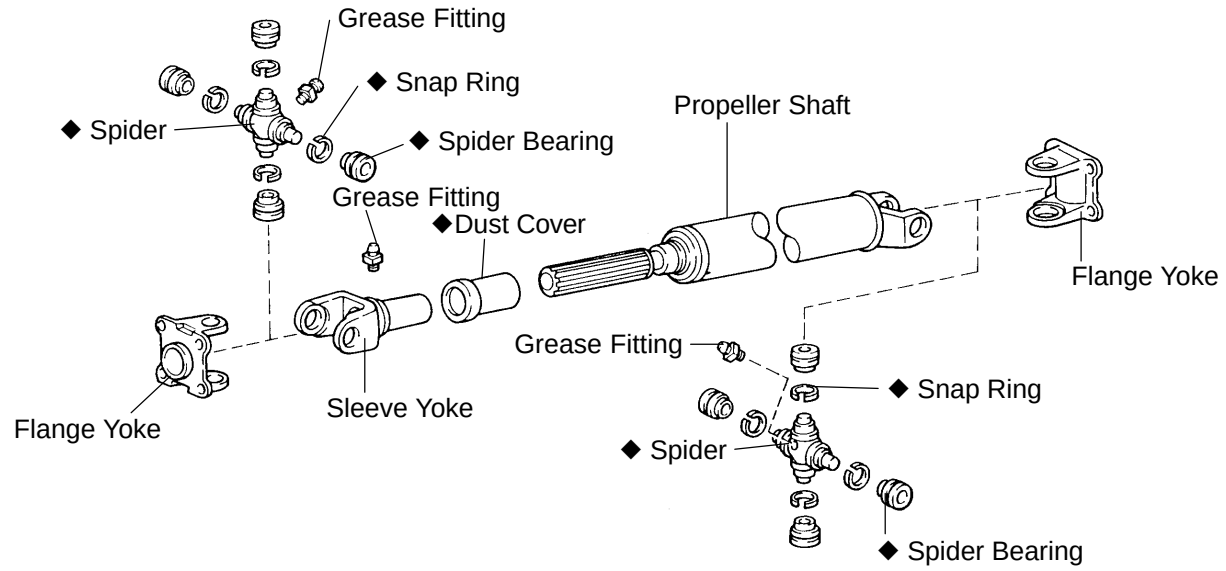
PR03I-02



Front propeller shaft



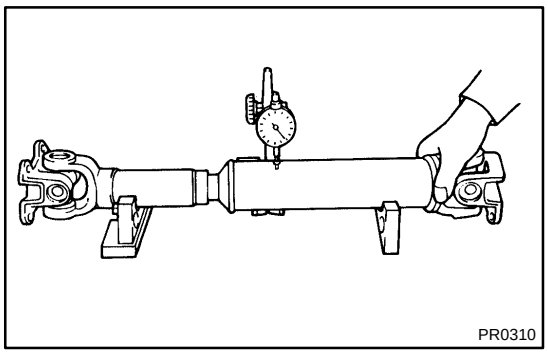
Rear propeller shaft



◆ Non-reusable part

D03041

PR03K-02


PR0310

INSPECTION

NOTICE:

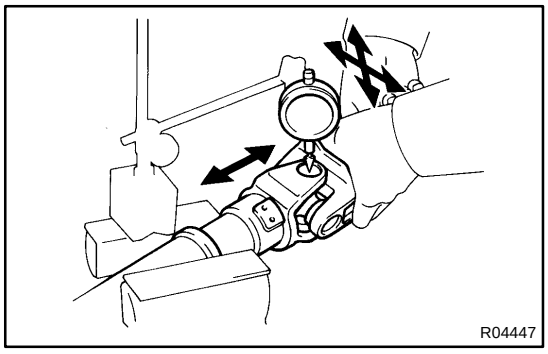
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

1. INSPECT FRONT AND REAR PROPELLER SHAFTS FOR DAMAGE OR RUNOUT

Using a dial indicator, check the runout of shafts.

Maximum runout: 0.8 mm (0.031 in.)

If shaft runout is greater than maximum, replace the shaft.


R04447

2. INSPECT SPIDER BEARING

(a) Check the spider bearings for wear or damage.

(b) Check the spider bearing axial play by turning the yoke with holding the shaft tightly.

Maximum bearing axial play: 0 mm (0 in.)

If necessary, replace the spider bearing.

PR03M-02

INSTALLATION

Installation is in the reverse order of removal (See page PR-4).

HINT:

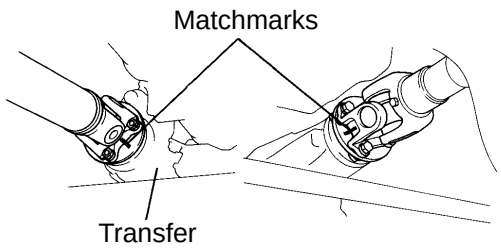
After installation, pump MP grease into each fitting with a grease gun until the grease begins to flow around the oil seal.

PR03J-02

REMOVAL

1. REMOVE ENGINE NO. 2 UNDER COVER

Front Propeller Shaft



2. REMOVE FRONT PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft flange and transfer.

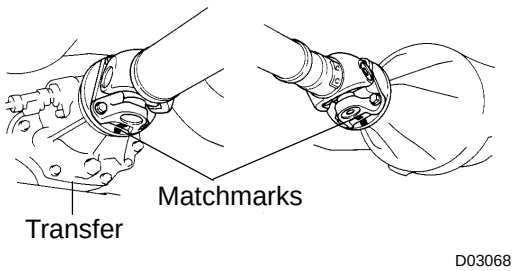
(b) Remove the 4 nuts and washers.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(c) Place matchmarks on the propeller shaft flange and front differential.

(d) Remove the 4 nuts, bolts and washers.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(e) Remove the front propeller shaft.

Rear Propeller Shaft



3. REMOVE REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft flange and transfer.

(b) Remove the 4 nuts and washers.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

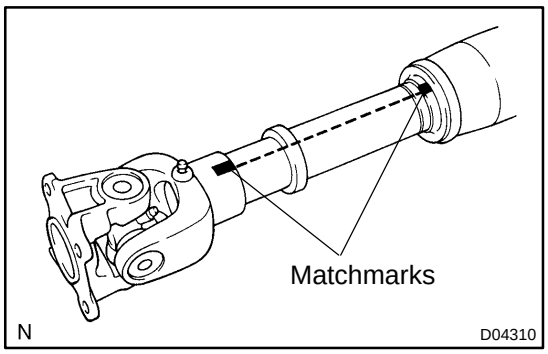
(c) Place matchmarks on the propeller shaft flange and rear differential.

(d) Remove the 4 nuts, bolts and washers.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(e) Remove the rear propeller shaft.

PR03L-02

REPLACEMENT

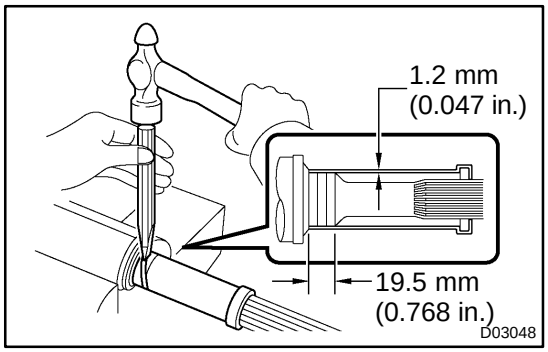


NOTICE:

Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

REPLACE DUST COVER

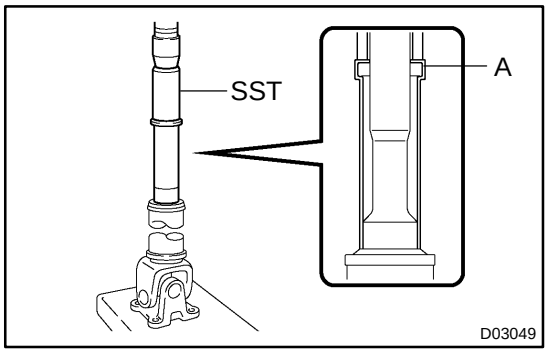
(a) Remove the sleeve yoke from the propeller shaft.
  (1) Place matchmarks on the sleeve yoke and shaft.
  (2) Pull out the sleeve yoke from the shaft.



(b) Remove the dust cover.
  Cut the dust cover spirally at the pressing-in part with a saw and pry it off with a chisel and hammer.

NOTICE:

Do not damage the propeller shaft. If damaged, replace the shaft with a new one.



(c) Install a new dust cover.
  Using SST and press, press in a new dust cover.
  SST 09636-20010

NOTICE:

Place the universal joint straight when pressing in the dust cover. Apply MP grease to the "A" part.

(d) Insert the sleeve yoke into the propeller shaft.
  (1) Apply MP grease to the propeller shaft spline and sleeve yoke sliding surface.
  (2) Align the matchmarks on the sleeve yoke and propeller shaft.
  (3) Install the propeller shaft into the sleeve yoke.

SPIDER BEARING

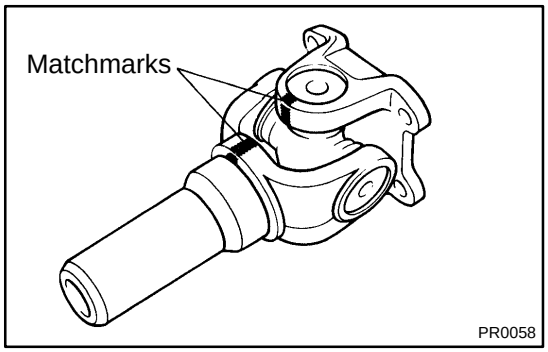
PR04M-01

REPLACEMENT

NOTICE:

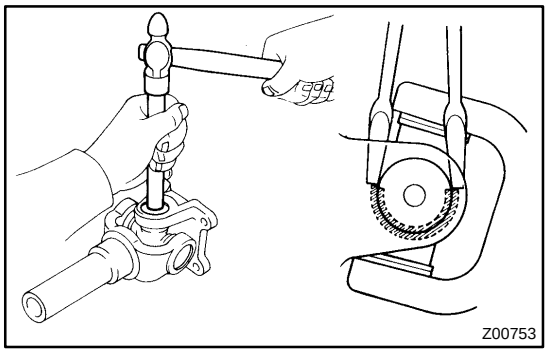
Be careful not to grip the propeller shaft tube too tightly in a vise as this will cause deformation.

1. REMOVE PROPELLER SHAFT (See page PR-4)



2. PLACE MATCHMARKS ON SHAFT AND FLANGE YOKE OR FLANGE YOKE AND SLEEVE YOKE

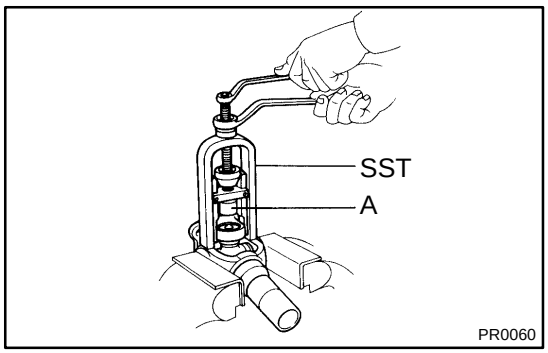
3. REMOVE SLEEVE YOKE FROM PROPELLER SHAFT



4. REMOVE SNAP RINGS

(a) Using a brass bar and hammer, slightly tap in the bearing outer races.

(b) Using 2 screwdrivers, remove the 4 snap rings from the grooves.

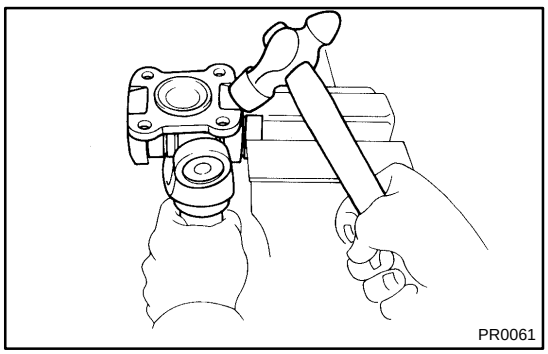


5. REMOVE SPIDER BEARINGS

(a) Using SST, push out the bearing from the flange.
SST 09332-25010

HINT:

Sufficiently raise the part indicated by ”A” so that it does not come into contact with the bearing.

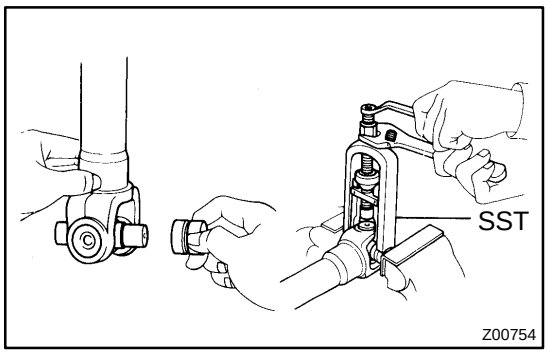


(b) Clamp the bearing outer race in a vise and tap off the flange with a hammer.

HINT:

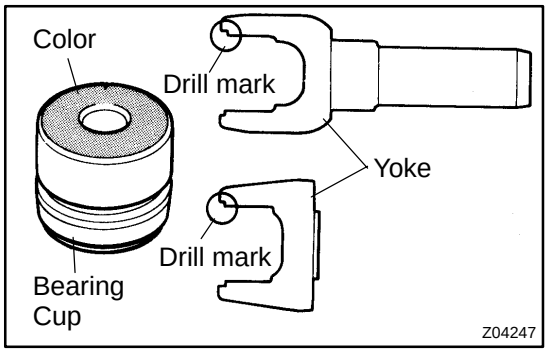
Remove the bearing on the opposite side in the same procedure.

(c) Remove the flange yoke from the sleeve yoke (or propeller shaft).



(d) Install the 2 removed bearing outer races to the spider.
(e) Using SST, push out the bearing from the yoke.
SST 09332-25010
(f) Clamp the outer bearing race in a vise and tap off the yoke with a hammer.

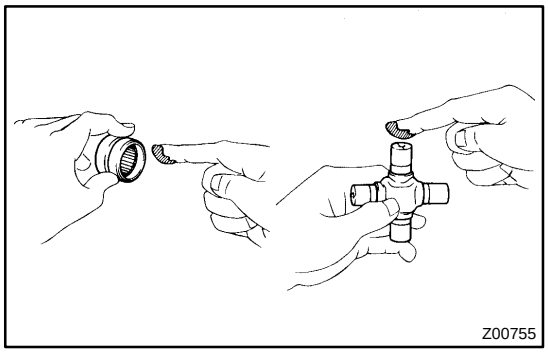
HINT:
Remove the bearing on the opposite side in the same procedure.



6. SELECT SPIDER BEARING

Select the bearing according to whether or not there is a drill mark on the yoke section.

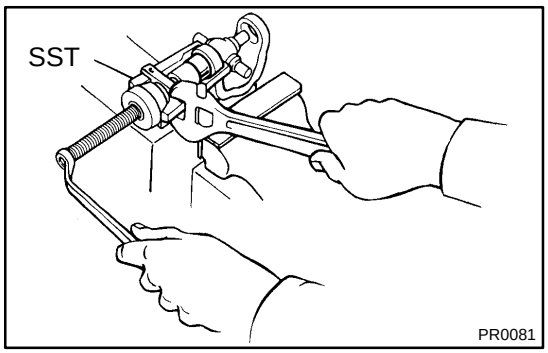
Yoke	Bearing
w/ drill mark	w/ color mark (Red)
No drill mark	No color mark



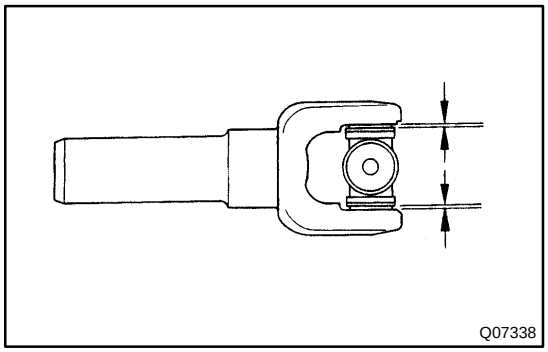
7. INSTALL SPIDER BEARING

(a) Apply MP grease to a new spider and bearings.

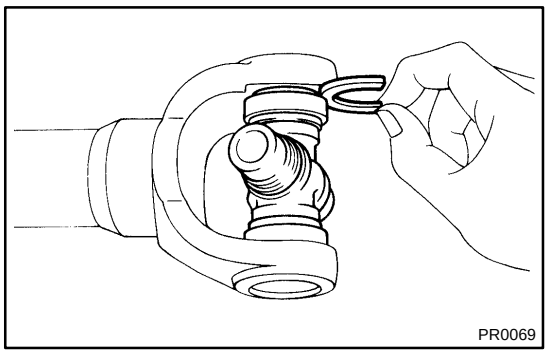
NOTICE:
Be careful not to apply too much grease.



(b) Fit the spider into the yoke.
(c) Using SST, install the bearings on the spider.
SST 09332-25010



(d) Using SST, adjust both bearings so that the snap ring grooves are at maximum and equal in width.


PR0069

8. INSTALL SNAP RING

(a) Install 2 new snap rings of equal thickness which will allow 0 mm (0 in.) axial play.

HINT:

Do not reuse the snap rings.

Thickness of snap ring:

Color	Mark	Thickness mm (in.)
–	1	2.28 - 2.30 mm (0.0898 - 0.0906 in.)
–	2	2.30 - 2.32 mm (0.0906 - 0.0913 in.)
–	–	2.32 - 2.34 mm (0.0913 - 0.0921 in.)
Brown	–	2.34 - 2.36 mm (0.0921 - 0.0929 in.)
Blue	–	2.36 - 2.38 mm (0.0929 - 0.0937 in.)
–	6	2.38 - 2.40 mm (0.0937 - 0.0945 in.)
–	7	2.40 - 2.42 mm (0.0945 - 0.0953 in.)
–	8	2.42 - 2.44 mm (0.0953 - 0.0961 in.)
–	九	2.44 - 2.46 mm (0.0961 - 0.0969 in.)
–	10	2.46 - 2.48 mm (0.0969 - 0.0976 in.)

M00056

(b) Using a hammer, tap the yoke until there is no clearance between the bearing outer race and snap ring.

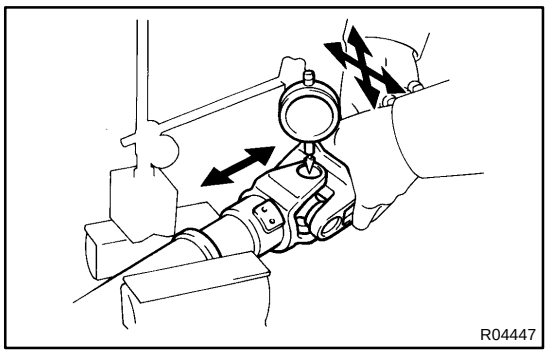
9. INSTALL FLANGE YOKE TO SLEEVE YOKE (OR PROPELLER SHAFT)

(a) Align the matchmarks on the propeller shaft and flange yoke or flange yoke and sleeve yoke.

(b) Install the flange yoke to the sleeve yoke (or propeller shaft).

HINT:

Install 2 new spider bearings and snap ring on the flange yoke side in the procedure described above.



10. CHECK SPIDER BEARING (See page PR-5)

(a) Check that the spider bearing moves smoothly.

(b) Check the spider bearing axial play.

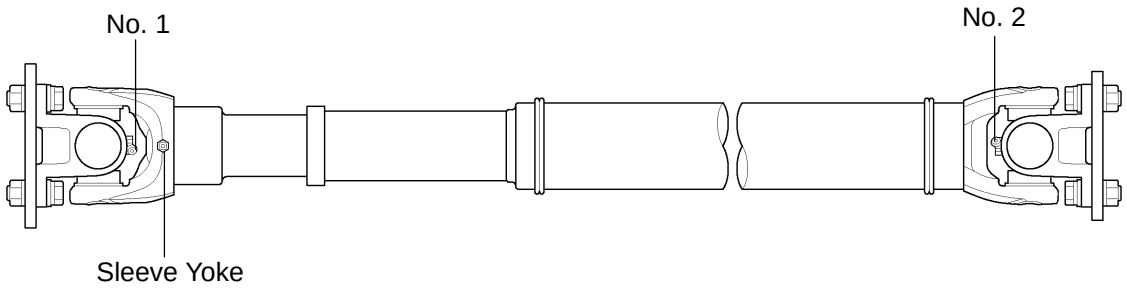
Maximum bearing axial play: 0 mm (0 in.)

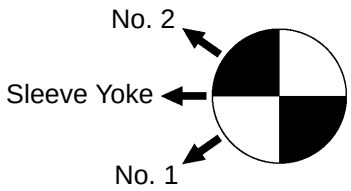
HINT:

When replacing the spider bearing, be sure that the grease fitting assembly hole is facing to the direction shown in the illustration.

SPIDER GREASE FITTING ASSEMBLY DIRECTION

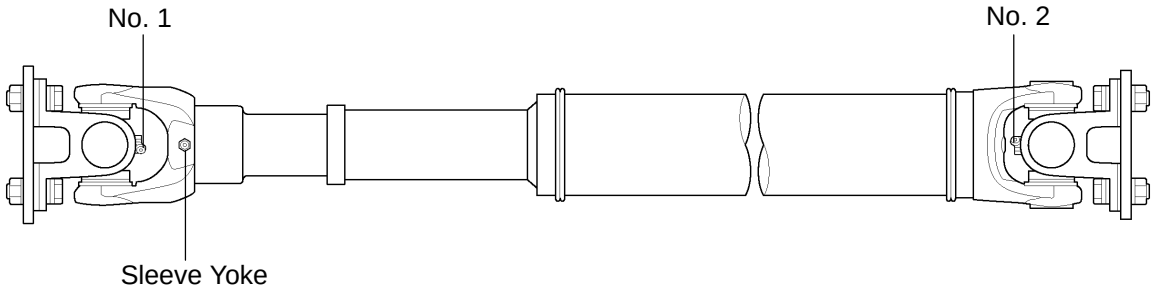
Front propeller shaft





The figure at left shows the locations of the grease fittings as seen from the rear.

Rear propeller shaft



D01633

TROUBLESHOOTING

PR03H-02

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptoms	Suspect Area	See page
Noise	1. Sleeve yoke spline (Worn)	PR-5
	2. Spider bearing (Worn or stuck)	PR-5
Vibration	1. Sleeve yoke spline (Stuck)	PR-5
	2. Propeller shaft (Runout)	PR-5
	3. Propeller shaft (Imbalance)	-

AIR CONDITIONING

SS0O3-03

SERVICE DATA

Refrigerant charge volume	Single A/C	650 ± 50 g (22.93 ± 1.76 oz.)
	Dual A/C	1,050 ± 50 g (37.03 ± 1.76 oz.)
Idle speed	Magnetic clutch not engaged	700 ± 50 rpm
	Magnetic clutch engaged	780 ± 50 rpm
Magnetic clutch clearance		0.5 ± 0.15 mm (0.020 ± 0.0059 in.)

SS0O4-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Condenser x Discharge tube		5.4	55	48 in.·lbf
Condenser x Liquid tube		10	100	7
Compressor x Discharge hose		10	100	7
Compressor x Suction hose		10	100	7
Expansion valve x Evaporator		3.4	35	30
Liquid line (Block joint)		10	100	7
Liquid line (Piping line)		14	140	10
Discharge line (Piping joint)		22	225	16
Suction line (Block joint)		10	100	7
Suction line (Piping joint)	5/8”	32	330	24
	3/4”	42	425	31
Compressor x Cylinder block		49	500	36

AUTOMATIC TRANSMISSION

SS0OO-02

SERVICE DATA

A750F		
Line pressure (Wheel locked)		
	Engine idling	
	D position	362 - 420 kPa (3.7 - 4.3 kgf·cm^2, 53 - 61 psi)
	R position	500 - 580 kPa (5.1 - 5.9 kgf·cm^2, 73 - 84 psi)
	AT stall (Throttle valve fully opened)	
	D position	1,360 - 1,460kPa (13.9 - 14.9 kgf·cm^2, 197 - 212 psi)
	R position	1,295 - 1,415 kPa (13.2 - 14.4 kgf·cm^2, 188 - 205 psi)
Engine stall revolution	D and R positions	2,150 ± 150 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	700 ± 50 rpm
Drive plate runout	Max.	0.20 mm (0.0079 in.)
Torque converter runout	Max.	0.30 mm (0.0118 in.)
Torque converter clutch installation distance		More than 17.1 mm (0.673 in.)
Shift schedule		
D position		
(Throttle valve fully opened)	1 → 2	45 - 57 km/h (28 - 35 mph)
	2 → 3	79 - 90 km/h (49 - 56 mph)
	3 → 4	113 - 128 km/h (70 - 80 mph)
	4 → 5	165 - 180 km/h (103 - 112 mph)
	5 → 4	158 - 173 km/h (98 - 108 mph)
	4 → 3	105 - 117 km/h (65 - 73 mph)
	3 → 2	70 - 78 km/h (43 - 48 mph)
	2 → 1	35 - 41 km/h (22 - 25 mph)
(Throttle valve fully closed)	4 → 5	32 - 38 km/h (20 - 24 mph)
	5 → 4	24 - 29 km/h (15 - 18 mph)
3 position		
(Throttle valve fully opened)	1 → 2	45 - 57 km/h (28 - 35 mph)
	2 → 3	79 - 90 km/h (49 - 56 mph)
	4 → 3	119 - 132 km/h (74 - 82 mph)
	3 → 2	70 - 78 km/h (43 - 48 mph)
	2 → 1	35 - 41 km/h (22 - 25 mph)
2 position		
(Throttle valve fully opened)	1 → 2	45 - 57 km/h (28 - 35 mph)
	3 → 2	80 - 88 km/h (50 - 55 mph)
	2 → 1	35 - 41 km/h (22 - 25 mph)
L position		
(Throttle valve fully opened)	2 → 1	41 - 47 km/h (25 - 29 mph)
Lock-up point	Throttle valve opening 5 %	
D position		
5th gear	Lock-up ON	67 - 74 km/h (42 - 46 mph)
	Lock-up OFF	60 - 67 km/h (37 - 42 mph)
4 position		
4th gear	Lock-up ON	61 - 68 km/h (38 - 42 mph)
	Lock-up OFF	54 - 61 km/h (34 - 38 mph)

SS0OP-02

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.1 vehicle speed sensor x Transfer case		16	160	12
No.2 vehicle speed sensor x Transmission case	NT	5.4	55	48 in.·lbf
	SP2	5.4	55	48 in.·lbf
ATF temperature sensor (for linear control) x Valve body		11	112	8
ATF temperature sensor (for oil temp warning lamp) x Valve body		10	100	7
ATF temperature sensor x Transmission case		5.4	55	48 in.·lbf
Park/neutral position switch	Bolt	13	130	9
	Nut	3.9	40	35 in.·lbf
Transmission control shaft lever x Transmission control rod		13	130	9
Shift solenoid lock plate x Valve body		6.4	65	57 in.·lbf
Shift solenoid S1 S2 x Valve body		10	102	7
Shift solenoid SR x Valve body		6.4	65	57 in.·lbf
Valve body x Transmission case		11	110	8
Oil stainer x Valve body		10	100	7
Oil pan x Transmission case		4.4	55	39 in.·lbf
Drain plug x Oil pan		20	205	15
Parking lock pawl bracket x Transmission case		7.4	75	65 in.·lbf
Shift lever assembly x Body		8.3	85	73 in.·lbf
Control lever x Shift lever plate		13	130	9
Transmission control rod x Shift lever assembly		13	130	9
Shift lever guide housing x Shift lever plate		4.9	50	43 in.·lbf
Power steering oil cooler sub-assy x Body		7.5	76	66 in.·lbf
Oil cooler bracket x Body		12	117	8
Oil cooler bracket x Oil cooler		4.9	50	43 in.·lbf
Oil cooler pipe x Body		4.9	50	43 in.·lbf
Oil filler pipe		12	122	9
Transfer shift lever x Transfer shift lever rod assembly		12	122	9
Transfer shift lever boot x Body		5.4	55	48 in.·lbf
Hole plug x Transmission housing		18	185	13
Drive plate x Torque converter clutch		48	490	35
Oil cooler pipe union nut		34	347	25
Crossmember	Bolt	50	510	37
	Nut	74	750	54
Engine mounting insulator rear x Transmission case		59	600	43
Transmission housing x Engine	Bolt A	71	724	52
	Bolt B	37	377	27
Drive plate x Crankshaft	1st	49	500	36
	2nd	Turn 90°	Turn 90°	Turn 90°

BODY ELECTRICAL

SS0CN-30

SERVICE DATA

AUTOMATIC LIGHT CONTROL SENSOR	
(Connector disconnected)	
3 - Ground (Ignition switch ON)	5.2 - 9.0V
TURN SIGNAL FLASHER	
1 - Ground (Ignition switch LOCK or ACC)	No voltage
1 - Ground (Ignition switch ON)	Battery positive voltage
4 - Ground (Constant)	Battery positive voltage
SPEEDOMETER (ON-VEHICLE)	
USA:	
Standard indication (mph)	Allowable range (mph)
20	18 - 24
40	38 - 44
60	56 - 66
80	78 - 88
100	98 - 110
120	118 - 132
CANADA:	
Standard indication (km/h)	Allowable range (km/h)
20	17 - 24
40	38 - 46
60	57.5 - 67
80	77 - 88
100	96 - 109
120	115 - 130
140	134 - 151.5
160	153 - 173
TACHOMETER (ON-VEHICLE)/ DC 13.5 V 25 ˚C at (77 ˚F)	
Standard indication	Allowable range
700	630 - 770
1,000	900 - 1,100
2,000	1,850 - 2,150
3,000	2,800 - 3,200
4,000	3,800 - 4,200
5,000	4,800 - 5,200
6,000	5,750 - 6,250
7,000	6,700 - 7,300
FUEL SENDER GAUGE	
Float position mm (in.)	Voltage (V)
F: Approx. 85.3 (3.36)	Approx. 0.30 ± 0.1
1/2: Approx. 1.7 (0.76)	Approx. 2.45 ± 0.1
E: Approx. 9.19 (3.62)	Approx. 4.60 ± 0.1
DEFOGGER SWITCH (w/ Navigation)	
B22 - Ground (Ignition switch LOCK or ACC)	No voltage

B22 - Ground (Ignition switch ON)	Battery positive voltage
A10 - Ground (Constant)	Battery positive voltage
DEFOGGER SWITCH (w/o Navigation)	
8 - Ground (Ignition switch LOCK or ACC)	No voltage
8 - Ground (Ignition switch ON)	Battery positive voltage
2 - Ground (Constant)	Battery positive voltage
SLIDING ROOF CONTROL ASSEMBLY	
5 - Ground (Constant)	Battery positive voltage
8 - Ground (Ignition switch LOCK or ACC)	No voltage
8 - Ground (Ignition switch ON)	Battery positive voltage
POWER MIRROR SWITCH	
4 - Ground (Ignition switch LOCK)	No voltage
4 - Ground (Ignition switch ACC or ON)	Battery positive voltage
POWER SEAT SWITCH (Driver's Seat)	
11 - Ground (Constant)	Battery positive voltage
POWER SEAT SWITCH (Passenger's Seat)	
11 - Ground (Constant)	Battery positive voltage
LUMBAR SUPPORT SWITCH (Driver's Seat)	
POWER MIRROR SWITCH (Wire harness side)	
4 - Ground (Ignition switch is LOCK)	No voltage
4 - Ground (Ignition switch is ACC or ON)	Battery positive voltage
POWER AMPLIFIER	
7 - Ground (Constant)	Battery positive voltage
16 - Ground (Constant)	Battery positive voltage
REAR SEAT AUDIO	
24 - Ground (Ignition switch LOCK)	No voltage
24 - Ground (Ignition switch ACC or ON)	Battery positive voltage
12 - Ground (Constant)	Battery positive voltage
DVD CHANGER	
1 - Ground (Ignition switch LOCK)	No voltage
1 - Ground (Ignition switch ACC or ON)	Battery positive voltage
10 - Ground (Constant)	Battery positive voltage
RADIO RECEIVER	
A1 - Ground (Ignition switch LOCK)	No voltage
A11 - Ground (Ignition switch ACC or ON)	Battery positive voltage
A11 - Ground (Constant)	Battery positive voltage
ANTENNA MOTOR CONTROL RELAY	
4 - Ground (Constant)	Battery positive voltage
7 - Ground (Ignition switch ACC or LOCK)	No voltage
7 - Ground (Ignition switch ON)	Battery positive voltage
17 - Ground (Ignition switch LOCK)	No voltage
17 - Ground (Ignition switch ACC or ON)	Battery positive voltage
OVERHEAD J/B	
8 - Ground (Constant)	Battery positive voltage

11 - Ground (Ignition switch OFF or ACC)	No voltage
11 - Ground (Ignition switch ON)	Battery positive voltage

BODY

TORQUE SPECIFICATION

SS0OL-11

Part tightened	N·m	kgf·cm	ft·lbf
FRONT BUMPER	-	-	-
Front bumper cover x Body Bolt:	8.5	87	76 in.·lbf
Front bumper cover x Body Screw:	3.0	31	27 in.·lbf
Fog light x Front bumper cover	4.9	50	43 in.·lbf
Front bumper reinforcement x Body	58	590	43
REAR BUMPER	-	-	-
Rear bumper cover x Body	20	204	15
Reflex reflector x Rear bumper cover	4.9	50	43 in.·lbf
Rear bumper step reinforcement x Extension mounting bracket	12.5	127	11
Extension mounting bracket x Body	19	195	14
Rear bumper reinforcement x Body	20	204	15
HOOD	-	-	-
Hood x Hood side hinge	18	185	13
FRONT DOOR	-	-	-
Door glass x Window regulator	8.0	82	71 in.·lbf
Window regulator x Door panel	8.0	82	71 in.·lbf
Door lock x Door panel	5.0	51	44 in.·lbf
Outside handle x Door panel	5.0	51	44 in.·lbf
Door lock cylinder x Outside handle	5.0	51	44 in.·lbf
Door hinge x Body	23	235	17
Door hinge x Door panel	26	265	19
Door check x Door panel	5.0	51	44 in.·lbf
Door check x Body	27	275	20
Door lock striker x Body	11	115	8
REAR DOOR	-	-	-
Door glass x Window regulator	8.0	82	71 in.·lbf
Window regulator x Door panel	8.0	82	71 in.·lbf
Door lock x Door panel	5.0	51	44 in.·lbf
Outside handle x Door panel	5.0	51	44 in.·lbf
Door hinge x Body	23	235	17
Door hinge x Door panel	26	265	19
Door check x Door panel	5.0	51	44 in.·lbf
Door check x Body	27	275	20
Door lock striker x Body	11	115	8
UPPER BACK DOOR	-	-	-
Back door hinge x Body	28	286	21
Back door hinge x Door panel	31	316	23
Door lock striker x Door panel	11.5	117	8
Back door control x Door panel	5.0	51	44 in.·lbf
Back door lock x Door panel	7.0	71	62 in.·lbf
LOWER BACK DOOR	-	-	-
Back door lock x Door panel	5.0	51	44 in.·lbf

Tail gate stay x Door panel	18.5	189	14
Tail gate stay x Body	18.5	189	14
Door hinge x Body	28	286	21
Door hinge x Door panel	31	316	23
Door lock striker x Body	11.5	117	8
Back door lock control x Door panel	5.0	51	44 in.·lbf
Upper back door striker x Door panel	11.5	117	8
BACK DOOR STAY	-	-	-
Back door stay x Body	17.5	178	13
Back door stay x Door panel	13	133	10
FRONT WIPER AND WASHER	-	-	-
Wiper arm x Wiper link	20	204	15
Wiper link x Body	5.4	55	48 in.·lbf
REAR WIPER AND WASHER	-	-	-
Wiper motor and link assembly x Door panel	5.4	55	48 in.·lbf
Wiper arm x Wiper link	5.4	55	48 in.·lbf
INSTRUMENT PANEL	-	-	-
Front passenger airbag assembly x Reinforcement	20	204	15
Steering wheel set nut	50	510	37
Front passenger airbag assembly x Instrument panel	6.0	61	53 in.·lbf
SIDE STEP	-	-	-
No. 1 side step bracket x Side step	5.0	51	44 in.·lbf
No. 1 side step bracket x Body	18	184	13
No. 2 side step bracket x Side step	5.0	51	44 in.·lbf
No. 2 side step bracket x Body Bolt:	18	184	13
No. 2 side step bracket x Body Nut:	12	120	9
No. 3 side step bracket x Side step	5.0	51	44 in.·lbf
No. 3 side step bracket x Body	18	184	13
FRONT SEAT	-	-	-
Front seat adjuster x Body	42	430	31
Seatback assembly x Seat adjuster	43	440	32
Armrest x Seatback assembly	37	380	27
Seat cushion assembly x Seat adjuster	21	210	15
Seat position control relay x Seat adjuster	5.5	56	49 in.·lbf
Seatback cover x Seatback frame w/ Side airbag:	4.7	48	42in.·lbf
Seat position sensor x Seat adjuster Driver's side:	8.0	82	71in.·lbf
REAR NO. 1 SEAT (LH)	-	-	-
Seat cushion hinge x Body	37	380	27
Seatback assembly x Seat adjuster	41	420	30
Seat adjuster x Seat cushion frame	41	420	30
REAR NO. 1 SEAT (RH)	-	-	-
Seat cushion hinge x Body	37	380	27
Seatback assembly x Seat adjuster	37	380	27
Seat adjuster x Seat cushion frame	37	380	27
REAR NO. 2 SEAT	-	-	-
Seatback assembly x Reclining adjuster	41	420	30

Reclining adjuster x Seat cushion frame		41	420	30
Seat leg adjuster x Seat cushion frame	A Bolt:	18	184	13
Seat leg adjuster x Seat cushion frame	B Bolt:	37	380	27
SEAT BELT		-	-	-
Outer belt shoulder anchor x Adjustable anchor		42	430	31
Adjustable anchor x Body		42	430	31
Outer belt shoulder anchor x Body		42	430	31
Seat belt reclining detecting part x Seat back assembly		3.9	40	35 in.·lbf
Seat belt floor anchor x Body		42	430	31
Retractor x Body	Upper Side:	5.0	51	44 in.·lbf
Retractor x Body	Lower Side:	42	430	31
Retractor x Seatback frame		42	430	31
Inner belt x seat cushion frame		42	430	31
Inner belt x Rear seat lock		42	430	31
Lap type center with inner belt x Seat cushion frame		42	430	31
Rear seat shoulder belt guide x Seatback frame		42	430	31
CRS tether anchor bracket x Body		27	275	20

BRAKE

SS062-17

SERVICE DATA

Brake pedal height (from asphalt sheet)		183.7 - 193.7 mm (7.232 - 7.626 in.)
Brake pedal freeplay		1.0 - 6.0 mm (0.039 - 0.236 in.)
Brake pedal reserve distance at 490 N (50 kgf, 110.1 lbf)		More than 116 mm (4.57 in.)
Brake pedal lever clearance		3.0 mm (0.118 in.)
Front brake pad thickness	STD	11.5 mm (0.453 in.)
Front brake pad thickness	Minimum	1.0 mm (0.039 in.)
Front brake disc thickness	STD	32.0 mm (1.260 in.)
Front brake disc thickness	Minimum	30.0 mm (1.181 in.)
Front brake disc runout	Maximum	0.07 mm (0.0028 in.)
Rear brake pad thickness	STD	12.0 mm (0.472 in.)
Rear brake pad thickness	Minimum	1.0 mm (0.039 in.)
Rear brake disc thickness	STD	18.0 mm (0.709 in.)
Rear brake disc thickness	Minimum	16.0 mm (0.611 in.)
Rear brake disc runout	Maximum	0.1 mm (0.004 in.)
Rear brake disc inside diameter	STD	230 mm (9.06 in.)
Rear brake disc inside diameter	Maximum	231 mm (9.09 in.)
Parking brake shoe lining thickness	STD	4.0 mm (0.157 in.)
Parking brake shoe lining thickness	Minimum	1.0 mm (0.039 in.)
Parking brake lever travel at 196 N (20 kgf, 44 lbf)		4 - 6 clicks
Parking brake clearance between rear shoe and lever		Less than 0.25 mm (0.0098 in.)
Parking brake shoe and lever clearance adjusting shim thickness		0.3 mm (0.012 in.) 0.4 mm (0.016 in.) 0.5 mm (0.020 in.) 0.6 mm (0.024 in.) 0.9 mm (0.035 in.)

SS063-18

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Brake line union nut	15	155	11
Hydraulic brake booster clevis lock nut	25	260	19
Hydraulic brake booster x Pedal bracket	15	155	11
Brake pedal bracket set bolt	20	200	14
ABS ECU or ABS & BA & TRAC & VSC ECU set nut	5.0	51	44 in.·lbf
Bleeder plug	11	110	8
Front disc brake caliper x Flexible hose	30	310	22
Front disc brake mounting bolt x Steering knuckle	123	1,250	90
Rear disc brake caliper installation bolt	26	270	20
Rear disc brake caliper x Flexible hose	30	310	22
Rear disc brake torque plate x Rear backing plate	103	1,050	76
Reservoir set screw	1.7	17.5	15.2 in.·lbf
Master cylinder pressure sensor (w/ ABS & BA & TRAC & VSC only)	81	830	60
Accumulator x Booster pump motor	54	550	36
Front speed sensor installation bolt	8.0	82	71 in.·lbf
Front speed sensor harness clamp bolt	13	130	9
Rear speed sensor installation bolt	8.0	82	71 in.·lbf
Rear speed sensor harness clamp bolt	13	130	9
Front brake disc x Front axle hub	74	750	54
Parking brake bellcrank assembly x Backing plate	13	130	9
Bellcrank stopper bolt lock nut	5.4	55	48 in.·lbf

CHARGING

SS0OF-04

SERVICE DATA

Battery	Specific gravity	at 20˚C (68˚F)	1.25 - 1.29
	Voltage	at 20˚C (68˚F)	12.5 - 12.9 V
Generator	Rated output		12V 130A
	Rotor coil resistance	at 20˚C (68˚F)	2.3 - 2.7 Ω
	Slip ring diameter	STD	14.2 - 14.4 mm (0.559 - 0.567 in.)
		Minimum	14.0 mm (0.551 in.)
	Brush exposed length	STD	10.5 mm (0.413 in.)
		Minimum	4.5 mm (0.177 in.)
Charging circuit	Without load	STD amperage	10 A or less
		STD voltage	13.2 - 14.8 V
	With load	STD amperage	30 A or less

SS0OG-04

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Bearing retainer x Drive end frame		2.6	27	23 in.·lbf
Rectifier end frame x Drive end frame		5.8	59	51 in.·lbf
Generator pulley x Rotor		110.3	1,125	81
Brush holder x Rectifier end frame		1.8	18	16 in.·lbf
End cover x Rectifier end frame		4.6	47	41 in.·lbf
Rear end cover x Rectifier end frame		4.6	47	41 in.·lbf
Generator x Cylinder block	Bolt	39	400	29
	Nut 10 mm	39	440	29
	Nut 8 mm	15.5	158	11

COOLING

SERVICE DATA

SS0O9-01

Thermostat	Valve opening temperature		80 - 84˚C (176 - 183˚F)
	Valve lift	at 95˚C (203˚F)	10 mm (0.39 in.) or more
Radiator cap	Relief valve opening pressure	STD	93 - 123 kPa (0.95 - 1.25 kgf/cm^2, 13.5 - 17.8 psi)
		Minimum	78 kPa (0.8 kgf/cm^2, 11.4 psi)

SS0OA-01

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Drain plug x Union on cylinder block		12.7	130	9
Water pump x Cylinder block	Bolt	21	215	15
	Stud bolt and nut	18	185	13
Water inlet housing x Water pump		18	185	13
Water inlet x Water inlet housing		19	195	14
Radiator x Fan shroud		5.0	50	44 in.·lbf
Radiator x Radiator side support		12.7	130	9
Radiator side support x Bracket		20	200	15
Radiator mounting bolt		18	185	13
Radiator mounting nut		20	200	15

EMISSION CONTROL

TORQUE SPECIFICATION

SS0O5-05

Part tightened	N·m	kgf·cm	ft·lbf
Front exhaust pipe x Exhaust manifold	62	632	46
Front exhaust pipe x Center pipe	40	408	30
Heated oxygen sensor x Front exhaust pipe	20	200	14

ENGINE MECHANICAL

SERVICE DATA

SS0OQ-10

Compression pressure	at 250 rpm STD	1,324 kPa (13.5 kgf/cm^2, 192 psi) or more
	Minimum	981 kPa (10.0 kgf/cm^2, 142 psi)
	Difference of pressure between each cylinder	98 kPa (1.0 kgf/cm^2, 14 psi) or less
Valve clearance	at cold Intake	0.15 - 0.25 mm (0.006 - 0.010 in.)
	Exhaust	0.25 - 0.35 mm (0.010 - 0.014 in.)
	Valve clearance adjusting shim No.00	2.000 mm (0.0787 in.)
	No.02	2.020 mm (0.0795 in.)
	No.04	2.040 mm (0.0803 in.)
	No.06	2.060 mm (0.0811 in.)
	No.08	2.080 mm (0.0819 in.)
	No.10	2.100 mm (0.0827 in.)
	No.12	2.120 mm (0.0835 in.)
	No.14	2.140 mm (0.0843 in.)
	No.16	2.160 mm (0.0850 in.)
	No.18	2.180 mm (0.0858 in.)
	No.20	2.200 mm (0.0866 in.)
	No.22	2.220 mm (0.0874 in.)
	No.24	2.240 mm (0.0882 in.)
	No.26	2.260 mm (0.0890 in.)
	No.28	2.280 mm (0.0898 in.)
	No.30	2.300 mm (0.0906 in.)
	No.32	2.320 mm (0.0913 in.)
	No.34	2.340 mm (0.0921 in.)
	No.36	2.360 mm (0.0929 in.)
	No.38	2.380 mm (0.0937 in.)
	No.40	2.400 mm (0.0945 in.)
	No.42	2.420 mm (0.0953 in.)
	No.44	2.440 mm (0.0961 in.)
	No.46	2.460 mm (0.0969 in.)
	No.48	2.480 mm (0.0976 in.)
	No.50	2.500 mm (0.0984 in.)
	No.52	2.520 mm (0.0992 in.)
	No.54	2.540 mm (0.1000 in)
	No.56	2.560 mm (0.1008 in.)
	No58	2.580 mm (0.1016 in.)
	No.60	2.600 mm (0.1024 in.)
	No.62	2.620 mm (0.1031 in.)
	No.64	2.640 mm (0.1039 in.)
	No.66	2.660 mm (0.1047 in.)
	No.68	2.680 mm (0.1055 in.)
	No.70	2.700 mm (0.1063 in.)
	No.72	2.720 mm (0.1071 in.)
	No.74	2.740 mm (0.1079 in.)
	No.76	2.760 mm (0.1087 in.)
	No.78	2.780 mm (0.1094 in.)
	No.80	2.800 mm (0.1102 in.)
Ignition timing	w/ Terminals TC and E1 connected of DLC1	5 -15˚ BTDC @ idle
Idle speed	-	700 ± 50 rpm
Timing belt tensioner	Protrusion from housing end	10.5 - 11.5 mm (0.413 - 0.453 in.)

Cylinder head	Warpage	Maximum	0.10 mm (0.039 in.)
	Valve seat		
	Refacing angle		30°, 45°, 60°
	Contacting angle		45°
	Contacting width		1.0 - 1.4 mm (0.039 - 0.055 in.)
	Valve guide bushing bore diameter	STD	10.285 - 10.306 mm (0.4049 - 0.4057 in.)
		O/S 0.05	10.335 - 10.356 mm (0.4069 - 0.4077 in.)
	Cylinder head bolt thread inside diameter	STD	9.810 - 9.960 mm (0.3862 - 0.3921 in.)
		Minimum	9.70 mm (0.3819 in.)
	Protrusion height	Intake	9.2 - 9.8 mm (0.362 - 0.386 in.)
		Exhaust	8.2 - 8.8 mm (0.323 - 0.346 in.)
Valve guide bushing	Inside diameter		5.510 - 5.530 mm (0.2169 - 0.2177 in.)
	Outside diameter (for repair part)	STD	10.285 - 10.306 mm (0.4049 - 0.4057 in.)
		O/S 0.05	10.335 - 10.356 mm (0.4069 - 0.4077 in.)
Valve	Valve overall length	STD Intake	95.05 mm (3.7421 in.)
		Exhaust	95.10 mm (3.7441 in.)
		Minimum Intake	94.55 mm (3.7224 in.)
		Exhaust	94.60 mm (3.7244 in.)
	Valve face angle		44.5°
	Stem diameter	Intake	5.470 - 5.485 mm (0.2154 - 0.2159 in.)
		Exhaust	5.465 - 5.480 mm (0.2152 - 0.2157 in.)
	Stem oil clearance	STD Intake	0.025 - 0.060 mm (0.0010 - 0.0024 in.)
		Exhaust	0.030 - 0.065 mm (0.0012 - 0.0026 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD IN	1.25 mm (0.049 in.)
		EX	1.4 mm (0.055 in.)
		Minimum	0.5 mm (0.020 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length		54.1 mm (2.130 in.)
	Installed tension at 35.0 mm (1.378 in.)		204 - 226 N (20.8 - 23.0 kgf·cm, 45.9 - 50.7 lbf)
Valve lifter	Lifter diameter		30.966 - 30.976 mm (1.2191 - 2.2195 in.)
	Lifter bore diameter		31.000 - 31.016 mm (1.2205 - 1.2211 in.)
	Oil clearance	STD	0.024 - 0.050 mm (0.0009 - 0.0020 in.)
		Maximum	0.07 mm (0.0028 in.)
Camshaft	Thrust clearance	STD Intake	0.040 - 0.090 mm (0.0016 - 0.0035 in.)
		Exhaust	0.040 - 0.085 mm (0.0016 - 0.0033 in.)
		Maximum	0.12 mm (0.0047 in.)
	Journal oil clearance	STD	0.030 - 0.067 mm (0.0012 - 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter		26.954 - 26.970 mm (1.0612 - 1.0618 in.)
	Circle runout		0.08 mm (0.0031 in.)
	Cam lobe height	STD Intake	41.94 - 42.04 mm (1.6512 - 1.6551 in.)
		Exhaust	41.96 - 42.06 mm (1.6520 - 1.6559 in.)
		Minimum Intake	41.79 mm (1.6453 in.)
		Exhaust	41.81 mm (1/6461 in.)
	Camshaft gear backlash	STD	0.020 - 0.200 mm (0.0008 - 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 - 18.8 mm (0.712 - 0.740 in.)
Manifold	Warpage	Maximum Intake	0.15 mm (0.0059 in.)
		Exhaust	0.50 mm (0.0197 in.)

Cylinder block	Cylinder head surface warpage	Maximum	0.07 mm (0.0028 in.)
	Cylinder bore diameter	STD STD Mark 1	94.002 - 94.010 mm (3.7009 - 3.7012 in.)
		Mark 2	94.010 - 94.023 mm (3.7012 - 3.7017 in.)
		Mark 3	94.023 - 94.031 mm (3.7017 - 3.7020 in.)
		Maximum STD	94.231 mm (3.7099 in.)
		O/S 050	94.731 mm (3.7296 in.)
	Main bearing cap bolt tension portion diameter	STD	10.760 - 10.970 mm (0.4236 - 0.4319 in.)
		Minimum	10.40 mm (0.4094 in.)
Piston and piston ring	Piston diameter	STD Mark 1	93.902 - 93.912 mm (3.6969 - 3.6973 in.)
		Mark 2	93.912 - 93.920 mm (3.6973 - 3.6976 in.)
		Mark 3	93.920 - 93.930 mm (3.6976 - 3.6980 in.)
		O/S 0.50	94.402 - 94.430 mm (3.7166 - 3.7177 in.)
	Piston oil clearance	STD	0.090 - 0.111 mm (0.0035 - 0.0044 in.)
		Maximum	0.13 mm (0.0051 in.)
	Piston ring groove clearance	No.1	0.030 - 0.080 mm (0.0012 - 0.0031 in.)
		No.2	0.030 - 0.070 mm (0.0012 - 0.0028 in.)
	Piston ring end gap	STD No.1	0.300 - 0.500 mm (0.0118 - 0.0197 in.)
		No.2	0.400 - 0.650 mm (0.0157 - 0.0256 in.)
		Oil	0.130 - 0.480 mm (0.0051 - 0.0189 in.)
		Maximum No.1	1.10 mm (0.0433 in.)
		No.2	1.20 mm (0.0472 in.)
		Oil	1.15 mm (0.0453 in.)
Connecting rod	Thrust clearance	STD	0.160 - 0.290 mm (0.0063 - 0.0138 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod thickness		22.880 - 22.920 mm (0.9008 - 0.9024 in.)
	Connecting rod oil clearance	STD	0.027 - 0.053 mm (0.0011 - 0.0021 in.)
		Maximum	0.065 mm (0.0026 in.)
	Connecting rod bearing center wall thickness (Reference)	Mark 2	1.484 - 1.487 mm (0.0584 - 0.0585 in.)
		Mark 3	1.487 - 1.490 mm (0.0585 - 0.0587 in.)
		Mark 4	1.490 - 1.493 mm (0.0587 - 0.0588 in.)
		Mark 5	1.493 - 1.496 mm (0.0588 - 0.0589 in.)
		Mark 6	1.496 - 1.499 mm (0.0589 - 0.0590 in.)
		Mark 7	1.499 - 1.502 mm (0.0590 - 0.0591 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Bushing inside diameter		22.005 - 22.014 mm (0.8663 - 0.8667 in.)
	Piston pin diameter		21.997 - 22.006 mm (0.8660 - 0.8664 in.)
	Bushing oil clearance	STD	0.005 - 0.011 mm (0.0002 - 0.0004 in)
		Maximum	0.05 mm (0.0020 in.)
	Connecting rod bolt tension portion diameter	STD	7.200 - 7.300 mm (0.2835 - 0.2874 in.)
		Minimum	7.00 mm (0.2756 in.)
Crankshaft	Thrust clearance	STD	0.020 - 0.220 mm (0.0008 - 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.440 - 2.490 mm (0.0961 - 0.0980 in.)
	Main journal bore diameter on cylinder block (with main bearing)		66.986 - 67.000 mm (2.6372 - 2.6378 in.)
	Main journal oil clearance	STD	0.040 - 0.058 mm (0.0016 - 0.0023 in.)
		Maximum	0.070 mm (0.0028 in.)
	Main journal diameter		66.988 - 67.000 mm (2.6373 - 2.6378 in.)

Crankshaft (cont'd)	Main bearing center wall thickness (Reference)		
	No.1 and No.5	Mark 3	2.481 - 2.484 mm (0.0977 - 0.0978 in.)
		Mark 4	2.484 - 2.487 mm (0.0978 - 0.0979 in.)
		Mark 5	2.487 - 2.490 mm (0.0979 - 0.0980 in.)
		Mark 6	2.490 - 2.493 mm (0.0980 - 0.0981 in.)
		Mark 7	2.493 - 2.496 mm (0.0981 - 0.0983 in.)
	Others	Mark 1	2.481 - 2.484 mm (0.0977 - 0.0978 in.)
		Mark 2	2.484 - 2.487 mm (0.0978 - 0.0979 in.)
		Mark 3	2.487 - 2.490 mm (0.0979 - 0.0980 in.)
		Mark 4	2.490 - 2.493 mm (0.0980 - 0.0981 in.)
		Mark 5	2.493 - 2.496 mm (0.0981 - 0.0983 in.)
	Crank pin diameter		51.982 - 52.000 mm (2.0465 - 2.0472 in.)
	Circle runout	Maximum	0.08 mm (0.0031 in.)
	Main journal taper and out-of-round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out-of-round	Maximum	0.02 mm (0.0008 in.)

SS0OR-11

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fan shroud x Radiator assembly		5	51	44 in.·lbf
Radiator bracket x Radiator assembly	Bolt	18	185	13
	Nut	20	200	15
A/C Compressor x Cylinder block		49	500	36
Generator x Generator bracket		39	400	29
No.1 idler pulley, No.2 idler pulley x Cylinder Block		34.5	350	25
Camshaft timing pulley x Camshaft timing tube		108	1,100	80
Drive belt tensioner x Cylinder block		16	160	12
Timing belt tensioner x Oil pump		26	270	19
Crankshaft pulley x Crankshaft		245	2,500	181
Fan bracket x Cylinder block	12 mm head	16	160	12
	14 mm head	32	330	24
No.2 timing belt cover x Cylinder block		16	160	12
No.3 timing belt cover x Cylinder block, cylinder head		7.5	80	66 in.·lbf
Drive belt idler pulley x Fan bracket		39	400	29
Fluid coupling x Fan bracket		21	215	16
Exhaust manifold x Cylinder head		44	450	33
Cylinder head x Cylinder block	1st	32	325	24
	2nd	Turn 90˚	Turn 90˚	Turn 90˚
	3rd	Turn 90˚	Turn 90˚	Turn 90˚
Camshaft bearing cap x Cylinder head	Bolt C	7.5	80	66 in.·lbf
	Others	16	160	12
Cylinder head cover x Cylinder head		6.0	60	53 in.·lbf
Engine hanger x Cylinder head		37	380	27
Front water bypass joint, Rear water bypass joint x Cylinder head		18	185	13
Intake manifold x Cylinder head		18	185	13
V-bank cover bracket x Intake manifold		7.5	80	66 in.·lbf
Timing belt rear plate x Cylinder head		7.5	80	66 in.·lbf
Drive plate x Crankshaft	1st	49	500	36
	2nd	Turn 90˚	Turn 90˚	Turn 90˚
Transmission x Cylinder block		72	730	53
Transmission x No.1 oil pan		37	380	27
Drive plate x Torque converter clutch		48	490	35
Flywheel housing under cover x Transmission		18	185	13
Frame crossmember x Body		50	510	37
Frame crossmember x Rear engine mounting insulator		74	750	55
Frame bracket x Engine mounting bracket		30	310	22
PS pump x Cylinder head		62	632	46
A/C compressor x Cylinder block, Fan bracket		49	500	36
Main bearing cap x Cylinder block	1st	27	275	20
	2nd	Turn 90˚	Turn 90˚	Turn 90˚
Connecting rod cap x Connecting rod	1st	24.5	250	18
	2nd	Turn 90˚	Turn 90˚	Turn 90˚
Rear oil seal retainer x Cylinder block		8.0	80	71 in.·lbf
Engine coolant drain union x Cylinder block		49	500	36

Engine mounting bracket x Cylinder block	36	370	27
Water bypass pipe x Cylinder block	18	185	13
Front exhaust pipe x Exhaust manifold	63	640	46
No.2 front exhaust pipe x Front exhaust pipe	40	408	30
Center exhaust pipe x Front exhaust pipe	40	408	30
Heated oxygen sensor (Bank 1, 2 sensor 2) x Front exhaust pipe	20	200	14
Heat insulator x Exhaust manifold	7.5	77	66 in.·lbf
Shift lever assembly x Transmission	8.3	86	73 in.·lbf
Shift lever assembly x Transmission control rod	13	130	9

IGNITION

SS0O6-03

SERVICE DATA

Firing order	-		1 - 8 - 4 - 3 - 6 - 5 - 7 - 2
Spark plug	Recommended spark plug	DENSO made	SK20R11
		NGK made	IFR6A11
	Correct electrode gap for new spark plug		1.1 mm (0.043 in.)
	Maximum electrode gap for used spark plug		1.3 mm (0.051 in.)
Camshaft position sensor	Resistance	Cold	835 - 1,400 Ω
		Hot	1,060 - 1,645 Ω
Crankshaft position sensor	Resistance	Cold	1,630 - 2,740 Ω
		Hot	2,065 - 3,225 Ω

SS0O7-01

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Spark plug x Cylinder head	17.5	180	13
Ignition coil (with igniter) x Cylinder head cover	7.5	80	66 in.·lbf
Camshaft position sensor x LH cylinder head	7.5	80	66 in.·lbf
Crankshaft position sensor x Oil pump	6.5	65	58 in.·lbf

LUBRICATION

SERVICE DATA

SS0OB-01

Oil pressure		at idle speed	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
		at 3,000 rpm	294 - 588 kPa (3.0 - 6.0 kgf/cm^2, 43 - 85 psi)
Oil pump	Tip clearance	STD	0.110 - 0.240 mm (0.0043 - 0.0094 in.)
		Maximum	0.35 mm (0.0138 in.)
	Side clearance	STD	0.030 - 0.090 mm (0.0012 - 0.0035 in.)
		Maximum	0.15 mm (0.0059 in.)
	Body clearance	STD	0.100 - 0.175 mm (0.0039 - 0.0069 in.)
		Maximum	0.30 mm (0.0118 in.)

SS0OC-02

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
No.2 oil pan x Drain plug		39	400	29
Oil pump body cover x Oil pump body		10	105	8
Oil pump x Cylinder block	14 mm head	30.5	310	22
	12 mm and 6mm hexagon head	15.5	160	11
Oil strainer x Cylinder block, Oil pump		7.5	80	66 in.·lbf
No.1 oil pan x Oil pump, Oil seal retainer		7.5	80	66 in.·lbf
No.1 oil pan x Cylinder block	10 mm head	7.5	80	66 in.·lbf
	12 mm head	28	290	21
Oil pan baffle plate x No.1 oil pan		7.5	80	66 in.·lbf
No.2 oil pan x No.1 oil pan		7.5	80	66 in.·lbf
Oil filter bracket x Oil pump		18	185	13
Oil cooler x Oil filter bracket	Union bolt	68.6	700	51
Oil dipstick guide x Cylinder head		15	153	11

PROPELLER SHAFT

SS0NK-02

SERVICE DATA

Shaft runout		Max.	0.8 mm (0.031 in.)
Bearing axial play		Max.	0 mm (0 in.)
Snap ring thickness	Color	Mark	
	–	1	2.28 - 2.30 mm (0.0898 - 0.0906 in.)
	–	2	2.30 - 2.32 mm (0.0906 - 0.0913 in.)
	–	–	2.32 - 2.34 mm (0.0913 - 0.0921 in.)
	Brown	–	2.34 - 2.36 mm (0.0921 - 0.0929 in.)
	Blue	–	2.36 - 2.38 mm (0.0929 - 0.0937 in.)
	–	6	2.38 - 2.40 mm (0.0937 - 0.0945 in.)
	–	7	2.40 - 2.42 mm (0.0945 - 0.0953 in.)
	–	8	2.42 - 2.44 mm (0.0953 - 0.0961 in.)
	–	九	2.44 - 2.46 mm (0.0961 - 0.0969 in.)
	–	10	2.46 - 2.48 mm (0.0969 - 0.0976 in.)

M00054

SS0NL-02

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Front propeller shaft x Front differential	80	820	59
Front propeller shaft x Transfer	80	820	59
Rear propeller shaft x Transfer	106	1,080	78
Rear propeller shaft x Rear differential	106	1,080	78

SUPPLEMENTAL RESTRAINT SYSTEM

SS061-66

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Steering wheel set nut		50	510	37
Steering wheel pad set screw (Torx screw)		8.8	90	78 in.·lbf
Front passenger airbag assembly x Instrument panel		6.0	61	53 in.·lbf
Front passenger airbag assembly x Instrument panel reinforcement		20	205	15
Front seat x Body		42	430	31
Seat cushion assembly x Seat adjuster assembly		21	210	15
Seatback cover with pad x Seatback frame		4.7	48	42 in.·lbf
Armrest x Seatback frame		37	380	27
Seatback frame x Seat adjuster assembly		43	440	32
Curtain shield airbag assembly x Body		9.8	100	86 in.·lbf
Airbag sensor assembly x Body		17.5	178	13
Front airbag sensor x Body		7.5	76	66 in.·lbf
Side and curtain shield airbag sensor assembly x Body		20	205	15
Front seat outer belt x Body	Upper bolt:	8.0	81	71 in.·lbf
	Lower bolt:	42	428	31
Curtain shield airbag sensor assembly x Body		17.5	178	13
Rear seat belt anchor x Body		42	428	31
Seat position sensor assembly x Seat adjuster assembly		8.0	82	71 in.·lbf

SUSPENSION AND AXLE

SS0OJ-10

SERVICE DATA

Cold tire inflation pressure	Tire size P275/70R16 Front	 200 kPa (2.0 kgf/cm^2, 29 psi) *220 kPa (2.2 kgf/cm^2, 32 psi)
	Rear	220 kPa (2.2 kgf/cm^2, 32 psi) *240 kPa (2.4 kgf/cm^2, 35 psi)
Front wheel alignment	Vehicle height Front A - B Rear C - D	 71 mm (2.795 in.) 51 mm (2.008 in.)
	Camber Right-left error	0°05' ± 45' (0.08° ± 0.75°) 30' (0.5°) or less
	Caster Right-left error	2°30' ± 45' (2.5° ± 0.75°) 30' (0.5°) or less
	Steering axis inclination Right-left error	12°10' ± 45' (12.17° ± 0.75°) 30' (0.5°) or less
	Toe-in (total) Rack end length difference	0°06' ± 12' (0.1° ± 0.2°, 1 ± 2 mm, 0.04 ± 0.08 in.) 3.0 mm (0.118 in.) or less
	Wheel angle Inside wheel Outside wheel: Reference	36°42' (33°42' - 36°42') 36.7° (33.7° - 36.7°) 32°36' 32.6°
Front axle	Front axle hub preload (at starting)	42 - 67 N (4.3 - 6.8 kgf, 9.5 - 15.0 lbf)
	Snap ring thickness	1.8 mm (0.0709 in.) 2.0 mm (0.0787 in.) 2.2 mm (0.0866 in.) 2.4 mm (0.0945 in.) 2.6 mm (0.1024 in.) 2.8 mm (0.1102 in.)
Front drive shaft	Front drive shaft length	573.9 ± 5.0 mm (22.594 ± 0.197 in.)
Front suspension	Upper suspension arm ball joint turning torque	1.0 - 4.4 N·m (10 - 45 kgf·cm, 8.9 - 39 in.·lbf)
	Lower suspension arm ball joint turning torque	0.29 - 2.94 N·m (3 - 30 kgf·cm, 2.6 - 26 in.·lbf)
Rear axle shaft	Bearing backlash Max.	0.6 mm (0.024 in.)
	Axle shaft deviation Max.	0.05 mm (0.0020 in.)
	Axle shaft runout Max.	2.0 mm (0.079 in.)
	Axle shaft flange runout Max.	0.05 mm (0.0020 in.)

*: Trailer towing

A: Ground clearance of spindle center

B: Ground clearance of lower suspension arm front bolt center

C: Ground clearance of rear axle shaft center

D: Ground clearance of lower control arm front bushing center

Front differential	Companion flange vertical runout	Max.	0.09 mm (0.0035 in.)
	Companion flange lateral runout	Max.	0.09 mm (0.0035 in.)
	Drive pinion preload (at starting)	New bearing	1.0 - 1.6 N·m (10 - 16 kgf·cm, 8.9 - 14.2 in.·lbf)
		Reused bearing	0.5 - 0.8 N·m (5 - 8 kgf·cm, 4.4 - 7.1 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.3 in.·lbf)
	Ring gear runout	Max.	0.07 mm (0.0028 in.)
	Ring gear backlash		0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash		0.05 - 0.20 mm (0.0020 - 0.0079 in.)
	Differential case runout	Max.	0.07 mm (0.0028 in.)
	Front differential oil seal drive in depth		1.5 mm (0.059 in.)
	Side gear thrust washer thickness		0.9 mm (0.035 in.) 1.0 mm (0.039 in.) 1.1 mm (0.043 in.) 1.2 mm (0.047 in.) 1.3 mm (0.051 in.)

Front differential	Side bearing adjusting washer thickness	2.58 mm (0.1016 in.) 2.60 mm (0.1024 in.) 2.62 mm (0.1031 in.) 2.64 mm (0.1039 in.) 2.66 mm (0.1047 in.) 2.68 mm (0.1055 in.) 2.70 mm (0.1063 in.) 2.72 mm (0.1071 in.) 2.74 mm (0.1079 in.) 2.76 mm (0.1087 in.) 2.78 mm (0.1094 in.) 2.80 mm (0.1102 in.) 2.82 mm (0.1110 in.) 2.84 mm (0.1118 in.) 2.86 mm (0.1126 in.) 2.88 mm (0.1134 in.) 2.90 mm (0.1142 in.) 2.92 mm (0.1150 in.) 2.94 mm (0.1157 in.) 2.96 mm (0.1165 in.) 2.98 mm (0.1173 in.) 3.00 mm (0.1181 in.) 3.02 mm (0.1189 in.) 3.04 mm (0.1197 in.) 3.06 mm (0.1205 in.) 3.08 mm (0.1213 in.) 3.10 mm (0.1220 in.) 3.12 mm (0.1228 in.) 3.14 mm (0.1236 in.) 3.16 mm (0.1244 in.) 3.18 mm (0.1252 in.) 3.20 mm (0.1260 in.) 3.22 mm (0.1268 in.) 3.24 mm (0.1276 in.) 3.26 mm (0.1283 in.) 3.28 mm (0.1291 in.) 3.30 mm (0.1299 in.) 3.32 mm (0.1307 in.) 3.34 mm (0.1315 in.) 3.36 mm (0.1323 in.) 3.38 mm (0.1331 in.) 3.40 mm (0.1339 in.) 3.42 mm (0.1346 in.) 3.44 mm (0.1354 in.) 3.46 mm (0.1362 in.) 3.48 mm (0.1370 in.)

Front differential	Drive pinion bearing adjusting washer thickness	1.70 mm (0.067 in.) 1.73 mm (0.068 in.) 1.76 mm (0.069 in.) 1.79 mm (0.070 in.) 1.82 mm (0.072 in.) 1.85 mm (0.073 in.) 1.88 mm (0.074 in.) 1.91 mm (0.075 in.) 1.94 mm (0.076 in.) 1.97 mm (0.078 in.) 2.00 mm (0.079 in.) 2.03 mm (0.080 in.) 2.06 mm (0.081 in.) 2.09 mm (0.082 in.) 2.12 mm (0.083 in.) 2.15 mm (0.085 in.) 2.18 mm (0.086 in.) 2.21 mm (0.087 in.) 2.24 mm (0.088 in.) 2.27 mm (0.089 in.) 2.30 mm (0.091 in.) 2.33 mm (0.092 in.)

Rear differential	Companion flange vertical runout Max.	0.10 mm (0.0039 in.)
	Companion flange lateral runout Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing Reused bearing	1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf) 0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)
	Ring gear runout Max.	0.05 mm (0.0020 in.)
	Ring gear backlash	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash	0.02 - 0.15 mm (0.0008 - 0.0059 in.)
	Differential case runout Max.	0.04 mm (0.0016 in.)
	Rear differential front oil seal drive in depth	0.5 mm (0.020 in.)
	Side gear thrust washer thickness	1.55 mm (0.061 in.) 1.60 mm (0.063 in.) 1.65 mm (0.065 in.) 1.70 mm (0.067 in.) 1.75 mm (0.069 in.) 1.80 mm (0.071 in.) 1.85 mm (0.073 in.) 1.90 mm (0.075 in.) 1.95 mm (0.077 in.) 2.00 mm (0.079 in.) 2.05 mm (0.081 in.) 2.10 mm (0.083 in.)
	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

Rear differential (w/ Diff. Lock)	Companion flange vertical runout	Max.	0.10 mm (0.0039 in.)
	Companion flange lateral runout	Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting)	New bearing	1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)
		Reused bearing	0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)
	Total preload (at starting)		Drive pinion preload plus 0.3 - 0.5 N·m (3 - 5 kgf·cm, 2.7 - 4.4 in.·lbf)
	Ring gear runout	Max.	0.05 mm (0.0020 in.)
	Ring gear backlash		0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash		0.02 - 0.15 mm (0.0008 - 0.0059 in.)
	Differential case runout	Max.	0.04 mm (0.0016 in.)
	Rear differential front oil seal drive in depth		0.5 mm (0.020 in.)
	Side gear thrust washer thickness		1.55 mm (0.061 in.) 1.60 mm (0.063 in.) 1.65 mm (0.065 in.) 1.70 mm (0.067 in.) 1.75 mm (0.069 in.) 1.80 mm (0.071 in.) 1.85 mm (0.073 in.) 1.90 mm (0.075 in.) 1.95 mm (0.077 in.) 2.00 mm (0.079 in.) 2.05 mm (0.081 in.) 2.10 mm (0.083 in.)
	Ring gear backlash adjusting washer thickness	Mark	
		1	2.67 mm (0.1051 in.)
		2	2.70 mm (0.1063 in.)
		3	2.73 mm (0.1075 in.)
		4	2.76 mm (0.1087 in.)
		5	2.79 mm (0.1098 in.)
		6	2.82 mm (0.1110 in.)
		7	2.85 mm (0.1122 in.)
		8	2.88 mm (0.1134 in.)
		9	2.91 mm (0.1146 in.)
		10	2.94 mm (0.1157 in.)
		11	2.97 mm (0.1169 in.)
		12	3.00 mm (0.1181 in.)
		13	3.03 mm (0.1193 in.)
		14	3.06 mm (0.1205 in.)
		15	3.09 mm (0.1217 in.)
		16	3.12 mm (0.1228 in.)
		17	3.15 mm (0.1240 in.)
		18	3.18 mm (0.1252 in.)
		19	3.21 mm (0.1264 in.)
		20	3.24 mm (0.1276 in.)
		21	3.27 mm (0.1287 in.)
		22	3.30 mm (0.1299 in.)
		23	3.33 mm (0.1311 in.)

Rear differential (w/ Diff. Lock)	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

Rear differential (w/ LSD)	Companion flange vertical runout Max.	0.10 mm (0.0039 in.)
	Companion flange lateral runout Max.	0.10 mm (0.0039 in.)
	Drive pinion preload (at starting) New bearing	1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)
	Reused bearing	0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)
	Total preload (at starting)	Drive pinion preload plus 0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)
	Ring gear runout Max.	0.05 mm (0.0020 in.)
	Ring gear backlash	0.13 - 0.18 mm (0.0051 - 0.0071 in.)
	Side gear backlash	0.02 - 0.15 mm (0.0008 - 0.0059 in.)
	Differential case runout Max.	0.04 mm (0.0016 in.)
	Side gear thrust washer thickness (Reference)	1.97 - 2.06 mm (0.0776 - 0.0811 in.)
	Clutch plate thickness (Reference)	1.97 - 2.03 mm (0.0776 - 0.0799 in.)
	Compression spring free length (Reference)	32.8 mm (1.291 in.)
	Rear differential front oil seal drive in depth	0.5 mm (0.020 in.)
	Adjusting shim thickness Mark	
	A	0.20 mm (0.0079 in.)
	B	0.25 mm (0.0098 in.)
	C	0.30 mm (0.0118 in.)
	D	0.35 mm (0.0138 in.)
	Tooth contact pattern adjusting washer thickness	1.050 mm (0.04134 in.) 1.075 mm (0.04232 in.) 1.100 mm (0.04331 in.) 1.125 mm (0.04429 in.) 1.150 mm (0.04528 in.) 1.175 mm (0.04626 in.) 1.200 mm (0.04724 in.) 1.225 mm (0.04823 in.) 1.250 mm (0.04921 in.) 1.275 mm (0.05020 in.) 1.300 mm (0.05118 in.) 1.325 mm (0.05217 in.) 1.350 mm (0.05315 in.) 1.375 mm (0.05413 in.) 1.400 mm (0.05512 in.) 1.425 mm (0.05610 in.) 1.450 mm (0.05709 in.) 1.475 mm (0.05807 in.) 1.500 mm (0.05906 in.) 1.525 mm (0.06004 in.) 1.550 mm (0.06102 in.)

SS0OK-05

TORQUE SPECIFICATION

FRONT			
Part tightened	N·m	kgf·cm	ft·lbf
Hub bolt	131	1,340	97
Knuckle stopper bolt lock nut	44	450	32
Steering knuckle x Brake caliper	123	1,250	91
Disc x Axle hub	74	750	55
Flange x Axle hub	33	335	24
Axle hub bearing lock nut	64	650	47
Flexible hose x Bracket	28	290	21
ABS speed sensor installation bolt	8.0	82	71 in.·lbf
ABS speed sensor wire harness x Steering knuckle arm	13	130	10
ABS speed sensor wire harness bracket x Steering knuckle	28	290	21
Steering knuckle arm x Steering knuckle	147	1,500	108
Tie rod end x Steering knuckle arm	122	1,250	90
Upper suspension arm x Steering knuckle	110	1,125	81
Lower suspension arm x Steering knuckle	159	1,625	117
Oil seal x Steering knuckle	18	185	13
Propeller shaft x Companion flange	80	820	59
Body x No. 3 frame crossmember	68	695	50
No. 3 frame crossmember x Differential support	186	1,900	137
Differential support x Differential tube	186	1,900	137
Differential support x Differential carrier	78	800	58
Differential support x Body	186	1,900	137
Differential carrier cover x Body	186	1,900	137
Breather hose bracket x Carrier cover	17	173	13
Filler plug	49	500	36
Drain plug	49	500	36
Differential tube x Differential carrier	105	1,070	77
Bearing cap x Differential carrier	85	870	63
Oil deflector x Carrier cover	7.3	74	65 in.·lbf
Carrier cover x Differential carrier	47	475	35
Differential case x Ring gear	97	985	72
Companion flange x Drive pinion	See page SA-47		
Lower suspension arm x Shock absorber	135	1,400	100
Piston rod x Body	68	700	50
Torque arm x Lower suspension arm	225	2,300	166
ABS speed sensor wire harness x Upper suspension arm	13	130	10
Upper suspension arm x Body	98	1,000	72
Stabilizer bar link x Lower suspension arm	52	530	38
Lower suspension arm x Body	230	2,350	170
Stabilizer bar x Stabilizer bar link	25	250	18
Stabilizer bar bracket x Body	18	185	13

REAR			
Part tightened	N·m	kgf·cm	ft·lbf
Hub bolt	131	1,340	97
Axle housing x Brake caliper	103	1,050	76
Axle housing x Backing plate	123	1,250	91
Brake line	15	150	11
Shock Absorber x Axle housing	98	1,000	72
Stabilizer bar bracket x Body	18	185	13
Follow spring x Body	28	290	21
Piston rod x Body	69	704	51
Lateral control rod x Body	150	1,530	111
Upper control arm x Body	150	1,530	111
Upper control arm x Axle housing	150	1,530	111
Lower control arm x Body	150	1,530	111
Lower control arm x Axle housing	150	1,530	111
Heat insulator x Body	18	185	13
Lateral control rod x Axle housing	149	1,520	110
Stabilizer bar x Stabilizer bar bracket	26	270	19
Stabilizer bar link x Stabilizer bar bracket	15	150	11
Stabilizer bar bracket x Axle housing	18	185	13
Propeller shaft x Companion flange	106	1,080	78
Companion flange x Drive pinion w/ Diff. Lock w/ LSD	See page SA-107 See page SA-127 See page SA-150		
Differential carrier x Axle housing	72	740	53
Filler plug	49	500	36
Drain plug	49	500	36
Differential case x Ring gear	137	1,400	101
Differential carrier			
Bearing cap x Differential carrier	83	850	61
Adjusting nut lock x Bearing cap	13	130	10
RH differential case x LH differential case	47	480	35
Differential carrier (w/ Diff. Lock)			
No. 1 actuator protector x Actuator	15	150	11
No. 2 actuator protector x Axle housing	36	367	27
Bearing cap x Differential carrier	113	1,150	83
Cover x Differential carrier	18	185	13
Actuator x Differential carrier	24	240	18
Actuator x Shift fork	20	200	15
Indicator switch	40	410	30
Differential cover x Differential case	58	590	43
Differential carrier (w/ LSD)			
Bearing cap x Differential carrier	83	850	61
Adjusting nut lock x Bearing cap	13	130	10
RH differential case x LH differential case	47	480	35

SFI

SS0CB-20

SERVICE DATA

Fuel pressure regulator	Fuel pressure	at no vacuum	265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)
Fuel pump	Resistance	at 20˚C (68˚F)	0.2 - 3.0 Ω
Injector	Resistance Injection volume Difference between each cylinder Fuel leakage	at 20˚C (68˚F)	13.4 - 14.2 Ω 56 - 69 cm^3 (3.4 - 4.2 cu in.) per 15 seconds 13 cm^3 (0.8 cu in.) or less 1 drop or less per 12 minutes
MAF meter	Resistance (THA - E2)	at -20˚C (-4˚F) at 20˚C (68˚F) at 60˚C (140˚F)	12.5 - 16.9 kΩ 2.19 - 2.67 kΩ 0.50 - 0.68 kΩ
Throttle body	Throttle body fully closed angle		5.5˚
Accelerator pedal position sensor	Standard throttle valve opening percentage Sensor lever full-open position		60 % or more
Throttle control motor	Motor resistance	at 20˚C (68˚F)	0.3 - 100 Ω
VSV for EVAP	Resistance	at 20˚C (68˚F)	30 - 34 Ω
VSV for vapor pressure sensor	Resistance	at 20˚C (68˚F)	30 - 36 Ω
ECT sensor	Resistance	at -20˚C (-4˚F) 0˚C (32˚F) 20˚C (68˚F) 40˚C (104˚F) 60˚C (140˚F) 80˚C (176˚F)	10 - 20 kΩ 4 - 7 kΩ 2 - 3 kΩ 0.9 - 1.3 kΩ 0.4 - 0.7 kΩ 0.2 - 0.4 kΩ
Vapor pressure sensor	Power source voltage		4.5 - 5.5 V
Heated oxygen sensor	Heater coil resistance	at 20˚C (68˚F)	11 - 16 Ω
Fuel cut rpm		Fuel return rpm	1,000 rpm
Fuel pump resistar	Resistance	at 20˚C (68˚F)	0.70 - 0.76 Ω
VSV for CCV	Resistance	at 20˚C (68˚F)	24 - 30 Ω

SS0CC-19

TORQUE SPECIFICATION

Part tightened		N·m	kgf·cm	ft·lbf
Fuel line				
Union bolt type		39	400	29
Flare nut type	for use with SST	34	345	25
		38	380	28
Fuel pressure pulsation damper x Delivery pipe	for use with SST	33	340	24
		39	400	29
Fuel pressure regulator x RH delivery pipe		7.5	80	66 in.·lbf
Fuel tank vent tube set plate x Fuel tank		3.5	35	31 in.·lbf
Front fuel pipe x Delivery pipe		39	400	29
Front fuel pipe x Lower intake manifold		7.5	80	66 in.·lbf
Fuel return pipe x LH delivery pipe		7.5	80	66 in.·lbf
Delivery pipe x Lower intake manifold		18	185	13
Fuel sender gauge x Fuel tank		1.5	15	13 in.·lbf
Fuel tank x Body		39	400	29
Drain plug x Fuel tank		6.5	65	58 in.·lbf
Fuel tank filler pipe x Fuel tank		3.5	35	31 in.·lbf
Cutoff valve cover x Fuel tank		1.5	15	13 in.·lbf
Accelerator pedal position sensor x Body		5.0	51	44 in.·lbf
Throttle body x Upper intake manifold, Lower intake manifold		18	185	13
Upper intake manifold, Accelerator cable bracket x Lower intake manifold		18	185	13
ECT sensor x Front water bypass joint		20.4	208	15
Knock sensor x Cylinder block		45	450	33
Heated oxygen sensor x Exhaust manifold		44	450	32
Heated oxygen sensor x Front exhaust pipe		20	200	14
No.1 rear seat x Body		41	420	30
MAF meter x Air cleaner		1.68	17	15 in.·lbf
Fuel pump resistor x Body		12	122	8.8

STEERING

SERVICE DATA

SS0OH-05

POWER STEERING FLUID		
Oil level rise	Maximum	Below 5 mm (0.20 in.)
Oil pressure at idle speed with valve closed	Minimum	10,000 kPa (102 kgf/cm^2, 1,451 psi)
STEERING WHEEL		
Steering wheel freeplay	Maximum	40 mm (1.58 in.)
Steering effort at idle speed	Maximum	4.9 N·m (50 kgf·cm, 43 in.·lbf)
PS VANE PUMP		
Pump shaft and front housing bushing oil clearance	STD	0.021 - 0.043 mm (0.00083 - 0.00169 in.)
	Maximum	0.070 mm (0.00276 in.)
Pump shaft and rear housing bushing oil clearance	STD	0.020 - 0.077 mm (0.00079 - 0.00303 in.)
	Maximum	0.080 mm (0.00315 in.)
Vane plate thickness	Minimum	1.405 mm (0.0531 in.)
Vane plate and pump rotor groove clearance	Maximum	0.03 mm (0.0012 in.)
Flow control valve spring length	Minimum	31.3 mm (1.2323 in.)
Pump rotating torque	Maximum	0.28 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less
PS GEAR		
Steering rack runout	Maximum	0.03 mm (0.0118 in.)
Total preload	Center area	1.8 - 2.2 N·m (18.4 - 22.4 kgf·cm, 16.0 - 19.5 in.·lbf)
	End area	1.3 - 1.7 N·m (13.3 - 17.3 kgf·cm, 11.5 - 15.0 in.·lbf)

SS0OI-07

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
STEERING COLUMN			
Steering wheel set nut	50	510	37
Steering wheel pad set screw (Torx screw)	8.8	90	78 in.·lbf
Steering column assembly set nut and bolt	25	260	19
Intermediate shaft assembly x Sliding yoke	34	350	25
Sliding yoke x No. 2 Intermediate shaft assembly	34	350	25
Control valve shaft x No. 2 Intermediate shaft assembly	34	350	25
Main shaft assembly x Intermediate shaft assembly	34	350	25
Hole cover x Body	13	130	9
TILT STEERING COLUMN:			
Tube attachment x Column tube	15	150	11
Tilt steering bolt	20	210	15
No. 2 lower cover set nut	25	260	19
POWER TILT AND POWER TELESCOPIC STEERING COLUMN:			
Steering column protector No. 1 set bolt	15	150	11
Power tilt motor set bolt	20	210	15
Power telescopic motor set bolt	8.8	90	78 in.·lbf
Column tube stopper	19	190	14
Tube attachment x Column tube	15	150	11
Telescopic steering slider support set bolt	11	110	8
Telescopic steering screw set nut	2.0	20	17 in.·lbf
No. 2 lower cover set nut	25	260	19
Column upper tube sub-assembly x Column upper tube assembly	20	210	15
Telesco lever lock bolt	10	100	7
PS VANE PUMP			
Union bolt x Pressure feed tube	56	575	42
PS vane pump assembly set bolt	17	175	13
Suction port union set bolt	12	120	9
Pressure port union	69	700	51
Rear housing set bolt	22	225	16
PS GEAR			
Cylinder end stopper	110 (145)	1,122 (1,480)	81 (107)
Bearing guide nut	24.5	250	19
Control valve housing set bolt	18	180	13
Rack guide spring cap	25	250	18
Rack guide spring cap lock nut	51 (70)	520 (700)	38 (51)
Rack x Rack end	99 (132)	1,014 (1,350)	74 (98)
Tie rod end lock nut	55	560	41
Turn pressure tube union nut	23 (24.5)	230 (250)	17 (18)
PS gear assembly set bolt and nut	120	1,250	89
Return tube x Control valve housing	50 (44)	510 (450)	37 (29)
Pressure feed tube x Control valve housing	42	430	31
Tube clamp set bolt	18	180	13

Tie rod end x Steering knuckle	72	730	53
Engine oil filter assembly set bolt and nut	18	180	13

( ): For use without SST

STARTING

SERVICE DATA

SS0OD-01

Starter	Rated voltage and output power		12 V 2.0 kW
	No-load characteristics	Current	100 A or less at 11.5 V
		rpm	2,500 rpm or less
	Brush length	STD	15.0 mm (0.591 in.)
		Minimum	9.0 mm (0.354 in.)
	Spring installed load	STD	21.5 - 27.5 N (2.2 - 2.8 kgf, 4.8 - 6.2 lbf)
		Minimum	12.7 N (1.3 kgf, 2.9 lbf)
	Commutator		
	Diameter	STD	35.0 mm (1.378 in.)
		Minimum	34.0 mm (1.339 in.)
	Undercut depth	STD	0.7 mm (0.028 in.)
		Minimum	0.2 mm (0.008 in.)
	Circle runout	Maximum	0.05 mm (0.0020 in.)
	Field frame		
	Shunt coil resistance	at 20˚C (68˚F)	1.5 - 1.9 Ω
	Magnetic switch		
	Contact plate for wear	Maximum	0.9 mm (0.035 in.)

SS0OE-01

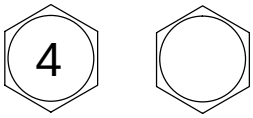
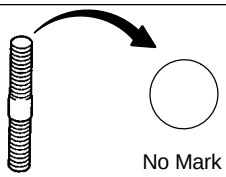
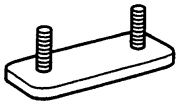
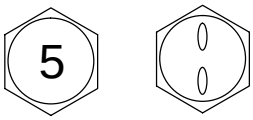
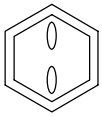
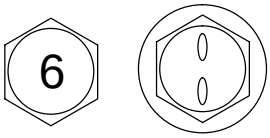
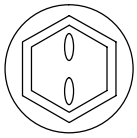
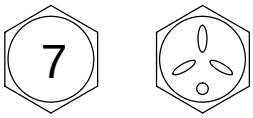
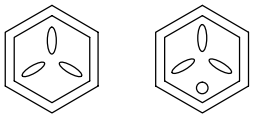
TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Terminal 30 nut, Terminal C nut x Terminal bolt	17	170	13
End cover x Magnetic switch housing	3.6	37	32 in.·lbf
End cover x Brush holder	3.8	39	34 in.·lbf
Starter hosing x Magnetic switch	9.3	95	82 in.·lbf
End cover with field frame x Magnetic switch	9.3	95	82 in.·lbf
Lead wire of field coil x Terminal C	5.9	60	52 in.·lbf
Wire clamp, Starter wire x Starter	9.81	100	87 in.·lbf
Starter x Cylinder block	39	400	29

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS0ZS-01

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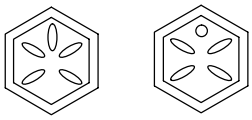
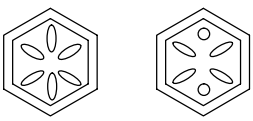
				10T
				11T

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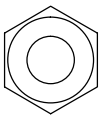
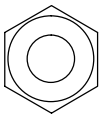
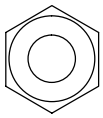
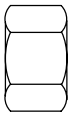
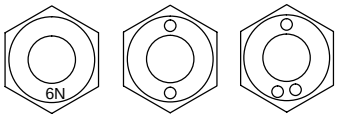
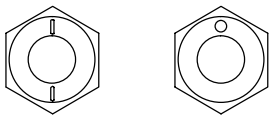
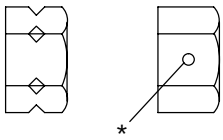
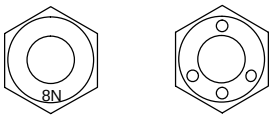
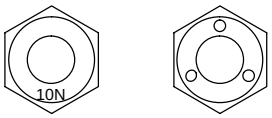
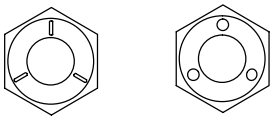
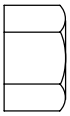
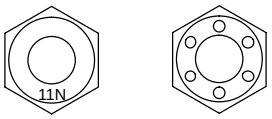
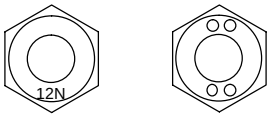
SS0ZU-01

HOW TO DETERMINE NUT STRENGTH

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

*: Nut with 1 or more marks on one side surface of the nut.

B06432

HINT:

Use the nut with the same number of the nut strength classification or the greater than the bolt strength classification number when tightening parts with a bolt and nut.

Example: Bolt = 4T

Nut = 4N or more

SS0ZT-01

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

TRANSFER

SS0OM-03

SERVICE DATA

Idler gear rear bearing adjusting shim thickness		
	Mark 2	0.30 mm (0.0118 in.)
	Mark 3	0.45 mm (0.0177 in.)
	Mark 4	2.40 mm (0.0945 in.)
	Mark 5	2.60 mm (0.1024 in.)
	Mark 6	2.80 mm (0.1102 in.)
	Mark 7	3.00 mm (0.1181 in.)
	Mark 8	3.20 mm (0.1260 in.)
	Mark 9	3.40 mm (0.1339 in.)
	Mark 10	3.60 mm (0.1417 in.)
	Mark 11	3.80 mm (0.1496 in.)
	Mark 12	4.00 mm (0.1575 in.)
	Mark 13	0.55 mm (0.0216 in.)
Output shaft rear bearing adjusting shim thickness		
	Mark B	0.30 mm (0.0118 in.)
	Mark C	0.45 mm (0.0177 in.)
	Mark D	1.00 mm (0.0394 in.)
	Mark E	1.20 mm (0.0472 in.)
	Mark F	1.40 mm (0.0551 in.)
	Mark G	1.60 mm (0.0630 in.)
	Mark H	1.80 mm (0.0709 in.)
	Mark J	2.00 mm (0.0787 in.)
	Mark K	2.20 mm (0.0866 in.)
	Mark L	2.40 mm (0.0945 in.)
	Mark M	2.60 mm (0.1024 in.)
	Mark N	0.55 mm (0.0216 in.)
Input gear snap ring thickness		
	Mark A	2.90 mm (0.1141 in.)
	Mark B	2.95 mm (0.1161 in.)
	Mark C	3.00 mm (0.1181 in.)
	Mark D	3.05 mm (0.1201 in.)
	Mark E	3.10 mm (0.1220 in.)
	Mark F	3.15 mm (0.1240 in.)
Input shaft rear ball bearing snap ring thickness		
	Mark A	2.00 mm (0.0787 in.)
	Mark B	2.10 mm (0.0827 in.)
	Mark C	2.20 mm (0.0866 in.)
	Mark D	2.30 mm (0.0906 in.)
	Mark E	2.40 mm (0.0945 in.)
Idler low gear thrust clearance	STD	0.125 - 0.275 mm (0.00492 - 0.01083 in.)
	Max.	0.275 mm (0.01083 in.)
Idler low gear radial clearance	STD	0.015 - 0.068 mm (0.00059 - 0.00268 in.)
	Max.	0.068 mm (0.00268 in.)
Idler gear diameter	STD	38.48 - 38.50 mm (1.5149 - 1.5157 in.)
	Max.	38.50 mm (1.5157 in.)
Idler low gear diameter	STD	45.52 - 45.54 mm (1.7922 - 1.7930 in.)
	Max.	45.54 mm (1.7930 in.)
High speed output gear thrust clearance	STD	0.10 - 0.25 mm (0.0039 - 0.0098 in.)
	Max.	0.25 mm (0.0098 in.)
High speed output gear radial clearance	STD	0.035 - 0.091 mm (0.00138 - 0.00358 in.)
	Max.	0.091 mm (0.00358 in.)
Center differential front case, rear case backlash	Max.	0.05 mm (0.0020 in.)

Shift fork No.2 and clutch sleeve clearance	STD	0.1 - 0.4 mm (0.0039 - 0.0157 in.)
	Max.	0.4 mm (0.0157 in.)
Center differential side gear thrust washer thickness		
		1.70 mm (0.0669 in.)
		1.85 mm (0.0728 in.)
		2.00 mm (0.0787 in.)
		2.15 mm (0.0846 in.)
		2.30 mm (0.0906 in.)
		2.45 mm (0.0965 in.)
		2.60 mm (0.1024 in.)
		2.75 mm (0.1083 in.)
		2.90 mm (0.1142 in.)
		3.05 mm (0.1201 in.)
Front drive gear piece snap ring thickness		
	Mark A	2.00 mm (0.0787 in.)
	Mark B	2.10 mm (0.0827 in.)
	Mark C	2.20 mm (0.0866 in.)
	Mark D	2.30 mm (0.0906 in.)
	Mark E	2.40 mm (0.0945 in.)
	Mark F	2.50 mm (0.0984 in.)
	Mark G	2.60 mm (0.1024 in.)
	Mark H	2.70 mm (0.1063 in.)
	Mark J	2.80 mm (0.1102 in.)
	Mark K	1.80 mm (0.0709 in.)
	Mark L	1.90 mm (0.0748 in.)
Front extension housing ball bearing snap ring thickness		
	Mark A	1.70 mm (0.0669 in.)
	Mark B	1.80 mm (0.0709 in.)
Front output shaft hub snap ring thickness		
	Mark A	1.80 mm (0.0709 in.)
	Mark B	1.90 mm (0.0748 in.)
	Mark C	2.00 mm (0.0787 in.)
	Mark D	2.10 mm (0.0827 in.)
	Mark E	2.20 mm (0.0866 in.)
Oil pump driven rotor body clearance	STD	0.08 - 0.17 mm (0.0031 - 0.0067 in.)
	Max.	0.17 mm (0.0067 in.)
Oil pump driven rotor body tip clearance	STD	0.05 - 0.15 mm (0.0020 - 0.0059 in.)
	Max.	0.15 mm (0.0059 in.)
Oil pump side clearance	STD	0.03 - 0.10 mm (0.0012 - 0.0039 in.)
	Max.	0.10 mm (0.0039 in.)
Rear extension housing ball bearing snap ring thickness		
	Mark A	1.70 mm (0.0669 in.)
	Mark B	1.80 mm (0.0709 in.)
Rear output shaft ball bearing snap ring thickness		
	Mark 1	1.95 mm (0.0768 in.)
	Mark 2	2.05 mm (0.0807 in.)
	Mark 3	2.15 mm (0.0847 in.)
	Mark 4	2.25 mm (0.0886 in.)
Motor actuator		
Terminal 1 - Terminal 5	STD resistance	0.3 - 100 Ω
Terminal 1 or 5 - body ground	STD resistance	More than 0.5 MΩ
Breather hose (from the hose end to the clip end)		5 mm (0.20 in.) or more

SS0ON-04

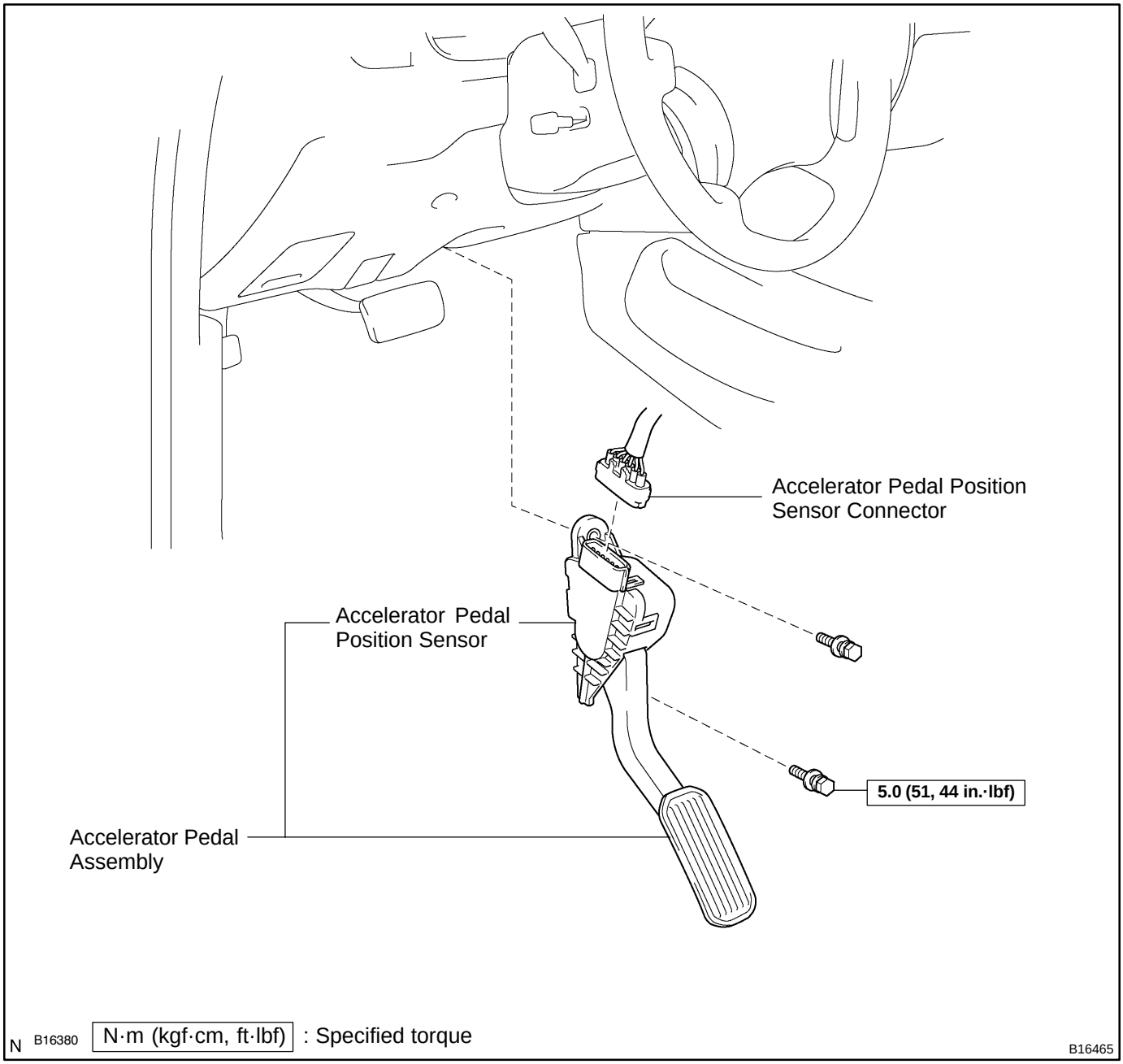
TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Crossmember x Frame	50	510	37
Crossmember x Engine rear mounting	74	750	54
Transfer x Transmission	69	700	51
Filler and drain plug	37	380	27
Oil pump plate x Rear extension housing	4.9	50	43 in.·lbf
Oil pump cover x Rear extension housing	4.9	50	43 in.·lbf
Lever lock pin	12	120	9
Oil strainer x Rear case	4.9	50	43 in.·lbf
Oil receiver x Front case	12	120	9
Case cover x Rear case	37	380	27
Rear extension housing x Rear case	37	380	27
Front extension housing x Front case	37	380	27
Transfer indicator switch (Center diff. lock)	37	380	27
Transfer indicator switch (Low switch)	37	380	27
Transfer indicator switch (Neutral switch)	37	380	27
Screw plug x Front case	19	190	14
Screw plug x Rear extension housing	29	300	22
Motor actuator x Front case	18	185	13
Differential front case x Differential rear case	See page TR-31		
Front case x Rear case	37	380	27
Crossmember x Transfer case protector	28	290	21
Speed sensor driven gear	11	115	8
Transfer shift lever rod assembly x Shift outer lever	14	140	10
Transfer control shift lever retainer x Transmission	19	190	14
Transfer x Front propeller shaft	80	820	59
Front propeller shaft x Front differential	80	820	59
Transfer x Rear propeller shaft	106	1,080	78
Rear propeller shaft x Rear differential	106	1,080	78
Rear extension housing x Retainer	39	400	29

ACCELERATOR PEDAL POSITION SENSOR

COMPONENTS

SF1UM-03



SF1UN-03

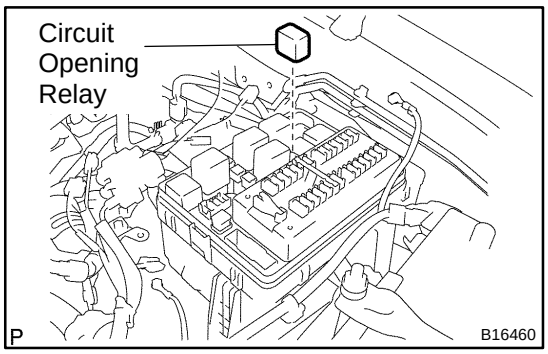
INSPECTION

INSPECT ACCELERATOR PEDAL POSITION SENSOR (See page DI-318)

If necessary, replace the accelerator pedal assembly.

NOTICE:

- **Be careful not to give a shock to the accelerator pedal assembly.**
- **Be careful not to disassemble the accelerator pedal assembly.**



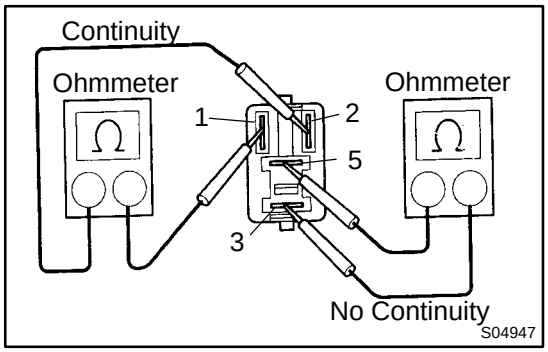
CIRCUIT OPENING RELAY

SF136-06

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE CIRCUIT OPENING RELAY (Marking: C/OPN)



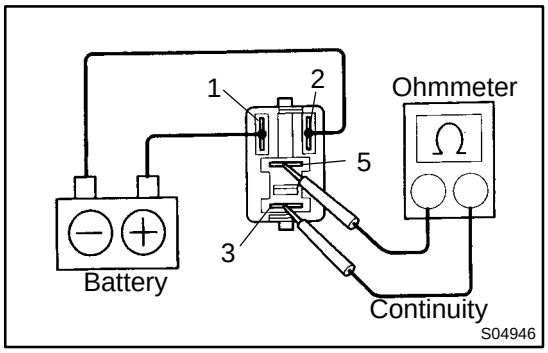
3. INSPECT CIRCUIT OPENING RELAY CONTINUITY

(a) Using an ohmmeter, check that there is a continuity between terminal 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminal 3 and 5.

If there is a continuity, replace the relay.



4. INSPECT CIRCUIT OPENING RELAY OPERATION

(a) Apply the battery positive voltage across terminal 1 and 2.

(b) Using an ohmmeter, check that there is a continuity between terminal 3 and 5.

If there is no continuity, replace the relay.

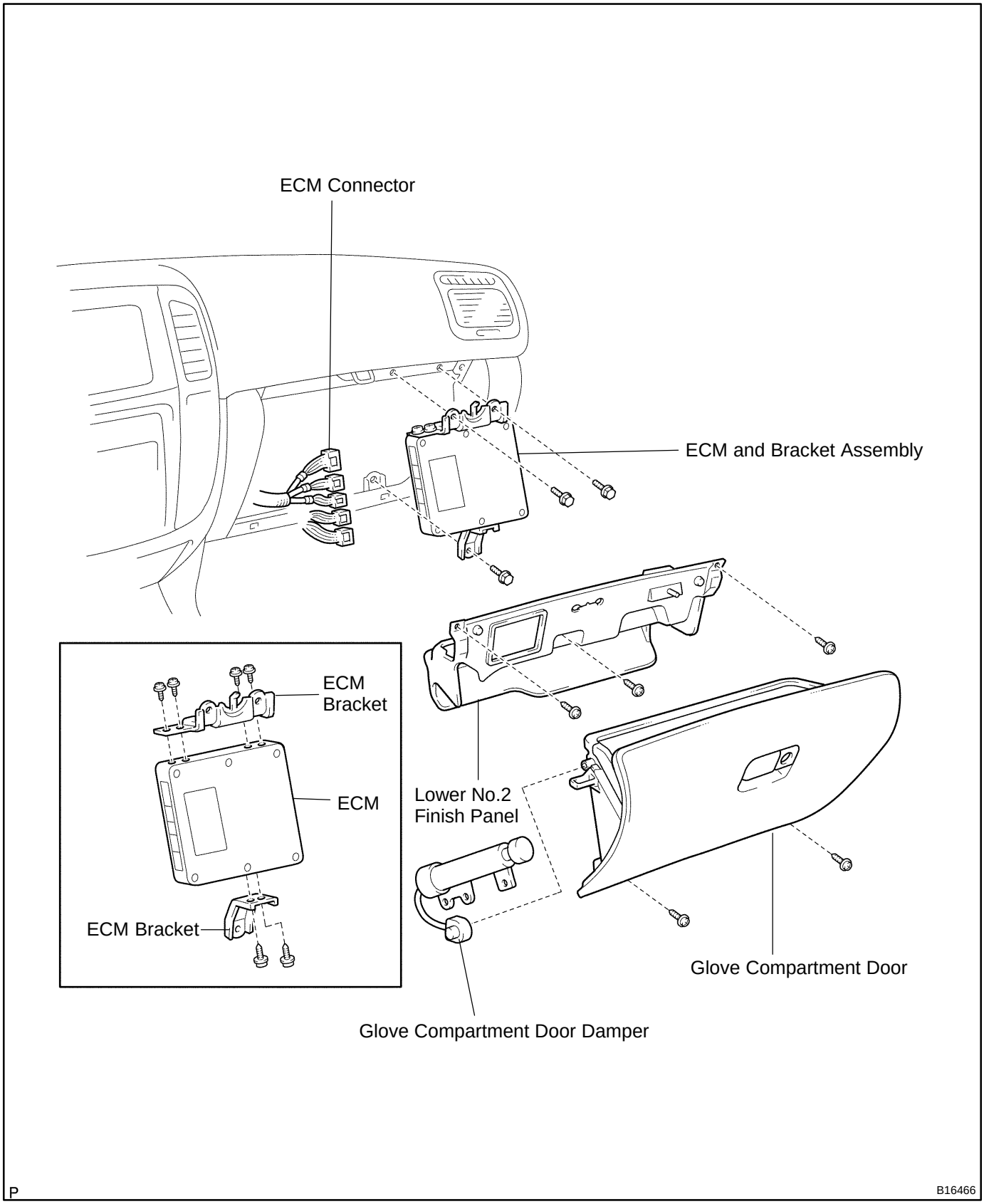
5. REINSTALL CIRCUIT OPENING RELAY

6. REINSTALL RELAY BOX COVER

ENGINE CONTROL MODULE (ECM)

COMPONENTS

SF0Q0-12



SF0Q1-02

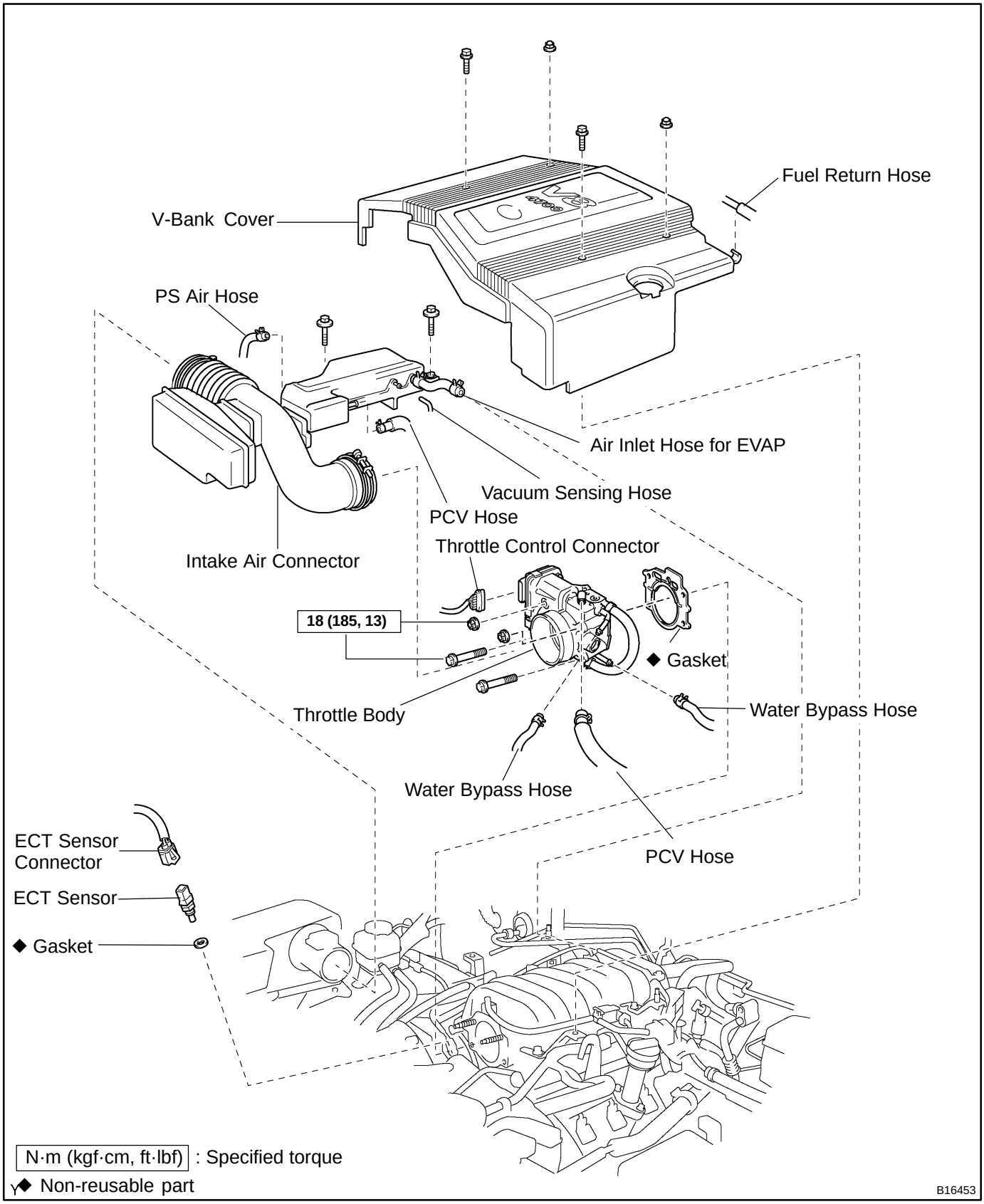
INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page DI-46)
3. REINSTALL ECM

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

SF0PN-11

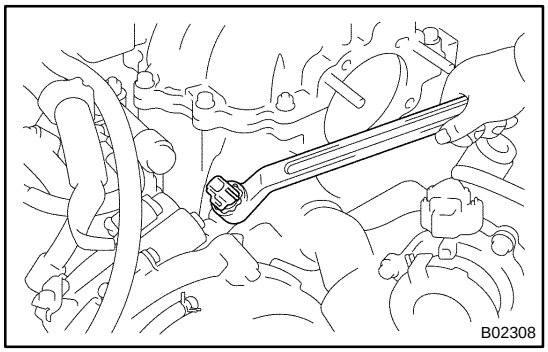
COMPONENTS



SF0PO-17

INSPECTION

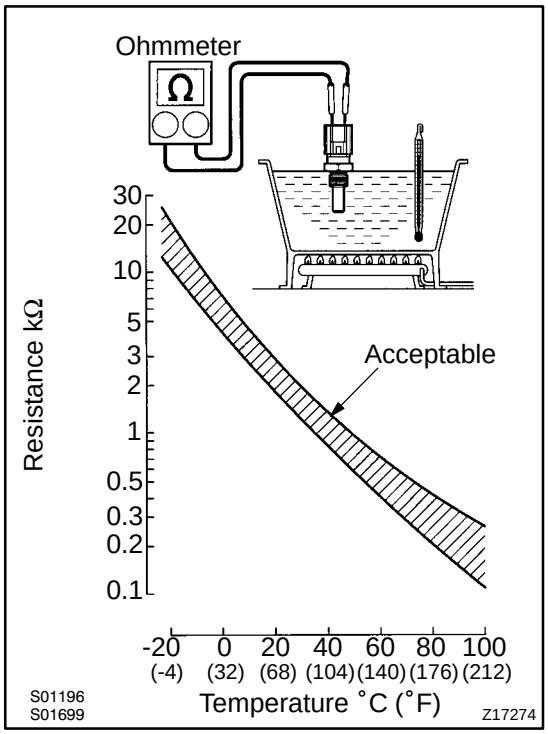
1. **DRAIN ENGINE COOLANT**
2. **REMOVE V-BANK COVER**
3. **REMOVE INTAKE AIR CONNECTOR**
4. **DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS (See page SF-36)**



5. **REMOVE ECT SENSOR**

(a) Disconnect the ECT sensor connector.

(b) Remove the ECT sensor and the gasket.



6. **INSPECT ECT SENSOR**

Using an ohmmeter, measure the resistance between the terminals.

Resistance: Refer to the graph

If the resistance is not as specified, replace the ECT sensor.

7. **REINSTALL ECT SENSOR**

(a) Install a new gasket and the ECT sensor.

Torque: 20.4 N·m (208 kgf·cm, 15 ft·lbf)

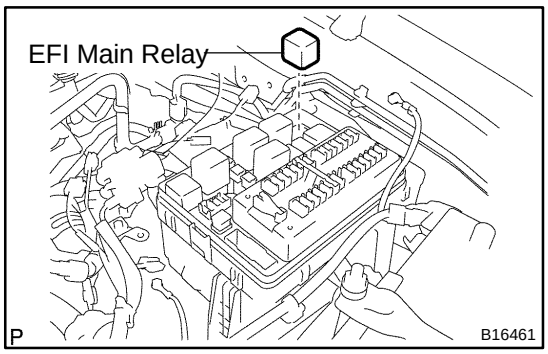
(b) Connect the ECT sensor connector.

8. **REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS**

Install a new gasket and the throttle body with the 2 bolts and 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

9. **REINSTALL INTAKE AIR CONNECTOR**
10. **REFILL WITH ENGINE COOLANT (See page CO-2)**
11. **REINSTALL V-BANK COVER**



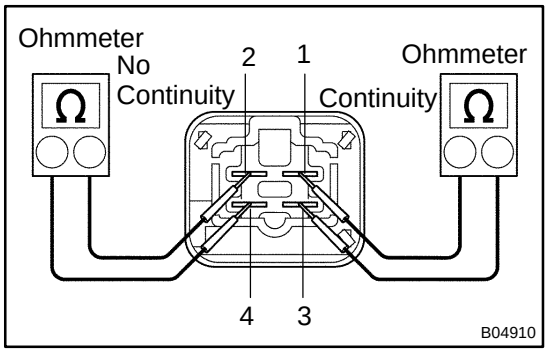
EFI MAIN RELAY

SF06G-18

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE EFI MAIN RELAY (Marking: EFI)



3. INSPECT EFI MAIN RELAY

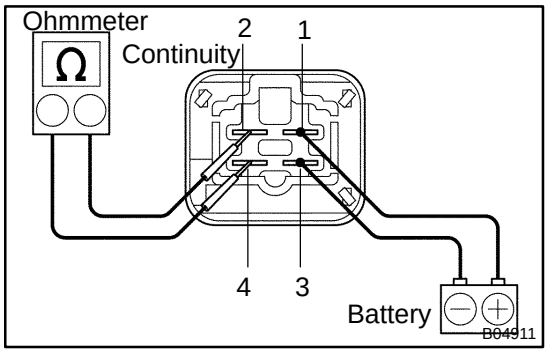
(a) Inspect the relay continuity.

(1) Using an ohmmeter, check that there is a continuity between terminal 1 and 3.

If there is no continuity, replace the relay.

(2) Check that there is no continuity between terminals 2 and 4.

If there is a continuity, replace the relay.



(b) Inspect the relay operation.

(1) Apply battery positive voltage across terminals 1 and 3.

(2) Using an ohmmeter, check that there is a continuity between terminal 2 and 4.

If there is no continuity, replace the relay.

4. REINSTALL EFI MAIN RELAY

5. REINSTALL RELAY BOX COVER

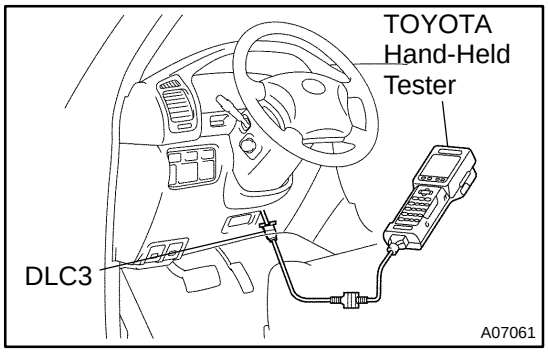
FUEL CUT RPM

SF0Q2-14

INSPECTION

1. WARM UP ENGINE

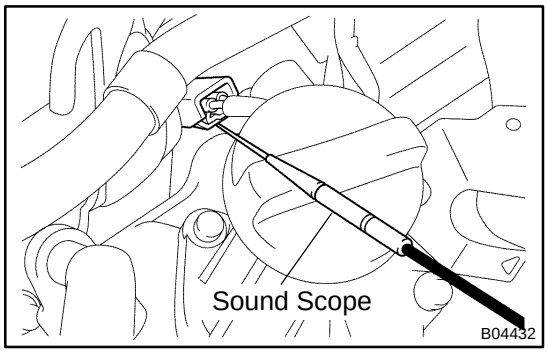
Allow the engine to warm up to normal operating temperature.



2. CONNECT TOYOTA HAND-HELD TESTER OR OBDII SCAN TOOL

(a) Connect the TOYOTA hand-held tester or OBDII scan tool to the DLC3.

(b) Please refer to the TOYOTA hand-held tester or OBDII scan tool operator's manual for further details.



3. INSPECT FUEL CUTOFF RPM OPERATION

(a) Increase the engine speed to at least 2,500 rpm.

(b) Check the injector for operating noise.

(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

- The vehicle should be at at rest during the inspection.
- Inspection with the A/C OFF.

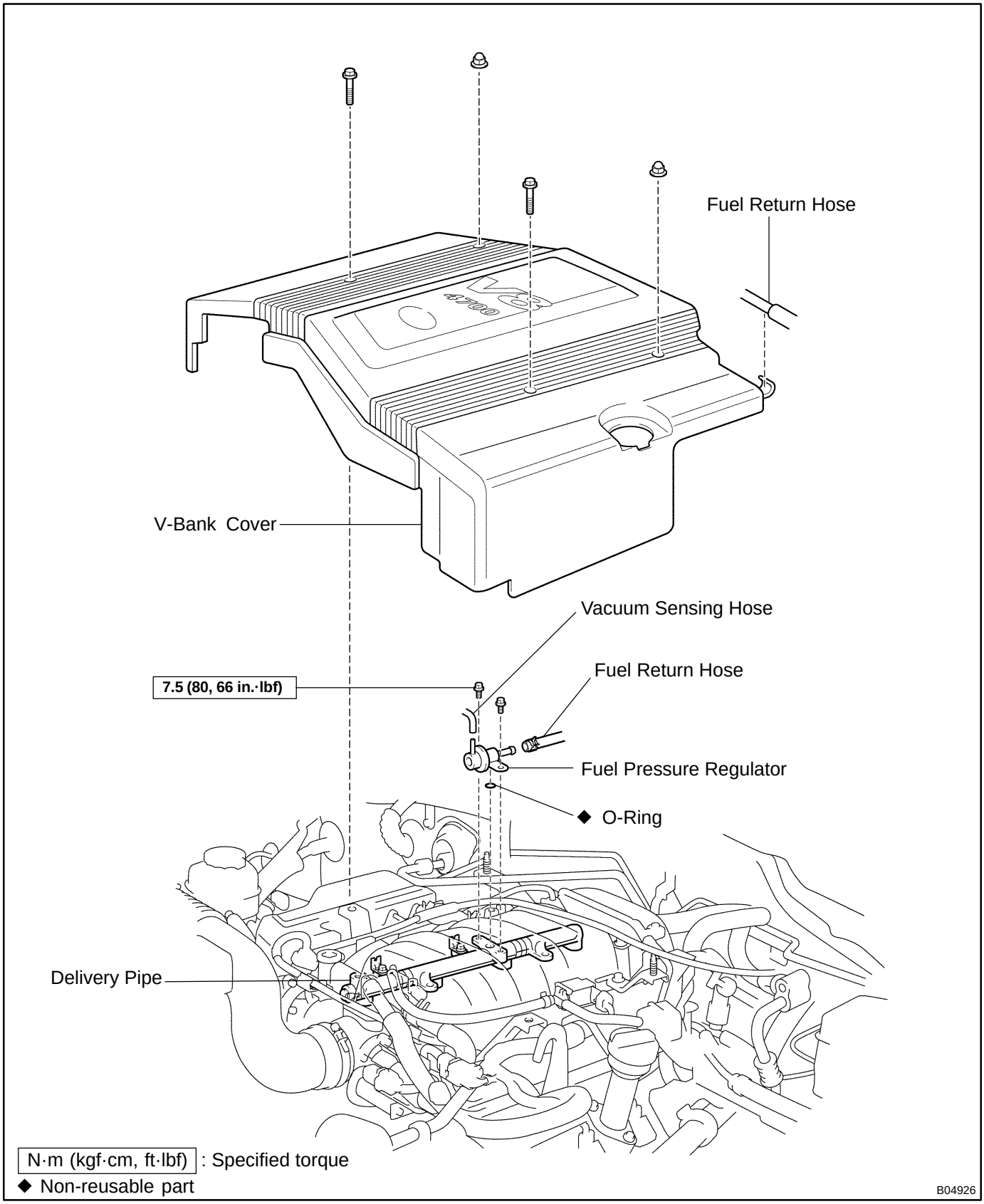
Fuel return speed: 1,000 rpm

4. DISCONNECT TOYOTA HAND- HELD TESTER OR OBDII SCAN TOOL

FUEL PRESSURE REGULATOR

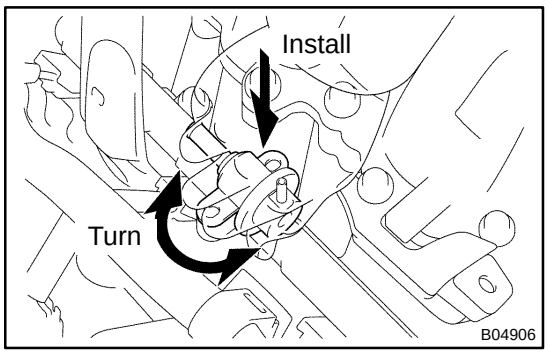
COMPONENTS

SF0XZ-11



SF0Y1-11

INSTALLATION



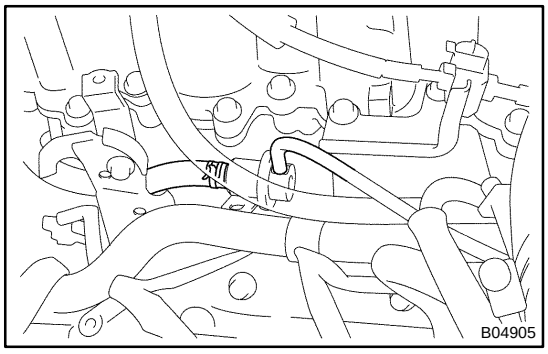
1. INSTALL FUEL PRESSURE REGULATOR

(a) Apply a light coat of gasoline to a new O-ring, and install it to the fuel pressure regulator.

(b) While turning the fuel pressure regulator left and right, install it to the delivery pipe.

(c) Install the fuel pressure regulator with the 2 bolts.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)



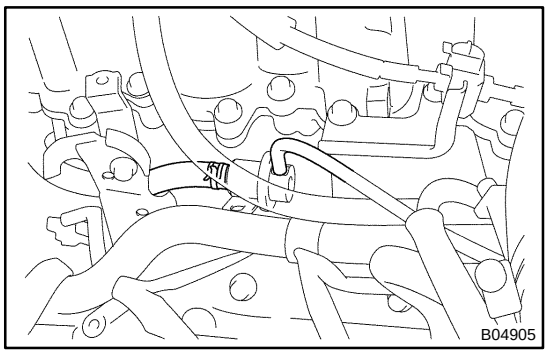
(d) Connect the vacuum sensing hose to the fuel pressure regulator.

(e) Connect the fuel return hose to the pressure regulator.

2. CHECK FOR FUEL LEAKS (See page SF-1)

3. INSTALL V-BANK COVER

SF0Y0-08



REMOVAL

1. REMOVE V-BANK COVER

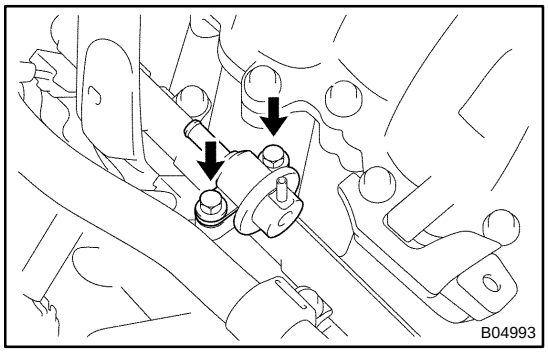
2. REMOVE FUEL PRESSURE REGULATOR

(a) Disconnect the vacuum sensing hose from the fuel pressure regulator.

(b) Disconnect the fuel return hose from the fuel pressure regulator.

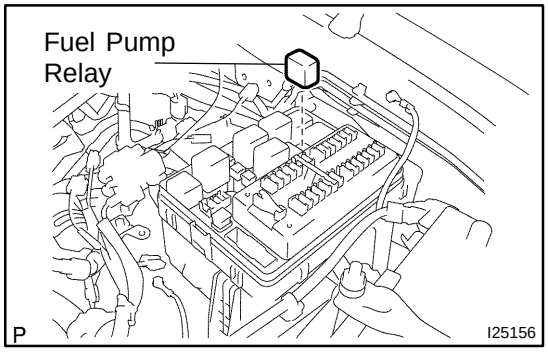
CAUTION:

Put a shop rag under the fuel pressure regulator.



(c) Remove the 2 bolts, and pull out the pressure regulator.

(d) Remove the O-ring from the fuel pressure regulator.



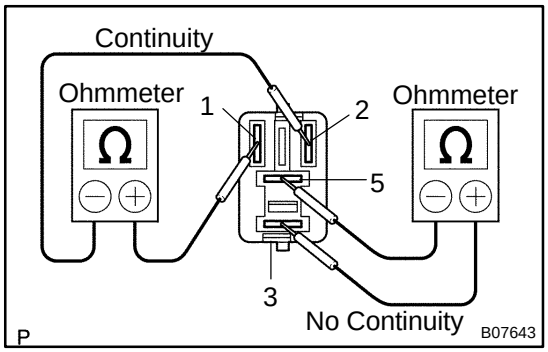
FUEL PUMP RELAY

SF137-06

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE FUEL PUMP RELAY (Marking: F/PUMP)



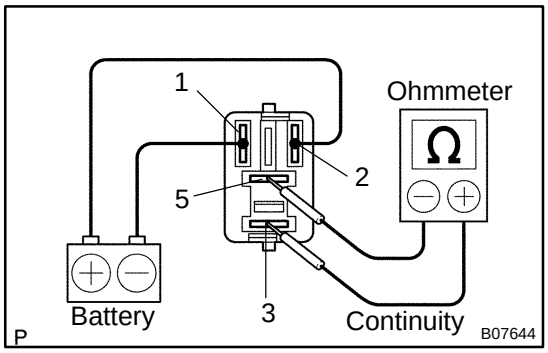
3. INSPECT FUEL PUMP RELAY CONTINUITY

(a) Using an ohmmeter, check that there is a continuity between terminal 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is a continuity, replace the relay.



4. INSPECT FUEL PUMP RELAY OPERATION

(a) Apply the battery positive voltage across terminal 1 and 2.

(b) Using an ohmmeter, check that there is a continuity between terminal 3 and 5.

If there is no continuity, replace the relay.

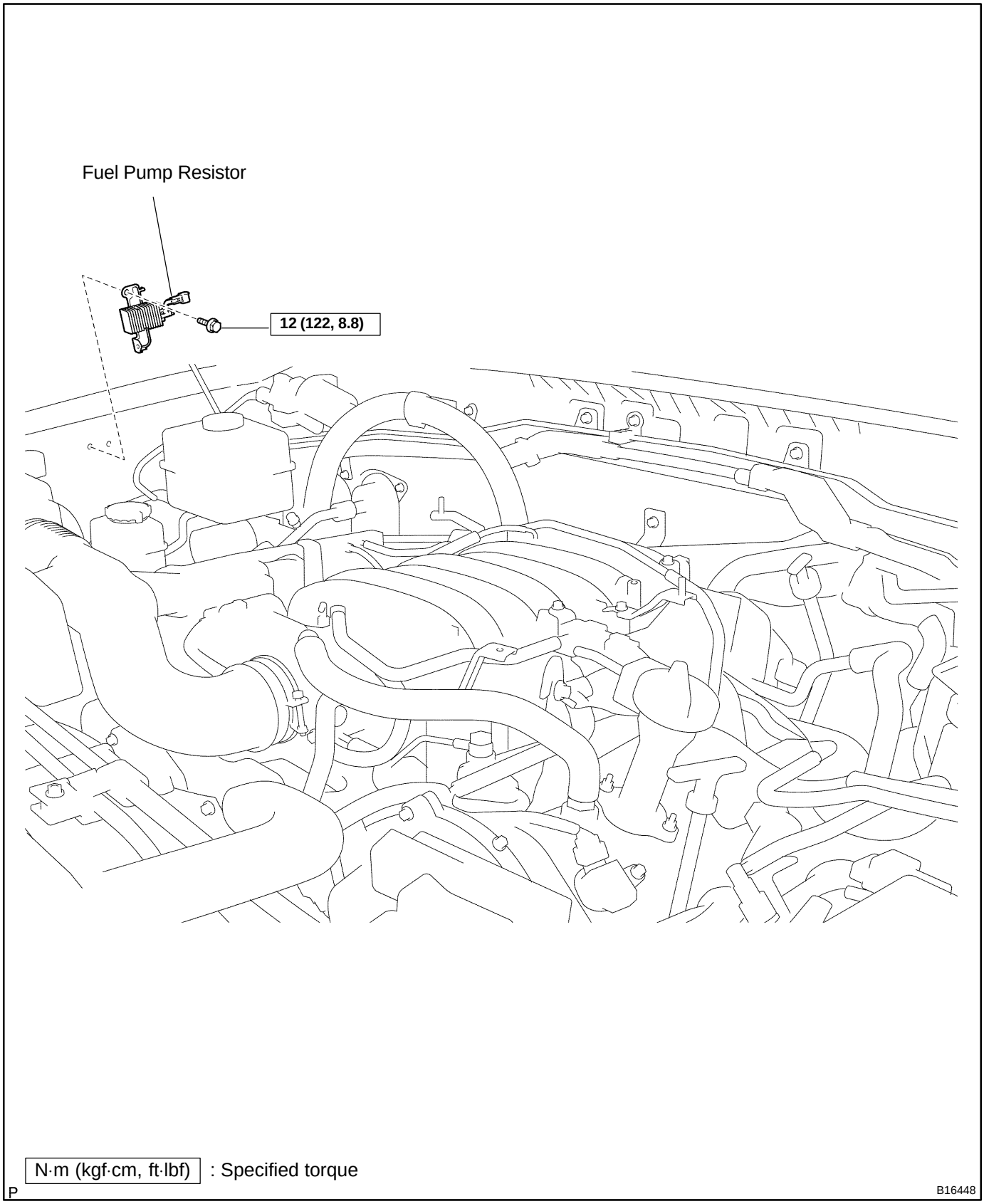
5. REINSTALL FUEL PUMP RELAY

6. REINSTALL RELAY BOX COVER

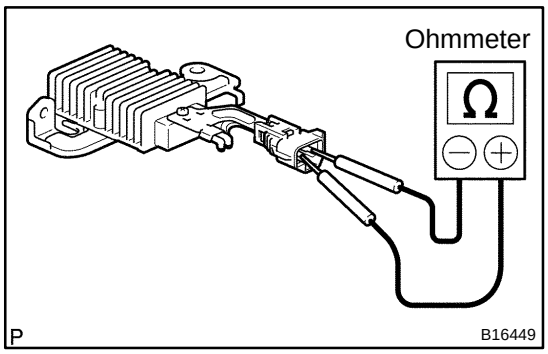
FUEL PUMP RESISTOR

COMPONENTS

SF138-04



SF139-04



INSPECTION

1. REMOVE FUEL PUMP RESISTOR

2. INSPECT FUEL PUMP RESISTOR

Using an ohmmeter, measure the resistance between the terminals.

Resistance: 0.70 - 0.76 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the resistor.

3. REINSTALL FUEL PUMP RESISTOR

Torque: 12 N·m (122 kgf·cm, 8.8 ft·lbf)

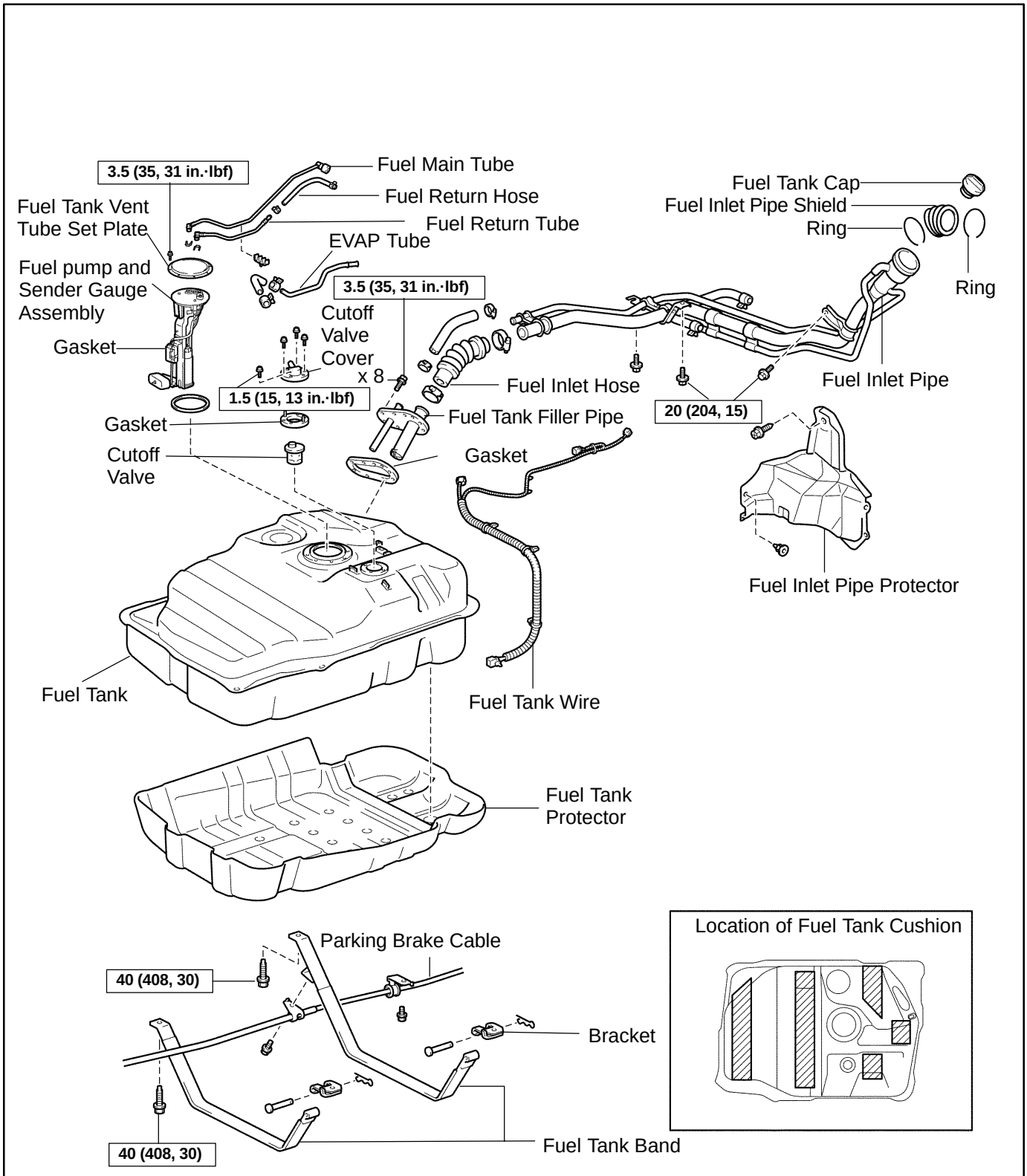
FUEL TANK AND LINE

SF0OZ-15

COMPONENTS

CAUTION:

- **Always use new gaskets when replacing the fuel tank or component parts.**
- **Apply the proper torque to all tightening parts.**



N·m (kgf·cm, ft·lbf) : Specified torque

P Non-reusable part

B16457

SF0P0-12

INSPECTION

INSPECT FUEL TANK AND LINE

(a) Check the fuel lines from cracks or leakage, and all connections for deformation.

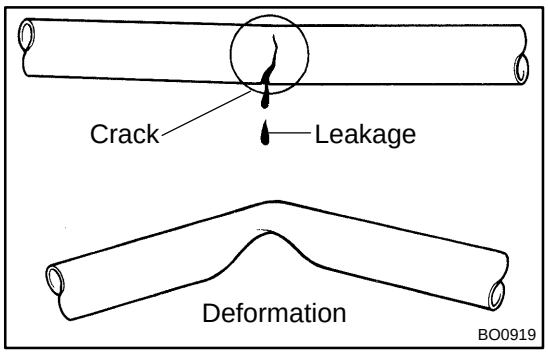
(b) Check the fuel tank vapor vent system hoses and all connections for looseness, sharp bends or damage.

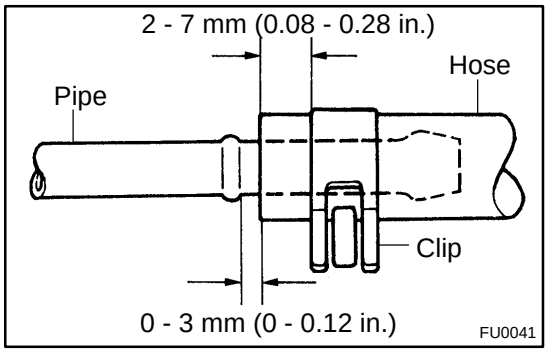
(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

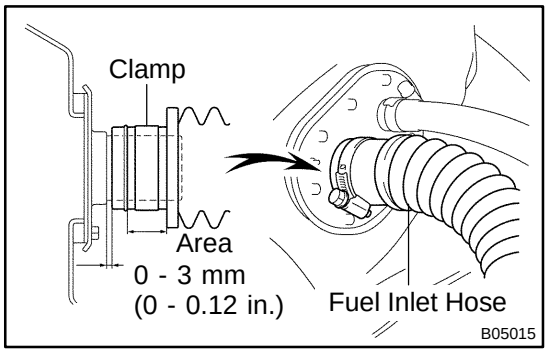
(d) Check the filler neck for damage or fuel leakage.

(e) Hose and pipe connections are as shown in the illustration.

If a problem is found, repair or replace the parts as necessary.

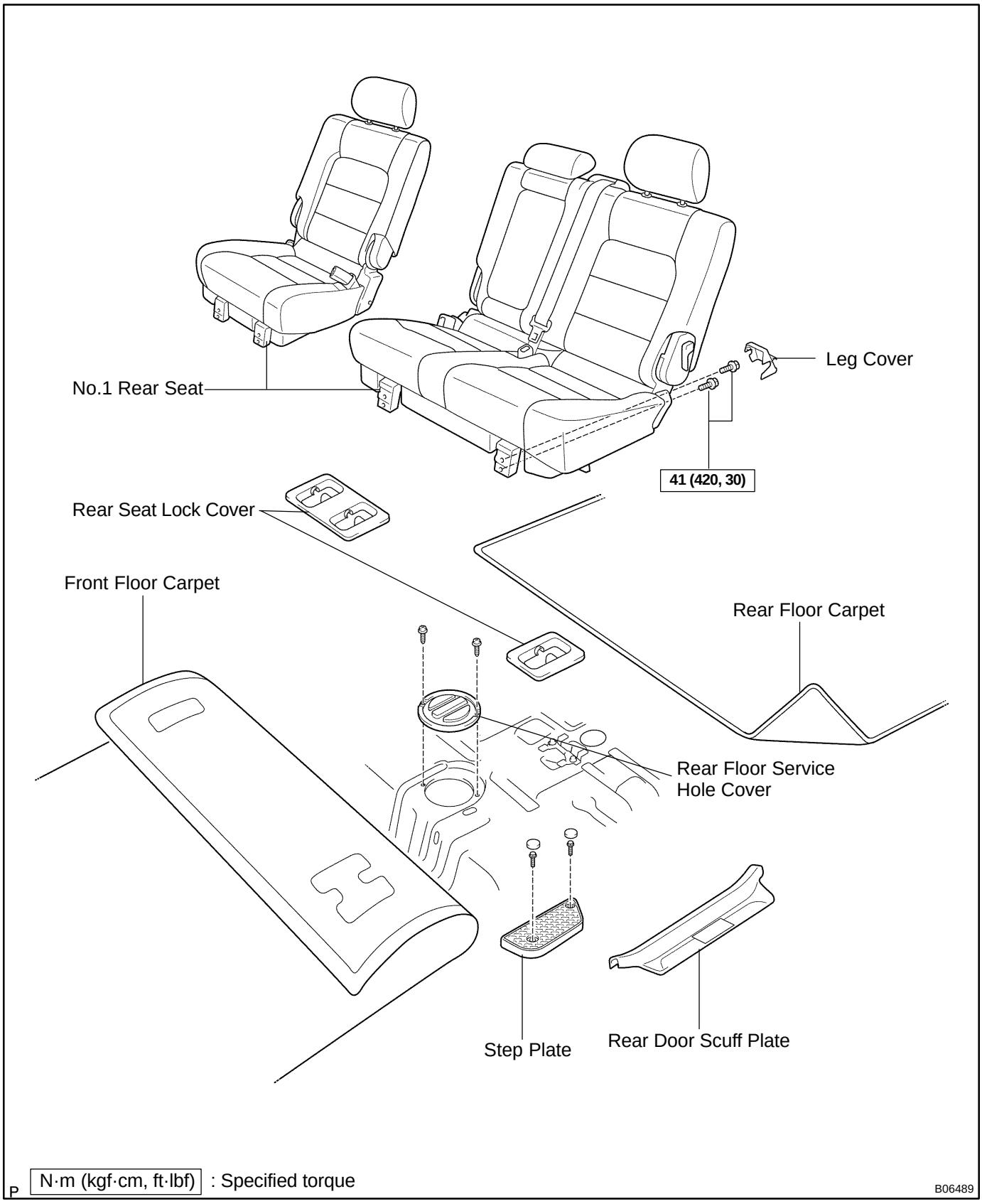


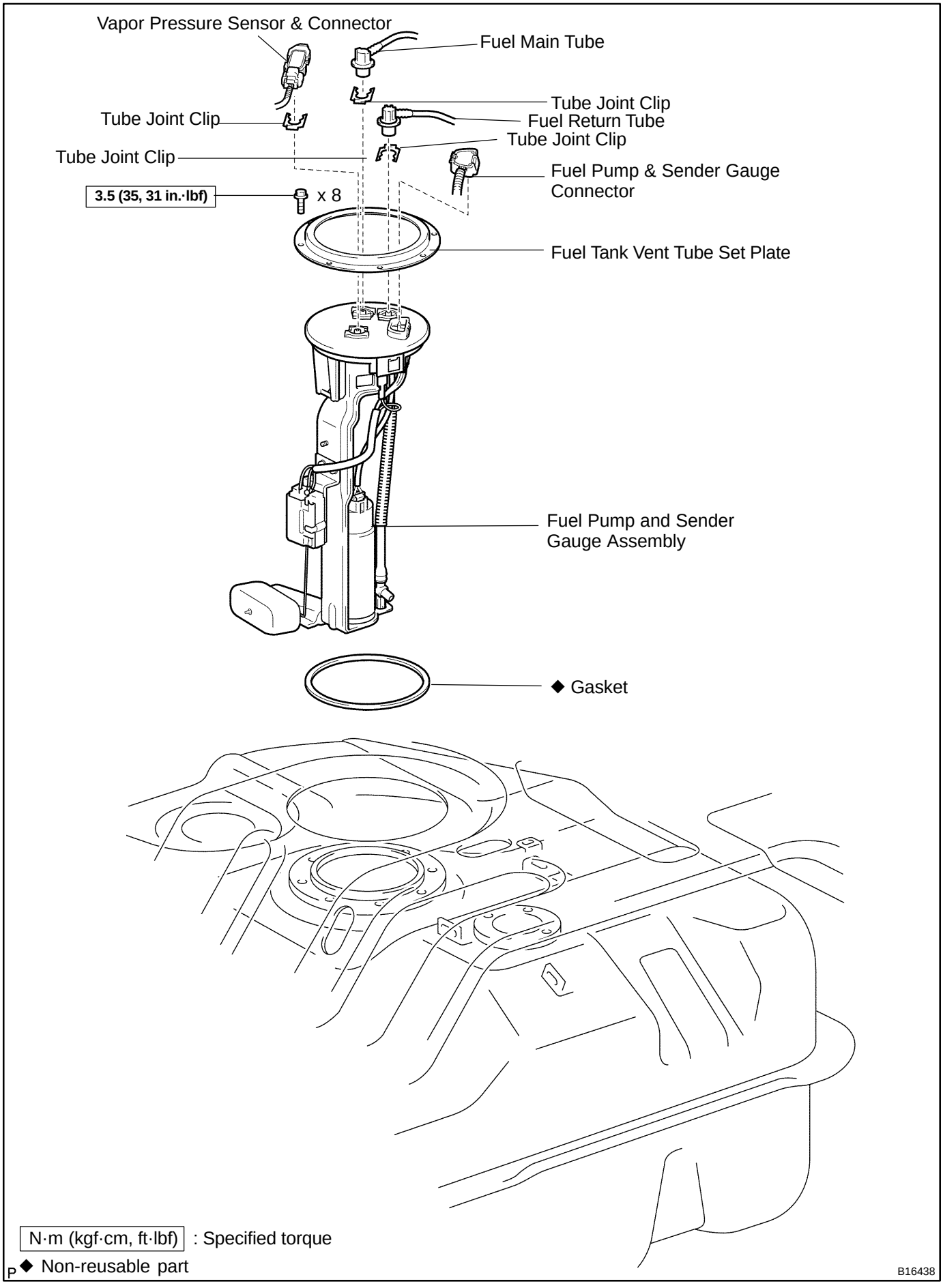


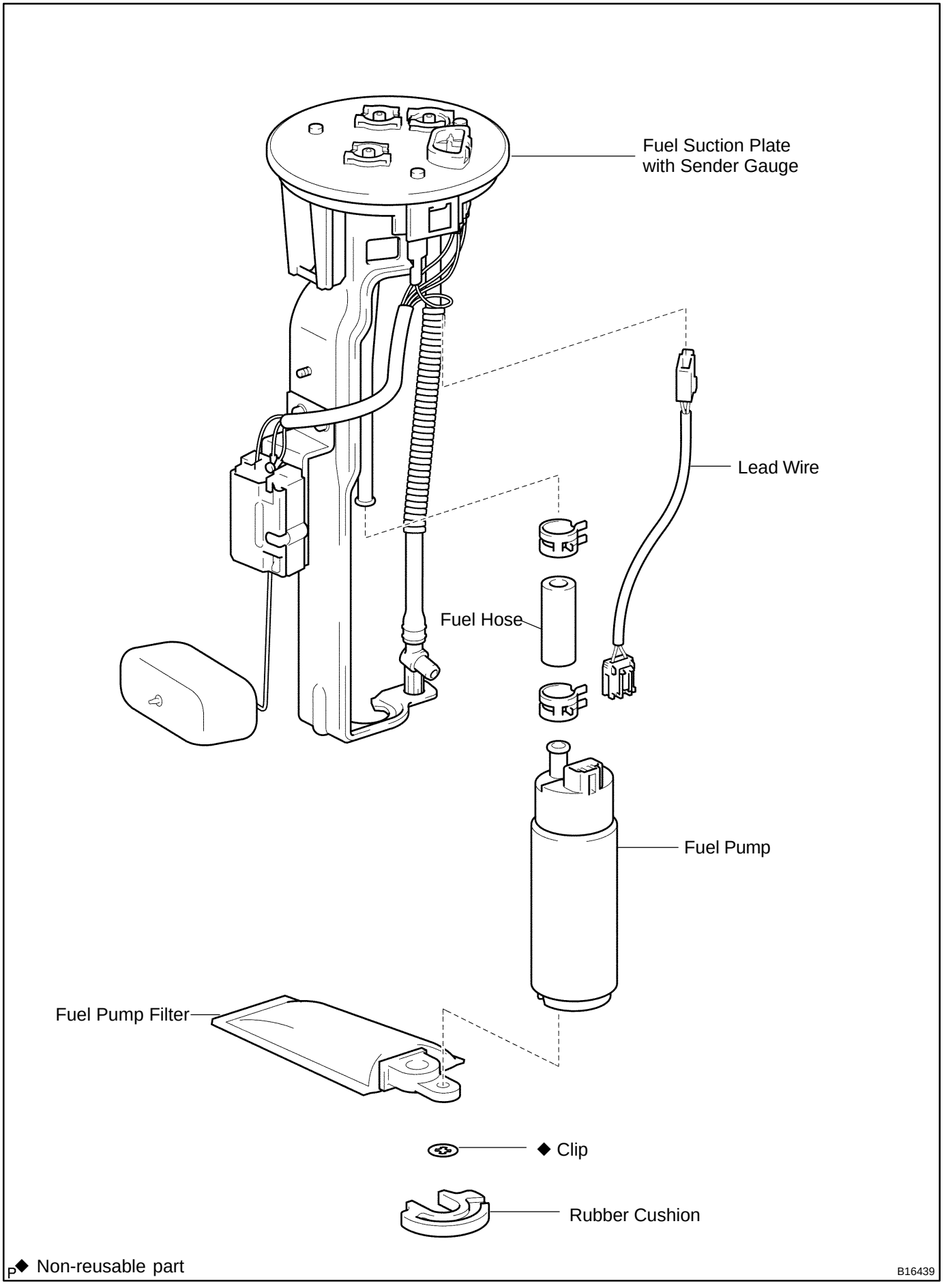


SF0XW-05

COMPONENTS

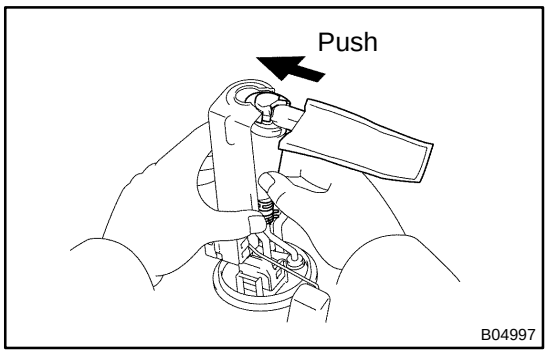



Vapor Pressure Sensor & Connector
Fuel Main Tube
Tube Joint Clip
Tube Joint Clip
Fuel Return Tube
Tube Joint Clip
Tube Joint Clip
Fuel Pump & Sender Gauge Connector
3.5 (35, 31 in.·lbf)
x 8
Fuel Tank Vent Tube Set Plate
Fuel Pump and Sender Gauge Assembly
◆ Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
B16438


Fuel Suction Plate
with Sender Gauge
Lead Wire
Fuel Hose
Fuel Pump
Fuel Pump Filter
◆ Clip
Rubber Cushion
P◆ Non-reusable part
B16439

SF0XY-04

INSTALLATION



1. INSTALL FUEL PUMP FILTER TO FUEL PUMP

Install the pump filter with a new clip.

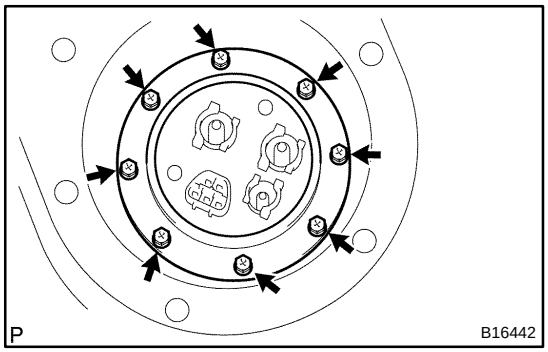
2. INSTALL FUEL PUMP TO FUEL PUMP BRACKET

(a) Install the rubber cushion to the fuel pump.

(b) Connect the fuel hose to the outlet port of the fuel pump.

(c) Install the fuel pump by pushing the lower side of the fuel pump.

3. INSTALL LEAD WIRE TO FUEL PUMP



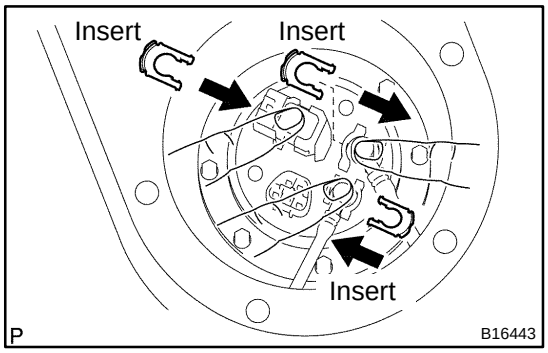
4. INSTALL FUEL PUMP AND SENDER GAUGE ASSEMBLY TO FUEL TANK

(a) Install a new gasket to the fuel suction plate.

(b) Insert the fuel pump and the sender gauge assembly into the fuel tank.

(c) Install the fuel tank vent tube set plate with the 8 bolts.

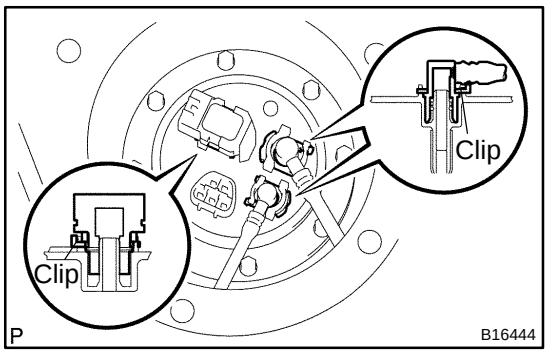
Torque: 3.5 N·m (35 kgf·cm, 31 in.·lbf)



5. CONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) TO FUEL SUCTION PLATE

(a) Before installing the tube connectors, check foreign matters on the connection between the nylon tube and the suction plate.

(b) Attach the fuel tube connectors to the ports of the fuel suction plate and insert the clips until you hear a click.



(c) After the connection, pull out the clips to check to see that they are installed securely.

6. CONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

7. CHECK FOR FUEL LEAKS (See page SF-1)

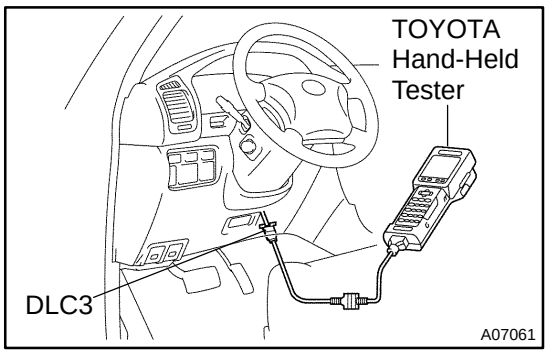
8. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Install the rear service hole cover with the 2 screws.

(b) Cover the rear and front floor carpets.

9. INSTALL REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS

10. INSTALL NO.1 REAR SEATS



FUEL PUMP

SF10V-02

ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Connect a TOYOTA hand-held tester or OBD II scan tool to the DLC3.

(b) Turn the ignition switch ON, and press the TOYOTA hand-held tester or OBD II scan tool main switch ON.

NOTICE:

Do not start the engine.

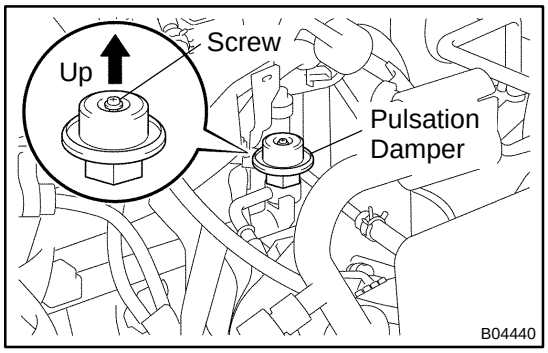
(c) Select the ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool.

(d) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator's manual for further details.

(e) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector. (See step 3)

(f) Disconnect the fuel return hose from the clamp on the V-bank cover.

(g) Remove the 2 bolts, nuts and V-bank cover.



(h) Check that the pulsation damper screw pop up when the fuel pump operates.

If operation is not as specified, check following parts:

- Fusible link
- Fuses
- EFI main relay
- Fuel pump
- ECM
- Wiring connections

(i) Turn the ignition switch OFF.

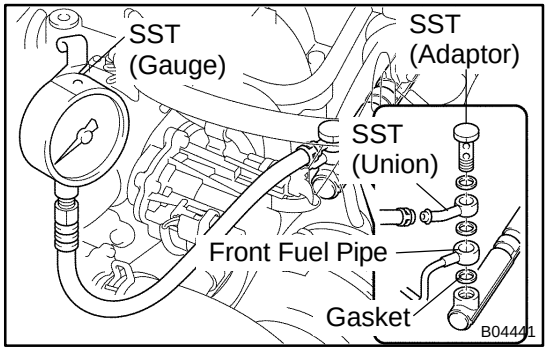
(j) Disconnect the TOYOTA hand-held tester or OBD II scan tool from the DLC3.

2. CHECK FUEL PRESSURE

(a) Check the battery positive voltage is above 12 V.

(b) Disconnect the negative (-) terminal cable from the battery.

(c) Remove the front fuel pipe from the LH delivery pipe (See page SF-22).



(d) Install the front fuel pipe and SST (pressure gauge) to the delivery pipe with the 3 lower gaskets and SST (adaptor).
SST 09268-45014 (09268-41190, 90405-06167)
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(e) Wipe off any splattered gasoline.

(f) Reconnect the negative (-) terminal cable to the battery.

(g) Connect a TOYOTA hand-held tester or OBD II scan tool to the DLC3 (See (a) to (e) in step 1 on the check fuel pump operation).

(h) Measure the fuel pressure.

Fuel pressure:
265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)

If pressure is higher than the specification, replace the fuel pressure regulator.

If pressure is lower than the specification, check these parts:

- Fuel hoses and connections
- Fuel pump
- Fuel filter
- Fuel pressure regulator

(i) Disconnect the TOYOTA hand- held tester from the DLC3.

(j) Start the engine.

(k) Measure the fuel pressure at idle.

Fuel pressure:
265 - 304 kPa (2.7 - 3.1 kgf/cm^2, 38 - 44 psi)

(l) Stop the engine.

(m) Check that the fuel pressure remains in the specification below for 5 minutes after the engine stop.

Fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi) or more

If the pressure is not as specified, check the fuel pump, pressure regulator and/or the injectors.

(n) After checking the fuel pressure, disconnect the negative (-) terminal cable from the battery and carefully remove the SST to prevent gasoline from splashing.
SST 09268-45014

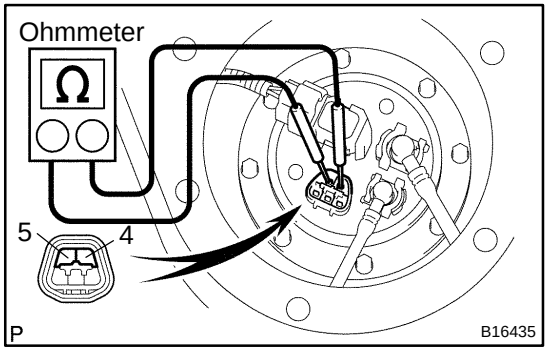
(o) Reinstall the front fuel pipe to the LH delivery pipe (See page SF-27).

(p) Reconnect the negative (-) terminal cable to the battery.

(q) Check for fuel leaks (See page SF-1).

(r) Reinstall the V-bank cover with the 2 bolts and nuts.

(s) Reconnect the fuel return hose to the clamp on the V-bank cover.



3. INSPECT FUEL PUMP

(a) Remove the No.1 rear seats.

(b) Remove the 2 rear door scuff plates, the step plates and the rear seat lock covers.

(c) Pull off the front and rear floor carpets.

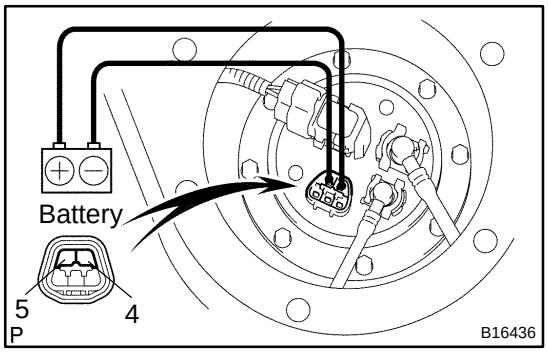
(d) Remove the 2 screws and the rear floor service hole cover.

(e) Disconnect the fuel pump & sender gauge connector.

(f) Using an ohmmeter, measure the resistance between terminal 4 and 5.

Resistance: 0.2 - 3.0 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the fuel pump and/or the lead wire.



(g) Inspect the fuel pump operation.
Connect the battery positive (+) lead to terminal 4 of the connector, and the battery negative (-) lead to terminal 5.
Check that the fuel pump operates.

NOTICE:

- **These tests must be done quickly (within 10 seconds) to prevent the coil burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always change the connection on the battery side.**

If operation is not as specified, replace the fuel pump and/or lead wire.

(h) Reconnect the fuel pump & sender gauge connector.

(i) Reinstall the rear floor service hole cover with the 2 screws.

(j) Reinstall the front and rear floor carpets.

(k) Remove the 2 rear door scuff plates, the step plates and the rear sear lock covers.

(l) Reinstall the No.1 rear seats.

SF0XX-04

REMOVAL

CAUTION:

Do not smoke or work near an open frame when working the fuel pump.

1. REMOVE NO.1 REAR SEATS

2. REMOVE REAR DOOR SCUFF PLATES, STEP PLATES AND REAR SEAT LOCK COVERS

3. REMOVE REAR FLOOR SERVICE HOLE COVER

(a) Take off the front and rear floor carpets.

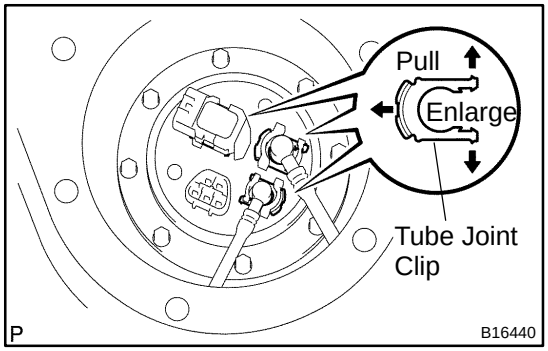
(b) Remove the 2 screws and rear floor service hole cover.

4. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

5. DISCONNECT FUEL MAIN TUBE AND RETURN TUBE (FUEL TUBE CONNECTORS) FROM FUEL SUCTION PLATE

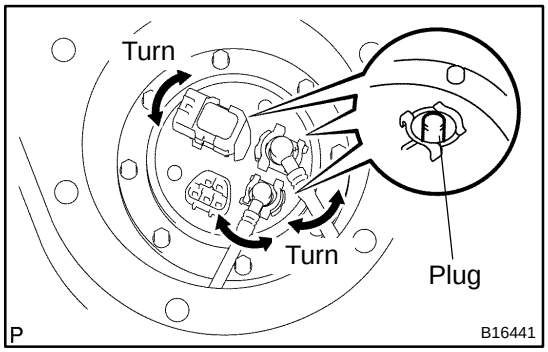
CAUTION:

- **Perform disconnecting operation of the fuel tube connector (quick type) after reading the precautions. (See page SF-1)**
- **Prevent the retained pressure in the fuel line from splashing inside the vehicle compartment.**
- **Be careful not to damage the contact surface or let the foreign matters on there when sealing the tube and the suction plates with the quick connectors through O-ring.**
- **Be sure to perform the disconnection by hand. Do not use tools.**
- **Do not bend or turn the nylon tube by force.**



(a) Before the operation, remove foreign matters or dirt sticking to the tube joint clips.

(b) Enlarge the tip of the clips with fingers and pull them out for disconnection.



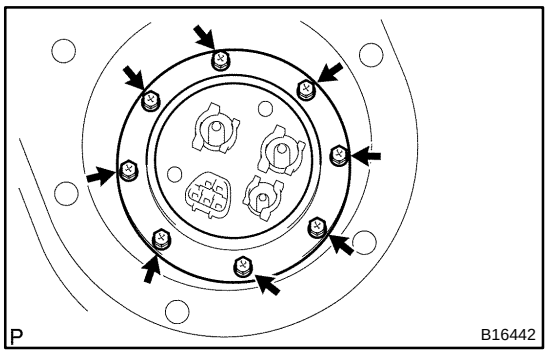
(c) Pull out the fuel main tube and the return tube.

If the nylon tube and the suction plate stick together, ease the connection by turning the nylon tube with fingers and pull it out for disconnection.

NOTICE:

Plug the port of the fuel suction plate with a clean rubber cap.

(d) After the disconnection, protect the connector with a plastic bag.



6. REMOVE FUEL PUMP AND SENDER GAUGE ASSEMBLY FROM FUEL TANK

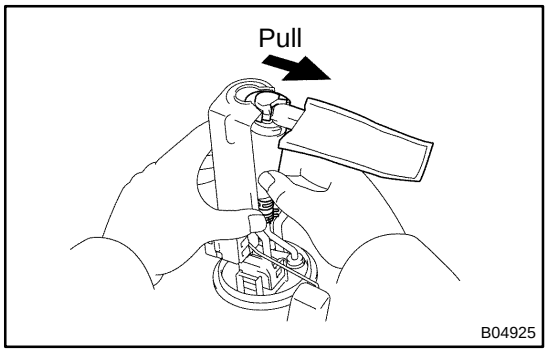
(a) Remove the 8 bolts.

(b) Pull out the fuel pump and the sender gauge assembly.

NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

(c) Remove the gasket from the fuel section plate.



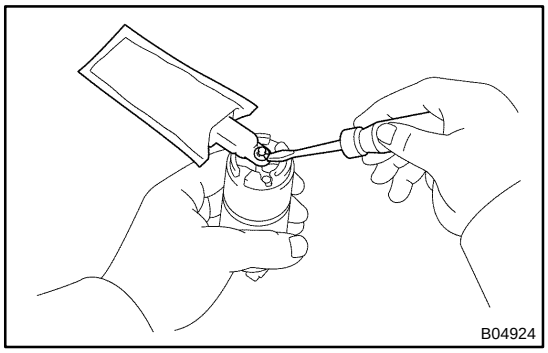
7. REMOVE LEAD WIRE FROM FUEL PUMP

8. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull out the lower side of the fuel pump from the pump bracket.

(b) Disconnect the fuel hose from the fuel pump, and remove the fuel pump.

(c) Remove the rubber cushion from the fuel pump.



9. REMOVE FUEL PUMP FILTER FROM FUEL PUMP

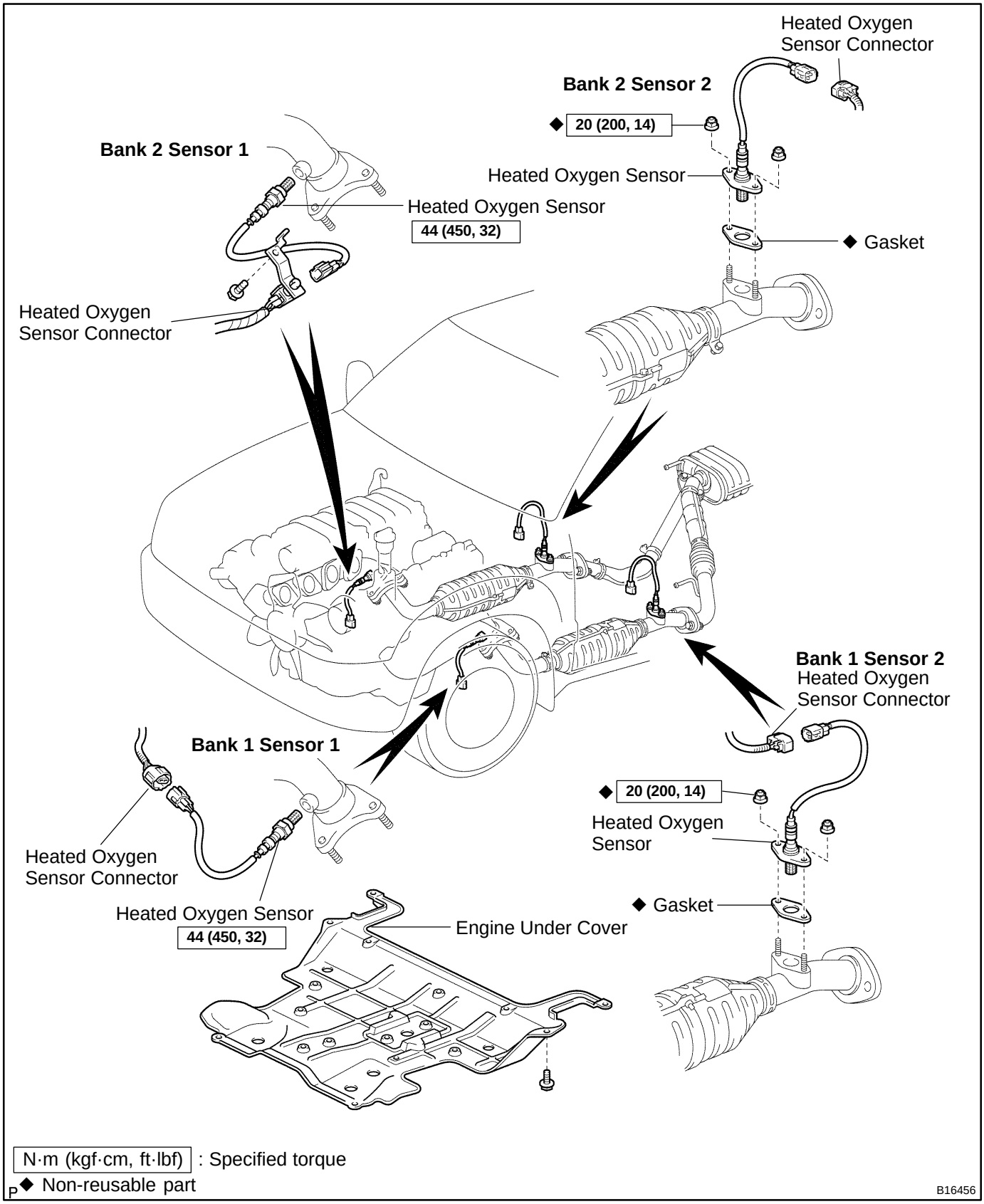
(a) Using a small screwdriver, remove the clip.

(b) Pull out the pump filter.

HEATED OXYGEN SENSOR

COMPONENTS

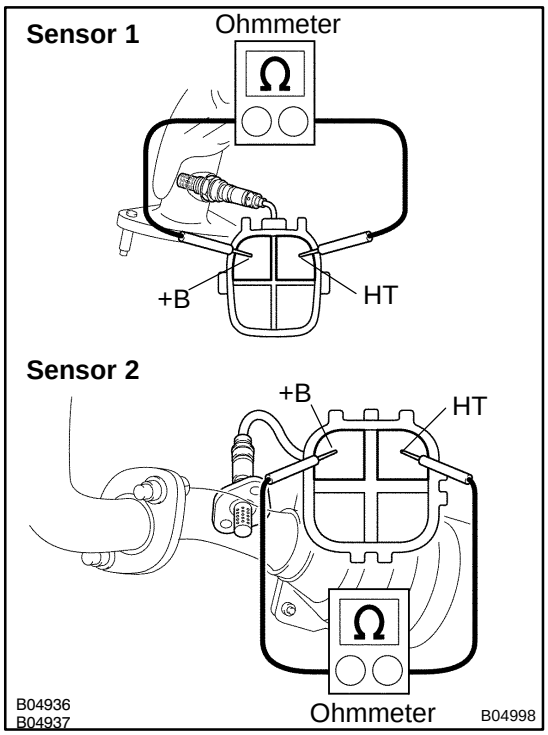
SF0Y9-09



N·m (kgf·cm, ft·lbf) : Specified torque

P◆ Non-reusable part

B16456



SF0YA-12

INSPECTION

1. INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSORS

(a) Disconnect the oxygen sensor connector.

(b) Using an ohmmeter, measure the resistance between terminal +B and HT.

Resistance: 11 - 16 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the sensor.

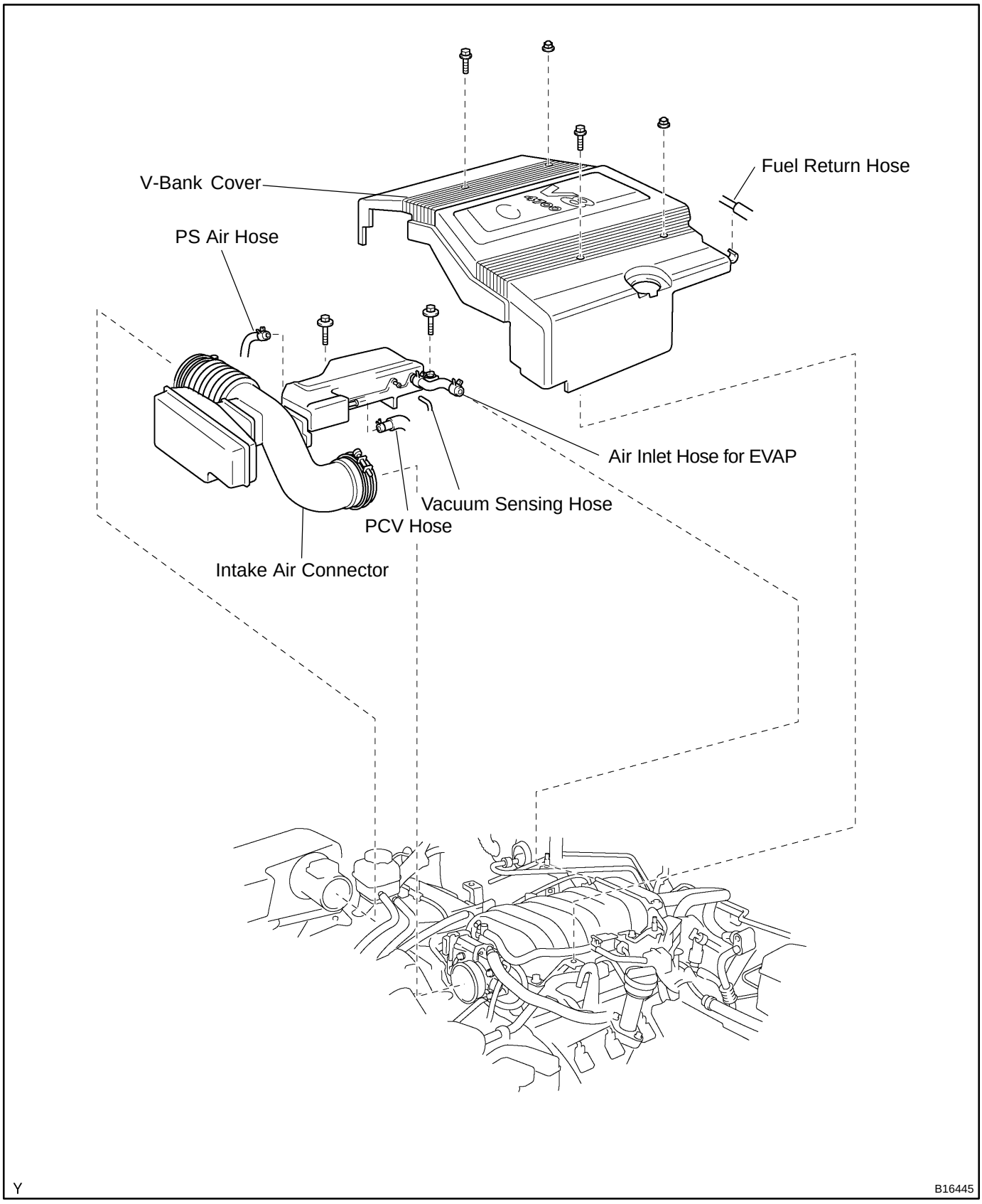
Torque:
44 N·m (450 kgf·cm, 32 ft·lbf) for sensor 1
20 N·m (200 kgf·cm, 14 ft·lbf) for sensor 2

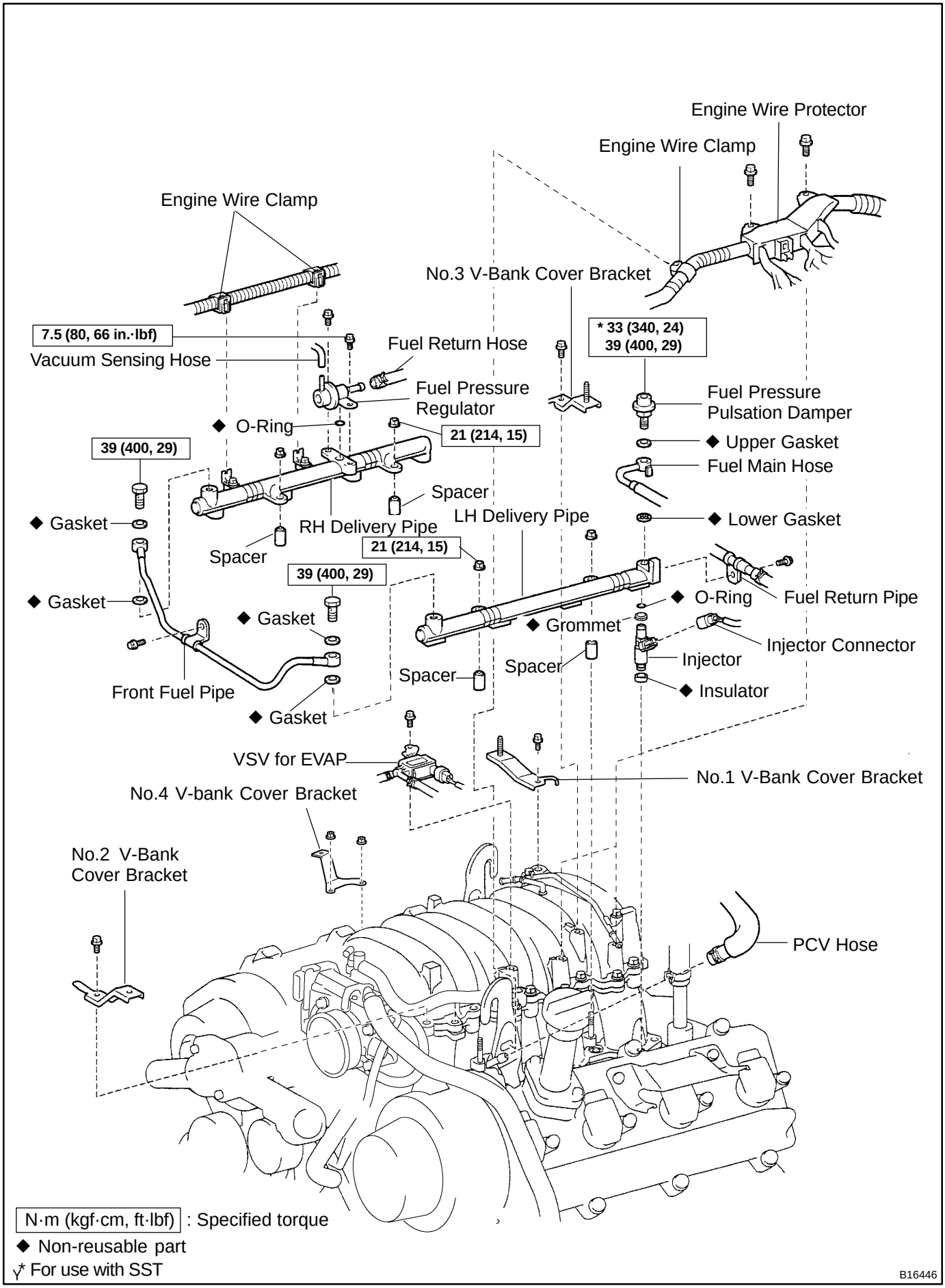
(c) Reconnect the oxygen sensor connector.

2. INSPECT OPERATION OF HEATED OXYGEN SENSORS (See pages DI-106 and DI-138)

SF0OS-13

COMPONENTS




Engine Wire Protector
Engine Wire Clamp
Engine Wire Clamp
No.3 V-Bank Cover Bracket
7.5 (80, 66 in.·lbf)
Vacuum Sensing Hose
Fuel Return Hose
* 33 (340, 24)
39 (400, 29)
Fuel Pressure Regulator
Fuel Pressure Pulsation Damper
◆ O-Ring
21 (214, 15)
◆ Upper Gasket
39 (400, 29)
Fuel Main Hose
Spacer
◆ Gasket
RH Delivery Pipe
LH Delivery Pipe
◆ Lower Gasket
Spacer
21 (214, 15)
39 (400, 29)
◆ Gasket
◆ O-Ring
Fuel Return Pipe
◆ Gasket
◆ Grommet
Injector Connector
Spacer
Spacer
Injector
Front Fuel Pipe
◆ Insulator
◆ Gasket
VSV for EVAP
No.1 V-Bank Cover Bracket
No.4 V-bank Cover Bracket
No.2 V-Bank Cover Bracket
PCV Hose
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
* For use with SST
B16446

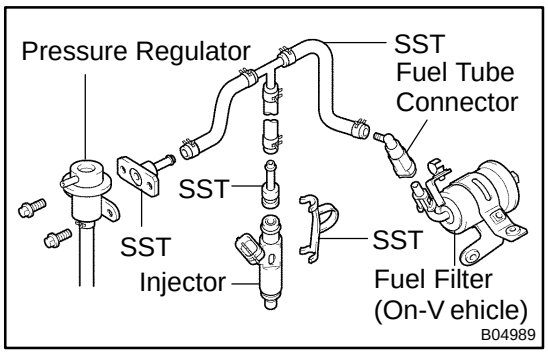
SF0Y3-06

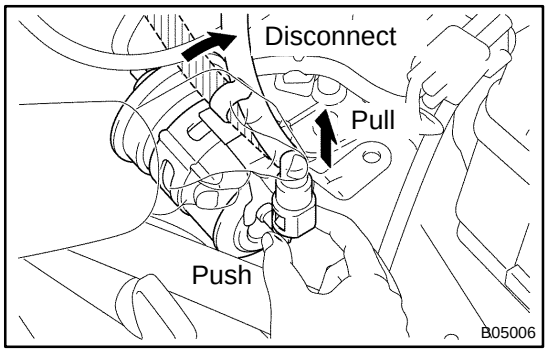
INSPECTION

1. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clean of sparks during the test.

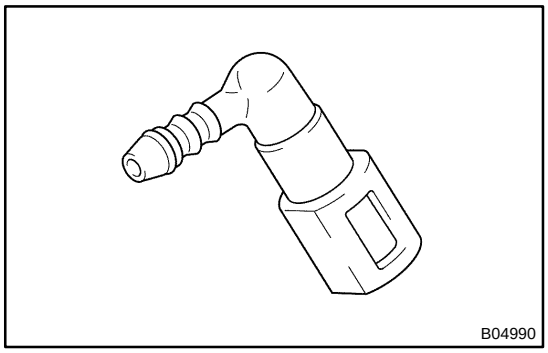




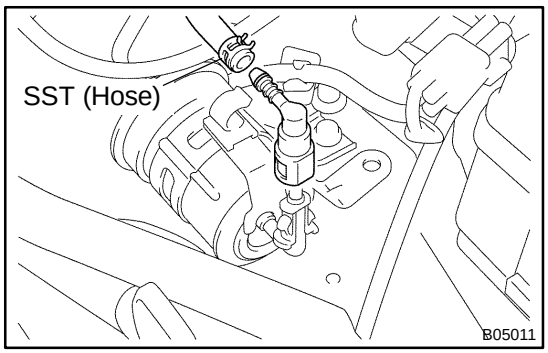
(a) Disconnect the fuel inlet hose (fuel tube connector) from the fuel filter.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after reading the precautions (See page SF-1).**
- **Prevent the retained pressure in the fuel pipe line from splashing inside the engine compartment.**



(b) Use a new fuel main hose and take out the fuel tube connector from its hose.
Part No. 23271-50150



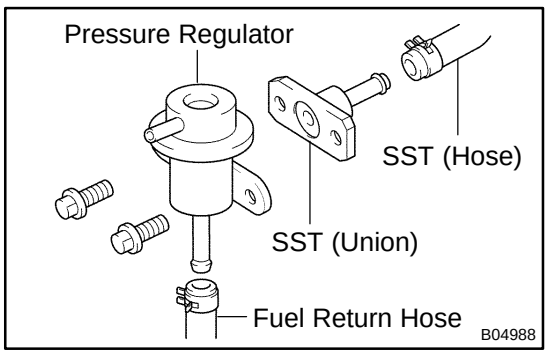
(c) Connect SST (hose) and fuel tube connector to the fuel filter outlet.
SST 09268-41047

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after reading the precautions (See page SF-1).

HINT:

Use the vehicle's fuel filter.

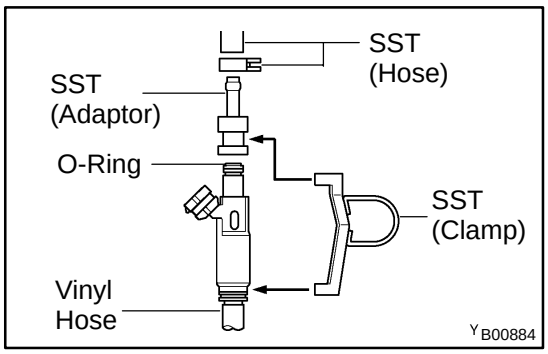


(d) Remove the pressure regulator from the delivery pipe.

(e) Install the O-ring to the fuel inlet of the pressure regulator.

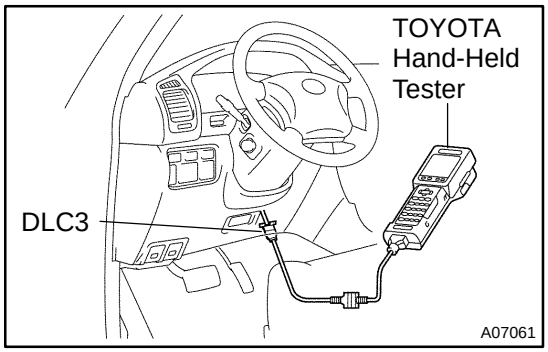
(f) Connect SST (hose) to the fuel inlet of the pressure regulator with SST (union) and the 2 bolts.
SST 09268-41047 (09268-41091)
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

(g) Connect the fuel return hose to the fuel outlet of the pressure regulator.



(h) Install the O-ring to the injector.
(i) Connect SST (adaptor and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268-41047 (09268-41110, 09268-41300)
(j) Put the injector into the graduated cylinder.

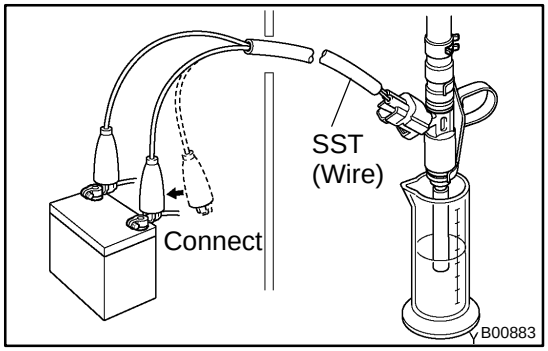
CAUTION:
Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(k) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
(l) Connect the battery negative (-) cable to the battery.
(m) Turn the ignition switch ON, and press the TOYOTA hand-held tester or OBD II scan tool main switch ON.

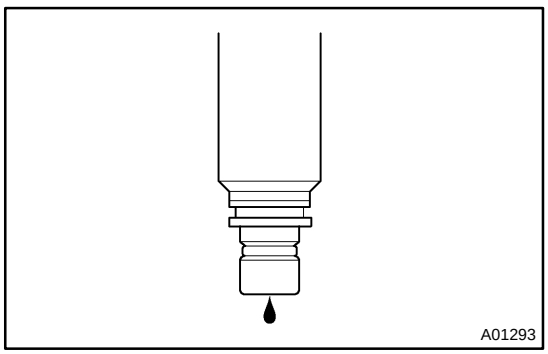
NOTICE:
Do not start the engine.

(n) Select ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool.
(o) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator's manual for further details.
(p) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector
(See page SF-7).



(q) Connect SST (wire) to the injector and the battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842-30070
Volume: 56 - 69 cm^3 (3.4 - 4.2 cu in.) per 15 seconds
Difference between each injector:
13 cm^3 (0.8 cu in.) or less

If the injection volume is not as specified, replace the injector.



2. INSPECT LEAKAGE

(a) In the condition above, disconnect the tester probes of SST (wire) from the battery and check the fuel leakage from the injector.
SST 09842-30070
Fuel drop: 1 drop or less per 12 minutes

(b) Turn the ignition switch OFF.

(c) Disconnect the negative (-) terminal cable from the battery.

(d) Remove SST and fuel tube connector.
SST 09268-41047, 09842-30070

(e) Disconnect the TOYOTA hand-held tester or OBD II scan tool from the DLC3.

(f) Reconnect the fuel inlet pipe (fuel tube connector) to the fuel filter.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions (See page SF-1).

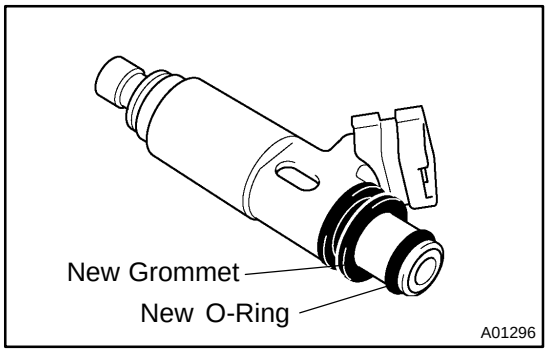
SF0Y4-06

INSTALLATION

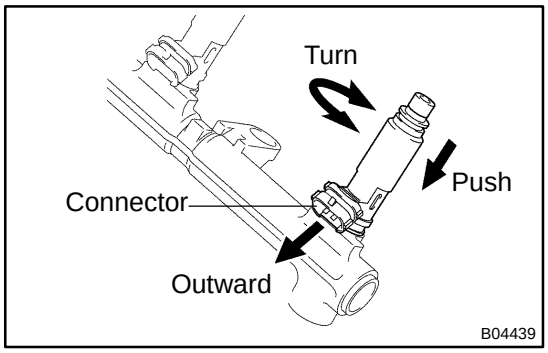
1. INSTALL INJECTORS AND DELIVERY PIPES

NOTICE:

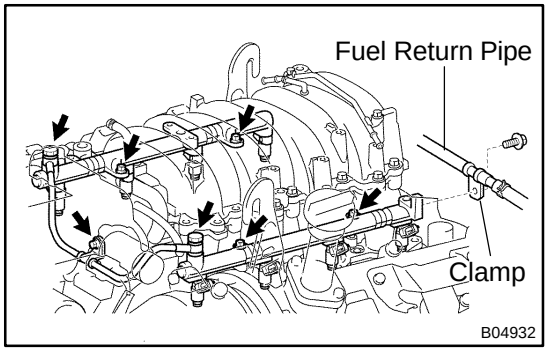
- **Be careful not to drop the injectors when installing the delivery pipes.**
- **Since the O-ring may be stuck to the injector, do not put a side load on it at the removal.**



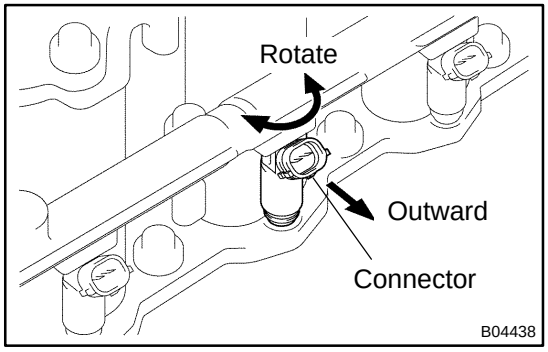
(a) Install a new grommet to each injector.
(b) Apply a light coat of gasoline to new O-rings and install them to each injector.



(c) While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 8 injectors.
(d) Position injector connector outward.
(e) Place the 4 spacers and 8 new insulators on the intake manifold.
(f) Place the 2 delivery pipes and the injectors assemblies on the lower intake manifold.
(g) Temporarily install the 4 nuts.
(h) Install the front fuel pipe with the bolt, the 4 new gaskets and the 2 union bolts.
Torque:
39 N·m (400 kgf·cm, 29 ft·lbf) for union bolts
7.5 N·m (80 kgf·cm, 66 in.·lbf) for bolt



(i) Install the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

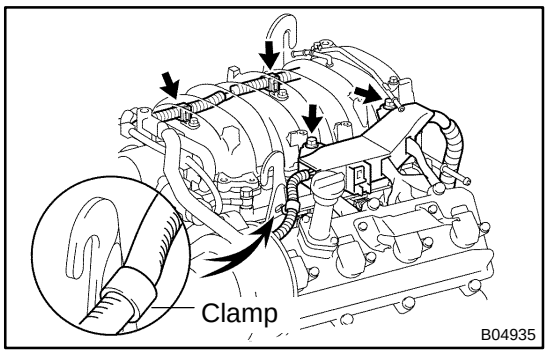


(j) Check that the injectors rotate smoothly.

HINT:

If injectors do not rotate smoothly, the probable cause is incorrect installation of O-rings. Replace the O-rings in that case.

(k) Position the injector connector outward.
(l) Tighten the 4 nuts holding the delivery pipes to the lower intake manifold.
Torque: 21 N·m (214 kgf·cm, 15 ft·lbf)
(m) Connect the 8 injectors connectors.



2. INSTALL ENGINE WIRE TO LH DELIVERY PIPE

Install the 2 wire clamps on the engine wire to the brackets on the delivery pipe.

3. INSTALL ENGINE WIRE PROTECTOR

(a) Connect the engine wire clamp to the No.1 engine hanger.

(b) Install the engine wire protector with the 2 bolts.

(c) Connect the PCV hose to the PCV valve.

(d) Connect VSV EVAP to the upper intake manifold.

(e) Install the No.1 V-bank cover bracket to the upper intake manifold.

(f) Install the No.2 V-bank cover bracket to the upper intake manifold.

(g) Install the No.3 V-bank cover bracket to the upper intake manifold.

(h) Install the No.4 V-bank cover bracket to the upper intake manifold.

4. INSTALL FUEL PRESSURE PULSATION DAMPER (See page SF-1)

5. INSTALL INTAKE AIR CONNECTOR

6. INSTALL V-BANK COVER

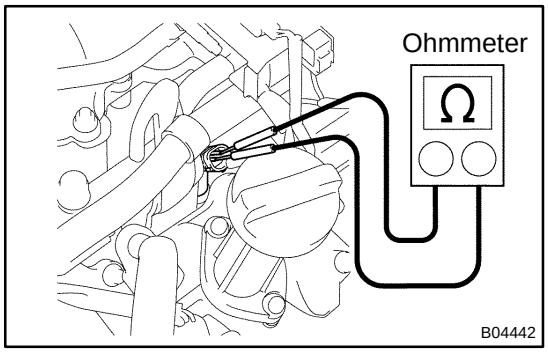
INJECTOR

SF0OR-10

ON-VEHICLE INSPECTION

1. REMOVE V-BANK COVER

2. REMOVE INTAKE AIR CONNECTOR



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the 8 injector connectors.

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance: 13.4 - 14.2 Ω at 20˚C (68˚F)

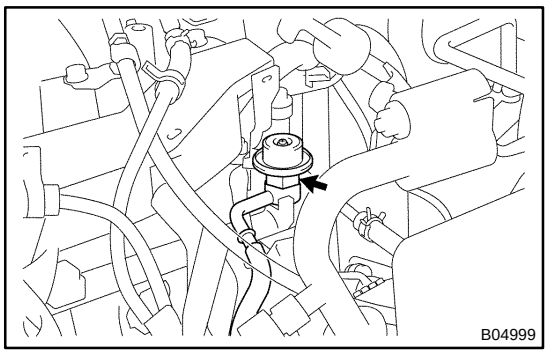
If the resistance is not as specified, replace the injector.

(c) Reconnect the 8 injector connectors.

4. REINSTALL INTAKE AIR CONNECTOR

5. REINSTALL V-BANK COVER

SF0Y2-05



REMOVAL

1. REMOVE V-BANK COVER

2. REMOVE INTAKE AIR CONNECTOR

3. REMOVE FUEL PRESSURE PULSATION DAMPER

Remove the pulsation damper, the upper gasket, the fuel main hose and the lower gasket.

CAUTION:

- **Put a shop rag under the delivery pipe.**
- **Slowly loosen the pulsation damper.**

4. DISCONNECT ENGINE WIRE PROTECTOR FROM UPPER INTAKE MANIFOLD

(a) Disconnect the PCV hose from the PCV valve.

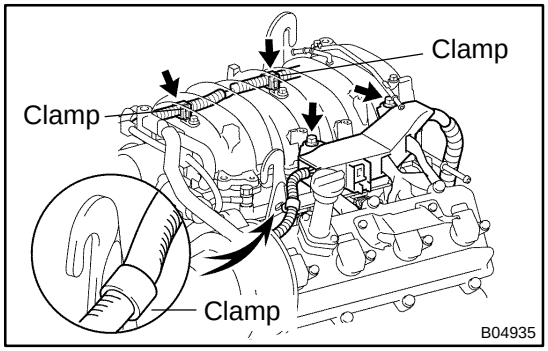
(b) Disconnect the VSV for EVAP from the upper intake manifold.

(c) Remove the No.1 V-bank cover bracket from the upper intake manifold.

(d) Remove the No.2 V-bank cover bracket from the upper intake manifold.

(e) Remove the No.3 V-bank cover bracket from the upper intake manifold.

(f) Remove the No.4 V-bank cover bracket from the upper intake manifold.



(g) Remove the 2 bolts, and disconnect the engine wire protector from the upper intake manifold.

(h) Disconnect the engine wire clamp from the No.1 engine hanger.

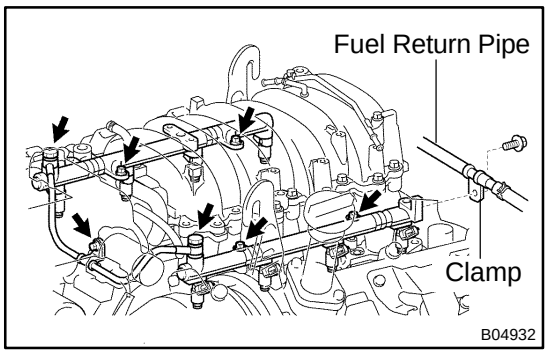
5. DISCONNECT ENGINE WIRE FROM RH DELIVERY PIPE

Disconnect the 2 wire clamps on the engine wire from the brackets on the delivery pipe.

6. REMOVE DELIVERY PIPES AND INJECTORS

NOTICE:

- **Be careful not to drop the injectors when removing the delivery pipes.**
- **Since the O-ring may be stuck to the injector, do not put a side load on it at the removal.**

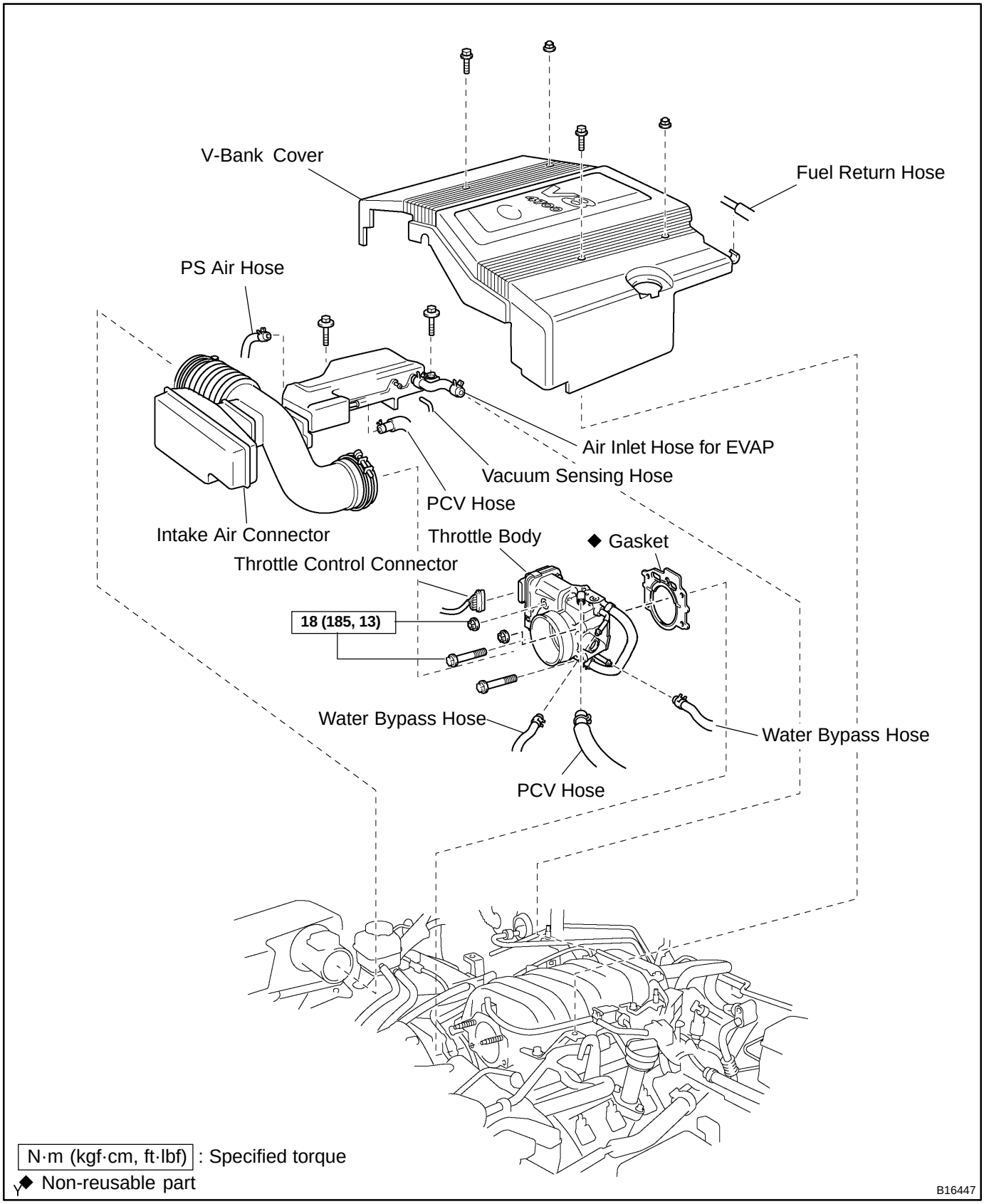


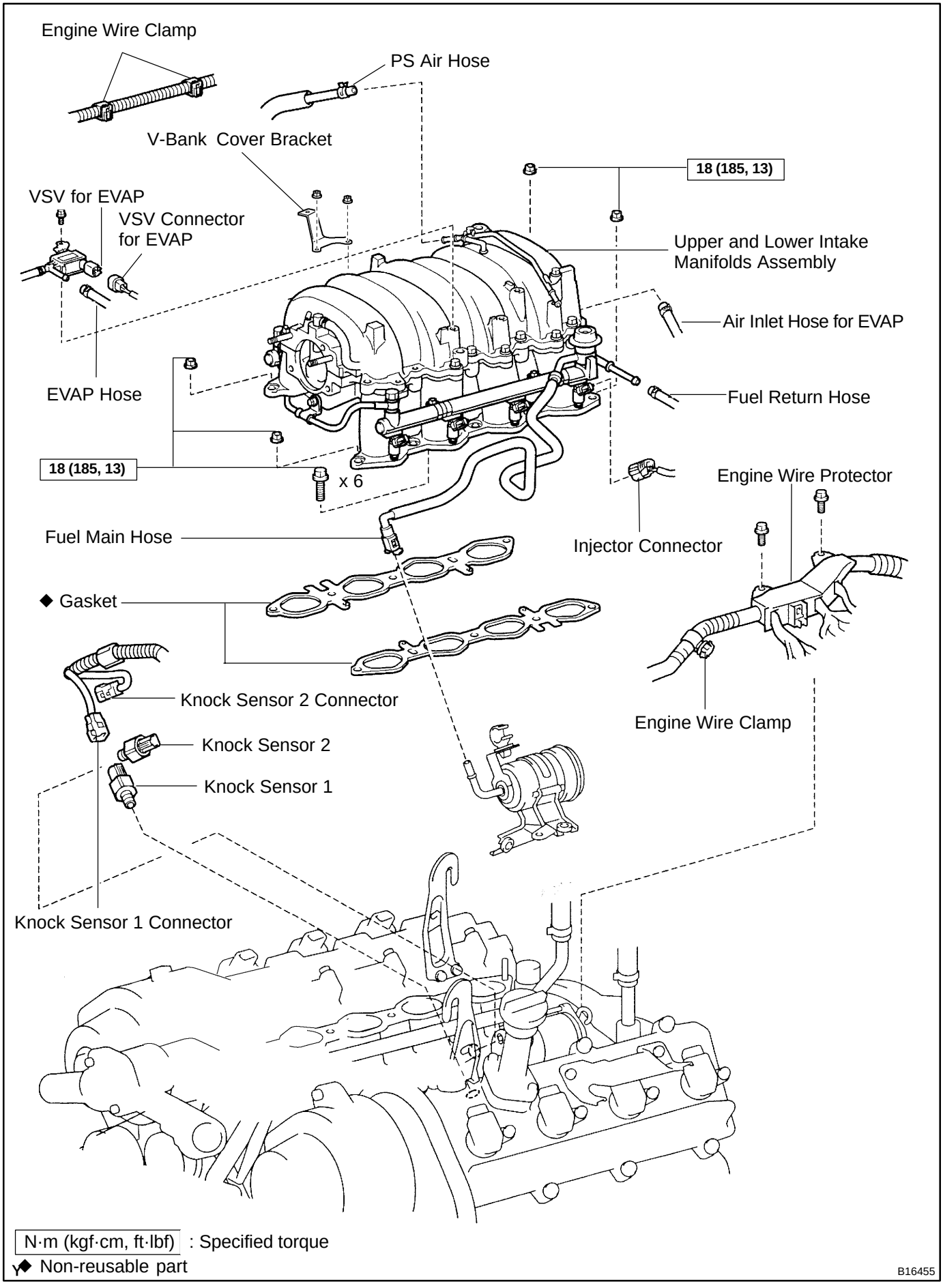
(a) Remove the bolt holding the clamp on the fuel return pipe to the LH delivery pipe.
(b) Remove the bolt, the 2 union bolts, the 4 gaskets and the front fuel pipe.
(c) Disconnect the 8 injector connectors.
(d) Remove the 4 nuts holding the delivery pipes to the lower intake manifold.
(e) Remove the 2 delivery pipes, the 8 injectors, the 4 spacers and the 8 insulators.
(f) Remove the O-ring and the grommet from each injector.

KNOCK SENSOR

COMPONENTS

SF0PR-14

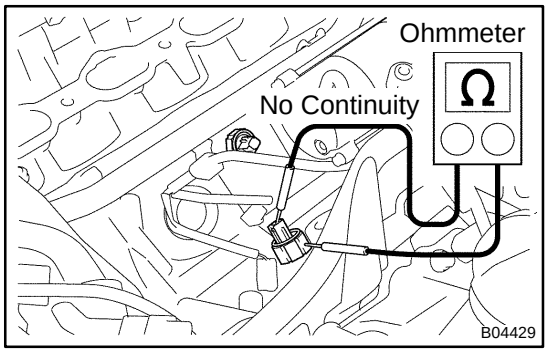



Engine Wire Clamp
PS Air Hose
V-Bank Cover Bracket
18 (185, 13)
VSV for EVAP
VSV Connector for EVAP
Upper and Lower Intake Manifolds Assembly
Air Inlet Hose for EVAP
EVAP Hose
Fuel Return Hose
18 (185, 13)
x 6
Engine Wire Protector
Fuel Main Hose
Injector Connector
◆ Gasket
Knock Sensor 2 Connector
Engine Wire Clamp
Knock Sensor 2
Knock Sensor 1
Knock Sensor 1 Connector
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
B16455

SF0PS-10

INSPECTION

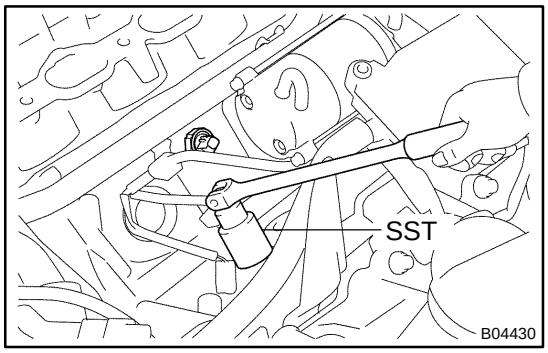
1. REMOVE V-BANK COVER
2. REMOVE INTAKE AIR CONNECTOR
3. DISCONNECT THROTTLE BODY FROM INTAKE MANIFOLDS (See page SF-50)
4. REMOVE UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM-35)



5. INSPECT KNOCK SENSOR 1, 2

(a) Disconnect the knock sensor connectors.

(b) Using an ohmmeter, check that there is no continuity between the terminal and body.



If there is a continuity, replace the sensor with SST.

SST 09816-30010

Torque: 45 N·m (450 kgf·cm, 33 ft·lbf)

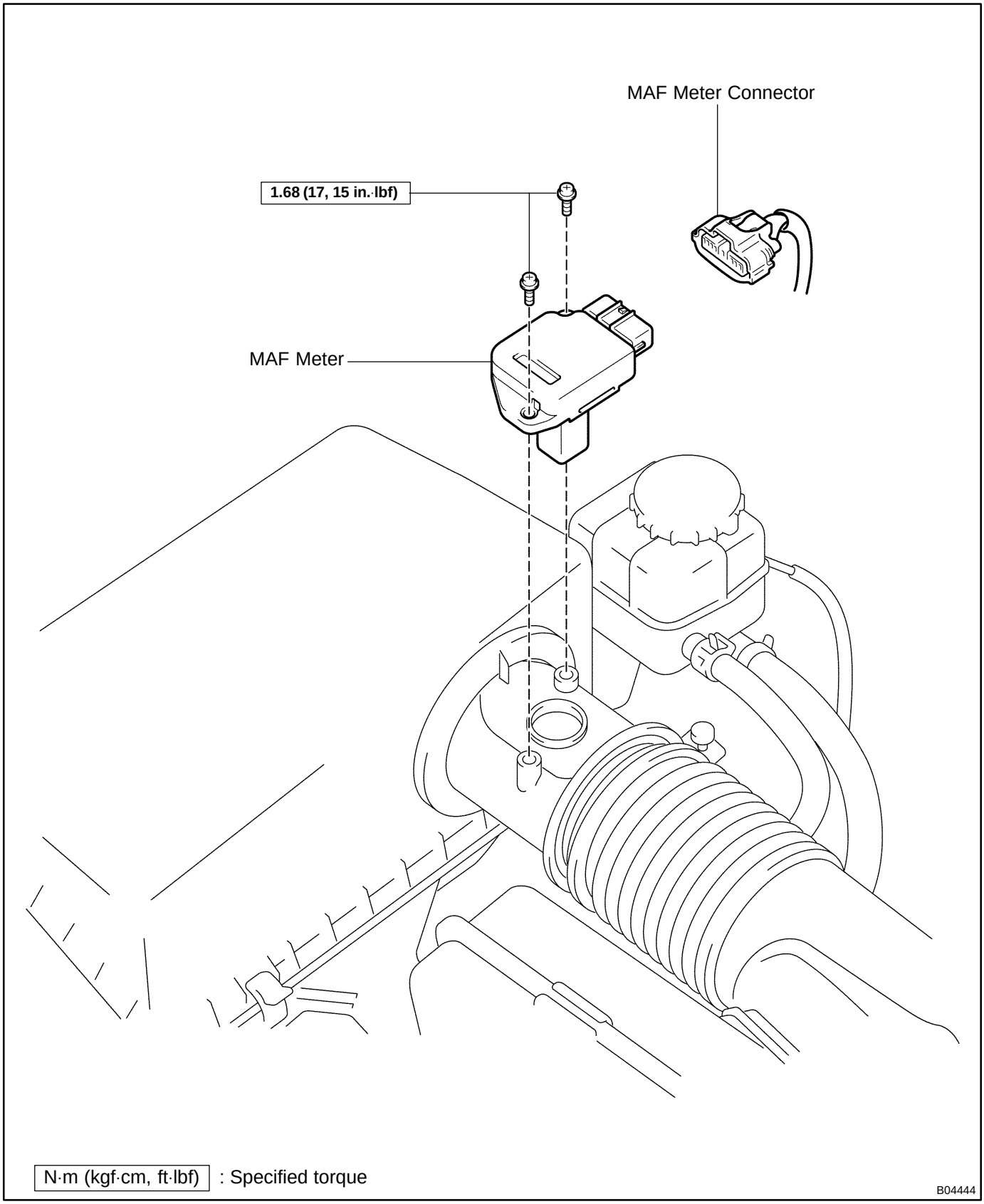
(c) Reconnect the knock sensor connectors.

6. REINSTALL UPPER AND LOWER INTAKE MANIFOLDS ASSEMBLY (See page EM-59)
7. REINSTALL THROTTLE BODY TO INTAKE MANIFOLDS (See page SF-50)
8. REINSTALL INTAKE AIR CONNECTOR
9. REINSTALL V-BANK COVER

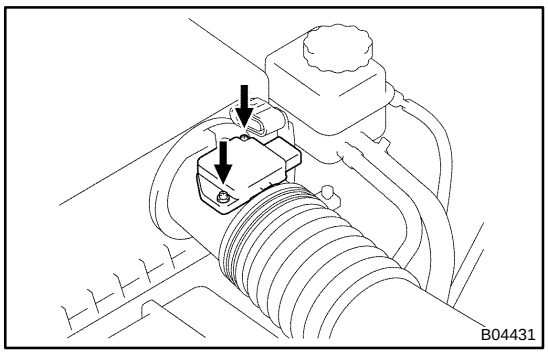
MASS AIR FLOW (MAF) METER

COMPONENTS

SF0P1-10



SF0P2-07

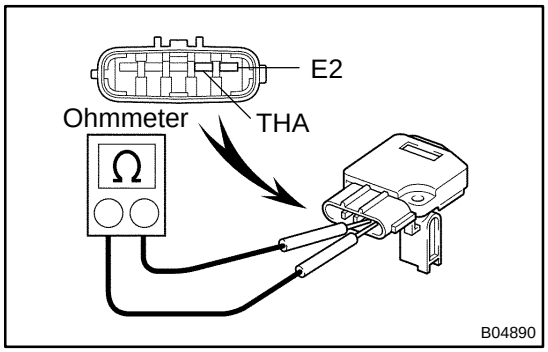


INSPECTION

1. DISCONNECT MAF METER CONNECTOR

2. REMOVE MAF METER

Remove the 2 screws and MAF meter.

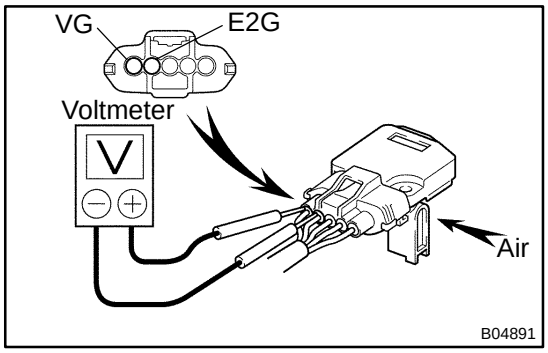


3. INSPECT MAF METER

(a) Using an ohmmeter, measure the resistance between terminals THA and E2.

Terminals	Resistance	Temperature
THA - E2	12.5 - 16.9 kΩ	-20 ˚C (-4 ˚F)
THA - E2	2.19 - 2.67 kΩ	20 ˚C (68 ˚F)
THA - E2	0.50 - 0.68 kΩ	60 ˚C (140 ˚F)

If the resistance is not as specified, replace the MAF meter.



(b) Inspect for operation.

(1) Connect the MAF meter connector.

(2) Connect the negative (-) terminal cable to the battery.

(3) Turn the ignition switch ON.

(4) Using a voltmeter, connect the positive (+) tester probe to terminal VG and negative (-) tester probe to terminal E2G.

(5) Blow air into the MAF meter, and check that the voltage fluctuates.

If operation is not as specified, replace the MAF meter.

(6) Turn the ignition switch OFF.

(7) Disconnect the negative (-) terminal cable from the battery.

(8) Disconnect the MAF meter connector.

4. REINSTALL MAF METER

Install the MAF meter with the 2 screws.

Torque: 1.68 N·m (17 kgf·cm, 15 in.·lbf)

5. RECONNECT MAF METER CONNECTOR

SFI SYSTEM

SF0XU-11

PRECAUTION

1. BEFORE WORKING ON FUEL SYSTEM, DISCONNECT NEGATIVE (-) TERMINAL CABLE FROM BATTERY

HINT:

Any diagnostic trouble code retained by the computer will be erased when the negative (-) terminal cable is removed from the battery.

Therefore, if necessary, read the diagnosis before removing the negative (-) terminal cable from the battery.

2. DO NOT SMOKE OR WORK NEAR AN OPEN FLAME WHEN WORKING ON THE FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) Take following precautions to prevent the engine misfire.
  (1) Check proper connection to battery terminals, etc.
  (2) After repair work, check that the ignition coil terminals and all other ignition system lines are reconnected securely.
  (3) When cleaning the engine compartment, be especially careful to protect the electrical system from water.

(b) Take following precautions to handle the oxygen sensor.
  (1) Do not drop the oxygen sensor or hit against an object.
  (2) Do not allow the sensor to contact with water.

5. IF VEHICLE IS EQUIPPED WITH MOBILE RADIO SYSTEM (HAM, CB, ETC.)

If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.

6. AIR INDUCTION SYSTEM

(a) Separation of the engine oil dipstick, oil filler cap, PCV hose, etc. may cause the engine to be out of tune.

(b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will cause air suction, which makes the engine out of tune.

7. ELECTRONIC CONTROL SYSTEM

(a) Disconnect the power by either turning the ignition switch OFF or disconnecting the negative (-) terminal cable from the battery before removing SFI wiring connectors, terminals, etc.

HINT:

Always check the diagnostic trouble code before disconnecting the negative (-) terminal cable from the battery.

(b) When installing the battery, be especially careful not to incorrectly connect the positive (+) and negative (-) cables.

(c) Do not a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.

(d) Be careful during the troubleshooting as there are numerous transistor circuit, and even slight terminal contact can cause further troubles.

(e) Do not open the ECM cover.

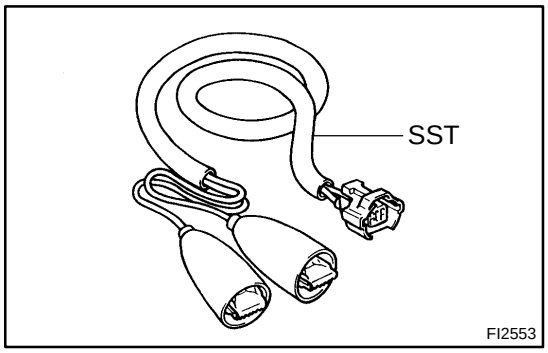
(f) When inspecting in rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the SFI parts and the wiring connectors.

(g) Parts should be replaced as the original assembly.

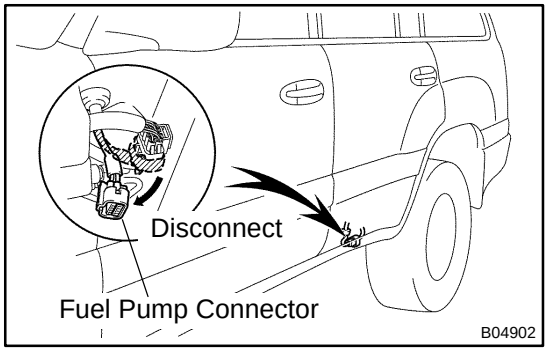
(h) Care should be taken when pulling out and inserting the wiring connectors.

(1) Release the lock and pull out the connector.

(2) Fully insert the connector and check that it is locked.



(i) Use SST for the inspection, the injector and the wiring connector test.
SST 09842-30070



8. FUEL SYSTEM

(a) When disconnecting the high fuel pressure line, a large amount of gasoline may be spilled:

(1) Disconnect the fuel pump connector.

(2) Start the engine. After the engine has stopped on its own, turn the ignition switch OFF.

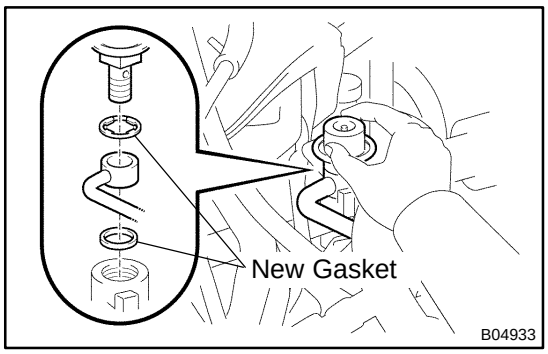
(3) Put a container under the connection.

(4) Slowly loosen the connection.

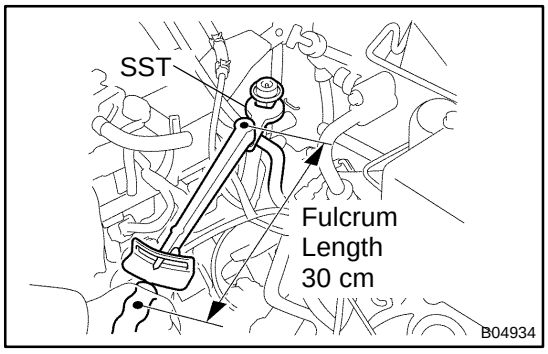
(5) Disconnect the connection.

(6) Plug the connection with a rubber plug.

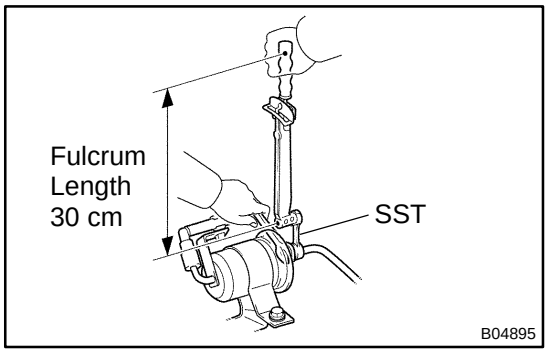
(7) Reconnect the fuel pump connector.



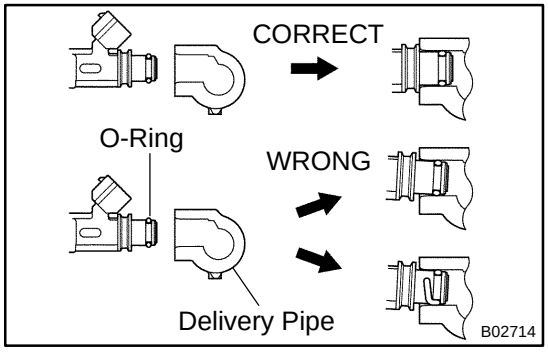
(b) When connecting the union bolt (fuel pressure pulsation damper) on the high pressure pipe union, follow the procedure below:
(1) Always use 2 new gaskets.
(2) Tighten the union bolt by hand.



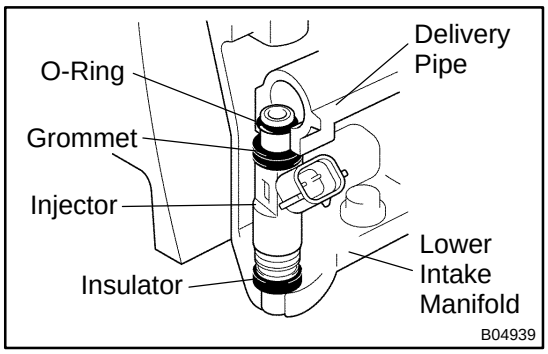
(3) Using SST, tighten the union bolt to the specified torque.
SST 09612-24014 (09617-24011)
Torque:
33 N·m (340 kgf·cm, 24 ft·lbf) for use with SST
39 N·m (400 kgf·cm, 29 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).



(c) When connecting the flare nut on the high pressure pipe union, follow the procedure below:
(1) Apply a light coat of engine oil to the flare nut, and tighten the flare nut by hand.
(2) Using SST, tighten the flare nut to the specified torque.
SST 09023-12700
NOTICE:
Do not rotate the fuel filter outlet when tightening the flare nut.
Torque:
34 N·m (345 kgf·cm, 25 ft·lbf) for use with SST
38 N·m (380 kgf·cm, 28 ft·lbf)
HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

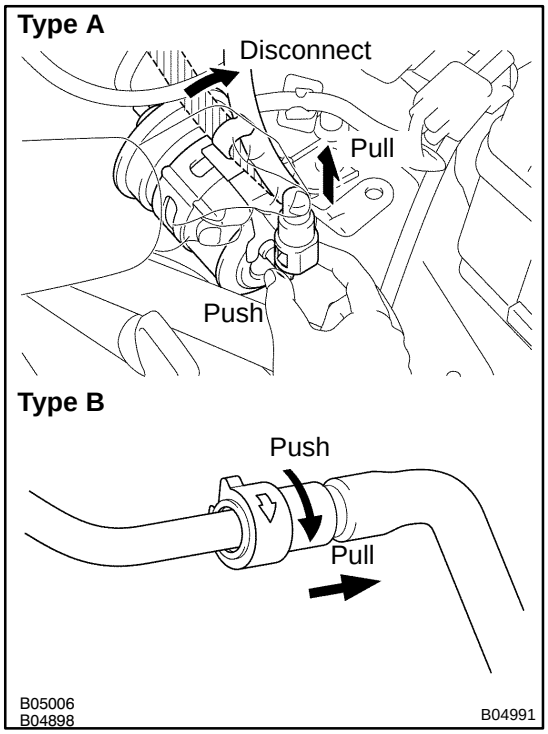


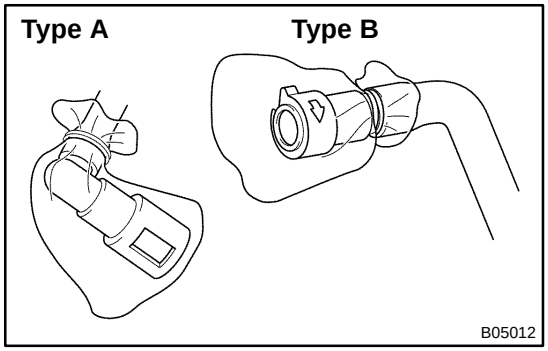
(d) Take following precautions to remove and install the injectors.
(1) Never reuse the O-ring.
(2) When placing a new O-ring on the injector, take care not to damage it.
(3) Coat a new O-ring with spindle oil or gasoline before installing; never use engine, gear or brake oil.



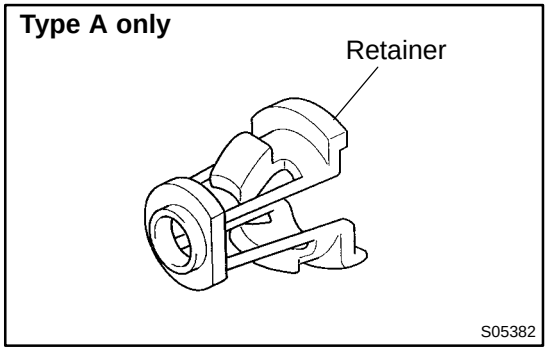
(e) Install the injector to the delivery pipe and lower intake manifold as shown in the illustration.
Before installing the injector, spindle oil or gasoline must be applied on the place where the delivery pipe or the intake manifold touches the O-ring of the injector.

(f) Take following precautions to disconnect the fuel tube connector (quick type):
(1) Check that there is no dirt on the pipe and around the connector before disconnecting them. If there is, clean the dirt away.
(2) Be sure to disconnect it with hands.
(3) Type A:
When the connector and the pipe are stuck, push the clicks of the retainer and pull the connector to free to disconnect and pull it out. Do not use any tool at this time.
Type B:
When the connector and the pipe are stuck, turn and pull the connector to disconnect. Do not use any tool at this time.
(4) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.

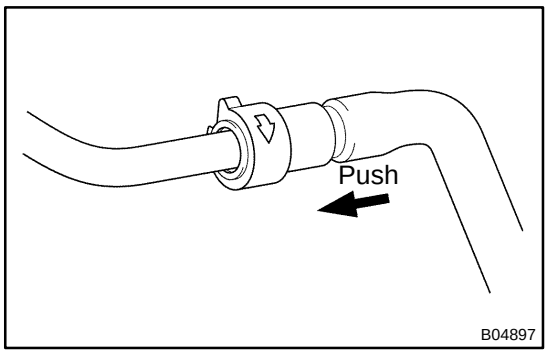




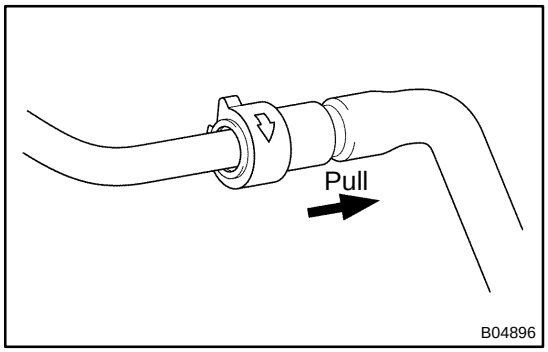
(5) Prevent the disconnected pipe and connector from damaging and getting foreign objects by covering them with a vinyl bag.



(g) Take following precautions to connect the fuel tube connector (quick type):
(1) Do not reuse the retainer removed from the pipe.
(2) Do not use any tool. Use hands to connect the retainer to the pipe.
(3) Check if there is any damage or foreign objects on the connected part of the pipe.

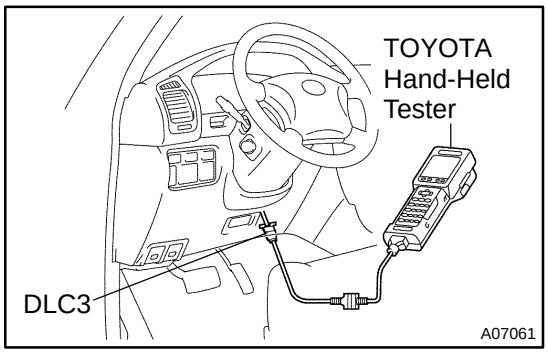


(4) Match the axis of the connector with that of the pipe, and push in the connector until the connector makes a ”click” sound. In the joint part is too tight to connect them, apply a little new engine oil on the tip of the pipe.



(5) After finishing the connection, check if the pipe and the connector are securely connected by pulling them.
(6) Check if there is any fuel leakage.

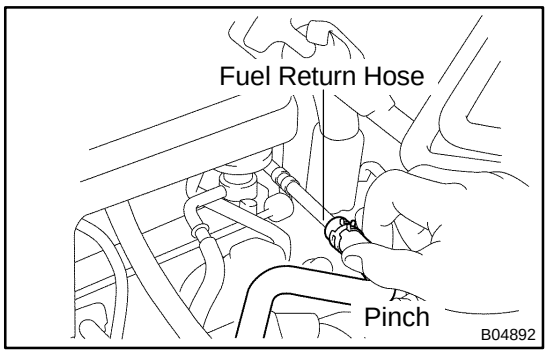
(h) Take following precautions to handle the nylon tube.
(1) Pay attention not to turn the joint part of the nylon tube and the quick connector by force when connecting them.
(2) Pay attention not to twist the nylon tube.
(3) Do not remove the EPDM protector on the outside of the nylon tube.
(4) Do not connect them by bending the nylon tube.



(i) Check that there are no fuel leaks on the fuel system after doing the maintenance.
(1) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
(2) Turn the ignition switch ON and press the TOYOTA hand-held or OBD II scan tool tester main switch ON.

NOTICE:
Do not start the engine.

(3) Select the ACTIVE TEST mode on the TOYOTA hand-held tester or OBD II scan tool .
(4) Please refer to the TOYOTA hand-held tester or OBD II scan tool operator’s manual for further details.
(5) If you have no TOYOTA hand-held tester or OBD II scan tool, connect the positive (+) and negative (-) leads from the battery to the fuel pump connector (See page SF-7).



(6) Pinch the fuel return hose.
The pressure in the high pressure line will rise to approx. 392 kPa (4 kgf/cm^2, 57 psi). In this state, check to see that there is no leak on any part of the fuel system.

NOTICE:

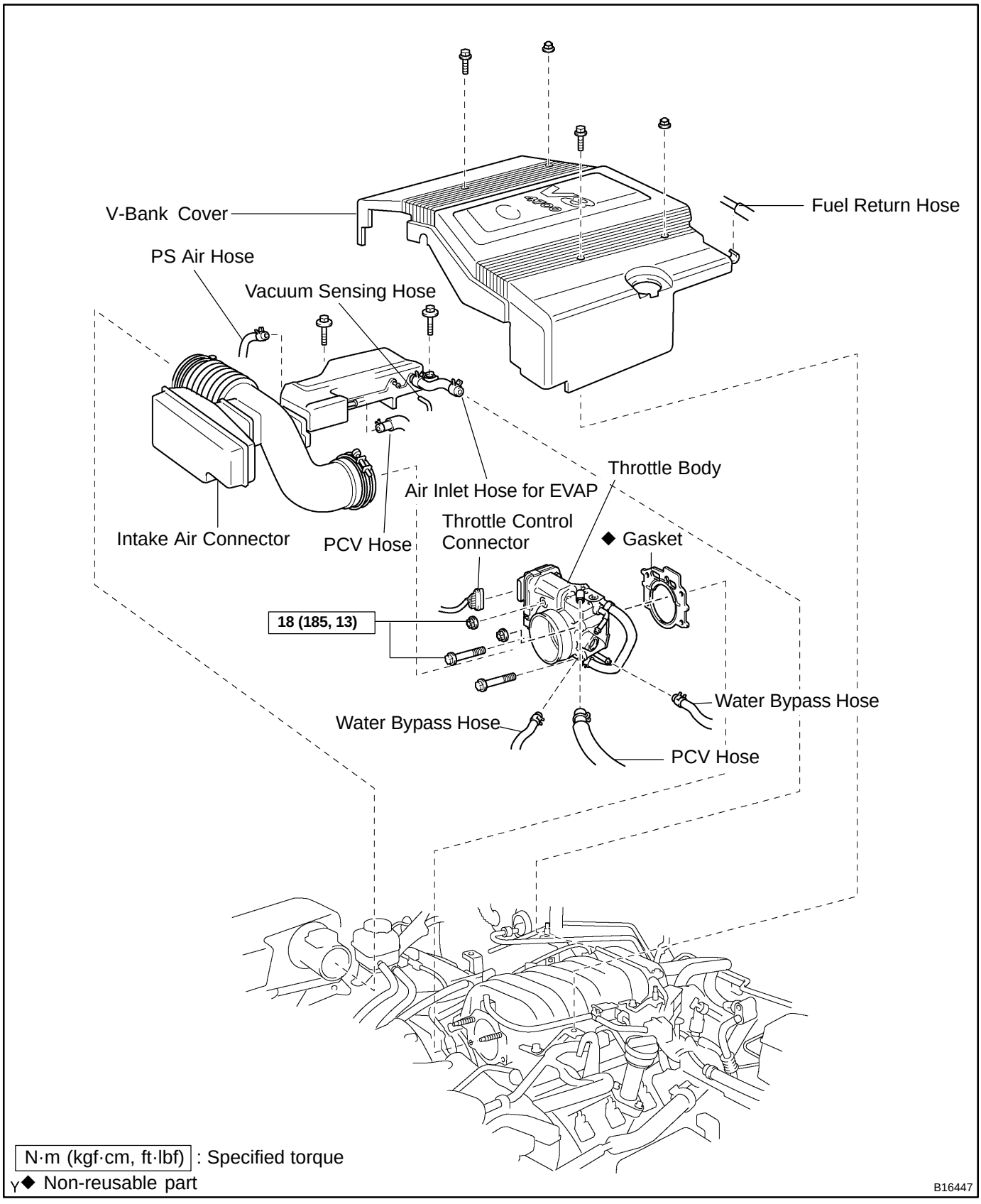
Always pinch the hose. Do not bend as it may cause the hose to crack.

(7) Turn the ignition switch OFF.

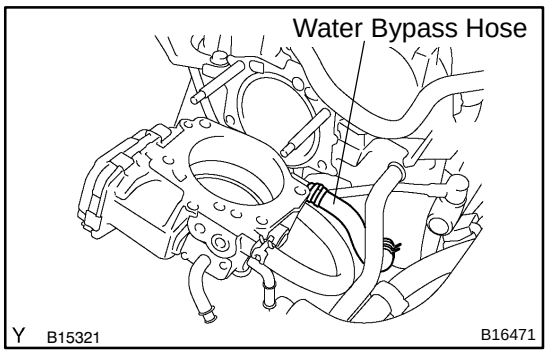
(8) Disconnect the TOYOTA hand-held tester from the DLC3.

SF1UW-01

COMPONENTS



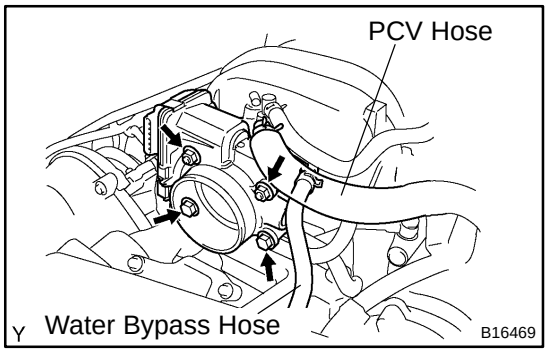
SF0P7-13



INSTALLATION

1. INSTALL THROTTLE BODY

(a) Connect the water bypass hose to the manifold thermostat on the throttle body.



(b) Install a new gasket and the throttle body with the 2 bolts and the 2 nuts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(c) Connect the water bypass hose and the PCV hose to the throttle body.

(d) Connect the throttle control connector.

2. INSTALL INTAKE AIR CONNECTOR

3. FILL WITH ENGINE COOLANT (See page CO-2)

4. START ENGINE AND CHECK FOR ENGINE COOLANT LEAKS

5. INSTALL V-BANK COVER

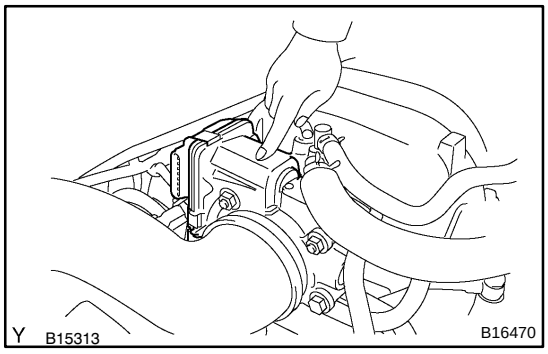
THROTTLE BODY

SF1UV-01

ON-VEHICLE INSPECTION

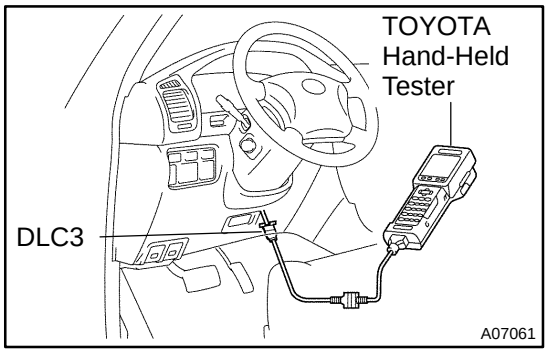
1. REMOVE V-BANK COVER

2. INSPECT SYSTEM OPERATION



(a) Inspect the throttle control motor for operating sound.
  (1) Turn the ignition switch ON.
  (2) When turning the accelerator pedal position sensor lever, check the running sound of the motor. Also, check that there is no friction sound.

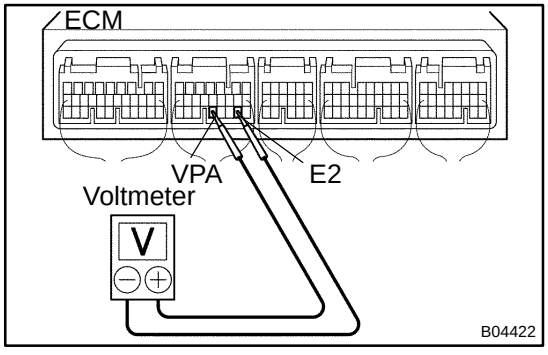
If operation is not as specified, check the throttle control motor (See step 3), wiring and ECM.



(b) Inspect the accelerator pedal position sensor.
  (1) Connect the TOYOTA hand-held tester or OBD II scan tool to the DLC3.
  (2) Check that the MIL does not come on.
  (3) When turning the accelerator pedal position sensor lever to the full- open position, check that the throttle valve opening percentage (THROTTLE POS) of CURRENT DATA shows the standard value.

  Standard throttle valve opening percentage:
  60 % or more

If operation is not as specified, check that the accelerator pedal position sensor (See page DI-318), wiring and ECM.



If you have no TOYOTA hand-held tester or OBD II scan tool, measure the voltage between terminal VPA and E2 of the ECM connector.

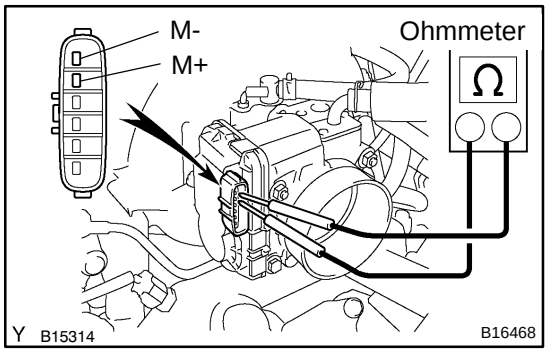
(c) Inspect the air assist system.
  (1) Start the engine and check that the MIL does not come on.
  (2) Allow the engine to warm up to normal operating temperature.
  (3) Turn the A/C compressor ON to OFF, and check the idle speed.

Idle speed (Transmission in neutral): 700 ± 50 rpm

NOTICE:

Perform inspection under the condition with no electrical load.

(d) After checking the above (b) to (d), perform the running test and check that there is no incongruity.



3. INSPECT THROTTLE CONTROL MOTOR

(a) Disconnect the throttle connector.

(b) Using an ohmmeter, measure the motor resistance between terminal M+ and M-.

Motor resistance: 0.3 - 100 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the throttle body.

(c) Reconnect the throttle body connector.

4. INSPECT THROTTLE POSITION SENSOR (See page DI-84)

If necessary, replace the throttle body.

NOTICE:

Be careful not to give a shock to the throttle body.

Be careful not to disassemble the throttle body.

5. REINSTALL V-BANK COVER

SF0P5-13

REMOVAL

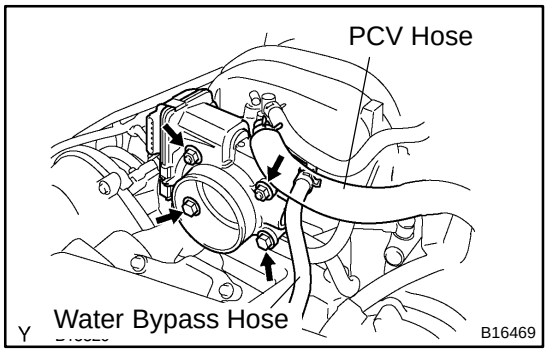
1. REMOVE V-BANK COVER

2. DRAIN ENGINE COOLANT

3. REMOVE INTAKE AIR CONNECTOR

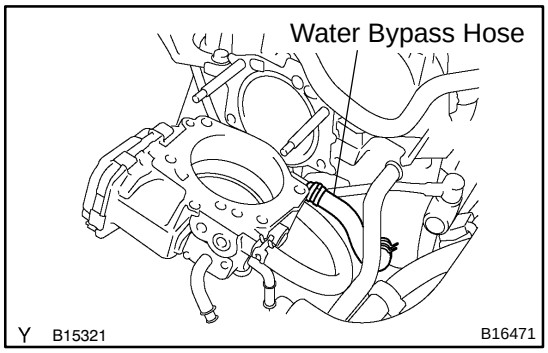
4. REMOVE THROTTLE BODY

(a) Disconnect the throttle control connector.



(b) Disconnect the PCV hose and the water bypass hose from the throttle body.

(c) Remove the 2 bolts and 2 nuts, and disconnect the throttle body from the intake manifold.



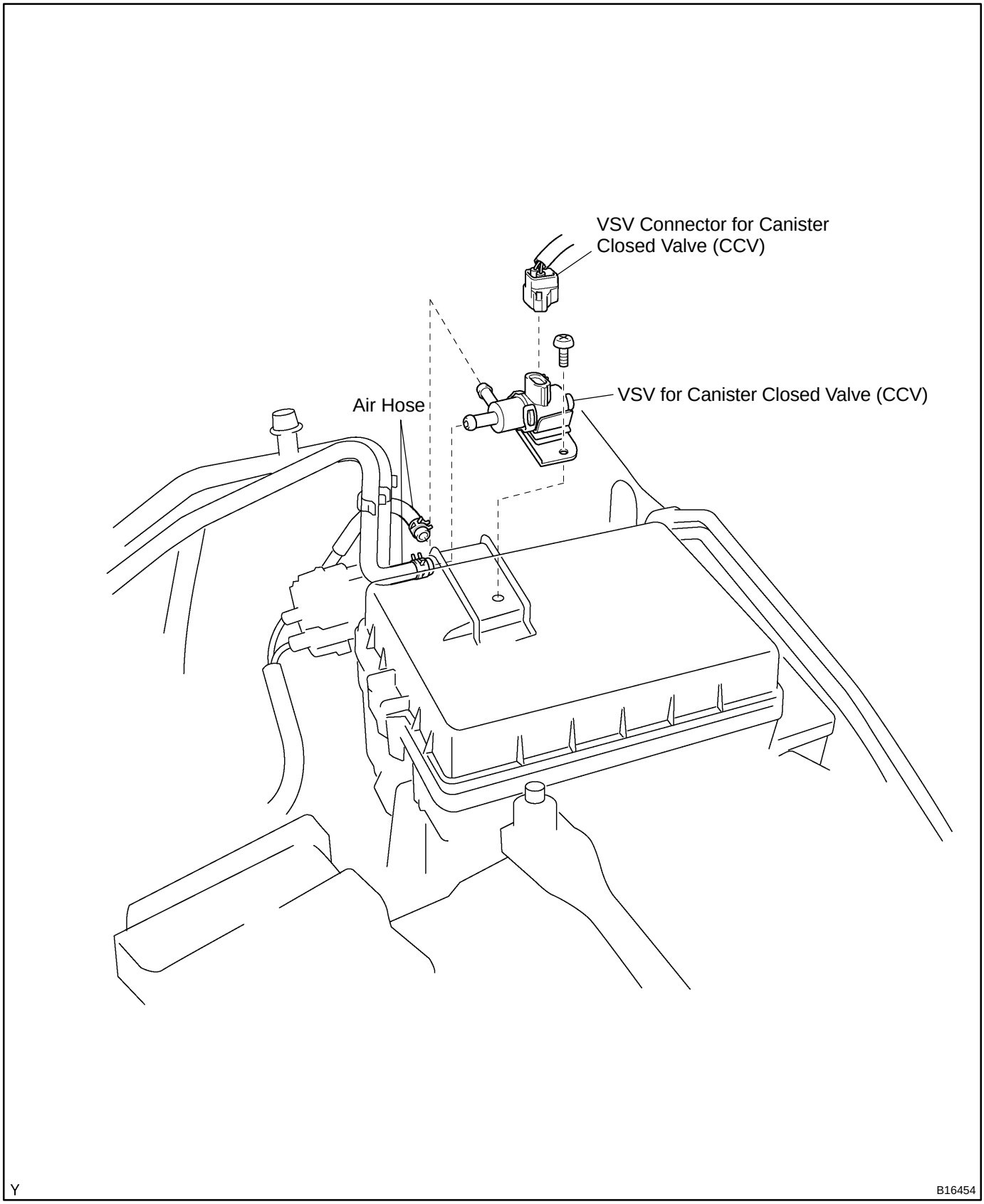
(d) Disconnect the water bypass hose from the manifold thermostat on the throttle body, and remove the throttle body.

(e) Remove the gasket.

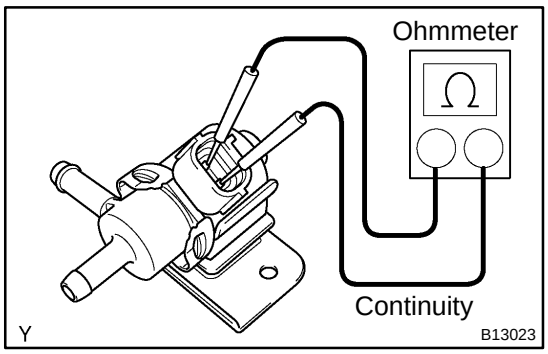
VSV FOR CANISTER CLOSED VALVE (CCV)

COMPONENTS

SF149-05



SF14A-06



INSPECTION

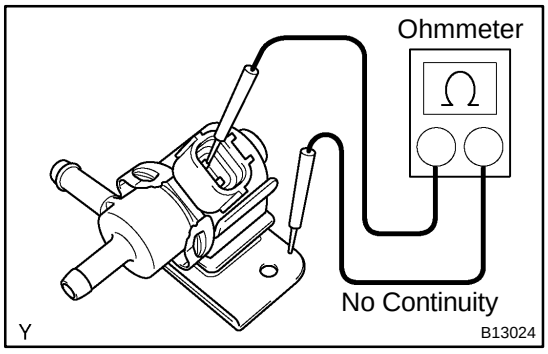
1. REMOVE VSV

2. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is a continuity between the terminals.

Resistance: 24 - 30 Ω at 20˚C (68˚F)

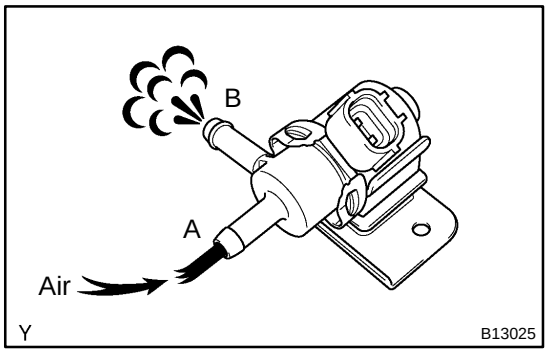
If there is no continuity, replace VSV.



3. INSPECT VSV FOR GROUND

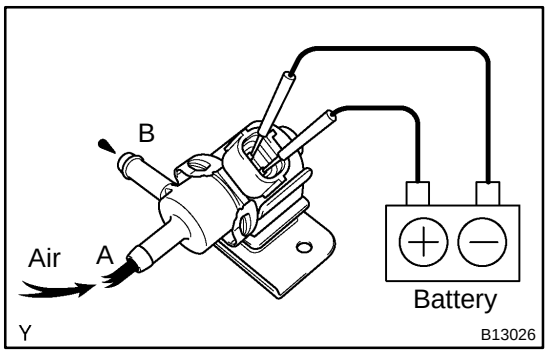
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is a continuity, replace VSV.



4. INSPECT VSV OPERATION

(a) Check that air flows from the ports A to B.



(b) Apply the battery positive voltage across the terminals.

(c) Check that air does not flow from the ports A to B.

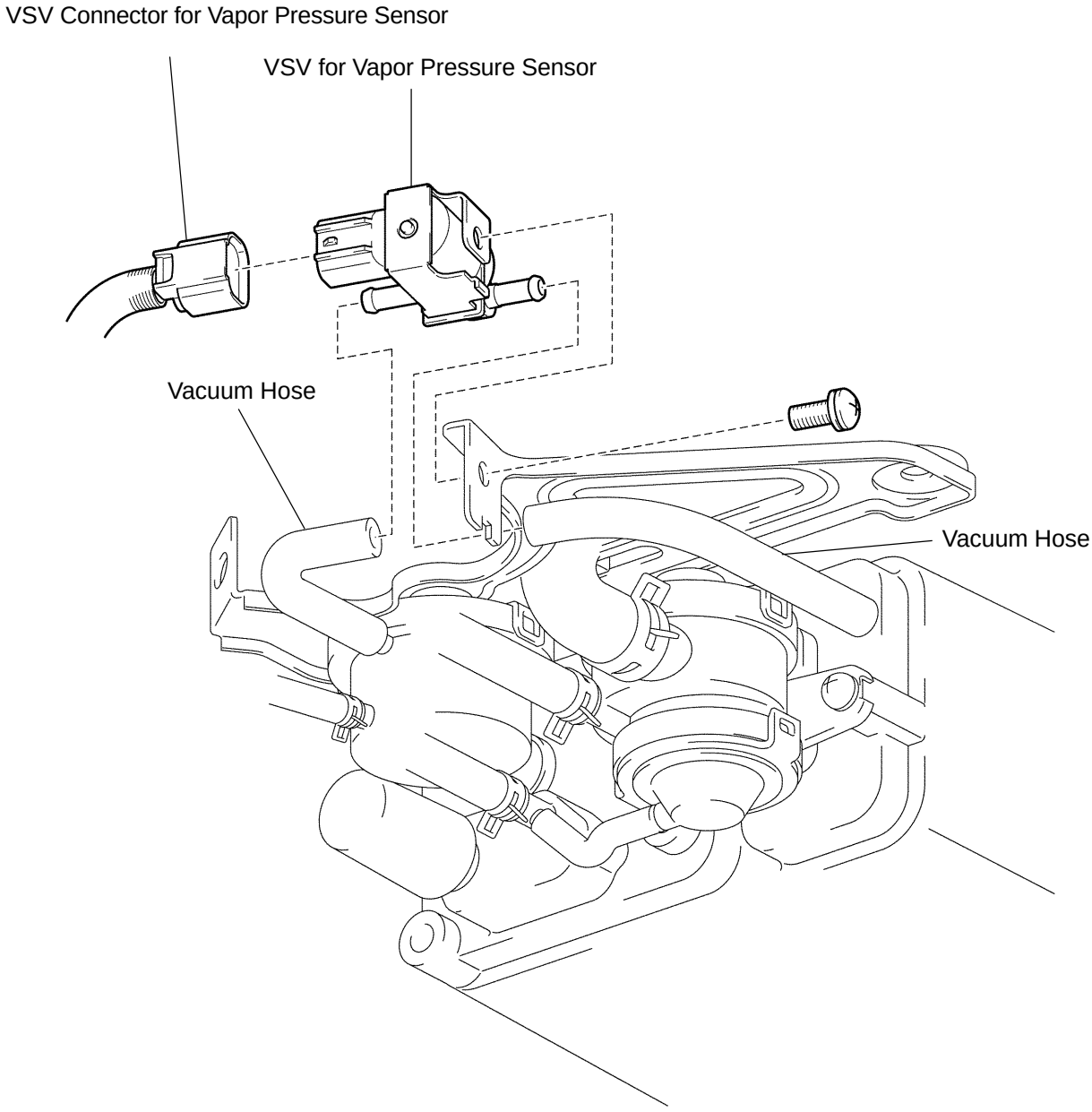
If operation is not as specified, replace VSV.

5. REINSTALL VSV

VSV FOR VAPOR PRESSURE SENSOR

COMPONENTS

SF0Y8-09



P

B16464

SF0PM-11

INSPECTION

1. REMOVE VSV

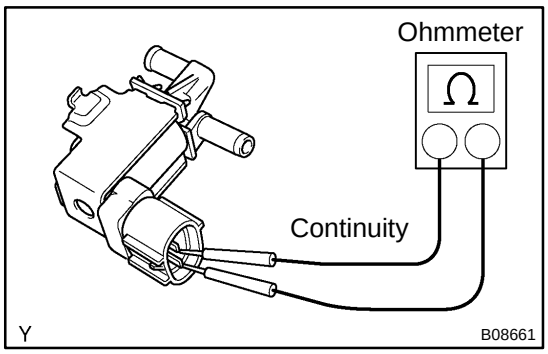
2. INSPECT VSV

(a) Inspect VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 30 - 36 Ω at 20˚C (68˚F)

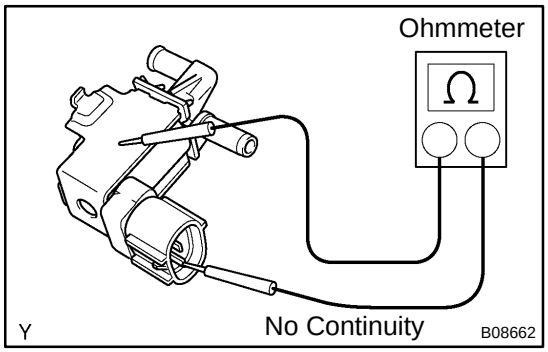
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

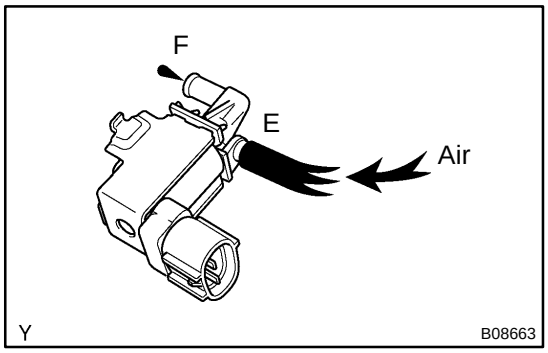
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is a continuity, replace the VSV.



(c) Inspect the VSV operation.

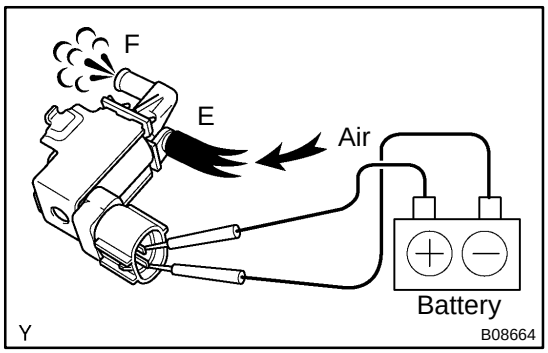
(1) Check that air flows from the ports E to F.



(2) Apply the battery positive voltage across the terminals.

(3) Check that air flows from the ports E to F.

If operation is not as specified, replace VSV.

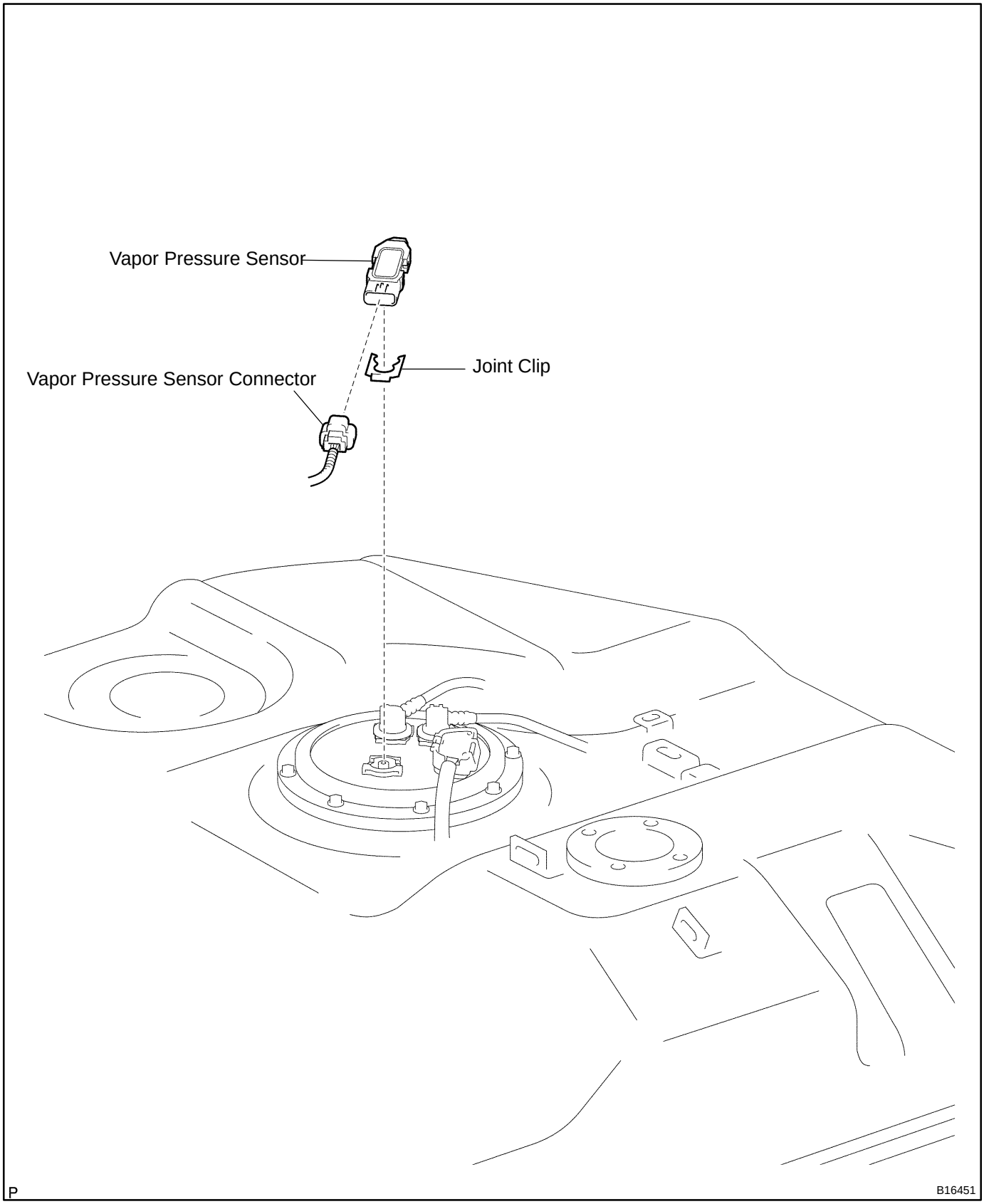


3. REINSTALL VSV

VAPOR PRESSURE SENSOR

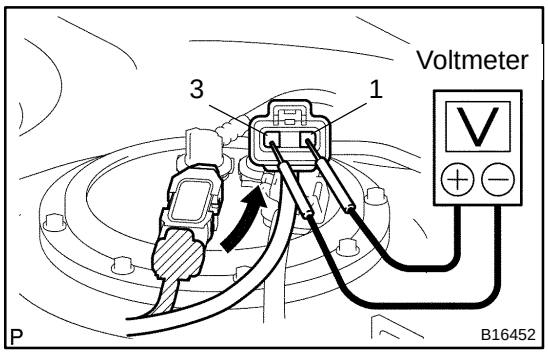
COMPONENTS

SF0PP-10



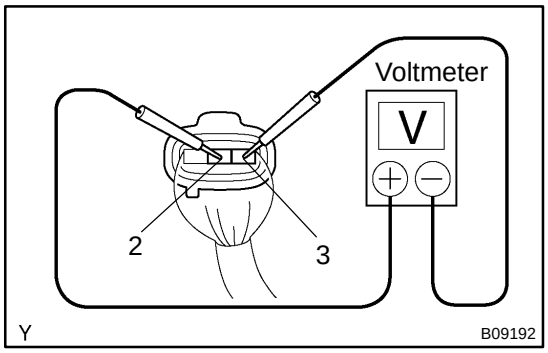
SF0PQ-10

INSPECTION



1. INSPECT POWER SOURCE VOLTAGE OF VAPOR PRESSURE SENSOR

(a) Disconnect the vapor pressure sensor connector.
(b) Turn the ignition switch ON.
(c) Using a voltmeter, measure the voltage between connector terminal 1 and 3 of the wiring harness side.
Voltage: 4.5 - 5.5 V
(d) Turn the ignition switch OFF.
(e) Reconnect the vapor pressure sensor connector.



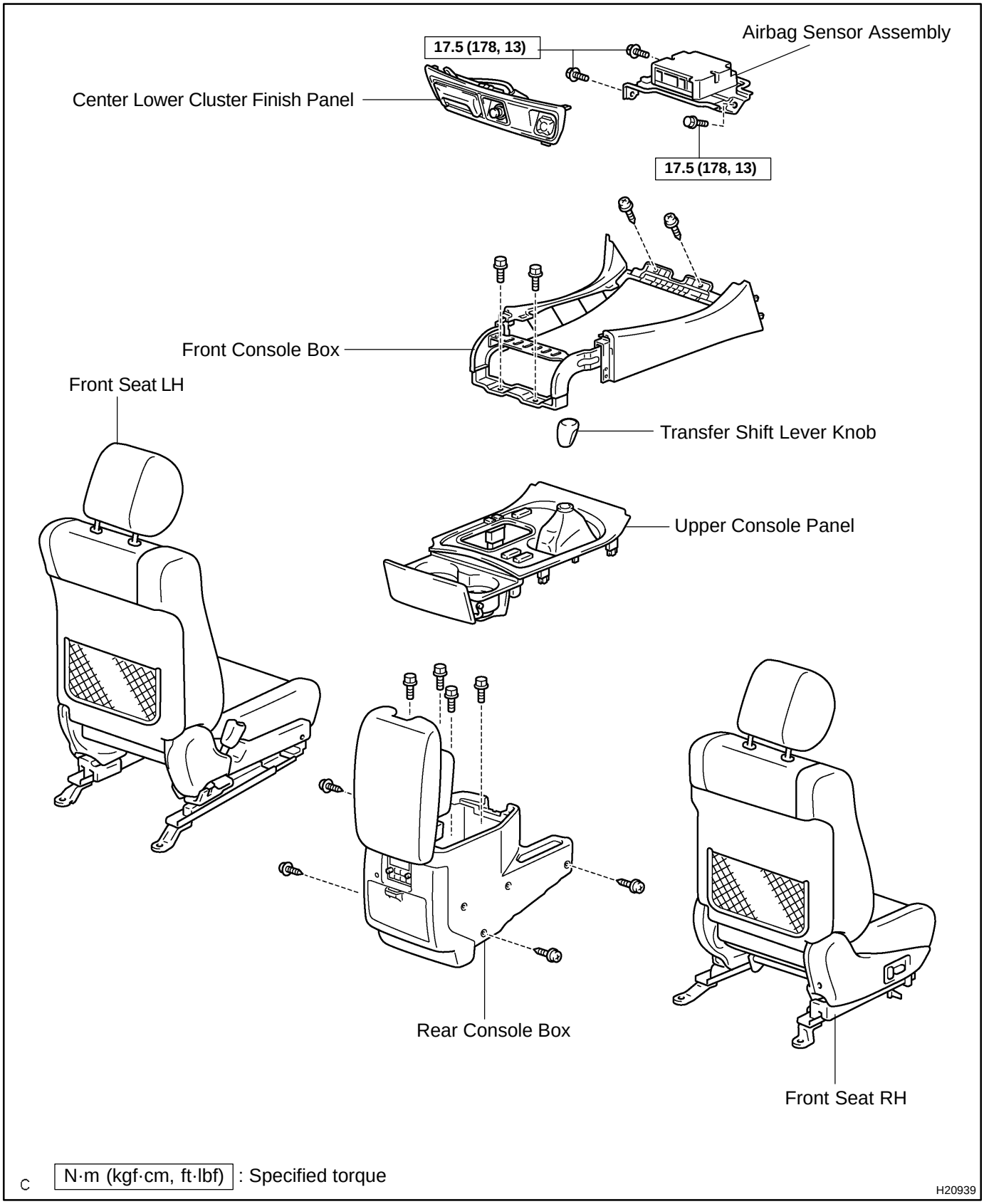
2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

(a) Turn the ignition switch ON.
(b) Remove the fuel tank cap.
(c) Connect a voltmeter to terminal 2 and 3, and measure the output voltage.
Voltage: 3.0 - 3.6 V
(d) Reinstall the fuel tank cap.
(e) Turn the ignition switch OFF.

AIRBAG SENSOR ASSEMBLY

COMPONENTS

RS0BK-08



RS0BM-03

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the airbag sensor assembly (See page RS-69).

RS0BO-08

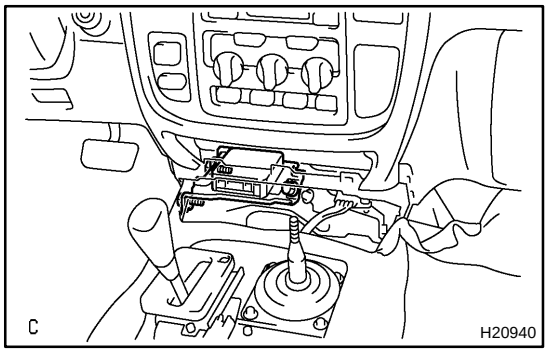
INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**

HINT:

For step 2 to 6, refer to page BO-91 .



1. INSTALL AIRBAG SENSOR ASSEMBLY

(a) Install the airbag sensor assembly with the 3 bolts.
Torque: 17.5 N·m (178 kgf·cm, 13 ft·lbf)

(b) Connect the airbag sensor connectors.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installing, shake the sensor assembly to check that there is no looseness.**

2. INSTALL CENTER LOWER INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY

3. INSTALL FRONT CONSOLE BOX

4. INSTALL REAR CONSOLE BOX WITH CONSOLE REAR END PANEL

5. INSTALL UPPER CONSOLE PANEL

6. INSTALL TRANSFER SHIFT LEVER KNOB

7. INSTALL FRONT SEAT (See page BO-117)

8. INSPECT SRS WARNING LIGHT (See page DI-692)

RS0BL-08

REMOVAL

NOTICE:

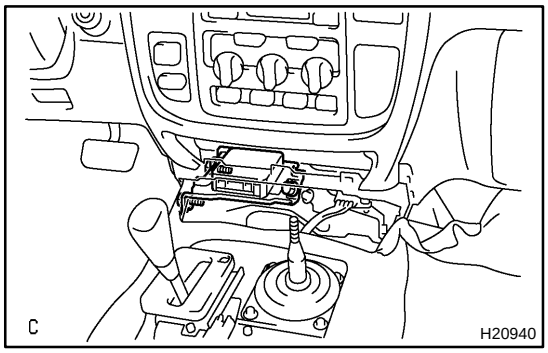
Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary.

(If the IC terminals are touched, the IC may be destroyed by static electricity.)

HINT:

For step 2 to 6, refer to page BO-84 .

1. **REMOVE FRONT SEAT (See page BO-105)**
2. **REMOVE TRANSFER SHIFT LEVER KNOB**
3. **REMOVE UPPER CONSOLE PANEL**
4. **REMOVE REAR CONSOLE BOX WITH CONSOLE REAR END PANEL**
5. **REMOVE FRONT CONSOLE BOX**
6. **REMOVE CENTER LOWER CLUSTER FINISH PANEL ASSEMBLY**



7. **REMOVE AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the airbag sensor connectors.

NOTICE:

Disconnect the connectors with the airbag sensor assembly installed.

(b) Remove the 3 bolts and the airbag sensor assembly.

RS0BN-01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the airbag sensor assembly.

- If the SRS has been deployed in a collision.
- If the airbag sensor assembly has been found to be faulty in troubleshooting.
- If the airbag sensor assembly has been dropped.

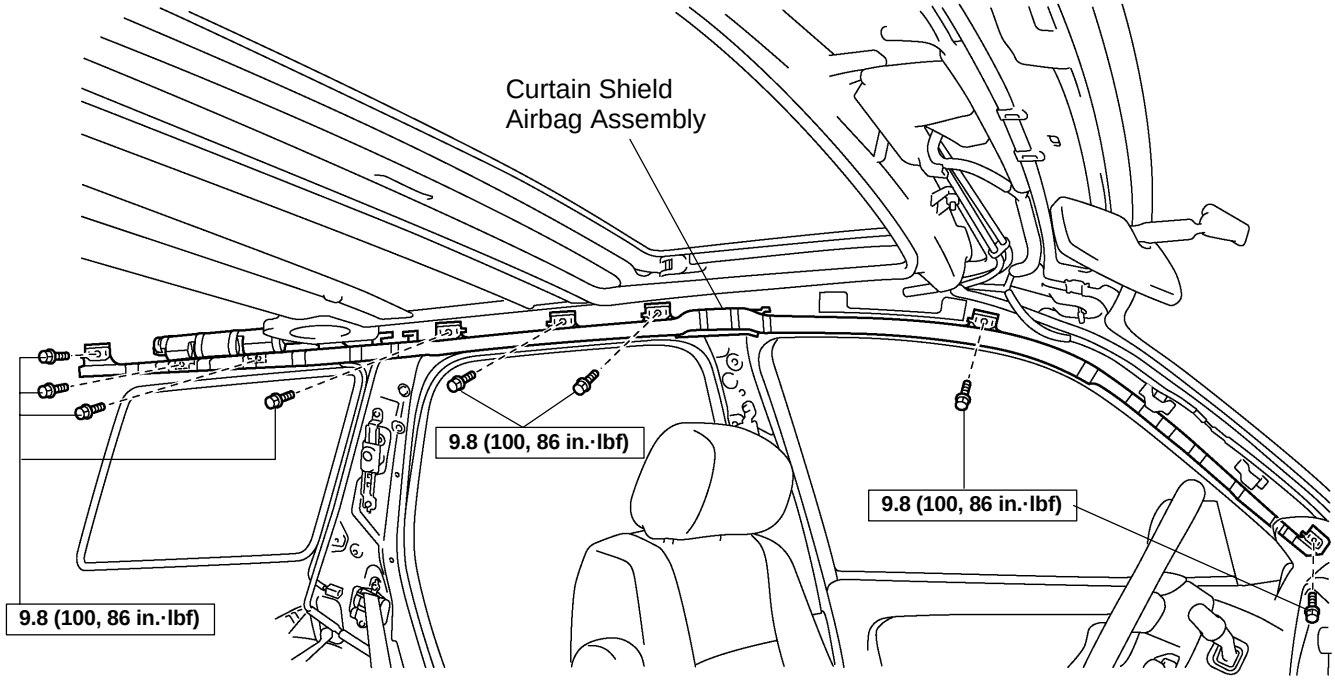
CAUTION:

For removal and installation of the airbag sensor assembly, see page RS-70 and RS-73 . Be sure to follow the correct procedure.

CURTAIN SHIELD AIRBAG ASSEMBLY

RS0N2-11

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H20928

RS0VO-01

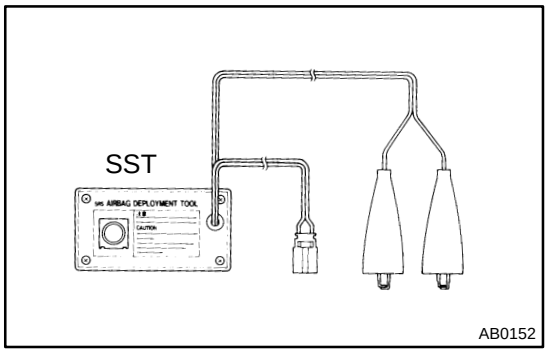
DISPOSAL

HINT:

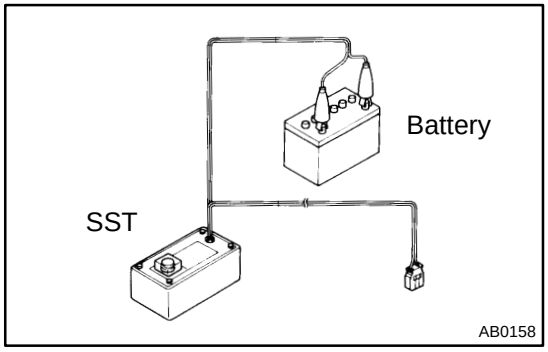
When scrapping vehicles equipped with an SRS or disposing of the side airbag assembly always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES,.U.S.A., INC.

CAUTION:

- **Never dispose of a curtain shield airbag assembly of which airbag has not been deployed.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors 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.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the airbag assembly.**
- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**



1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

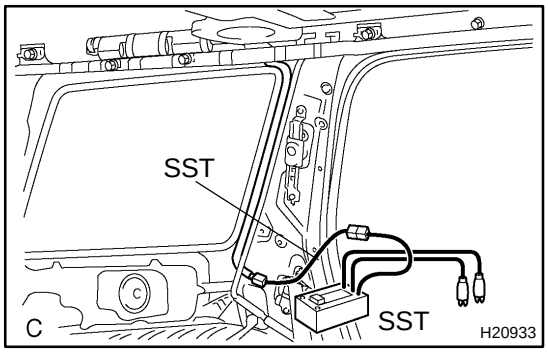
Have a battery ready as the power source to deploy the airbag.

(a) Check the function of the SST (See step 1-(a) on page RS-20).
SST 09082-00700

(b) Disconnect the curtain shield airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



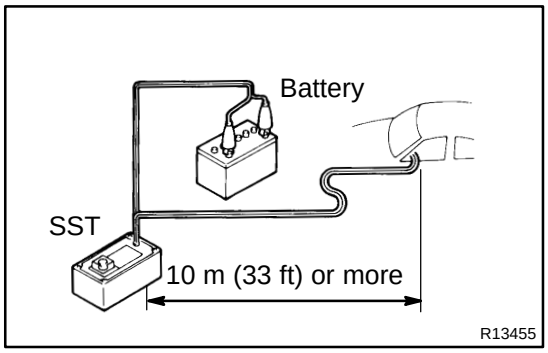
(c) Install the SST.

(1) Connect the connectors of the SST to the airbag connector.

SST 09082-00700, 09082-00760

NOTICE:

To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock.



(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

(d) Deploy the airbag.

(1) Check that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling the curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water, etc. to the curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the curtain shield airbag assembly still installed.**

HINT:

The airbag deploys as the LED of the SST activation switch comes on.

2. DEPLOYMENT WHEN DISPOSING OF CURTAIN SHIELD AIRBAG ASSEMBLY

NOTICE:

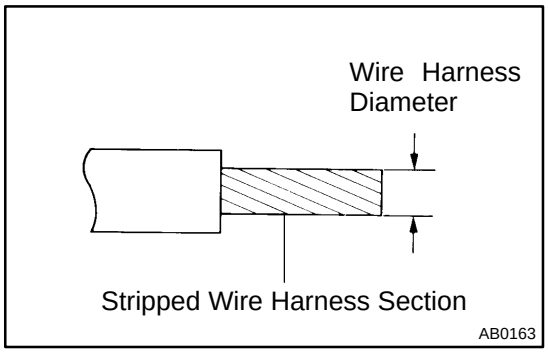
- **When disposing of the curtain shield airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:

Have a battery ready as the power source to deploy the airbag.

(a) Remove the curtain shield airbag assembly (See page RS-59).

(b) Cut off the deployment section in airbag from inflator.



(c) Using a service-purpose wire harness, tie down the curtain shield airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more)

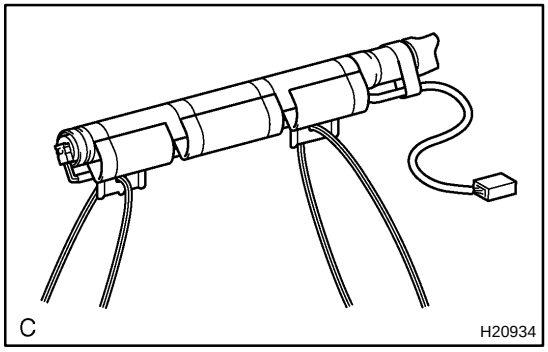
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the curtain shield airbag assembly, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2.).

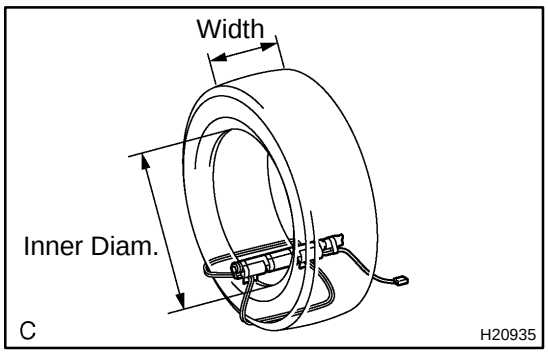
HINT:

To calculate the square of the stripped wire harness section-

Square = 3.14 x (Diameter)^2 divided by 4



(1) Passing the wire harness through the installation holes as shown in the illustration.

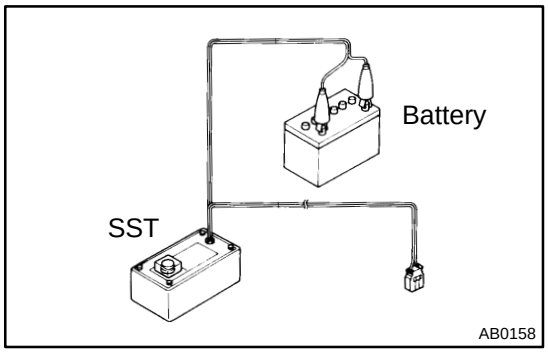


(2) Position the curtain shield airbag assembly inside the tire with the airbag deployment direction facing inside.

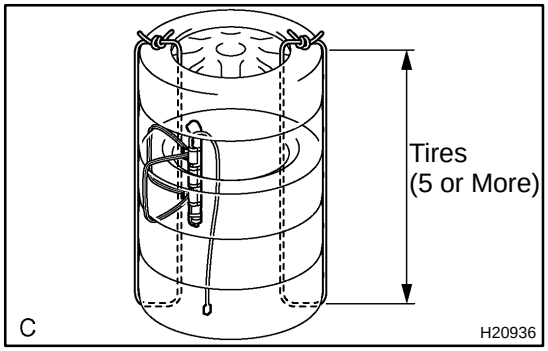
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
Make sure that the wire harness is tight. It is very dangerous when a loose wire harness results in the curtain shield airbag assembly coming free due to the shock from the airbag deploying.

NOTICE:
The tire will be marked by the airbag deployment, so when disposing of the airbag use a redundant tire.



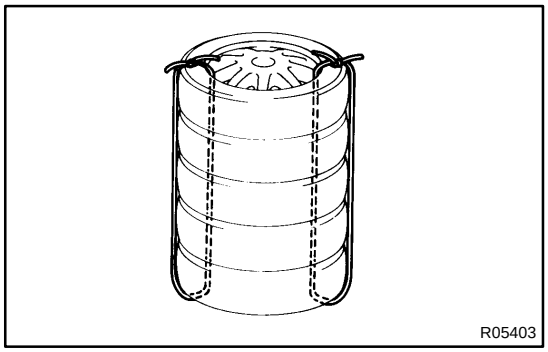
(d) Check the function of the SST (See step 1-(a) on page RS-20).
SST 09082-00700



(e) Place the tires.

CAUTION:
Place the tire so that the deployment direction of the curtain shield airbag will be downward.

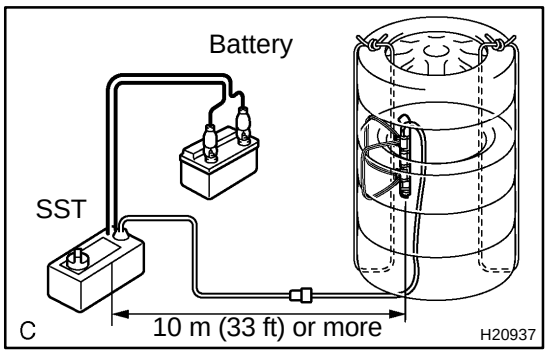
(1) Place at least 2 tires under the tire to which the side airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the side airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with 2 wire harnesses.

CAUTION:
Make sure that the wire harnesses are tight. It is very dangerous when loose wire harness results in the tires coming free due to the shock from the airbag deploying.

HINT:
Place the SST connector and wire harness inside tires. Secure at least 1 m (3 ft) of slack for the wire harness.



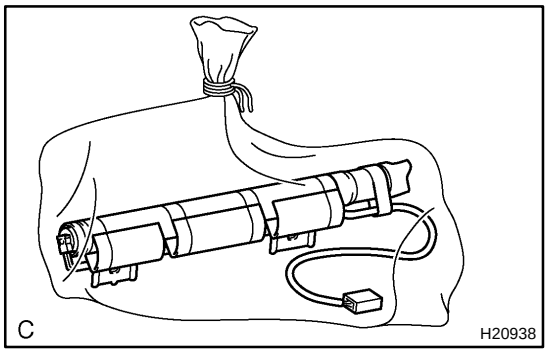
(f) Install the SST.
Connect the connectors of the SST to the curtain shield airbag assembly connector.
SST 09082-00700, 09082-00760

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 battery positive (+) terminal and the black clip to the battery negative (-) terminal.
(2) Check that no one is within 10 m (33 ft) area around the tire which the side airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys as the LED of the SST activation switch comes on.

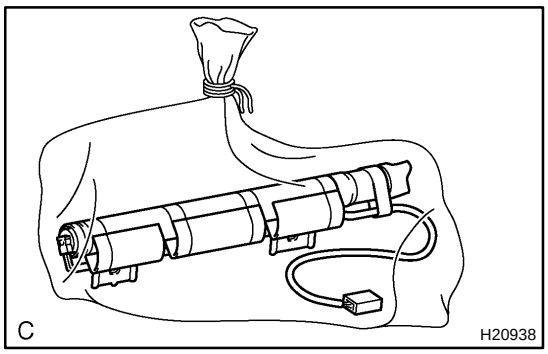


(h) Dispose of the curtain shield airbag assembly.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the curtain shield airbag assembly from the tire.
(2) Place the curtain shield airbag assembly in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.



3. DEPLOYMENT WHEN DISPOSING OF CURTAIN SHIELD AIRBAG ASSEMBLY WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the curtain shield airbag assembly.

CAUTION:

- **The curtain shield airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a curtain shield airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a curtain shield airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the curtain shield airbag assembly (See page RS-59).

(2) Place the curtain shield airbag assembly in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.

RS0N4-09

INSPECTION

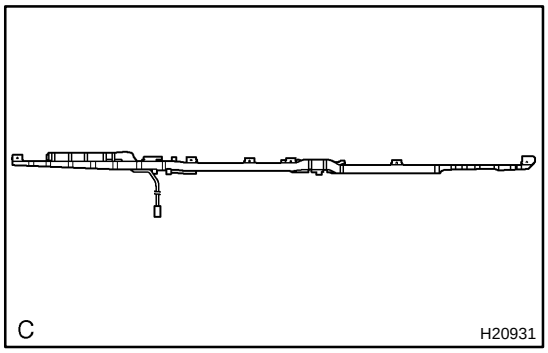
1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

(b) Do a visual check which includes the following items with the curtain shield airbag assembly installed in the vehicle. Check cuts, minute cracks or marked discoloration on the front pillar garnish and roof headlining.

2. Vehicle involved in a collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).



(b) Do a visual check which includes the following items with the curtain shield airbag assembly removed from the vehicle.

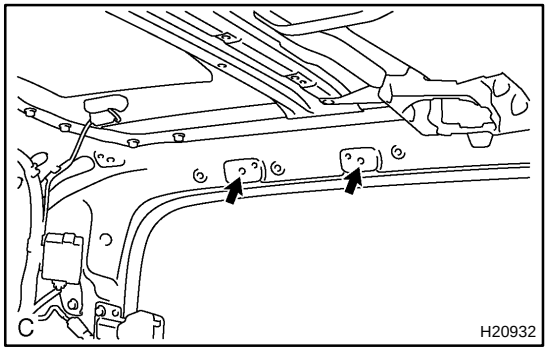
- Check cuts, tears and cracks, or marked discoloration of the curtain shield airbag assembly.
- Check cuts and cracks in wire harness, and chipping in connectors.

CAUTION:
For removal and installation of the curtain shield airbag assembly, see page RS-59 and RS-68 . Be sure to follow the correct procedure.

3. Vehicle involved in a collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

(b) Do a visual check which includes the following items with the curtain shield airbag assembly removed from the vehicle.



- Check the deformation or cracks on the body that the curtain shield airbag installed on.
- Check the damage to the connector and wire harness.

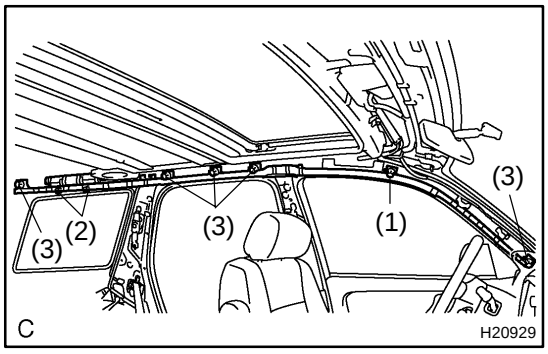
HINT:
If the body that the curtain shield airbag was installed on is deformed or cracked, replace it.

RS0TH-03

INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.



1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

(a) In the order shown in the illustration, install the curtain shield airbag with the 8 bolts.

Torque: 9.8 N·m (100 kgf·cm, 86 in.·lbf)

CAUTION:

Pay due attention not to twist the deployment section of the curtain shield airbag assembly.

NOTICE:

- **Make sure that the curtain shield airbag assembly is installed to the specified torque.**
- **If the curtain shield airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the curtain shield airbag assembly with a new one.**
- **When installing the curtain shield airbag assembly, take care it is not pinched between other parts.**

(b) Connect the connector of the curtain shield airbag assembly.

2. INSTALL ROOF HEADLINING (See page BO-101)

3. INSPECT SRS WARNING LIGHT (See page DI-692)

RS0TG-03

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**

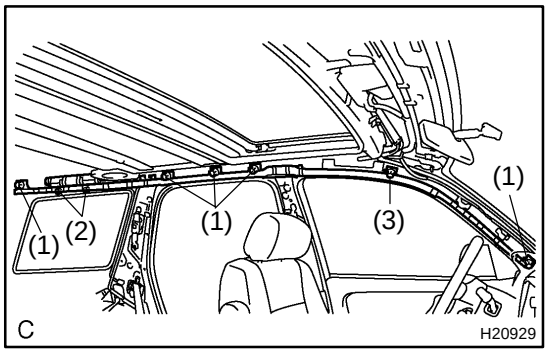
1. REMOVE ROOF HEADLINING (See page BO-97)

2. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY

(a) Disconnect the curtain shield airbag connector.

NOTICE:

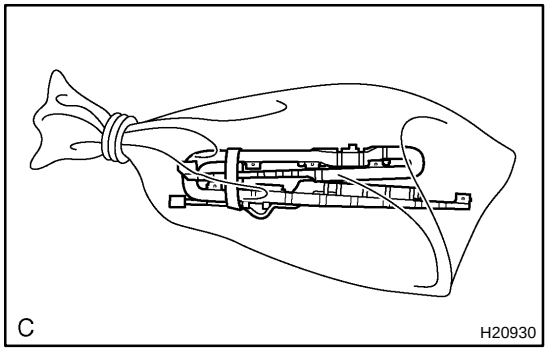
When handling the airbag connector, take care not to damage the airbag wire harness.



(b) In the order shown in the illustration, remove the bolts and curtain shield airbag assembly.

HINT:

- Loosen the bolt (3) before removing the bolt (2).
- Bind the front and rear parts of the curtain shield airbag assembly before removing the bolt (3).



(c) Put the removed curtain shield airbag in a clear plastic bag and keep it in a safe place.

CAUTION:

Never disassemble the curtain shield airbag assembly.

NOTICE:

Plastic bag is not reusable.

RS0N6-06

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the curtain shield airbag assembly or curtain shield airbag cover.

Case	Replacing part
If the curtain shield airbag has been deployed.	Curtain shield airbag assembly
If the curtain shield airbag assembly has been found to be faulty in trouble-shooting.	Curtain shield airbag assembly
If the curtain shield airbag assembly has been found to be faulty during checking items (See page RS-60).	Curtain shield airbag assembly
If the front pillar garnish has been found to be faulty during checking items (See page RS-60).	Front pillar garnish
If the roof headlining has been found to be faulty during checking items (See page RS-60).	Roof headlining
If the curtain shield airbag assembly has been dropped.	Curtain shield airbag assembly

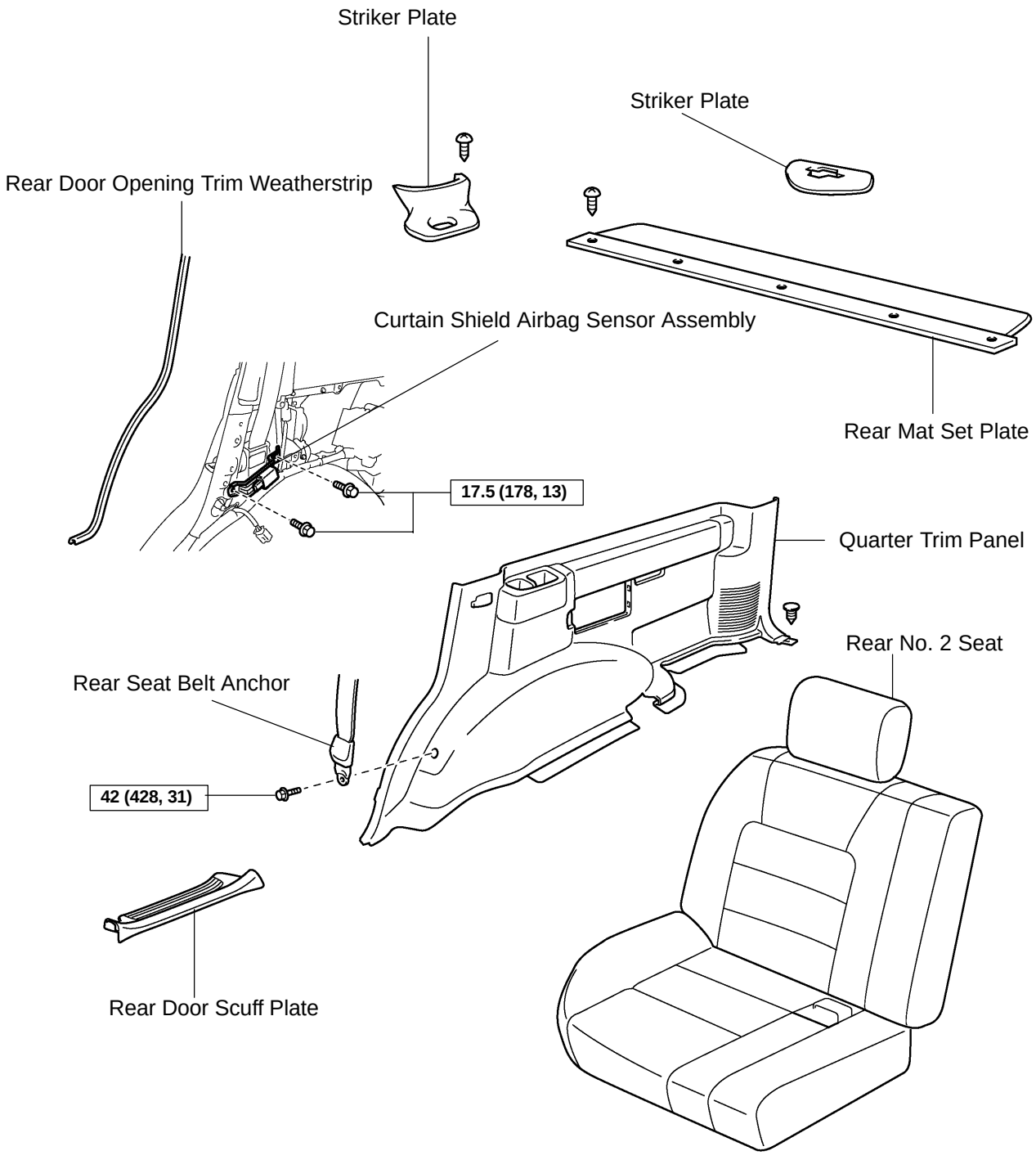
CAUTION:

For removal and installation of the curtain shield airbag assembly, see page RS-59 and RS-68. Be sure to follow the correct procedure.

CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

RS0SH-04

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H20947

RS0SJ-03

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the curtain shield airbag sensor assembly (See page RS-85).

RS0SL-04

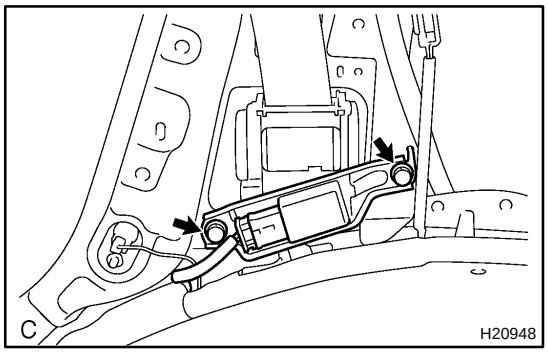
INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the curtain shield airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**

HINT:

For step 2 to 8, refer to page BO-101 .



1. INSTALL CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

(a) Install the curtain shield airbag sensor assembly with the 2 bolts.

Torque: 17.5 N·m (178 kgf·cm, 13 ft·lbf)

(b) Connect the connector.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure that the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL QUARTER TRIM PANEL

3. INSTALL STRIKER PLATES

4. INSTALL REAR NO. 2 SEAT

5. INSTALL REAR MAT SET PLATE

6. INSTALL REAR SEAT BELT ANCHOR

7. INSTALL REAR DOOR OPENING TRIM

8. INSTALL REAR DOOR SCUFF PLATE

9. INSPECT SRS WARNING LIGHT (See page DI-692)

RS0SI-04

REMOVAL

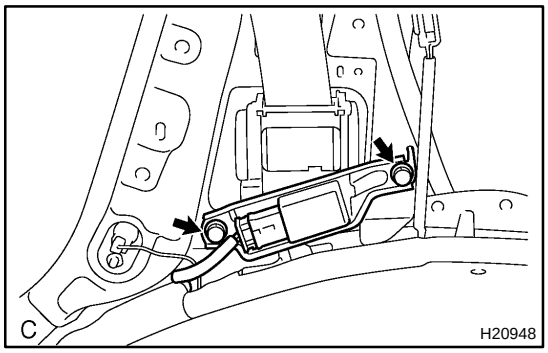
NOTICE:

- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)**
- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**

HINT:

For the step 1 to 7, refer to page BO-97 .

1. **REMOVE REAR DOOR SCUFF PLATE**
2. **REMOVE REAR DOOR OPENING TRIM**
3. **REMOVE REAR SEAT BELT ANCHOR**
4. **REMOVE REAR MAT SET PLATE**
5. **REMOVE REAR NO. 2 SEAT**
6. **REMOVE STRIKER PLATES**
7. **REMOVE QUARTER TRIM PANEL**



8. **REMOVE CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 bolts and curtain shield airbag sensor assembly.

RS0SK-02

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the curtain shield airbag sensor assembly.

- If the curtain shield airbag sensor assembly has been deployed in a collision.
- If the curtain shield airbag sensor assembly has been found to be faulty in troubleshooting.
- If the curtain shield airbag sensor assembly has been dropped.

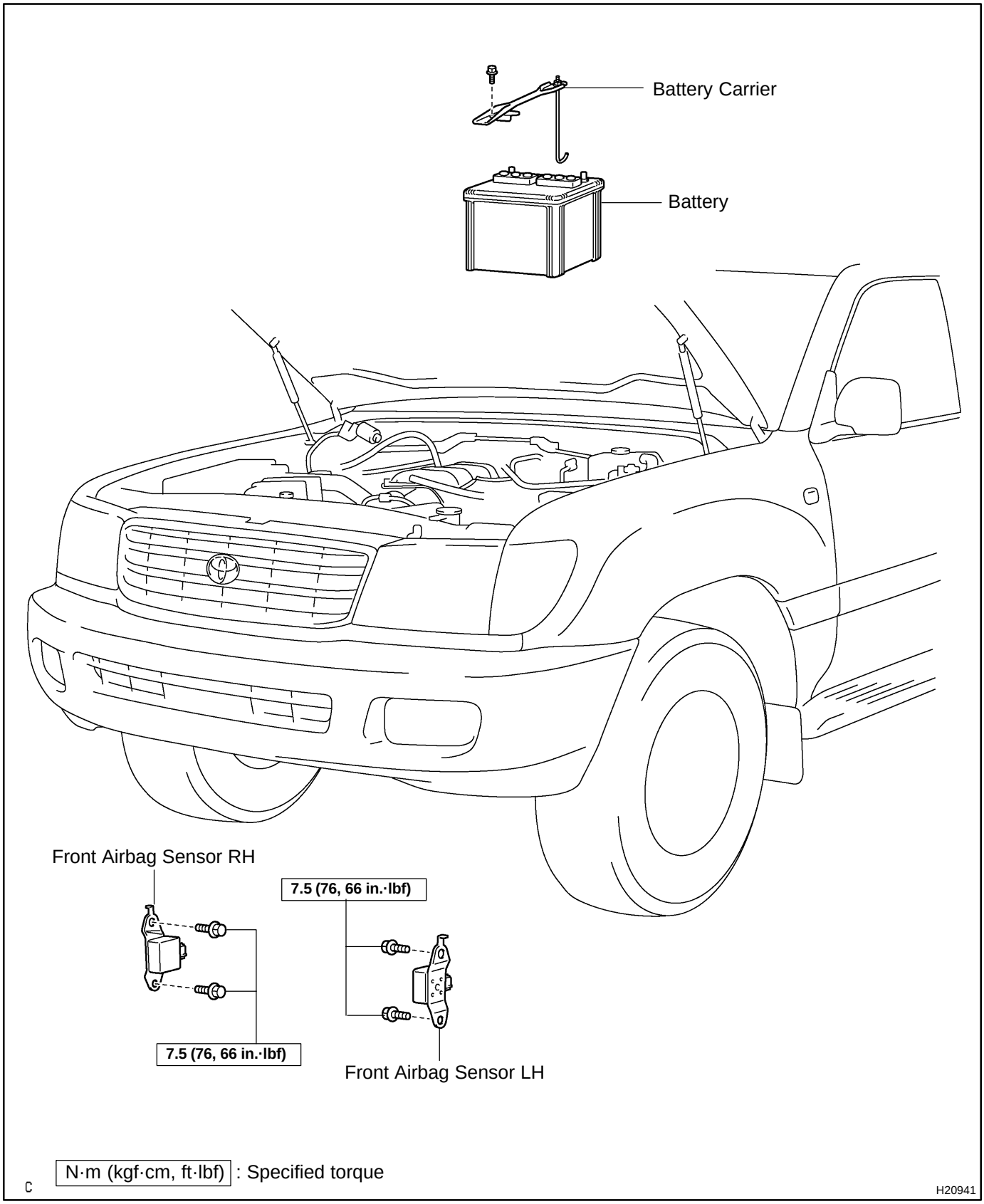
CAUTION:

For removal and installation of the curtain shield airbag sensor assembly, see page RS-86 and RS-89 . Be sure to follow the correct procedure.

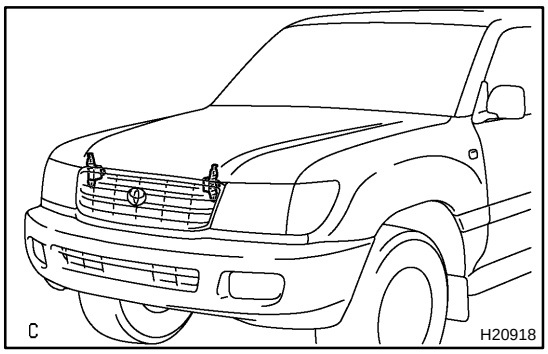
FRONT AIRBAG SENSOR

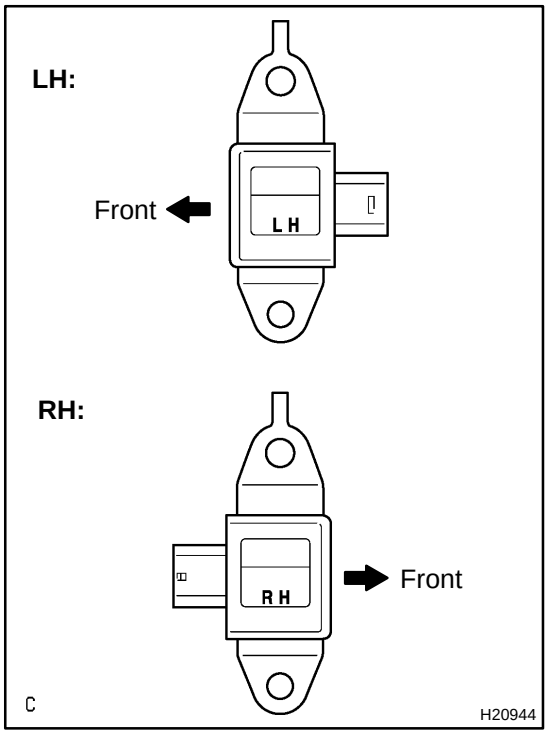
COMPONENTS

RS0BP-08



RS0BR-08





INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

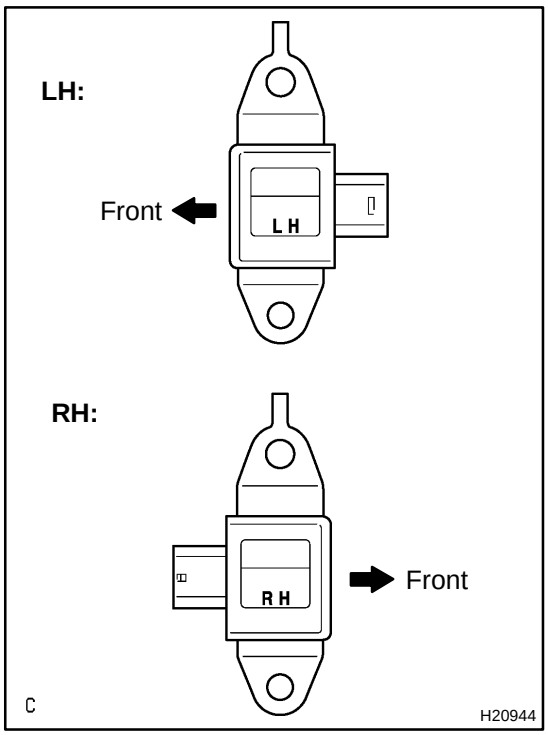
2. Vehicle involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

(b) If the front fender of the vehicle or its periphery is damaged, do a visual check for damage to the front airbag sensor, which includes the following items even if the airbag was not deployed:

- Bracket deformation.
- Paint peeling off the bracket.
- Cracks, dents or chips in the case.
- Cracks, dents, chipping and scratches in the connector.
- Peeling off of the label or damage to the serial number.

RS0BT-06



INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the sensor involved in a collision when the SRS has deployed.**
- **Never repair a sensor in order to reuse it.**

1. INSTALL FRONT AIRBAG SENSOR

(a) Install the front airbag sensor with the arrow on the sensor facing toward the front of the vehicle.

Torque: 7.5 N·m (76 kgf·cm, 66 in.·lbf)

NOTICE:

- **Make sure that the sensor is installed with the specified torque.**
- **If the sensor has been dropped, or there are cracks, dents or other defects in the case, brackets or connector, replace the removed sensor with a new one.**
- **The front sensor is equipped with an electrical connection check mechanism. Be sure to lock this mechanism securely when connecting the connector. If the connector is not securely locked, a malfunction code will be detected by the diagnostic system.**

(b) Connect the front airbag sensor connector.

2. INSTALL BATTERY AND BATTERY CARRIER

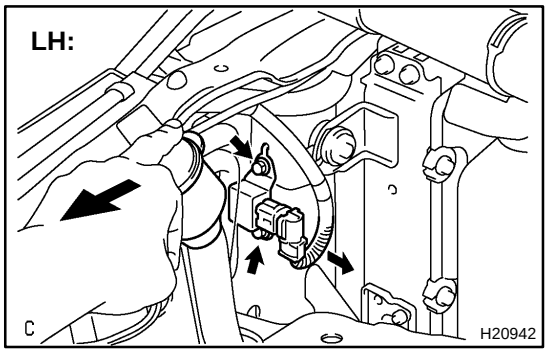
3. INSPECT SRS WARNING LIGHT (See page DI-692)

RS0BQ-07

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never reuse the sensor involved in a collision when the SRS has deployed.**
- **Never repair a sensor in order to reuse it.**



1. REMOVE FRONT AIRBAG SENSOR LH

(a) Remove the battery carrier and battery.

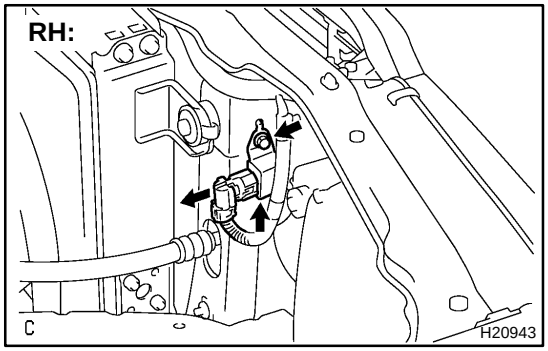
(b) Disconnect the front airbag sensor connector.

NOTICE:

Disconnect the connector with sensor assembly installed.

(c) Pull the windshield washer tank opening as shown in the illustration.

(d) Remove the 2 bolts and front airbag sensor LH.



2. REMOVE FRONT AIRBAG SENSOR RH

(a) Disconnect the front airbag sensor connector.

NOTICE:

Disconnect the connector with sensor assembly installed.

(b) Remove the 2 bolts and front airbag sensor RH.

RS0BS-04

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the front airbag sensor.

- If the SRS has been deployed in a collision. (Replace both the left and right airbag sensors.)
- If the front airbag sensor has been found to be faulty in troubleshooting.
- If the front airbag sensor has been found to be faulty during checking items (See page RS-76).
- If the front airbag sensor has been dropped.

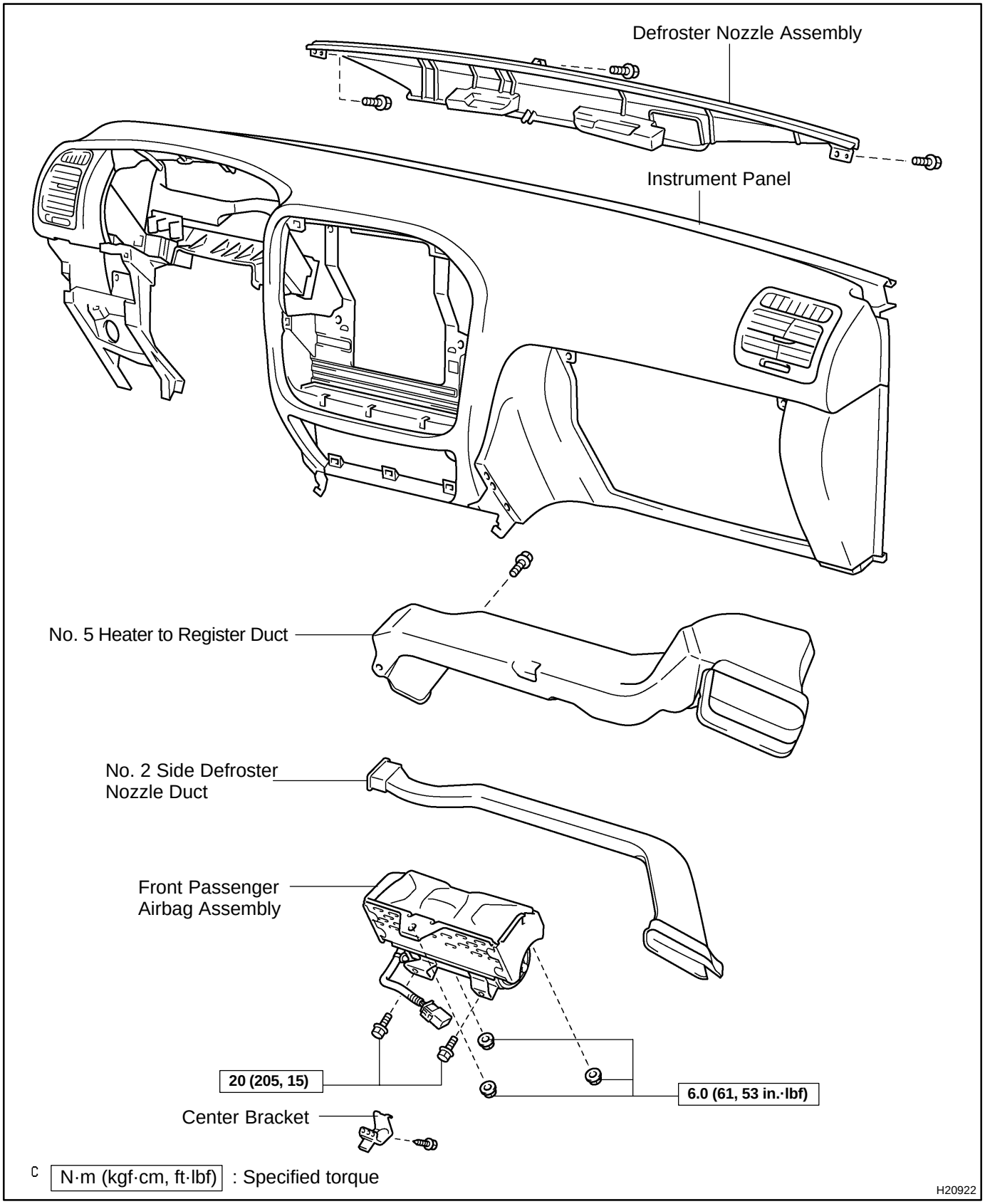
CAUTION:

For removal and installation of the front airbag sensor, see page RS-75 and RS-78 .
Be sure to follow the correct procedure.

FRONT PASSENGER AIRBAG ASSEMBLY

COMPONENTS

RS0BE-08



RS0VK-01

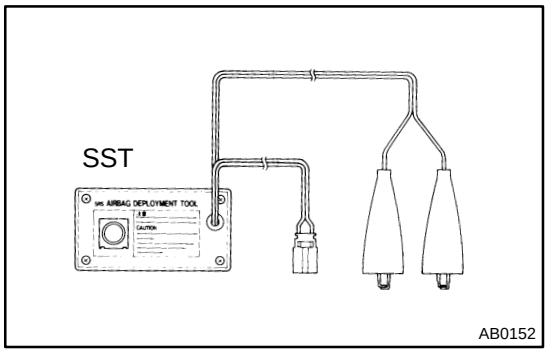
DISPOSAL

HINT:

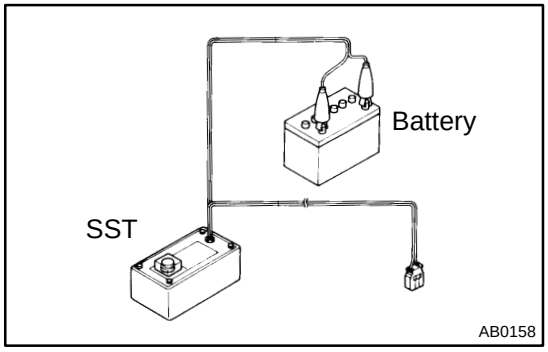
When scrapping vehicle equipped with an SRS or disposing of a front passenger airbag assembly, always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a front passenger airbag assembly of which airbag has not been deployed.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out of doors 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.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the front passenger airbag assembly.**
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**

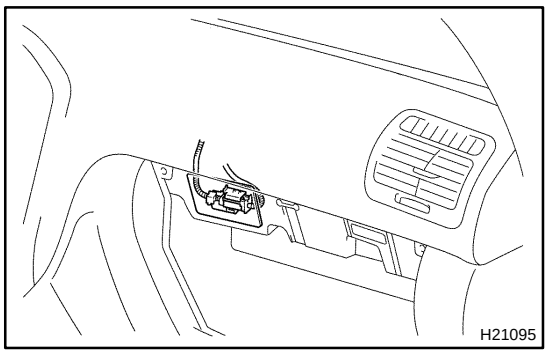


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

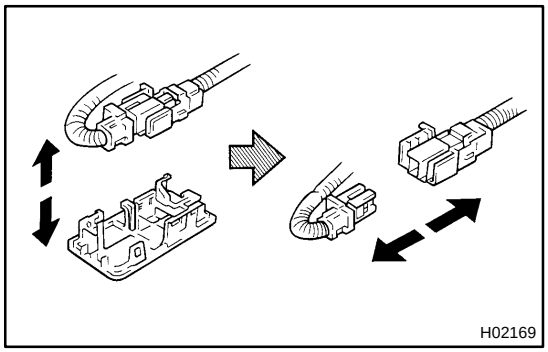
(a) Check the function of the SST
(See page RS-20).



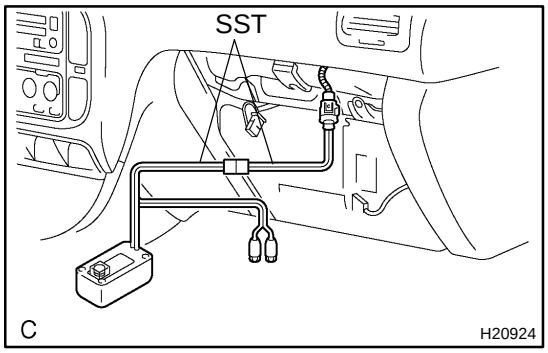
(b) Disconnect the airbag connector.
(1) Remove the glove compartment door.
(2) Remove the No. 1 under cover.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



(3) Pull up the connector.
(4) Disconnect the airbag connector.

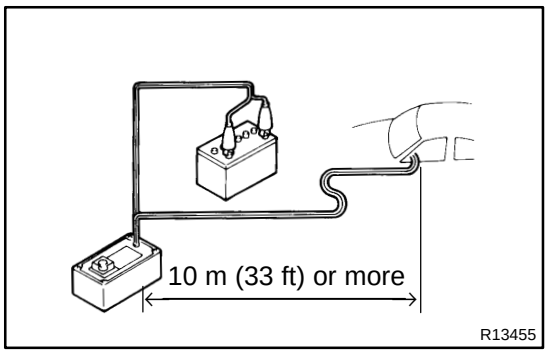


(c) Install the SST.
(1) Connect the connector of SST to the front passenger airbag assembly connector.

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.

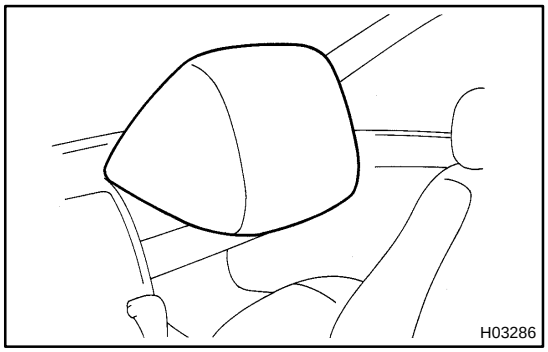


(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.
(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the negative (+) terminal.



(d) Deploy the airbag.
(1) Check that no one is inside the vehicle, nor within 10 m (33 ft) area around the vehicle.
(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**

- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the front passenger airbag assembly still installed.**
- **When moving a vehicle for scrapping which has a front passenger airbag assembly with deployed airbag, use gloves and safety glasses.**

HINT:

The airbag deploys as the LED of the SST activation switch comes on.

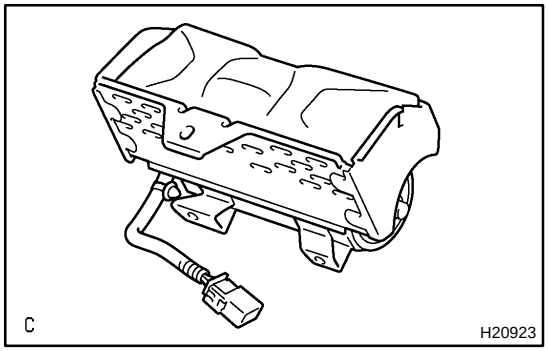
2. DEPLOYMENT WHEN DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY ONLY

NOTICE:

- **When disposing of the front passenger airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:

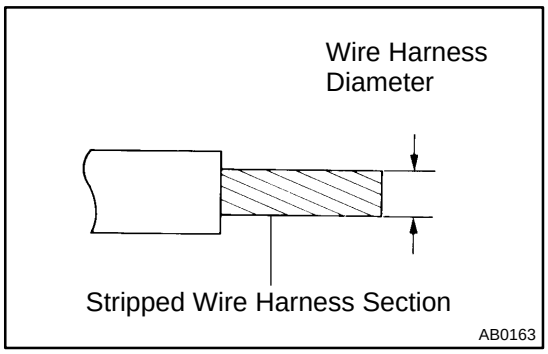
Have a battery ready as the power source to deploy the airbag.



(a) Remove the front passenger airbag assembly (See page RS-31).

CAUTION:

- **When removing the front passenger airbag assembly, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**
- **When storing the front passenger airbag assembly, keep the upper surface of the airbag deployment side facing upward.**



(b) Using a service-purpose wire harness for the vehicle, tie down the front passenger airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in.^{2} or more)

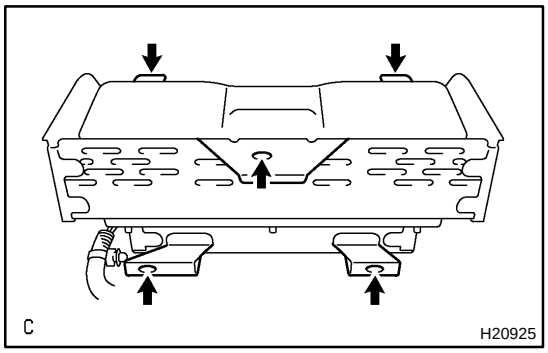
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the front passenger airbag assembly, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness which is at least 1.25 mm^2 (0.0019 in.^{2}).

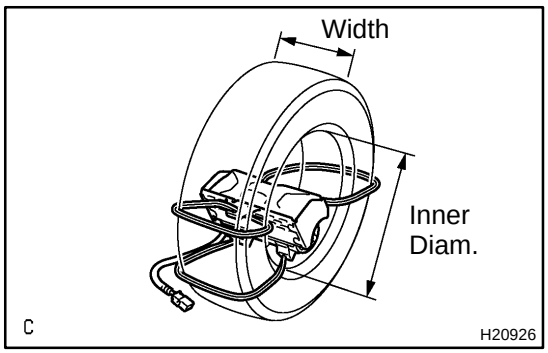
HINT:

To calculate the square of the stripped wire harness section:

Square = 3.14 X (Diameter)^2 divided by 4



(1) While passing the wire harness through the installation holes indicated by arrows in the illustration, wind the wire harness around the tire.



(2) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

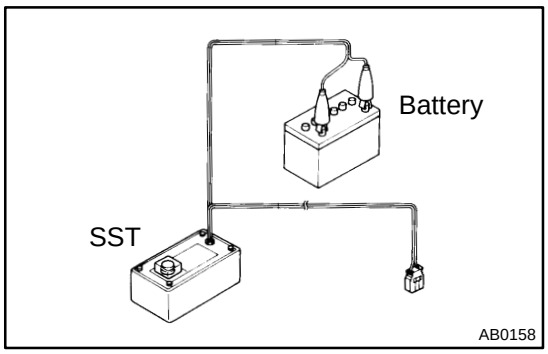
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:

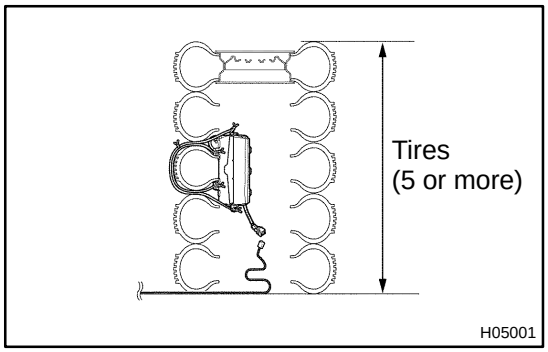
- **Make sure that the wire harness is tight. It is very dangerous if looseness in the wire harness results in the front passenger airbag assembly coming free due to the shock from the airbag deployment.**
- **Always tie down the front passenger airbag assembly with the airbag deployment side facing inside.**

NOTICE:

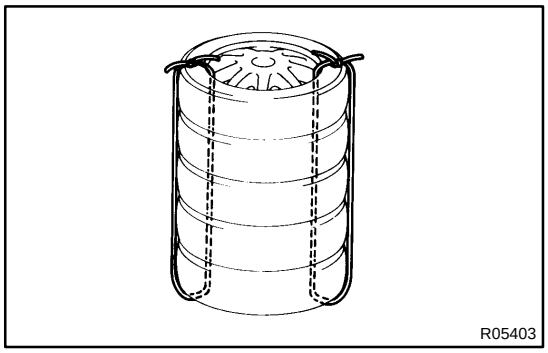
The tire will be marked by the airbag deployment, so use a redundant tire.



(c) Check the functioning of the SST
(See step 1-(a) on page RS-20).
SST 09082-00700



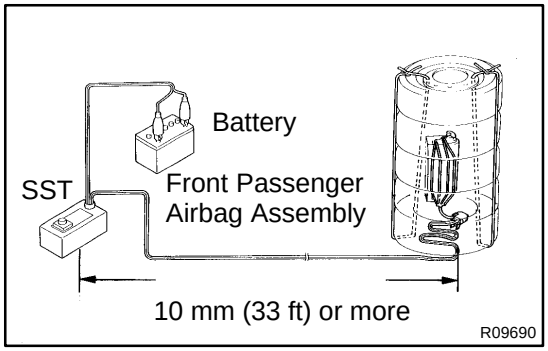
(d) Place tires.
(1) Place at least 2 tires under the tire to which the front passenger airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the front passenger airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with 2 wire harnesses.

CAUTION:
Make sure that the wire harnesses are tight. It is very dangerous if loose wire harnesses result in the tires coming free due to the shock from the airbag deploying.

HINT:
Place the SST connector and wire harness inside tires. Provide at least 1 m (3 ft) of slack for the wire harness.

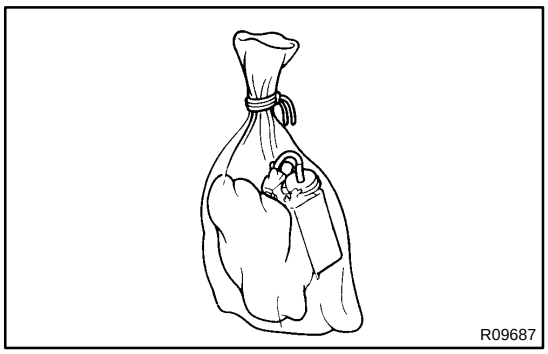


(e) Install the SST.
Connect the connector of the SST to the front passenger airbag assembly connector.
SST 09082-00700, 09082-00780

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tires.

(f) Deploy the airbag.
(1) Connect the red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
(2) Confirm that no one is within 10 m (33 ft) area around the tire which the front passenger airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys as the LED of the SST activation switch comes on.



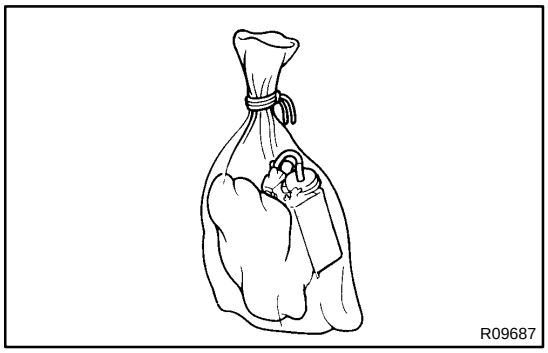
(g) Dispose of the front passenger airbag assembly.

CAUTION:

- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**

(1) Remove the front passenger airbag assembly from the tire.

(2) Place the front passenger airbag assembly in a plastic bag, tie the end tightly and dispose of it in the same way as other general parts disposal.



3. DEPLOYMENT WHEN-DISPOSING OF FRONT PASSENGER AIRBAG ASSEMBLY DEPLOYED IN A COLLISION

Dispose of the front passenger airbag assembly.

CAUTION:

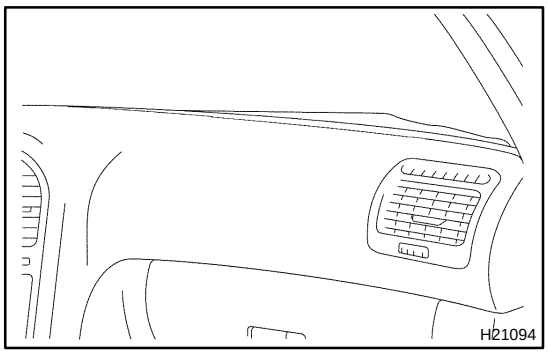
- **The front passenger airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a front passenger airbag assembly with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a front passenger airbag assembly with deployed airbag.**

(1) Remove the front passenger airbag assembly from the tire.

(2) Place the front passenger airbag assembly in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.

RS0BG-06

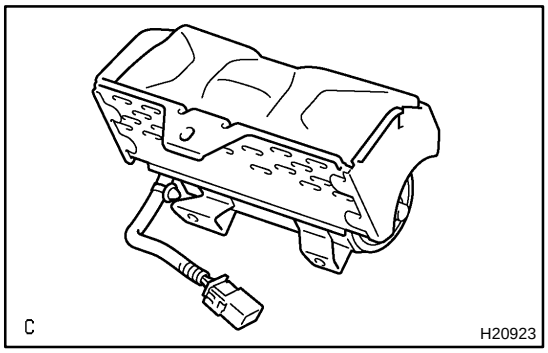
INSPECTION



1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check
(See page DI-692).

(b) Do a visual check which includes the following items with the front passenger airbag assembly installed in the vehicle.
Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly and instrument panel.

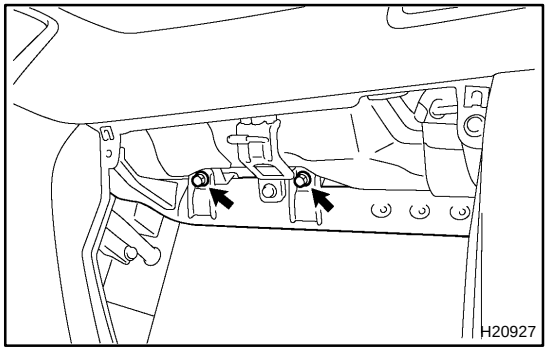


2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check
(See page DI-692).

(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.

- Check cuts, minute cracks or marked discoloration on the front passenger airbag assembly.
- Check cuts and cracks in wire harnesses, and for chipping in connectors.
- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.



HINT:
If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

CAUTION:
For removal and installation of the front passenger airbag assembly, see page RS-31 and RS-41 and be sure to follow the correct procedure.

3. Vehicle involved in collision and airbag is deployed: INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check
(See page DI-692).

(b) Do a visual check which includes the following items with the front passenger airbag assembly removed from the vehicle.

- Check the deformation or cracks on the instrument panel and instrument panel reinforcement.
- Check the damage on the connector and wire harness.

HINT:

If the instrument panel or instrument panel reinforcement is deformed or cracked, never repair it. Always replace it with a new one.

RS0BJ-05

INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.

HINT:

For step 2 to 5, refer to page BO-91 .

1. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

Install the front passenger airbag assembly to the instrument panel with the 3 nuts.

Torque: 6.0 N·m (61 kgf·cm, 53 in.·lbf)

CAUTION:

- **Make sure that no foreign objects are trapped between the airbag bag and the module.**
- **Do not damage the strap when installing the module.**

NOTICE:

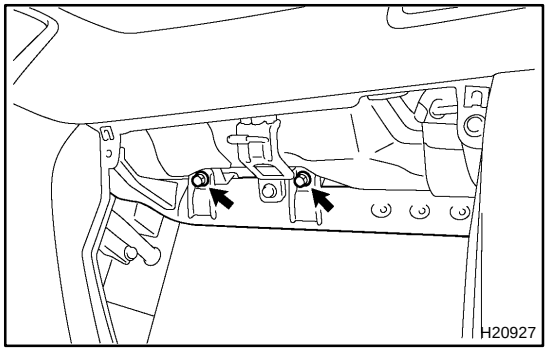
If the front passenger airbag assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the front passenger airbag assembly with a new one.

2. INSTALL NO. 2 SIDE DEFROSTER NOZZLE DUCT

3. INSTALL NO. 5 HEATER TO REGISTER DUCT

4. INSTALL DEFROSTER NOZZLE ASSEMBLY

5. INSTALL CENTER BRACKET



6. INSTALL INSTRUMENT PANEL

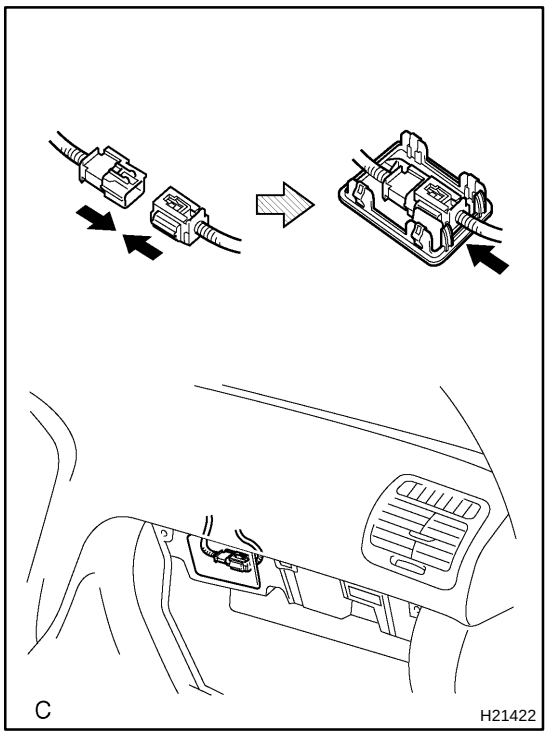
(See page BO-91)

Install the 2 bolts to instrument panel reinforcement.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

NOTICE:

- **Make sure the front passenger airbag assembly is installed with the specified torque.**
- **When installing the instrument panel, take care that the airbag wire harness does not interfere with other parts and is not pinched between other parts.**
- **When installing the instrument panel box, carefully pull out the airbag wire harness from the glove compartment upper hole.**



7. CONNECT AIRBAG CONNECTOR

(a) Connect the airbag connector.

(b) Set the connector on the No. 1 under cover.

(c) Install the No. 1 under cover to the lower No. 2 finish panel.

(d) Install the glove compartment door (See page BO-91).

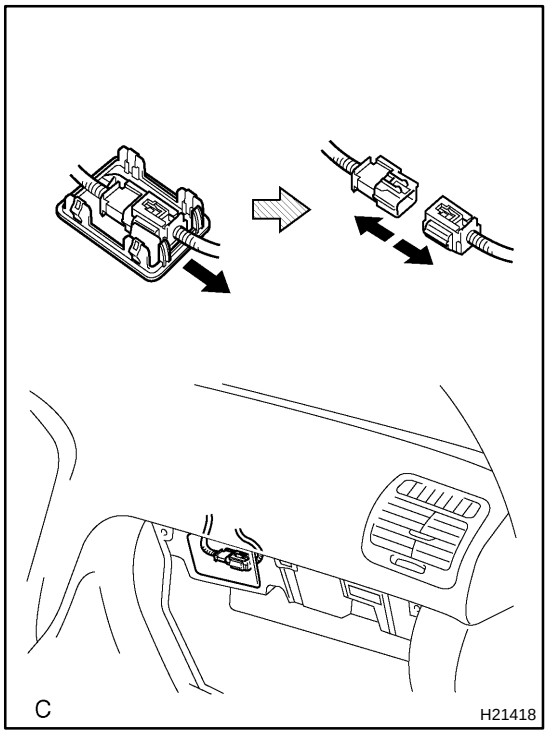
8. INSPECT SRS WARNING LIGHT (See page DI-692)

RS0BF-06

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**



1. DISCONNECT AIRBAG CONNECTOR

(a) Remove the glove compartment door.

(b) Remove the No. 1 under cover from the lower No. 2 finish panel.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Pull up the connector.

(d) Disconnect the front passenger airbag connector.

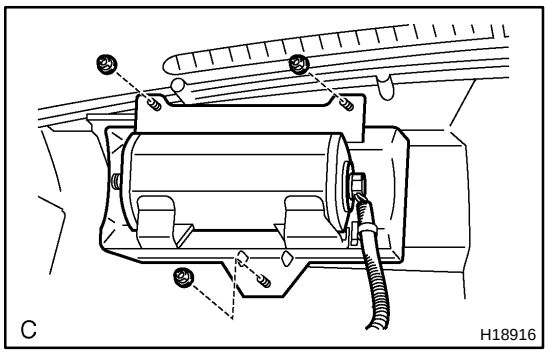
2. REMOVE INSTRUMENT PANEL
(See page BO-84)

3. REMOVE CENTER BRACKET

4. REMOVE DEFROSTER NOZZLE ASSEMBLY

5. REMOVE NO. 5 HEATER TO REGISTER DUCT

6. REMOVE NO. 2 SIDE DEFROSTER NOZZLE DUCT



7. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

Remove the 3 nuts, then remove the front passenger airbag assembly.

CAUTION:

- **Do not store the front passenger airbag assembly with the airbag deployment side facing downward.**
- **Never disassemble the front passenger airbag assembly.**

RS0BI-04

REPLACEMENT

REPLACEMENT REQUIREMENTS

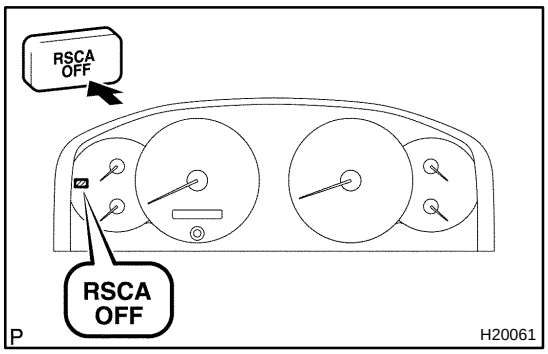
In the following cases, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement.

Case	Replacing part
If the airbag has been deployed.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty in trouble-shooting.	Front passenger airbag assembly
If the front passenger airbag assembly has been found to be faulty during checking items (See page RS-32).	Front passenger airbag assembly
If the instrument panel has been found to be faulty during checking items (See page RS-32).	Instrument panel
If the instrument panel reinforcement has been found to be faulty during checking items (See page RS-32).	Instrument panel reinforcement
If the front passenger airbag assembly has been dropped.	Front passenger airbag assembly

CAUTION:

For replacement of the front passenger airbag assembly, see page RS-31 and RS-41 .

Be sure to follow the correct procedure.



RSCA OFF SWITCH

RS0XJ-01

INSPECTION

1. INSPECT RSCA OFF INDICATOR LIGHT

(a) Turn the ignition switch to ON.

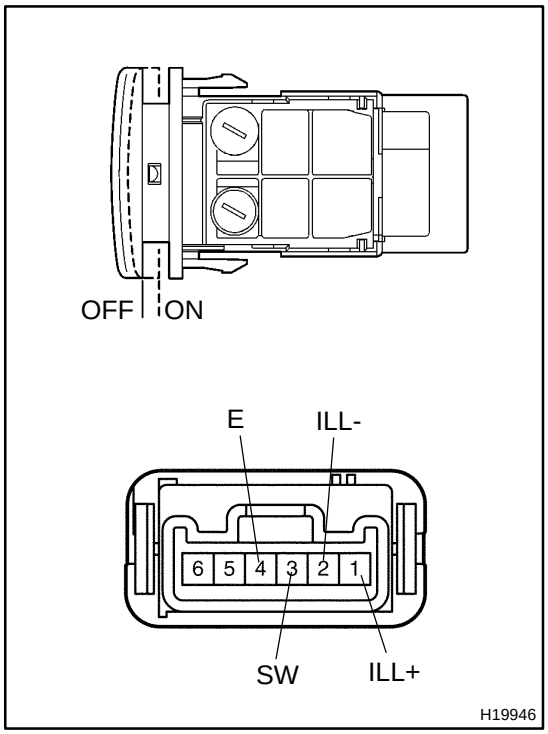
(b) Check that the RSCA OFF indicator light goes off after it comes on for 3 seconds.

(c) Check that the RSCA OFF indicator light comes on after pressing the RSCA OFF switch approx. 2 seconds.

2. INSPECT RSCA OFF SWITCH CONTINUITY

(a) Remove the LWR instrument panel finish panel (See page BO-84).

(b) Remove the RSCA OFF switch from the LWR instrument panel finish panel.



(c) Inspect the continuity between the each terminals.

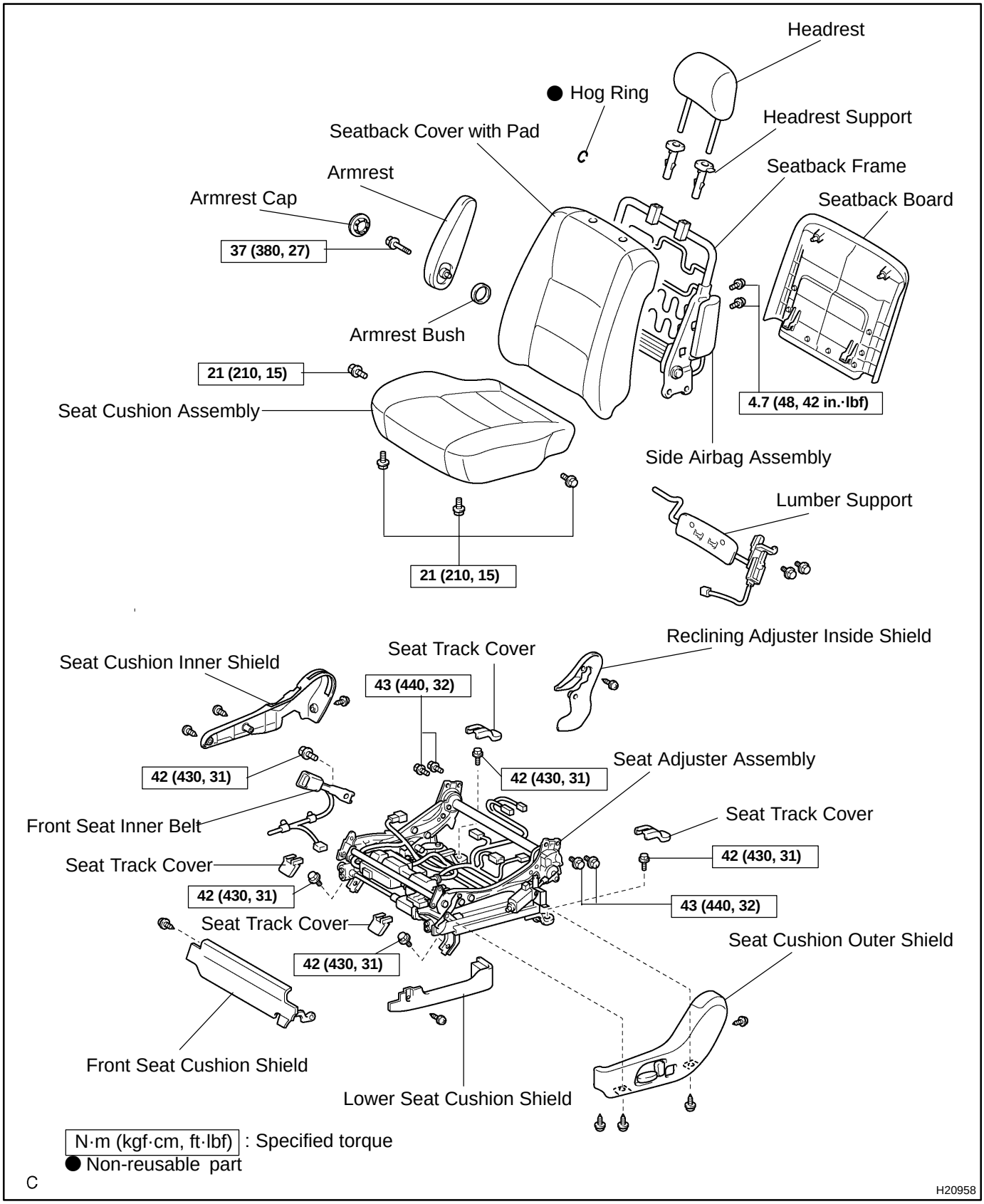
Switch position	Tester connection	Specified condition
OFF	SW (3) ↔ E (4)	No continuity
Hold ON	SW (3) ↔ E (4)	Continuity
Illumination	ILL+ (1) ↔ ILL- (2)	Continuity

If continuity is not as specified, replace the RSCA OFF switch or bulb.

SIDE AIRBAG ASSEMBLY

COMPONENTS

RS0T9-03



RS0VM-01

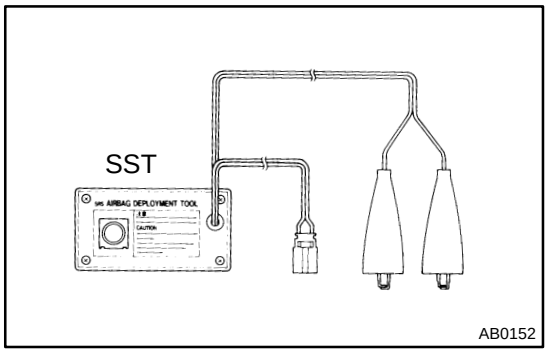
DISPOSAL

HINT:

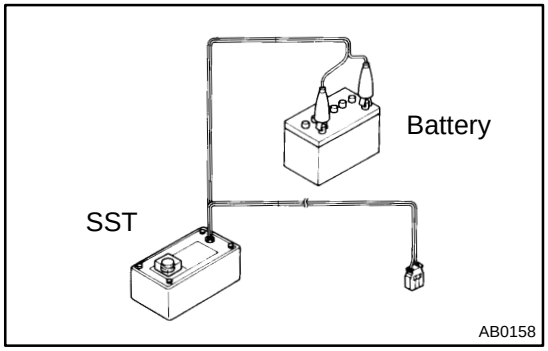
When scrapping vehicles equipped with an SRS or disposing of the side airbag assembly always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a side airbag assembly of which airbag has not been deployed.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors 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.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the airbag assembly.**
- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a side airbag assembly with the deployed airbag.**

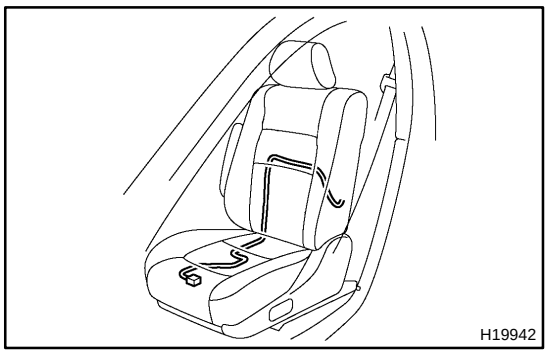


1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

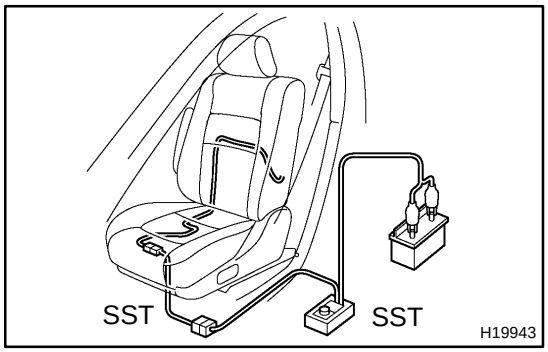
(a) Check the function of the SST (See step 1-(a) on page RS-20).
SST 09082-00700



(b) Disconnect the side airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.



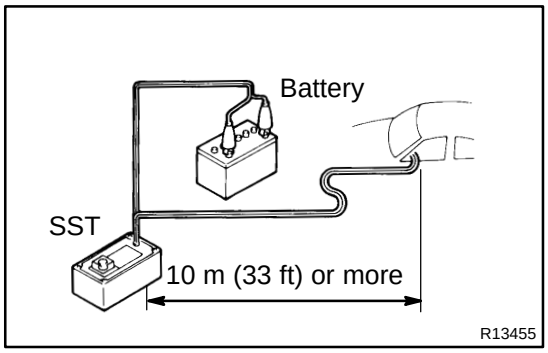
(c) Install the SST.

(1) Connect the connectors of the SST to the 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.



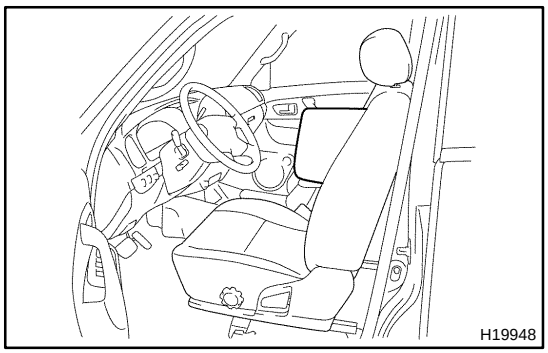
(2) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(3) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.



(d) Deploy the airbag.

(1) Check that no one is inside the vehicle or within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling the side airbag assembly with the deployed airbag.**
- **Do not apply water, etc. to the side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **When scrapping a vehicle, deploy the airbag and scrap the vehicle with the side airbag assembly still installed.**

HINT:

The airbag deploys as the LED of the SST activation switch comes on.

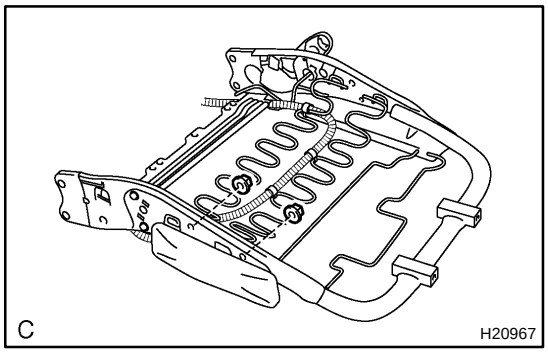
2. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY

NOTICE:

- **When disposing of the side airbag assembly only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

HINT:

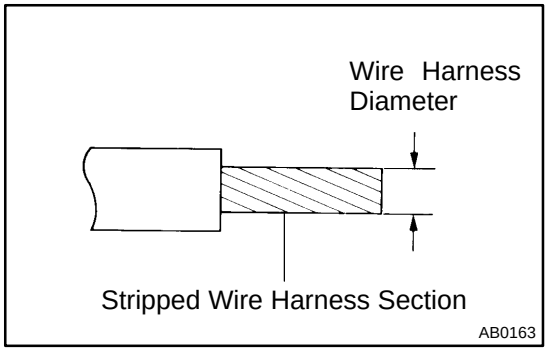
Have a battery ready as the power source to deploy the airbag.



(a) Remove the 2 nuts and side airbag assembly from the seatback assembly, then disengage the clamps.

CAUTION:

When storing the side airbag assembly, keep the upper surface of the airbag deployment side facing upward.



(b) Using a service-purpose wire harness, tie down the side airbag assembly to the tire.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more)

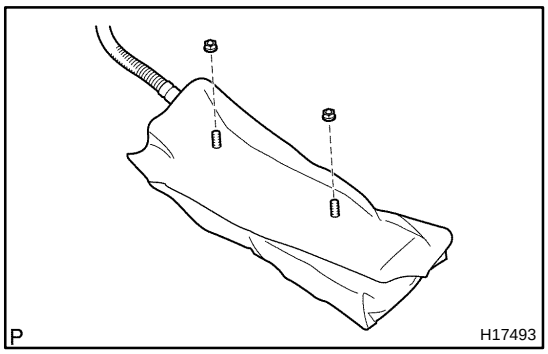
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the side airbag assembly, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2.).

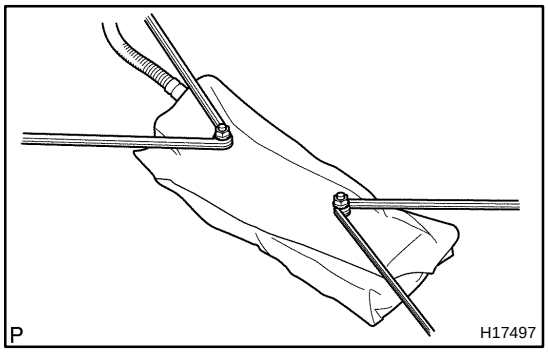
HINT:

To calculate the square of the stripped wire harness section-

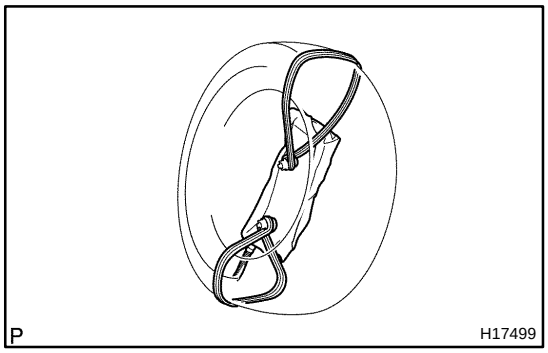
Square = 3.14 x $(Diameter)^2$ divided by 4



(1) Install the 2 nuts to the side airbag assembly.



(2) Wind the wire harness around the stud bolts of the side airbag assembly as shown in the illustration.



(3) Position the side airbag assembly inside the tire with the airbag deployment direction facing inside.

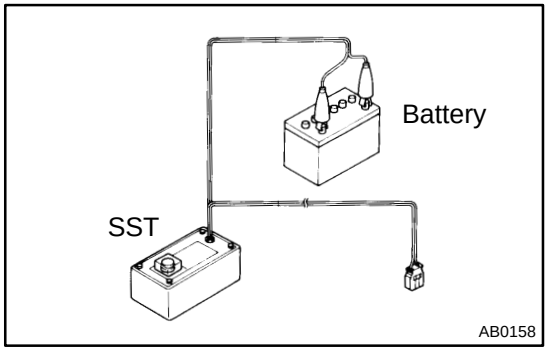
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:

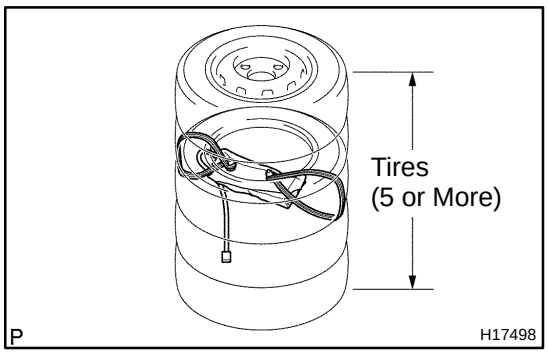
- **Make sure that the wire harness is tight. It is very dangerous when a loose wire harness results in the side airbag assembly coming free due to the shock from the airbag deploying.**
- **Always tie down the side airbag assembly with the airbag deployment side facing inside.**

NOTICE:

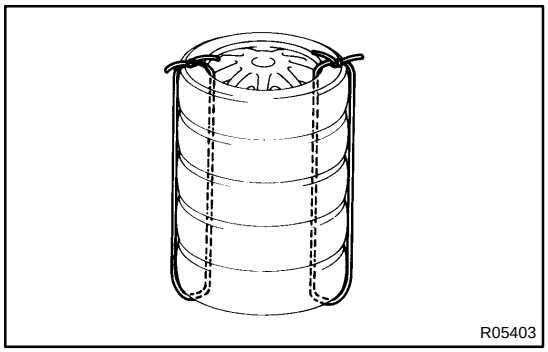
The tire will be marked by the airbag deployment, so when disposing of the airbag, use a redundant tire.



(c) Check the function of the SST (See step 1-(a) on page RS-20).
SST 09082-00700



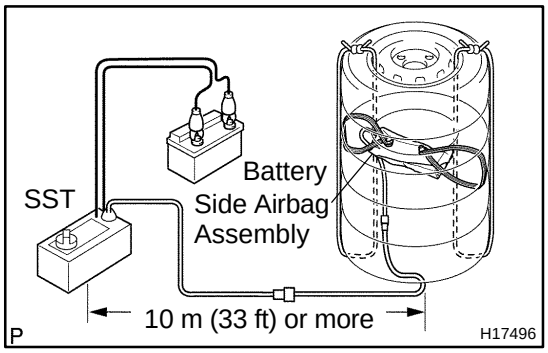
(d) Place the tires.
(1) Place at least 2 tires under the tire to which the side airbag assembly is tied.
(2) Place at least 2 tires over the tire to which the side airbag assembly is tied. The top tire should have the wheel installed.



(3) Tie the tires together with 2 wire harnesses.

CAUTION:
Make sure that the wire harnesses are tight. It is very dangerous when loose wire harness results in the tires coming free due to the shock from the airbag deployment.

HINT:
Place the SST connector and wire harness inside tires. Secure at least 1 m (3 ft) of slack for the wire harness.

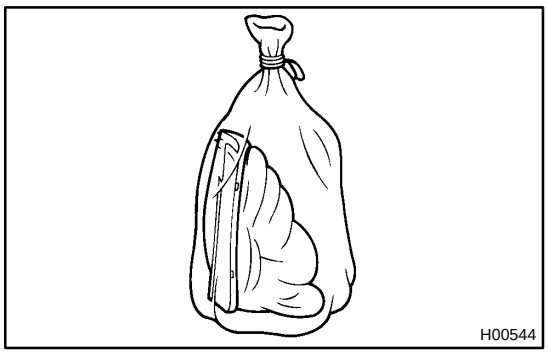


(e) Install the SST.
Connect the connectors of the SST to the side airbag assembly connector.
SST 09082-00700, 09082-00750

NOTICE:
To avoid damaging the SST connector and wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(f) Deploy the airbag.
(1) Connect the SST red clip to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.
(2) Check that no one is within 10 m (33 ft) area around the tire which the side airbag assembly is tied to.
(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys as the LED of the SST activation switch comes on.



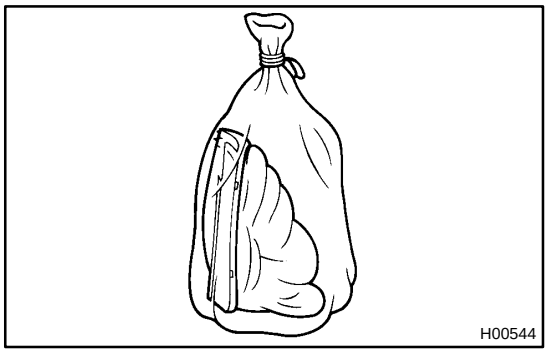
(g) Dispose of the side airbag assembly.

CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a side airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the side airbag assembly from the tire.

(2) Place the side airbag assembly in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.



3. DEPLOYMENT WHEN DISPOSING OF SIDE AIRBAG ASSEMBLY WITH AIRBAG DEPLOYED IN COLLISION

Dispose of the side airbag assembly.

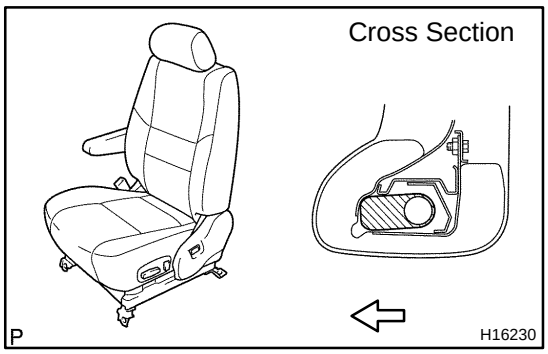
CAUTION:

- **The side airbag assembly is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a side airbag assembly with the deployed airbag.**
- **Do not apply water etc. to a side airbag assembly with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**

(1) Remove the side airbag assembly from the seat (See page BO-105 and see step 2. on page RS-48).

(2) Place the side airbag assembly in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.

RS0LB-04



INSPECTION

1. Vehicle not involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

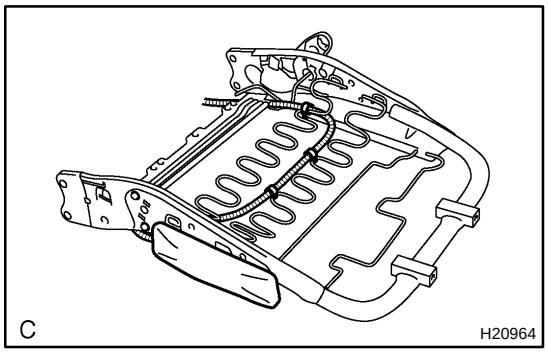
(b) Do a visual check which includes the following item with the seatback assembly installed in the vehicle.

Check that there are no cuts or frayed in seams and outside of seatback cover.

2. Vehicle involved in a collision and airbag is not deployed:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).



(b) Do a visual check which includes the following items with the seatback assembly removed from the vehicle.

- Check cuts, tears and cracks of the side airbag assembly.
- Check cuts and cracks in wire harness, and chipping in connectors.
- Check cuts and cracks of the side airbag bracket.

CAUTION:

For removal and installation of the seatback assembly, see page BO-105 and BO-117. Be sure to follow the correct procedure.

3. Vehicle involved in a collision and airbag is deployed:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

(b) Do a visual check which includes the following items with the seatback assembly removed from the vehicle.

- Check the seatback installation part of the seat adjuster.
- Check the damage to the connector and wire harness.

CAUTION:

For removal and installation of the seatback assembly, see page BO-105 and BO-117. Be sure to follow the correct procedure.

HINT:

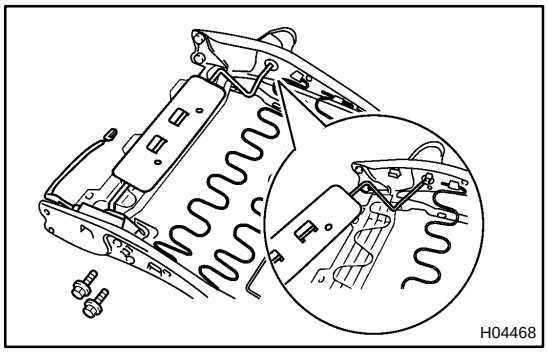
If the seat adjuster is deformed, never repair it. Always replace it with a new one.

RS0VN-01

INSTALLATION

NOTICE:

Never use airbag parts from another vehicle. When replacing parts, replace them with new parts.

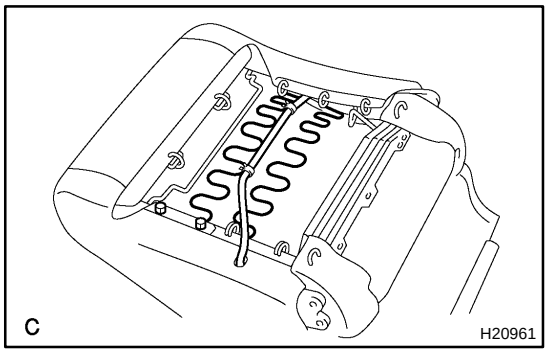


1. INSTALL LUMBER SUPPORT

Install the lumber support with the 2 bolts.

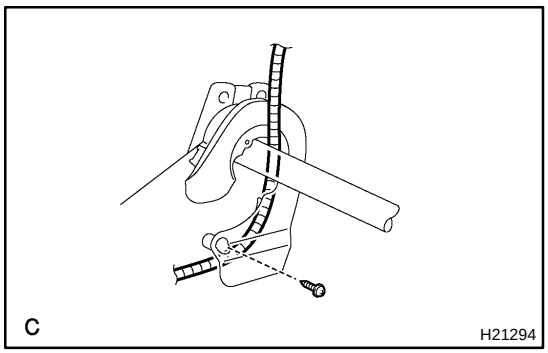
2. INSTALL SEATBACK FRAME

(a) Install the seatback cover with pad to the seatback frame.



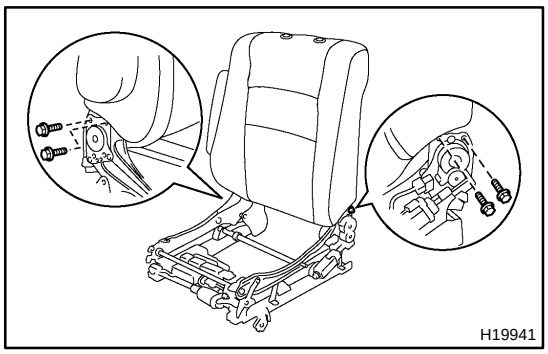
(b) Install new hog rings, clamps and the 2 bolts.
Torque: 4.7 N·m (48 kgf·cm, 42 in.·lbf)

(c) Install the 2 headrest supports.



3. INSTALL SEATBACK ASSEMBLY

(a) Place the airbag connector along the inner seat adjuster, and then install the RH reclining adjuster inside shield so that the connector is placed in between.

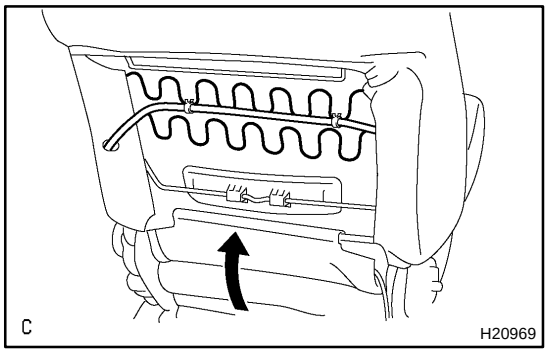


(b) Install the seatback assembly with the 4 bolts.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

NOTICE:

- **Make sure that the seatback assembly is installed to the specified torque.**
- **If the seatback assembly has been dropped, or there are cracks, dents or other defects in the case or connector, replace the seatback assembly with a new one.**
- **When installing the seatback assembly, take care it is not to be pinched between other parts.**

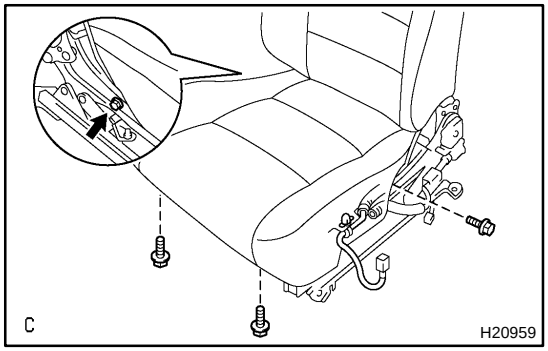
(c) Install new hog rings.



(d) Hang the hook.
(e) Connect the connectors.

4. INSTALL ARMREST
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

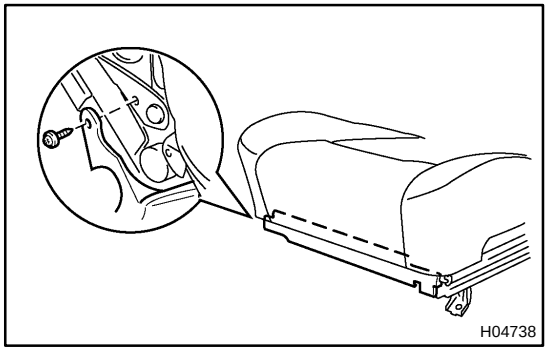
5. INSTALL HEADREST



6. INSTALL SEAT CUSHION ASSEMBLY

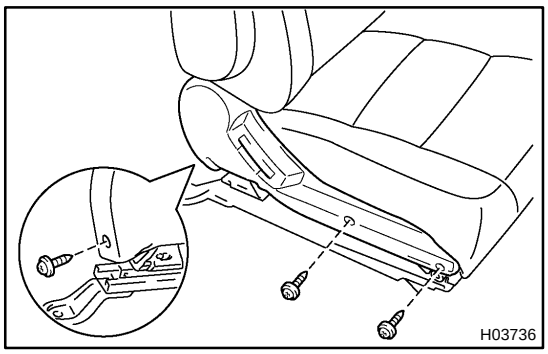
(a) Install the seat cushion assembly with the 4 bolts.
Torque: 21 N·m (210 kgf·cm, 15 ft·lbf)

(b) Engage the wire harness clamp.



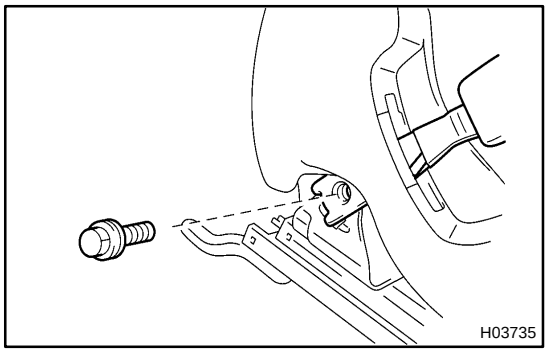
7. INSTALL FRONT SEAT CUSHION SHIELD

Install the seat cushion shield with the screw.



8. INSTALL LOWER SEAT CUSHION SHIELD

Install the lower seat cushion shield with the screws.

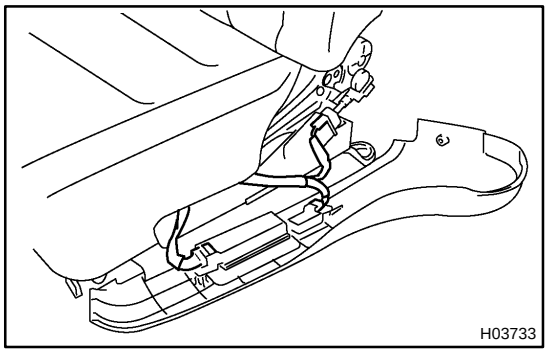


9. INSTALL FRONT SEAT INNER BELT

(a) Engage the clamp, then connect the connector.

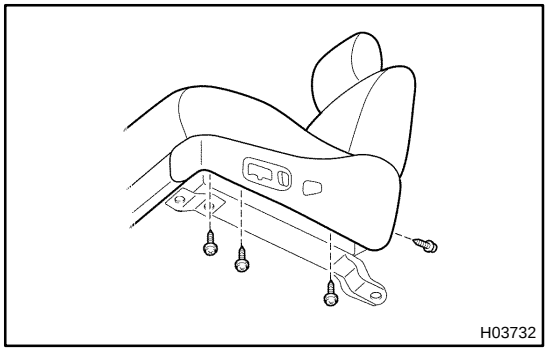
(b) Install the inner belt with the bolt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)



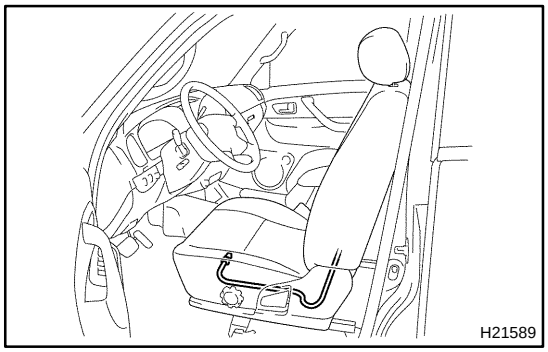
10. INSTALL SEAT CUSHION OUTER SHIELD

(a) Connect the connectors as shown in the illustration.



(b) Install the seat cushion outer shield with the 4 screws.

11. INSTALL SEATBACK BOARD



12. INSTALL FRONT SEAT

(a) Install the front seat.

NOTICE:

Be careful not to damage body.

(b) Connect the connectors.

(c) Install the 4 bolts.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

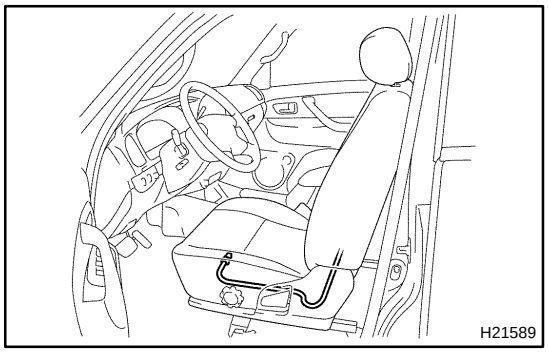
(d) Install the 4 track covers.

RS0VL-01

REMOVAL

NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Never use the airbag parts from another vehicle. When replacing parts, replace them with new parts.**



1. REMOVE FRONT SEAT

(a) Remove the 4 seat track covers and 4 bolts.

(b) Disconnect the power seat and side airbag connector.

NOTICE:

When handling the airbag connector, take care not to damage the airbag wire harness.

(c) Remove the front seat.

NOTICE:

Be careful not to damage the body.

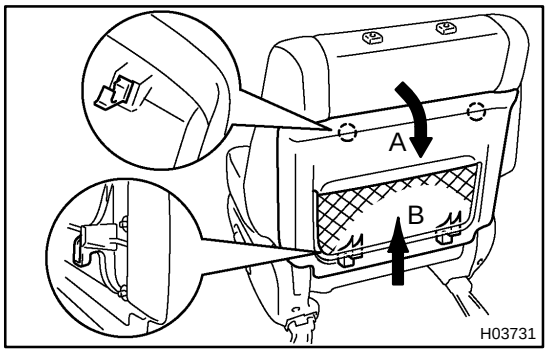
2. REMOVE HEADREST

3. REMOVE SEATBACK BOARD

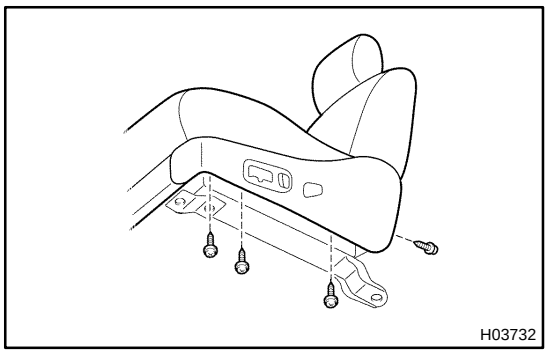
Remove the seatback board as shown in the illustration.

HINT:

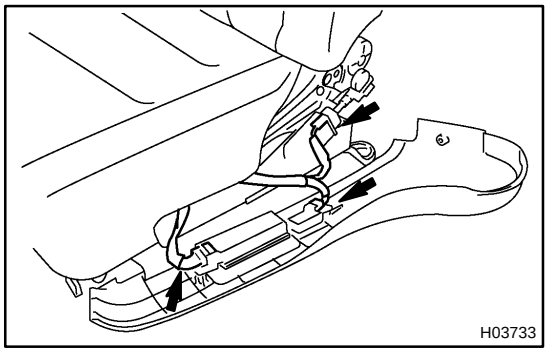
Remove the seatback board in order ”A” and ”B” as shown in the illustration.



4. REMOVE SEAT CUSHION OUTER SHIELD

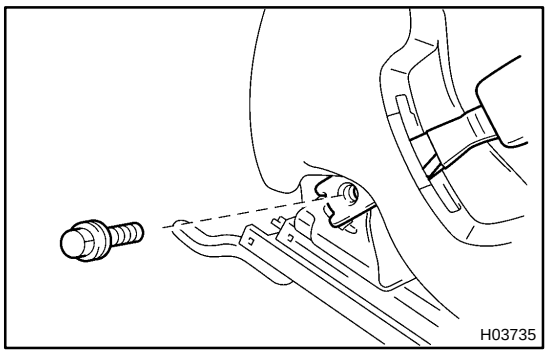


(a) Remove the 4 screws.



(b) Disconnect the connectors as shown in the illustration.

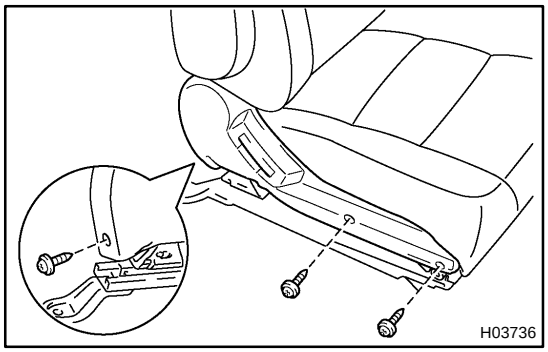
(c) Remove the seat cushion outer shield.



5. REMOVE FRONT SEAT INNER BELT

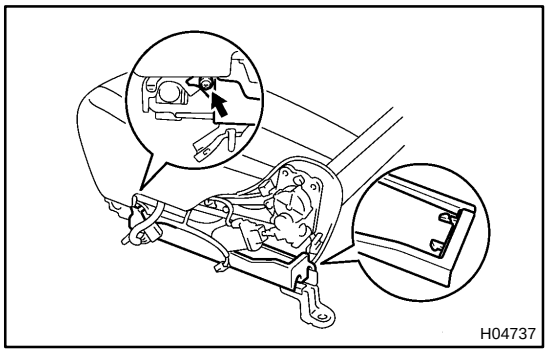
(a) Remove the clump, then disconnect the connector.

(b) Remove the bolt and inner belt.



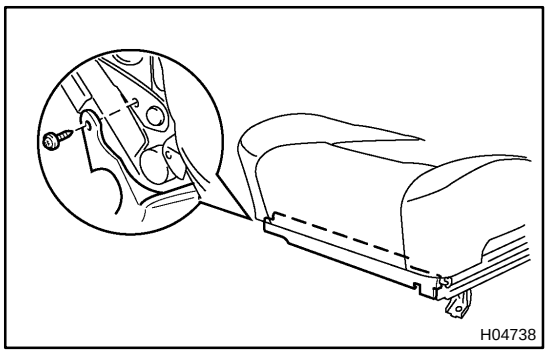
6. REMOVE SEAT CUSHION INNER SHIELD

Remove the 3 screws and seat cushion inner shield.



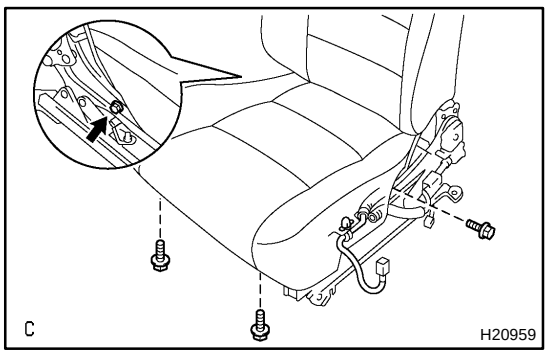
7. REMOVE LOWER SEAT CUSHION SHIELD

Remove the screw and lower seat cushion shield as shown in the illustration.



8. REMOVE FRONT SEAT CUSHION SHIELD

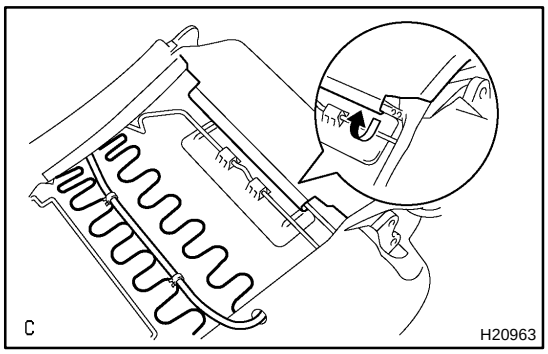
Remove the screw and front seat cushion shield.



9. REMOVE SEAT CUSHION ASSEMBLY

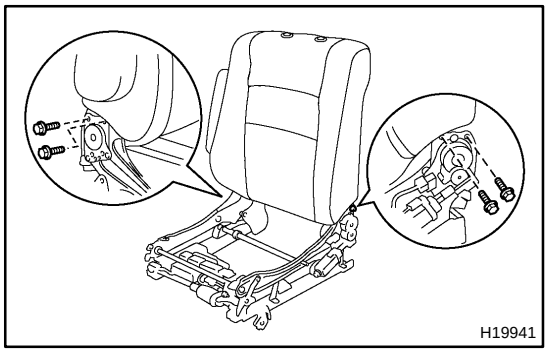
(a) Remove the 4 bolts.

(b) Remove the clamps from the seat cushion assembly.



10. REMOVE SEATBACK ASSEMBLY

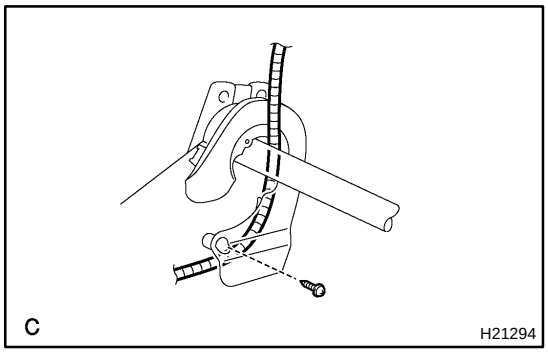
(a) Remove the hog rings.
(b) Disengage the hook as shown in the illustration.
(c) Disconnect the connectors.



(d) Remove the 4 bolts and seatback assembly.

NOTICE:

When handling the airbag connector take care not to damage the airbag wire harness.

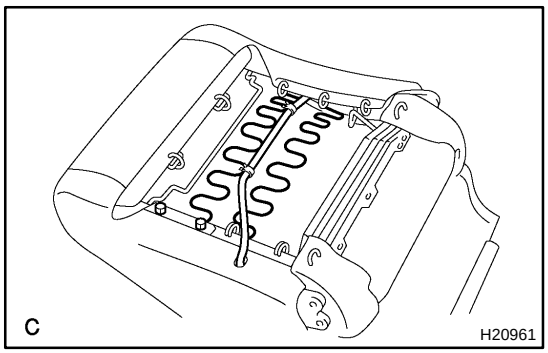


(e) Remove the 2 screws and RH reclining adjuster inside shield, then disconnect the side airbag connector.

NOTICE:

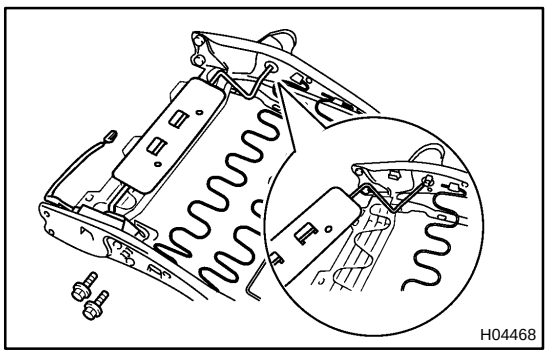
When handling the airbag connector take care not to damage the airbag wire harness.

11. REMOVE ARMREST



12. REMOVE SEATBACK FRAME

(a) Remove the hog rings, clamps and the 2 bolts.
(b) Remove the 2 headrest supports.
(c) Remove the seatback frame from the seatback cover with pad.



13. REMOVE LUMBER SUPPORT

Remove the 2 bolts and lumber support.

RS0LD-03

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seatback assembly or seatback cover.

Case	Replacing part
If the side airbag has been deployed.	Seatback assembly
If the side airbag assembly has been found to be faulty in troubleshooting.	Seatback assembly
If the side airbag assembly has cuts during checking items (See page RS-47).	Seatback assembly
If the seatback cover has cuts and frayed seams during checking items (See page RS-47).	Seatback cover
If the side airbag assembly has been found to be faulty during checking items (See page RS-47).	Seatback assembly
If the seatback cover has been found to be faulty during checking items (See page RS-47).	Seatback cover
If the seatback assembly has been dropped.	Seatback assembly

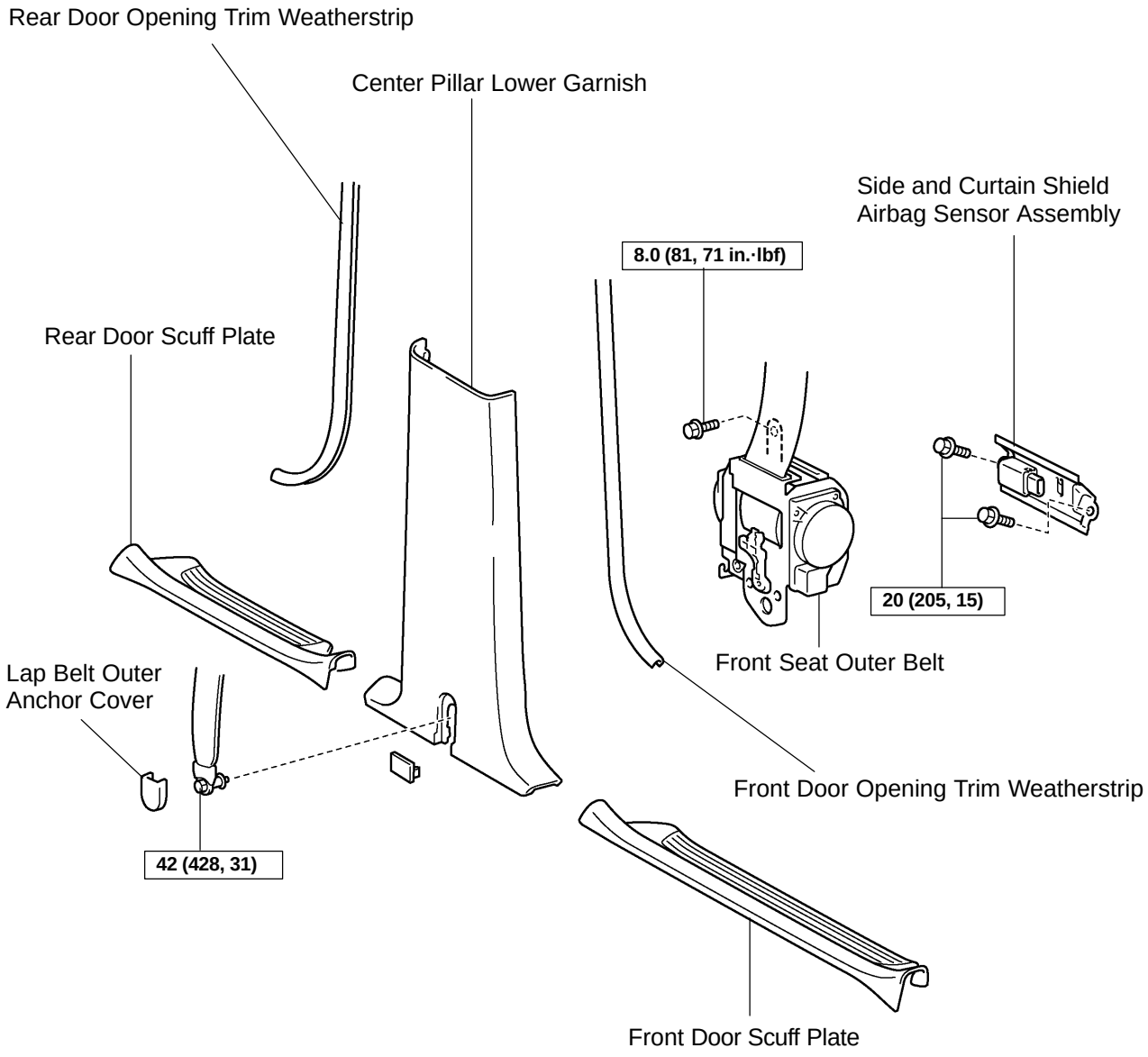
CAUTION:

For removal and installation of the seatback assembly, see page RS-44 and RS-55 . Be sure to follow the correct procedure.

SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

RS0NI-07

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H20945

RS0NK-06

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the side and curtain shield airbag sensor assembly (See page RS-79).

RS0NM-08

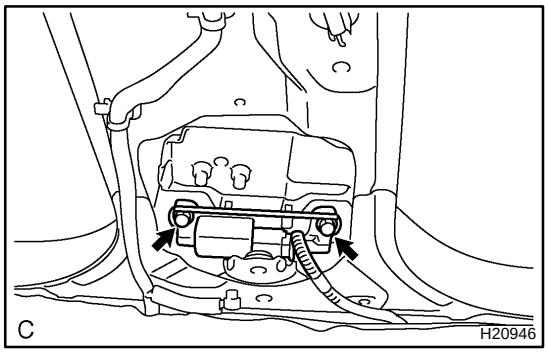
INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the side and curtain shield airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**

HINT:

For step 2 to 9, refer to page BO-101 .



1. INSTALL SIDE AND CURTAIN SHIELD AIRBAG SENSOR

(a) Install the side and curtain shield airbag sensor assembly with the 2 bolts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Connect the connector of the side and curtain shield airbag sensor assembly.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure that the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL FRONT SEAT OUTER BELT

Torque:

Upper bolt: 8.0 N·m (81 kgf·cm, 71 in.·lbf)

3. INSTALL CENTER PILLAR LOWER GARNISH

4. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP

5. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP

6. **INSTALL FRONT SEAT OUTER BELT FLOOR ANCHOR**
   Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)
7. **INSTALL LAP BELT OUTER ANCHOR COVER**
8. **INSTALL FRONT DOOR SCUFF PLATE**
9. **INSTALL REAR DOOR SCUFF PLATE**
10. **INSPECT SRS WARNING LIGHT (See page DI-692)**

RS0NJ-08

REMOVAL

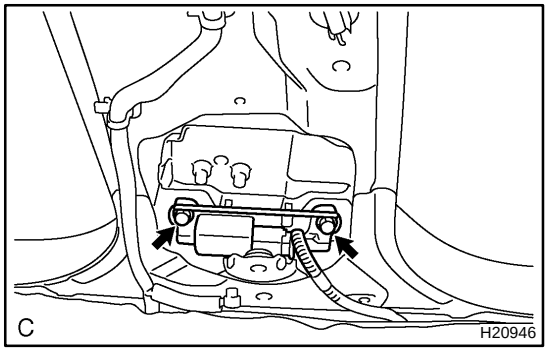
NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary (If the IC terminals are touched, the IC may be destroyed by static electricity.).**

HINT:

For step 1 to 8, refer to page BO-97 .

1. **REMOVE REAR DOOR SCUFF PLATE**
2. **REMOVE FRONT DOOR SCUFF PLATE**
3. **REMOVE LAP BELT OUTER ANCHOR COVER**
4. **REMOVE FRONT SEAT OUTER BELT FLOOR ANCHOR**
5. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
7. **REMOVE CENTER PILLAR LOWER GARNISH**
8. **REMOVE FRONT SEAT OUTER BELT**



9. **REMOVE SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 bolts and side and curtain shield airbag sensor assembly.

RS0NL-02

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the side and curtain shield airbag sensor assembly.

- If the side and curtain shield airbag assembly has been deployed in a collision.
- If the side and curtain shield airbag sensor assembly has been found to be faulty in troubleshooting.
- If the side and curtain shield airbag sensor assembly has been dropped.

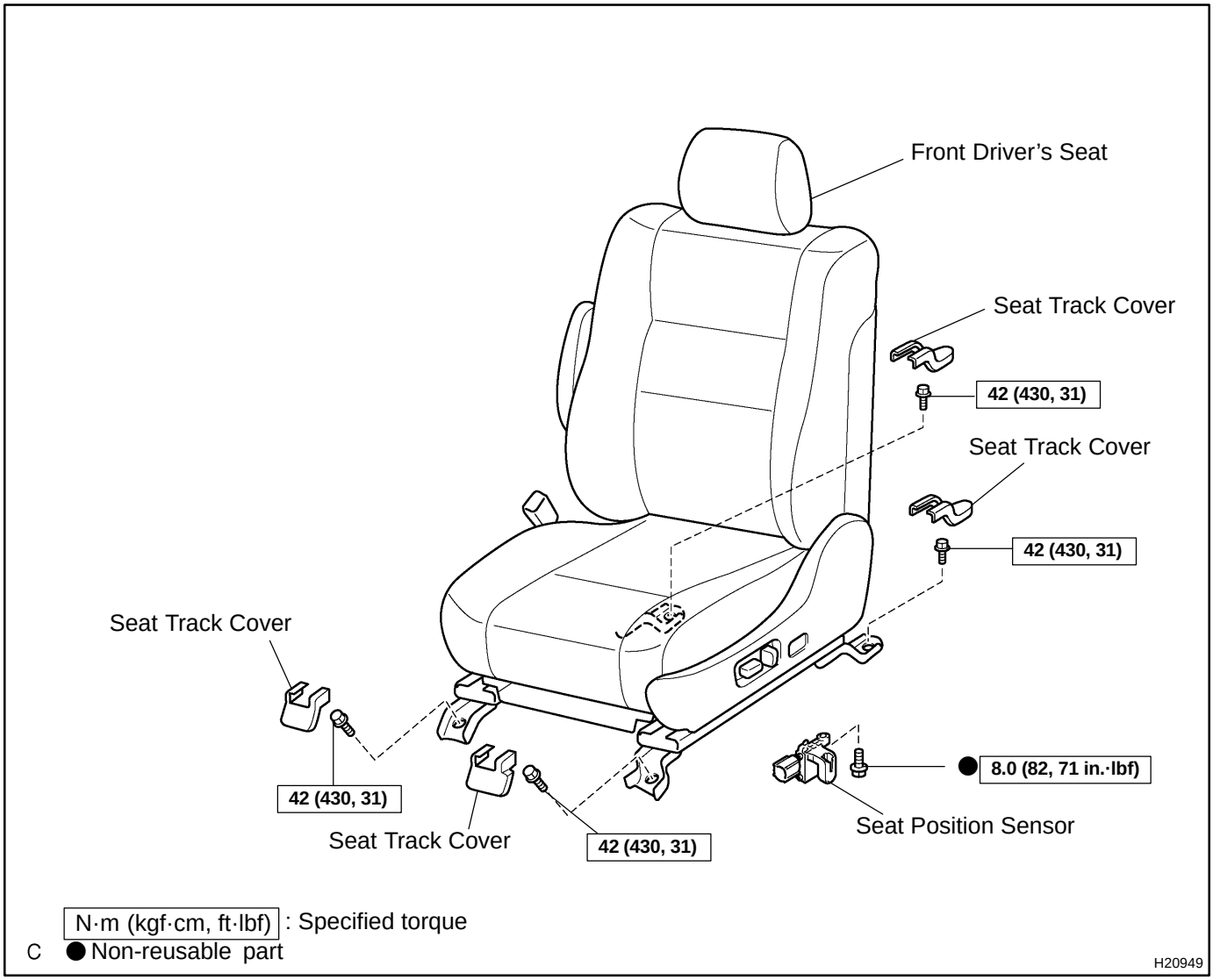
CAUTION:

For removal and installation of the side and curtain shield airbag sensor assembly, see page RS-80 and RS-83 . Be sure to follow the correct procedure.

SEAT POSITION SENSOR ASSEMBLY

COMPONENTS

RS0UN-02



RS0UP-02

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

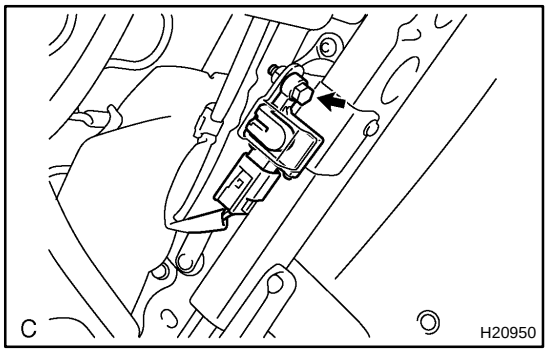
Replace the seat position sensor assembly (See page RS-90).

RS0VQ-01

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the seat position sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**



1. INSTALL SEAT POSITION SENSOR ASSEMBLY

(a) Connect the connector.

(b) Install the seat position sensor assembly with a new bolt.

Part No.:

Bolt: 90119-06871

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure that the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL FRONT SEAT ASSEMBLY (DRIVER SIDE) (See page BO-1 17)

3. INSPECT SRS WARNING LIGHT (See page DI-692)

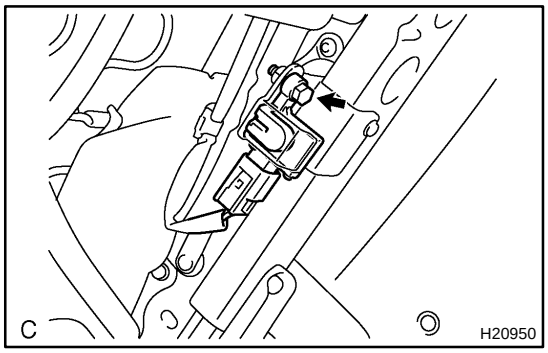
RS0VP-01

REMOVAL

NOTICE:

- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)**
- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**

1. REMOVE FRONT SEAT ASSEMBLY (DRIVER SIDE)
(See page BO-105)



2. REMOVE SEAT POSITION SENSOR ASSEMBLY

(a) Remove the bolt and seat position sensor assembly.

(b) Disconnect the connector.

RS0UQ-01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seat position sensor assembly.

- If the seat position sensor assembly has been found to be faulty in troubleshooting.
- If the seat position sensor assembly has been dropped.

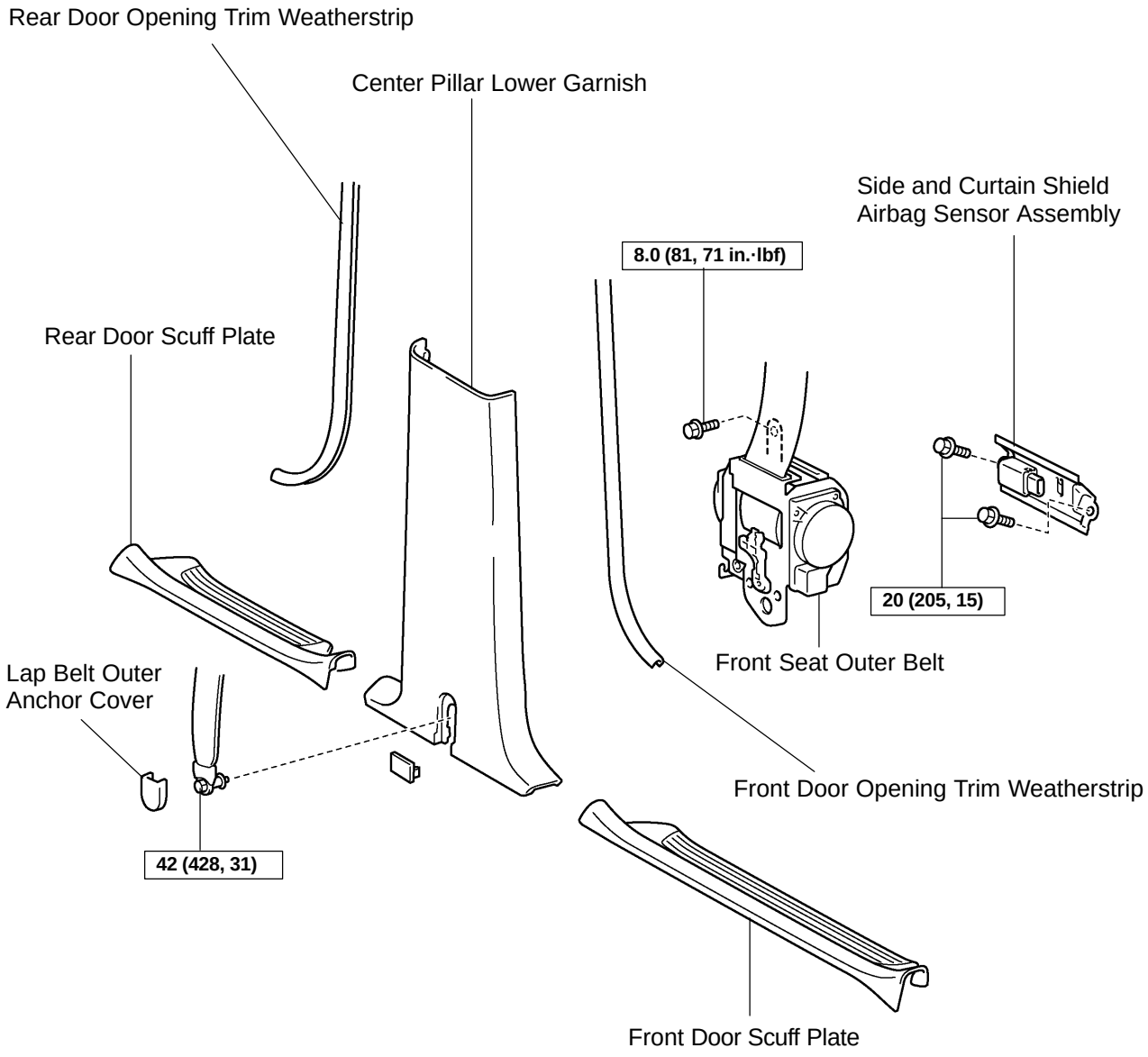
CAUTION:

For removal and installation of the seat position sensor assembly, see page RS-91 and RS-94 . Be sure to follow the correct procedure.

SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

RS0NI-07

COMPONENTS



C N·m (kgf·cm, ft·lbf) : Specified torque

H20945

RS0NK-06

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Replace the side and curtain shield airbag sensor assembly (See page RS-79).

RS0NM-08

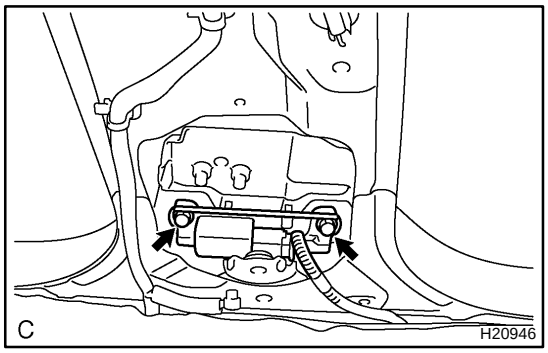
INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the side and curtain shield airbag sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**

HINT:

For step 2 to 9, refer to page BO-101 .



1. INSTALL SIDE AND CURTAIN SHIELD AIRBAG SENSOR

(a) Install the side and curtain shield airbag sensor assembly with the 2 bolts.

Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)

(b) Connect the connector of the side and curtain shield airbag sensor assembly.

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure that the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL FRONT SEAT OUTER BELT

Torque:

Upper bolt: 8.0 N·m (81 kgf·cm, 71 in.·lbf)

3. INSTALL CENTER PILLAR LOWER GARNISH

4. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP

5. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP

6. **INSTALL FRONT SEAT OUTER BELT FLOOR ANCHOR**
   Torque: 42 N·m (428 kgf·cm, 31 ft·lbf)
7. **INSTALL LAP BELT OUTER ANCHOR COVER**
8. **INSTALL FRONT DOOR SCUFF PLATE**
9. **INSTALL REAR DOOR SCUFF PLATE**
10. **INSPECT SRS WARNING LIGHT (See page DI-692)**

RS0NJ-08

REMOVAL

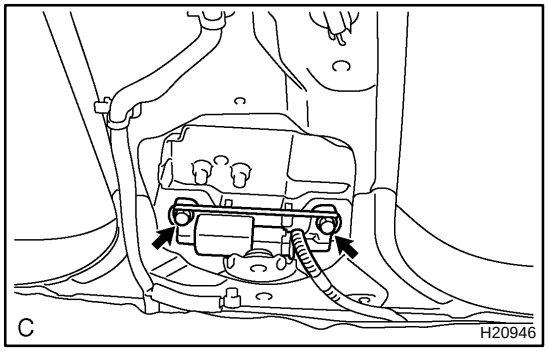
NOTICE:

- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**
- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary (If the IC terminals are touched, the IC may be destroyed by static electricity.).**

HINT:

For step 1 to 8, refer to page BO-97 .

1. **REMOVE REAR DOOR SCUFF PLATE**
2. **REMOVE FRONT DOOR SCUFF PLATE**
3. **REMOVE LAP BELT OUTER ANCHOR COVER**
4. **REMOVE FRONT SEAT OUTER BELT FLOOR ANCHOR**
5. **REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP**
6. **REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP**
7. **REMOVE CENTER PILLAR LOWER GARNISH**
8. **REMOVE FRONT SEAT OUTER BELT**



9. **REMOVE SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY**

(a) Disconnect the connector.

NOTICE:

Disconnect the connector with the sensor assembly installed.

(b) Remove the 2 bolts and side and curtain shield airbag sensor assembly.

RS0NL-02

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the side and curtain shield airbag sensor assembly.

- If the side and curtain shield airbag assembly has been deployed in a collision.
- If the side and curtain shield airbag sensor assembly has been found to be faulty in troubleshooting.
- If the side and curtain shield airbag sensor assembly has been dropped.

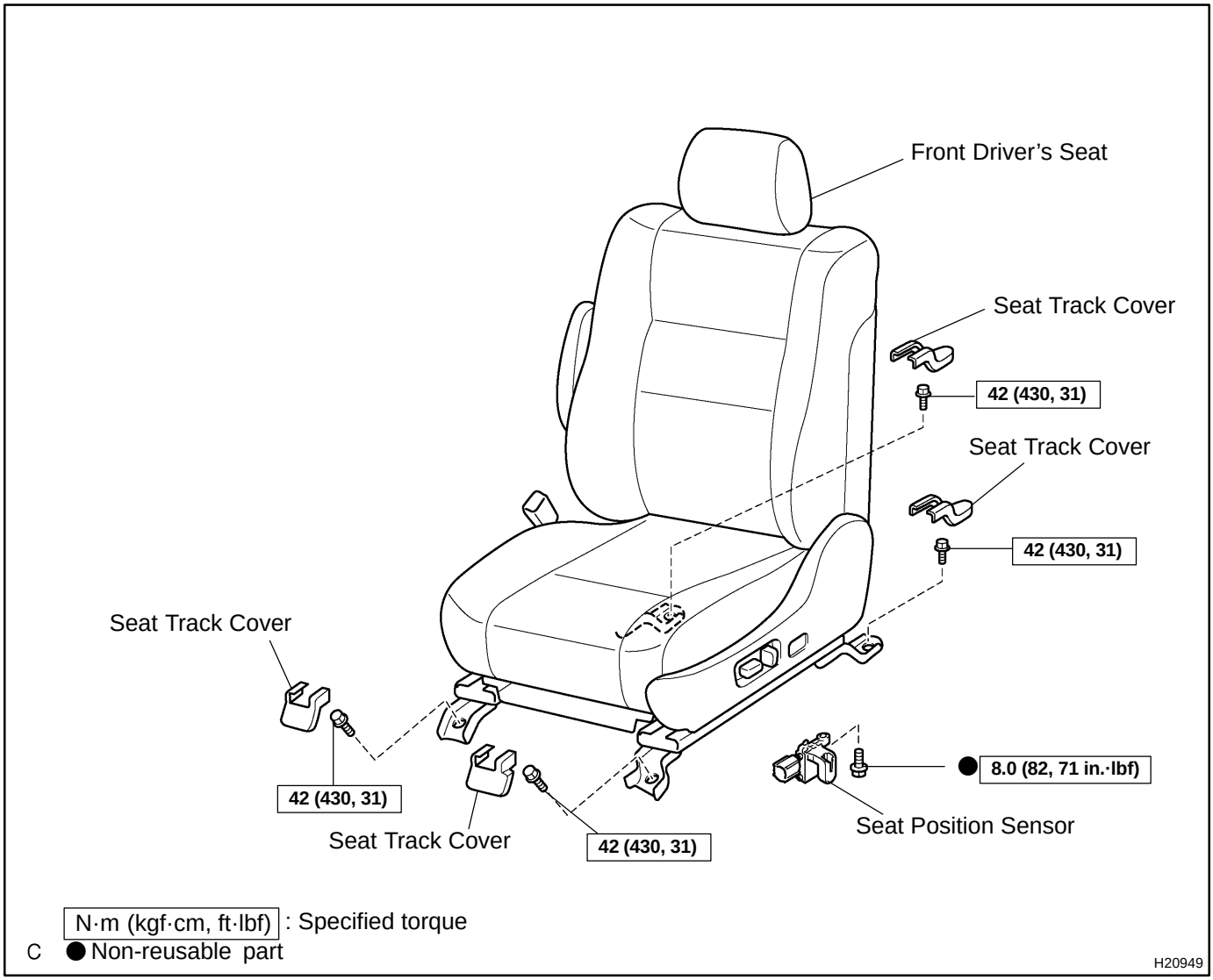
CAUTION:

For removal and installation of the side and curtain shield airbag sensor assembly, see page RS-80 and RS-83 . Be sure to follow the correct procedure.

SEAT POSITION SENSOR ASSEMBLY

COMPONENTS

RS0UN-02



RS0UP-02

INSPECTION

1. Vehicle not involved in collision:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision and airbag is not deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

3. Vehicle involved in collision and airbag is deployed:
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

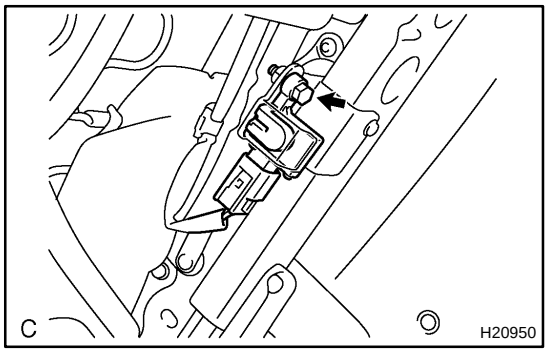
Replace the seat position sensor assembly (See page RS-90).

RS0VQ-01

INSTALLATION

NOTICE:

- **Never use SRS parts from another vehicle. When replacing parts, replace them with new ones.**
- **Never reuse the seat position sensor assembly involved in a collision when the airbag has deployed.**
- **Never repair a sensor in order to reuse it.**



1. INSTALL SEAT POSITION SENSOR ASSEMBLY

(a) Connect the connector.

(b) Install the seat position sensor assembly with a new bolt.

Part No.:

Bolt: 90119-06871

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

NOTICE:

- **Connection of the connector is done after the sensor assembly has been installed.**
- **Make sure that the sensor assembly is installed with the specified torque.**
- **If the sensor assembly has been dropped, or there are cracks, dents or other defects in the case, bracket or connector, replace the sensor assembly with a new one.**
- **When installing the sensor assembly, take care that the SRS wiring does not interfere with other parts and is not pinched between other parts.**
- **After installation, shake the sensor assembly to check that there is no looseness.**

2. INSTALL FRONT SEAT ASSEMBLY (DRIVER SIDE) (See page BO-1 17)

3. INSPECT SRS WARNING LIGHT (See page DI-692)

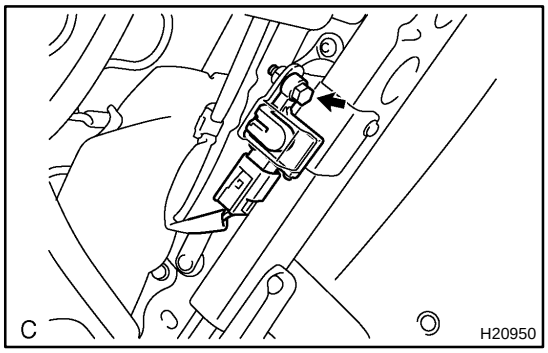
RS0VP-01

REMOVAL

NOTICE:

- **Do not open the cover or the case of the ECU and various electrical devices unless absolutely necessary. (If the IC terminals are touched, the IC may be destroyed by static electricity.)**
- **If the wiring connector of the SRS is disconnected and the ignition switch is at ON position, DTCs will be recorded.**

1. REMOVE FRONT SEAT ASSEMBLY (DRIVER SIDE)
(See page BO-105)



2. REMOVE SEAT POSITION SENSOR ASSEMBLY

(a) Remove the bolt and seat position sensor assembly.

(b) Disconnect the connector.

RS0UQ-01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the seat position sensor assembly.

- If the seat position sensor assembly has been found to be faulty in troubleshooting.
- If the seat position sensor assembly has been dropped.

CAUTION:

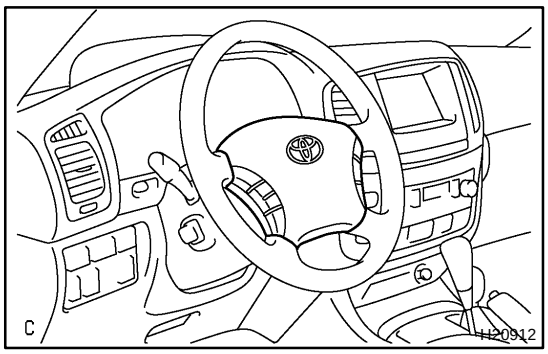
For removal and installation of the seat position sensor assembly, see page RS-91 and RS-94 . Be sure to follow the correct procedure.

RS0VH-01

OPERATION

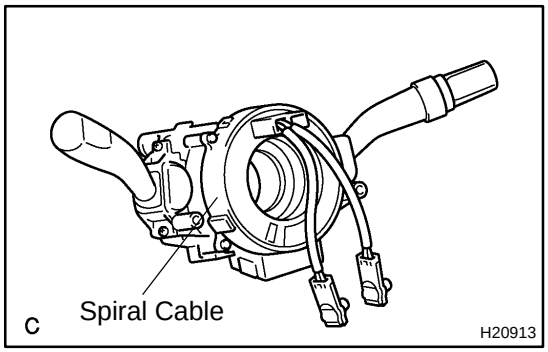
1. STEERING WHEEL PAD (with AIRBAG)

The inflater and bag of the SRS are stored in the steering wheel pad and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly.



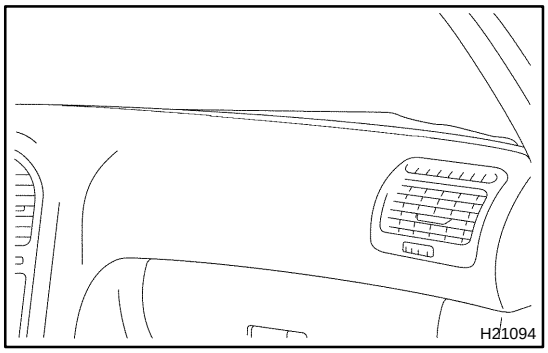
2. SPIRAL CABLE (in COMBINATION SWITCH)

A spiral cable is used as an electrical joint from the vehicle body side to the steering wheel.



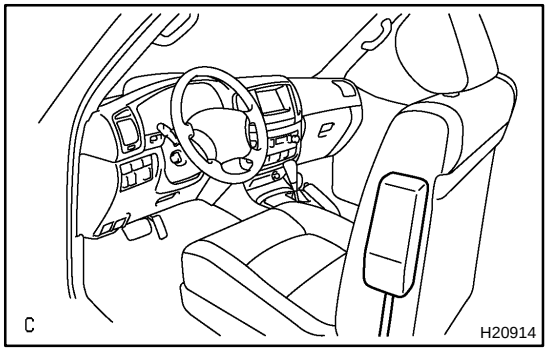
3. FRONT PASSENGER AIRBAG ASSEMBLY

The inflater and bag of the SRS are stored in the front passenger airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the airbag sensor assembly.



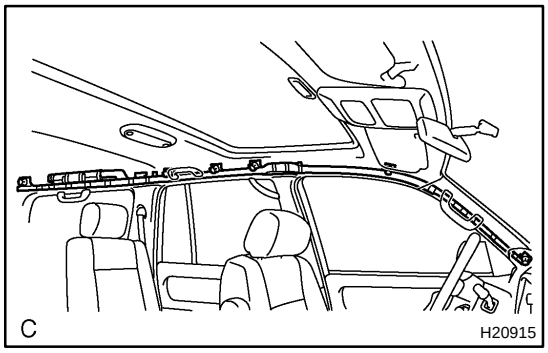
4. SIDE AIRBAG ASSEMBLY

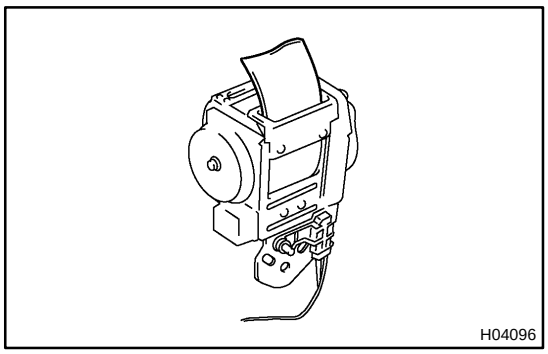
The inflater and bag of the SRS side airbag are stored in the side airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the side airbag sensor assembly.



5. CURTAIN SHIELD AIRBAG ASSEMBLY

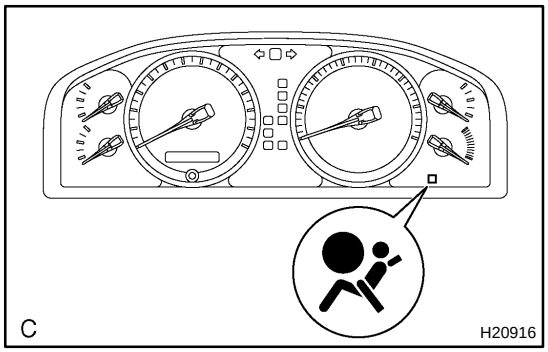
The inflater and bag of the SRS are stored in the curtain shield airbag assembly and cannot be disassembled. The inflater contains a squib, igniter charge, gas generator, etc., and inflates the bag when instructed by the side airbag sensor assembly.





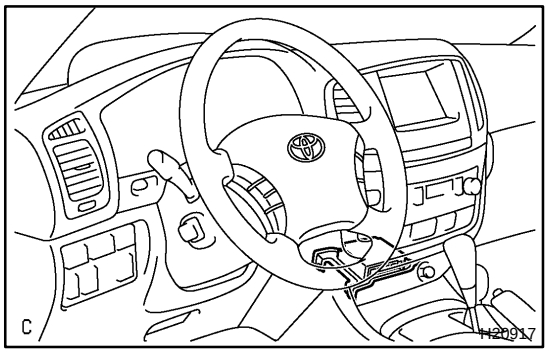
6. SEAT BELT PRETENSIONER

The seat belt pretensioner system is a component of the front seat outer belt. The seat belt pretensioner cannot be disassembled.



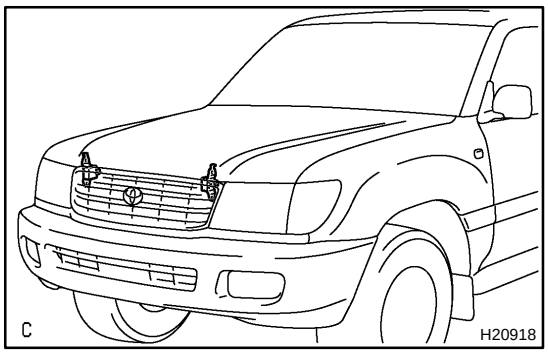
7. SRS WARNING LIGHT

The SRS warning light is located on the combination meter. It goes on to alert the driver of trouble in the system when a malfunction is detected in the airbag sensor assembly self-diagnosis. In normal operating conditions when the ignition switch is turned to the ON position, the light comes on for about 3 seconds and then goes off.



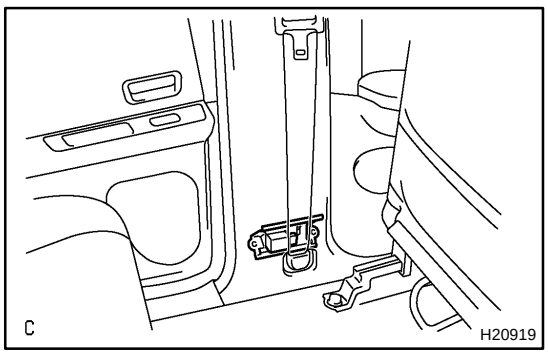
8. AIRBAG SENSOR ASSEMBLY

The airbag sensor assembly is mounted on the floor inside the front console box. The airbag sensor assembly consists of an airbag sensor, safing sensor, diagnosis circuit, ignition control, drive circuit, etc. It receives signals from the airbag sensor, front airbag sensor, side and curtain shield airbag sensor assembly, curtain shield airbag sensor assembly and judges whether the SRS must be activated or not. The airbag sensor assembly cannot be disassembled.



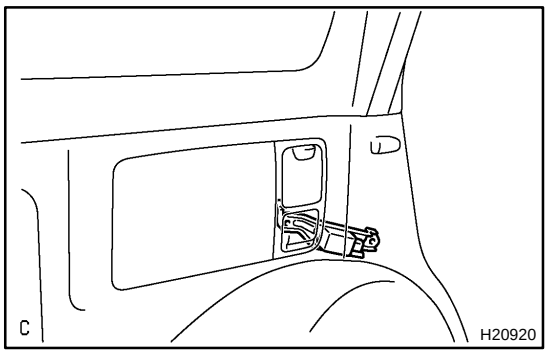
9. FRONT AIRBAG SENSOR

The front airbag sensor is mounted on each of the radiator side supports. The front airbag sensor consists of a frontal deceleration sensor, diagnosis circuit, etc. These send signals to the airbag sensor assembly. The front airbag sensor cannot be disassembled.



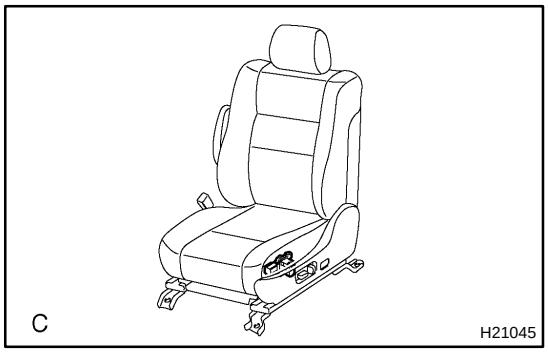
10. SIDE AND CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

The side and curtain shield airbag sensor assembly is mounted in the LH and RH center pillars. The side and curtain shield airbag sensor assembly consist of a lateral deceleration sensor, safing sensor, diagnosis circuit, etc. These send signals to the airbag sensor assembly to judge whether the SRS side airbag and curtain shield airbag must be activated or not. The side and curtain shield airbag sensor assembly cannot be disassembled.



11. CURTAIN SHIELD AIRBAG SENSOR ASSEMBLY

The curtain shield airbag sensor assembly is mounted in the LH and RH rear pillars. The curtain shield airbag sensor assembly consists of a lateral deceleration sensor, safing sensor, diagnosis circuit, etc. These sensors send signals to the airbag sensor assembly to judge whether the SRS curtain shield airbag must be activated or not. The curtain shield airbag sensor assembly cannot be disassembled.



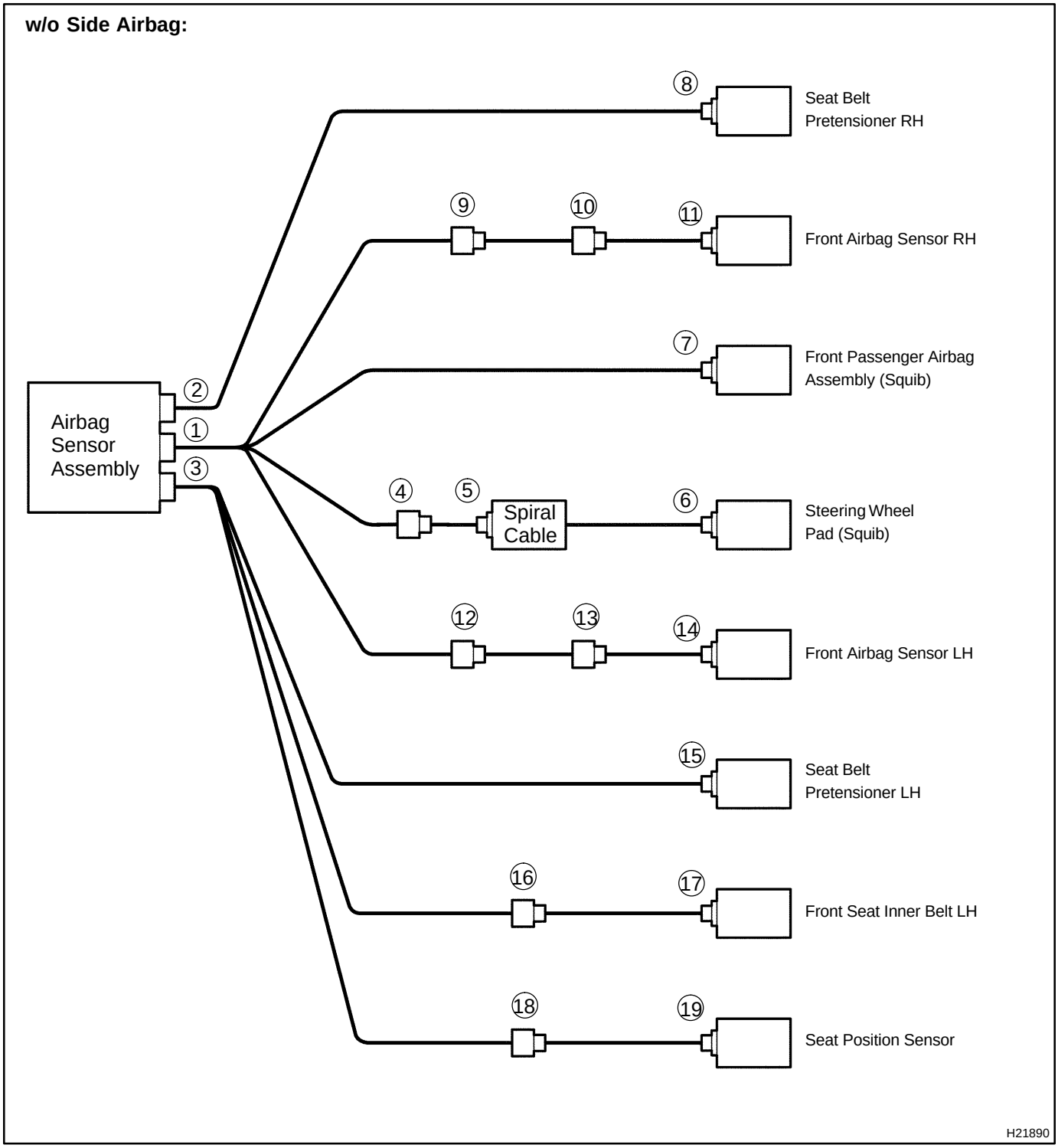
12. SEAT POSITION SENSOR ASSEMBLY

The seat position sensor assembly is mounted on the seat rail of the driver's seat. The sensor unit consists of a magnet sensor, diagnosis circuit, etc. It judges the seat sliding position and sends the signal to the airbag sensor assembly. The seat position sensor assembly cannot be disassembled.

13. SRS CONNECTORS

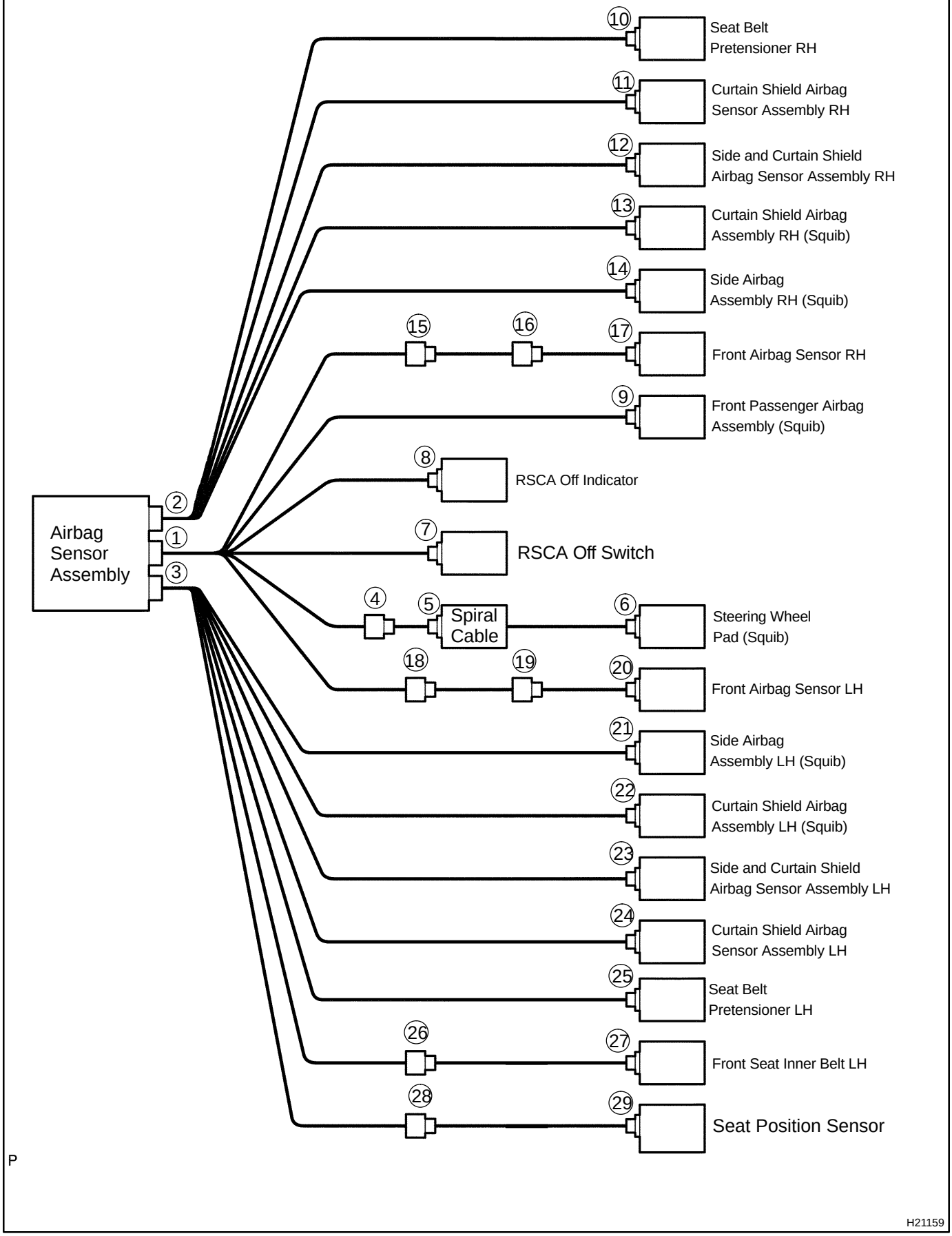
HINT:

SRS connectors are located as shown in the following illustration.



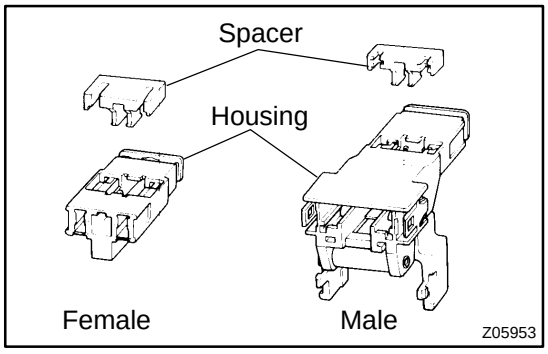
No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 1, 2, 3, 4, 5, 7, 9, 10, 11, 12, 13, 14
(2)	Activation Prevention Mechanism	Connectors 1, 2, 3, 4, 5, 6, 7, 8, 15
(3)	Electrical Connection Check Mechanism	Connectors 1, 2, 3
(4)	Half Connection Prevention Mechanism	Connectors 4, 5, 7, 9, 10, 11, 12, 13, 14
(5)	Connector Lock Mechanism	Connectors 6

w/ Side Airbag:



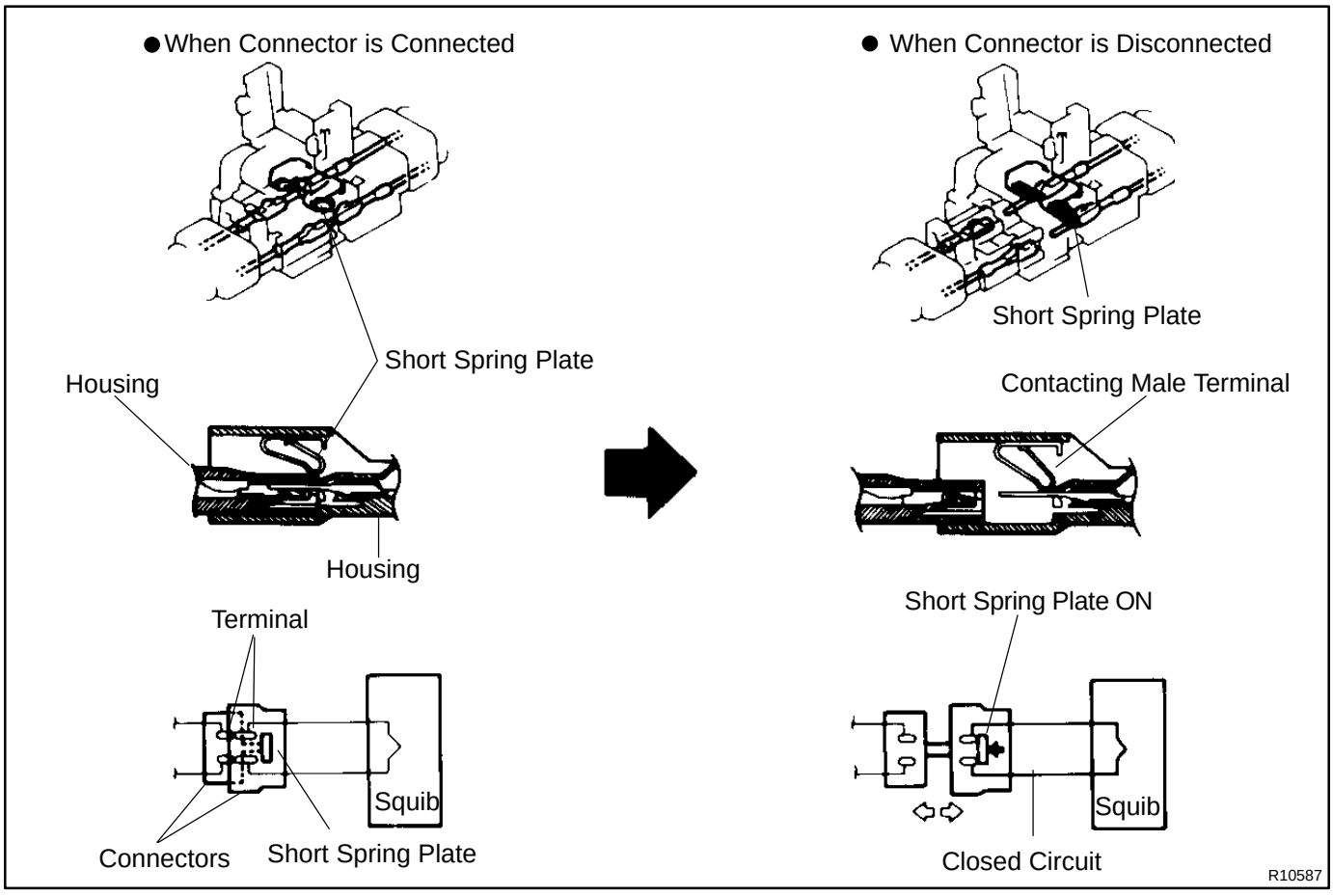
No.	Item	Application
(1)	Terminal Twin-Lock Mechanism	Connectors 1, 2, 3, 4, 5, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
(2)	Activation Prevention Mechanism	Connectors 1, 2, 3, 4, 5, 6, 10, 13, 14, 21, 22, 25
(3)	Electrical Connection Check Mechanism	Connectors 1, 2, 3
(4)	Half Connection Prevention Mechanism	Connectors 4, 5, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24
(5)	Connector Lock Mechanism	Connectors 6

(a) All connectors in the SRS are colored in yellow to distinguish them from other connectors. Connectors having special functions and specifically designed for the SRS are used in the locations shown on the previous page to ensure high reliability. These connectors use durable gold-plated terminals.

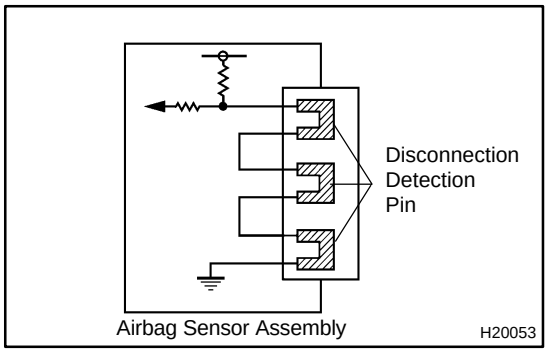


(1) Terminal Twin-Lock Mechanism
Each connector has a two-piece component consisting of a housing and a spacer. This design allows the terminal to be locked securely by two locking devices (the retainer and the lance) to prevent terminals from coming out.

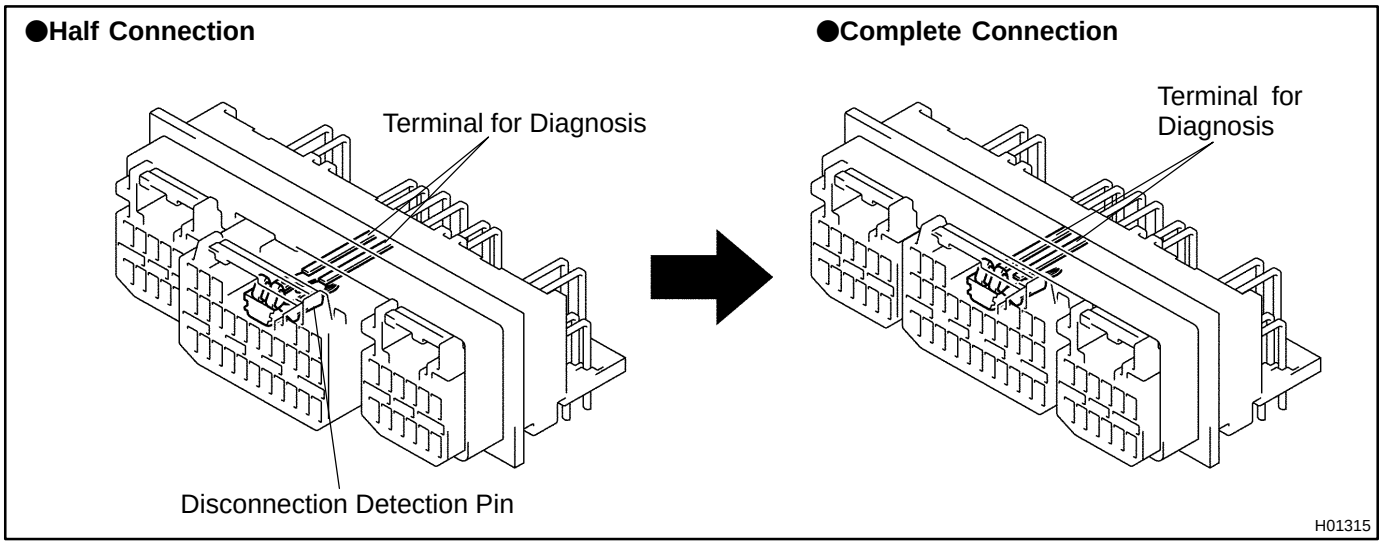
(2) Activation Prevention Mechanism
Each connector contains a short spring plate. When the connector is disconnected, the short spring plate automatically connects positive (+) terminal and negative (-) terminal of the squib.



HINT:
The type of connector is shown in the diagram on the previous page.

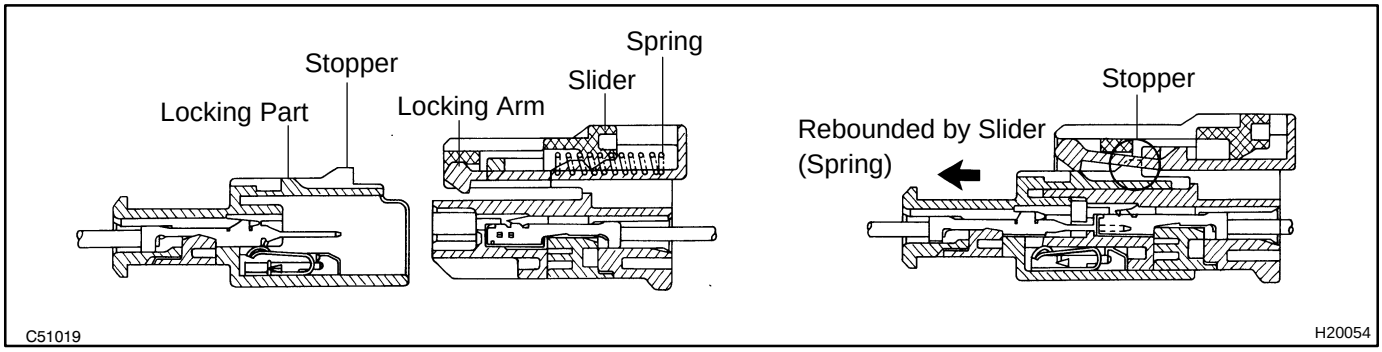


(3) Electrical Connection Check Mechanism
This mechanism electrically checks that connectors are connected correctly and completely. The electrical connection check mechanism is designed so that the disconnection detection pin is connected with the diagnosis terminals when the connector housing lock is locked.

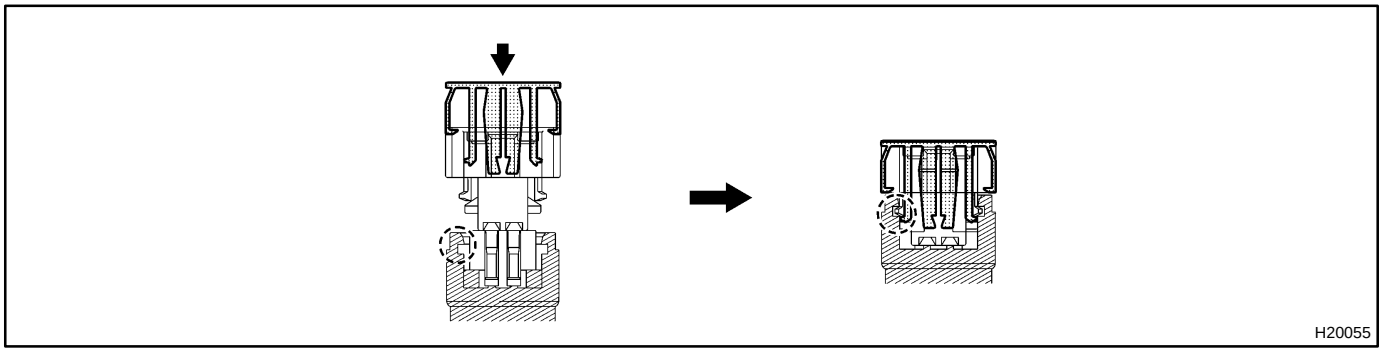


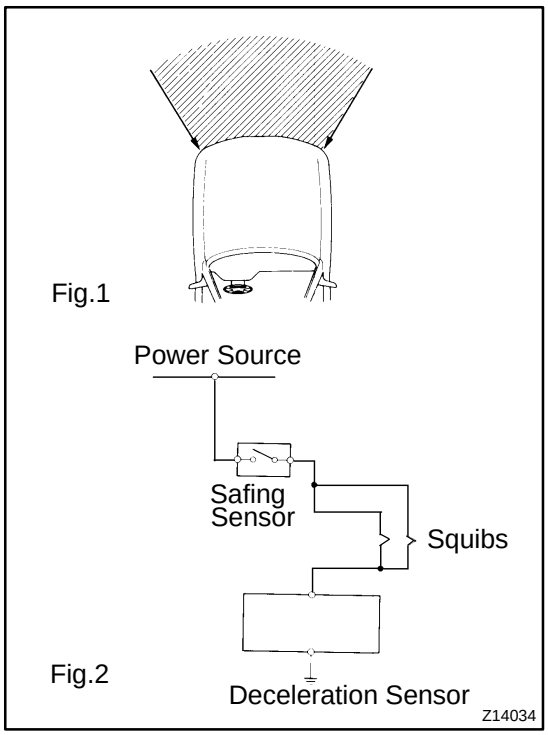
HINT:
The illustration shows connectors ”1”, ”2” and ”3” in step 13.
Connectors 2 and 3 also have similar mechanism.

(4) Half connection prevention mechanism:
If the connector is not completely connected, the connector is disconnected due to the spring operation to the extent that no continuity exists.

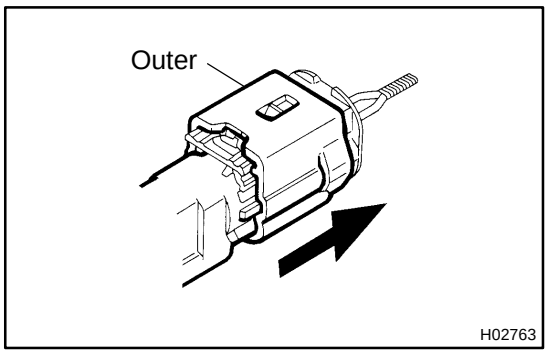


(5) Connector lock mechanism:
Locking the connector lock button securely connects the connector.





(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. A 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 a 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 open the steering wheel pad and instrument panel.
Bag inflation then ends, and the bags deflate as the gas is discharged through discharge holes at the bag's rear or side.



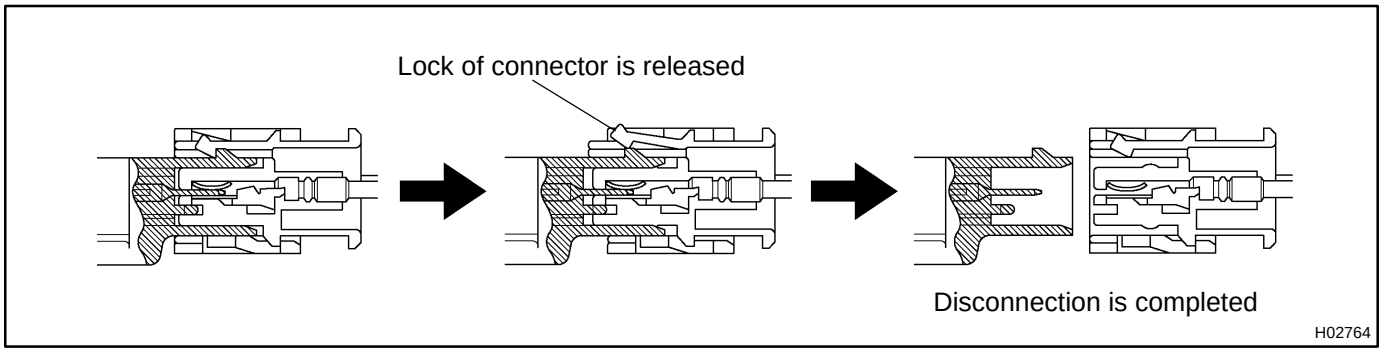
14. DISCONNECTION OF CONNECTORS FOR FRONT AIRBAG SENSOR, SIDE AND CURTAIN SHIELD AIRBAG SENSOR AND CURTAIN SHIELD AIRBAG SENSOR

(a) While holding both flank sides of the outer, slide the outer in the direction shown by an arrow.

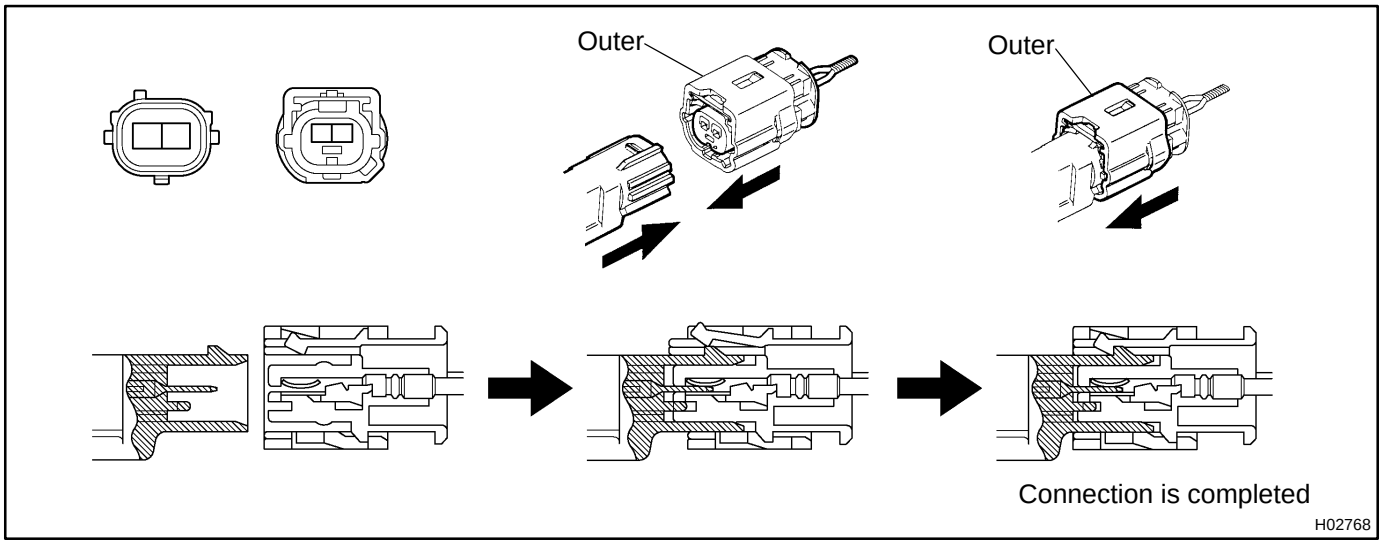
(b) Lock of the connectors is released, and then disconnect the connectors.

HINT:

Be sure to hold both flank sides of the outer. If holding the top and bottom sides, it will obstruct disconnection.



15. CONNECTION OF CONNECTORS FOR FRONT AIRBAG SENSOR, SIDE AND CURTAIN SHIELD AIRBAG SENSOR AND CURTAIN SHIELD AIRBAG SENSOR



(a) Align the male connector (of the side of sensor) and female connector in the same direction as shown in the illustration and fit them in without rubbing.

(b) As they are fitted in, the outer slides rearward. Press it until the outer returns to its original position again.

If fitting stops half way, connectors will separate.

(c) Be sure to insert until they are locked. After fitting in, pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound to be fit in can be heard.)

HINT:

Do not fit in while holding the outer.

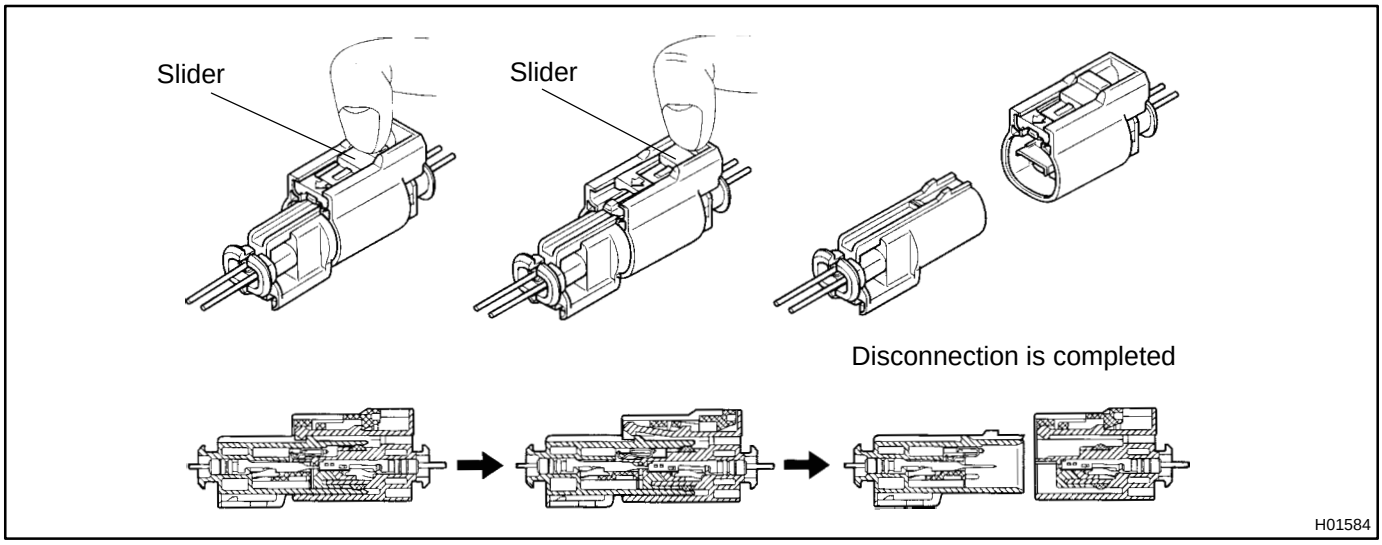
When fitting in, the outer slides. Do not touch it.

16. DISCONNECTION OF SIDE AIRBAG CONNECTOR

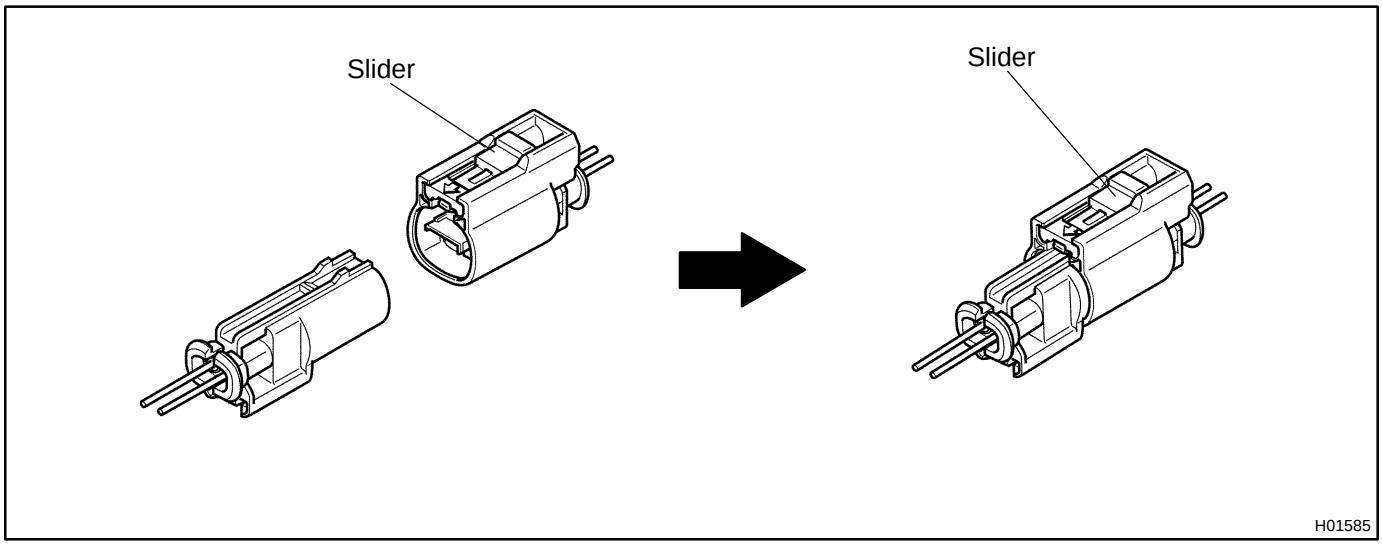
(a) Place a finger on the slider.

(b) Slide the slider to release lock.

(c) Disconnect the connector.



17. CONNECTION OF SIDE AIRBAG CONNECTOR



(a) Align a lock part of male connector and a slider of female connector in the same direction as shown in the illustration, fit them in without rubbing.

(b) Be sure to insert until they are locked. After fitting in pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound to be fit in can be heard.)

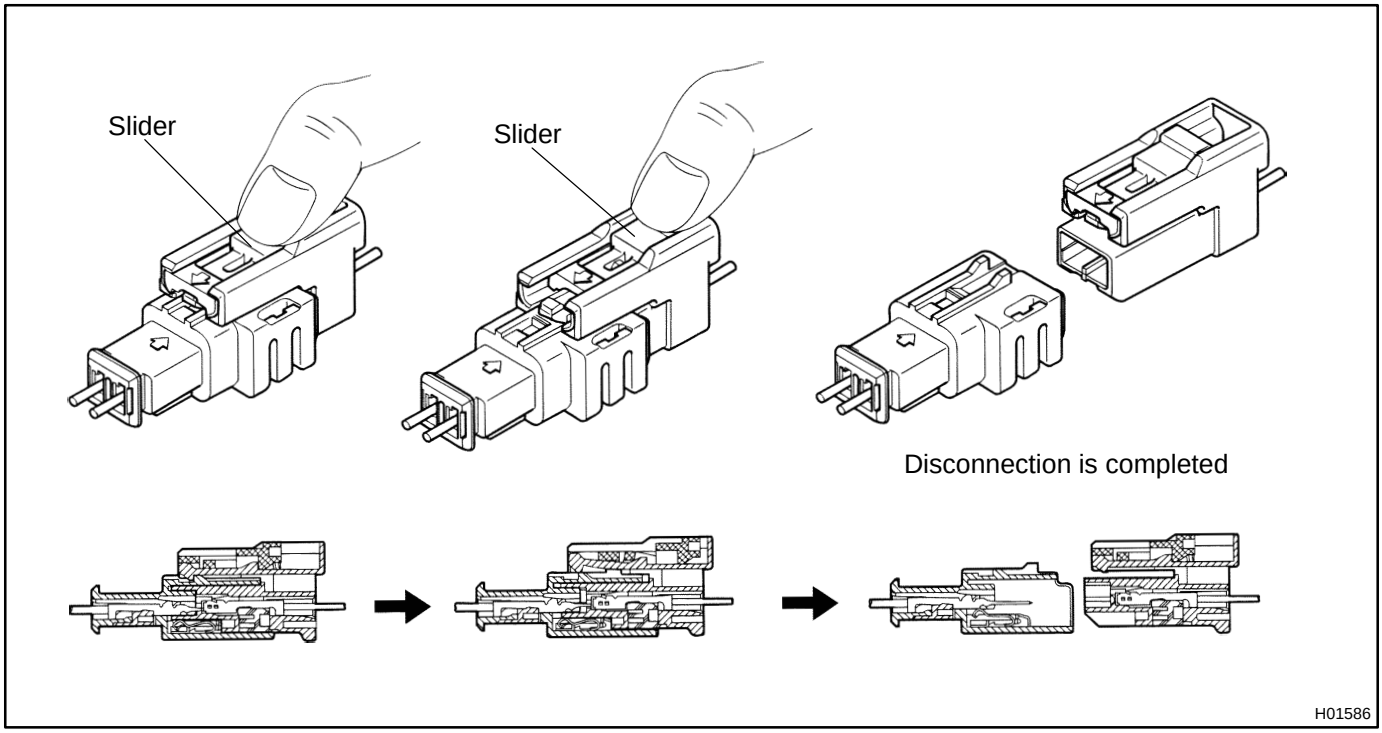
HINT:

As the slider slides, do not touch it.

Be careful not to deform the release board. If the release board is deformed, replace it with a new one.

18. DISCONNECTION OF CONNECTORS FOR CURTAIN SHIELD AIRBAG ASSEMBLY AND FRONT PASSENGER AIRBAG ASSEMBLY

(a) Place a finger on the slider.
(b) Slide the slider to release lock.
(c) Disconnect the connector.



19. CONNECTION OF CONNECTORS FOR CURTAIN SHIELD AIRBAG ASSEMBLY AND FRONT PASSENGER AIRBAG ASSEMBLY

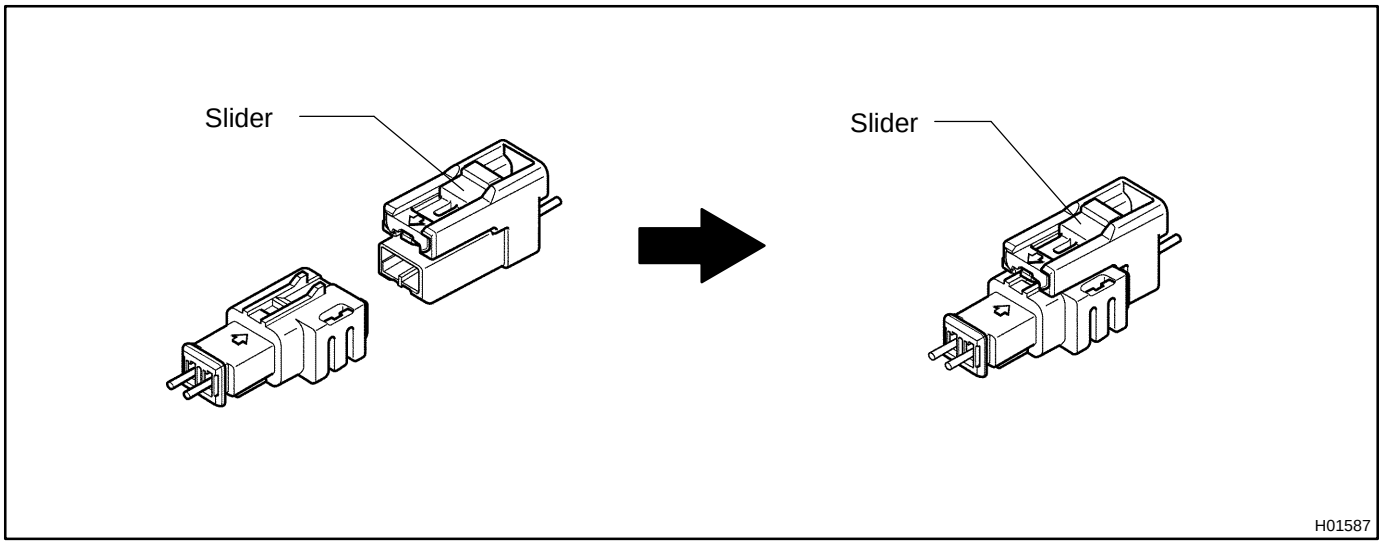
(a) Align a lock part of male connector and a slider of female connector in the same direction as shown in the illustration, fit them in without rubbing.

(b) Be sure to insert until they are locked. After fitting in pull them slightly to check that they are locked. (When locked, make sure that the outer returns to its original position and sound to be fit in can be heard.)

HINT:

As the slider slides, do not touch it.

Be careful not to deform the release board. If the release board is deformed, replace it with a new one.



SRS AIRBAG

RS0B6-06

PRECAUTION

CAUTION:

- **The LAND CRUISER is equipped with SRS, which comprises a driver airbag, front passenger airbag, side airbag and curtain shield 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. Further, if a mistake is made in servicing the SRS, it is possible that the SRS may fail to operate when required. Before performing servicing (including removal or installation of parts, inspection or replacement), be sure to read the following items carefully, then follow the correct procedures described in the repair manual.**
- **Work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**
  (The SRS is equipped with a back-up power source so that if work is started within 90 seconds from disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed.)
- **Do not expose the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side and curtain shield airbag sensor assembly, curtain shield airbag sensor assembly or seat position sensor assembly directly to hot air or flames.**

NOTICE:

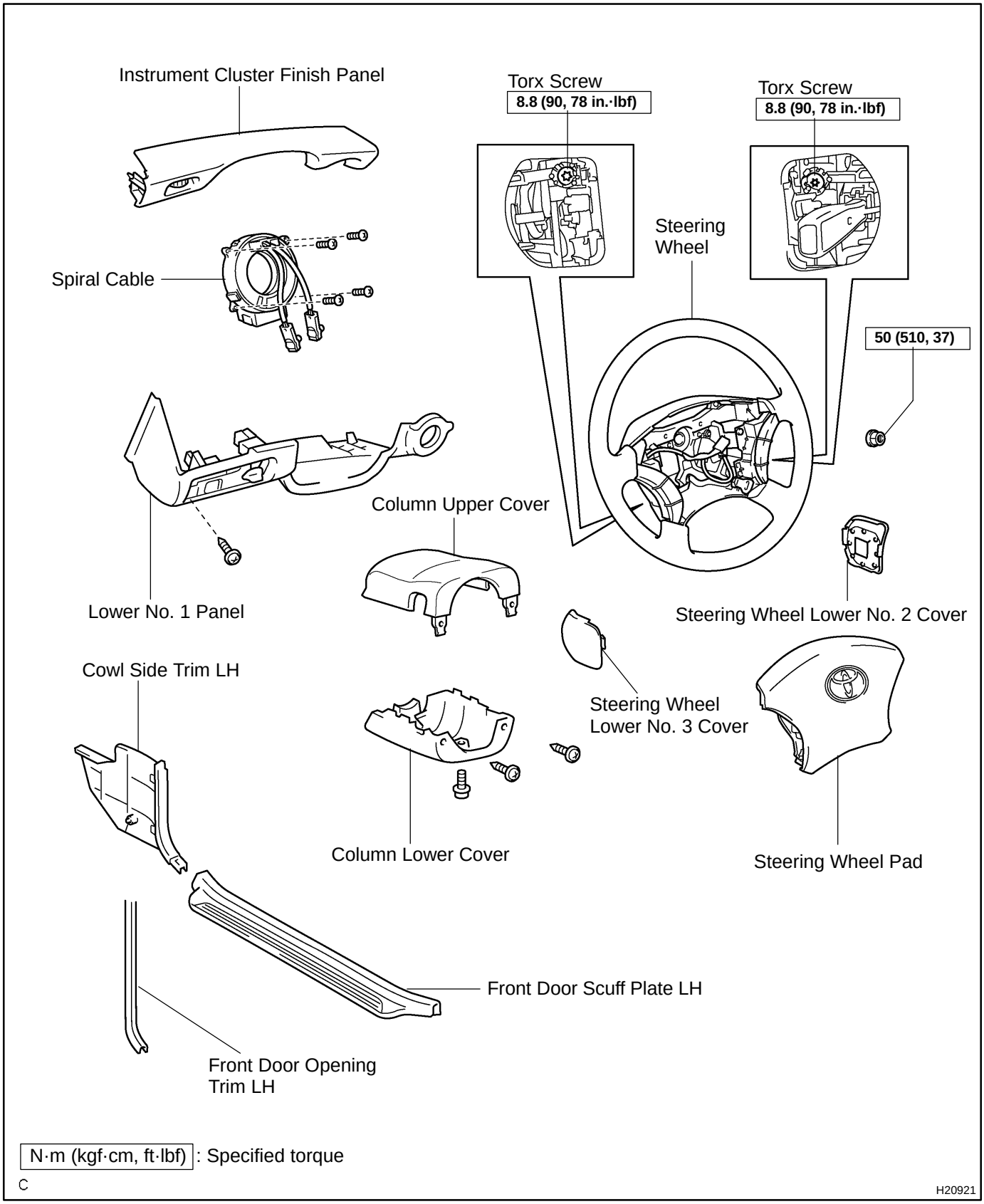
- **Malfunction symptoms of the SRS are difficult to confirm, so the DTCs become the most important source of information when troubleshooting. When troubleshooting the SRS, always inspect the DTCs before disconnecting the battery.**
- **Even in the case of a minor collision where the SRS does not deploy, the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side and curtain shield airbag sensor assembly, curtain shield airbag sensor assembly and seat position sensor assembly should be inspected (See page RS-18 , RS-32 , RS-47 , RS-60 , RS-71 , RS-76 , RS-81 , RS-87 and RS-92).**
- **Before repairs, remove the airbag sensor if shocks are likely to be applied to the sensor during repairs.**
- **Never use SRS parts from another vehicle. When replacing parts, replace them with new parts.**
- **Never disassemble and repair the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side and curtain shield airbag sensor assembly, curtain shield airbag sensor assembly or seat position sensor assembly in order to reuse it.**
- **If the steering wheel pad, front passenger airbag assembly, side airbag assembly, curtain shield airbag assembly, airbag sensor assembly, front airbag sensor, side and curtain shield airbag sensor assembly, curtain shield airbag sensor assembly or seat position sensor assembly has been dropped, or if there are cracks, dents or other defects in the case, bracket or connector, replace it with new one.**
- **Use a volt/ohmmeter with high impedance (10 kΩ/V minimum) for troubleshooting the system's electrical circuits.**
- **Information labels are attached to the periphery of the SRS components. Follow the instructions on the notice.**
- **After work on the SRS is completed, perform the SRS warning light check (See page DI-692).**

- **When the negative (-) terminal cable is disconnected from the battery, the memory of the clock and audio system will be canceled. So before starting work, make a record of the contents memorized in the audio memory system. When work is finished, reset the audio systems as they were before and adjust the clock. To avoid erasing the memory in each memory system, never use a back- up power supply from outside the vehicle.**
- **If the vehicle is equipped with a mobile communication system, refer to the precaution in the IN section.**

STEERING WHEEL PAD AND SPIRAL CABLE

COMPONENTS

RS0B8-10



RS0VJ-01

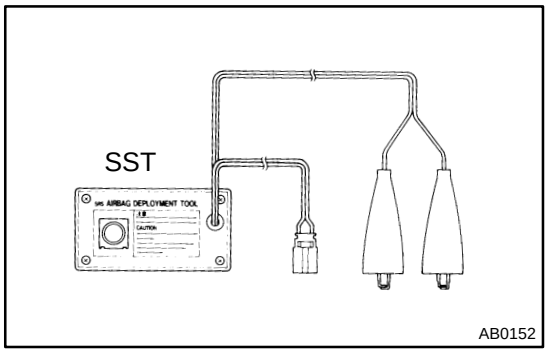
DISPOSAL

HINT:

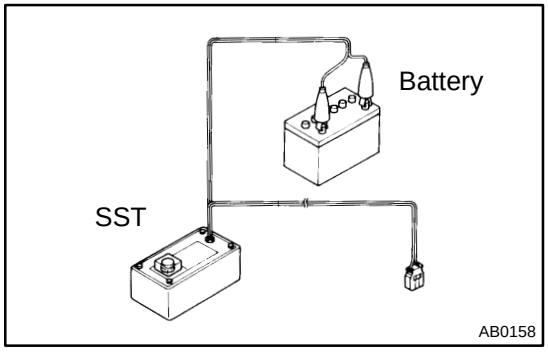
When scrapping vehicle equipped with an SRS or disposing of a steering wheel pad (with airbag), always first deploy the airbag in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the SERVICE DEPT. of TOYOTA MOTOR SALES, U.S.A., INC.

CAUTION:

- **Never dispose of a steering wheel pad of which airbag has not been deployed.**
- **The airbag produces a sizeable exploding sound when it deploys, so perform the operation out-of-doors and where it will not create a nuisance to nearby residents.**



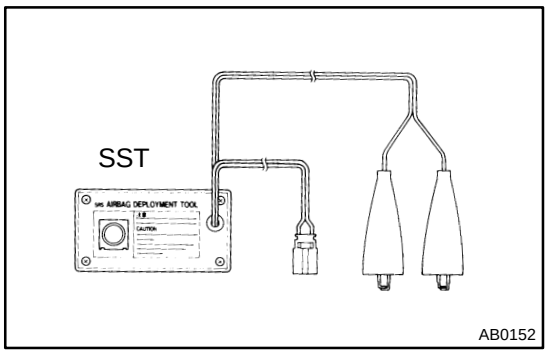
- **When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.**
  SST 09082-00700
- **When deploying an airbag, perform the operation at least 10 m (33 ft) away from the steering wheel pad.**
- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**



1. AIRBAG DEPLOYMENT WHEN SCRAPPING VEHICLE

HINT:

Have a battery ready as the power source to deploy the airbag.

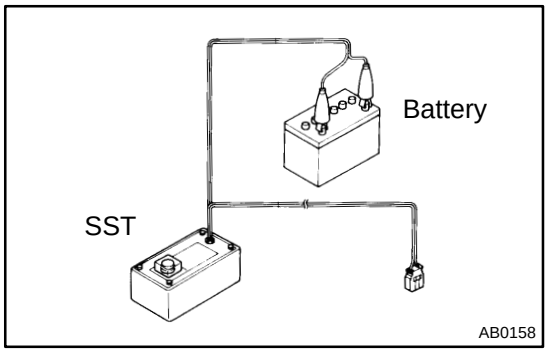


(a) Check the function of the SST.

CAUTION:

When deploying the airbag, always use the specified SST: SRS Airbag Deployment Tool.

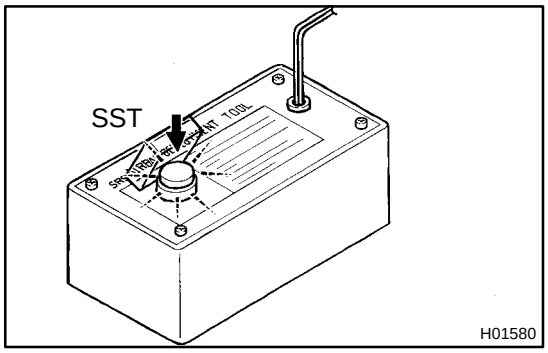
SST 09082-00700



(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.

HINT:

Do not connect the yellow connector of the SST which will be connected with the supplemental restraint system.

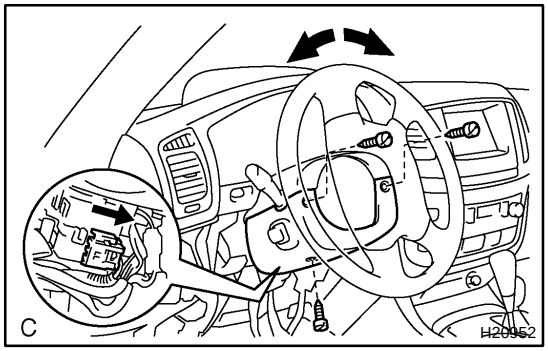


(2) Press the SST activation switch, and check that the LED of the SST activation switch comes on.

CAUTION:

If the LED lights up while the activation switch is not being pressed, a malfunction on SST is probable, so never use the SST.

(3) Disconnect the SST from the battery.

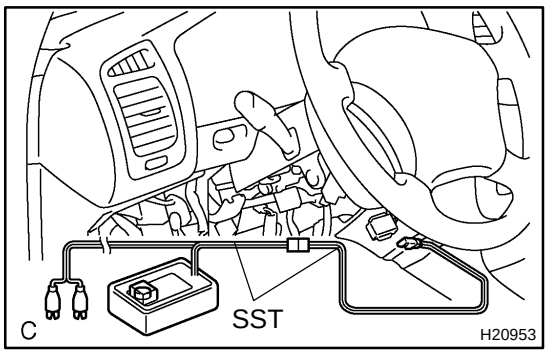


(b) Install the SST.

CAUTION:

Check that there is no looseness in the steering wheel and steering wheel pad.

(1) Remove the front door scuff plate LH.
(2) Remove the cowl side trim LH.
(3) Remove the front door opening trim LH.
(4) Remove the lower No. 1 panel.
(5) While turning the steering wheel right or left, remove the 3 screws and column lower cover.
(6) Disconnect the airbag connector of the spiral cable.

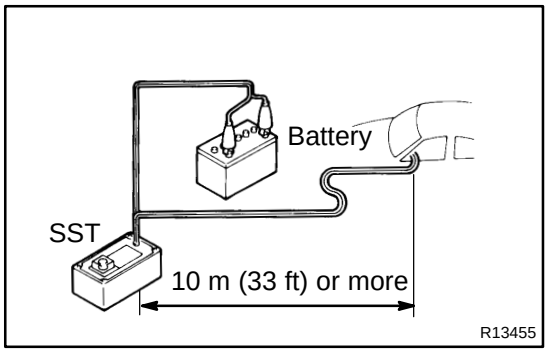


(7) Connect the connector of SST to the airbag connector of the spiral cable.

SST 09082-00700, 09082-00780

NOTICE:

To avoid damaging the connector of the SST and wire harness, do not lock the secondary lock of the twin lock.



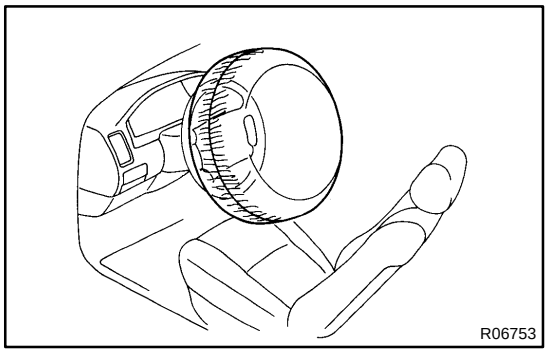
(8) Move the SST at least 10 m (33 ft) away from the front of the vehicle.

(9) Close all the doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(10) Connect the SST red clip to the battery positive (+) terminal and the black clip to the negative (-) terminal.



(c) Deploy the airbag.

(1) Confirm that no one is inside the vehicle nor within 10 m (33 ft) area around the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **When moving a vehicle for scrapping which has a steering wheel pad with deployed airbag, use gloves and safety glasses.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**

HINT:

The airbag deploys as the LED of the SST activation switch comes on.

2. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD ONLY

NOTICE:

- **When disposing of the steering wheel pad (with airbag) only, never use the customer's vehicle to deploy the airbag.**
- **Be sure to follow the procedure given below when deploying the airbag.**

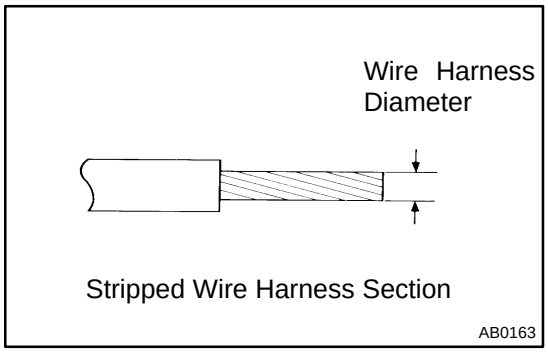
HINT:

Have a battery ready as the power source to deploy the airbag.

(a) Remove the steering wheel pad (See page SR-14).

CAUTION:

- **When storing the steering wheel pad, keep the upper surface of the pad facing upward.**
- **When removing the steering wheel pad, work must be started 90 seconds after the ignition switch is turned to the "LOCK" position and the negative (-) terminal cable is disconnected from the battery.**



(b) Using a service-purpose wire harness for the vehicle, tie down the steering wheel pad to the disc wheel.

Wire harness: Stripped wire harness section 1.25 mm^2 or more (0.0019 in^2. or more).

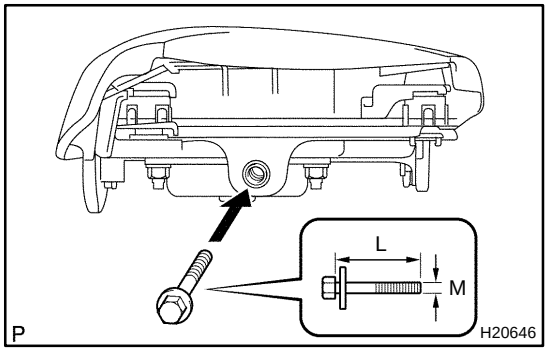
CAUTION:

If a wire harness which is too thin or some other thing is used to tie down the steering wheel pad, it may be snapped by the shock when the airbag is deployed. This is highly dangerous. Always use a wire harness for vehicle use which is at least 1.25 mm^2 (0.0019 in^2).

HINT:

To calculate the square of the stripped wire harness section:

Square = 3.14 x (Diameter)^2 divided by 4



(1) Install the 2 bolts with washers in the 2 bolt holes in the steering wheel pad.

Bolt:

L: 35.0 mm (1.387 in.)

M: 6.0 mm (0.236 in.)

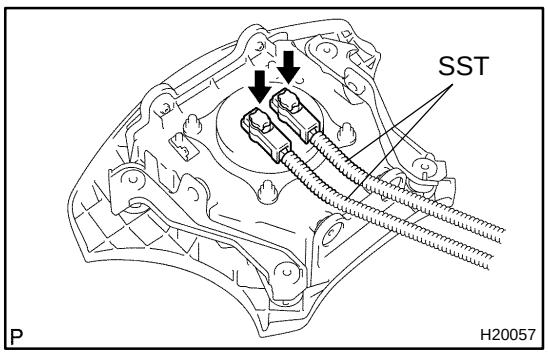
Pitch: 1.0 mm (0.039 in.)

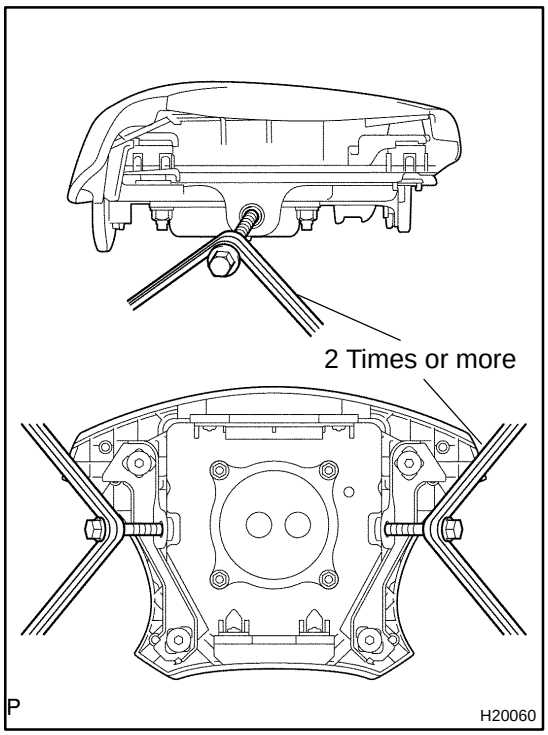
NOTICE:

- **Tighten the bolts by hand until the bolts become difficult to turn.**
- **Do not tighten the bolts excessively.**

(2) Connect the connectors of the SST to the steering wheel pad connectors.

SST 09082-00802 (09082-10801, 09082-30801)

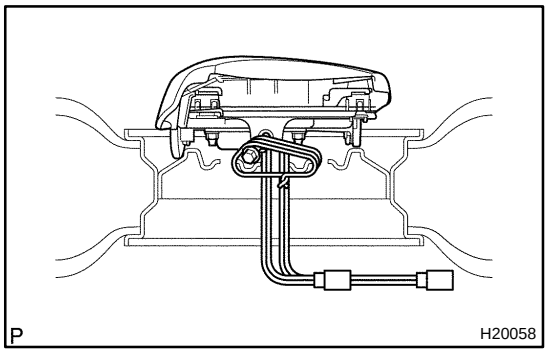




(3) Using 3 wire harness, wind the wire harness at least 2 times each around the bolts installed on the left and right sides of the steering wheel pad.

CAUTION:

- **Tightly wind the wire harness around the bolts so that there is no slack.**
- **If there is slackness in the wire harness, the steering wheel pad may come loose due to the shock when the airbag is deployed. This is highly dangerous.**



(4) Face the upper surface of the steering wheel pad upward. Separately tie the left and right sides of the steering wheel pad to the disc wheel through the hub nut holes. Position the steering wheel pad connector so that it hangs downward through a hub hole in the disc wheel.

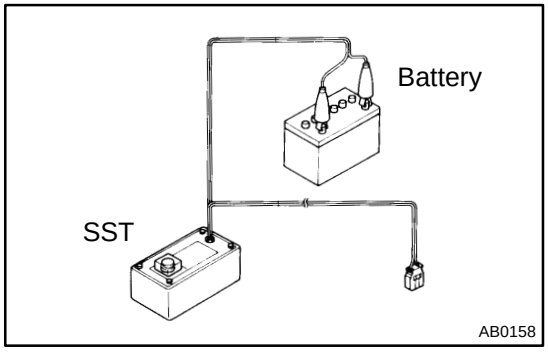
CAUTION:

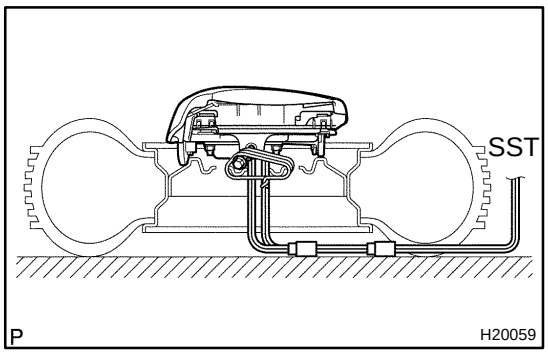
- **Make sure that the wire harness is tight. It is very dangerous when looseness in the wire harness results in the steering wheel pad coming free through the shock from the airbag deploying.**
- **Always tie down the steering wheel pad with the pad side facing upward. It is very dangerous if the steering wheel pad is tied down with the metal surface facing upward as the wire harness will be cut by the shock caused by the airbag is deployment and the steering wheel pad will be thrown into the air.**

NOTICE:

The disc wheel will be marked by airbag deployment, so when disposing of the airbag, use a redundant disc wheel.

(c) Check the function of the SST (See step 1-(a)).
SST 09082-00700





(d) Install the SST.

CAUTION:

Place the disc wheel on the level ground.

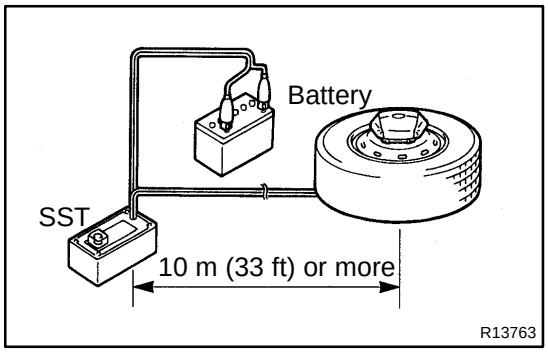
(1) Connect the connector of the SST.

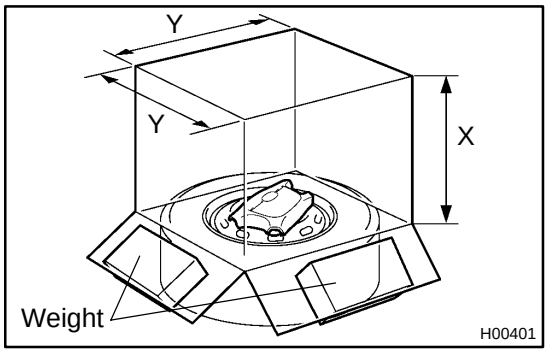
SST 09082-00700

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 the SST at least 10 m (33 ft) away from the steering wheel pad tied down on the disc wheel.





(e) Cover the steering wheel pad with a cardboard box or tires.

- Covering method using a cardboard box:
  Cover the steering wheel pad with the cardboard box and weight the cardboard box down in 4 places with at least 190 N (20 kg, 44 lb).

Size of cardboard box:

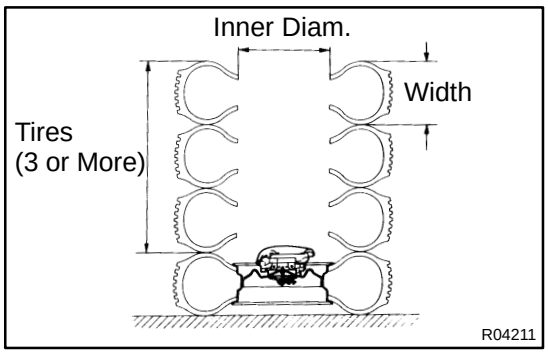
Must exceed the following dimensions:

X = 460 mm (18.11 in.)

Y = 650 mm (25.59 in.)

NOTICE:

- **When dimension Y of the cardboard box exceeds the diameter of the disc wheel with tire to which the steering wheel pad is tied, X should be the following size.**
  X = 460 mm (18.11 in.) + width of tire
- **If a cardboard box smaller than the specified size is used, the cardboard box will be broken by the shock from the airbag deployment.**



- Covering method using tires:
  Place at least 3 tires with no disc wheels on top of the tire with disc wheel to which the steering wheel pad is tied.

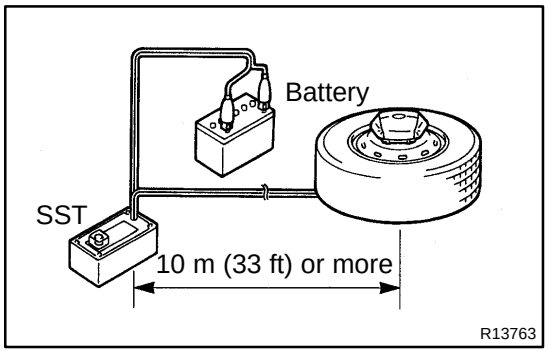
Tire size: Must exceed the following dimensions-
Width: 185 mm (7.28 in.)
Inner diameter: 360 mm (14.17 in.)

CAUTION:
Do not use tires with disc wheels.

NOTICE:
The tires may be marked by the airbag deployment, so use the redundant tires.

(f) Deploy the airbag.

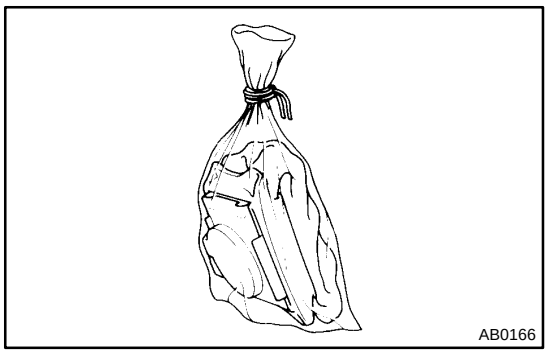
(1) Connect the red clip of the SST to the battery positive (+) terminal and the black clip to the battery negative (-) terminal.



(2) Check that no one is within 10 m (33 ft) area around the disc wheel which the steering wheel pad is tied to.

(3) Press the SST activation switch and deploy the airbag.

HINT:
The airbag deploys as the LED of the SST activation switch comes on.



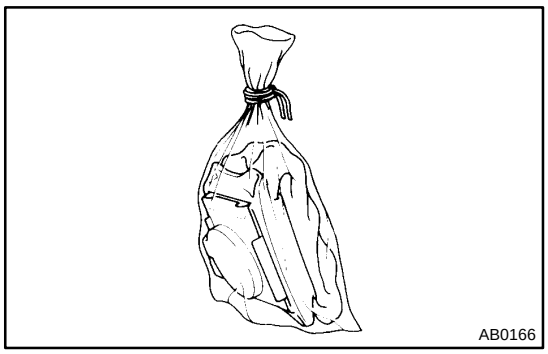
(g) Dispose of the steering wheel pad (with airbag).

CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **Use gloves and safety glasses when handling a steering wheel pad with deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with deployed airbag.**

(1) Remove the steering wheel pad from the disc wheel.

(2) Place the steering wheel pad in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.



3. DEPLOYMENT WHEN DISPOSING OF STEERING WHEEL PAD WITH AN AIRBAG DEPLOYED IN A COLLISION

Dispose of the steering wheel pad (with airbag).

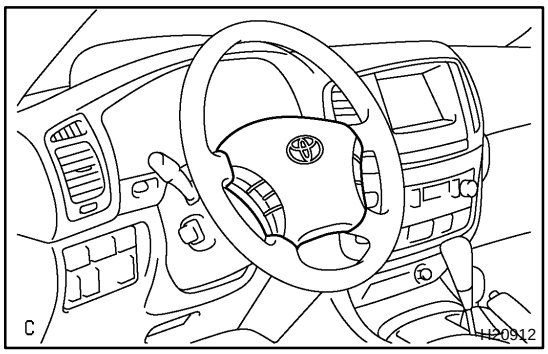
CAUTION:

- **The steering wheel pad is very hot when the airbag is deployed, so leave it alone for at least 30 minutes after deployment.**
- **When moving a vehicle for scrapping which has a steering wheel pad with the deployed airbag, use gloves and safety glasses.**
- **Use gloves and safety glasses when handling a steering wheel pad with the deployed airbag.**
- **Always wash your hands with water after completing the operation.**
- **Do not apply water, etc. to a steering wheel pad with the deployed airbag.**

(1) Remove the steering wheel pad from the steering wheel (See page SR-14).

(2) Place the steering wheel pad in a plastic bag, tie the end tightly and dispose of it as the other general parts disposal.

RS0VI-01



INSPECTION

1. Vehicle not involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

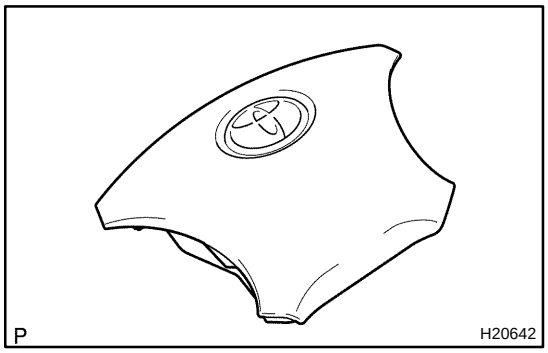
(b) Do a visual check which includes the following item with the steering wheel pad (with airbag) installed in the vehicle.

Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.

2. Vehicle involved in collision and airbag is not deployed:

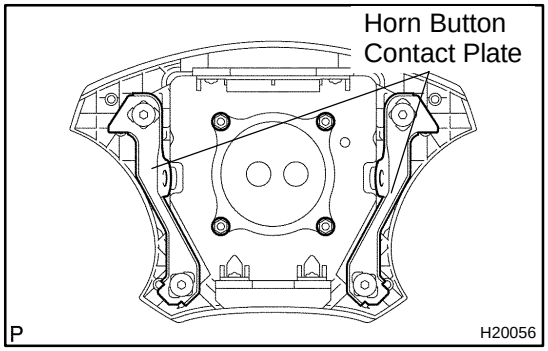
INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).



(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.

- Check cuts, minute cracks or marked discoloration on the steering wheel pad top surface and in the grooved portion.
- Check cuts and cracks in wire harness, and chipping in connectors.



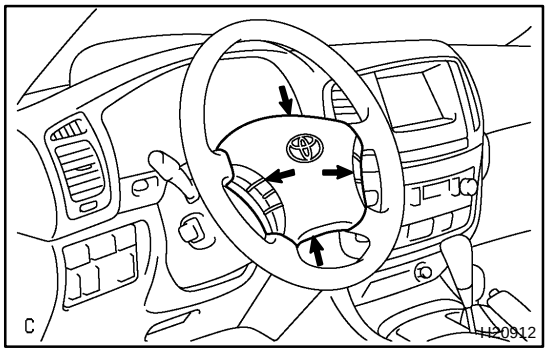
- Check the deformation of the horn button contact plate on the steering wheel pad (with airbag).

CAUTION:

For removal and installation of the steering wheel pad, see page SR-14 and SR-24 , and be sure to follow the correct procedure.

HINT:

- If the horn button contact plate of the steering wheel pad (with airbag) is deformed, never repair it. Always replace the steering wheel assembly with a new one.
- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.



3. Vehicle involved in collision and airbag is deployed: INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

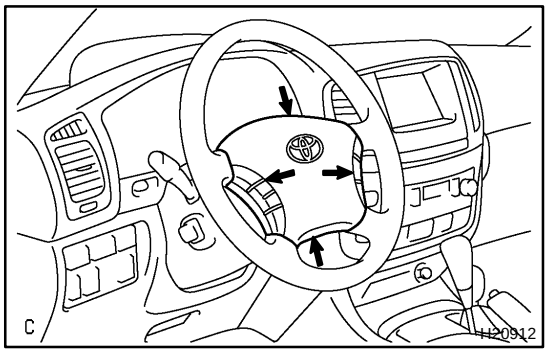
(a) Do a diagnostic system check (See page DI-692).

(b) Do a visual check which includes the following items with the steering wheel pad (with airbag) removed from the vehicle.

- Check that the metal part where the steering wheel pad is to be installed is not deformed.
- Check the damage on the spiral cable connector and wire harness.

HINT:

- Do not repair the metal part where the steering wheel pad is to be installed even if any deformation is found. Always replace the steering wheel assembly with a new one.



- There should be no interference between the steering wheel pad and steering wheel, and the clearance should be uniform all the way around when the new steering wheel pad is installed on the steering wheel.

RS0BD-08

INSTALLATION

HINT:

For step 1 to 9, refer to page SR-24 .

1. **INSTALL SPIRAL CABLE**
2. **INSTALL COLUMN UPPER AND LOWER COVERS**
3. **INSTALL LOWER NO. 1 PANEL**
4. **INSTALL INSTRUMENT CLUSTER FINISH PANEL**
5. **INSTALL FRONT DOOR OPENING TRIM LH**
6. **INSTALL COWL SIDE TRIM LH**
7. **INSTALL FRONT DOOR SCUFF PLATE LH**
8. **INSTALL STEERING WHEEL**
9. **INSTALL STEERING WHEEL PAD**
10. **INSPECT SRS WARNING LIGHT (See page DI-692)**

RS0B9-10

REMOVAL

HINT:

For step 1 to 9, refer to page SR-14 .

1. **REMOVE STEERING WHEEL PAD**
2. **REMOVE STEERING WHEEL**
3. **REMOVE FRONT DOOR SCUFF PLATE LH**
4. **REMOVE COWL SIDE TRIM LH**
5. **REMOVE FRONT DOOR OPENING TRIM LH**
6. **REMOVE INSTRUMENT CLUSTER FINISH PANEL**
7. **REMOVE LOWER NO. 1 PANEL**
8. **REMOVE COLUMN UPPER AND LOWER COVERS**
9. **REMOVE SPIRAL CABLE**

RS0SM-01

REPLACEMENT

REPLACEMENT REQUIREMENTS

In the following cases, replace the steering wheel pad, steering wheel or spiral cable.

Case	Replacing part
If the airbag has been deployed.	Steering wheel pad
If the steering wheel pad has been found to be faulty in troubleshooting.	Steering wheel pad
If the spiral cable has been found to be faulty in troubleshooting.	Spiral cable
If the steering wheel pad has been found to be faulty during checking items (See page RS-18).	Steering wheel pad
If the steering wheel has been found to be faulty during checking items (See page RS-18).	Steering wheel
If the spiral cable has been found to be faulty during checking items (See page RS-18).	Spiral cable
If the steering wheel pad has been dropped.	Steering wheel pad

CAUTION:

For removal and installation of the steering wheel pad, see page SR-14 and SR-24 , and be sure to follow the correct procedure.

RS0BV-05

INSPECTION

HINT:

The SRS wire harness is integrated with the cowl wire harness assembly. The wires for the SRS wire harness are encased in a yellow corrugated tube and all the connectors in the system are a standard yellow color.

1. Vehicle not involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

Do a diagnostic system check (See page DI-692).

2. Vehicle involved in collision:

INSPECT SUPPLEMENTAL RESTRAINT SYSTEM

(a) Do a diagnostic system check (See page DI-692).

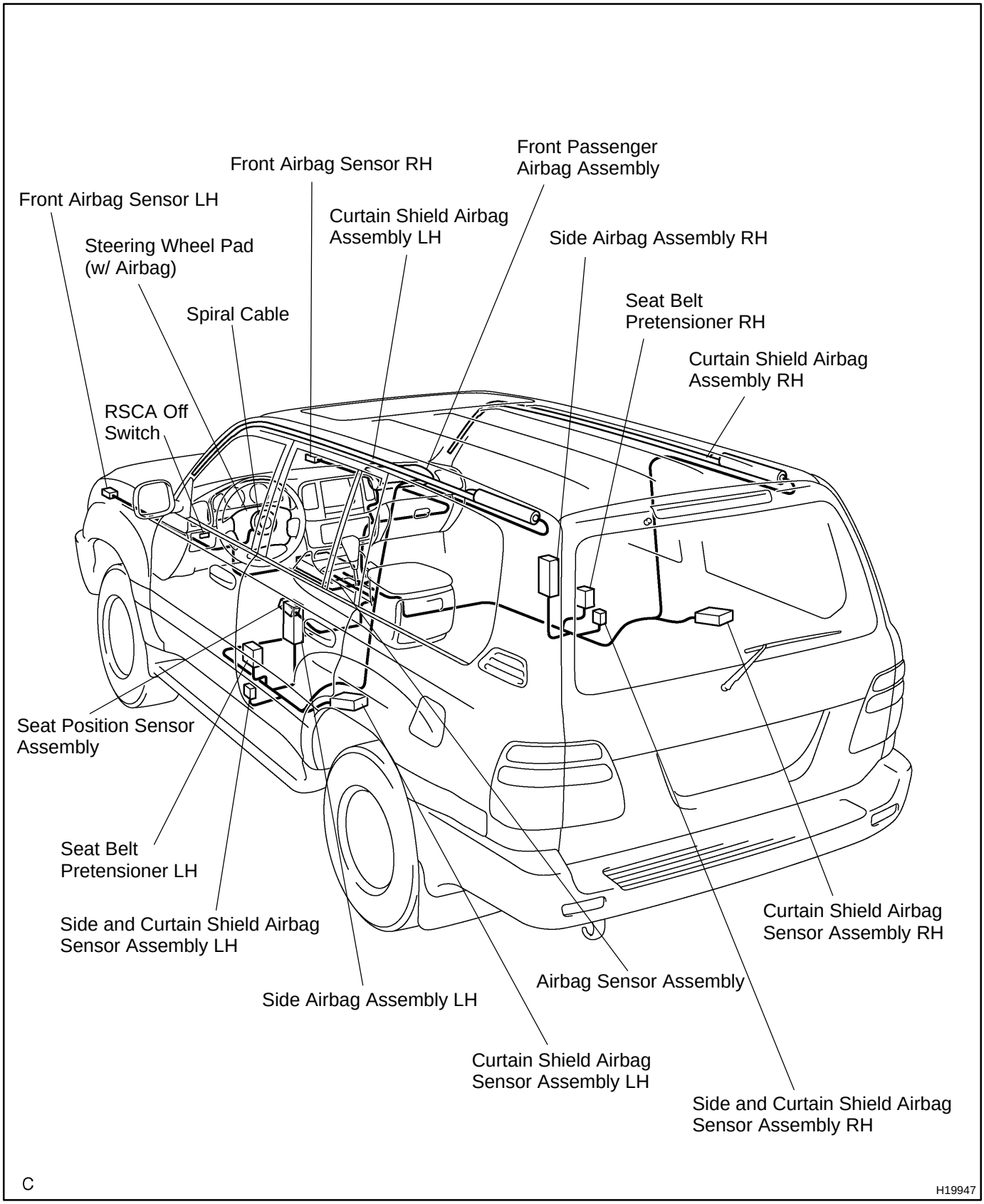
(b) Check for breaks in all wires of the SRS wire harness, and for exposed conductors.

(c) Check to see if the SRS wire harness connectors are cracked or chipped.

WIRE HARNESS AND CONNECTOR

LOCATION

RS0BU-07



RS0BW-04

REPLACEMENT

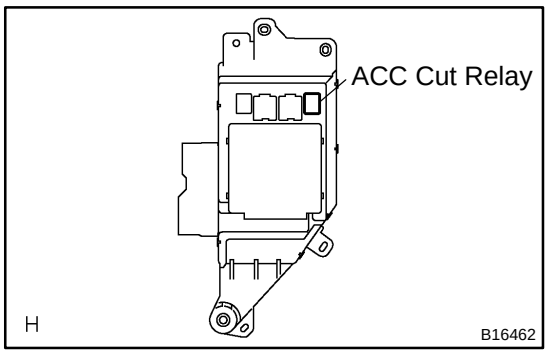
REPLACEMENT REQUIREMENTS

In the following cases, replace the wire harness or connector.

- If any part of the SRS wire harness or any connector has been found to be faulty in troubleshooting.
- If any part of the SRS wire harness or any connector has been found to be faulty during checking items 2-(b) or (c) (See page RS-97).

NOTICE:

If the wire harness used in the SRS is damaged, replace the whole wire harness assembly.



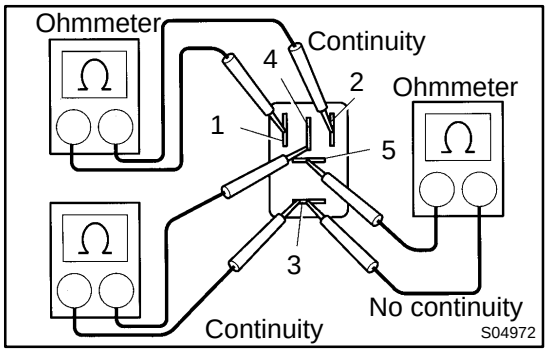
ACC CUT RELAY

ST0OU-01

INSPECTION

1. REMOVE ACC CUT RELAY

Remove the relay box and ACC cut relay.



2. INSPECT ACC CUT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

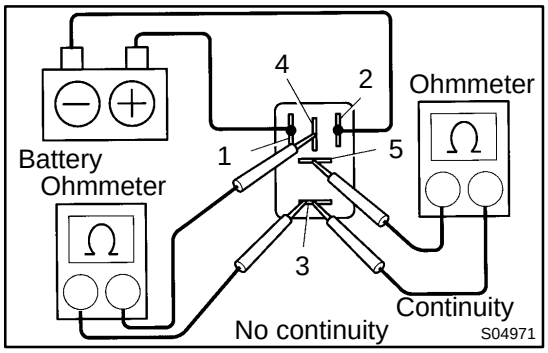
If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.

(c) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.



3. INSPECT ACC CUT RELAY OPERATION

(a) Apply battery positive voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.

(c) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

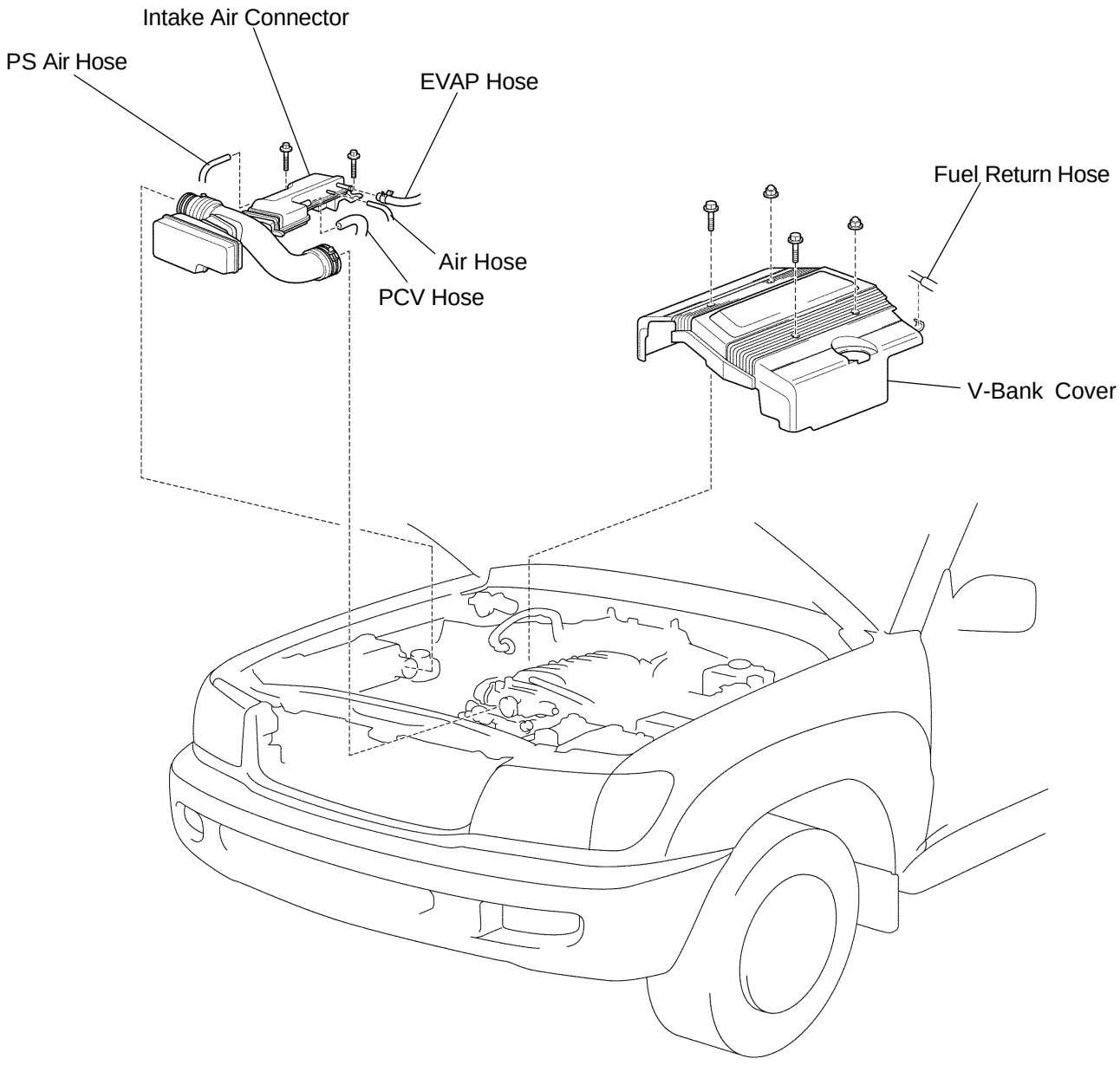
If there is no continuity, replace the relay.

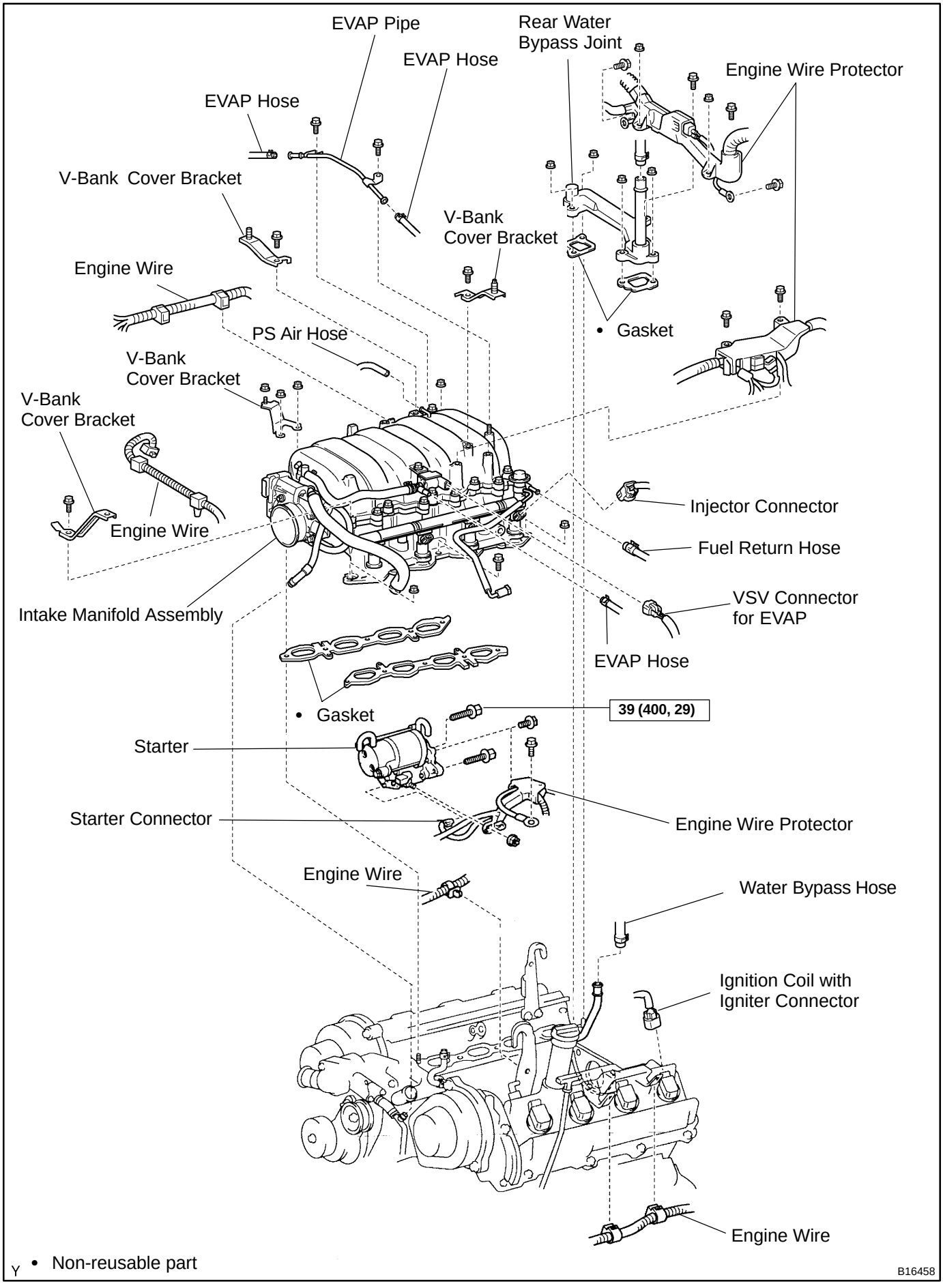
4. REINSTALL ACC CUT RELAY

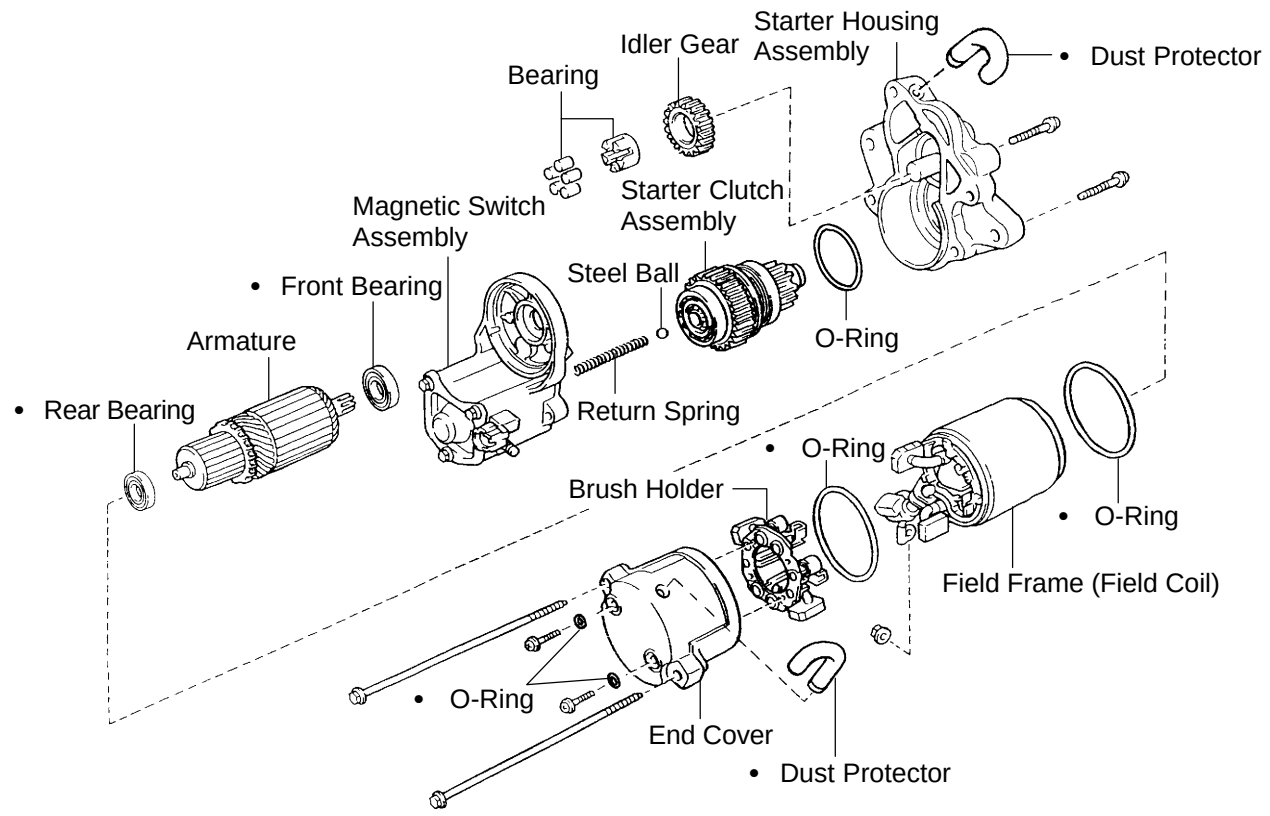
STARTER

COMPONENTS

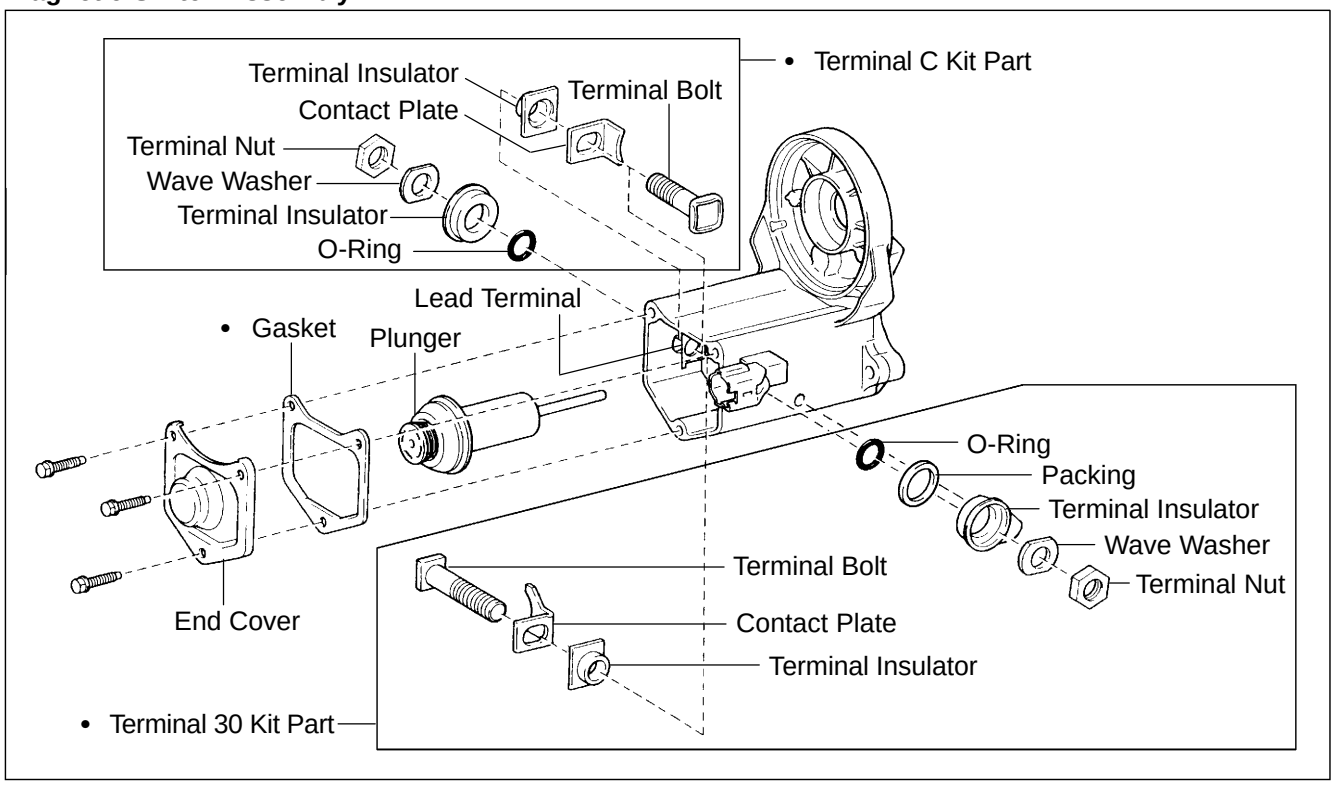
ST08B-03




EVAP Pipe
EVAP Hose
Rear Water Bypass Joint
Engine Wire Protector
EVAP Hose
V-Bank Cover Bracket
V-Bank Cover Bracket
Engine Wire
• Gasket
PS Air Hose
V-Bank Cover Bracket
V-Bank Cover Bracket
Injector Connector
Engine Wire
Fuel Return Hose
VSV Connector for EVAP
Intake Manifold Assembly
EVAP Hose
• Gasket
39 (400, 29)
Starter
Starter Connector
Engine Wire Protector
Engine Wire
Water Bypass Hose
Ignition Coil with Igniter Connector
Engine Wire
Y • Non-reusable part
B16458



Magnetic Switch Assembly

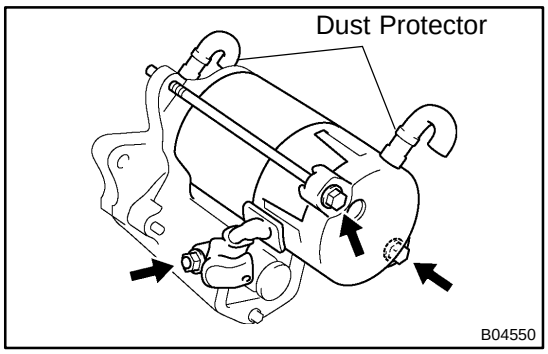


• Non-reusable part

B04547

ST08D-04

DISASSEMBLY

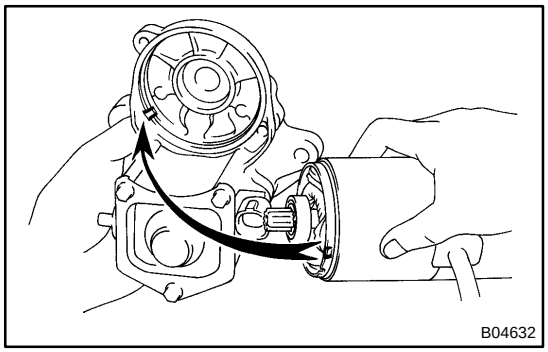


1. REMOVE 2 DUST PROTECTORS

2. REMOVE FIELD FRAME AND ARMATURE

(a) Remove the nut, and disconnect the lead wire from the magnetic switch terminal.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

(b) Remove the 2 through bolts.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



(c) Pull out the field frame together with the armature from the magnetic switch assembly.

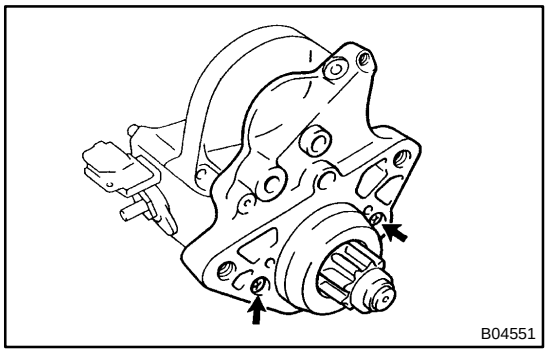
NOTICE:

At the time of notice, align the protrusion of the field frame with the groove of the magnetic switch.

(d) Remove the O-ring from the field frame.

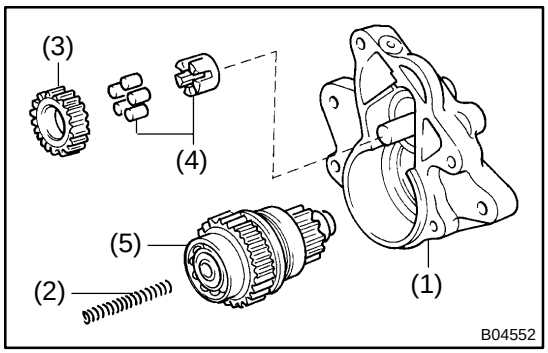
HINT:

At the time of assembly, use a new O-ring.



3. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

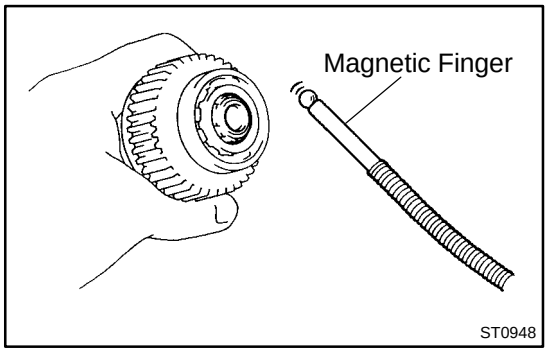
(a) Remove the 2 screws.
Torque: 9.3 N·m (95 kgf·cm, 82 in.·lbf)



(b) Remove these parts from the magnetic switch assembly:
(1) Starter housing
(2) Return spring
(3) Idler gear
(4) Bearing
(5) Starter clutch assembly

HINT:

At the time of assembly, apply grease to the return spring and insert the return spring into the clutch shaft hole.

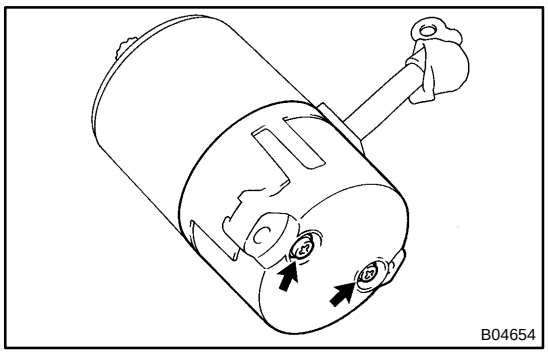


4. REMOVE STEEL BALL

Using a magnetic finger, remove the steel ball from the clutch shaft hole.

HINT:

At the time of assembly, apply grease to the steel ball and insert the steel ball into the clutch shaft hole.



5. REMOVE BRUSH HOLDER

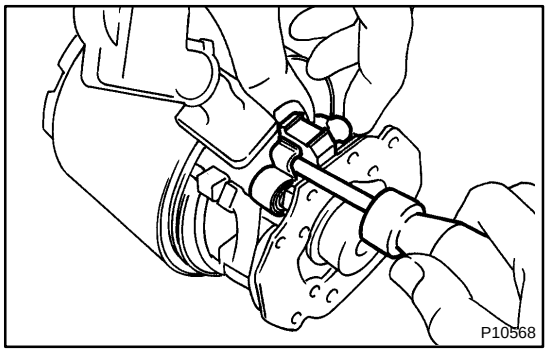
(a) Remove the 2 screws w/ O-ring and the end cover from the field frame.

Torque: 3.8 N·m (39 kgf·cm, 34 in.·lbf)

(b) Remove the O-ring from the field frame.

HINT:

At the time of assembly, use a new O-ring.



(c) Using a screwdriver, hold the spring back and disconnect the brush from the brush holder. Disconnect the 4 brushes, and remove the brush holder.

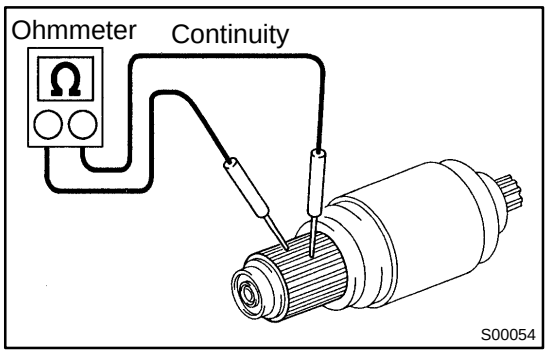
NOTICE:

Check that the positive (+) lead wires are not grounded.

6. REMOVE ARMATURE FROM FIELD FRAME

ST08E-03

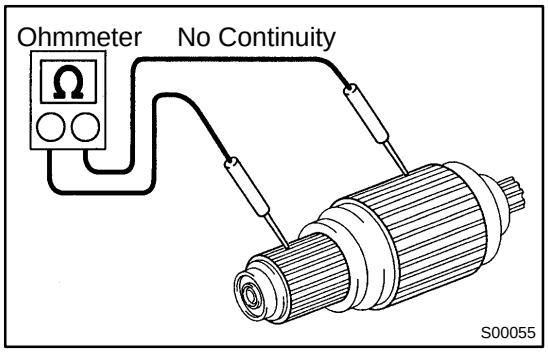
INSPECTION



1. INSPECT COMMUTATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the segments of the commutator.

If there is no continuity between any segment, replace the armature.



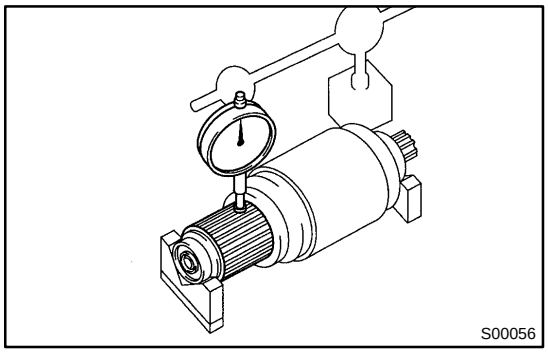
2. INSPECT COMMUTATOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the commutator and armature coil core.

If there is continuity, replace the armature.

3. INSPECT COMMUTATOR FOR DIRTY AND BURNT SURFACE

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a lathe.



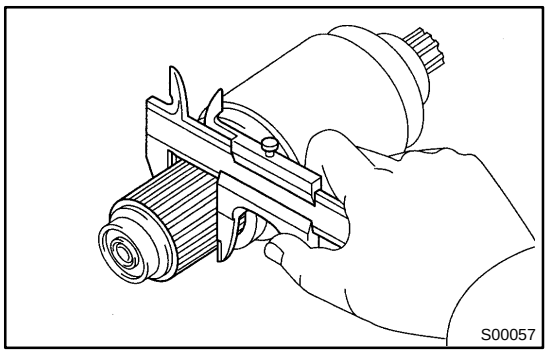
4. INSPECT COMMUTATOR CIRCLE RUNOUT

(a) Place the commutator on V-blocks.

(b) Using a dial indicator the circle runout.

Maximum circle runout:
0.05 mm (0.0020 in.)

If the circle runout is greater than maximum, correct it on a lathe.

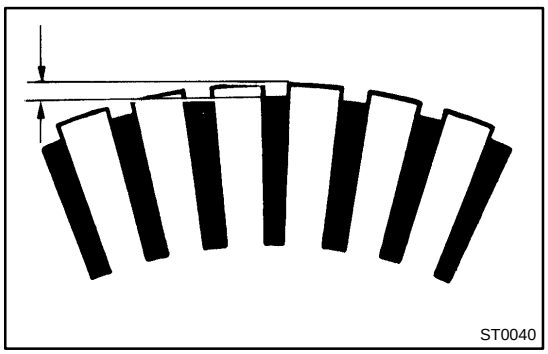


5. INSPECT COMMUTATOR DIAMETER

Using vernier calipers, measure the commutator diameter.

Standard diameter:
35.0 mm (1.378 in.)
Minimum diameter:
34.0 mm (1.339 in.)

If the diameter is less than minimum, replace the armature.

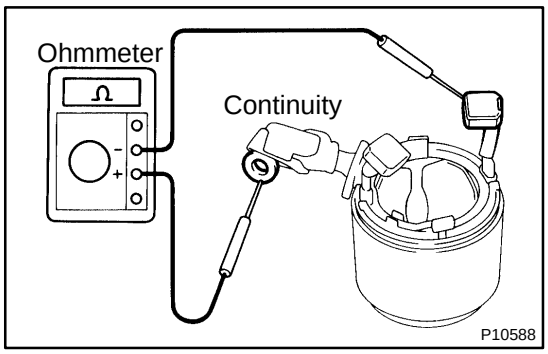


6. INSPECT UNDERCUT DEPTH

Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

Standard undercut depth:
0.7 mm (0.028 in.)
Minimum undercut depth:
0.2 mm (0.008 in.)

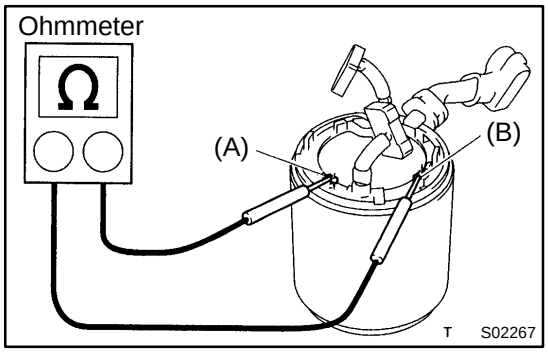
If the undercut depth is less than minimum, correct it with a hacksaw blade.



7. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

If there is no continuity, replace the field frame.



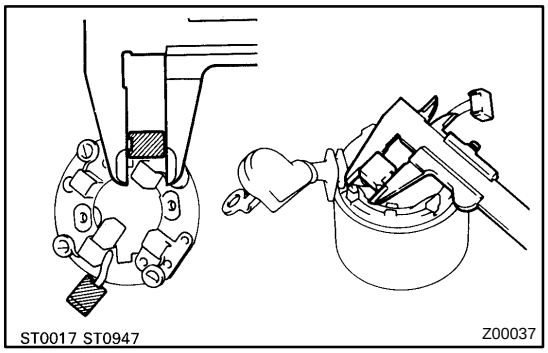
8. INSPECT SHUNT COIL FOR OPEN CIRCUIT

Using an ohmmeter, measure the resistance between shunt coil terminals (A) and (B).

Resistance:

1.5 - 1.9 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the field frame.



9. INSPECT BRUSH LENGTH

Using vernier calipers, measure the brush length.

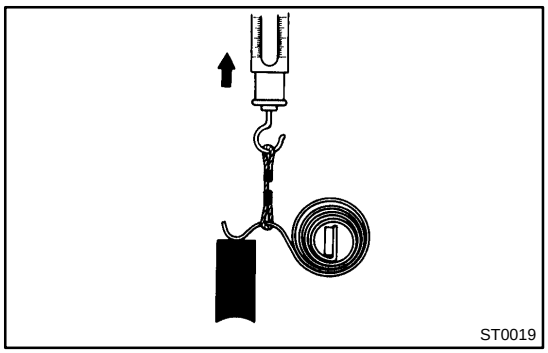
Standard length:

15.0 mm (0.591 in.)

Minimum length:

9.0 mm (0.354 in.)

If the length is less than minimum, replace the brush holder and field frame.



10. INSPECT BRUSH SPRING LOAD

Using a pull scale, measure the spring load by pulling the spring from the brush until they are separated.

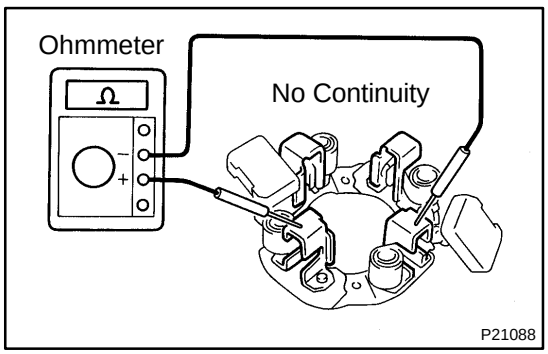
Standard spring installed load:

21.5 - 27.5 N (2.2 - 2.8 kgf, 4.8 - 6.2 lbf)

Minimum spring installed load:

12.7 N (1.3 kgf, 2.9 lbf)

If the installed load is less than minimum, replace the brush springs.



11. INSPECT BRUSH HOLDER INSULATION

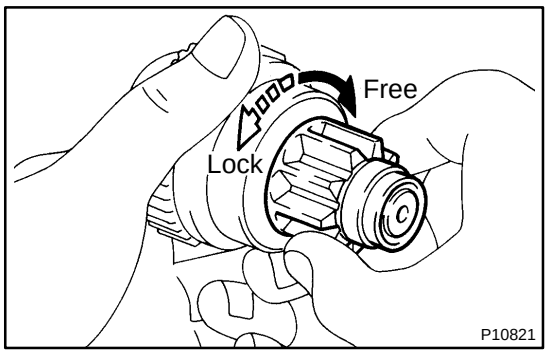
Using an ohmmeter, check that there is no continuity between the positive (+) and negative (-) brush holders.

If there is continuity, repair or replace the brush holder.

12. INSPECT GEAR TEETH

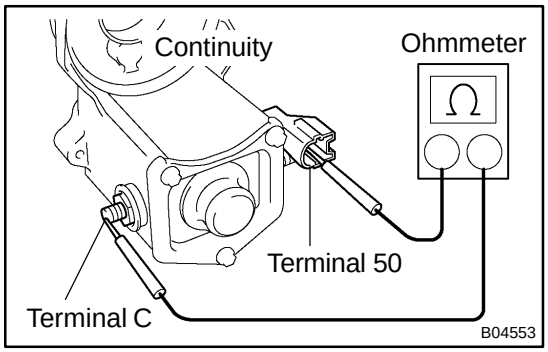
Check the gear teeth on the pinion gear, idle gear and the clutch assembly for wear or damage.

If any damage is found, replace the gear or clutch assembly, and also check the drive plate ring gear for wear or damage.



13. INSPECT CLUTCH PINION GEAR

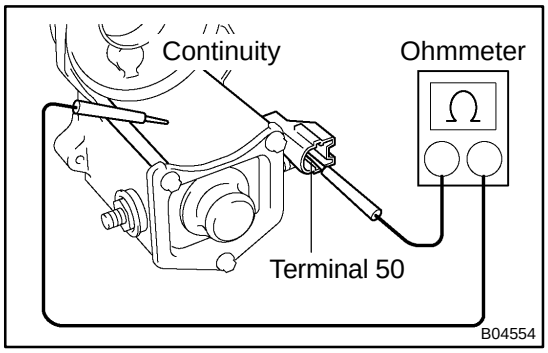
Rotate the pinion gear clockwise, and check that it turns freely. Check that it locks by rotating the pinion gear counterclockwise. If necessary, replace the clutch assembly.



14. DO PULL-IN COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, replace the magnetic switch.



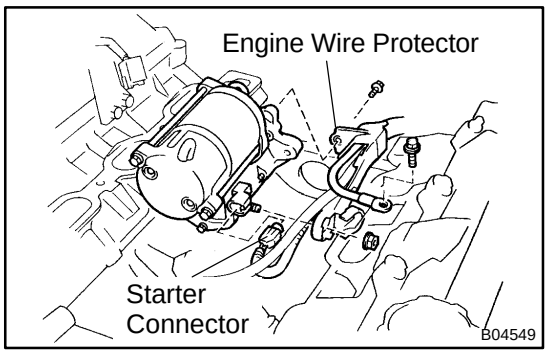
15. DO HOLD-IN COIL OPEN CIRCUIT TEST

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

ST08I-04

INSTALLATION



1. INSTALL STARTER

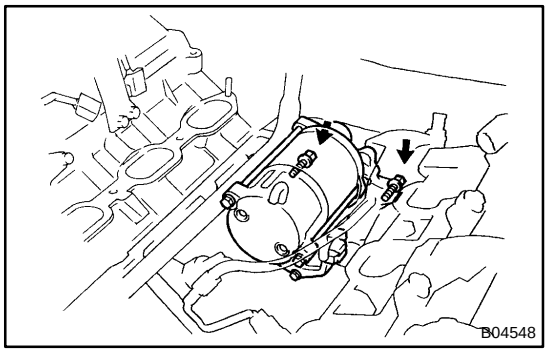
(a) Install the engine wire protector to the starter with the bolt.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(b) Connect the starter wire with the nut.
Torque: 9.81 N·m (100 kgf·cm, 84 in.·lbf)

(c) Connect the starter connector.

(d) Connect the starter to the cylinder block.

(e) Connect the engine wire with the bolt.



(f) Install the starter with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

2. INSTALL INTAKE MANIFOLD ASSEMBLY
(See page EM-59)

3. INSTALL INTAKE AIR CONNECTOR

4. INSTALL V-BANK COVER

ST08G-06

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page ST-6).

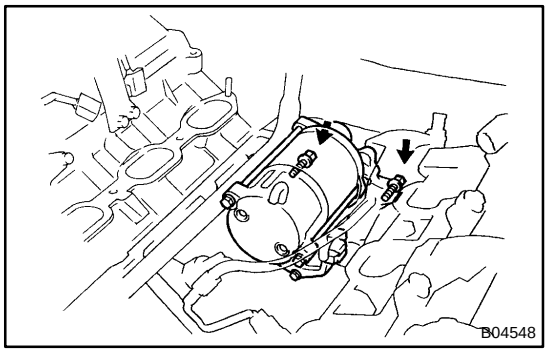
HINT:

At the time of assembly, use high-temperature grease to lubricate the bearing and gears when assembling the starter.

ST08C-04

REMOVAL

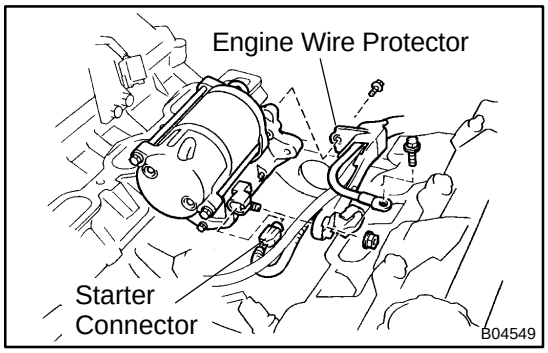
1. REMOVE V-BANK COVER
2. REMOVE INTAKE AIR CONNECTOR
3. REMOVE INTAKE MANIFOLD ASSEMBLY
(See page EM-35)



4. REMOVE STARTER

(a) Remove the 2 bolts holding the starter from the cylinder block.

(b) Disconnect the starter from the cylinder block.



(c) Disconnect the starter connector.

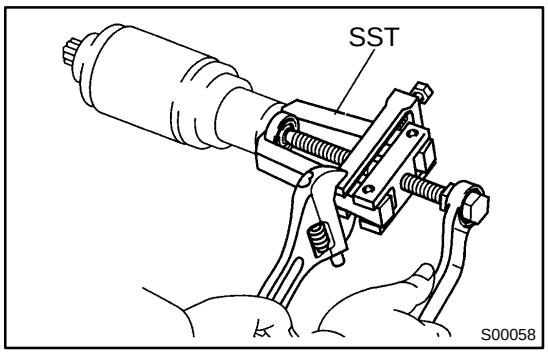
(d) Remove the nut, bolt and disconnect the starter wire.

(e) Remove the bolt, and disconnect the engine wire protector from the starter.

(f) Remove the starter.

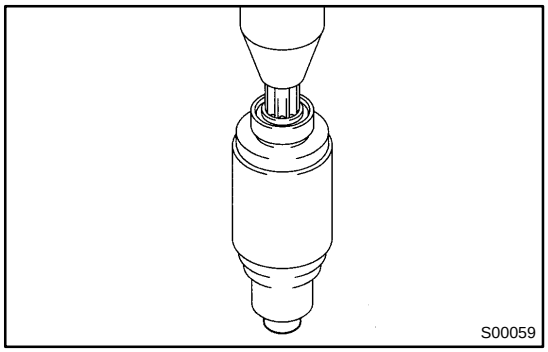
ST08F-07

REPLACEMENT

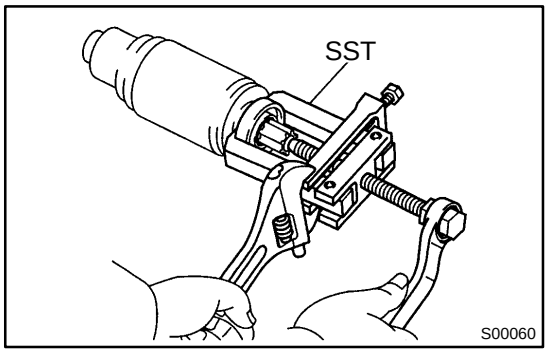


1. REPLACE REAR BEARING

(a) Using SST, remove the bearing.
SST 09286-4601 1

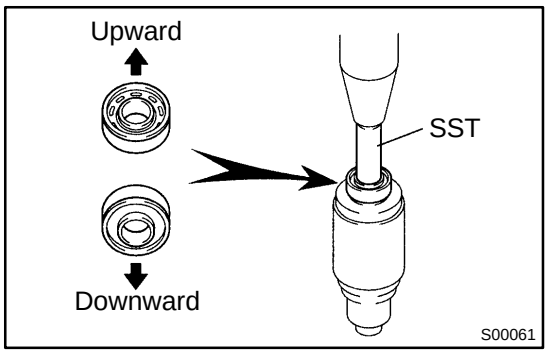


(b) Using a press, press in a new bearing.



2. REPLACE FRONT BEARING

(a) Using SST, remove the bearing.
SST 09286-4601 1

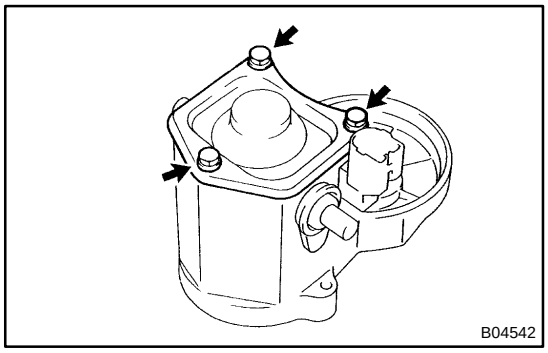


(b) Using SST and a press, press in a new bearing.

NOTICE:

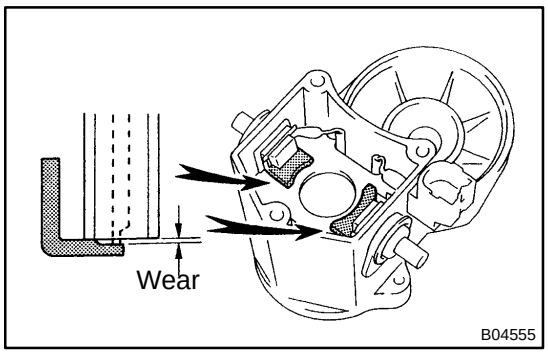
Be careful of the bearing installation direction.

SST 09820-00031



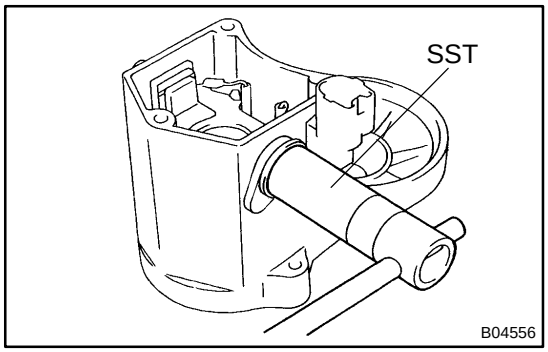
3. REPLACE MAGNETIC SWITCH TERMINAL KIT PARTS

(a) Remove the magnetic switch end cover.
Remove the 3 bolts, the end cover, the gasket and the plunger.

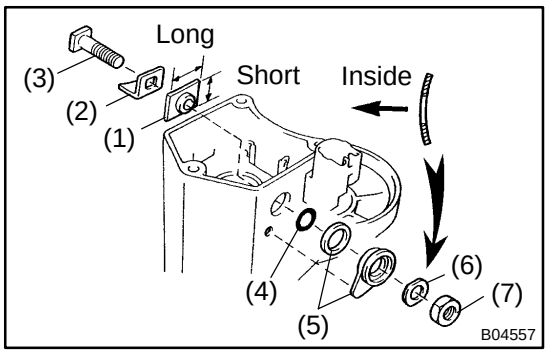


(b) Inspect contact plate for wear.
Using vernier calipers, measure the contact plate for depth of wear.
Maximum wear:
0.9 mm (0.035 in.)

If the depth of wear is greater than the maximum, replace the contact plate.



(c) Remove terminal kit parts.
(1) Using SST, loosen the terminal nuts.
SST 09810-38140
(2) Terminal C:
Remove the terminal nut, wave washer, terminal insulator (outside), O- ring, terminal bolt, contact plate and terminal insulator (inside).
(3) Terminal 30:
Remove the terminal nut, wave washer, terminal insulator (outside), O- ring, terminal bolt, contact plate, terminal insulator (inside).

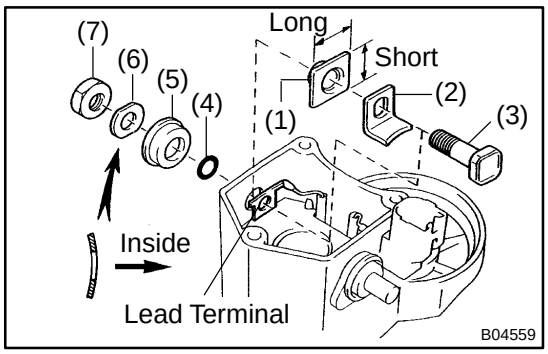


(d) Temporarily install these new terminal 30 kit parts:
(1) Terminal insulator (inside)
(2) Contact plate
(3) Terminal bolt
(4) O-ring
(5) Packing and terminal insulator (outside)
Install the packing to the terminal insulator, and install them.

HINT:
Match the protrusion of the insulator with the indentation of the housing.

(6) Wave washer
(7) Terminal nut

NOTICE:
Be careful to install the terminal insulator (inside) and wave washer in the correct direction.

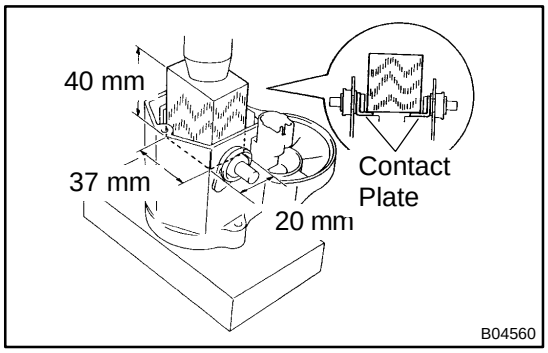


(e) Temporarily install these new terminal C kit parts:
(1) Terminal insulator (inside)
(2) Contact plate
(3) Terminal bolt
(4) O-ring
(5) Terminal insulator (outside)
(6) Wave washer
(7) Terminal nut

NOTICE:

Be careful to install the terminal insulator (inside) and wave washer in the correct direction.

(f) Temporarily tighten the terminal nuts.



(g) Tighten terminal nuts.
(1) Put a wooden block on the contact plate and press it down with a hand press.

Dimensions of wooden block:
20 x 37 x 40 mm (0.79 x 1.46 x 1.57 in.)
Press force:
981 N (100 kgf, 221 lbf)

NOTICE:

- **Check the diameter of the hand press ram. Then calculate the gauge pressure of the press when 981 N (100 kgf, 221 lbf) of force is applied.**
  Gauge pressure:

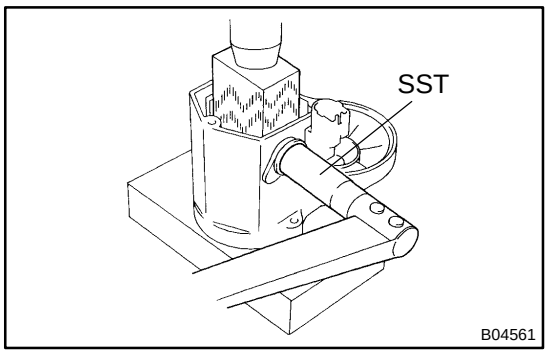
$$(kgf/cm^2) = \frac{100\ kgf}{\left(\frac{\text{Ram diameter (cm)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(psi) = \frac{221lbf}{\left(\frac{\text{Ram diameter (in.)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(kPa) = (kgf/cm^2) \times 98.1$$

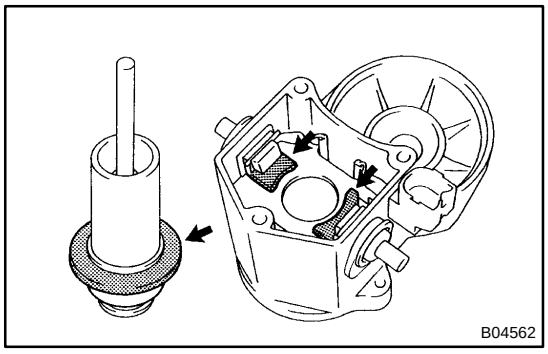
$$(kPa) = (psi) \times 6.9$$

- **If the contact plate is not pressed down with the specified pressure, the contact plate may tilt due to coil deformation or the tightening of the nut.**



(2) Using SST, tighten the nuts to the specified torque.
SST 09810-38140
Torque: 17 N·m (170 kgf·cm, 13 ft·lbf)

NOTICE:
If the nut is over tightened, it may cause cracks on the inside of the insulator.



(h) Clean contact surfaces of the contact plate and the plunger.
Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.

(i) Reinstall the magnetic switch end cover.
Install the plunger, the new gasket, the end cover and lead clamp with the 3 bolts.
Torque: 3.6 N·m (37 kgf·cm, 32 in.·lbf)

ST08H-07

TEST

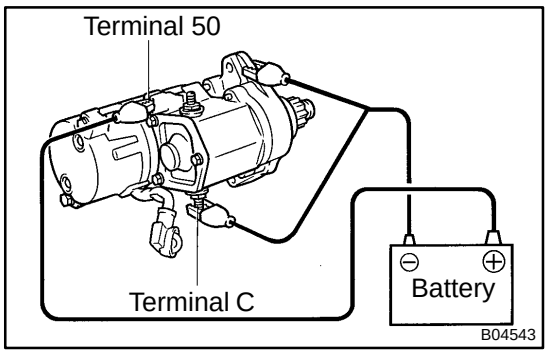
NOTICE:

These tests must be done within 3 to 5 seconds to avoid the coil to be burned-out.

1. DO PULL-IN TEST

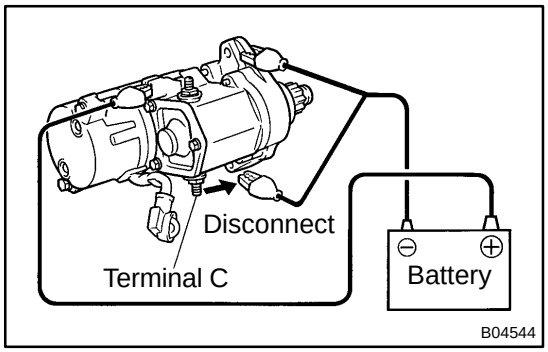
(a) Disconnect the field coil lead wire from terminal C.

(b) Connect the battery to the magnetic switch as shown. Check that the pinion gear moves outward.



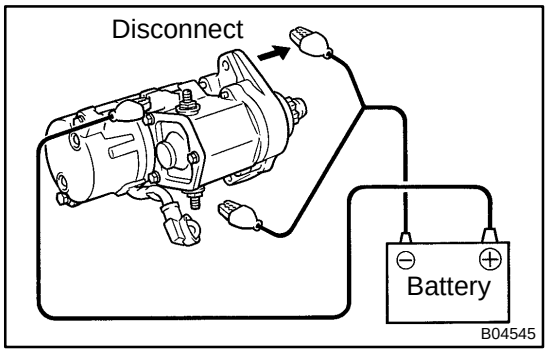
2. DO HOLD-IN TEST

While connected as above with the pinion gear out, disconnect the negative (-) lead from terminal C. Check that the pinion gear remains out.



3. INSPECT CLUTCH PINION GEAR RETURN

Disconnect the negative (-) lead from the starter body. Check that the pinion gear returns inward.



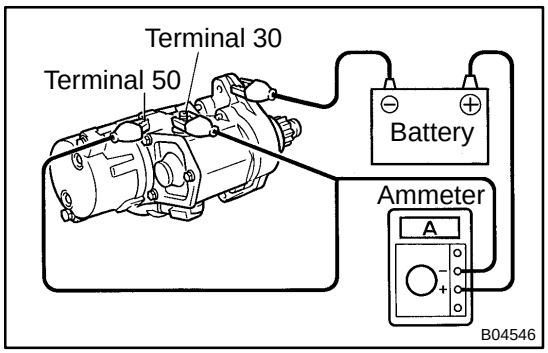
4. DO NO-LOAD PERFORMANCE TEST

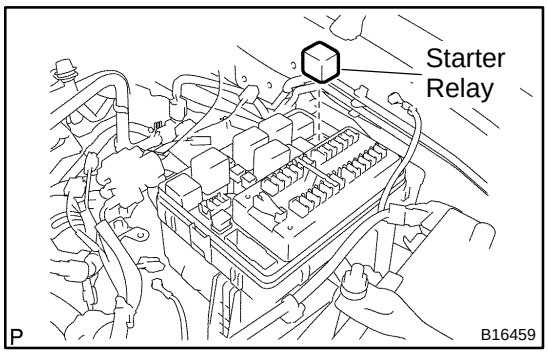
(a) Connect the battery and ammeter to the starter as shown.

(b) Check that the starter rotates smoothly and steadily with the pinion gear moving out. Check that the ammeter shows the specified current.

Specified current:

At 11.5 V: 100 A or less





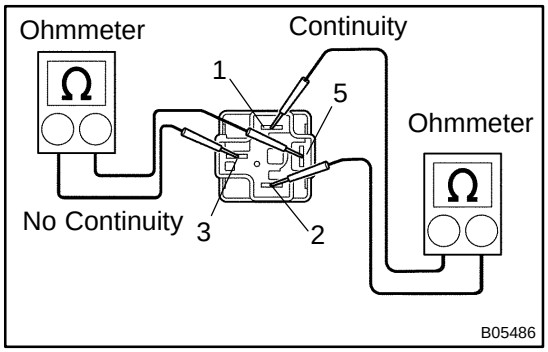
STARTER RELAY

INSPECTION

ST08J-07

1. REMOVE STARTER RELAY (Marking: ”ST”)

Remove the relay box cover and starter relay.



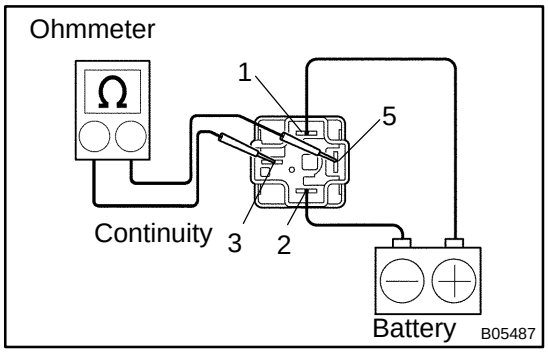
2. INSPECT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(b) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



3. INSPECT RELAY OPERATION

(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

4. REINSTALL STARTER RELAY

STARTING SYSTEM

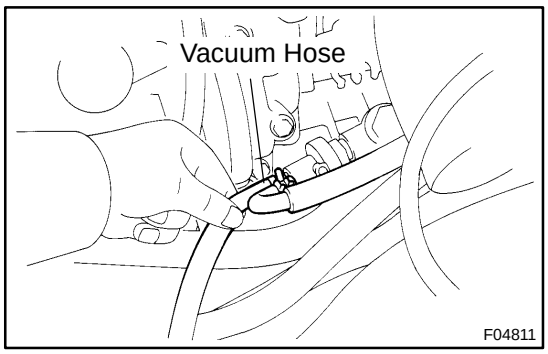
ST08A-01

ON-VEHICLE INSPECTION

NOTICE:

Before changing the starter, check these items again:

- **Connector connection**
- **Accessory installation, e.g.: theft deterrent system**



AIR CONTROL VALVE

SR0LZ-06

INSPECTION

1. TURN AIR CONDITIONING SWITCH OFF

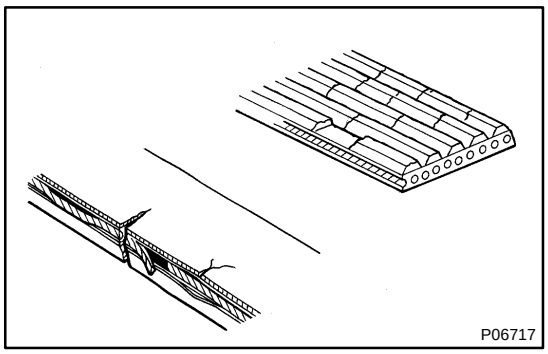
2. CHECK IDLE-UP

(a) Start the engine and run it at idle.

(b) Fully turn the steering wheel.

(c) Check that the engine rotations decrease when the vacuum hose of the air control valve is pinched.

(d) Check that the engine rotations increase when the hose is released.



DRIVE BELT

SR0LW-04

INSPECTION

INSPECT DRIVE BELT

Visually check the belt for excessive wear, frayed cords, etc.
If any defect has been found, replace the drive belt.
HINT:
Cracks on the rib side of a belt are considered acceptable. If the belt has chunks missing from the ribs, it should be replaced.

POWER STEERING FLUID

SR0LX-04

BLEEDING

1. CHECK FLUID LEVEL (See page SR-5)

2. JACK UP FRONT OF VEHICLE AND SUPPORT IT WITH STANDS

3. TURN STEERING WHEEL

With the engine stopped, turn the wheel slowly from lock to lock several times.

4. LOWER VEHICLE

5. START ENGINE

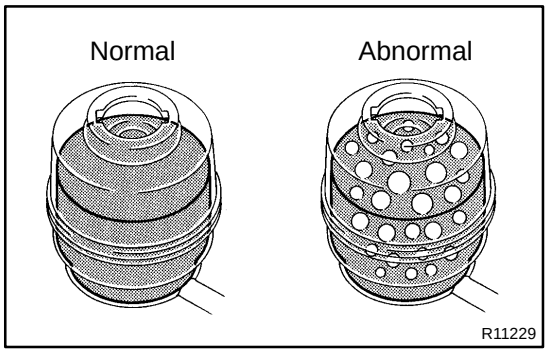
Run the engine at idle for a few minutes.

6. TURN STEERING WHEEL

(a) With the engine idling, turn the wheel to left or right full lock position and keep it there for 2-3 seconds, then turn the wheel to the opposite full lock position and keep it there for 2-3 seconds.

(b) Repeat (a) several times.

7. STOP ENGINE

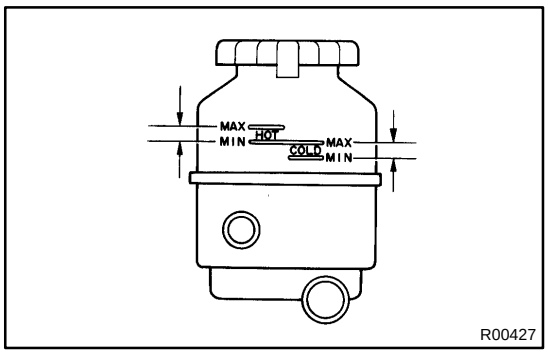


8. CHECK FOR FOAMING OR EMULSIFICATION

If the system has to be bled twice specifically because of foaming or emulsification, check for fluid leaks in the system.

9. CHECK FLUID LEVEL (See page SR-5)

SR0LY-05



INSPECTION

1. CHECK FLUID LEVEL

(a) Keep the vehicle level.

(b) With the engine stopped, check the fluid level in the oil reservoir.

If necessary, add fluid.

Fluid: ATF DEXRON® II or III

HINT:

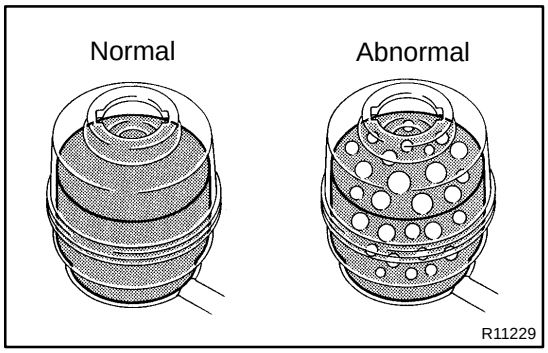
Check that the fluid level is within the HOT LEVEL range on the reservoir.

If the fluid is cold, check that it is within the COLD LEVEL range.

(c) Start the engine and run it at idle.

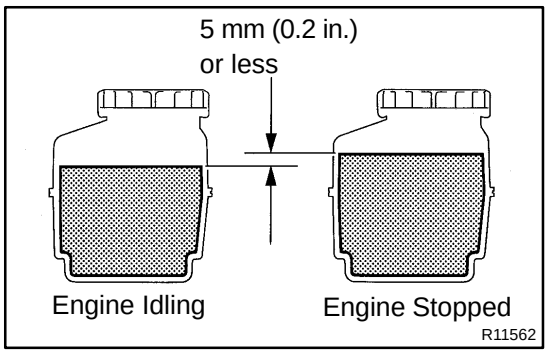
(d) Turn the steering wheel from lock to lock several times to boost fluid temperature.

Fluid temperature: 80˚C (176˚F)



(e) Check for foaming or emulsification.

If there is foaming or emulsification, bleed power steering system (See page SR-4).



(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 rise: 5 mm (0.20 in.)

If a problem is found, bleed power steering system (See page SR-4).

(i) Check the fluid level.

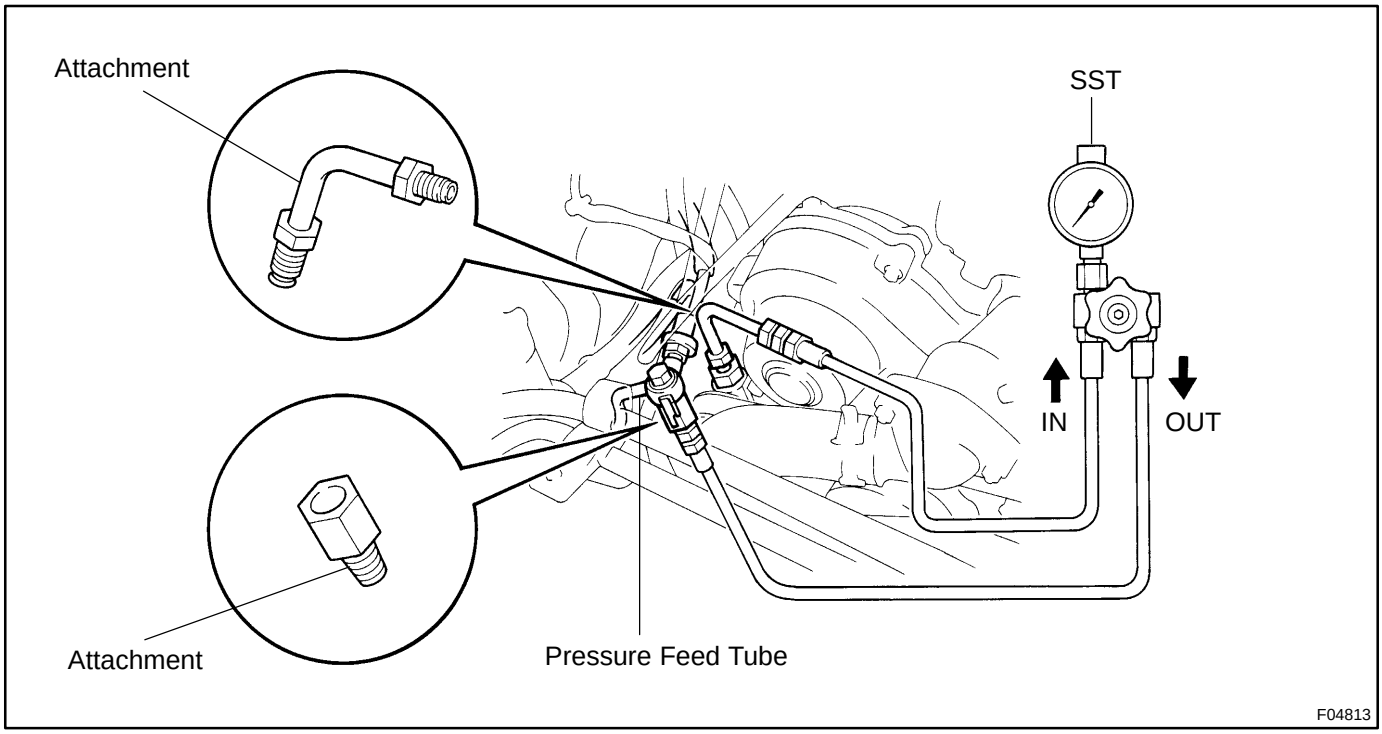
2. CHECK STEERING FLUID PRESSURE

(a) Remove the air cleaner assembly with air cleaner hose (See page SR-40).

(b) Disconnect the pressure feed tube from the PS vane pump (See page SR-40).

(c) Connect SST, as shown below.
SST 09640-10010 (09641-01010, 09641-01030, 09641-01060)

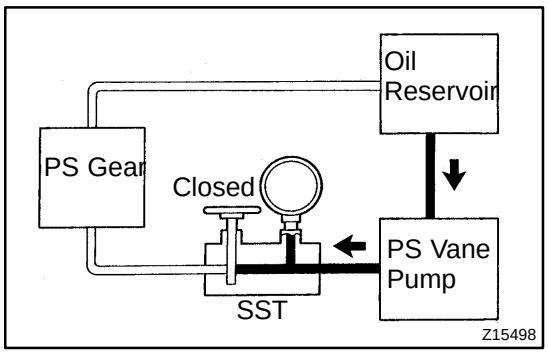
NOTICE:
Check that the valve of the SST is in the open position.



(d) Bleed the power steering system (See page SR-4).

(e) Start the engine and run it at idle.

(f) Turn the steering wheel from lock to lock several times to boost fluid temperature.
Fluid temperature: 80 ˚C (176 ˚F)

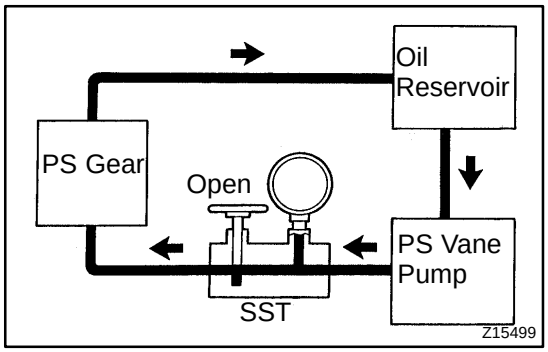


(g) With the engine idling, close the valve of the SST and observe the reading on the SST.
Minimum fluid pressure:
10,000 kPa (102 kgf/cm^2, 1,451 psi)

NOTICE:

★ **Do not keep the valve closed for more than 10 seconds.**

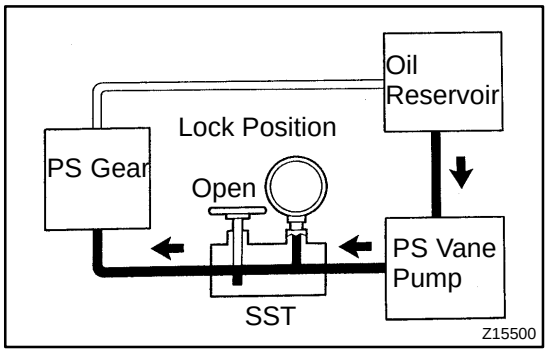
★ **Do not let the fluid temperature become too high.**



(h) With the engine idling, open the valve fully.

(i) Measure the fluid pressure at engine speeds of 1,000 rpm and 3,000 rpm.
Difference fluid pressure:
490 kPa (5 kgf/cm^2, 71 psi) or less

NOTICE:
Do not turn the steering wheel.



(j) With the engine idling and valve fully opened, turn the steering wheel to full lock.
Minimum fluid pressure:
10,000 kPa (102 kgf/cm^2, 1,451 psi)

NOTICE:

★ **Do not maintain lock position for more than 10 seconds.**

★ **Do not let the fluid temperature become too high.**

(k) Disconnect the SST.
SST 09640- 10010 (09641- 01010, 09641- 01030, 09641-01060)

(l) Connect the pressure feed tube (See page SR-47).

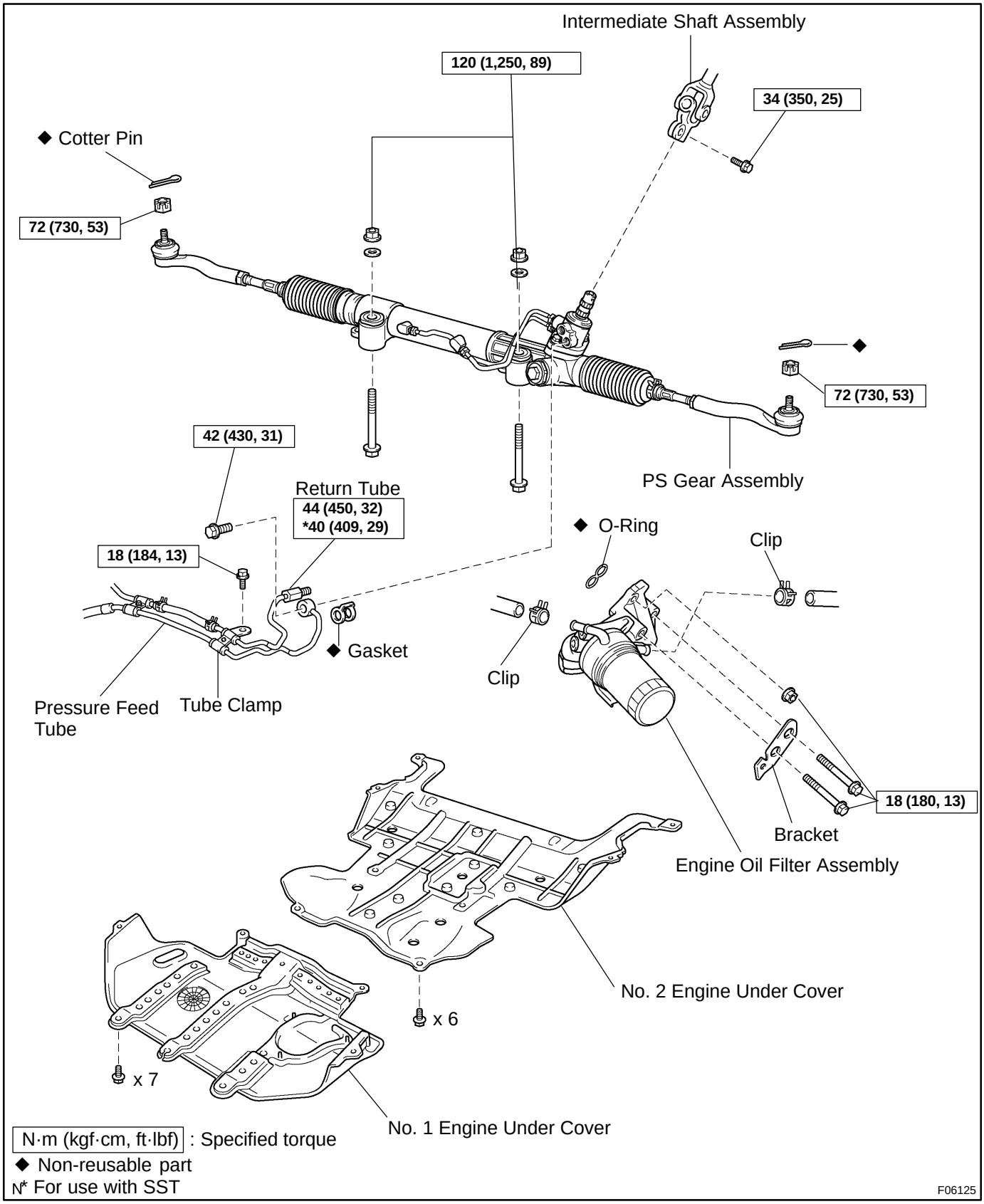
(m) Install the air cleaner assembly with air cleaner hose (See page SR-47).

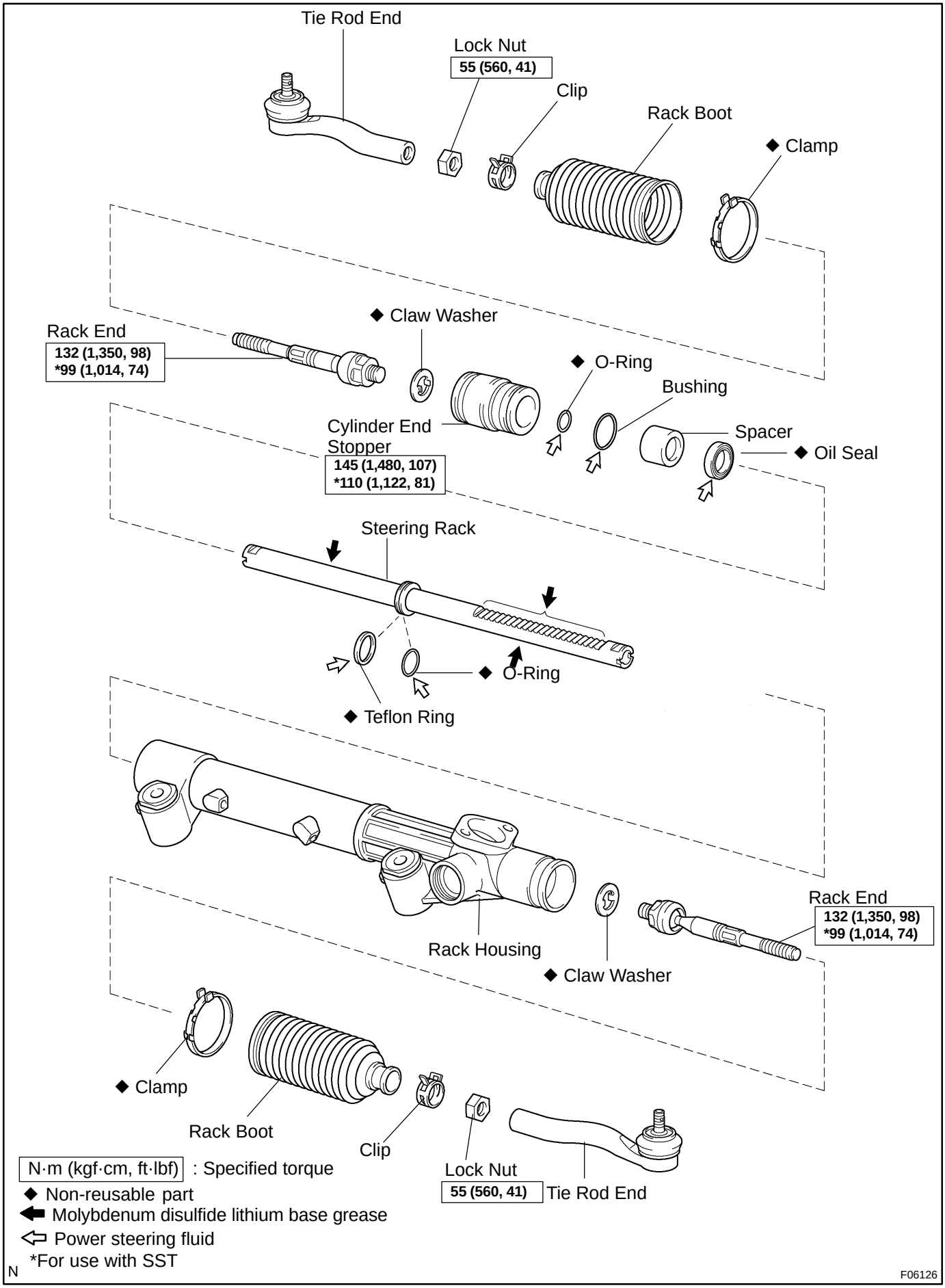
(n) Bleed the power steering system (See page SR-4).

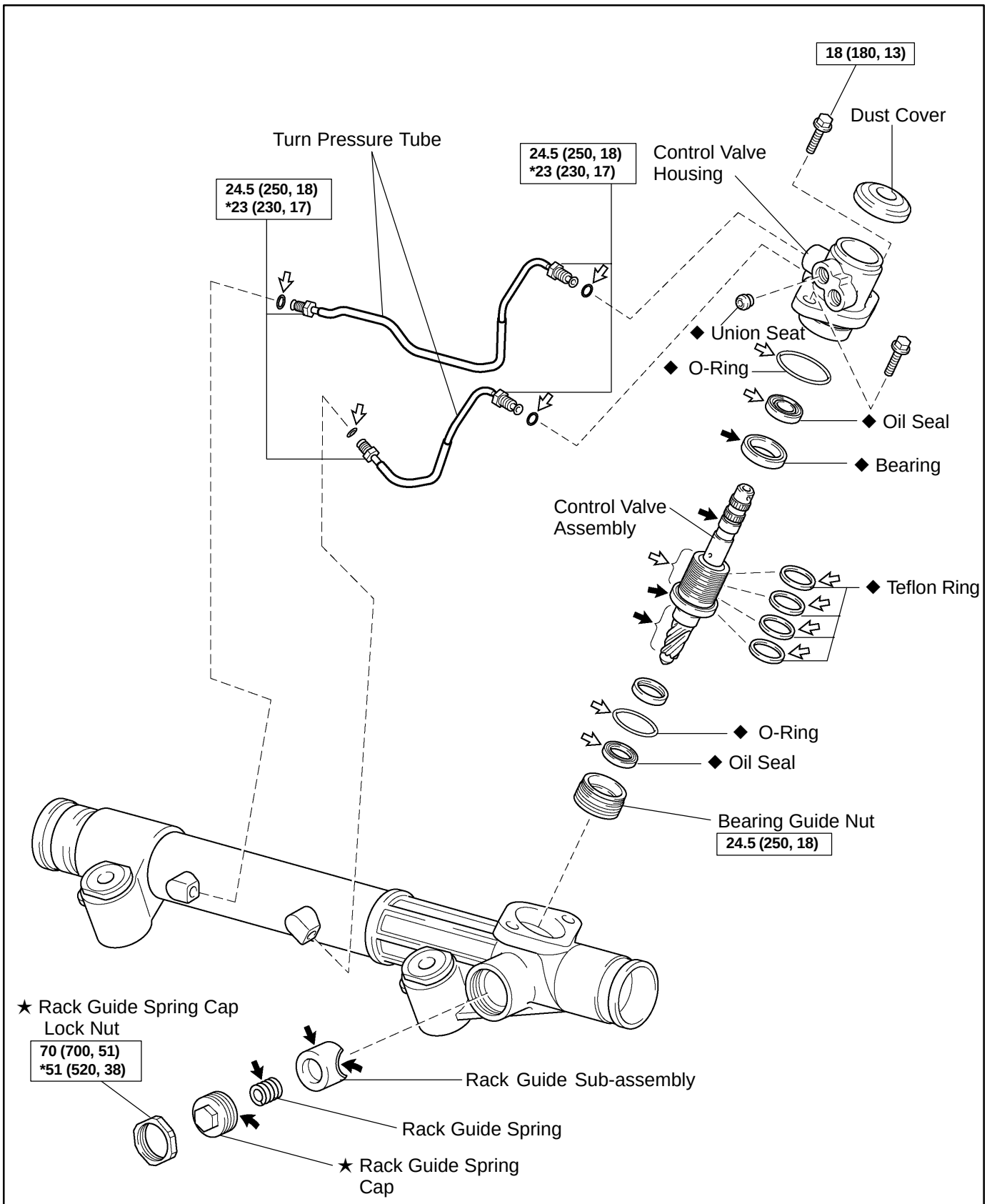
POWER STEERING GEAR

COMPONENTS

SR0MJ-06

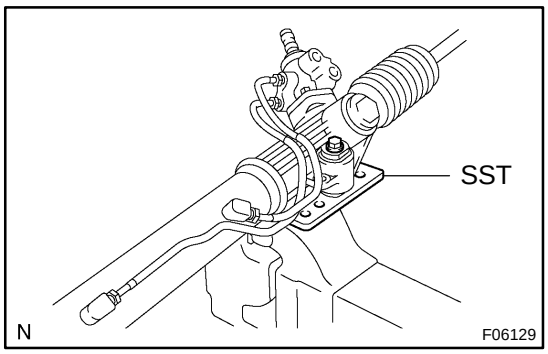



Tie Rod End
Lock Nut
55 (560, 41)
Clip
Rack Boot
◆ Clamp
◆ Claw Washer
Rack End
132 (1,350, 98)
*99 (1,014, 74)
◆ O-Ring
Bushing
Cylinder End
Stopper
145 (1,480, 107)
*110 (1,122, 81)
Spacer
◆ Oil Seal
Steering Rack
◆ O-Ring
◆ Teflon Ring
Rack End
132 (1,350, 98)
*99 (1,014, 74)
Rack Housing
◆ Claw Washer
◆ Clamp
Rack Boot
Clip
Lock Nut
55 (560, 41)
Tie Rod End
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
Molybdenum disulfide lithium base grease
Power steering fluid
*For use with SST
N
F06126


18 (180, 13)
Dust Cover
Turn Pressure Tube
24.5 (250, 18)
*23 (230, 17)
24.5 (250, 18)
*23 (230, 17)
Control Valve
Housing
◆ Union Seat
◆ O-Ring
◆ Oil Seal
◆ Bearing
Control Valve
Assembly
◆ Teflon Ring
◆ O-Ring
◆ Oil Seal
Bearing Guide Nut
24.5 (250, 18)
★ Rack Guide Spring Cap
Lock Nut
70 (700, 51)
*51 (520, 38)
Rack Guide Sub-assembly
Rack Guide Spring
★ Rack Guide Spring
Cap
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
★ Precoated part
Molybdenum disulfide lithium base grease
Power steering fluid
N * For use with SST
F06127

SR0ML-07

DISASSEMBLY



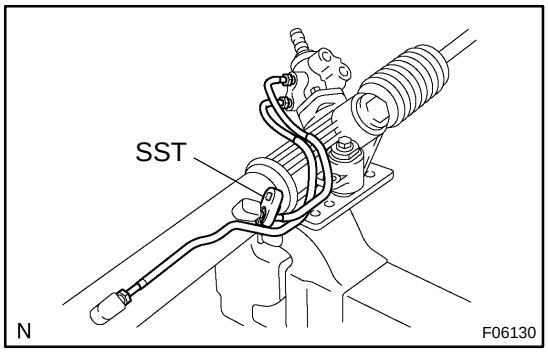
NOTICE:

When using a vise, do not overtighten it.

1. SECURE PS GEAR ASSEMBLY IN VISE

Using SST, secure the gear assembly in a vise, as shown in the illustration.

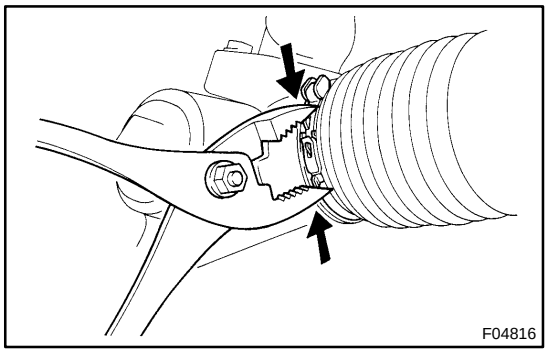
SST 09630-00014 (09631-00142)



2. REMOVE 2 TURN PRESSURE TUBES

Using SST, remove the tube.

SST 09023-38200



3. REMOVE RH AND LH CLIPS, RACK BOOTS AND CLAMPS

(a) Using pliers, loosen the clamp, as shown in the illustration.

NOTICE:

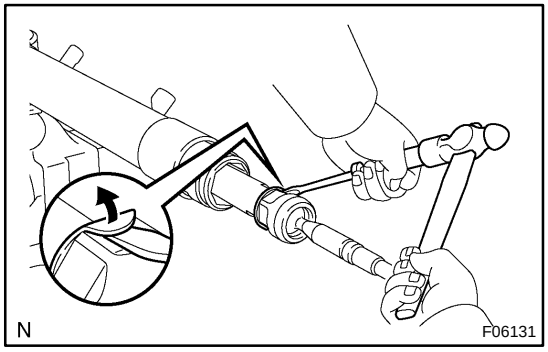
Be careful not to damage the boot.

(b) Remove the clip, rack boot and clamp.

(c) Employ the same manner described above to the other side.

HINT:

Mark the RH and LH rack boots.

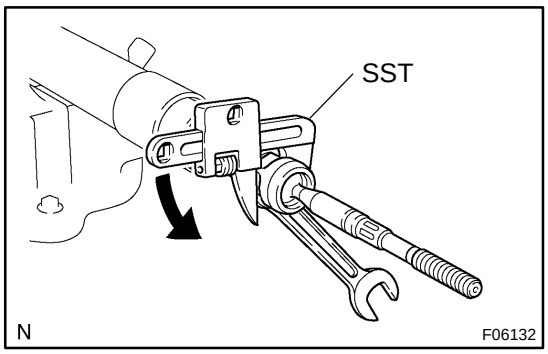


4. REMOVE RH AND LH RACK ENDS AND CLAW WASHERS

(a) Using a screwdriver and hammer, stake back the washer.

NOTICE:

Avoid and impact to the steering rack.

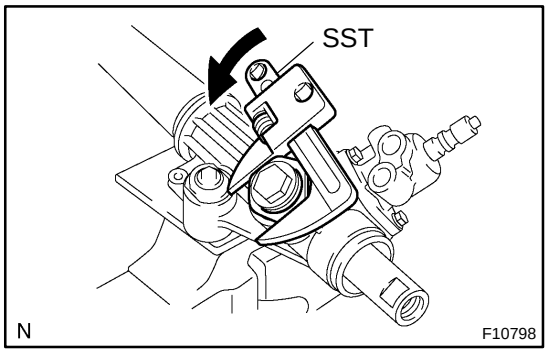


(b) Using a spanner to hold the steering rack steady, and using SST, remove the rack end.
SST 09922-10010

NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

(c) Remove the claw washer.
(d) Employ the same manner described above to the other side.

HINT:
Mark the RH and LH rack ends.



5. REMOVE RACK GUIDE SPRING CAP LOCK NUT

Using SST, remove the nut.
SST 09922-10010

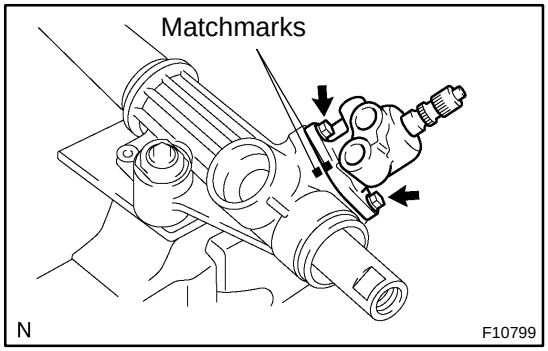
NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

6. REMOVE RACK GUIDE SPRING CAP

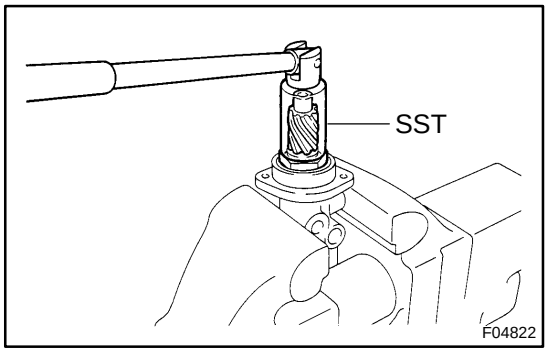
7. REMOVE RACK GUIDE SPRING AND RACK GUIDE SUB-ASSEMBL Y

8. REMOVE DUST COVER

9. REMOVE CONTROL VALVE HOSING WITH CONTROL VALVE ASSEMBLY

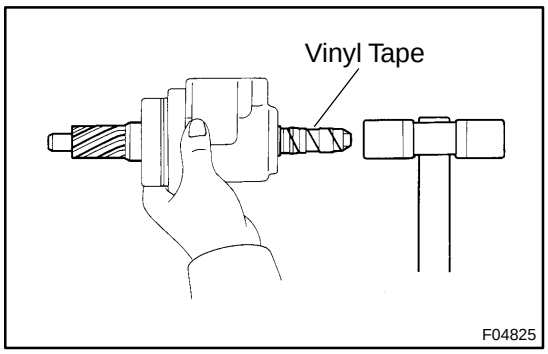


(a) Place matchmarks on the valve housing and rack housing.
(b) Remove the 2 bolts.
(c) Pull out the control valve assembly with the valve housing.
(d) Remove the O-ring from the valve housing.



10. REMOVE CONTROL VALVE ASSEMBLY

(a) Using SST, loosen the bearing guide nut.
SST 09631-20060



(b) Wind vinyl tape to the control valve shaft.
(c) Using a plastic hammer, tap out the valve assembly with the nut from the control valve housing.

NOTICE:

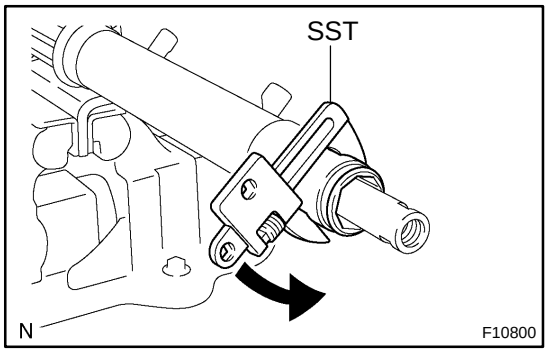
Be careful not to damage the oil seal lip.

(d) Remove the nut from the valve assembly.

NOTICE:

Be careful not the damage the oil seal lip.

(e) Remove the O-ring from the nut.



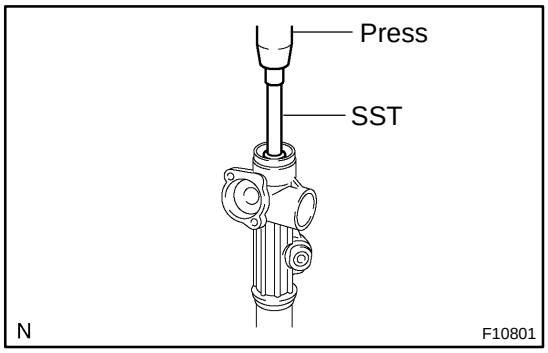
11. REMOVE CYLINDER END STOPPER AND SPACER

(a) Using SST, remove the stopper.
SST 09922-10010

NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

(b) Remove the O-ring from the stopper.



12. REMOVE STEERING RACK AND OIL SEAL

(a) Using SST, press out the rack and oil seal.

NOTICE:

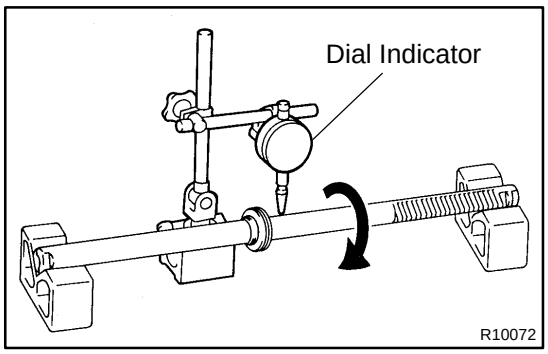
Take care not to drop the rack.

SST 09950-70010 (09951-07200)

(b) Remove the oil seal from the rack.

SR1C4-02

INSPECTION

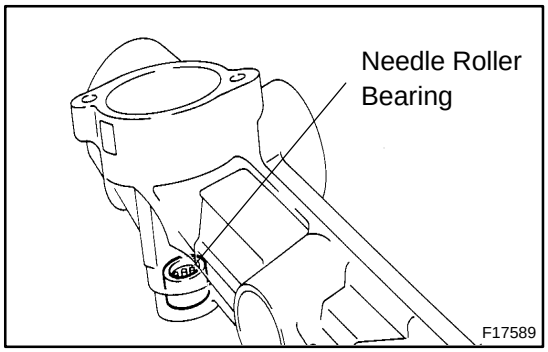


1. INSPECT STEERING RACK

(a) Using a dial indicator, check the rack for runout and for teeth wear and damage.

Maximum runout: 0.3 mm (0.012 in.)

(b) Check the back surface for wear and damage.

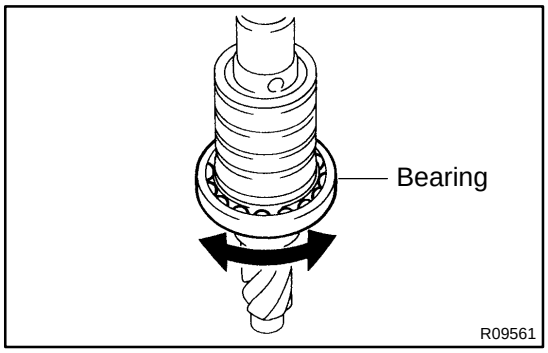


2. INSPECT BEARING

(a) Check the needle roller bearing of the rack housing for pitmarks or damage.

If faulty, replace the rack housing,

(b) Coat the inside of the bearing with molybdenum disulfide lithium base grease.



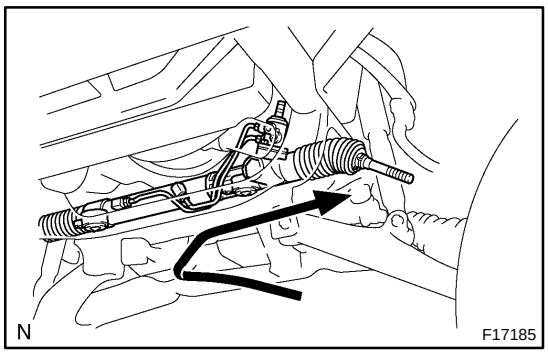
3. INSPECT BEARING

(a) Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the control valve assembly.

(b) Coat the bearing with molybdenum disulfide lithium base grease.

SR0MO-08



INSTALLATION

1. INSTALL PS GEAR ASSEMBLY

Torque the 2 new gear assembly set bolts, nuts and washers.

Torque: 120 N·m (1,250 kgf·cm, 89 ft·lbf)

HINT:

Slide the gear assembly to the right side, slide the gear assembly to the left side and position it.

2. INSTALL RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Screw the lock nut and tie rod end onto the rack end until the matchmarks are aligned.

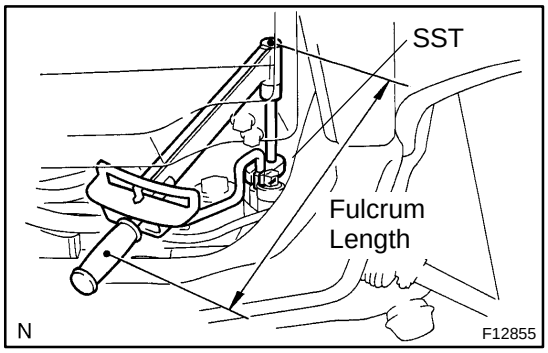
(b) After adjusting toe-in, torque the nut (See page SA-6).

Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

3. CONNECT TUBE CLAMP

Torque the bolt.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)



4. CONNECT RETURN TUBE

Using SST, connect the tube.

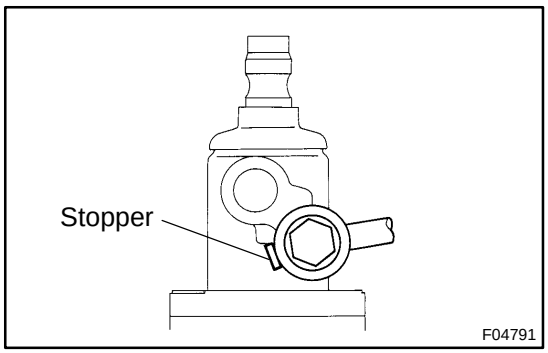
SST 09023-38400

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

HINT:

★ Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

★ This torque value is effective in case that SST is parallel to a torque wrench.



5. CONNECT PRESSURE FEED TUBE

Torque the union bolt with a new gasket.

HINT:

Make sure the stopper of the pressure feed tube touches the PS gear assembly as shown in the illustration, then torque the bolt.

Torque: 42 N·m (430 kgf·cm, 31 ft·lbf)

6. CONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY (See page SR-24)

7. INSTALL ENGINE OIL FILTER ASSEMBLY

(a) Install a new O-ring.

(b) Torque the 2 bolts and nut with the bracket.

Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

(c) Connect the 2 clips and hoses.

8. CONNECT RH AND LH TIE ROD ENDS (See page SA-20)

9. INSTALL NO. 2 ENGINE UNDER COVER

Tighten the 6 bolts.

10. INSTALL NO. 1 ENGINE UNDER COVER

Tighten the 7 bolts.

11. POSITION FRONT WHEELS FACING STRAIGHT AHEAD

HINT:

Do it with the front of the vehicle jacked up.

12. CENTER SPIRAL CABLE (See page SR-24)

13. INSTALL STEERING WHEEL

(a) Align the matchmarks on the wheel and steering column main shaft.

(b) Temporarily tighten the wheel set nut.

(c) Connect the connector.

14. BLEED POWER STEERING SYSTEM (See page SR-4)

15. CHECK STEERING WHEEL CENTER POINT

16. TORQUE STEERING WHEEL SET NUT

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

17. INSTALL STEERING WHEEL PAD (See page SR-24)

18. CHECK FRONT WHEEL ALIGNMENT (See page SA-6)

19. PERFORM ZERO POINT CALIBRATION OF YAW RATE AND DECELERATION SENSORS (See page DI-505)

SR1IN-01

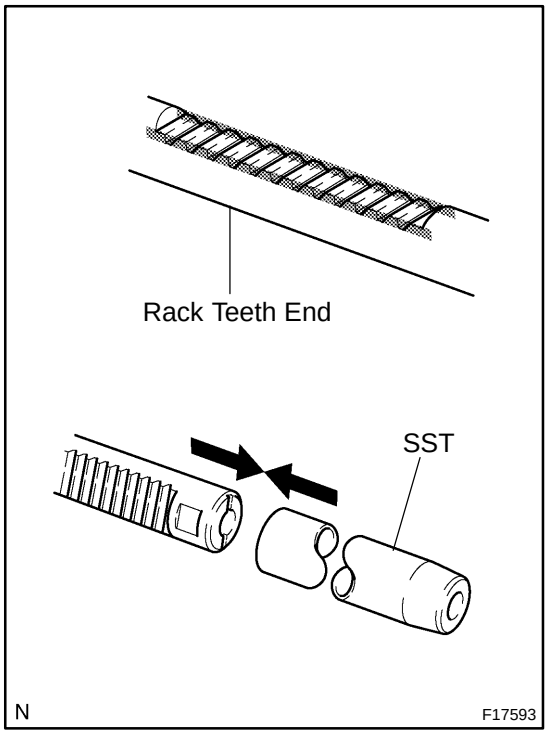
REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. COAT PARTS INDICATED BY ARROWS WITH POWER STEERING FLUID OR MOLYBDENUM DISULFIDE LITHIUM BASE GREASE

(See page SR-48)



2. INSTALL STEERING RACK

(a) Install SST to the rack.
SST 09631-00350

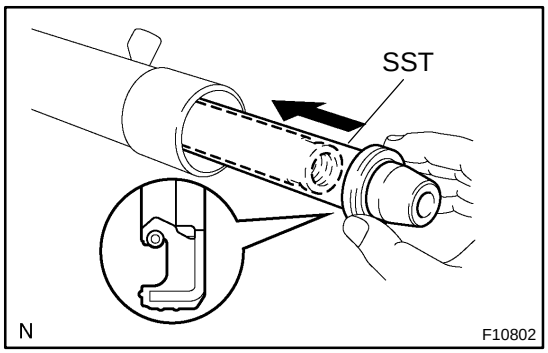
HINT:

If necessary, scrape the burrs off the rack teeth end and burnish.

(b) Coat SST with power steering fluid.

(c) Install the rack into the rack housing.

(d) Remove the SST.



3. INSTALL OIL SEAL

(a) Install SST to the steering rack opposite end.
SST 09631-00350

(b) Coat SST with power steering fluid.

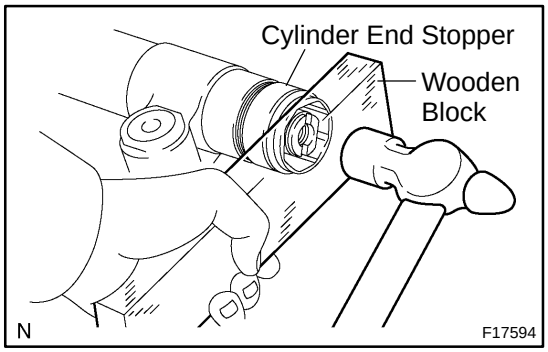
(c) Coat a new oil seal lip with power steering fluid.

(d) Install the oil seal by pushing it onto the SST without tilting.

NOTICE:

Make sure to install the oil seal facing the correct direction.

(e) Remove the SST.



4. INSTALL SPACER AND CYLINDER END STOPPER

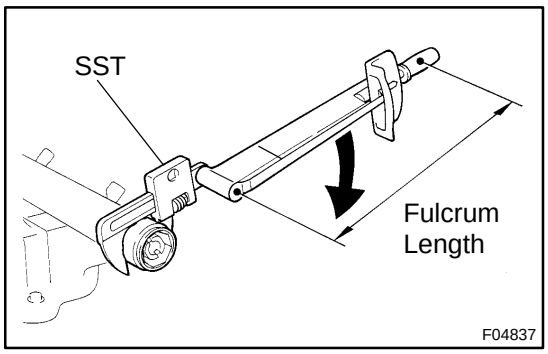
(a) Install the spacer.

(b) Coat a new O-ring with power steering fluid, and install it to the stopper.

(c) Using a wooden block and hammer, drive in the stopper until it is tightly installed.

NOTICE:

Be careful not to damage the O-ring.



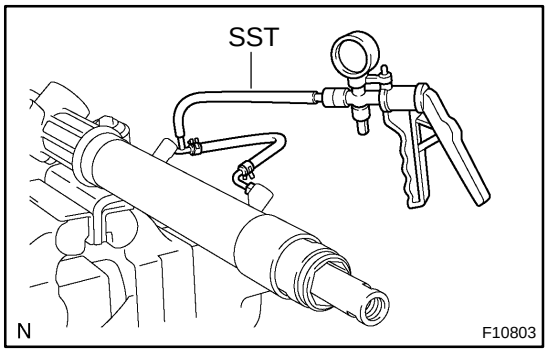
(d) Using SST, torque the stopper.
SST 09922-10010
Torque: 110 N·m (1,122 kgf·cm, 81 ft·lbf)

NOTICE:

Use SST 09922-10010 in the direction shown in the illustration.

HINT:

Use a torque wrench with a fulcrum length of 380 mm (14.97 in.).



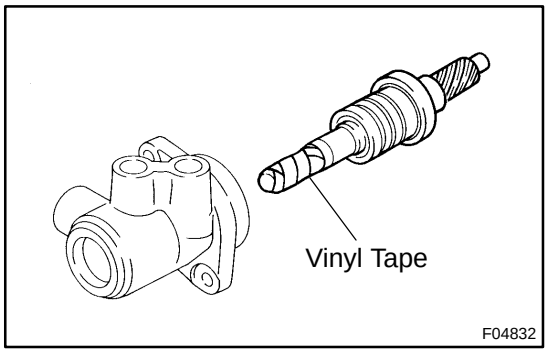
5. AIR TIGHTNESS TEST

(a) Install SST to the unions of the rack housing.
SST 09631-12071

(b) Apply 53 kPa (400 mmHg, 15.75 in.Hg) of vacuum for about 30 seconds.

(c) Check that there is no change in the vacuum.

If there is change in the vacuum, check the installation of the oil seals.



6. INSTALL CONTROL VALVE ASSEMBLY

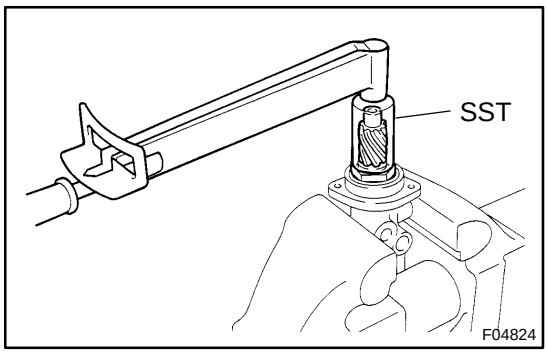
(a) Coat the teflon rings with power steering fluid.

(b) To prevent oil seal lip damage, wind vinyl tape on the serrated part of the control valve shaft.

(c) Push the valve assembly into the control valve housing.

NOTICE:

Be careful not to damage the teflon rings and oil seal lip.

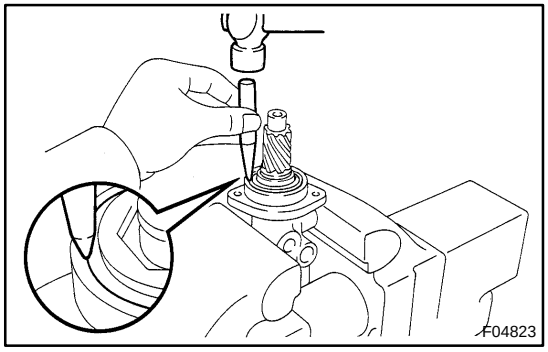


(d) Coat a new O-ring with power steering fluid, and install it to the bearing guide nut.

(e) Using SST, torque the nut.
SST 09631-20060
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

NOTICE:

Be careful not to damage the oil seal lip.



(f) Using a punch, stake the nut.

7. INSTALL CONTROL VALVE HOUSING WITH CONTROL VALVE ASSEMBLY

(a) Coat a new O-ring with power steering fluid, and install it to the valve housing.

(b) Align the matchmarks on the valve housing and rack housing, and install the valve housing with the valve assembly to the rack housing.

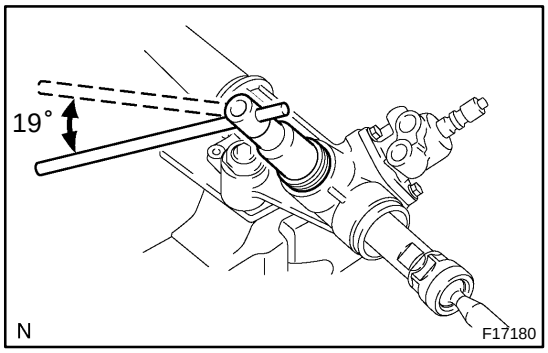
(c) Torque the 2 bolts.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

8. INSTALL DUST COVER

9. INSTALL RACK GUIDE SUB- ASSEMBLY, RACK GUIDE SPRING AND RACK GUIDE SPRING CAP

(a) Apply sealant to 2 or 3 threads of the cap.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(b) Temporarily install the cap.

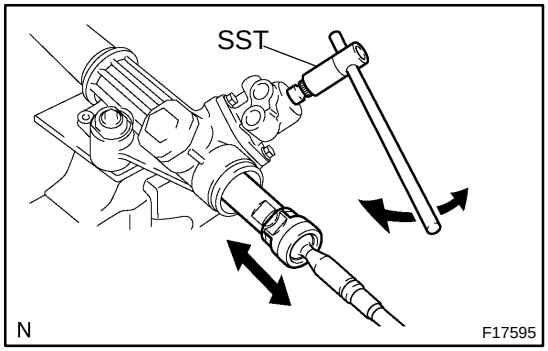


10. ADJUST TOTAL PRELOAD

(a) To prevent the steering rack teeth from damaging the oil seal lip, temporarily install the RH and LH rack ends.

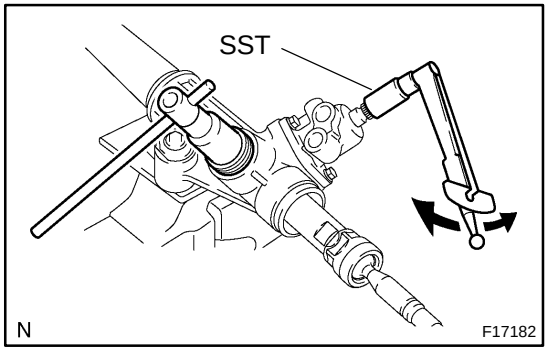
(b) Torque the rack guide spring cap.
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

(c) Return the cap 19°.

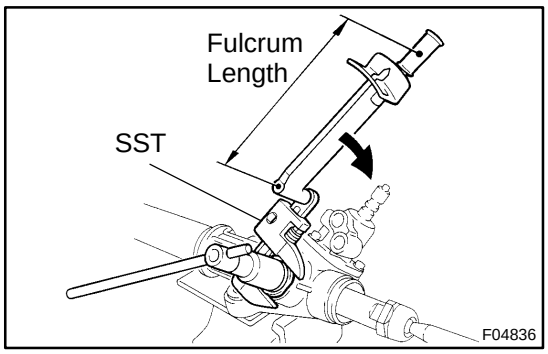


(d) Using SST, turn the control valve shaft right and left 1 or 2 times.
SST 09616-0001 1

(e) Loosen the cap until the rack guide spring is not functioning.



(f) Using SST and a torque wrench, tighten the cap until the preload is within specification.
SST 09616-0001 1
Preload (turning):
Center Area
1.8 - 2.2 N·m (18.4 - 22.4 kgf·cm, 16.0 - 19.5 in.·lbf)
End Area
1.3 - 1.7 N·m (13.3 - 17.3 kgf·cm, 11.5 - 15.0 in.·lbf)



11. INSTALL RACK GUIDE SPRING CAP LOCK NUT

(a) Apply sealant to 2 or 3 threads of the nut.
Sealant:
Part No.08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

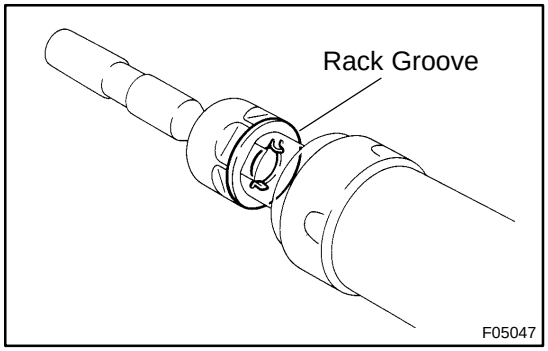
(b) Holding the rack guide spring cap rotating, and using SST, torque the nut.
SST 09922-10010
Torque: 52 N·m (520 kgf·cm, 38 ft·lbf)

NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 345 mm (14.97 in.).

(c) Recheck the total preload.
Preload (turning):
Center Area
1.8 - 2.2 N·m (18.4 - 22.4 kgf·cm, 16.0 - 19.5 in.·lbf)
End Area
1.3 - 1.7 N·m (13.3 - 17.3 kgf·cm, 11.5 - 15.0 in.·lbf)

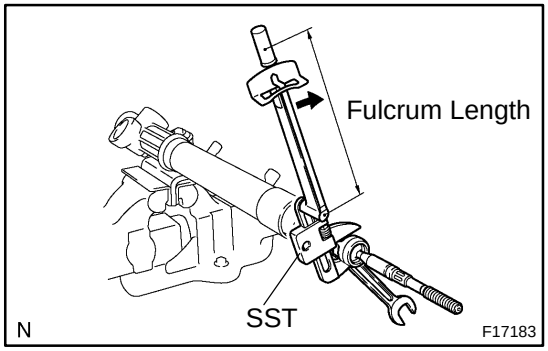
(d) Remove the RH and LH rack ends.



12. INSTALL RH AND LH CLAW WASHERS AND RACK ENDS

(a) Install a new washer, and temporarily tighten the rack end.

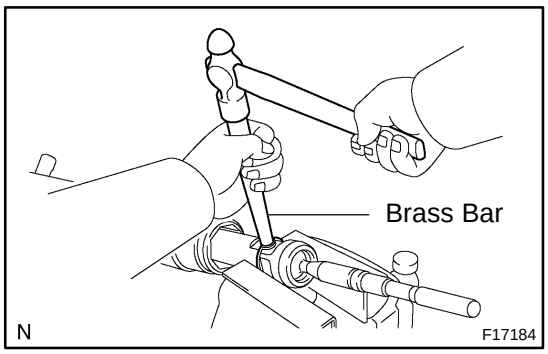
HINT:
Align the claws of the washer with the steering rack grooves.



(b) Using a spanner to hold the steering rack steady, and using SST, torque the rack end.
SST 09922-10010
Torque: 99 N·m (1,014 kgf·cm, 74 ft·lbf)

NOTICE:
Use SST 09922-10010 in the direction shown in the illustration.

HINT:
Use a torque wrench with a fulcrum length of 380 mm (13.58 in.).

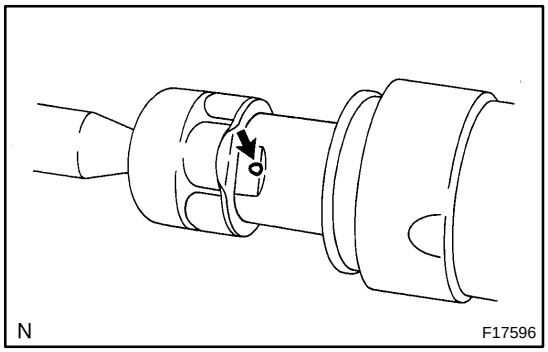


(c) Using a brass bar and hammer, stake the washer.

NOTICE:

Avoid any impact to the rack.

(d) Employ the same manner described above to the other side.

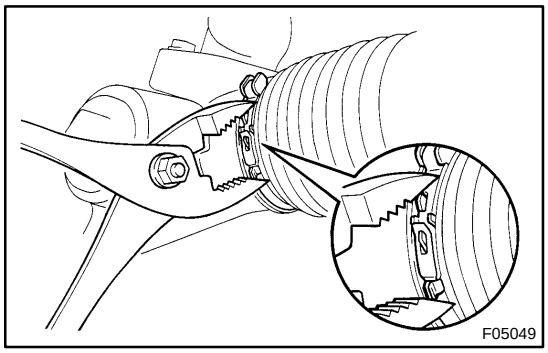


13. INSTALL RH AND LH RACK BOOTS, CLAMPS AND CLIPS

(a) Ensure that the tube hole is not clogged with grease.

HINT:

If the tube hole is clogged, the pressure inside the boot will change after it is assembled and the steering wheel is turned.



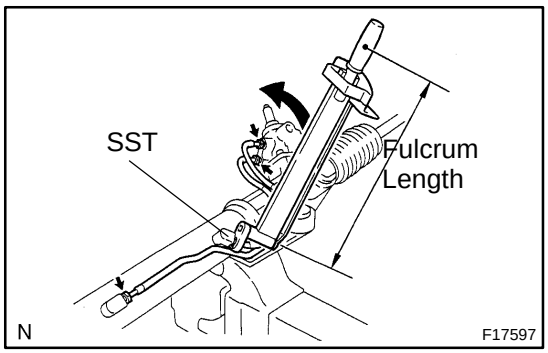
(b) Install the boot.

NOTICE:

Be careful not to damage or twist the boot.

(c) Using pliers tighten a new clamp, as shown in the illustration.

(d) Employ the same manner described above to the other side.



14. INSTALL 2 TURN PRESSURE TUBES

Using SST, install the tube.

SST 09023-38200

Torque: 23 N·m (230 kgf·cm, 17 ft·lbf)

HINT:

★ Use a torque wrench with a fulcrum length of 300 mm (11.81 in.).

★ This torque value is effective in case that SST is parallel to a torque wrench.

SR0MK-08

REMOVAL

NOTICE:

Remove the steering wheel assembly before the steering gear removal, because there is possibility of breaking of the spiral cable.

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. REMOVE STEERING WHEEL PAD
(See page SR-14)

3. REMOVE STEERING WHEEL (See page SR-14)

4. REMOVE NO. 1 ENGINE UNDER COVER

Remove the 7 bolts.

5. REMOVE NO. 2 ENGINE UNDER COVER

Remove the 6 bolts.

6. DISCONNECT RH AND LH TIE ROD ENDS
(See page SA-20)

7. REMOVE ENGINE OIL FILTER ASSEMBLY

(a) Disconnect the 2 clips and hoses.

(b) Remove the 2 bolts and nut with the bracket.

(c) Remove the O-ring.

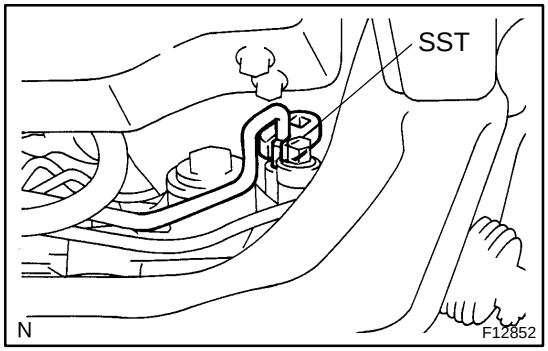
8. DISCONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY (See page SR-14)

HINT:

Turn the steering wheel fully to the right side.

9. DISCONNECT PRESSURE FEED TUBE

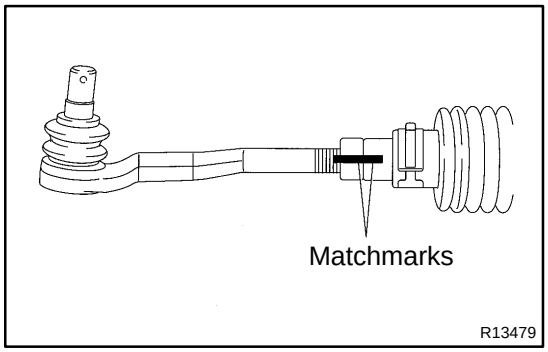
Remove the union bolt, gasket and disconnect the pressure feed tube.



10. DISCONNECT RETURN TUBE

Using SST, disconnect the tube.

SST 09023-38400

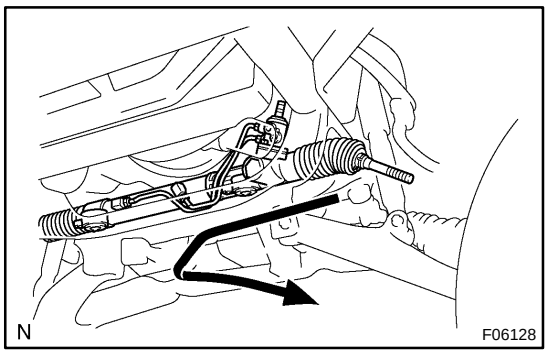


11. REMOVE RH AND LH TIE ROD ENDS AND LOCK NUTS

(a) Place matchmarks on the tie rod end and rack end.

(b) Loosen the lock nut, and remove the tie rod end and lock nut.

(c) Employ the same manner described above to the other side.



12. REMOVE PS GEAR ASSEMBLY

Remove the 2 gear assembly set bolts, nuts and washers.

HINT:

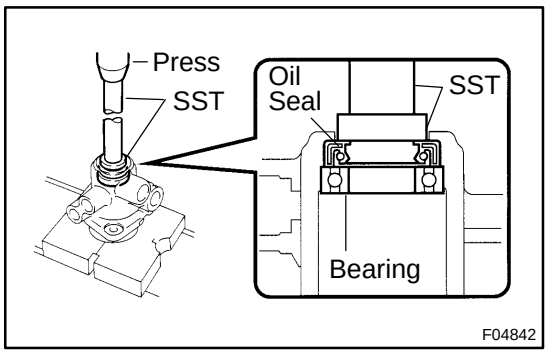
Slide the gear assembly to the right side, pull out the left side of the gear assembly from the member.

SR1C5-02

REPLACEMENT

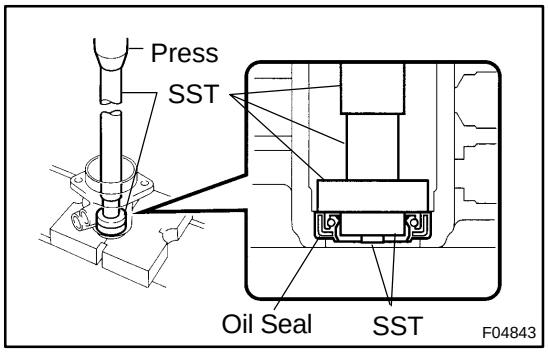
1. IF NECESSARY, REPLACE OIL SEAL AND BEARING

(a) Using SST, press out the oil seal and bearing from the control valve housing.
SST 09950-60010 (09951-00260), 09950-70010 (09951-07150)

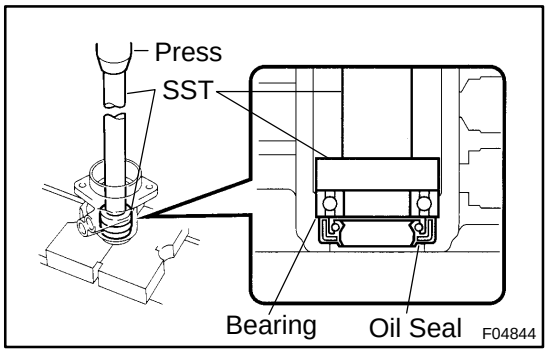


(b) Coat a new oil seal lip with power steering fluid.
(c) Using SST, press in the oil seal.
SST 09950-60010 (09951-00180, 09951-00330, 09952-06010), 09950-70010 (09951-07150)

NOTICE:
Make sure to install the oil seal facing in the correct direction.

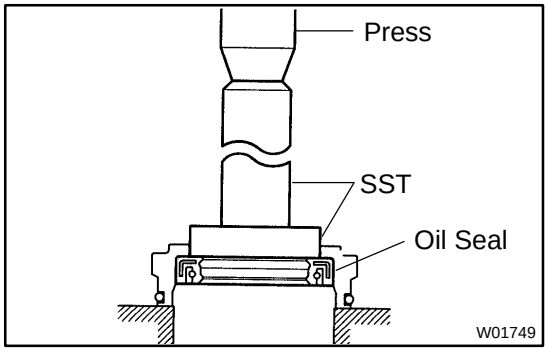


(d) Coat a new bearing with molybdenum disulfide lithium base grease.
(e) Using SST, press in the bearing.
SST 09950-60010 (09951-00330), 09950-70010 (09951-07150)



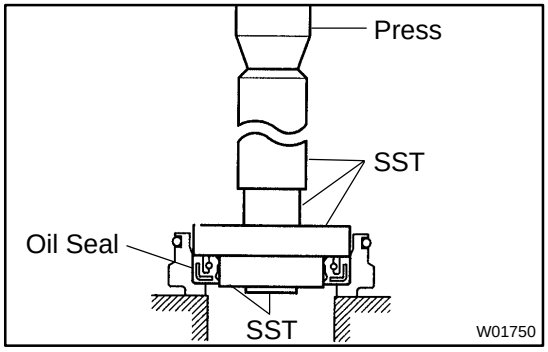
2. IF NECESSARY, REPLACE OIL SEAL

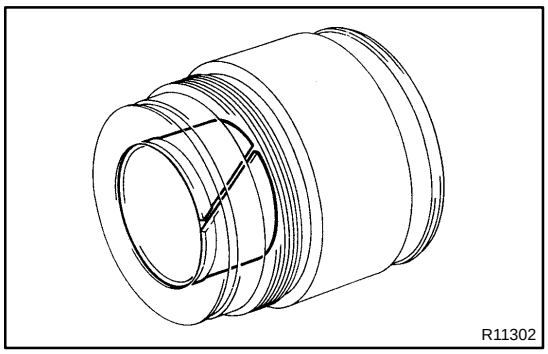
(a) Using SST, press out the oil seal from the bearing guide nut.
SST 09950-60010 (09951-00320), 09950-70010 (09951-07100)



(b) Coat a new oil seal lip with power steering fluid.
(c) Using SST, press in the oil seal.
SST 09950-60010 (09951-00280, 09951-00360, 09952-06010), 09950-70010 (09951-07100)

NOTICE:
Make sure to install the oil seal facing in the correct direction.

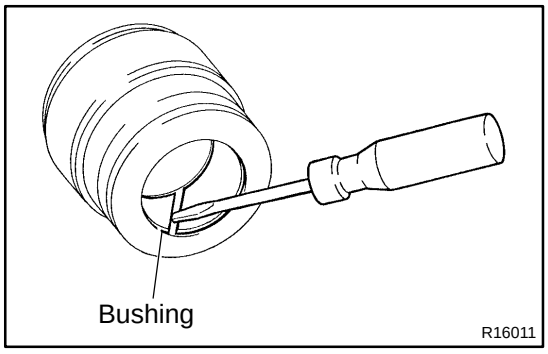




3. INSPECT BUSHING

(a) Check the inside of the bushing of the cylinder end stopper for cracks. If faulty, replace the bushing.

(b) Apply molybdenum disulfide lithium base grease to the inside of the bushing.



4. IF NECESSARY, REPLACE BUSHING

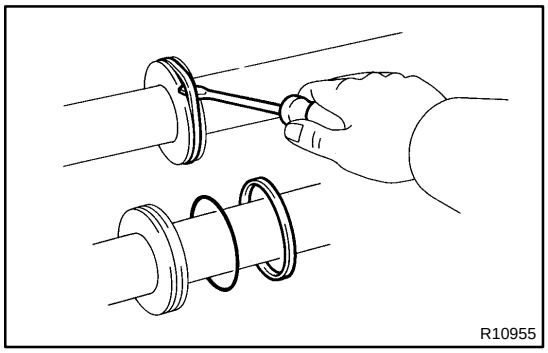
(a) Using a screwdriver, remove the bushing from the cylinder end stopper.

NOTICE:

Be careful not to damage the cylinder end stopper.

(b) Coat the inside of a new bushing with molybdenum disulfide lithium base grease.

(c) Install the bushing.



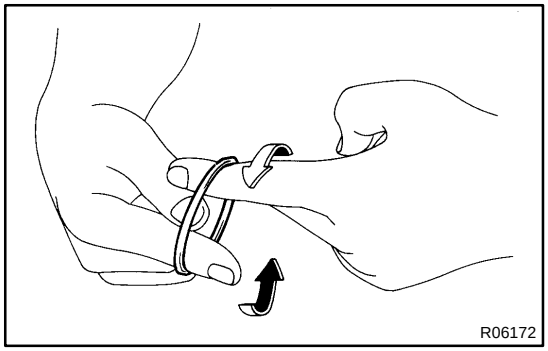
5. IF NECESSARY, REPLACE TEFLON RING AND O-RING

(a) Using a screwdriver, remove the teflon ring and O-ring from the steering rack.

NOTICE:

Be careful not to damage the groove for the ring.

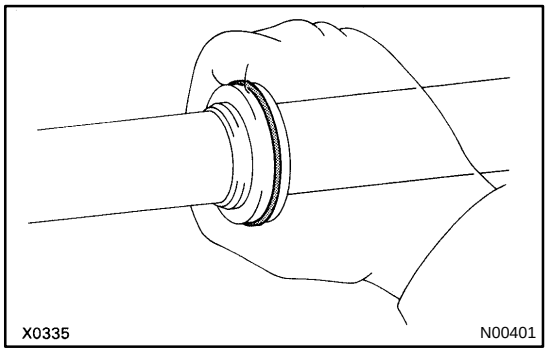
(b) Coat a new O-ring with power steering fluid and install it.



(c) Expand a new teflon ring with your fingers.

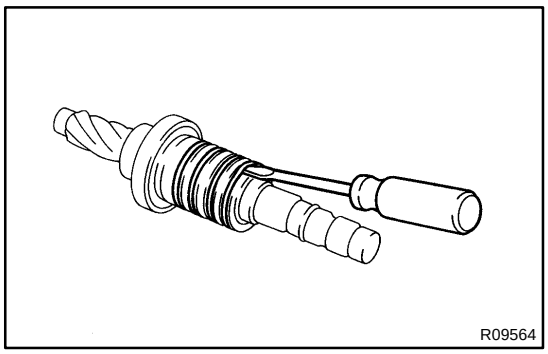
NOTICE:

Be careful not to overexpand the ring.



(d) Coat the ring with power steering fluid.

(e) Install the ring to the rack, and settle it down with your fingers.



6. IF NECESSARY, REPLACE TEFLON RINGS

(a) Using a screwdriver, remove the 4 teflon rings from the control valve assembly.

NOTICE:

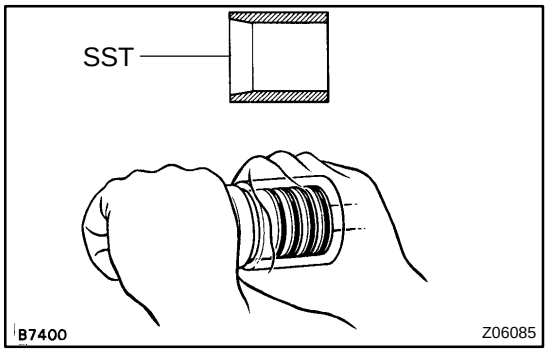
Be careful not to damage the grooves for the ring.

(b) Expand 4 new rings with your fingers.

NOTICE:

Be careful not to overexpand the ring.

(c) Coat the rings with power steering fluid.



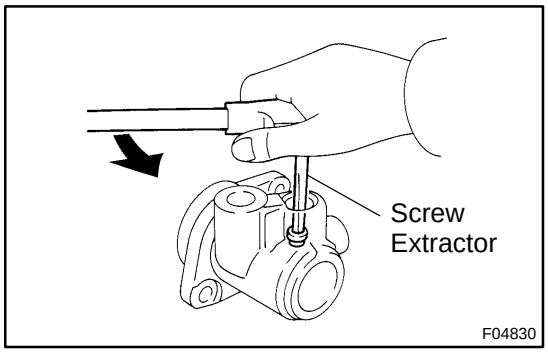
(d) Install the rings to the control valve assembly, and settle them down with your fingers.

(e) Carefully slide the tapered end of SST over the rings until the ring fits to the steering rack.

SST 09631-20081

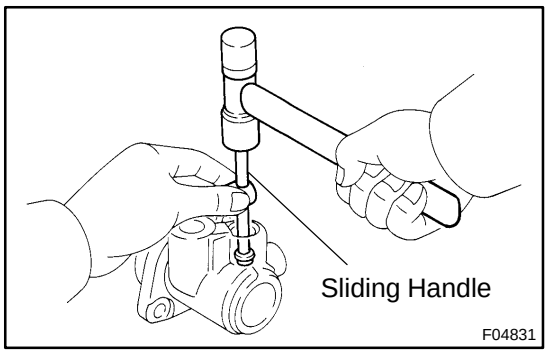
NOTICE:

Be careful not to damage the rings.



7. IF NECESSARY, REPLACE UNION SEAT

(a) Using a screw extractor, remove the union seat from the control valve housing.



(b) Using plastic hammer and sliding handle, lightly tap in a new union seat.

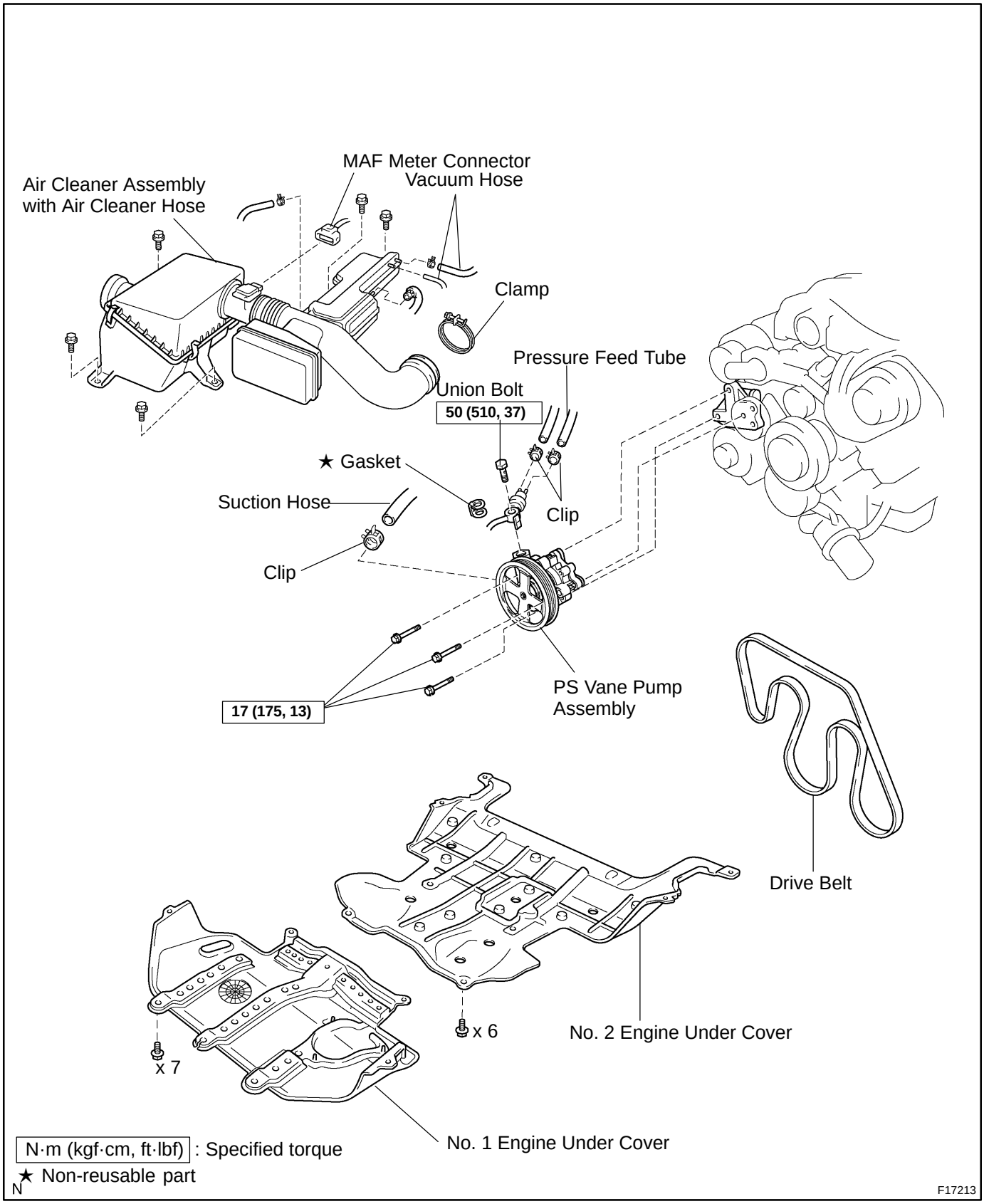
NOTICE:

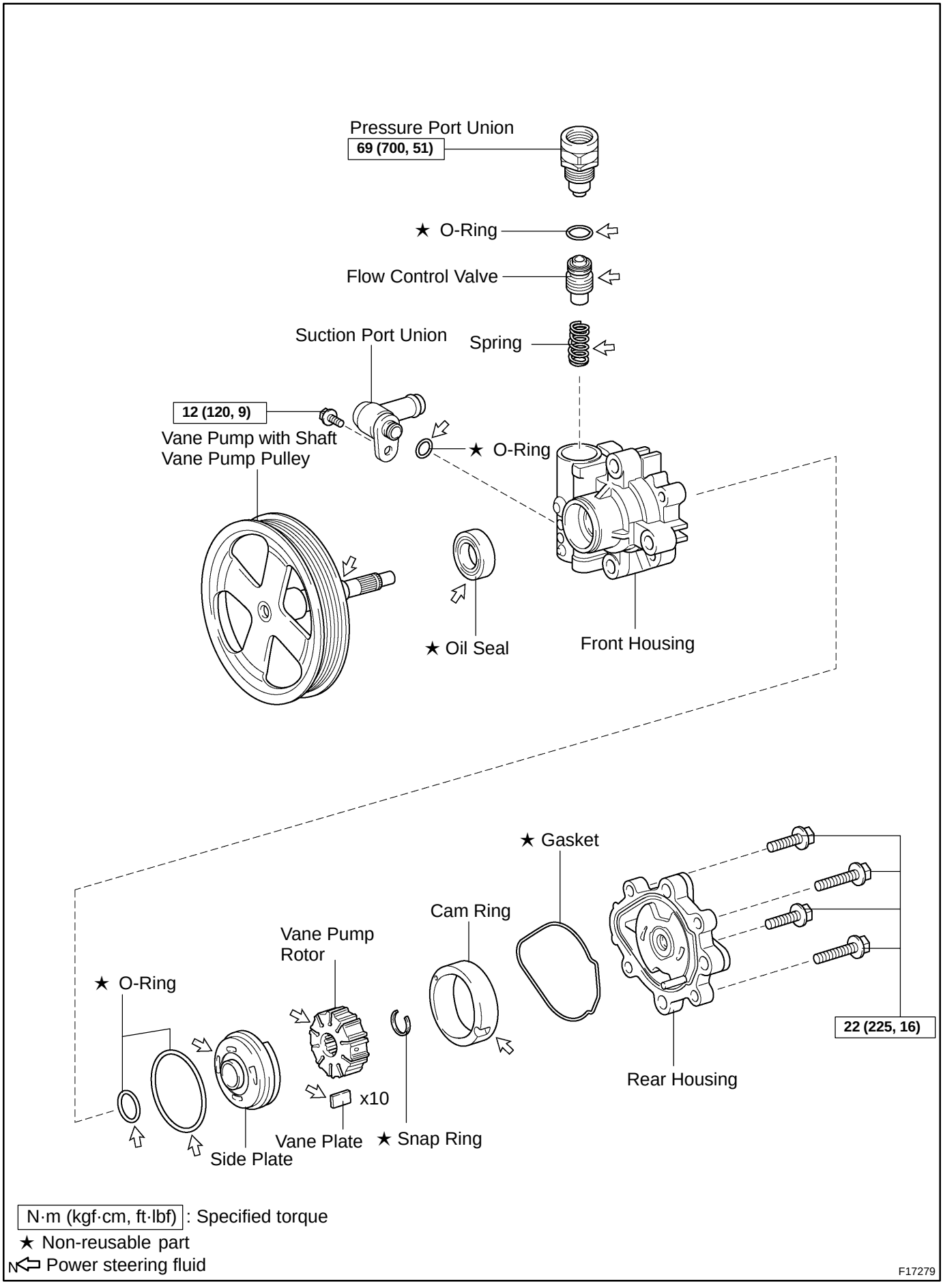
Before installing the union seat, remove dust sticking to the control valve housing.

POWER STEERING VANE PUMP

COMPONENTS

SR0MD-11



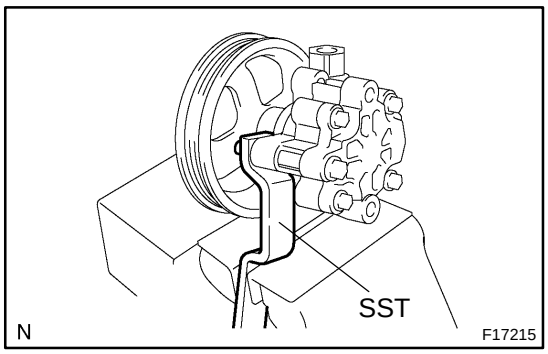


N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
N Power steering fluid

F17279

SR1IK-01

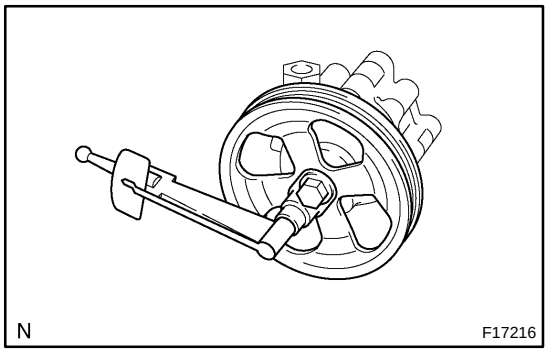
DISASSEMBLY



1. FIX VANE PUMP ASSEMBLY

Using SST, hold the vane assembly in a vise.

SST 09630-00014 (09631-00132)



2. MEASURE PS VANE PUMP ROTATING TORQUE

(a) Check that the pump rotates smoothly without abnormal noise.

(b) Temporarily install the bolt to the shaft.

(c) Using a torque wrench, check the pump rotating torque.

Rotating torque:

0.3 N·m (2.8 kgf·cm, 2.4 in.·lbf) or less

3. REMOVE SUCTION PORT UNION

(a) Remove the bolt.

(b) Remove the O-ring from the union.

4. REMOVE PRESSURE PORT UNION, FLOW CONTROL VALVE AND SPRING

Remove the O-ring from the union.

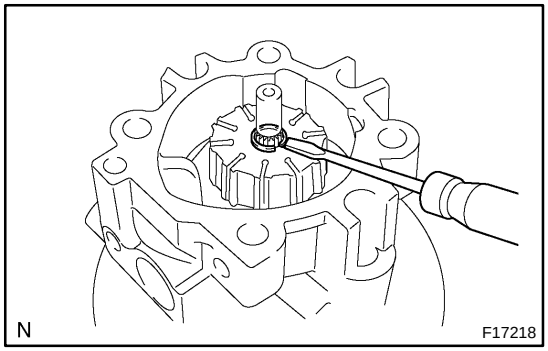
5. REMOVE REAR HOUSING

(a) Loosen the 4 bolts.

(b) Remove the vane pump assembly from the SST.

(c) Remove the 4 bolts and rear housing.

(d) Remove the gasket from the housing.



6. REMOVE CAM RING, 10 VANE PLATES AND VANE PUMP ROTOR

Using a screwdriver, remove the snap ring from the vane pump shaft.

NOTICE:

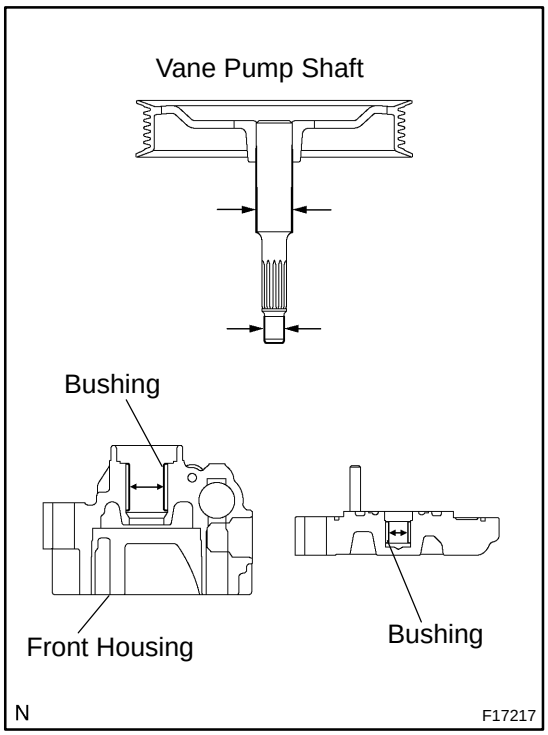
Be careful not to drop the plate.

7. REMOVE SIDE PLATE

8. REMOVE VANE PUMP SHAFT WITH PUMP PULLEY

SR1IL-01

INSPECTION

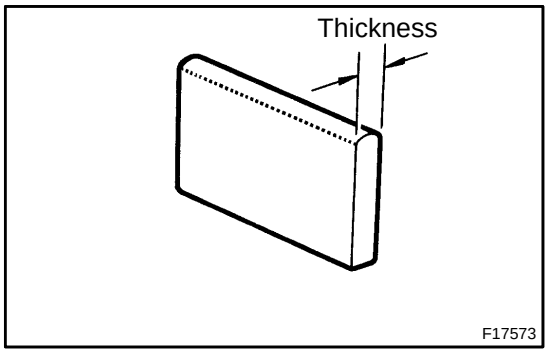


1. CHECK OIL CLEARANCE BETWEEN VANE PUMP SHAFT AND BUSHING OF FRONT HOUSING AND REAR HOUSING

Using a micrometer and caliper gauge, measure the oil clearance.

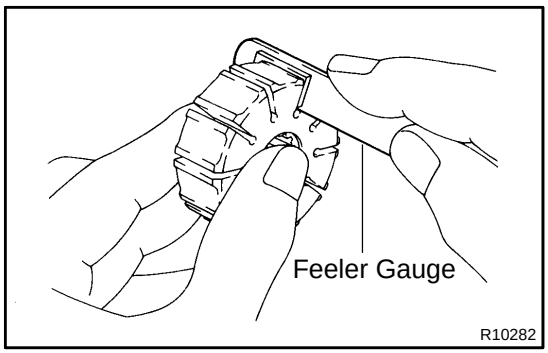
Standard clearance:
Front housing and shaft
0.020 - 0.077 mm (0.00079 - 0.00303 in.)
Rear housing and shaft
0.020 - 0.077 mm (0.00079 - 0.00303 in.)
Maximum clearance:
Front housing and shaft
0.070 mm (0.00276 in.)
Rear housing and shaft
0.080 mm (0.00315 in.)

If it is more than the maximum, replace a new vane pump assembly.



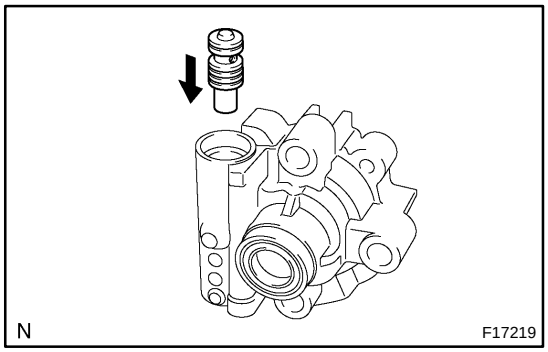
2. INSPECT VANE PUMP ROTOR AND VANE PLATES

(a) Using a micrometer, measure the height, thickness and length of the 10 plates.
Minimum thickness: 1.405 mm (0.05531 in.)



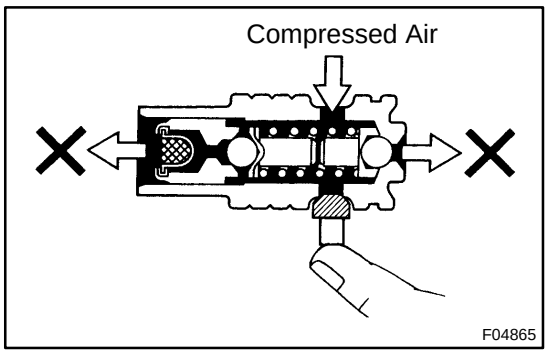
(b) Using a feeler gauge, measure the clearance between the rotor groove and plate.
Maximum clearance: 0.03 mm (0.0012 in.)

If it is more than the maximum, replace a new vane pump assembly.



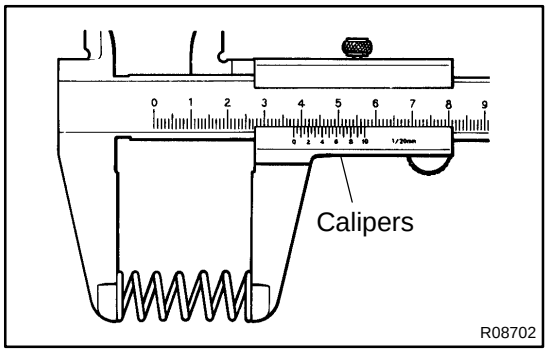
3. INSPECT FLOW CONTROL VALVE

(a) Coat the valve with power steering fluid and check that it falls smoothly into the valve hole by its own weight.



(b) Check the flow control valve for leakage.
Close one of the holes and apply compressed air 392-490 kPa (4-5 kgf/cm^2, 57-71 psi) into the opposite side hole, and confirm that air does not come out from the end holes.

If necessary, replace a new vane pump assembly.



4. INSPECT SPRING

Using calipers, measure the free length of the spring.

Minimum free length: 31.3 mm (1.2323 in.)

If it is not within the specification, replace a new vane pump assembly.

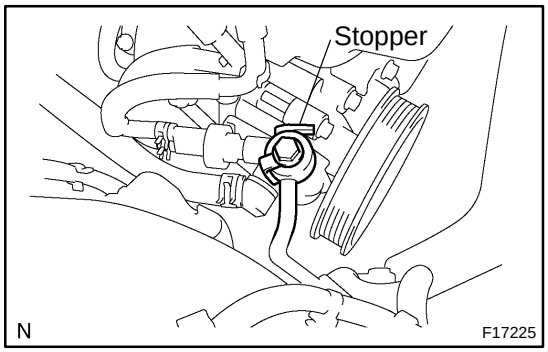
SR0MI-10

INSTALLATION

1. INSTALL PS VANE PUMP ASSEMBLY

Torque the 3 bolts.

Torque: 17 N·m (175 kgf·cm, 13 ft·lbf)



2. INSTALL PRESSURE FEED TUBE

Install new gaskets on each side of the tube and torque the union bolt.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

HINT:

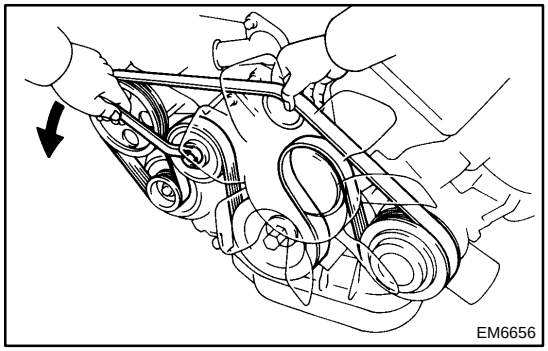
Make sure that the stopper of the tube touches the PS vane pump body as shown in the illustration, then torque the bolt.

3. CONNECT RETURN HOSE

Install the clip.

4. CONNECT 2 VACUUM HOSES

Install the 2 clips.



5. INSTALL DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and install the belt.

6. INSTALL AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Tighten the 3 bolts.
(b) Tighten the clamp.
(c) Connect the hose.
(d) Connect the MAF meter connector.

7. INSTALL NO. 2 ENGINE UNDER COVER

Tighten the 8 bolts.

8. INSTALL NO. 1 ENGINE UNDER COVER

Tighten the 6 bolts.

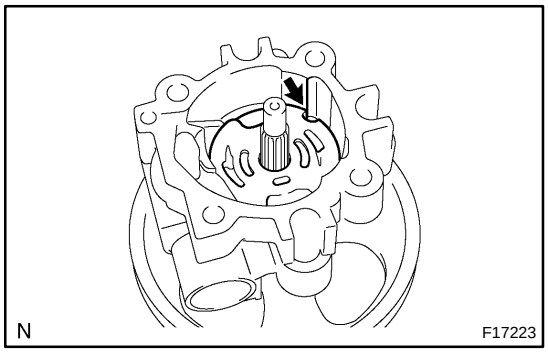
9. BLEED POWER STEERING SYSTEM

(See page SR-4)

SR1IM-01

REASSEMBLY

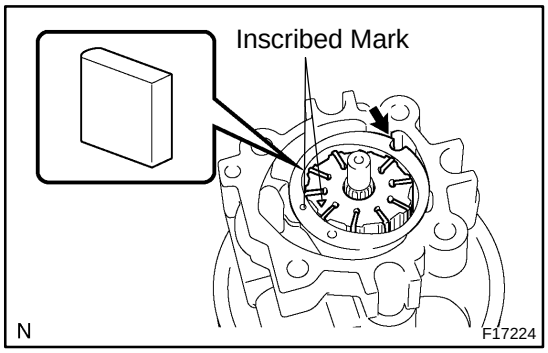
1. **COAT WITH POWER STEERING FLUID (See page SR-38)**
2. **INSTALL VANE PUMP SHAFT**



3. **INSTALL SIDE PLATE**

(a) Install a new O-ring to the front housing.
(b) Install a new O-ring to side plate.
(c) Install the side plate as shown in the illustrating.

HINT:
Align the hole of the side plate with the hole of the front housing.



4. **INSTALL CAM RING**

Install the ring with the inscribed mark facing outward.

HINT:
Align the hole of the cam ring with the hole of the front housing.

5. **INSTALL VANE PUMP ROTOR**

(a) Install the rotor with the inscribed mark facing outward.
(b) Install a new snap ring to the vane pump shaft.

6. **INSTALL 10 VANE PLATES**

(a) Install the plates with the round end facing outward.

7. **INSTALL REAR HOUSING**

(a) Coat new gasket with power steering fluid and install it to the housing.
(b) Temporarily install the 4 bolts.
(c) Using SST, hold the vane pump assembly in a vise.
(d) Torque the 4 bolts.
Torque: 22 N·m (225 kgf·cm, 16 ft·lbf)

8. **INSTALL SPRING, FLOW CONTROL VALVE AND PRESSURE PORT UNION**

(a) Install the valve facing the correct direction (See page SR-38).
(b) Coat a new O-ring with power steering fluid and install it to the union.
(c) Torque the union.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

9. **INSTALL SUCTION PORT UNION**

(a) Coat a new O-ring with power steering fluid and install it to the union.
(b) Torque the bolt.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

10. MEASURE PS VANE PUMP ROTATING TORQUE
(See page SR-41)

SR0ME-09

REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

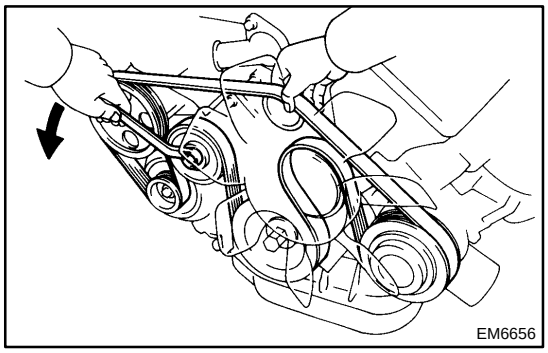
Remove the 6 bolts.

2. REMOVE NO. 2 ENGINE UNDER COVER

Remove the 8 bolts.

3. REMOVE AIR CLEANER ASSEMBLY WITH AIR CLEANER HOSE

(a) Disconnect the MAF meter connector.
(b) Disconnect the hoses.
(c) Loosen the clamp.
(d) Remove the 3 bolts.



4. REMOVE DRIVE BELT

Loosen the drive belt tension by turning the drive belt tensioner counterclockwise, and remove the drive belt.

5. DISCONNECT 2 VACUUM HOSES

Remove the 2 clips.

6. DISCONNECT RETURN HOSE

Remove the clip.

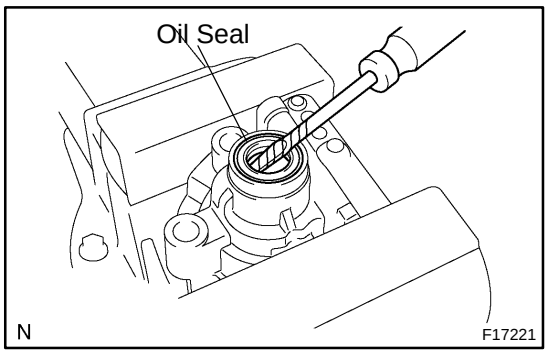
7. REMOVE PRESSURE FEED TUBE

Remove the union bolt and 2 gaskets.

8. REMOVE PS VANE PUMP ASSEMBLY

Remove the 3 bolts.

SR0RG-05



REPLACEMENT

NOTICE:

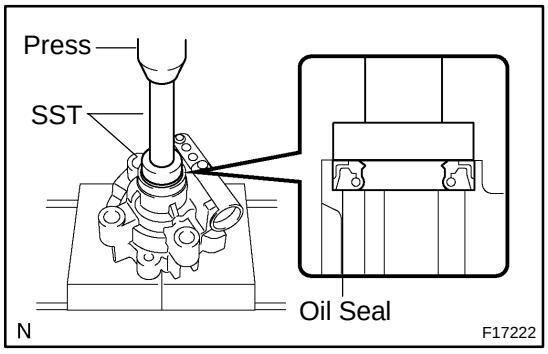
When using a vise, do not overtighten it.

IF NECESSARY, REPLACE OIL SEAL

(a) Using a screwdriver with vinyl tape wound around its tip, remove the oil seal.

NOTICE:

Be careful not to damage the front housing.



(b) Coat a new oil seal lip with power steering fluid.

(c) Using SST, press in the oil seal.

SST 09950-60010 (09951-00280),
09950-70010 (09951-07100)

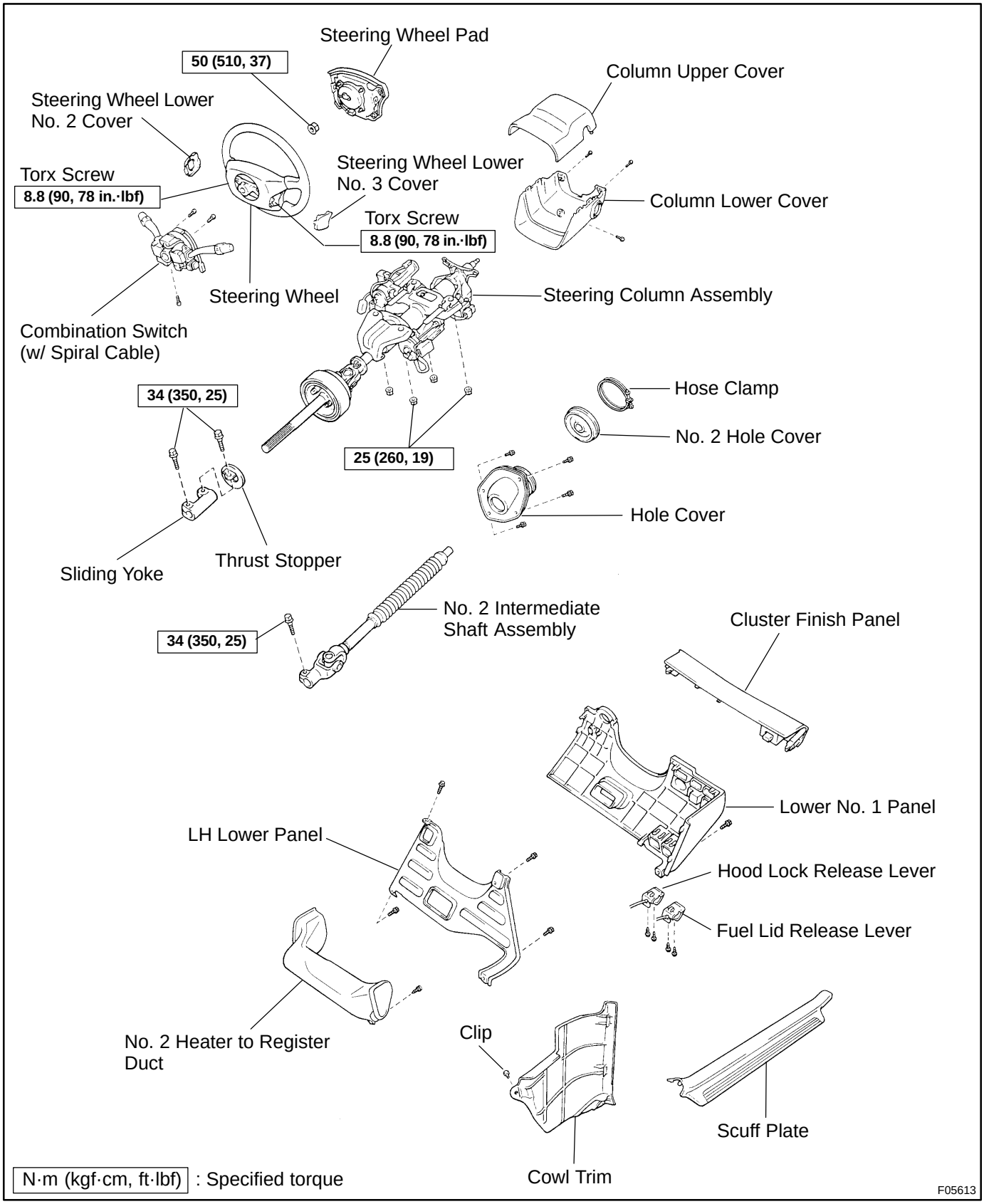
NOTICE:

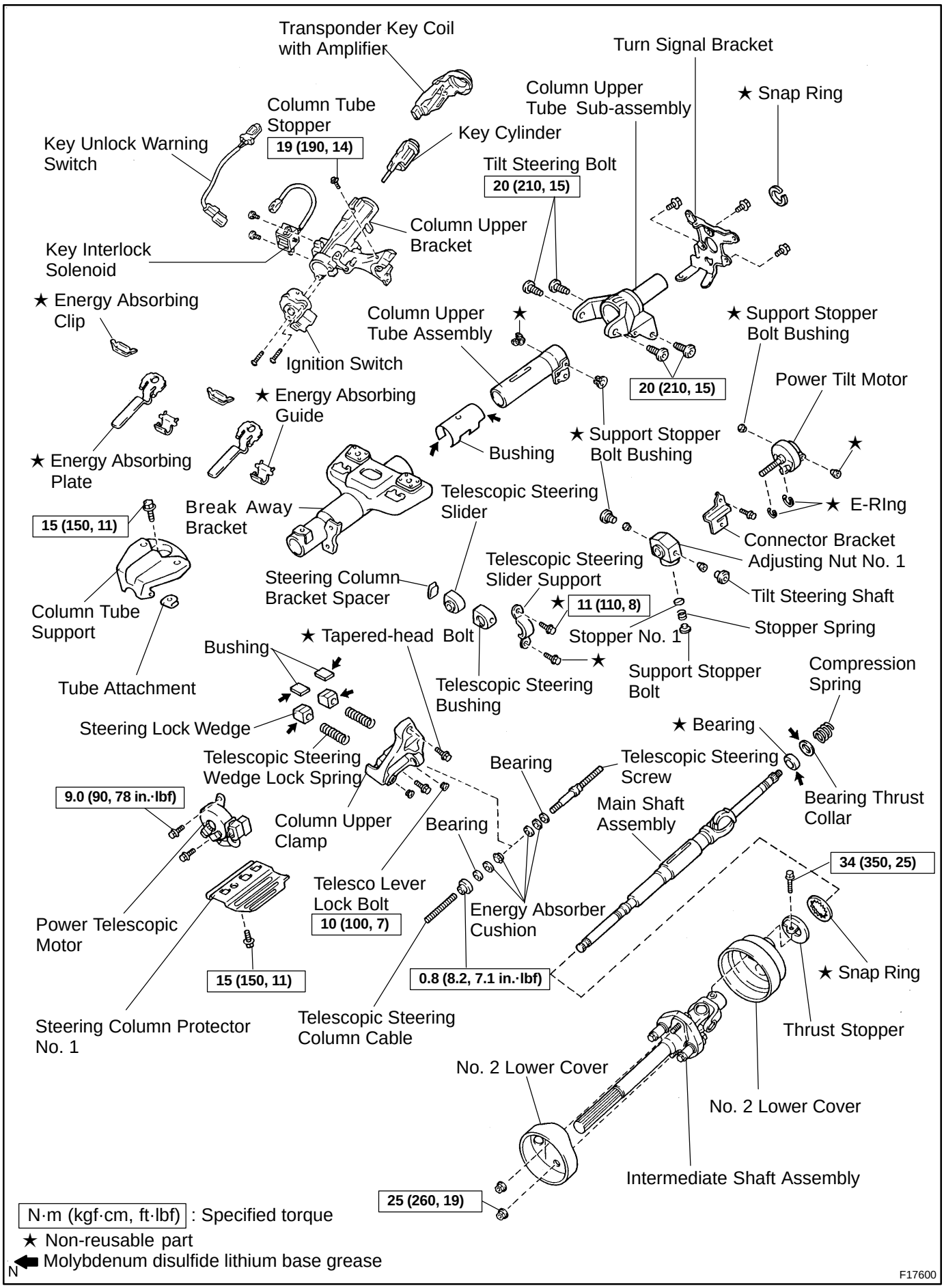
Make sure to install the oil seal facing the correct direction.

POWER TILT AND POWER TELESCOPIC STEERING COLUMN

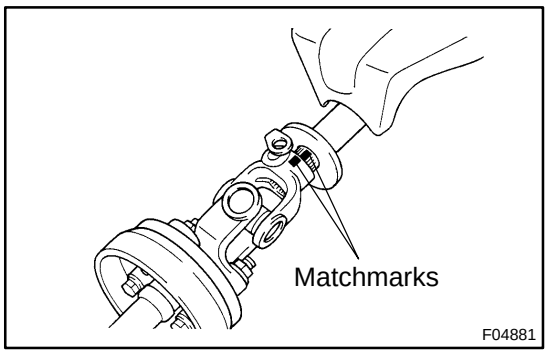
COMPONENTS

SR0M7-04




Transponder Key Coil with Amplifier
Turn Signal Bracket
Column Upper Tube Sub-assembly
★ Snap Ring
Column Tube Stopper
19 (190, 14)
Key Cylinder
Key Unlock Warning Switch
Tilt Steering Bolt
20 (210, 15)
Column Upper Bracket
Key Interlock Solenoid
★ Energy Absorbing Clip
Column Upper Tube Assembly
★ Support Stopper Bolt Bushing
Ignition Switch
20 (210, 15)
Power Tilt Motor
★ Energy Absorbing Guide
Bushing
★ Support Stopper Bolt Bushing
★ Energy Absorbing Plate
Telescopic Steering Slider
★ E-RIng
15 (150, 11)
Break Away Bracket
Connector Bracket
Adjusting Nut No. 1
Telescopic Steering Slider Support
Steering Column Bracket Spacer
Tilt Steering Shaft
★ 11 (110, 8)
Stopper No. 1
Stopper Spring
Column Tube Support
★ Tapered-head Bolt
Bushing
Support Stopper Bolt
Compression Spring
Tube Attachment
Telescopic Steering Bushing
★ Bearing
Steering Lock Wedge
Telescopic Steering Screw
Telescopic Steering Wedge Lock Spring
Bearing
Bearing Thrust Collar
9.0 (90, 78 in.·lbf)
Main Shaft Assembly
Column Upper Clamp
Bearing
34 (350, 25)
Telesco Lever Lock Bolt
10 (100, 7)
Energy Absorber Cushion
Power Telescopic Motor
15 (150, 11)
0.8 (8.2, 7.1 in.·lbf)
★ Snap Ring
Steering Column Protector No. 1
Telescopic Steering Column Cable
Thrust Stopper
No. 2 Lower Cover
No. 2 Lower Cover
Intermediate Shaft Assembly
25 (260, 19)
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
Molybdenum disulfide lithium base grease
N
F17600

SR0M9-05



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE NO. 2 LOWER COVER

Remove the 2 nuts and lower side No. 2 lower cover.

2. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the intermediate shaft assembly and main shaft assembly.

(b) Remove the bolt and intermediate shaft assembly with the upper side No. 2 lower cover.

(c) Remove the thrust stopper from the main shaft assembly.

3. REMOVE TRANSPONDER KEY AMPLIFIER

(a) Widen the claw humg on the upper bracket by approx. 1.0 mm (0.039 in.) using a screwdriver.

(b) Pull the transponder key amplirier toward the rear of the vehicle with the claw open.

NOTICE:

Take care not to use excessive force to prevent the case from being damage.

4. REMOVE CONNECTOR BRACKET

Remove the bolt and connector bracket.

5. REMOVE STEERING COLUMN PROTECTOR NO. 1

Remove the bolt and steering column protector No. 1.

6. REMOVE TURN SIGNAL BRACKET

Remove the 3 bolts and turn signal bracket.

7. REMOVE POWER TILT MOTOR

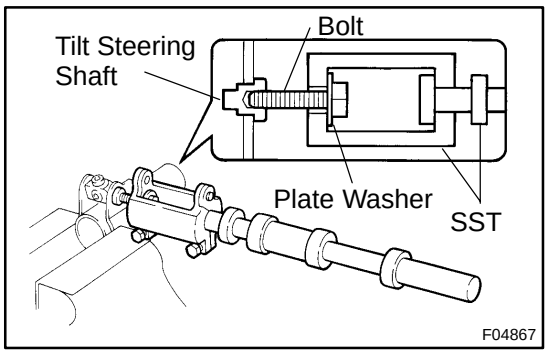
(a) Using a hexagon wrench, remove the support stopper bolt.

(b) Remove the stopper spring and stopper No. 1.

(c) Using a hexagon wrench, remove the 2 tilt steering bolts and power tilt motor.

(d) Using a screwdriver, remove the 2 E-rings.

(e) Remove the 2 support stopper bolt bushings from the power tilt motor.



8. REMOVE ADJUSTING NUT NO. 1

(a) Set SST, a plate washer (36 mm outer diameter) and bolt (6 mm normal diameter, 1.0 mm pitch, 50 mm length), as shown.

SST 09910-00015 (09911-0001 1, 09912-00010)

Reference:

Plate washer 90201-10201

Bolt 91111-51050

(b) Remove the 2 tilt steering shafts by using the sliding hammer on SST.

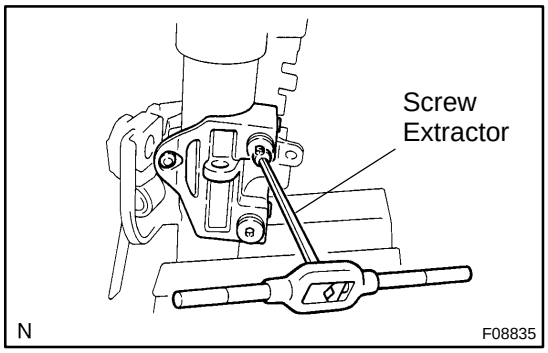
(c) Remove the adjusting nut No. 1.

(d) Remove the 2 support stopper bolt bushings from the adjusting nut No. 1.

9. REMOVE POWER TELESCOPIC MOTOR

(a) Remove the 2 bolts and power telescopic motor.

(b) Remove the telescopic steering column cable.



10. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Remove the column tube stopper.

(b) Using a centering punch, mark the center of the 2 tapered-head bolts.

(c) Using a 3 - 4 mm (0.12 - 0.16 in.) drill, drill into the 2 bolts.

(d) Using a screw extractor, remove the 2 bolts, column upper bracket and column upper clamp.

(e) Using a hexagon wrench, remove the 2 telesco lever lock bolts.

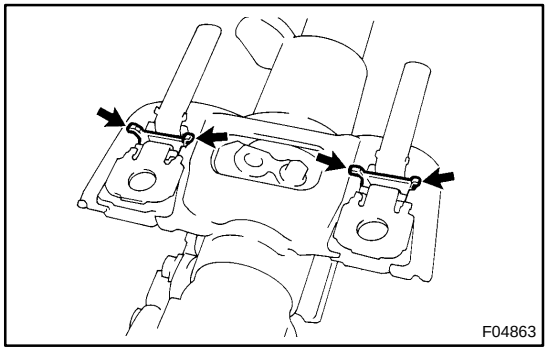
(f) Remove the 2 telescopic steering wedge lock springs, 2 steering lock wedges and column upper bracket and column upper clamp.

11. REMOVE COLUMN TUBE SUPPORT

(a) Remove the bolt.

(b) Remove the column tube support with tube attachment.

(c) Remove the tube attachment from the column tube support.



12. REMOVE 2 ENERGY ABSORBING PLATES

(a) Using pliers, remove the 2 energy absorbing clips.

(b) Remove the 2 energy absorbing plates and 2 energy absorbing guides.

13. REMOVE TELESCOPIC STEERING SLIDER SUPPORT

Remove the 2 bolts and telescopic steering slider support.

14. REMOVE TELESCOPIC STEERING BUSHING

15. REMOVE TELESCOPIC STEERING SLIDER

16. REMOVE STEERING COLUMN BRACKET SPACER

17. REMOVE TELESCOPIC STEERING SCREW

Remove the nut, 4 energy absorber cushions, 2 bearings and telescopic steering screw.

18. REMOVE COLUMN UPPER TUBE SUB-ASSEMBLY WITH MAIN SHAFT ASSEMBLY

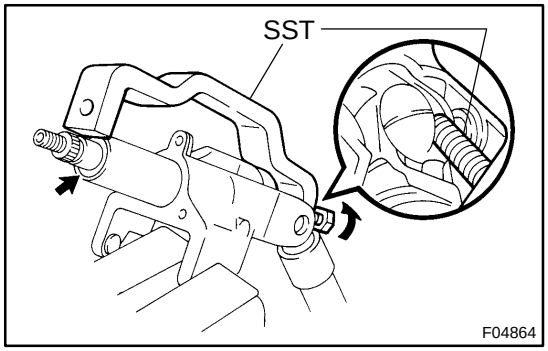
(a) Using a screwdriver, remove the lower side snap ring from the main shaft assembly.

(b) Using a hexagon wrench, remove the 2 tilt steering bolts and column upper tube sub-assembly with the main shaft assembly.

(c) Remove the column upper tube assembly from the break away bracket.

(d) Remove the 2 support stopper bolt bushings from the column upper tube assembly.

(e) Remove the 3 bushings from the break away bracket.



19. REMOVE MAIN SHAFT ASSEMBLY

(a) Using SST, compress the compression spring.
SST 09950-4001 1 (09958-04011)

NOTICE:

Do not bend the universal joint of the shaft assembly more than 20°.

(b) Using a snap ring expander, remove the upper side snap ring.

(c) Remove the main shaft assembly from the column upper tube sub-assembly.

(d) Remove the compression spring and bearing thrust collar from the main shaft assembly.

SR0MA-02

INSPECTION

(See page SR-20)

SR0MC-02

INSTALLATION

(See page SR-24)

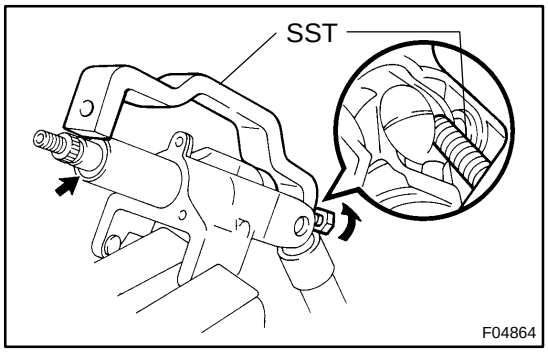
SR0RE-04

REASSEMBLY

NOTICE:

When using a vise, do not over tighten it.

1. COAT WITH PARTS INDICATED BY ARROWS MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR-27)



2. INSTALL MAIN SHAFT ASSEMBLY

(a) Install the bearing thrust collar and compression spring to the shaft.

(b) Install the shaft assembly to the column upper tube sub-assembly.

(c) Using SST, compress the compression spring.

SST 09950-4001 1 (09958-04011)

NOTICE:

Do not bend the universal joint of the shaft more than 20˚.

(d) Using a snap ring expander, install a new snap ring to the shaft.

3. INSTALL COLUMN UPPER TUBE SUB-ASSEMBLY WITH MAIN SHAFT ASSEMBLY

(a) Install the 3 bushings to the break away bracket.

(b) Install 2 new support stopper bolt bushings to the column tube assembly.

(c) Install the column upper tube assembly to the break away bracket.

(d) Install the column upper tube sub-assembly with the main shaft assembly to the break away bracket.

(e) Using a hexagon wrench, install the 2 tilt steering bolts.

Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(f) Install a new snap ring.

4. INSTALL TELESCOPIC STEERING SCREW

(a) Install the 4 energy absorber cushions, 2 bearings and telescopic steering screw.

(b) Install the nut.

Torque: 0.8 N·m (8.2 kgf·cm, 7.1 in.·lbf)

(c) Using a punch, stake the nut.

5. INSTALL STEERING COLUMN BRACKET SPACER

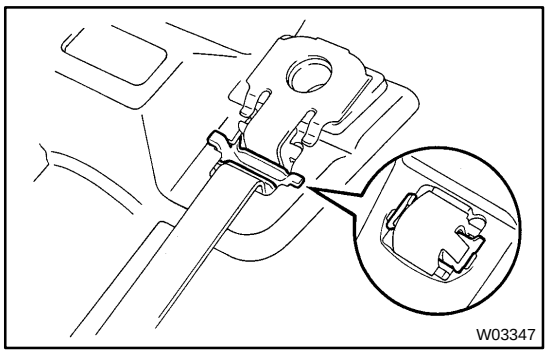
6. INSTALL TELESCOPIC STEERING SLIDER

7. INSTALL TELESCOPIC STEERING BUSHING

8. INSTALL TELESCOPIC STEERING SLIDER SUPPORT

Install the telescopic steering slider support with the 2 bolts.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



9. INSTALL 2 ENERGY ABSORBING GUIDES, PLATES AND CLIPS

(a) Install the 2 new energy absorbing guides and 2 new absorbing plates.

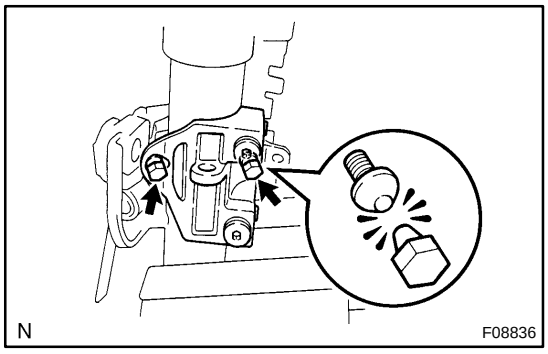
(b) Install the 2 new energy absorbing clips.

10. INSTALL COLUMN TUBE SUPPORT

(a) Install the tube attachment to the column tube support.

(b) Install the column tube support with the bolt.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



11. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Install the 2 telescopic steering wedge lock springs, 2 steering lock wedges and column upper bracket and column upper clamp.

(b) Using a hexagon wrench, install the 2 telesco lever lock bolts.

Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

(c) Install and tighten the 2 new tapered-head bolts until the bolt heads break off.

(d) Install the column tube stopper.

Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)

12. INSTALL POWER TELESCOPIC MOTOR

(a) Install the telescopic steering column cable.

(b) Install the power telescopic motor with the 2 bolts.

Torque: 9.0 N·m (90 kgf·cm, 78 in.·lbf)

13. INSTALL ADJUSTING NUT NO. 1

(a) Install 2 new support stopper bolt bushings to the adjusting nut No. 1.

(b) Install the adjusting nut No. 1 to the column upper tube.

(c) Install the 2 tilt steering shafts.

14. INSTALL POWER TILT MOTOR

(a) Install 2 new support stopper bolt bushings to the power tilt motor.

(b) Install 2 new E-rings.

(c) Using a hexagon wrench, install the power tilt motor and 2 tilt steering bolts.

Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(d) Install the stopper No. 1 and stopper spring.

(e) Using a hexagon wrench, install the support stopper bolt.

15. INSTALL TURN SIGNAL BRACKET

Install the turn signal bracket with the 3 bolts.

16. INSTALL STEERING COLUMN PROTECTOR NO. 1

Install the steering column protector No. 1 with the bolt.

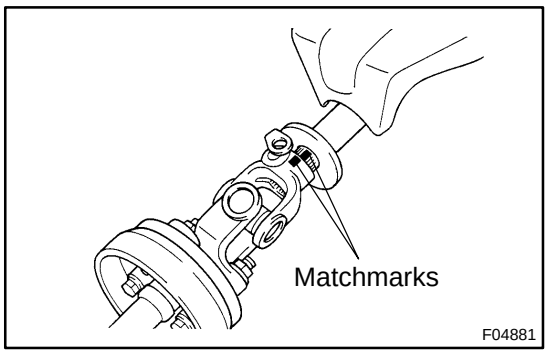
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

17. INSTALL CONNECTOR BRACKET

Install the connector bracket with the bolt.

18. INSTALL TRANSPONDER KEY AMPLIFIER ASSEMBLY

19. INSTALL NO. 2 LOWER COVER



20. INSTALL INTERMEDIATE SHAFT ASSEMBLY

(a) Install the thrust stopper and upper side No. 2 lower cover.

(b) Align the matchmarks on the intermediate shaft assembly and main shaft assembly.

(c) Install the bolt.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

21. INSTALL NO. 2 LOWER COVER

Install the No. 2 lower cover with the 2 nuts.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

SR0M8-02

REMOVAL

(See page SR-14)

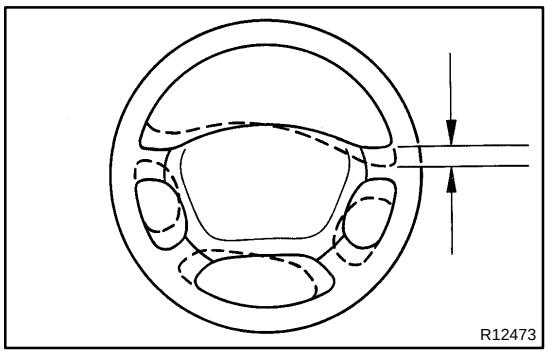
STEERING SYSTEM

SR0LU-03

PRECAUTION

★ **Care must be taken to replace parts properly because they could affect the performance of the steering system and result in a driving hazard.**

★ **The LAND CRUISER is equipped with SRS (Supplemental Restraint System) such as the driver airbag and front passenger airbag. Failure to carry out service operation in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices in the RS section.**



STEERING WHEEL

SR0M0-06

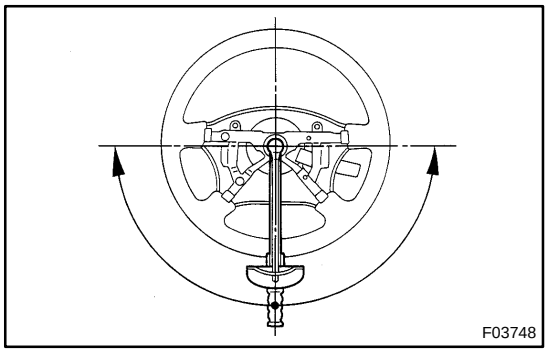
INSPECTION

1. CHECK STEERING WHEEL FREEPLAY

(a) Stop the vehicle and face the tires straight ahead.

(b) Rock the steering wheel gently up and down with a finger lightly, check the steering wheel freeplay.

Maximum freeplay: 40 mm (1.58 in.)



2. CHECK STEERING EFFORT

(a) Center the steering wheel.

(b) Remove the steering wheel pad (See page SR-14).

(c) Start the engine and run it at idle.

(d) Measure the steering effort in both directions.

Steering effort (Reference):

4.9 N·m (50 kgf·cm, 43 in.·lbf)

HINT:

Be sure to consider the tire type, pressure and contact surface before making your diagnosis.

(e) Torque the steering wheel set nut.

Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

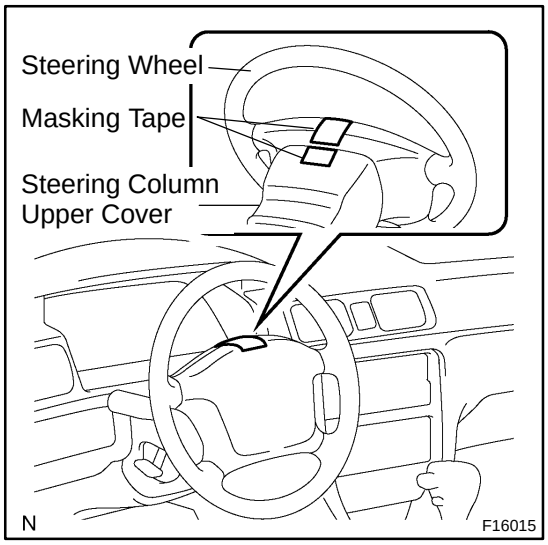
(f) Install the steering wheel pad (See page SR-24).

SR1HO-15

REPAIR PROCEDURES

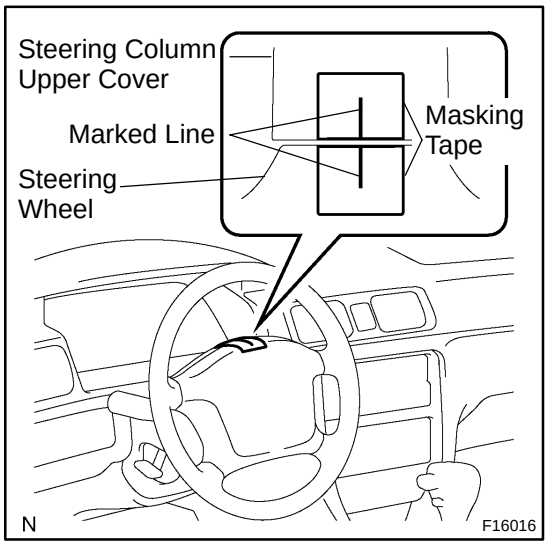
HINT:

This is the repair procedure for steering off center.



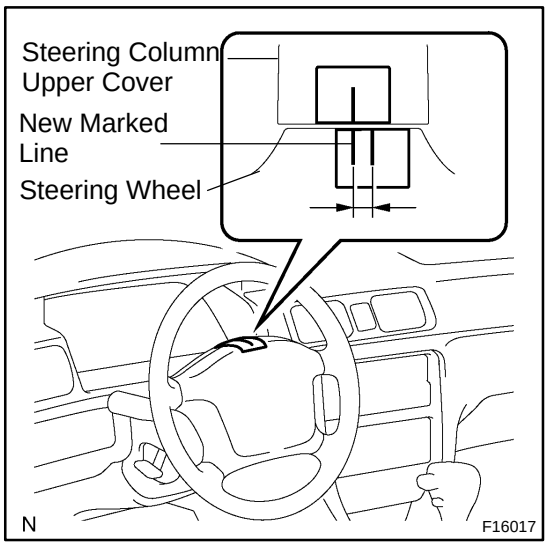
1. INSPECT STEERING WHEEL OFF CENTER

(a) Apply masking tape on the top center of the steering wheel and steering column upper cover.



(b) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), and hold the steering wheel to maintain the course.

(c) Draw a line on the masking tape as shown in the illustration.



(d) Turn the steering wheel to its straight position.

HINT:

Refer to the upper surface of the steering wheel, steering spoke and SRS airbag line for the straight position.

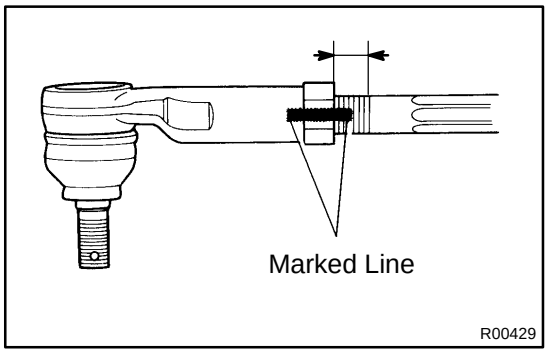
(e) Draw a new line on the masking tape of the steering wheel as shown in the illustraion.

(f) Measure the distance between the 2 lines on the masking tape of the steering wheel.

(g) Convert the measured distance to steering angle.
Measured distance 1 mm (0.04 in.) = Steering angle approximately 1 deg.

HINT:

Make a note of the steering angle.



2. ADJUST STEERING ANGLE

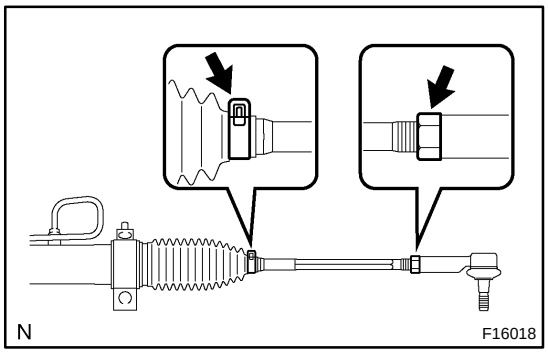
(a) Draw a line on the RH and LH tie rod and rack ends where it can easily be seen.

(b) Using a paper gauge, measure the distance from RH and LH tie rod ends to the rack end screws.

HINT:

★ Measure the RH side and LH side.

★ 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 end by the same amount (but in different directions) according to the steering angle.
1 turn 360 deg. of rack end (1.5 mm (0.059 in.) horizontal movement) = 12 deg. of steering angle

(f) Tighten the RH and LH lock nuts.
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

NOTICE:

Make sure that the difference in length between RH and LH tie rod ends and rack end screws are within 1.5 mm (0.059 in.).

(g) Install the RH and LH boot clips.

(h) Perform the zero point calibration of yaw rate and deceleration sensors (See page DI-505).

TROUBLESHOOTING

SR0LV-03

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in the order shown. If necessary, repair or replace these parts.

Symptom	Suspect Area	See page
Hard steering	3. Tires (Improperly inflated)	SA-4
	4. Power steering fluid level (Low)	SR-5
	5. Drive belt (Loose)	-
	6. Front wheel alignment (Incorrect)	SA-6
	7. Steering system joints (Worn)	-
	8. Suspension arm ball joints (Worn)	SA-71 SA-76
	9. Steering column (Binding)	-
	10.Power steering gear	SR-48
Poor return	1. Tires (Improperly inflated)	SA-4
	2. Front wheel alignment (Incorrect)	SA-6
	3. Steering column (Binding)	-
	4. Power steering gear	SR-48
Excessive play	1. Steering system joints (Worn)	-
	2. Suspension arm ball joints (Worn)	SA-71 SA-76
	3. Intermediate shaft, Universal joint, Sliding yoke (Worn)	-
	4. Front wheel bearing (Worn)	SA-11
	5. Power steering gear	SR-48
Abnormal noise	1. Power steering fluid level (Low)	SR-5
	2. Steering system joints (Worn)	-
	3. Power steering gear	SR-48

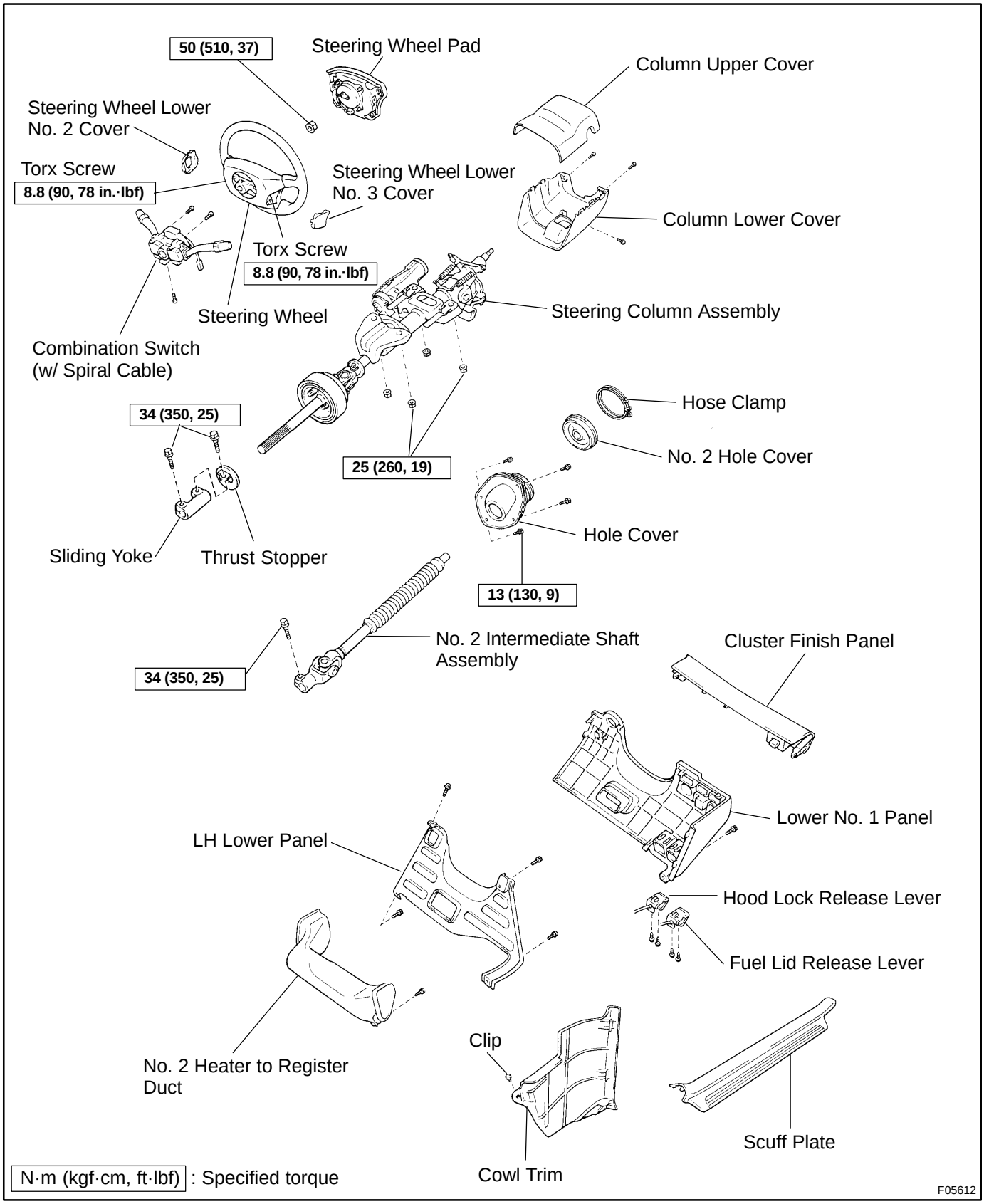
HINT:

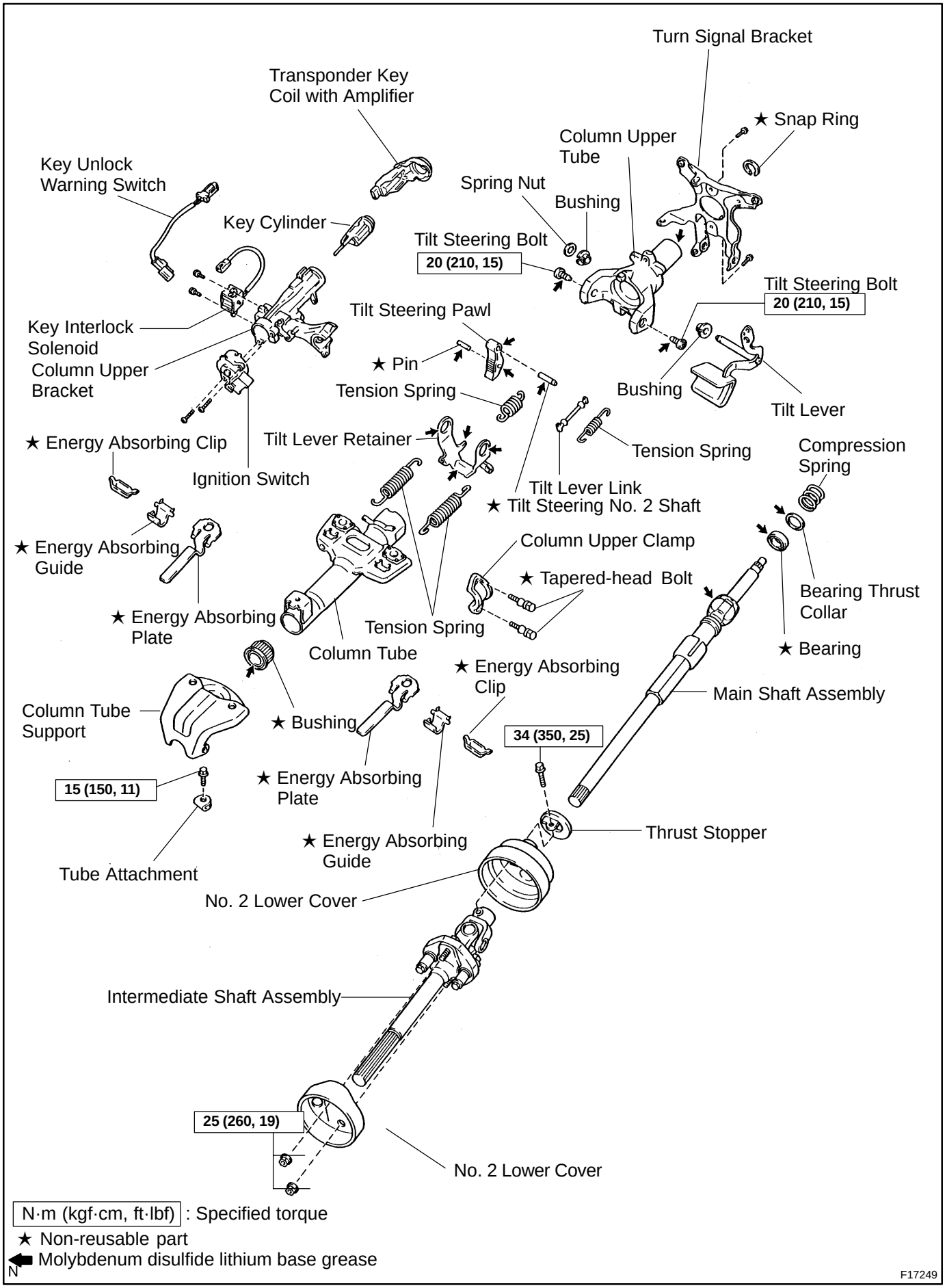
When the problem occurs on the power tilt and telescopic steering system, refer to the DI section (See page DI-656).

TILT STEERING COLUMN

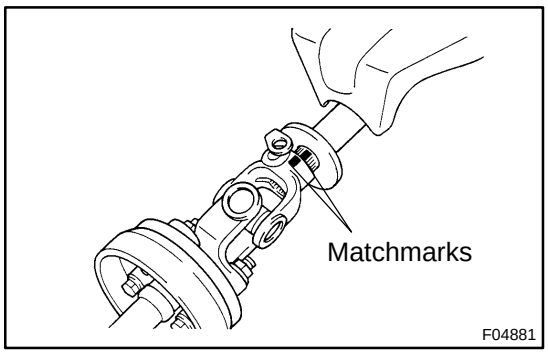
COMPONENTS

SR0M1-04




Turn Signal Bracket
Transponder Key Coil with Amplifier
★ Snap Ring
Column Upper Tube
Key Unlock Warning Switch
Spring Nut
Bushing
Key Cylinder
Tilt Steering Bolt
20 (210, 15)
Tilt Steering Bolt
20 (210, 15)
Tilt Steering Pawl
Key Interlock Solenoid
★ Pin
Column Upper Bracket
Tension Spring
Bushing
Tilt Lever
★ Energy Absorbing Clip
Tilt Lever Retainer
Tension Spring
Compression Spring
Ignition Switch
Tilt Lever Link
★ Tilt Steering No. 2 Shaft
★ Energy Absorbing Guide
Column Upper Clamp
★ Tapered-head Bolt
Bearing Thrust Collar
★ Energy Absorbing Plate
Tension Spring
Column Tube
★ Bearing
★ Energy Absorbing Clip
Main Shaft Assembly
Column Tube Support
★ Bushing
34 (350, 25)
15 (150, 11)
★ Energy Absorbing Plate
Thrust Stopper
★ Energy Absorbing Guide
Tube Attachment
No. 2 Lower Cover
Intermediate Shaft Assembly
25 (260, 19)
No. 2 Lower Cover
N·m (kgf·cm, ft·lbf) : Specified torque
★ Non-reusable part
Molybdenum disulfide lithium base grease
N
F17249

SR0RB-03



DISASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

1. REMOVE NO. 2 LOWER COVER

Remove the 2 nuts and lower side No. 2 lower cover.

2. REMOVE INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the intermediate shaft assembly and main shaft assembly.

(b) Remove the bolt and intermediate shaft assembly with the upper side No. 2 lower cover.

(c) Remove the thrust stopper from the main shaft assembly.

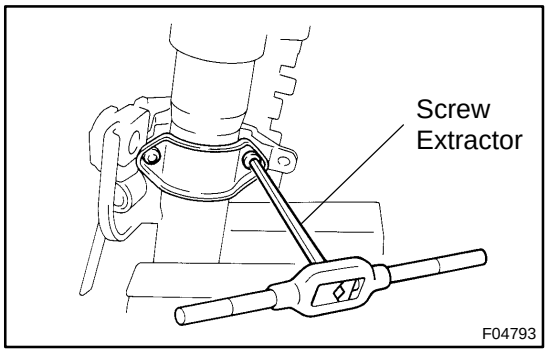
3. REMOVE TRANSPONDER KEY AMPLIFIER

(a) Widen the claw humg on the upper bracket by approx. 1.0 mm (0.039 in.) using a screwdriver.

(b) Pull the transponder key amplirier toward the rear of the vehicle with the claw open.

NOTICE:

Take care not to use excessive force to prevent the case from being damage.



4. REMOVE COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Using a centering punch, mark the center of the 2 tapered-head bolts.

(b) Using a 3-4 mm (0.12-0.16 in.) drill, drill into the 2 bolts.

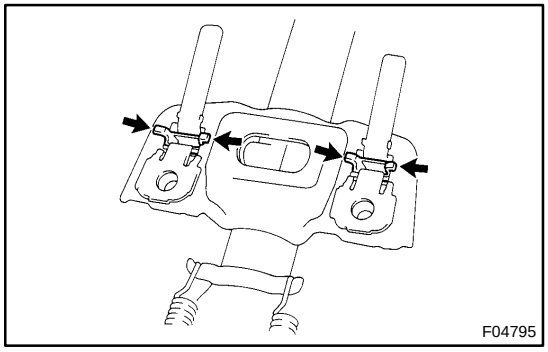
(c) Using a screw extractor, remove the 2 bolts, column upper bracket and column upper clamp.

5. REMOVE COLUMN TUBE SUPPORT

(a) Remove the bolt.

(b) Remove the column tube support with tube attachment.

(c) Remove the tube attachment from the column tube support.



6. REMOVE 2 ENERGY ABSORBING PLATES

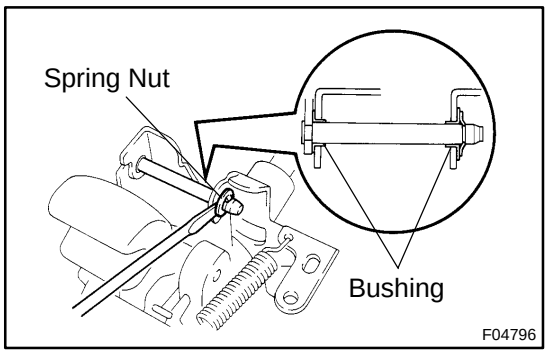
(a) Using pliers, remove the 2 energy absorbing clips.

(b) Remove the 2 energy absorbing plates and 2 energy absorbing guides.

7. REMOVE 4 TENSION SPRINGS

HINT:

Remove the springs with the tilt function at maximum tilt up.



8. REMOVE TILT LEVER

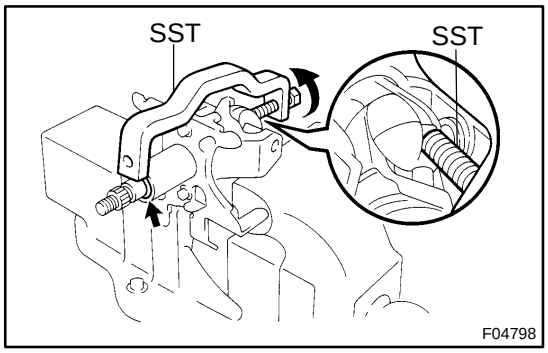
(a) Using a screwdriver, remove the spring nut.
(b) Remove the tilt lever.
(c) Remove the 2 bushings from the column upper tube.

9. REMOVE TILT LEVER LINK

10. REMOVE COLUMN UPPER TUBE WITH MAIN SHAFT ASSEMBLY

(a) Using a hexagon wrench, remove the 2 tilt steering bolts.
(b) Remove the upper tube with the main shaft assembly from the column tube.

11. REMOVE TILT LEVER RETAINER



12. REMOVE MAIN SHAFT ASSEMBLY

(a) Using SST, compress the compression spring.
SST 09950-4001 1 (09958-04011)

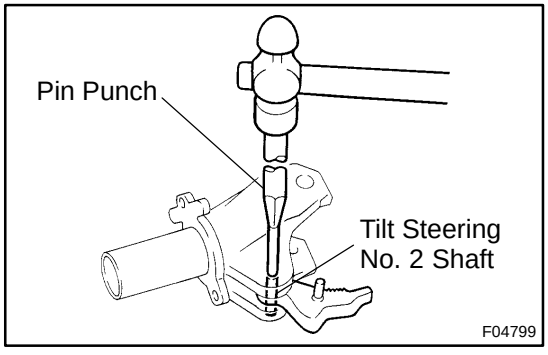
NOTICE:

Do not bend the universal joint of the shaft more than 20°.

(b) Using a snap ring expander, remove the snap ring from the shaft.
(c) Remove the shaft assembly from the column upper tube.
(d) Remove the compression spring and bearing thrust collar from the shaft.

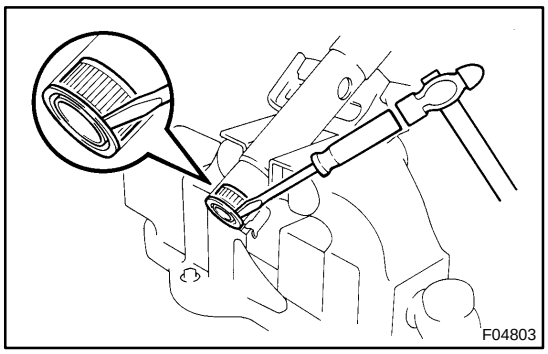
13. REMOVE TURN SIGNAL BRACKET

Remove the 2 bolts and turn signal bracket.



14. REMOVE TILT STEERING PAWL

(a) Using a pin punch and hammer, tap out the tilt steering No. 2 shaft.
(b) Remove the pawl from the column upper tube.
(c) Remove the pin from the pawl.

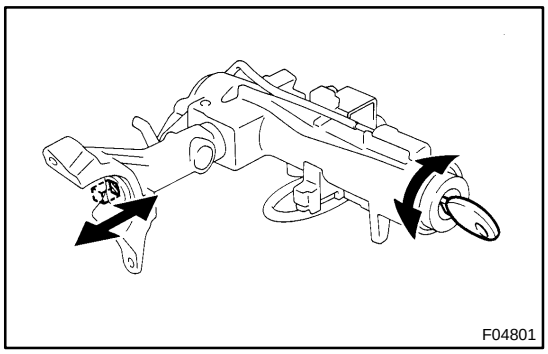


15. REMOVE BUSHING

Using a screwdriver, tap out the bushing.

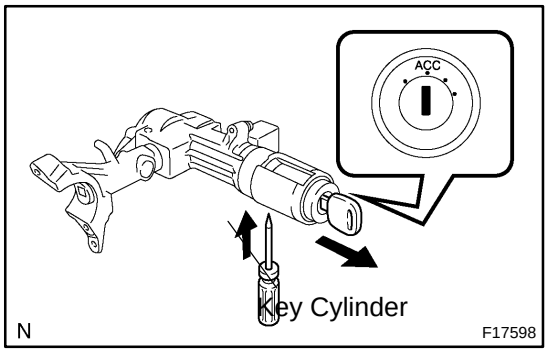
SR0RC-02

INSPECTION


F04801

1. INSPECT STEERING LOCK OPERATION

Check that the steering lock mechanism operates properly.



2. IF NECESSARY, REPLACE KEY CYLINDER

(a) Place the ignition key at the ACC position.

(b) Using a screwdriver, push down the stop pin of the cylinder, and pull out the key cylinder.

(c) Install a new cylinder.

HINT:

Make sure the key is at the ACC position.

3. INSPECT IGNITION SWITCH (See page BE-29)

4. IF NECESSARY, REPLACE IGNITION SWITCH

(a) Remove the 2 screws and ignition switch.

(b) Install a new ignition switch with the 2 screws.

5. INSPECT KEY UNLOCK WARNING SWITCH (See page BE-29)

6. IF NECESSARY, REPLACE KEY UNLOCK WARNING SWITCH

(a) Slide out the key unlock warning switch.

(b) Slide in a new key unlock warning switch.

7. INSPECT KEY INTERLOCK SOLENOID (See page AT-14)

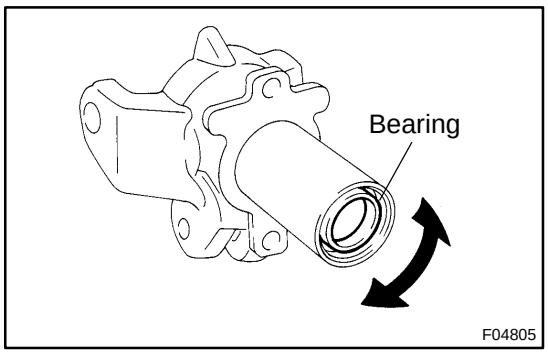
8. IF NECESSARY, REPLACE KEY INTERLOCK SOLENOID

(a) Remove the 2 screws and key interlock solenoid.

(b) Install a new key interlock solenoid with the 2 screws.

9. INSPECT TRANSPONDER KEY COIL (See page BE-196)

10. IF NECESSARY, REPLACE TRANSPONDER KEY AMPLIFIER

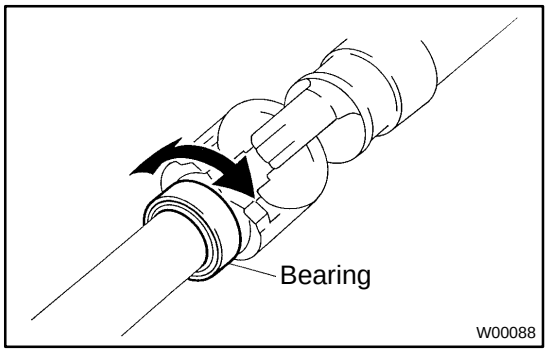


11. INSPECT UPPER BEARING

(a) Check the bearing rotation condition and check for abnormal noise.

If the bearing is worn or damaged, replace the column upper tube.

(b) Coat the bearing with molybdenum disulfide lithium base grease.



12. INSPECT LOWER BEARING

(a) Check the bearing rotation condition of the main shaft assembly and check for abnormal noise.

If necessary, replace bearing.

(b) Coat the bearing with molybdenum disulfide lithium base grease.

SR0M6-04

INSTALLATION

1. INSTALL NO. 2 HOLE COVER

2. INSTALL HOSE CLAMP

3. INSTALL SLIDING YOKE

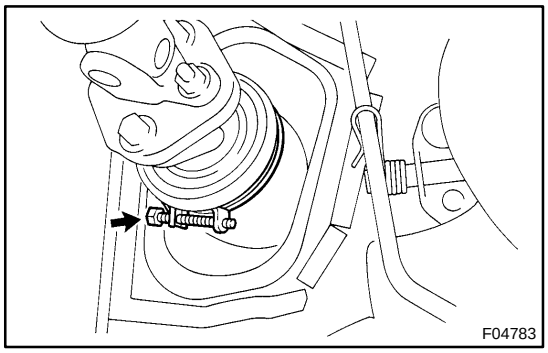
(a) Install the thrust stopper and sliding yoke to the steering column assembly.

(b) Install and temporarily tighten the bolt A.

4. INSTALL STEERING COLUMN ASSEMBLY

(a) Install the steering column assembly with the 4 nuts.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)



(b) Tighten the hose clamp.

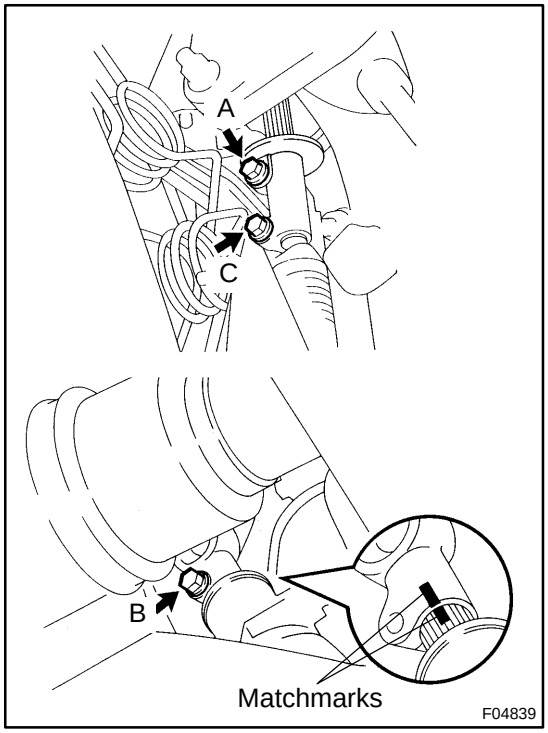
(c) Connect the connectors.

5. INSTALL HOLE COVER

Install the hole cover with the 4 bolts.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

6. INSTALL NO. 2 INTERMEDIATE SHAFT ASSEMBLY TO STEERING COLUMN ASSEMBLY



7. CONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Align the matchmarks on the No. 2 intermediate shaft and control valve shaft.

(b) Install the bolt C.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(c) Install the bolt B.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(d) Torque the bolt A.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

8. INSTALL NO. 2 HEATER TO REGISTER DUCT

Install the No. 2 heater to register duct with the screw.

9. INSTALL LH LOWER PANEL

Install the LH lower panel with the 4 bolts.

10. INSTALL LOWER NO. 1 PANEL

(a) Install the lower No. 1 panel with the screw.

(b) Connect the hood lock release lever and fuel lid release lever with the 4 screws.

11. INSTALL CLUSTER FINISH PANEL

Install the cluster finish panel and connector.

12. INSTALL COWL TRIM

Install the cowl trim with the clip.

13. INSTALL SCUFF PLATE

14. INSTALL SPIRAL CABLE (See page BE-31)

15. INSTALL COMBINATION SWITCH WITH SPIRAL CABLE

(a) Install the combination switch with the 3 screws.

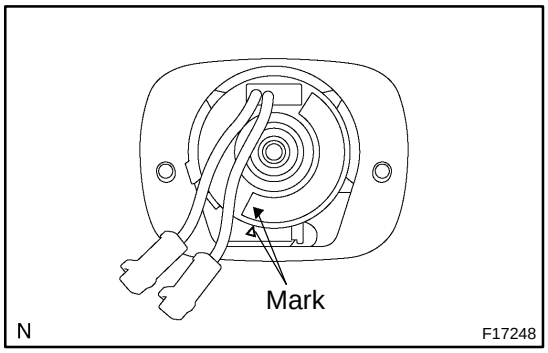
(b) Connect the airbag connector.

(c) Tilt steering column:
Connect the 3 connectors.

(d) w/ Power tilt and power telescopic steering column:
Connect the 5 connectors.

16. INSTALL UPPER AND LOWER COLUMN COVERS

Install the upper and lower column covers with the 3 screws.



17. CENTER SPIRAL CABLE

(a) Check that the front wheels are facing straight ahead.

(b) Turn the cable counterclockwise by hand until it becomes harder to turn the cable.

(c) Then rotate the cable clockwise about 2.5 turns to align the mark.

HINT:

The cable will rotate about 2.5 turns to either left or right of the center.

18. INSTALL STEERING WHEEL

(a) Align the matchmarks on the steering wheel and main shaft.

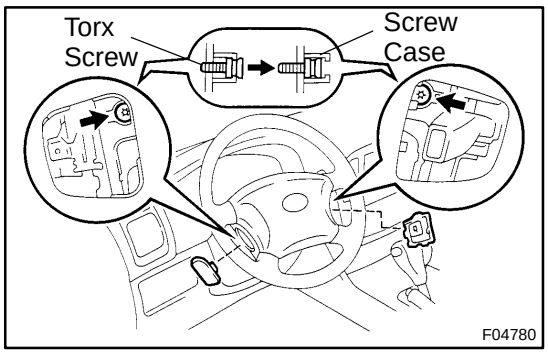
(b) Install the steering wheel set nut.
Torque: 50 N·m (510 kgf·cm, 37 ft·lbf)

(c) Connect the connector.

19. INSTALL STEERING WHEEL PAD

NOTICE:

- ★ **Never use airbag parts from another vehicle. When replacing parts, replace with new ones.**
- ★ **Make sure the wheel pad is installed to the specified torque.**
- ★ **If the wheel pad has been dropped, or there are cracks, dents or other defects in the case or connector, replace the wheel pad with a new one.**
- ★ **When installing the wheel pad, take care that the wirings do not interfere with other parts and are not pinched between other parts.**



(a) Connect the connector.
(b) Connect the airbag connector.
(c) Install the pad after confirming that the circumference groove of the torx screw is caught on the screws case.
(d) Using a torx socket wrench, torque the 2 screws.
Torque: 8.8 N·m (90 kgf·cm, 78 in.·lbf)
(e) Install the steering wheel lower No. 2 and No. 3 covers.

20. CHECK STEERING WHEEL CENTER POINT

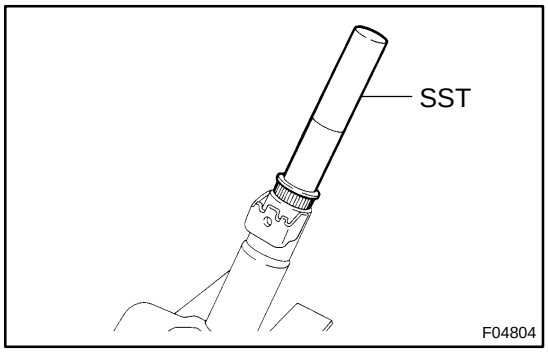
SR0RD-04

REASSEMBLY

NOTICE:

When using a vise, do not overtighten it.

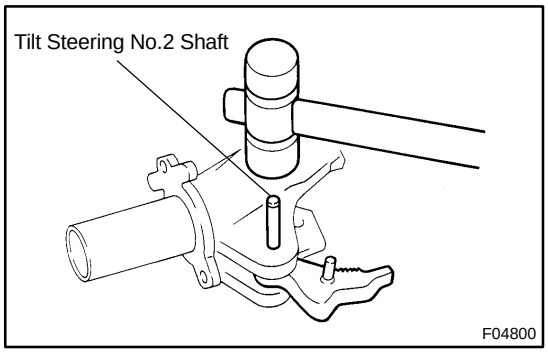
1. COAT PARTS INDICATED BY ARROWS WITH MOLYBDENUM DISULFIDE LITHIUM BASE GREASE (See page SR-12)



2. INSTALL BUSHING

(a) Coat a new bushing with molybdenum disulfide lithium base grease.

(b) Using SST and a hammer, tap in the bushing.
SST 09612-2201 1



3. INSTALL TILT STEERING PAWL

(a) Install a new pin to the pawl.

(b) Install the pawl to the column upper tube.

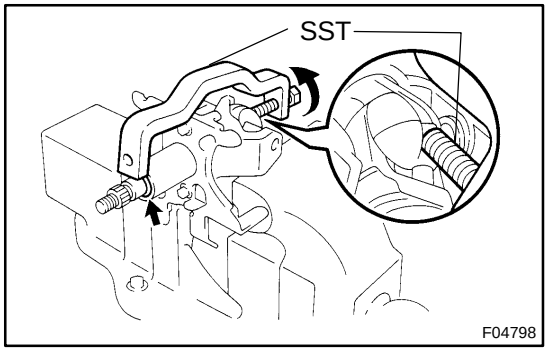
(c) Using a plastic hammer, tap in a new tilt steering No. 2 shaft.

NOTICE:

Tap the shaft completely into the steering column upper tube.

4. INSTALL TURN SIGNAL BRACKET

Install the turn signal bracket with the 2 bolts.



5. INSTALL MAIN SHAFT ASSEMBLY

(a) Install the bearing thrust collar and compression spring to the shaft.

(b) Install the shaft assembly to the column upper tube.

(c) Using SST, compress the compression spring.
SST 09950-4001 1 (09958-04011)

NOTICE:

Do not bend the universal joint of the shaft more than 20˚.

(d) Using a snap ring expander, install a new snap ring to the shaft.

6. INSTALL TILT LEVER RETAINER

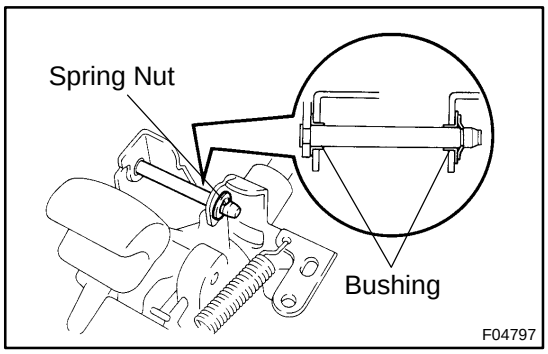
7. INSTALL COLUMN UPPER TUBE WITH MAIN SHAFT ASSEMBLY

(a) Install the column upper tube with the main shaft to the column tube.

(b) Using a hexagon wrench, torque the 2 tilt steering bolts.
Torque: 20 N·m (210 kgf·cm, 15 ft·lbf)

(c) Check that the upper tube turns smoothly.

8. INSTALL TILT LEVER LINK



9. INSTALL TILT LEVER

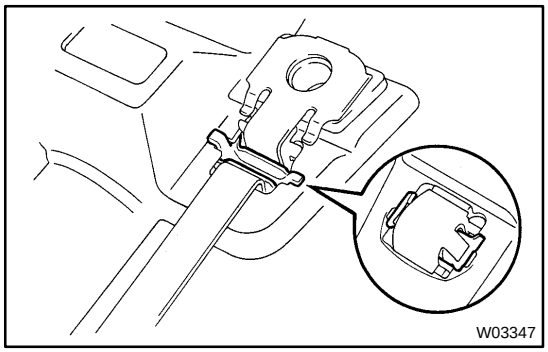
(a) Install the 2 bushings and tilt lever to the column upper tube, as shown in the illustration.

(b) Install a new spring nut to the lever.

10. INSTALL 4 TENSION SPRINGS

HINT:

Install the springs with the tilt function at maximum tilt up.



11. INSTALL 2 ENERGY ABSORBING PLATES

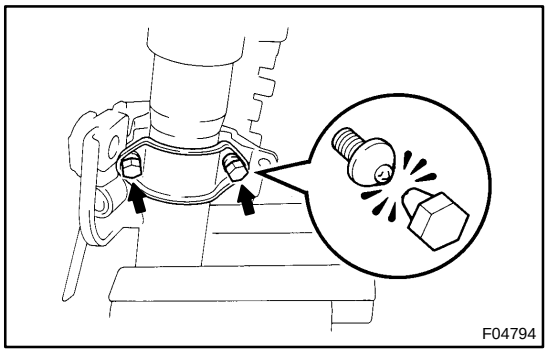
(a) Install the 2 new energy absorbing guides and 2 new absorbing plates.

(b) Install the 2 new energy absorbing clips.

12. INSTALL COLUMN TUBE SUPPORT

Install the tube attachment with the bolt to the column tube support.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

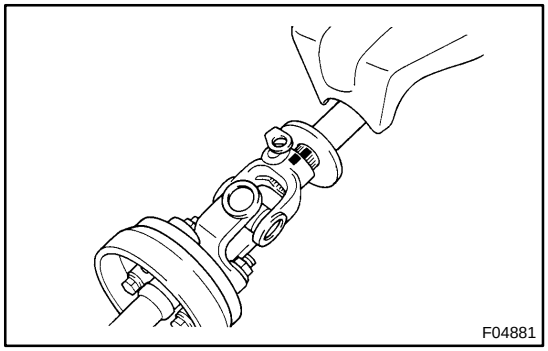


13. INSTALL COLUMN UPPER BRACKET AND COLUMN UPPER CLAMP

(a) Install the column upper bracket and column upper clamp with 2 new tapered-head bolts.

(b) Tighten the 2 new tapered-head bolts until the bolt heads break off.

14. INSTALL TRANSPONDER KEY AMPLIFIER ASSEMBLY



15. INSTALL INTERMEDIATE SHAFT ASSEMBLY

(a) Install the thrust stopper and upper side No. 2 lower cover.

(b) Align the matchmarks on the intermediate shaft assembly and main shaft assembly.

(c) Install the bolt.

Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

16. INSTALL NO. 2 LOWER COVER

Install the No. 2 lower cover with the 2 nuts.

Torque: 25 N·m (260 kgf·cm, 19 ft·lbf)

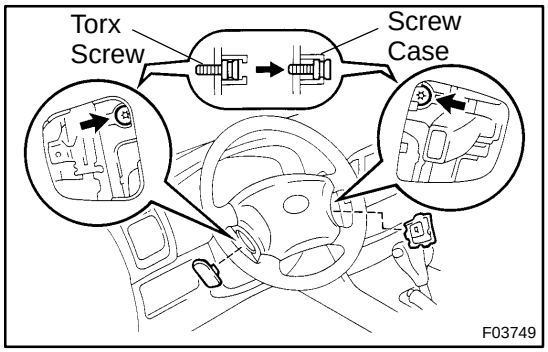
SR0M2-05

REMOVAL

1. REMOVE STEERING WHEEL PAD

NOTICE:

If the airbag connector is disconnected with the ignition switch at ON or ACC, DTCs will be recorded.



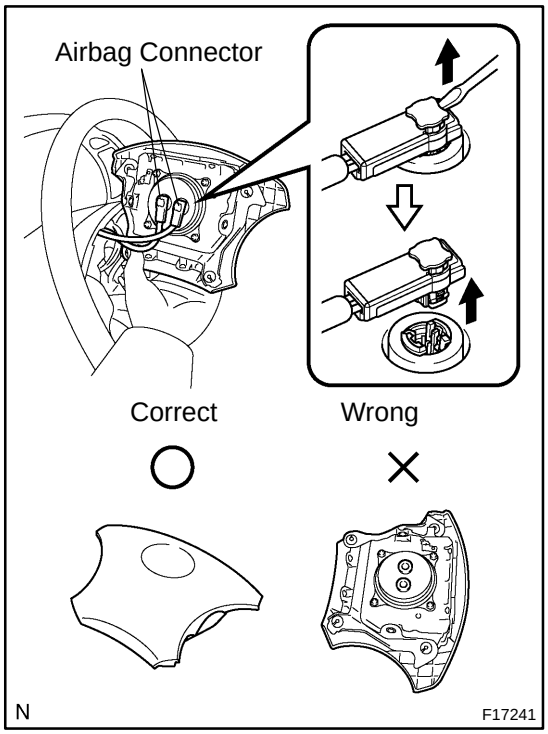
(a) Place the front wheels facing straight ahead.

(b) Remove the steering wheel lower No. 2 and No. 3 covers.

(c) Using a torx socket wrench, loosen the 2 torx screws.

HINT:

Loosen the 2 screws until the groove along the screw circumference catches on the screw case.



(d) Pull the pad out from the steering wheel and disconnect the 2 airbag connectors.

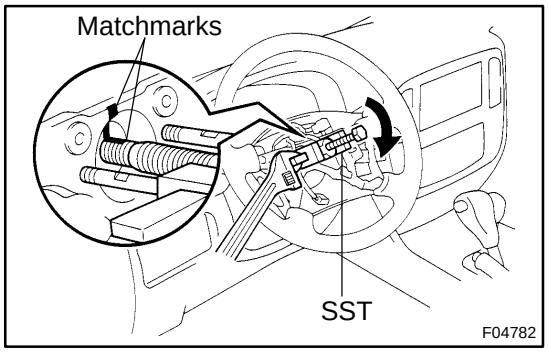
(e) Disconnect the connector.

CAUTION:

- ★ **When storing the wheel pad, keep the upper surface of the pad facing upward.**
- ★ **Never disassemble the wheel pad.**

NOTICE:

When removing the wheel pad, take care not to pull the airbag wire harness.



2. REMOVE STEERING WHEEL

(a) Disconnect the connector.

(b) Remove the steering wheel set nut.

(c) Place matchmarks on the steering wheel and main shaft assembly.

(d) Using SST, remove the wheel.

SST 09950- 50013 (09951- 05010, 09952- 05010, 09953-05020, 09954-05021)

3. REMOVE UPPER AND LOWER COLUMN COVERS

Remove the 3 screws, upper and lower column covers.

4. REMOVE COMBINATION SWITCH WITH SPIRAL CABLE

(a) Tilt steering column:
Disconnect the 3 connectors.

(b) w/ Power tilt and power telescopic steering column:
Disconnect the 5 connectors.

(c) Disconnect the airbag connector.

(d) Remove the 3 screws and combination switch.

5. REMOVE SPIRAL CABLE (See page BE-31)

NOTICE:

Do not disassembly the cable or apply oil to it.

6. REMOVE SCUFF PLATE

7. REMOVE COWL TRIM

Remove the clip and cowl trim.

8. REMOVE CLUSTER FINISH PANEL

Remove the connector and cluster finish panel.

9. REMOVE LOWER NO. 1 PANEL

(a) Remove the 2 screws and disconnect the hood lock release lever from the panel.

(b) Remove the 2 screws and disconnect the fuel lid release lever from the panel.

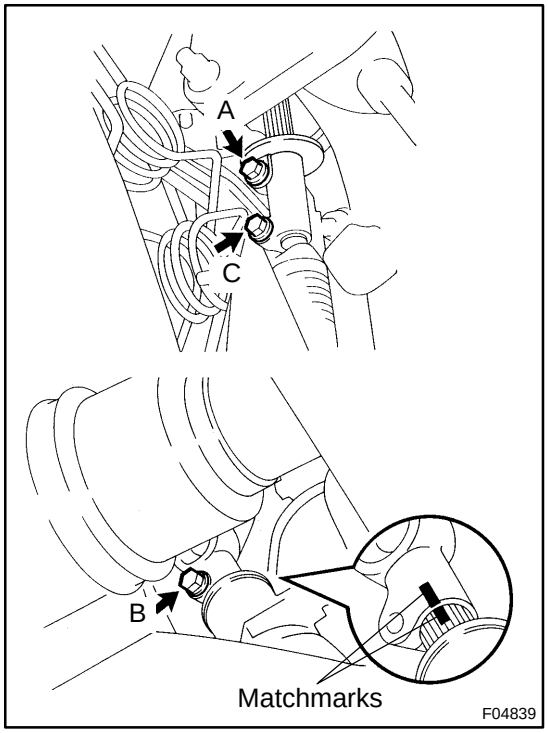
(c) Remove pad set screw and lower No. 1 panel.

10. REMOVE LH LOWER PANEL

Remove the 4 bolts and LH lower panel.

11. REMOVE NO. 2 HEATER TO REGISTER DUCT

Remove the screw and No. 2 heater to register duct.



12. DISCONNECT NO. 2 INTERMEDIATE SHAFT ASSEMBLY

(a) Place matchmarks on the No. 2 intermediate shaft and control valve shaft.

(b) Loosen the bolt A.

(c) Remove the bolt B and the bolt C, disconnect the No. 2 intermediate shaft from the control valve shaft and sliding yoke.

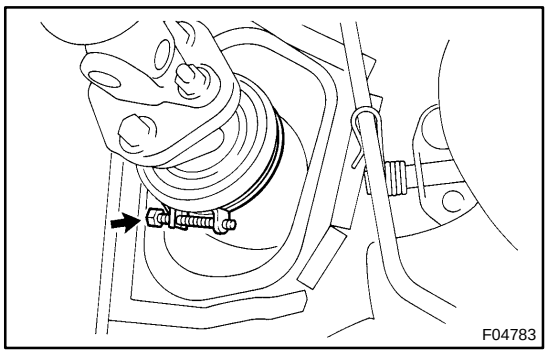
13. REMOVE NO. 2 INTERMEDIATE SHAFT ASSEMBLY

14. REMOVE HOLE COVER

Remove the 4 bolts and hole cover.

15. REMOVE STEERING COLUMN ASSEMBLY

(a) Disconnect the connectors.



(b) Loosen the hose clamp.
(c) Remove the 4 nuts and steering column assembly.

16. REMOVE SLIDING YOKE

(a) Remove the bolt A and sliding yoke.
(b) Remove the thrust stopper from the intermediate shaft assembly.

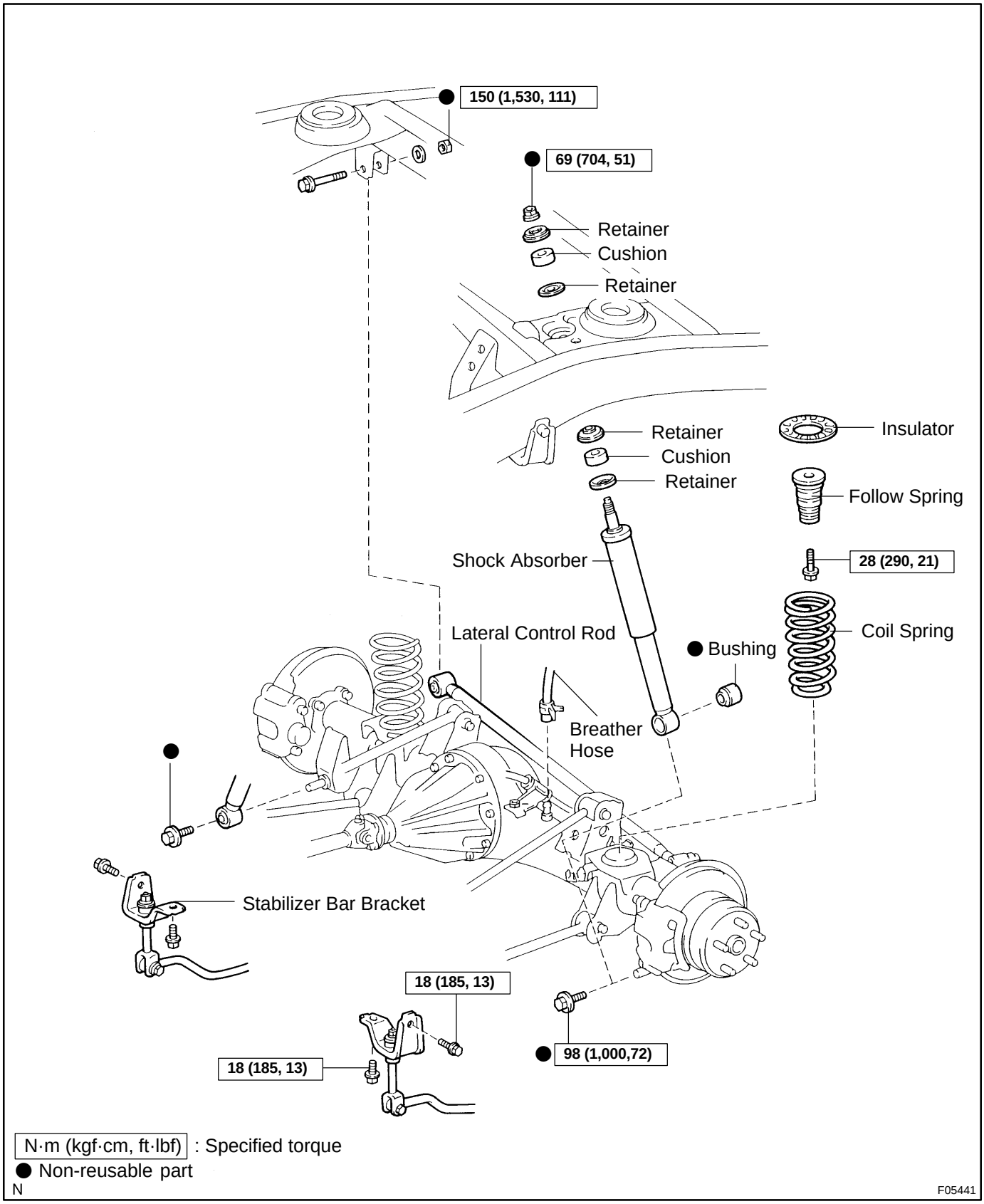
17. REMOVE HOSE CLAMP

18. REMOVE NO. 2 HOLE COVER

COIL SPRING AND REAR SHOCK ABSORBER

COMPONENTS

SA169-02

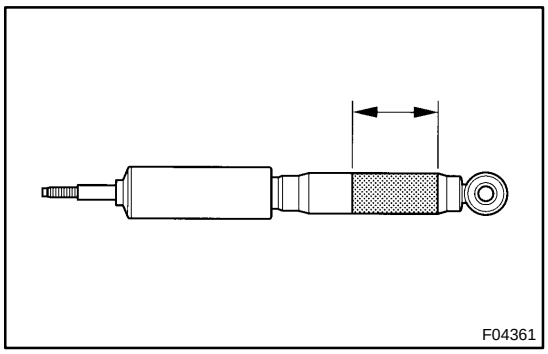


N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

N

F05441

SA16C-03



DISPOSAL

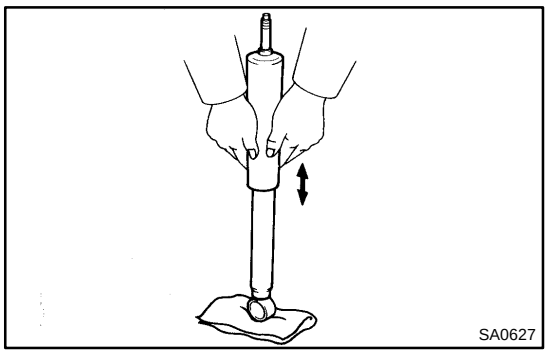
DISCARD SHOCK ABSORBER

Before discarding the shock absorber, drill a hole of 2 - 3 mm (0.079 - 0.118 in.) in diameter at the location shown in the illustration to discharge the gas inside.

NOTICE:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non-poisonous.**

SA16B-02



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

NOTICE:

When disposing the shock absorber, see DISPOSAL on page SA-175 .

SA16E-01

INSTALLATION

Installation is in the reverse order of removal (See page SA-172).

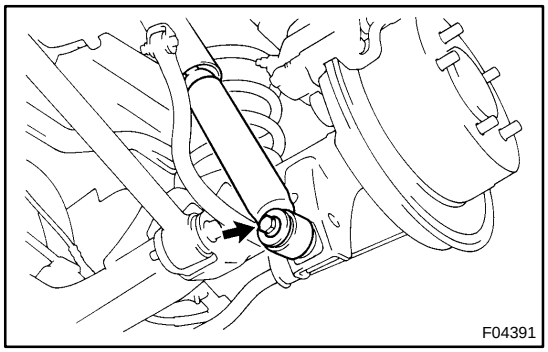
SA16A-02

REMOVAL

1. REMOVE REAR WHEELS

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. SUPPORT REAR AXLE HOUSING WITH JACK

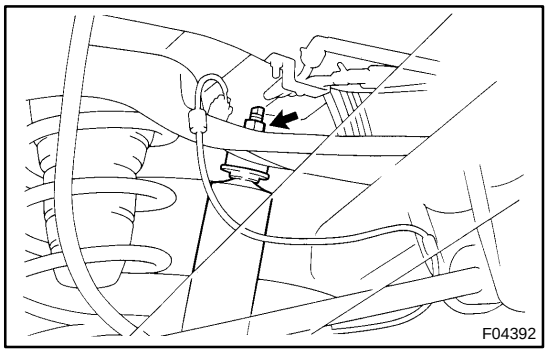


3. REMOVE SHOCK ABSORBER

(a) Remove the bolt and disconnect the shock absorber from the axle housing.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

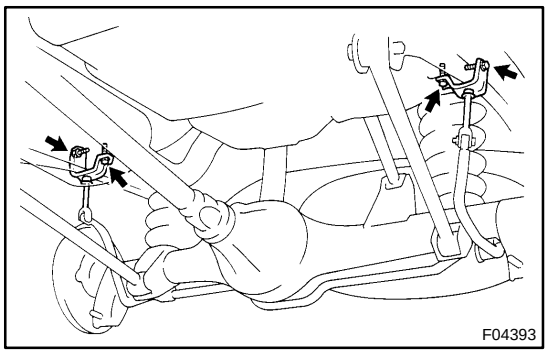
(b) Employ the same manner described above to the other side.



(c) While holding the piston rod, remove the nut, 2 retainers, cushion and shock absorber.

Torque: 69 N·m (704 kgf·cm, 51 ft·lbf)

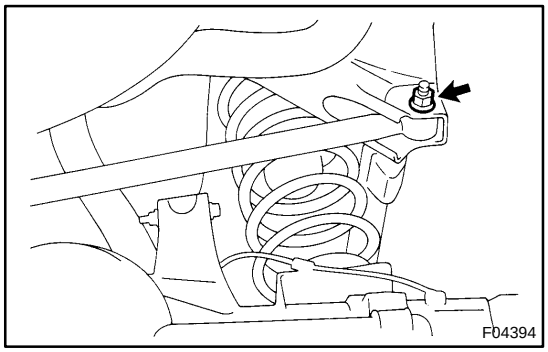
(d) Remove the 2 retainers and cushion from the shock absorber.



4. DISCONNECT LH AND RH STABILIZER BAR BRACKETS

Remove the 4 bolts and disconnect the LH and RH stabilizer bar brackets.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



5. DISCONNECT LATERAL CONTROL ROD

Remove the nut, washer, bolt and disconnect the lateral control rod.

Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:

At the time of installation, after stabilizing the suspension, torque the nut and bolt.

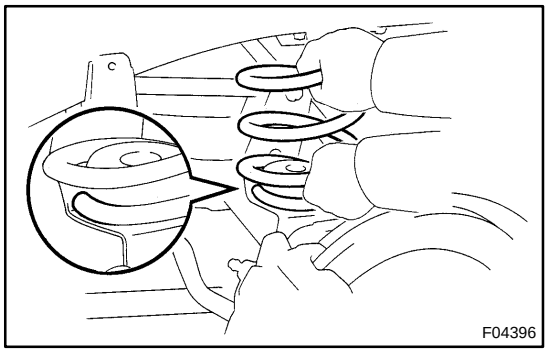
6. DISCONNECT BREATHER HOSE

7. REMOVE COIL SPRING

(a) Begin to lower the axle housing.

NOTICE:

Be careful not to snap the brake line and parking brake cable.

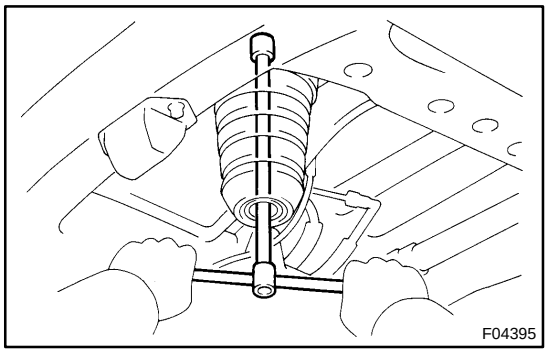


(b) While lowering the axle housing, remove the coil spring and insulator.

HINT:

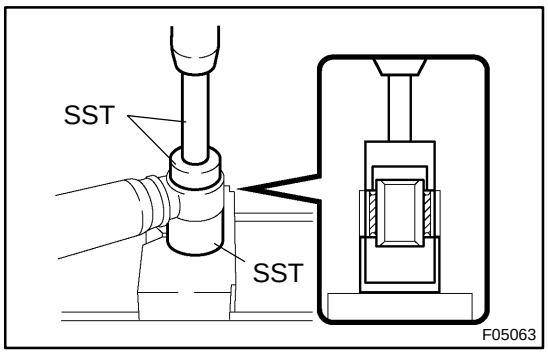
At the time of installation, please refer to the following items.

- Check that the coil spring end is installed correctly.
- If the coil spring end is not in the correct position, reinstall the coil spring.



(c) Remove the bolt and follow spring from the frame.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

SA16D-02

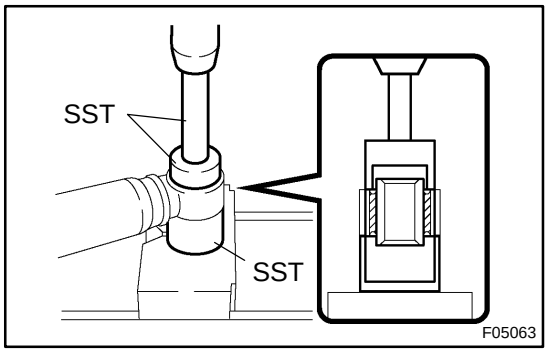


REPLACEMENT

1. REMOVE BUSHING

Using SST and a press, remove the bushing.

SST 09710-14013 (09710-00061),
09710-28012 (09710-07031),
09950-70010 (09951-07100)

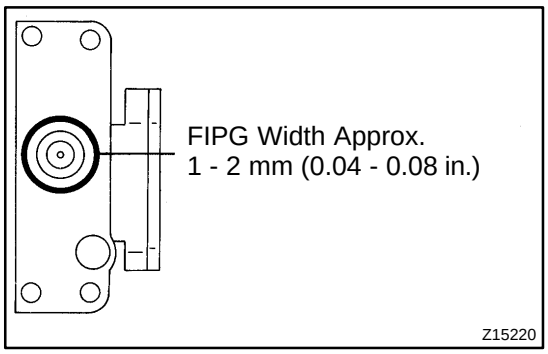


2. INSTALL BUSHING

Using SST and a press, install a new bushing.

SST 09710-14013 (09710-00061),
09710-28012 (09710-07031),
09950-70010 (09951-07100)

SA168-05



INSTALLATION

1. INSTALL ACTUATOR

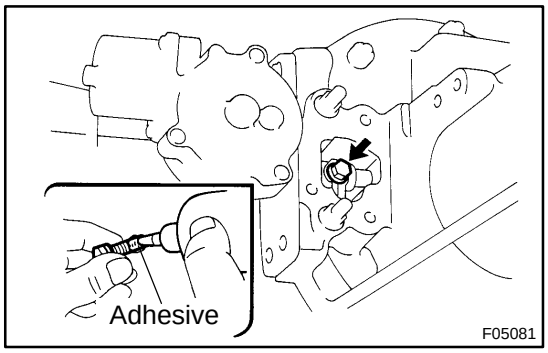
(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.

(b) Apply FIPG to the actuator.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.

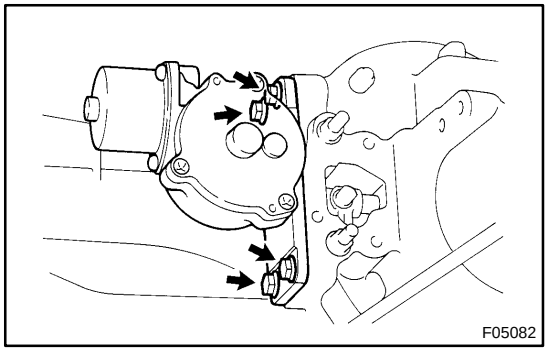
(c) Install the actuator to the differential and match the shaft with the shaft fork hole.

(d) Clean the threads of the set bolt and shaft fork with the white gasoline.

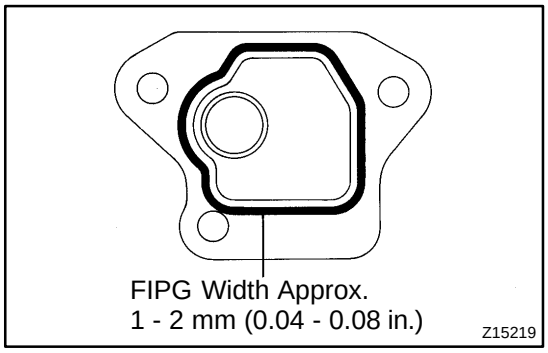


(e) Coat the threads of the set bolt with adhesive.
Adhesive:
Part No. 08833-00070, THREE BOND 1324 or equivalent

(f) Tighten the shift fork set bolt.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



(g) Tighten the 4 bolts uniformly, a little at time.
Torque: 24 N·m (240 kgf·cm, 18 ft·lbf)



2. INSTALL COVER

(a) Clean the contacting surfaces of any FIPG material using gasoline or alcohol.

(b) Apply FIPG to the cover.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

HINT:
Install the cover within 10 minutes after applying FIPG.

(c) Install the cover with the 3 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

3. INSTALL REAR DIFF. LOCK POSITION SWITCH

Install the diff. lock position switch with a new gasket.

Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

4. CONNECT CONNECTORS AND TUBE

HINT:

- The depth of the insertion of the bleeder tube into the hose is approx. 15 mm (0.59 in.).
- Take care that the water or the equivalent will not adhere to the connectors and hose.

5. INSTALL NO. 2 ACTUATOR PROTECTOR

Install the No. 2 actuator protector with the 2 nuts.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

6. INSTALL NO. 1 ACTUATOR PROTECTOR

Install the No. 1 actuator protector with the nut and bolt.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

7. CANCEL REAR DIFFERENTIAL LOCK POSITION

(a) Connect the cable to the negative terminal of the battery.

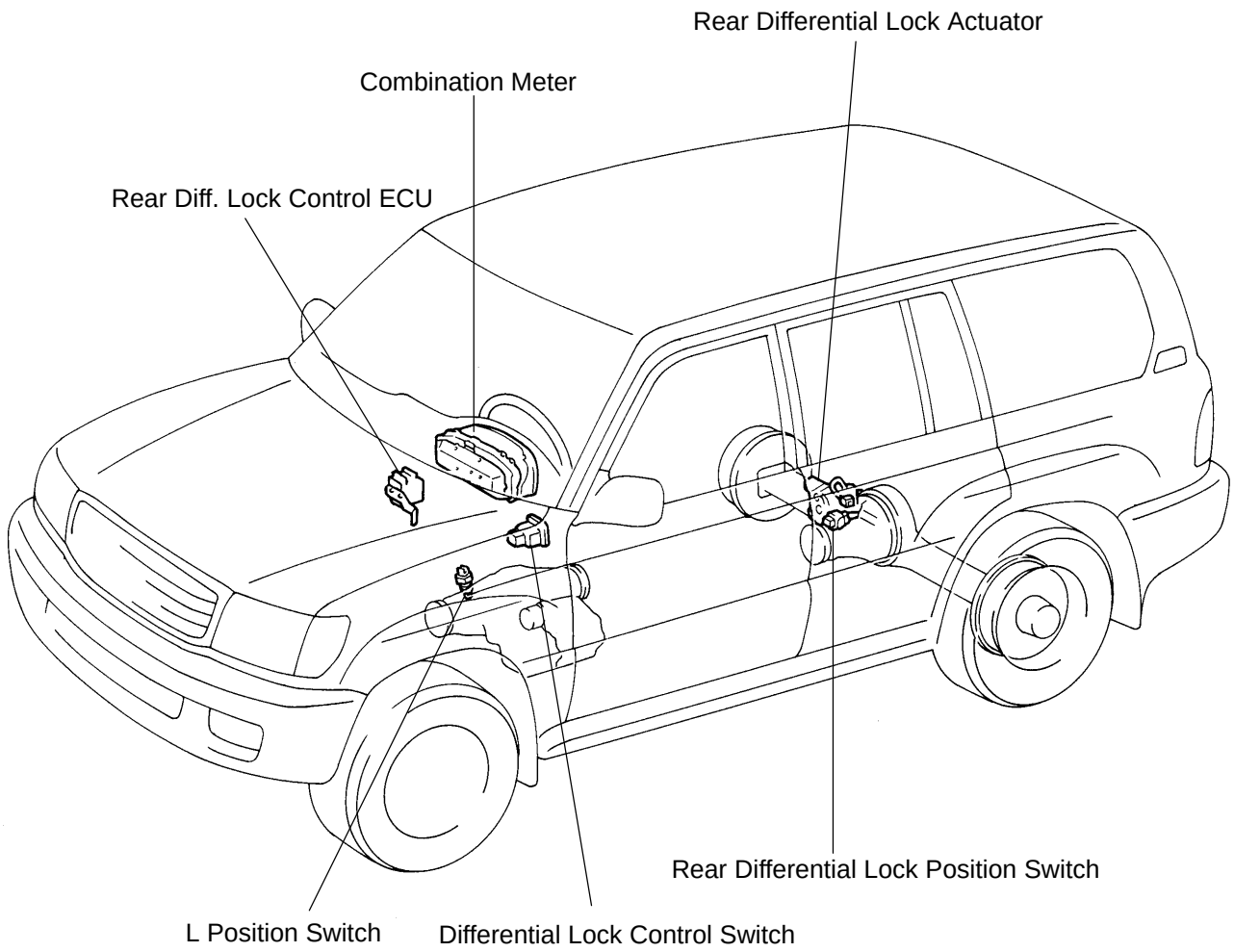
(b) Turn the ignition switch to the ON position.

(c) Turn the differential lock control switch to the OFF position and cancel the differential lock.

(d) Shift the transfer shift lever to H position.

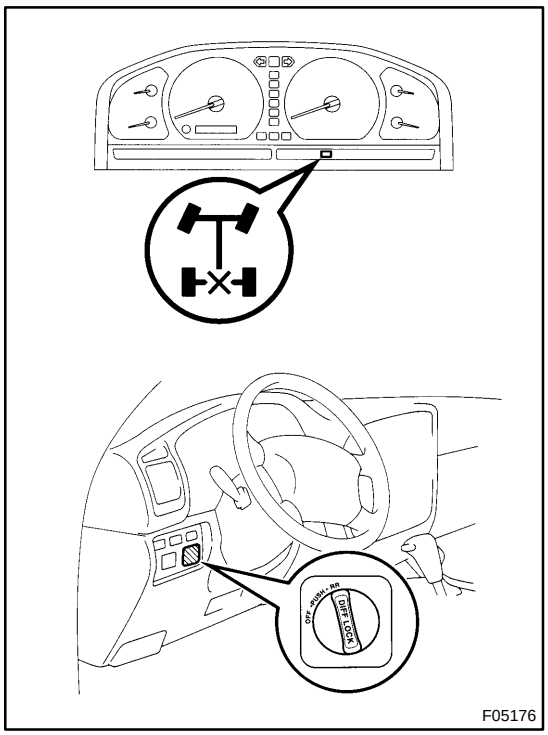
SA166-05

LOCATION



N

F05440



DIFFERENTIAL LOCKING SYSTEM

SA165-06

ON-VEHICLE INSPECTION

1. INSPECT DIFFERENTIAL LOCK SYSTEM

(a) Inspect the indicator light.
Check that the indicator light lights up for approx. 1 second when the ignition switch is turned ON.

(b) Inspect the differential lock operation.

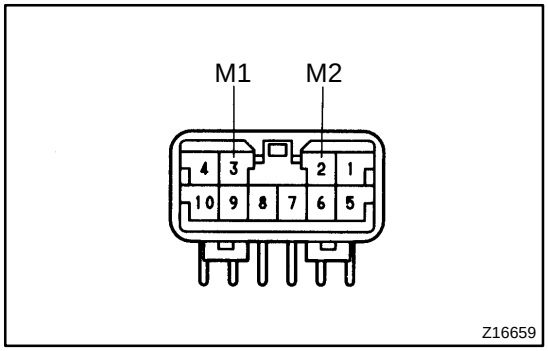
(1) Jack up the vehicle then start the engine.

(2) Shift the transfer shift lever to L position.

(3) When the diff. lock control switch is set to the RR position, the indicator light is turned on.
Differential lock is applied to the rear wheel at this time.

HINT:
If the gears of the differential lock system are not meshed, the indicator light remains blinking, so rotate the tires to mesh the gear.

(4) When the diff. lock control switch is at the OFF position, the indicator light goes off.
Differential lock is released for the rear wheel at this time.



(5) Check the voltage between the terminals of the rear diff. lock control ECU when switching the diff. lock control switch with the speedometer, registering approx. 8 km/h (5 mph) or more.

Swith position	Terminal	Specified value
ON	M1 - M2	0.5 V or less (No change)

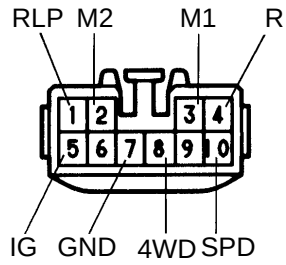
(6) Return the diff. lock control switch to OFF.

(7) Stop the engine and lower the vehicle.

2. INSPECT DIFF. LOCK SYSTEM CIRCUIT

(a) Inspect the battery positive voltage.
Battery positive voltage: 10 - 14 V

Wire harness:

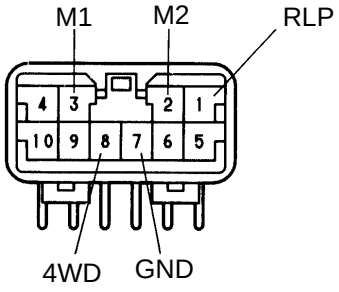


(b) Inspect the system circuit with the connector disconnected.
Disconnect the connector from the rear diff. lock control ECU and inspect the connector on the wire harness side, as shown in the table.

Symbols (Terminals No.)	Trouble part	Condition	Specified value
M1 - M2	RR Diff. Lock Actuator	-	Less than 100 Ω
GND - Body ground	Body ground	-	Continuity
SPD - Body ground	Speed sensor	Vehicle moves slowly	1 pulse each 40 cm (15.75 in.)
IG - Body ground	DIFF Fuse	Ignition switch ON	10 - 14 V
RLP - Body ground	Rear Diff. Lock Indicator Switch	Ignition switch ON with indicator light ON	About 0 V
		Ignition switch ON with indicator light OFF	10 - 14 V
4WD - Body ground	L position Switch	Ignition switch ON with T/F shift lever except L	About 0 V
		Ignition switch ON with T/F shift lever L	10 - 14 V
R - Body ground	Differential Lock Control Switch	Ignition switch ON with differential lock control switch RR	10 - 14 V
		Ignition switch ON with differential lock control switch OFF	About 0 V

HINT:
If the circuit is not as specified value, check and repair or replace the trouble part shown in the table above.

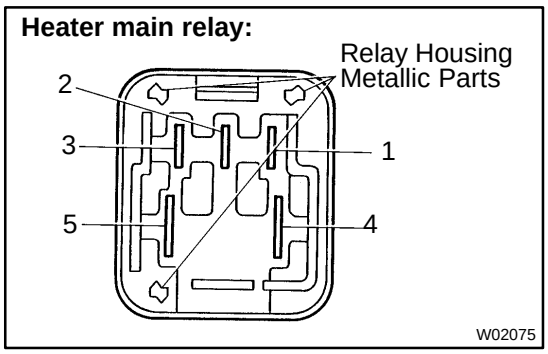
ECU:



(c) Inspect the system circuit with the connector connected.
(1) Turn the ignition switch to the ON position.
(2) Shift the transfer shift lever to L position.
(3) Using a voltmeter, measure the voltage when the differential lock control switch is in the position, as shown in the table.

Tester Connection ⊕ - ⊖	Switch position	Specified valve
4WD - GND	-	10 - 14 V
RLP - GND	RR*	0.5 V or less
M1 - M2	OFF → RR	0.5 V or less → 10 - 14 V (Approx. 1 sec.) → 0.5 V or less
M2 - M1	RR → OFF	

*: The rear differential should be locked mechanically.
If the circuit is not as specified value, replace the ECU.
(4) Install the ECU in place.



3. INSPECT DIFF. LOCK COMPONENTS

(a) Inspect the relay operation.

(1) Jack up the vehicle.

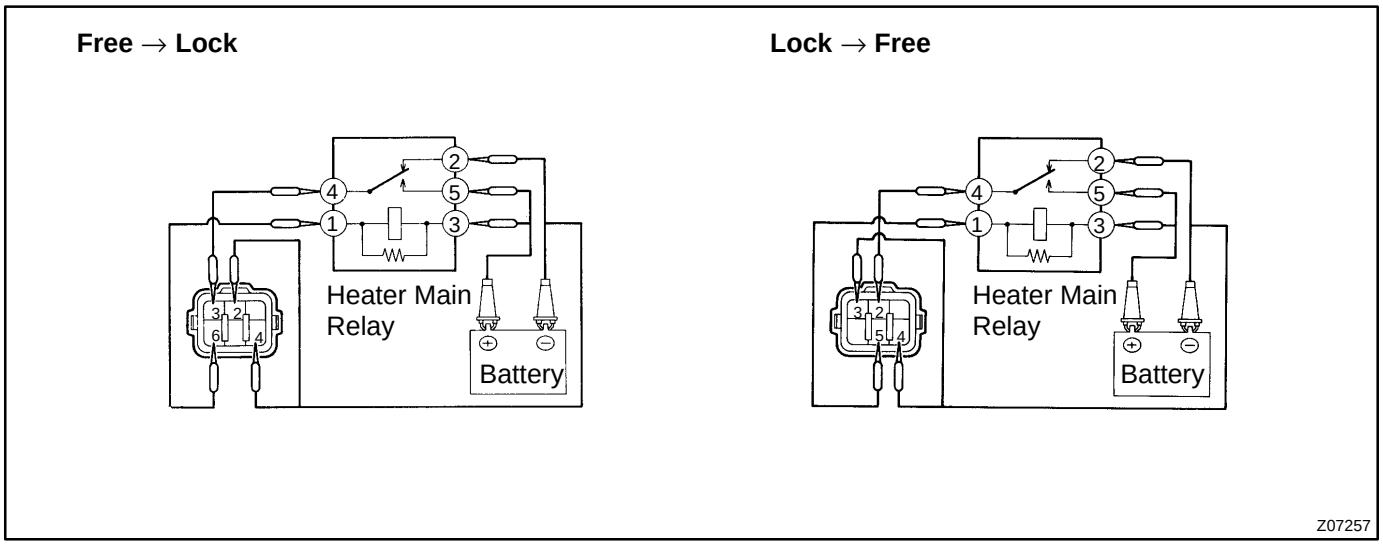
(2) Use a heater main relay and connect it, as shown below.

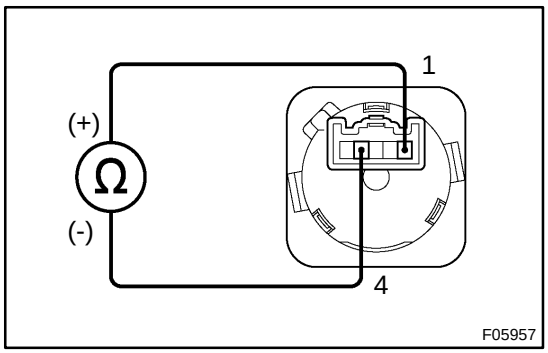
NOTICE:

Connect the terminals being careful not to touch the neighboring terminals or metallic parts of the relay housing.

(3) Rotate the tire and check that differential lock has occurred.

If operation is not as specified, replace the actuator.



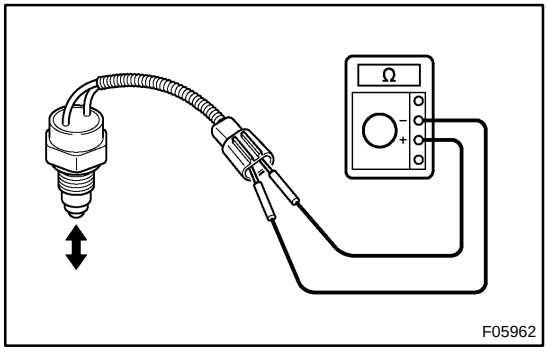


(b) Inspect the diff. lock control switch continuity.

Inspect the switch continuity between terminal 1 to terminal 4.

HINT:

If continuity dose not exist, replace the switch.



(c) Inspect the diff. lock indicator switch.

(1) Check that continuity between exists terminals when the switch is pushed (differential connected position).

(2) Check that no continuity exists when the switch is free (differential disconnected position).

HINT:

If operation is not as specified, replace the switch.

(d) Inspect the L position switch (See page TR-49).
(e) Inspect the vehicle speed sensor (See page BE-63).

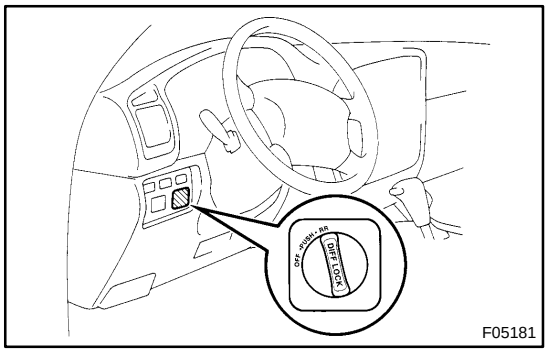
SA167-05

REMOVAL

1. SHIFTING REAR DIFF. LOCK POSITION

(a) Turn the ignition switch to the ON position.

(b) Shift the transfer shift lever to L position.



F05181

(c) Turn the differential lock control switch to the RR position and lock the rear differential.

HINT:

While rotating the rear wheels, check they are in the differential lock condition.

(d) Disconnect the cable from the negative terminal of the battery.

2. REMOVE NO. 1 ACTUATOR PROTECTOR

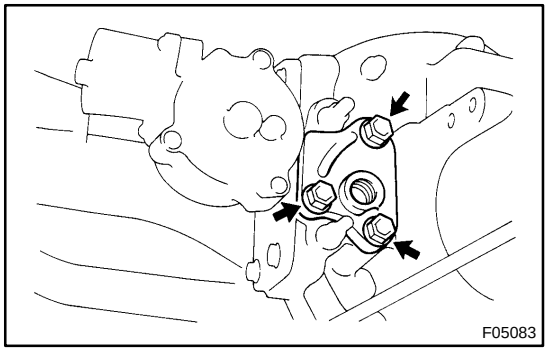
Remove the nut, bolt and No. 1 actuator protector.

3. REMOVE NO. 2 ACTUATOR PROTECTOR

Remove the 2 nuts and No. 2 actuator protector.

4. DISCONNECT CONNECTORS AND TUBE

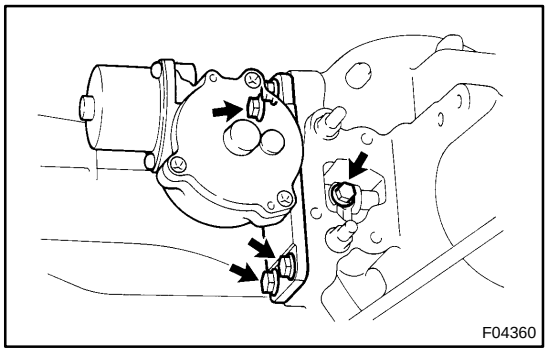
5. REMOVE REAR DIFF. LOCK POSITION SWITCH


F05083

6. REMOVE COVER

(a) Remove the 3 bolts.

(b) Using a brass bar and hammer, remove the cover.


F04360

7. REMOVE ACTUATOR

(a) Remove the shift fork set bolt.

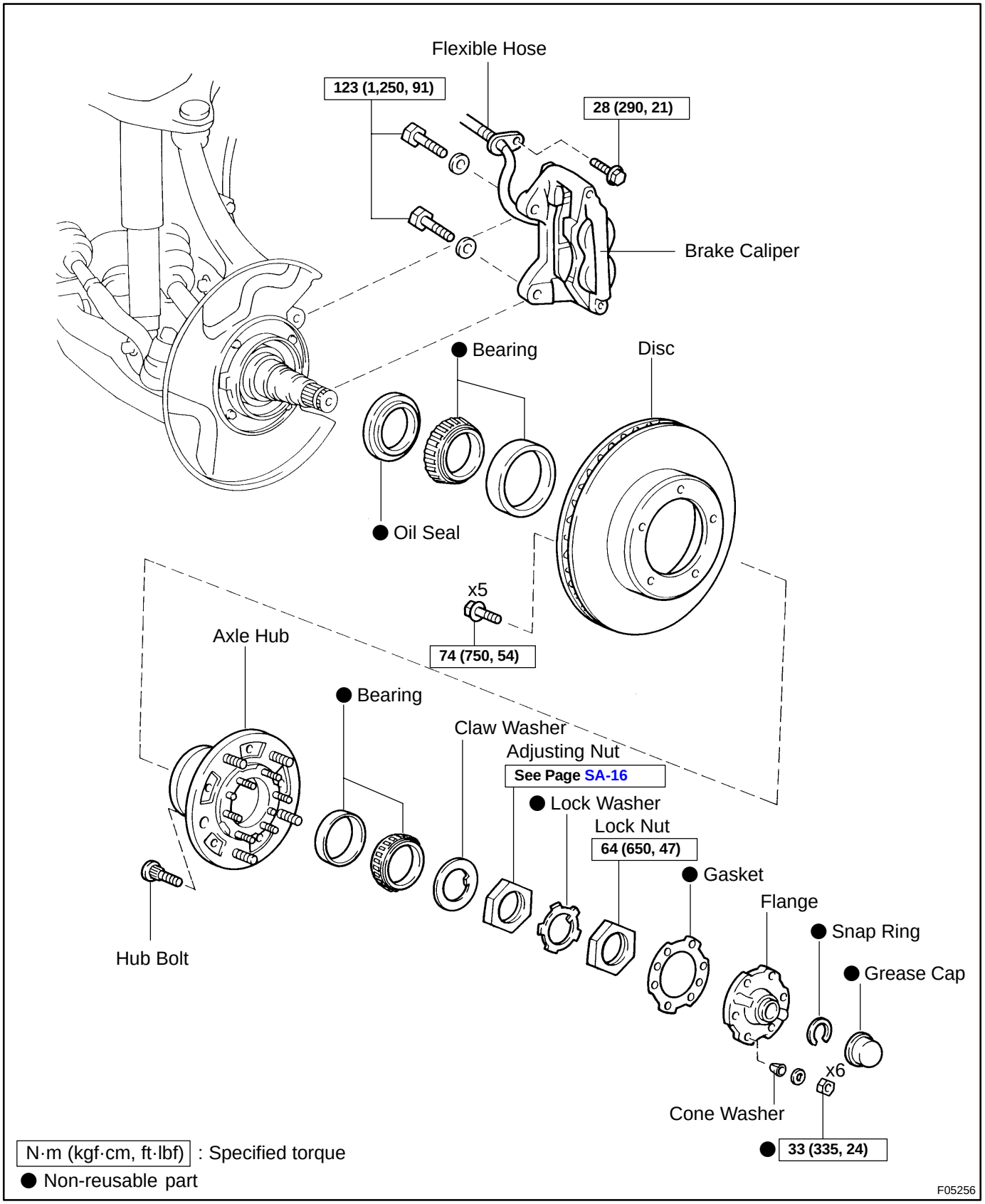
(b) Remove the 4 bolts.

(c) Using a screwdriver, pry out the actuator.

FRONT AXLE HUB

COMPONENTS

SA143-04



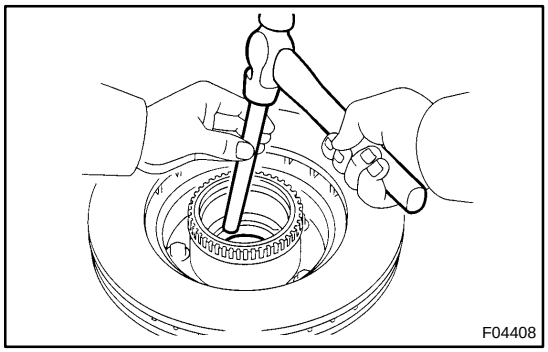
SA145-04

DISASSEMBLY

1. REMOVE OIL SEAL AND BEARING

(a) Using a screwdriver, pry out the oil seal.

(b) Remove the bearing from the axle hub.

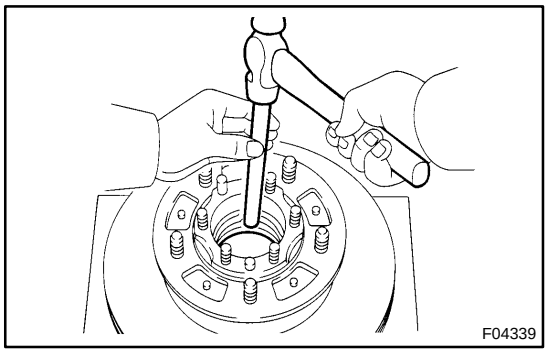


2. REMOVE BEARING OUTER RACES

(a) Using a brass bar and hammer, remove the outside bearing outer race.

NOTICE:

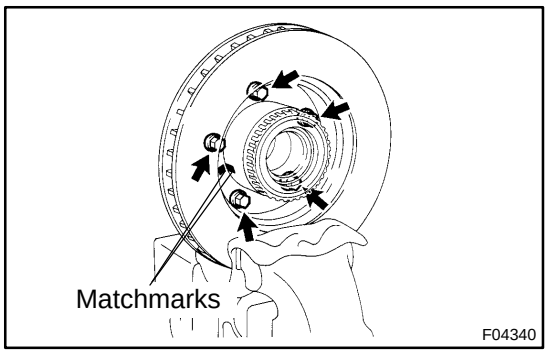
Be careful not to damage the ABS speed sensor rotor.



(b) Using a brass bar and hammer, remove the inside bearing outer race.

3. INSPECT BEARINGS

Clean the bearings and outer races and inspect them for wear or damage.



4. REMOVE DISC

(a) Mount the axle hub with the disc in a soft jaw vice.

NOTICE:

Close vice until it holds disc, do not tighten further.

(b) Place matchmarks on the axle hub and disc.

(c) Remove the 5 bolts and separate the axle hub and disc.

SA147-09

INSTALLATION

1. INSTALL AXLE HUB TO STEERING KNUCKLE

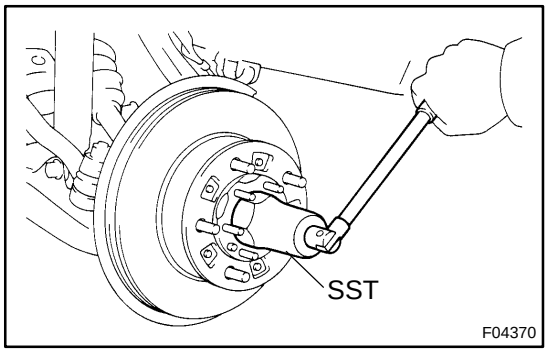
(a) Place the axle hub with disc to the steering knuckle.

NOTICE:

Be careful not to damage the ABS speed sensor rotor and oil seal.

(b) Install the outer bearing.

(c) Install the claw washer.



2. ADJUST PRELOAD

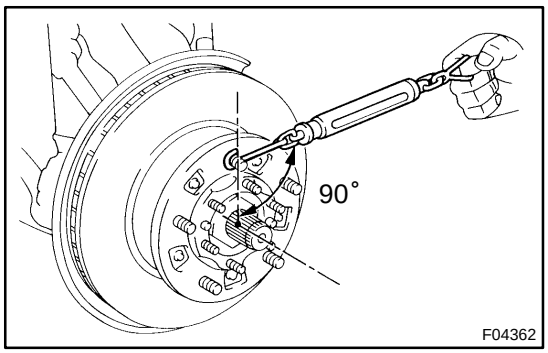
(a) Install the adjusting nut and using SST, tighten it.
SST 09607-60020
Torque: 59 N·m (600 kgf·cm, 43 ft·lbf)

(b) Turn the axle hub several times to settle down the bearing.

(c) Using SST, loosen the adjusting nut until it can rotate by hand.
SST 09607-60020

(d) Using SST, retighten the adjusting nut.
SST 09607-60020
Torque: 4.3 - 6.5 N·m (44 - 66 kgf·cm, 38 - 57 in.·lbf)

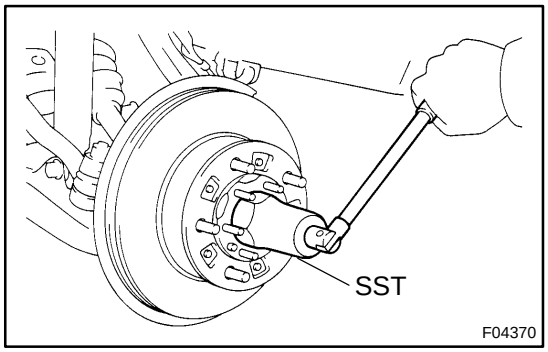
HINT:
Check that there is no looseness on the bearing.



(e) Using a spring tension gauge, measure the preload.
Preload (at starting):
42 - 67 N (4.3 - 6.8 kgf, 9.5 - 15.0 lbf)

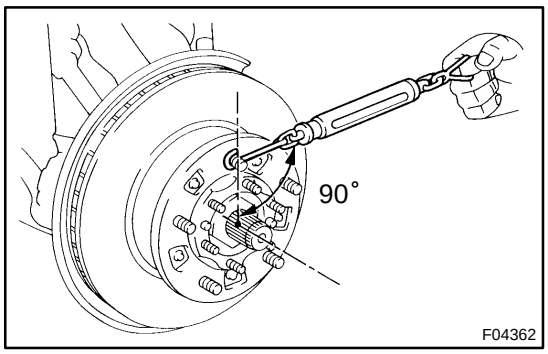
3. INSTALL LOCK WASHER AND LOCK NUT

(a) Install a new lock washer and the lock nut.



(b) Using SST, torque the lock nut.
SST 09607-60020
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

(c) Check that the axle hub rotates smoothly and there is no looseness on the bearing.



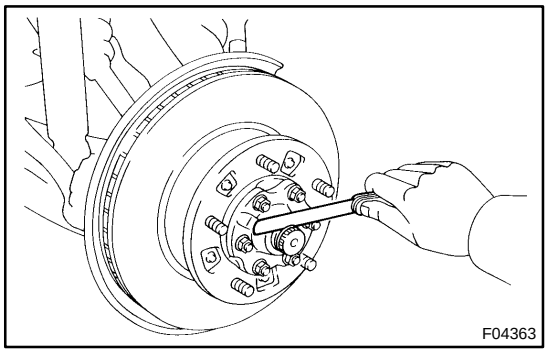
(d) Using a spring tension gauge, check the preload.
Preload (at starting):
42 - 67 N (4.3 - 6.8 kgf, 9.5 - 15.0 lbf)

HINT:
Make sure to check preload in the direction of rotation.
If the preload is not within the specified value, adjust it again with the adjusting nut.

(e) Secure the lock nut by bending one of the lock washer teeth inward and the other lock washer teeth outward.

4. INSTALL FLANGE

(a) Place a new gasket in position on the axle hub.
(b) Install the flange to the axle hub.
(c) Install the 6 cone washers, washers and new nuts.
Torque: 33 N·m (335 kgf·cm, 24 ft·lbf)



(d) Pull out the drive shaft to the outside of the vehicle and select the snap ring which ensures the clearance between the tip of the flange and the snap ring is less than 0.2 mm (0.008 in.).

Snap ring thickness:

1.8 mm (0.0709 in.)	2.4 mm (0.0945 in.)
2.0 mm (0.0787 in.)	2.6 mm (0.1024 in.)
2.2 mm (0.0866 in.)	2.8 mm (0.1102 in.)

(e) Using a snap ring expander, install a new snap ring to the drive shaft.
(f) Install a new grease cap to the flange.

5. INSTALL BRAKE CALIPER

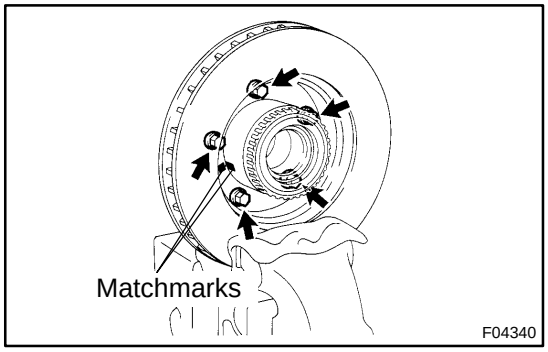
(a) Install the brake caliper, washers and 2 bolts.
Torque: 123 N·m (1,250 kgf·cm, 91 ft·lbf)
(b) Install the flexible hose and bolt to the steering knuckle.
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

6. INSTALL FRONT WHEEL
Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

7. CHECK ABS SPEED SENSOR SIGNAL
(See page DI-505)

SA146-04

REASSEMBLY



1. INSTALL DISC

(a) Mount the disc in a soft jaw vice.

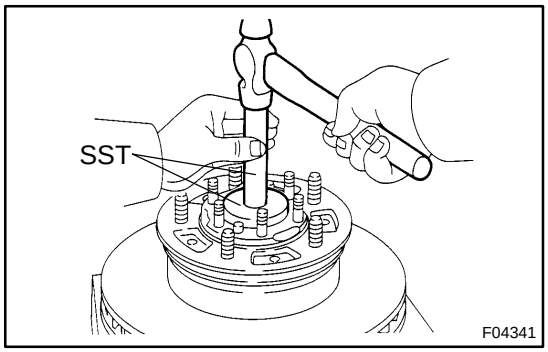
NOTICE:

Close vice until it holds disc, do not tighten further.

(b) Align the matchmarks on the axle hub and disc.

(c) Install the 5 bolts to the axle hub.

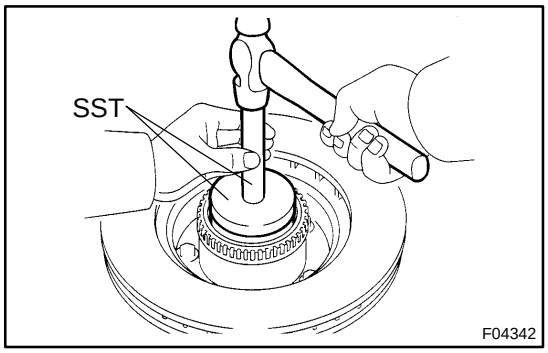
Torque: 74 N·m (750 kgf·cm, 54 ft·lbf)



2. INSTALL BEARING OUTER RACES

(a) Using SST and a hammer, carefully install a new outside bearing outer race.

SST 09950-60020 (09951-00730),
09950-70010 (09951-07100)

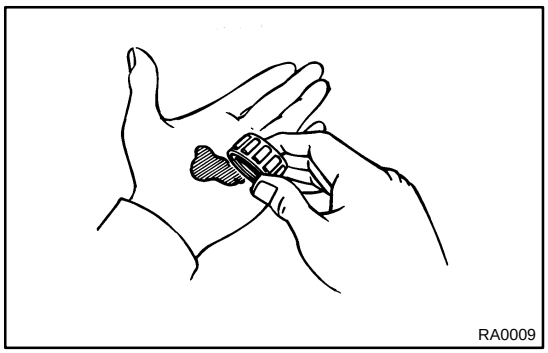


(b) Using SST and a hammer, carefully install a new inside bearing outer race.

SST 09950-60020 (09951-00890),
09950-70010 (09951-07100)

NOTICE:

Be careful not to damage the ABS speed sensor rotor.

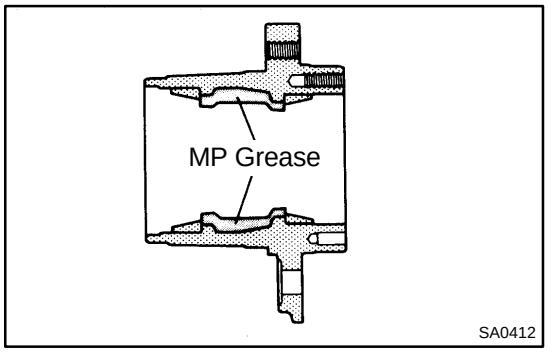


3. PACK BEARING WITH MP GREASE

(a) Place MP grease in the palm of your hand.

(b) Pack grease into a new bearing, continuing until the grease oozes out from the other side.

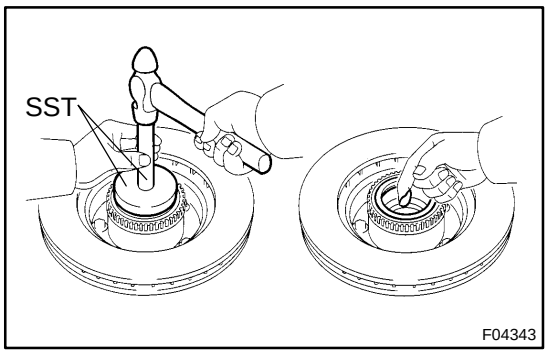
(c) Employ the same manner around the bearing circumference.



4. COAT INSIDE OF AXLE HUB WITH MP GREASE

5. INSTALL INNER BEARING AND OIL SEAL

(a) Place the inner bearing into the axle hub.



(b) Using SST and a hammer, install a new oil seal into the axle hub.

SST 09950-60020 (09951-01030),
09950-70010 (09951-07100)

NOTICE:

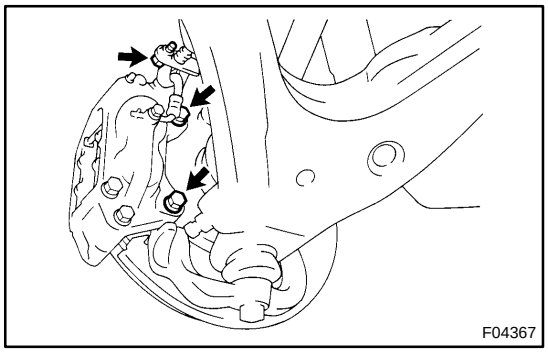
Be careful not to damage the ABS speed sensor rotor.

(c) Coat the lip of the oil seal with MP grease.

SA144-04

REMOVAL

1. REMOVE FRONT WHEEL

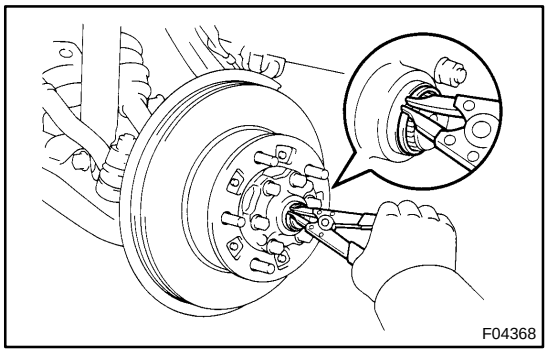

F04367

2. REMOVE BRAKE CALIPER

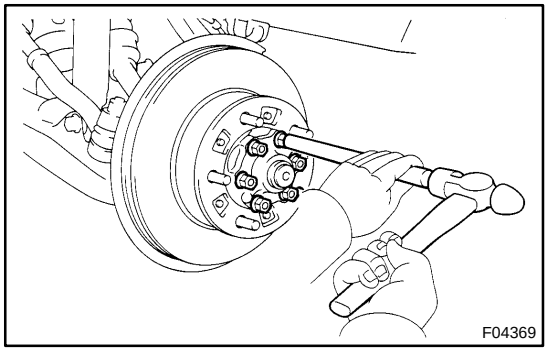
(a) Remove the bolt and disconnect the flexible hose from the steering knuckle.
(b) Remove the 2 bolts, washers and brake caliper.
(c) Support the brake caliper securely.

3. REMOVE FLANGE

(a) Using a screwdriver and hammer, remove the grease cap from the flange.


F04368

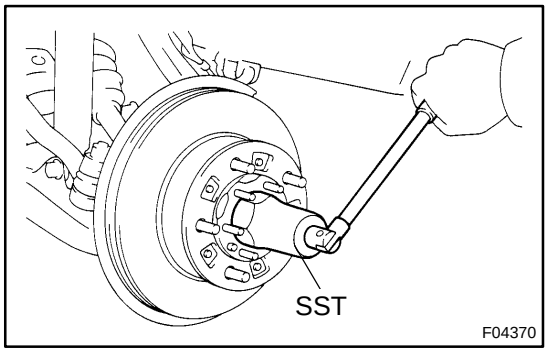
(b) Using a snap ring expander, remove the snap ring.
(c) Remove the 6 nuts and washers.
(d) Install the 6 nuts temporarily to protect the threads of the stud bolts.


F04369

(e) Using a brass bar and hammer, tap on the bolt heads and remove the 6 nuts and cone washers.
(f) Remove the flange and gasket.

4. REMOVE AXLE HUB WITH DISC

(a) Using a screwdriver, release the lock washer.



F04370

(b) Using SST, remove the lock nut.
SST 09607-60020
(c) Remove the lock washer.
(d) Using SST, remove the adjusting nut.
SST 09607-60020
(e) Remove the axle hub with disc.

NOTICE:

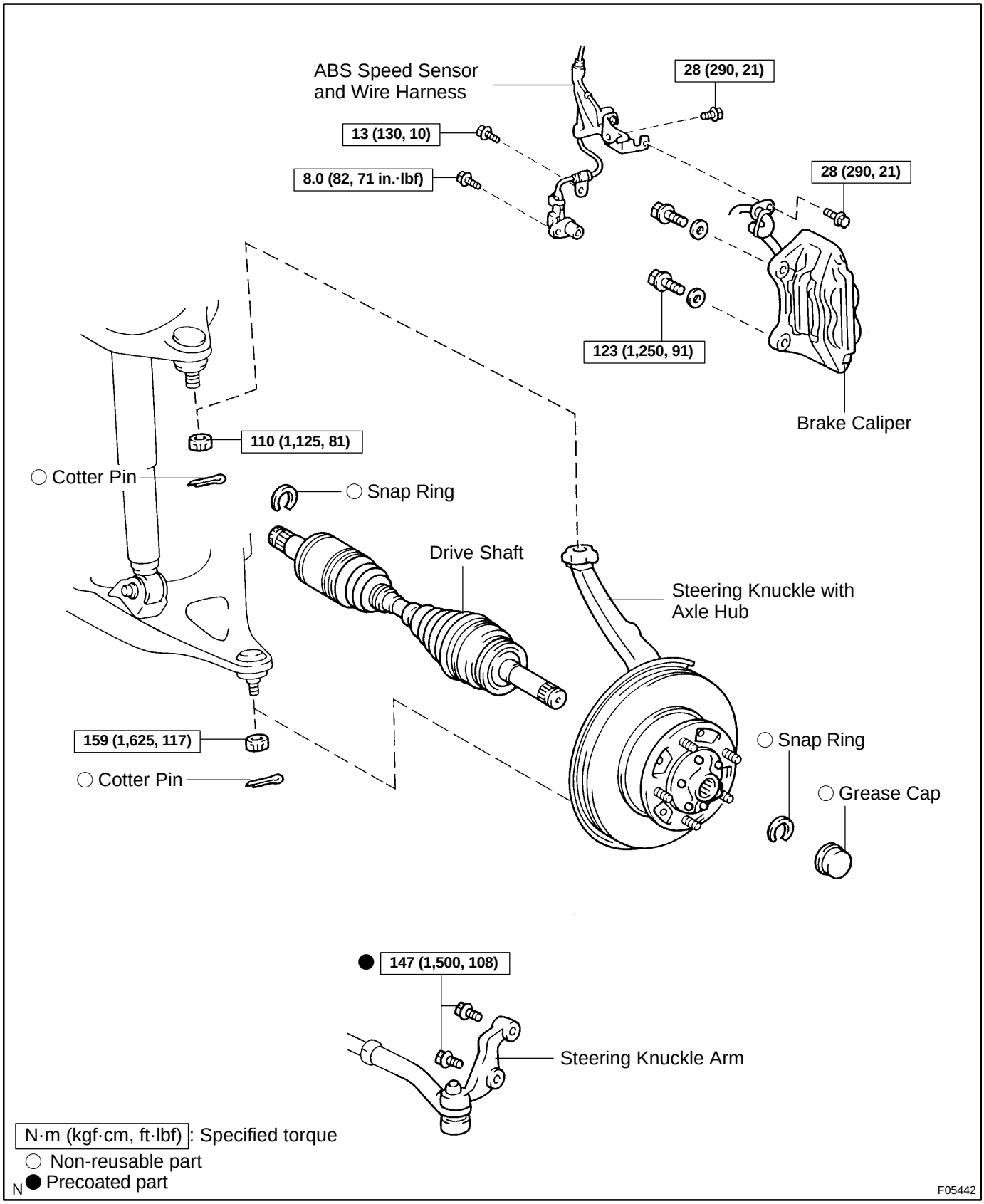
Be careful not to damage the ABS speed sensor rotor and oil seal.

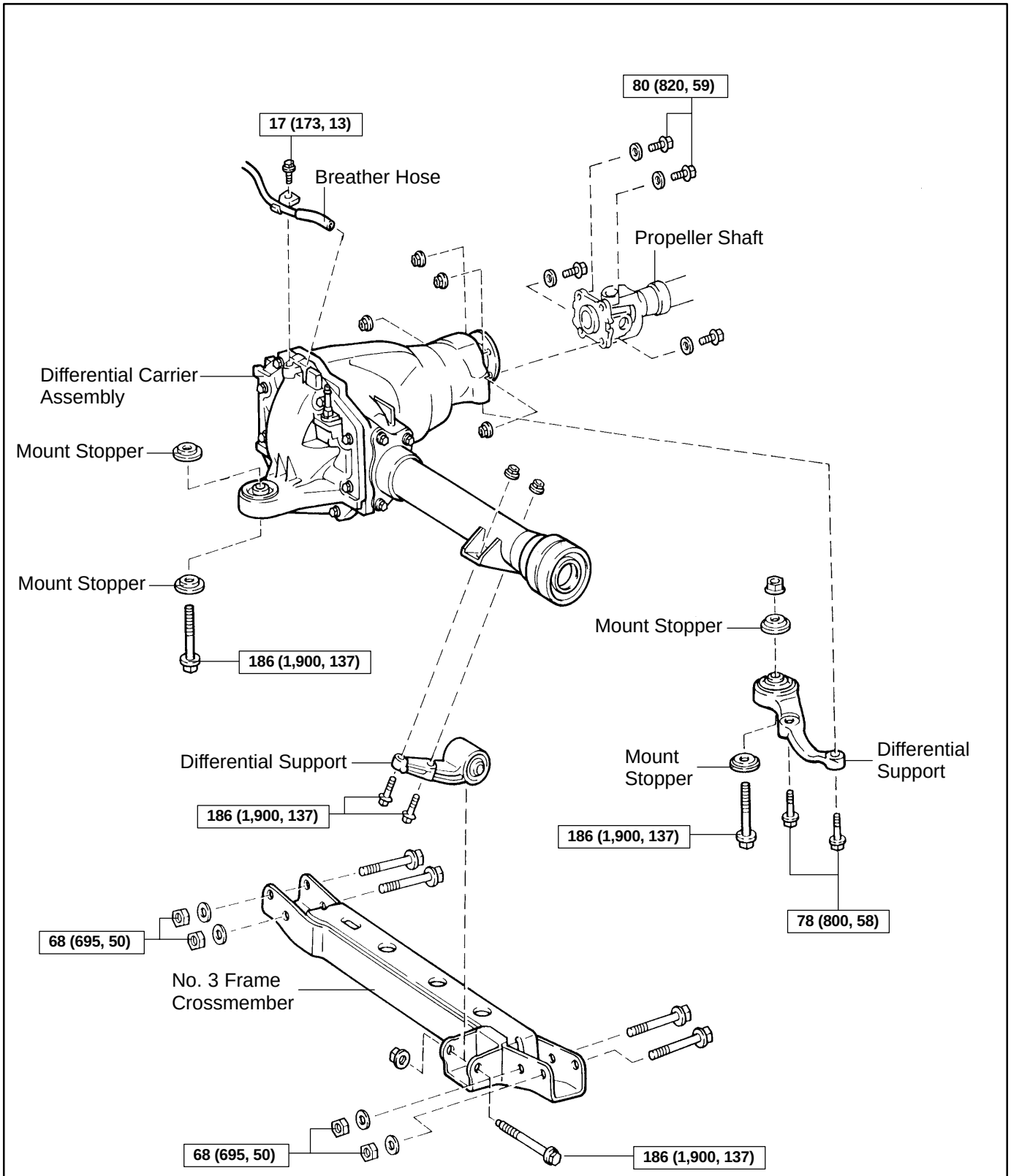
(f) Remove the claw washer and bearing from the axle hub.

FRONT DIFFERENTIAL CARRIER

SA1SE-01

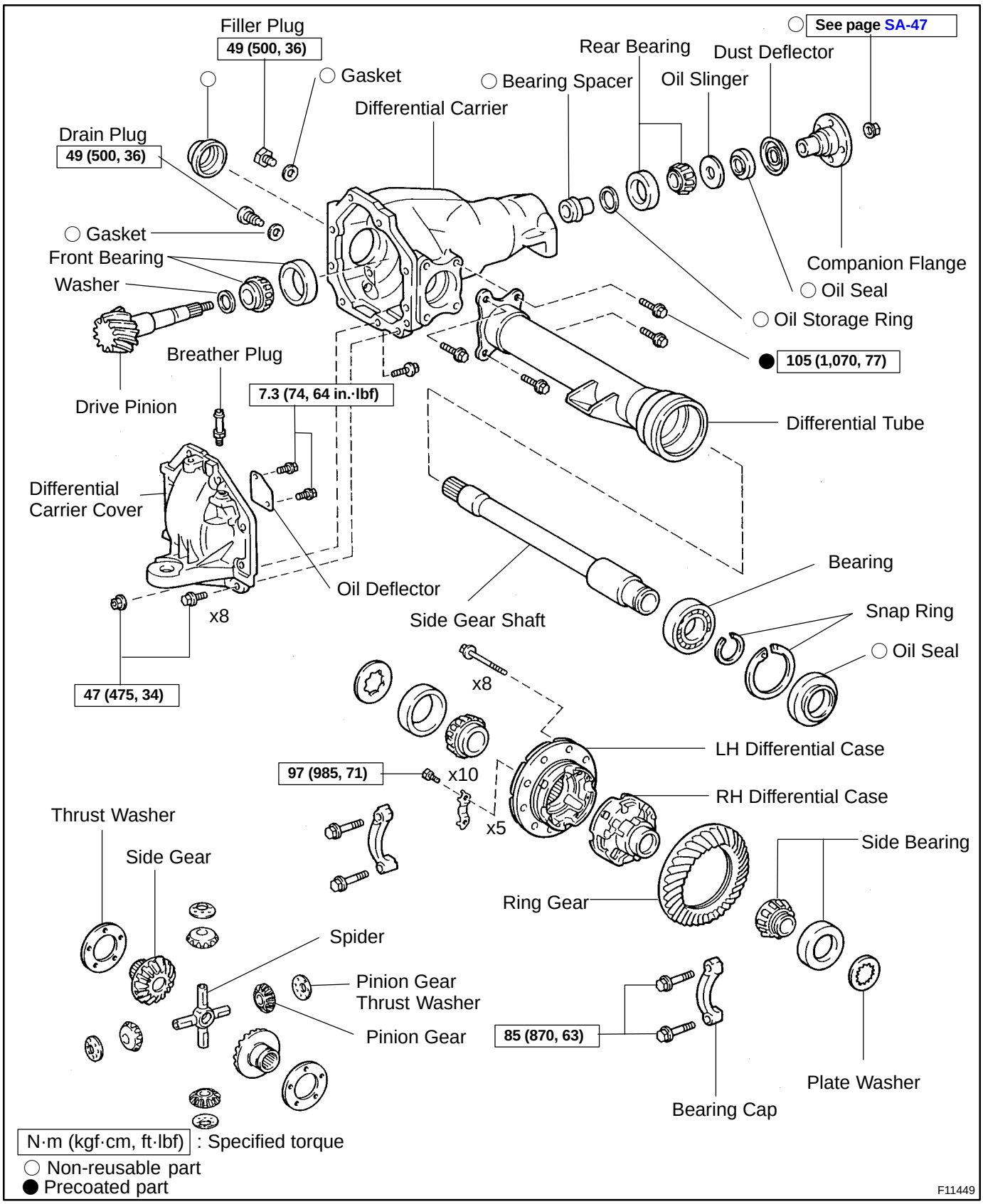
COMPONENTS





N·m (kgf·cm, ft·lbf) : Specified torque

F05231


Filler Plug
49 (500, 36)
Gasket
Drain Plug
49 (500, 36)
Gasket
Front Bearing
Washer
Drive Pinion
Breather Plug
7.3 (74, 64 in.·lbf)
Differential Carrier Cover
x8
47 (475, 34)
Differential Carrier
Bearing Spacer
Rear Bearing
Oil Slinger
Dust Deflector
See page SA-47
Companion Flange
Oil Seal
Oil Storage Ring
105 (1,070, 77)
Differential Tube
Oil Deflector
Side Gear Shaft
Bearing
Snap Ring
Oil Seal
x8
LH Differential Case
97 (985, 71)
x10
x5
RH Differential Case
Thrust Washer
Side Gear
Spider
Pinion Gear Thrust Washer
Pinion Gear
Ring Gear
Side Bearing
85 (870, 63)
Plate Washer
Bearing Cap
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
Precoated part
F11449

SA14N-14

DISASSEMBLY

1. REMOVE DIFFERENTIAL CARRIER COVER

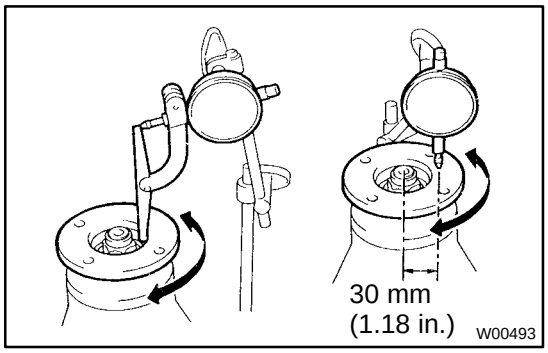
(a) Remove the 9 bolts and nut from the carrier cover.

(b) Using a brass bar and hammer, separate the cover from carrier.

(c) Remove the breather plug from the differential carrier cover.

(d) Remove the 2 bolts and oil deflector from the differential carrier cover.

2. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND, ETC.

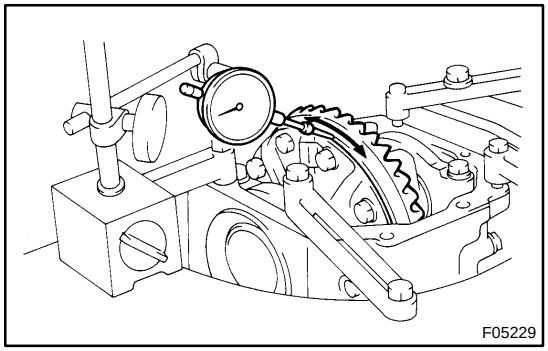


3. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum: 0.09 mm (0.0035 in.)

If the runout is greater than the maximum, replace the companion flange.

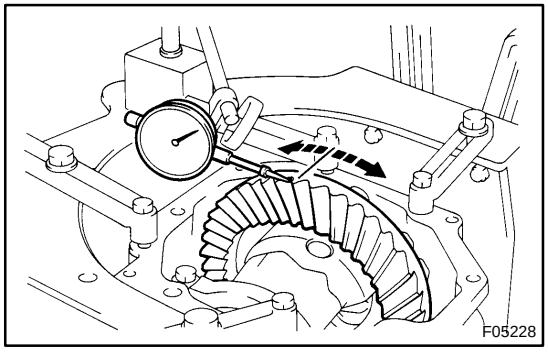


4. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.07 mm (0.0028 in.)

If the runout is greater than the maximum, replace the ring gear and drive pinion as a set.



5. CHECK RING GEAR BACKLASH

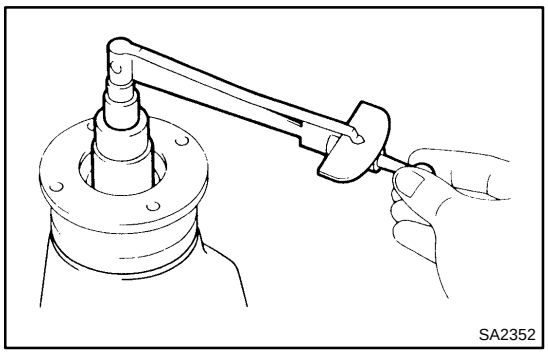
Using a dial indicator, while holding the drive pinion flange measure the ring gear backlash.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:

Measure at 3 or more places on the circumference of the ring gear.

If the backlash is not within the specification, adjust the backlash.



6. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.

Preload (at starting):
0.5 - 0.8 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)

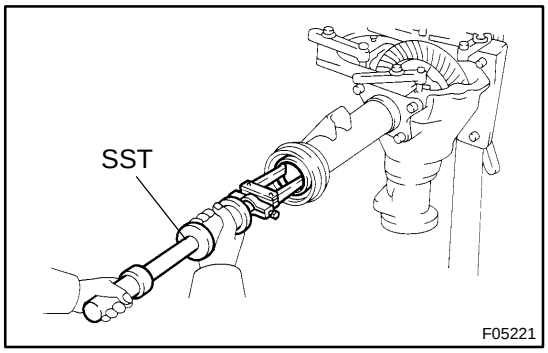
7. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
Drive pinion preload plus
0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)

If necessary, disassemble and inspect the differential.

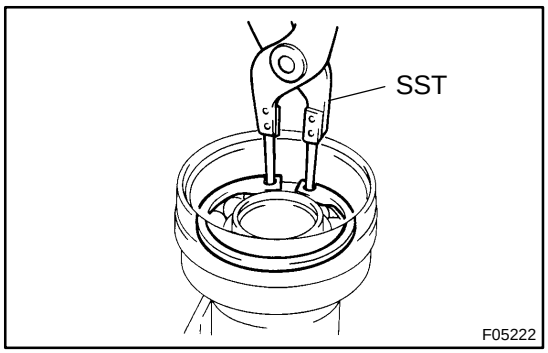
8. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA-47)



9. REMOVE SIDE GEAR SHAFT OIL SEALS

Using SST, remove the 2 side gear shaft oil seals.

SST 09308-00010



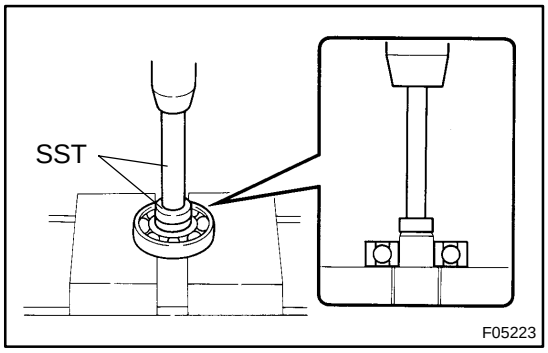
10. REMOVE DIFFERENTIAL TUBE ASSEMBLY

(a) Using SST, remove the snap ring.
SST 09350-30020 (09350-07060)

(b) Using a snap ring expander, remove the snap ring.

(c) Remove the 4 bolts and differential tube with side gear shaft from the differential carrier.

(d) Remove the side gear shaft from the differential tube.



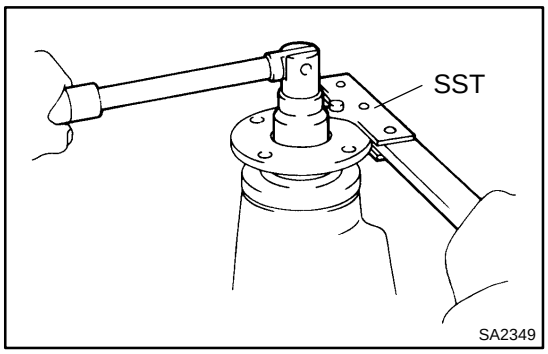
11. REMOVE SIDE GEAR BEARING

Using SST and a press, remove the bearing from side gear shaft.

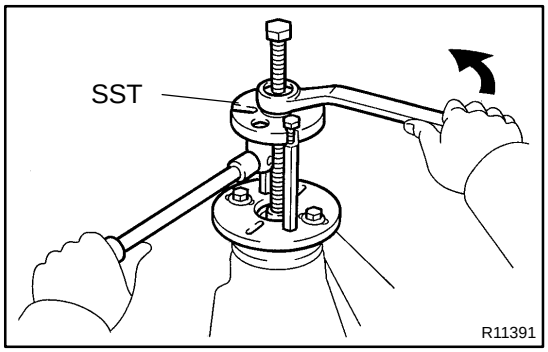
SST 09950-60010 (09951-00410), 09950-70010 (09951-07100)

12. REMOVE COMPANION FLANGE

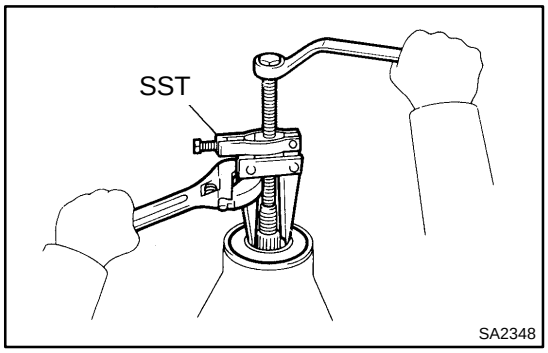
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330-00021



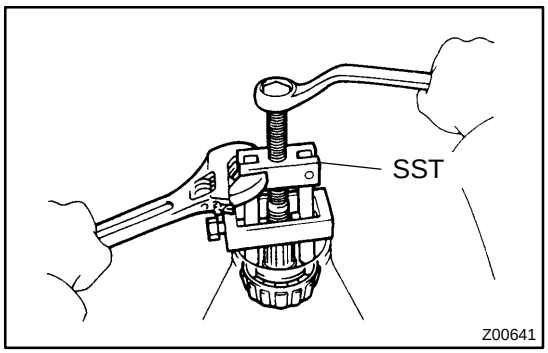
(c) Using SST, remove the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03020)



13. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308-10010

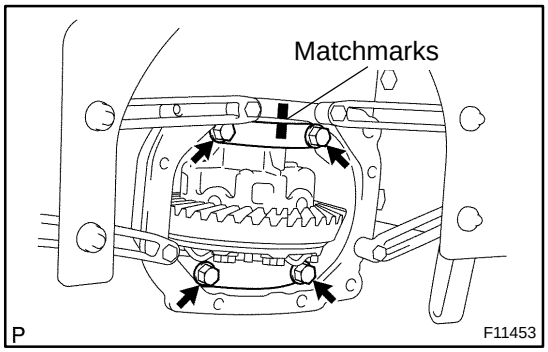
(b) Remove the oil slinger.



14. REMOVE REAR BEARING

Using SST, remove the rear bearing from the drive pinion.
SST 09556-22010

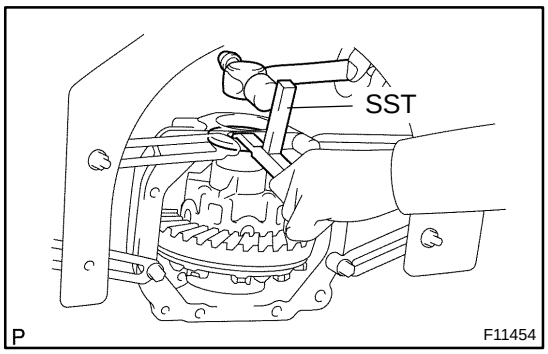
If the rear bearing is damaged or worn, replace the rear bearing.



15. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and 2 bearing caps.



(c) Using SST and a hammer, remove the 2 side bearing plate washers.
SST 09504-22012

HINT:

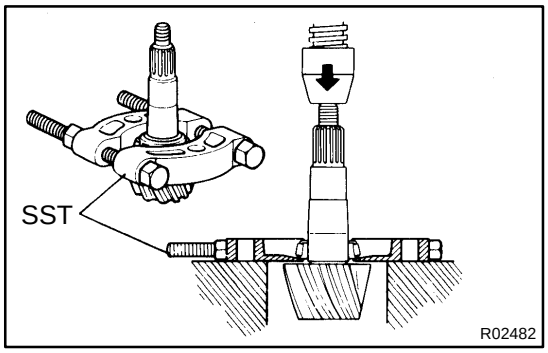
Measure the plate washer and note down the thickness.

(d) Remove the differential case with the bearing outer races from the differential carrier.

HINT:

Tag the bearing outer races to show the location for reassembling.

16. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER



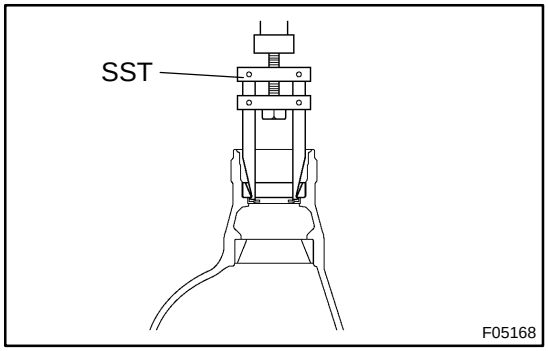
17. REMOVE DRIVE PINION FRONT BEARING

(a) Using SST and a press, remove the front bearing from the drive pinion.
SST 09950-00020

HINT:

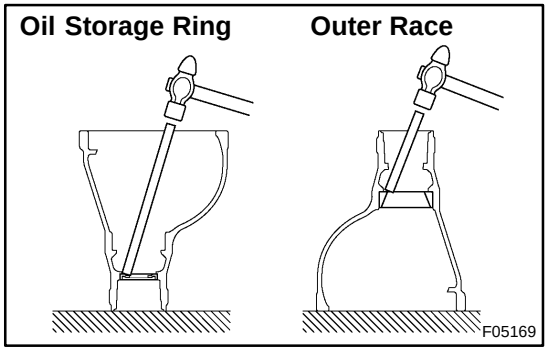
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the washer.

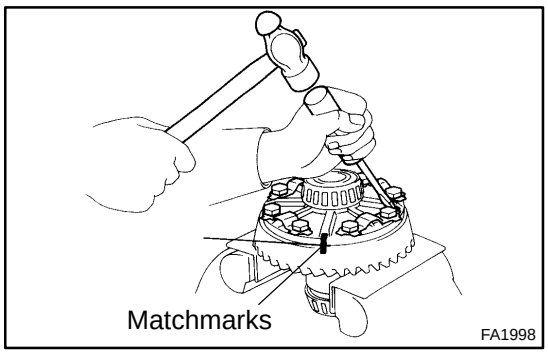


18. REMOVE DRIVE PINION FRONT AND REAR BEARING OUTER RACES AND OIL STORAGE RING

(a) Using SST, remove the rear bearing outer race.
SST 09308-00010



(b) Using a brass bar and hammer, remove the oil storage ring and front bearing outer race.



19. REMOVE RING GEAR

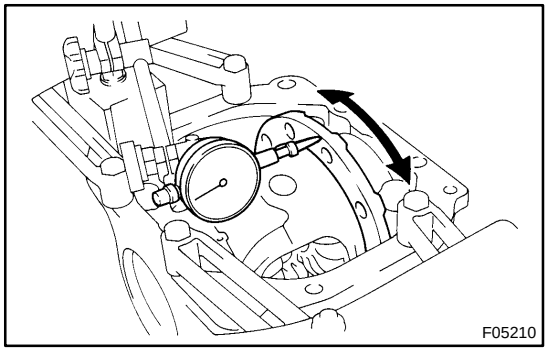
(a) Place matchmarks on the ring gear and differential case.
(b) Using a screwdriver and hammer, unstake the 5 lock plates.
(c) Remove the 10 bolts and 5 lock plates.
(d) Using a plastic hammer, tap on the ring gear to separate it from the differential case.

20. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.
(b) Install the assembled plate washers onto the side bearing.
(c) Install the differential case in the differential carrier.

HINT:
If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.
However, select a plate washer that allows no clearance between it and the carrier.

(d) Align matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bolts a little at a time.

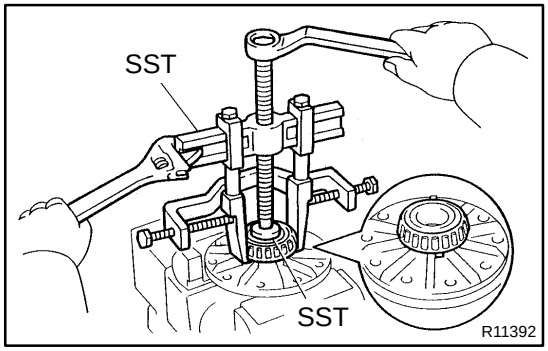


(f) Using a dial indicator, measure the differential case runout.

Maximum case runout: 0.07 mm (0.0028 in.)

If the runout is greater than the maximum, replace the differential case and side bearings as a set.

(g) Remove the differential case.

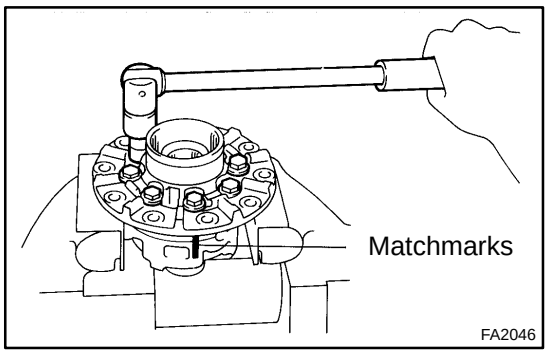


21. REMOVE SIDE BEARINGS

Using SST, remove the 2 side bearings from the differential case.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04030, 09954- 04010, 09955- 04061, 09957- 04010, 09958- 04011), 09950- 60010 (09951-00480)

HINT:
Fix the claws of SST to the notches in the differential case.



22. DISASSEMBLE DIFFERENTIAL CASE

(a) Place matchmarks on the LH and RH cases.
(b) Remove the 8 bolts uniformly, a little at a time.
(c) Using a plastic hammer, separate the LH and RH cases.
(d) Remove the spider, 2 side gears, side gear thrust washers, 4 pinion gears and pinion gear thrust washers from the RH differential case.

SA14Q-04

INSTALLATION

Installation is in the reverse order of removal (See page SA-39).

HINT:

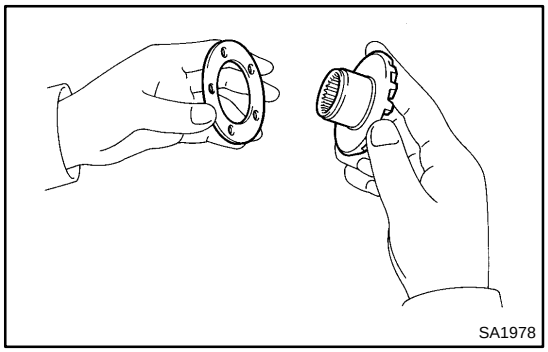
After installation, fill the differential with hypoid gear oil (See page SA-35).

SA14P-09

REASSEMBLY

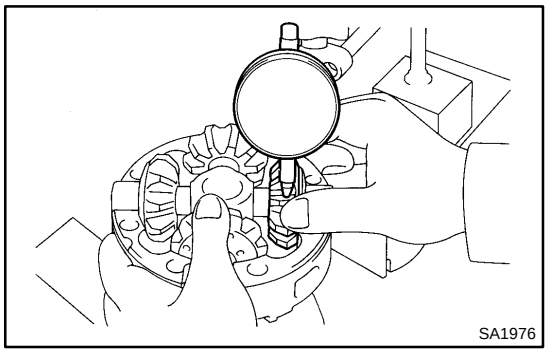
HINT:

- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.


SA1978

1. MEASURE SIDE GEAR BACKLASH AND ASSEMBLE DIFFERENTIAL CASE

(a) Install the 2 side gear thrust washers to the side gears.
(b) Install the 2 side gears to the RH case.
(c) Install the 4 pinion gears and pinion gear thrust washers to the spider.
(d) Install the pinion gears with the spider to the RH case.


SA1976

(e) Using a dial indicator, holding the side gear and spider, measure the side gear backlash,
Backlash: 0.05 - 0.20 mm (0.0020 - 0.0079 in.)

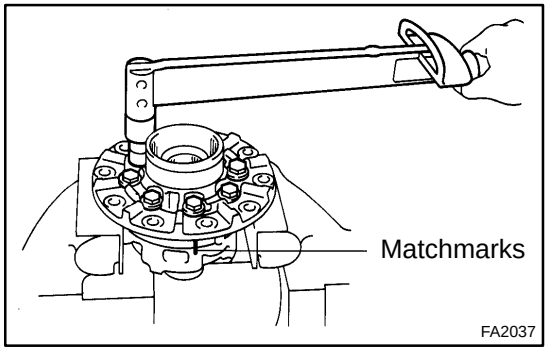
HINT:

- Measure at all 4 locations.
- Measure the backlash at the RH case and at the LH case.

If the backlash is not within the specification, install a thrust washer of a different thickness.

Thrust washer thickness

Thickness mm (in.)	Thickness mm (in.)
0.9 (0.035)	1.2 (0.047)
1.0 (0.039)	1.3 (0.051)
1.1 (0.043)	-

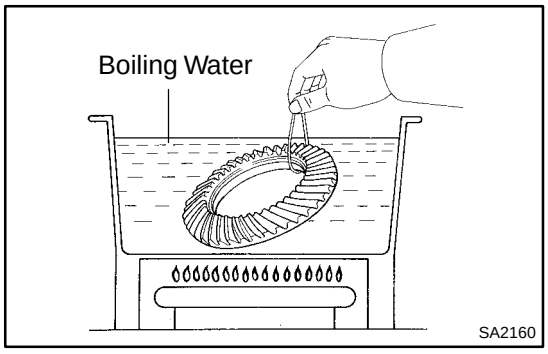


FA2037

(f) Align the matchmarks on the LH and RH cases.
(g) Torque the 8 bolts uniformly a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

2. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the contact surfaces of the differential case and ring gear.



(b) Heat the ring gear to approx. 100°C (212°F) in boiling water.

(c) Carefully take the ring gear out of the boiling water.

(d) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

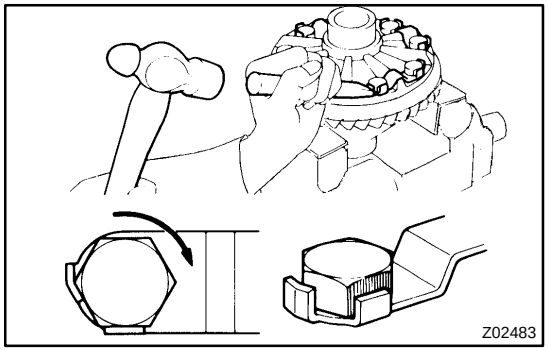
HINT:

Align the matchmarks on the ring gear and differential case.

(e) Temporarily install 5 new lock plates and 10 bolts so that the bolt holes in the ring gear and differential case are not misaligned.

(f) After the ring gear has cooled sufficiently, torque the 10 ring gear set bolts.

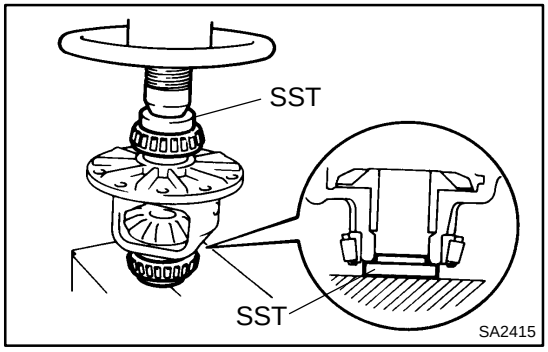
Torque: 97 N·m (985 kgf·cm, 71 ft·lbf)



(g) Using a chisel and hammer, stake the 5 lock plates.

HINT:

Stake the claws of the lock plates to fix the bolts. For the claw contacting the protruding portion of the bolt, stake only the half of it along the tightening direction.



3. INSTALL SIDE BEARINGS

Using SST and a press, install the 2 side bearings to the differential case.

SST 09223-15020, 09950-60010 (09951-00480)

4. CHECK RING GEAR RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the assembled plate washers onto the side bearing.

(c) Install the differential case in the differential carrier.

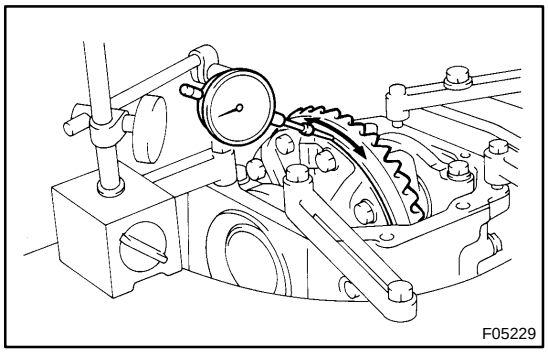
HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

However, select a plate washer that allows no clearance between it and the carrier.

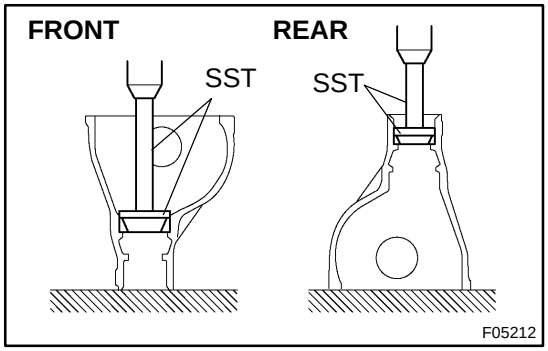
(d) Align matchmarks on the bearing cap and differential carrier.

(e) Install and uniformly tighten the 4 bolts a little at a time.



(f) Using a dial indicator, measure the ring gear runout.
Maximum runout: 0.07 mm (0.0028 in.)

(g) Remove the differential carrier.



5. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

(a) Using SST and a press, install the front bearing outer race.
SST 09950- 60020 (09951- 00780), 09950- 70010 (09951-07150)

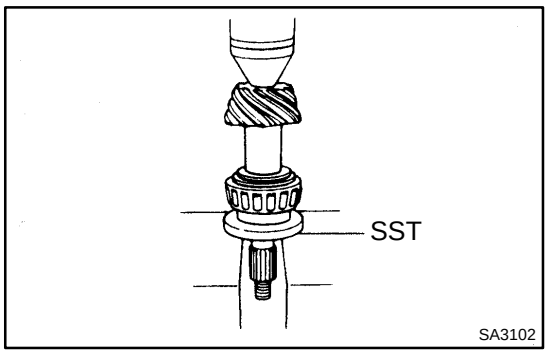
(b) Using SST and a press, install the rear bearing outer race.
SST 09950- 60020 (09951- 00710), 09950- 70010 (09951-07150)

6. INSTALL DRIVE PINION FRONT BEARING

(a) Install the washer on the drive pinion.

HINT:

First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



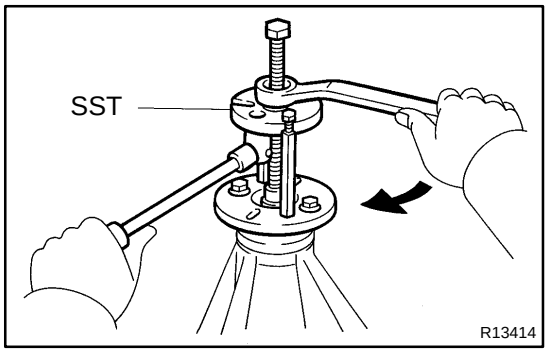
(b) Using SST and a press, install the front bearing onto the drive pinion.
SST 09506-30012

7. TEMPORARILY ADJUST DRIVE PINION PRELOAD

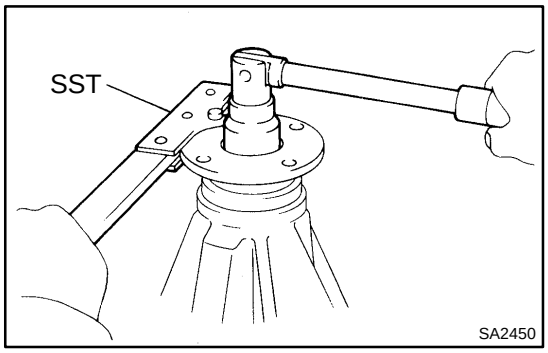
(a) Install the drive pinion and rear bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



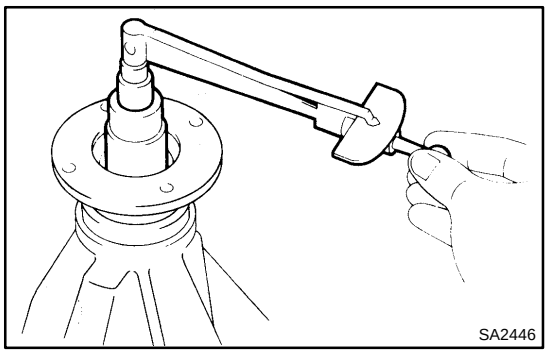
(c) Using SST, install the companion flange.
SST 09950- 30012, (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03020)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the nut.

NOTICE:

- **Coat the nut and threads of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



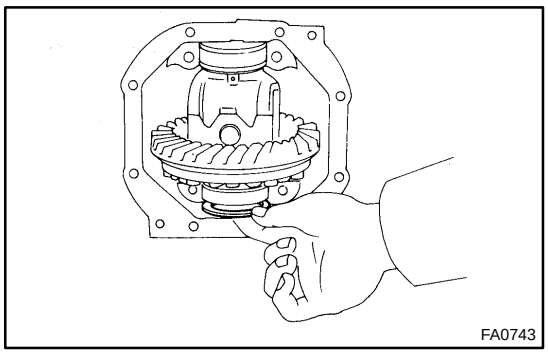
(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.0 - 1.6 N·m (10 - 16 kgf·cm, 8.7 - 13.9 in.·lbf)
Reused bearing
0.5 - 0.8 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)

HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

8. INSTALL DIFFERENTIAL CASE IN DIFFERENTIAL CARRIER

(a) Place the bearing outer races on their respective bearings. Check that the left and right outer races are not interchanged.

(b) Install the differential case in the differential carrier.

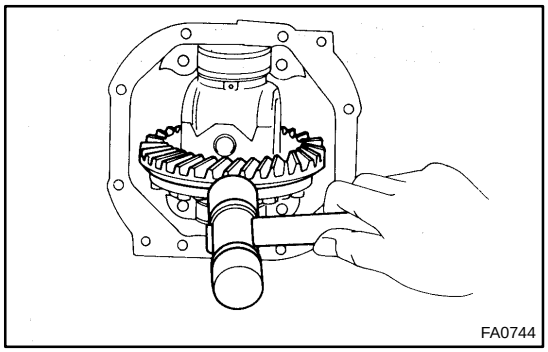


9. ADJUST RING GEAR BACKLASH

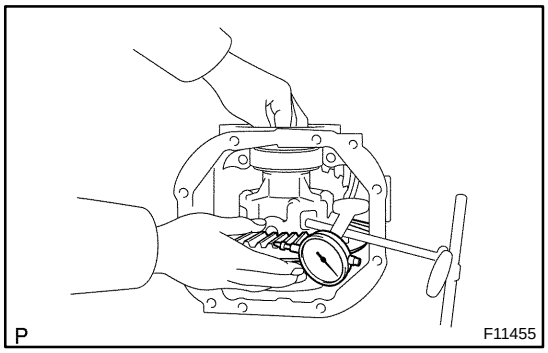
(a) Install the plate washer on the ring gear back side.

HINT:

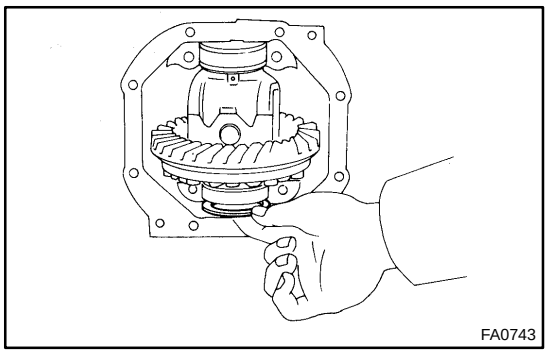
Make sure that the ring gear has backlash.



(b) Tap on the ring gear with a plastic hammer so that the washer fits to the bearing.



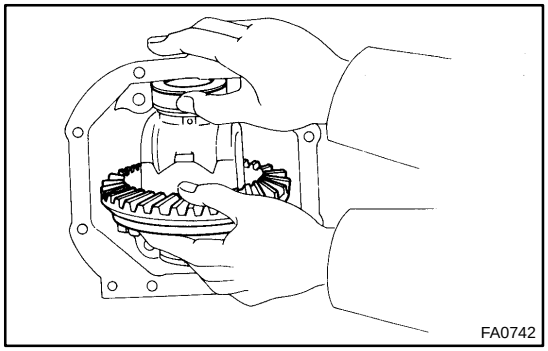
(c) Using a dial indicator, measure the side gear backlash while holding one pinion gear toward the differential case.
Backlash (Reference): 0.13 mm (0.0051 in.)



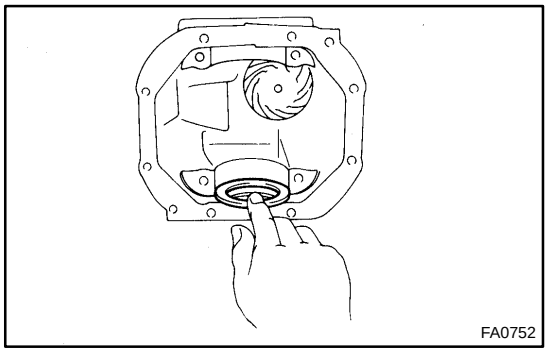
(d) Select a plate washer for back side ring gear, using the backlash as reference.

Side plate washer thickness

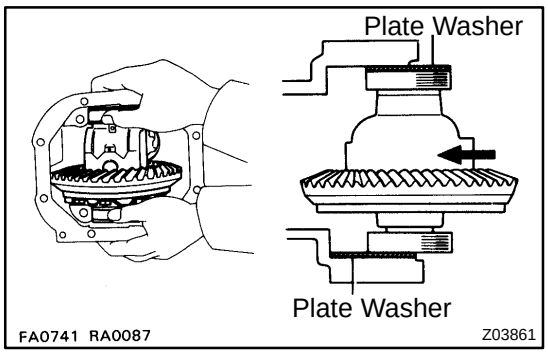
Thickness mm (in.)	Thickness mm (in.)
2.58 (0.1016)	3.04 (0.1197)
2.60 (0.1024)	3.06 (0.1205)
2.62 (0.1031)	3.08 (0.1213)
2.64 (0.1039)	3.10 (0.1220)
2.66 (0.1047)	3.12 (0.1228)
2.68 (0.1055)	3.14 (0.1236)
2.70 (0.1063)	3.16 (0.1244)
2.72 (0.1071)	3.18 (0.1252)
2.74 (0.1079)	3.20 (0.1260)
2.76 (0.1087)	3.22 (0.1268)
2.78 (0.1094)	3.24 (0.1276)
2.80 (0.1102)	3.26 (0.1283)
2.82 (0.1110)	3.28 (0.1291)
2.84 (0.1118)	3.30 (0.1299)
2.86 (0.1126)	3.32 (0.1307)
2.88 (0.1134)	3.34 (0.1315)
2.90 (0.1142)	3.36 (0.1323)
2.92 (0.1150)	3.38 (0.1331)
2.94 (0.1157)	3.40 (0.1339)
2.96 (0.1165)	3.42 (0.1346)
2.98 (0.1173)	3.44 (0.1354)
3.00 (0.1181)	3.46 (0.1362)
3.02 (0.1189)	3.48 (0.1370)


FA0742

(e) Select a ring gear teeth side plate washer so that is no clearance between the outer race and case.

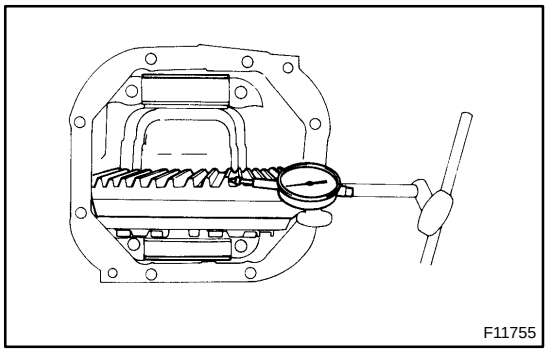

FA0752

(f) Remove the plate washers and differential case.
(g) Install the plate washer into the ring gear back side of the carrier.



(h) Place the other plate washer onto the differential case together with the outer race, and install the differential case with the outer race into the carrier.

(i) Tap on the ring gear with a plastic hammer so that the washers fit to the bearing.



(j) Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0070 in.)

If the backlash is not within the specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

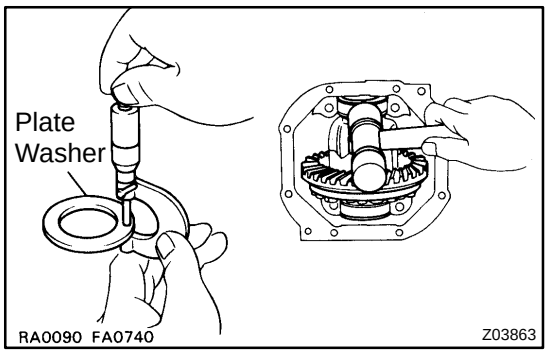
HINT:

There should be no clearance between the plate washer and case.

Make sure that there is ring gear backlash.

10. ADJUST SIDE BEARING PRELOAD

(a) Remove the ring gear teeth side plate washer and measure the thickness.



(b) Using the backlash as a reference, install a new washer of 0.06 - 0.09 mm (0.0024 - 0.0035 in.) thicker than the washer removed.

HINT:

Select a washer which can be pressed in 2/3 of the way with your finger.

(c) Using a plastic hammer, install the plate washer.

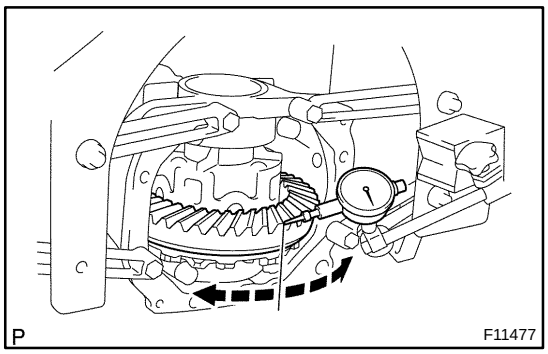
(d) Align matchmarks on the bearing cap and differential carrier.

(e) Tighten the 4 bolts.

Torque: 85 N·m (870 kgf·cm, 63 ft·lbf)

HINT:

Turn the ring gear several times to make the side bearings smooth.



(f) Using a dial indicator, adjust the ring gear backlash until it is within the specification.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0070 in.)

If the backlash is not within the specification, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

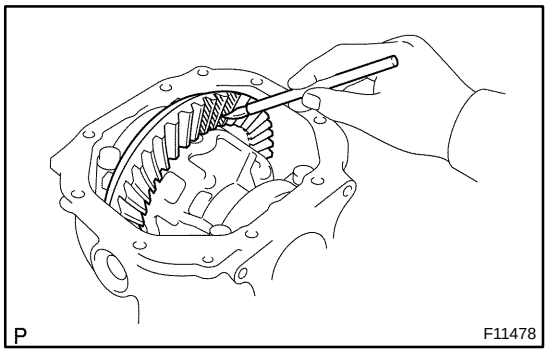
HINT:

The backlash will change by about 0.02 mm (0.0008 in.) corresponding to 0.03 mm (0.0012 in.) change in the plate washer.

11. MEASURE TOTAL PRELOAD

Using a torque wrench, measure the total preload.

Total preload (at starting):
Drive pinion preload plus
0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)

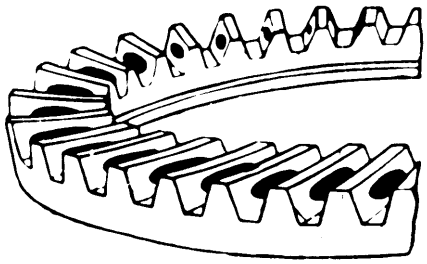


12. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

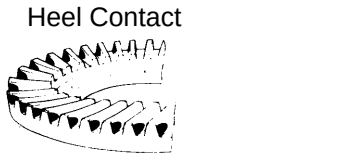
(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.

(b) Hold the companion flange firmly and rotate the ring gear in both directions.

(c) Inspect the tooth contact pattern.



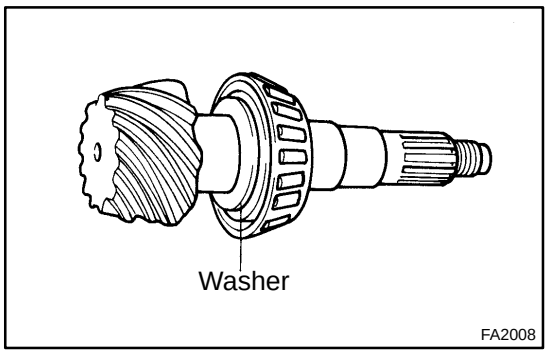
Proper Contact



Select an adjusting shim that will bring the drive pinion closer to the gear.

Select an adjusting shim that will shift the drive pinion gear away from the ring gear.

R02495



If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Washer thickness

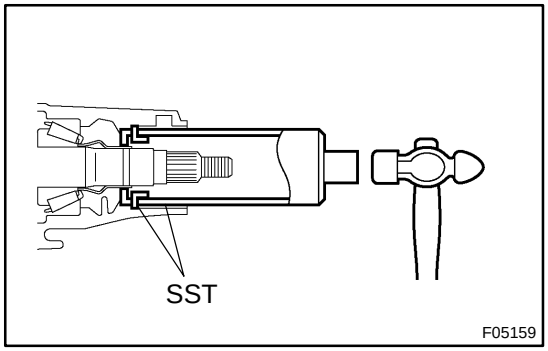
Thickness mm (in.)	Thickness mm (in.)
1.70 (0.0669)	2.03 (0.0799)
1.73 (0.0681)	2.06 (0.0811)
1.76 (0.0693)	2.09 (0.0822)
1.79 (0.0704)	2.12 (0.0835)
1.82 (0.0717)	2.15 (0.0847)
1.85 (0.0729)	2.18 (0.0858)
1.88 (0.0740)	2.21 (0.0870)
1.91 (0.0752)	2.24 (0.0882)
1.94 (0.0764)	2.27 (0.0894)
1.97 (0.0776)	2.30 (0.0906)
2.00 (0.0787)	2.33 (0.0918)

13. REMOVE COMPANION FLANGE (See page SA-40)

14. REMOVE OIL SLINGER

15. REMOVE REAR BEARING (See page SA-40)

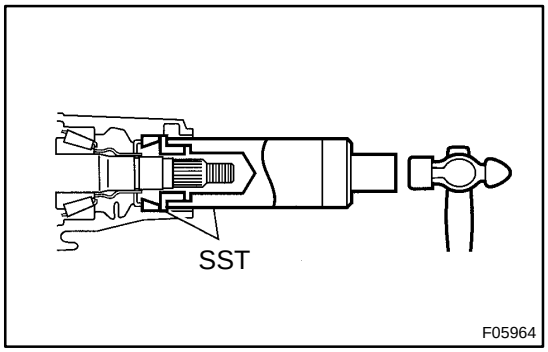
16. REMOVE REAR BEARING OUTER RACE (See page SA-40)



17. INSTALL BEARING SPACER AND OIL STORAGE RING

(a) Install a new bearing spacer.

(b) Using SST and a hammer, install a new oil storage ring.
SST 09316-6001 1 (09316-00011), 09506-35010



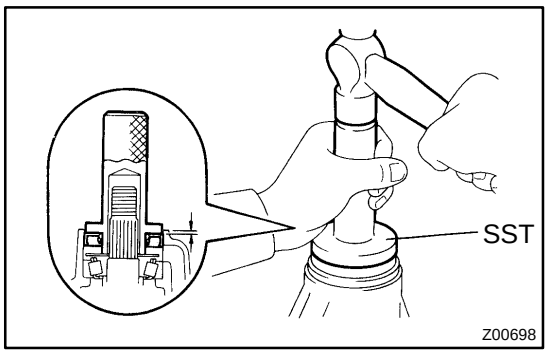
18. INSTALL REAR BEARING OUTER RACE

Using SST and a hammer, install the bearing outer race.
SST 09316-6001 1 (09316-00011), 09506-35010

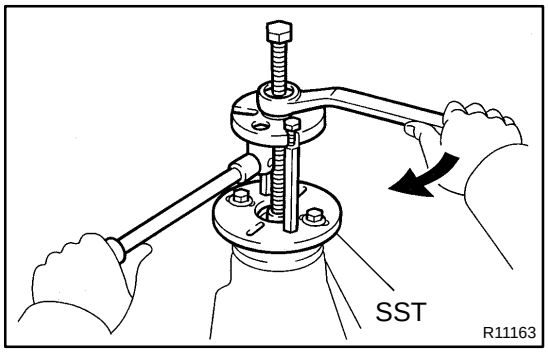
19. INSTALL REAR BEARING AND OIL SLINGER

20. INSTALL OIL SEAL

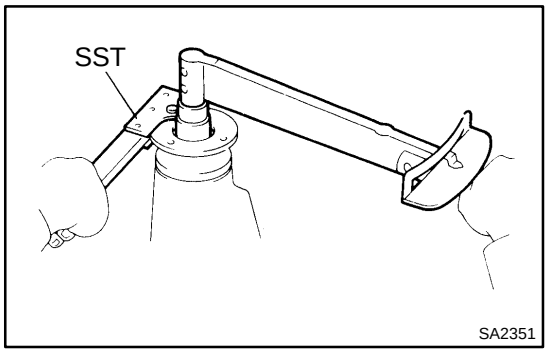
(a) Coat the hypoid gear oil to a new oil seal periphery.



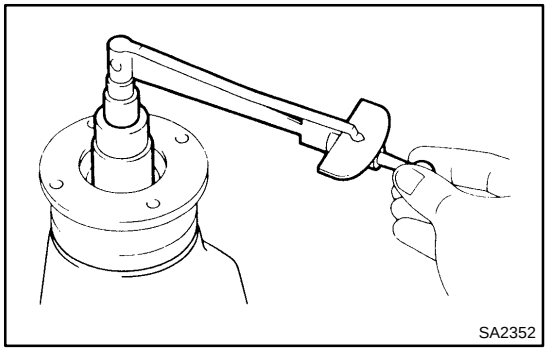
(b) Using SST and a hammer, install a new oil seal.
SST 09554-3001 1
Oil seal drive in depth: 1.5 mm (0.059 in.)
(c) Coat MP grease to the oil seal lip.



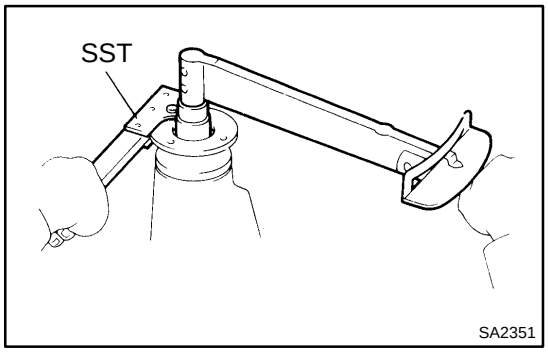
21. INSTALL COMPANION FLANGE
(a) Using SST, install the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03020)
(b) Coat the thread of a new nut with hypoid gear oil LSD.



(c) Using SST to hold the flange, tighten the nut.
SST 09330-00021
Torque: 108 N·m (1,100 kgf·cm, 80 ft·lbf)



22. ADJUST DRIVE PINION PRELOAD
Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.
Preload (at starting):
New bearing
1.0 - 1.6 N·m (10 - 16 kgf·cm, 8.7 - 13.9 in.·lbf)
Reused bearing
0.5 - 0.8 N·m (5 - 8 kgf·cm, 4.3 - 6.9 in.·lbf)
If the preload is greater than the specification, replace the bearing spacer.
If the preload is less than the specification, retighten the nut a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.



SST 09330-00021
Torque: 338 N·m (3,447 kgf·cm, 249 ft·lbf) or less
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

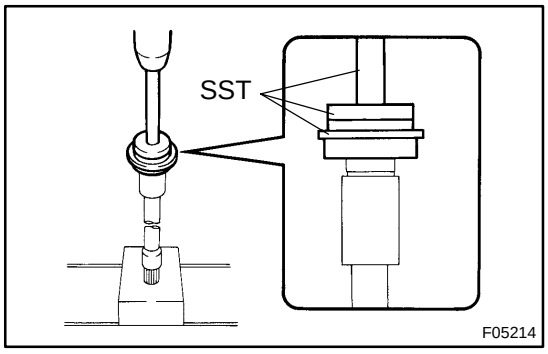
23. RECHECK TOTAL PRELOAD (See page SA-40)

24. RECHECK RING GEAR BACKLASH (See page SA-40)

25. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA-47)

26. CHECK RUNOUT OF COMPANION FLANGE (See page SA-40)

27. STAKE DRIVE PINION NUT



28. INSTALL SIDE GEAR BEARING

Using SST and a press, install the bearing to side gear shaft.

SST 09502- 12010, 09950- 60020 (09951- 00730), 09950-70010 (09951-07100)

29. INSTALL DIFFERENTIAL TUBE ASSEMBLY

(a) Clean surfaces with FIPG material attached to using gasoline or alcohol.

(b) Apply FIPG to the differential tube.

FIPG:
Part No. 08826 - 00090, THREE BOND 1281 or equivalent.

HINT:

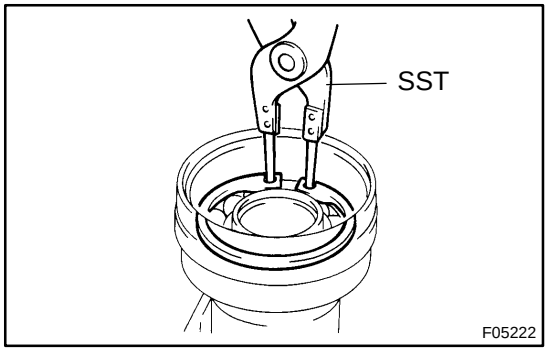
Install the differential tube within 10 minutes after applying FIPG.

(c) Install the differential tube with 4 bolts to the differential tube.

Torque: 105 N·m (1,070 kgf·cm, 77 ft·lbf)

(d) Install the side gear shaft.

(e) Using a snap ring expander, install the snap ring.

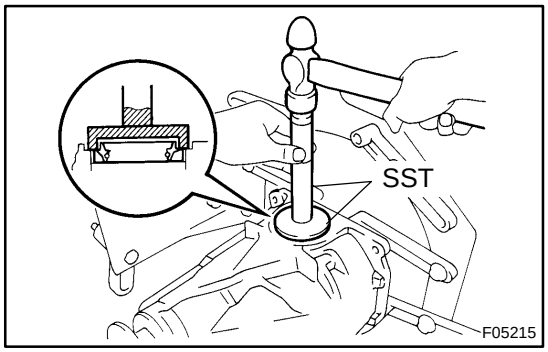


(f) Using SST, install the snap ring.

SST 09350-30020 (09350-07060)

30. INSTALL SIDE GEAR SHAFT OIL SEALS

(a) Coat the hypoid gear oil to a new oil seal periphery.



(b) Using SST and a hammer, install 2 new oil seals.

SST 09550-00032, 09950-70010 (09951-07150)

(c) Coat MP grease to the oil seal lip.

31. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND, ETC.

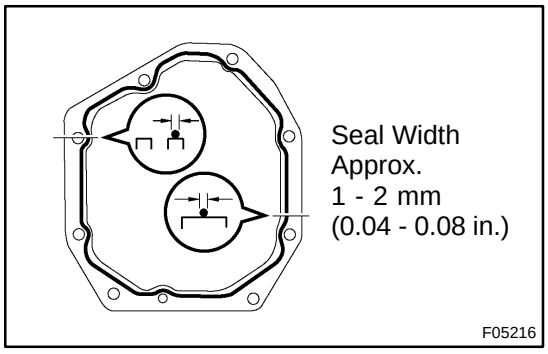
32. INSTALL DIFFERENTIAL CARRIER COVER

(a) Install the oil deflector with 2 bolts to the carrier cover.
Torque: 7.3 N·m (74 kgf·cm, 64 in.·lbf)

(b) Install the breather plug to the carrier cover.

(c) Remove any old FIPG material and be careful not to drop oil on the contact surfaces of the differential carrier and carrier cover.

(d) Clean surfaces with FIPG with material attached to using gasoline or alcohol.



(e) Apply FIPG to the carrier cover, as shown.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent.

HINT:
Install the carrier cover within 10 minutes after applying FIPG.

(f) Install the differential carrier cover with the 9 bolts.
Torque: 47 N·m (475 kgf·cm, 34 ft·lbf)

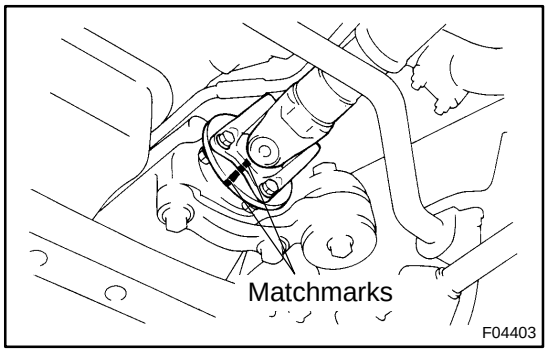
SA14M-04

REMOVAL

1. REMOVE FRONT WHEELS

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. REMOVE DRIVE SHAFTS (See page SA-26)



3. DISCONNECT FRONT PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and companion flange.

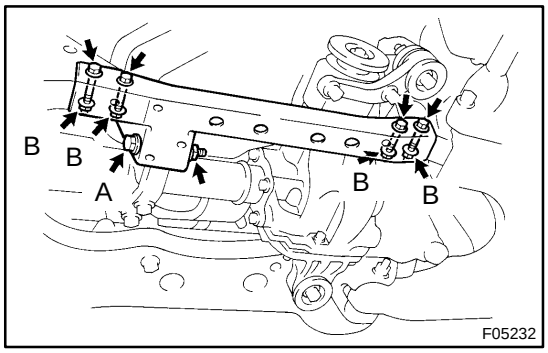
(b) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.

Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)

(c) Support the propeller shaft securely.

4. DRAIN HYPOID GEAR OIL

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



5. REMOVE NO. 3 FRAME CROSSMEMBER

Remove the 5 bolts, nuts, 4 washers and No. 3 frame crossmember.

Torque:

A: 186 N·m (1,900 kgf·cm, 137 ft·lbf)

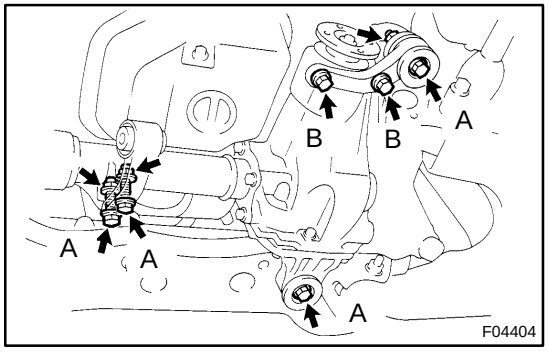
B: 68 N·m (695 kgf·cm, 50 ft·lbf)

6. REMOVE FRONT DIFFERENTIAL CARRIER ASSEMBLY

(a) Support the front differential carrier assembly with a jack.

(b) Remove the bolt and disconnect the breather hose.

Torque: 17 N·m (173 kgf·cm, 13 ft·lbf)



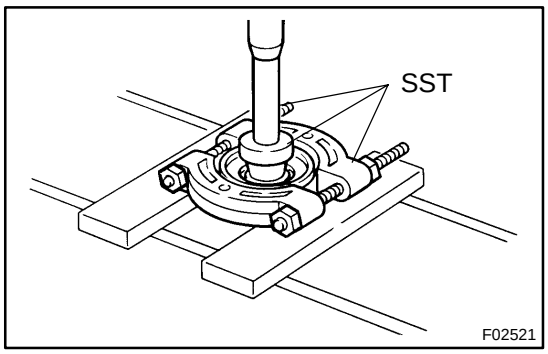
(c) Remove the 3 nuts, 4 mount stoppers, 6 bolts, 2 differential supports and front differential carrier assembly.

Torque:

A: 186 N·m (1,900 kgf·cm, 137 ft·lbf)

B: 78 N·m (800 kgf·cm, 58 ft·lbf)

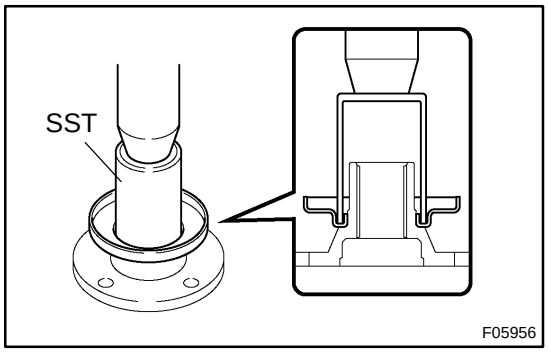
SA14O-04



REPLACEMENT

REPLACE COMPANION FLANGE DUST DEFLECTOR

(a) Using SST and a press, remove the dust deflector.
SST 09950-00020, 09950-60010 (09951-00400), 09950-70010 (09951-07100)

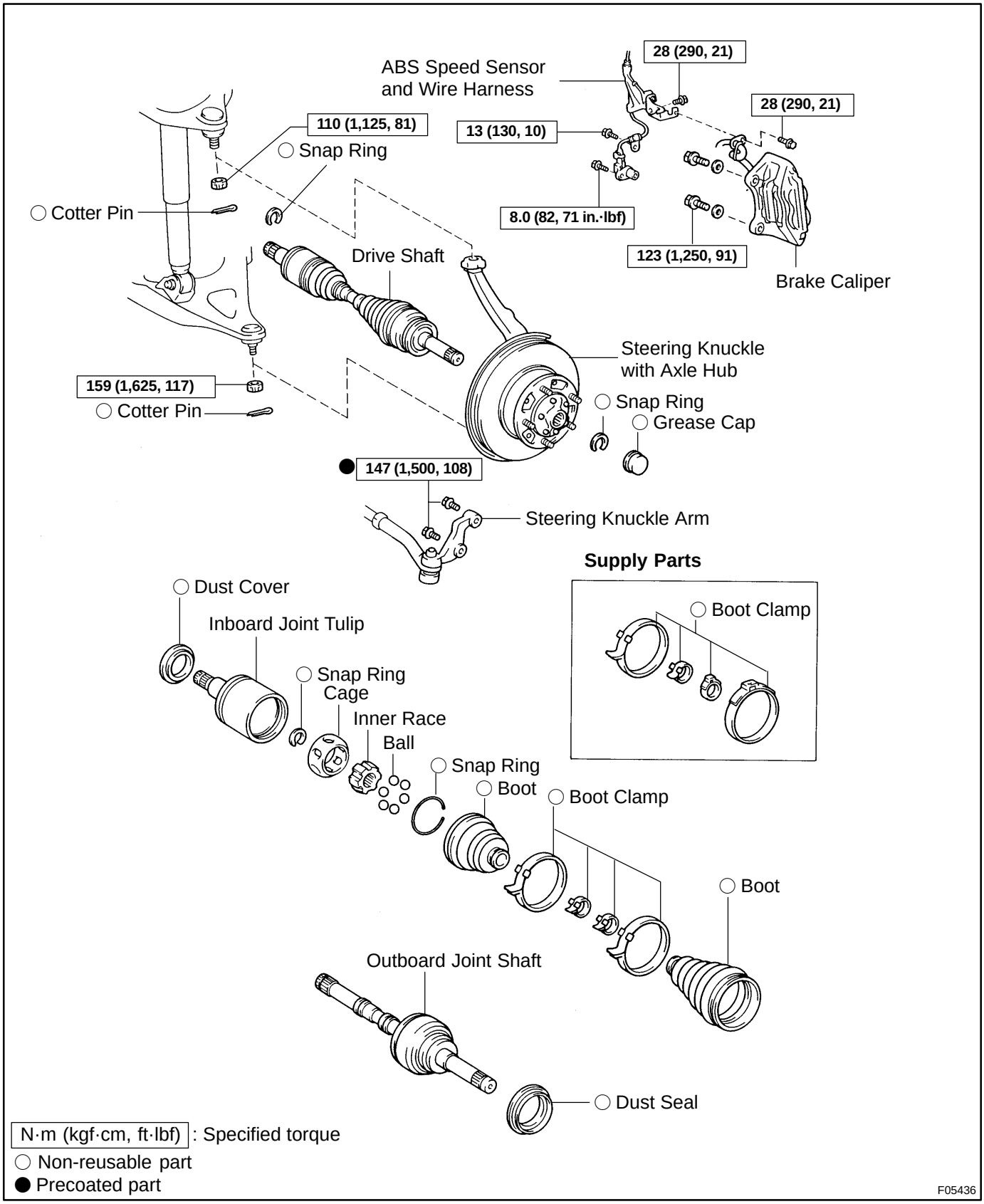


(b) Using SST and a press, install a new dust deflector.
SST 09223-00010

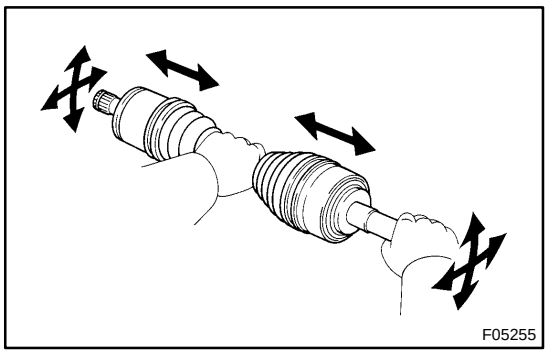
FRONT DRIVE SHAFT

COMPONENTS

SA14E-04



SA14G-04


F05255

DISASSEMBLY

1. CHECK DRIVE SHAFT

(a) Check to see that there is no remarkable play in the outboard joint.

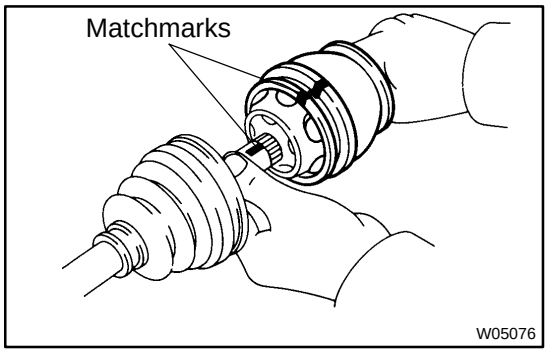
(b) Check to see that the inboard joint slides smoothly in the thrust direction.

(c) Check to see that there is no remarkable play in the radial direction of the inboard joint.

(d) Check the boots for damage.

2. UNSTAKE INBOARD JOINT BOOT CLAMPS

Using a screwdriver, unstake the 2 inboard joint boot clamps.



W05076

3. REMOVE INBOARD JOINT TULIP

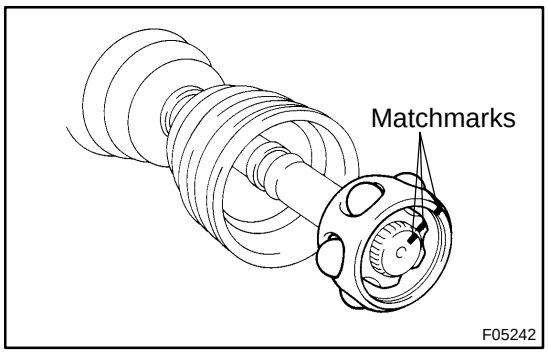
(a) Place matchmarks on the inboard joint tulip and outboard joint shaft.

NOTICE:

Do not punch the marks.

(b) Using a screwdriver, remove the snap ring from the outboard joint shaft.

(c) Remove the inboard joint tulip from the outboard joint shaft.



F05242

4. DISASSEMBLE INBOARD JOINT

(a) Place matchmarks on the outboard joint shaft, inner race and cage.

NOTICE:

Do not punch the marks.

(b) Remove the 6 balls.

(c) Slide the cage to the outboard joint side.

(d) Using a snap ring expander, remove the snap ring.

(e) Using a brass bar and hammer, remove the inner race.

NOTICE:

Be careful not to damage the inner race.

(f) Remove the cage.

5. REMOVE INBOARD JOINT BOOT AND 2 CLAMPS

6. REMOVE OUTBOARD JOINT BOOT CLAMPS

(a) Using a screwdriver, unstake the 2 outboard joint boot clamps.

HINT:

If the outboard joint boot clamps that have been replaced are installed to the drive shaft, use a side cutter or pliers to remove them.

(b) Remove the 2 outboard joint boot clamps and outboard joint boot.

NOTICE:

Do not disassemble the outboard joint.

7. REMOVE DUST COVER

Using a screwdriver and hammer, remove the dust cover from the inboard joint tulip.

8. REMOVE DUST SEAL

Using a screwdriver and hammer, remove the dust seal from the outboard joint shaft.

SA14I-08

INSTALLATION

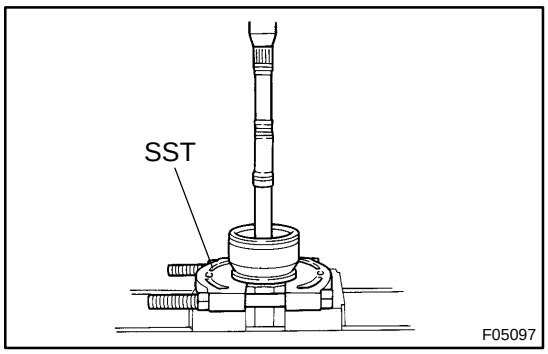
Installation is in the reverse order of removal (See page SA-26).

HINT:

After installation, check the ABS speed sensor signal (See page DI-505).

SA1DB-01

REASSEMBLY



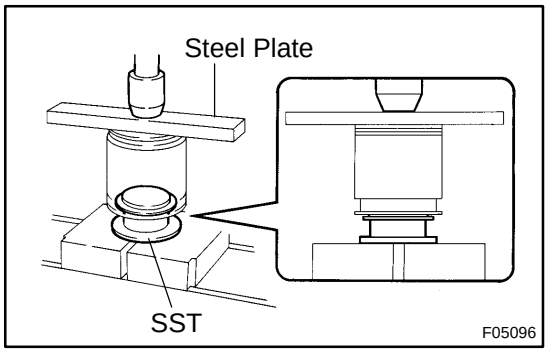
1. INSTALL DUST SEAL

Using SST and a press, install a new dust seal to the outboard joint shaft.

SST 09950-00020

NOTICE:

Be careful not to damage the dust seal.



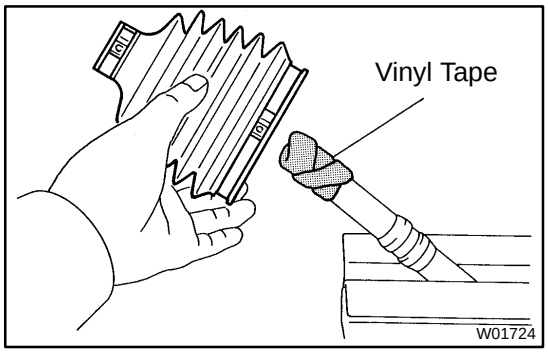
2. INSTALL DUST COVER

Using SST a steel plate and press, install a new dust cover.

SST 09316-2001 1

NOTICE:

Be careful not to damage the dust cover.



3. INSTALL OUTBOARD JOINT BOOT AND CLAMPS

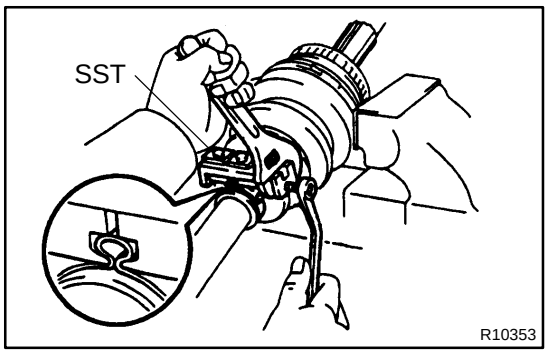
(a) Place 2 new boot clamps to boot.

HINT:

Before installing the boot, wrap vinyl tape around the spline of the shaft to prevent damaging the boot.

(b) Temporarily install a new boot to the outboard joint shaft.

(c) Position the inside clamp onto the boot.



(d) Using SST, pinch the inside clamp.

SST 09521-24010

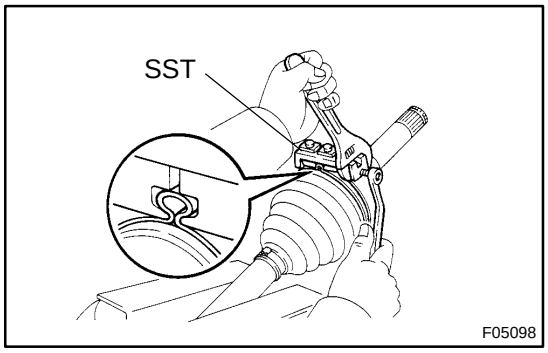
NOTICE:

Do not overtighten SST.

(e) Pack the outboard joint and boot with grease in the boot kit.

Grease capacity: 368 - 378 g (13.0 - 13.3 oz.)

(f) Position the outside clamp onto the boot.

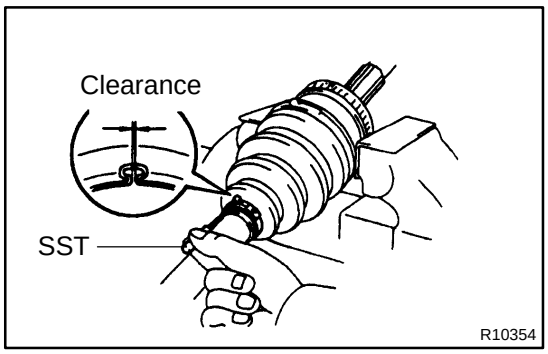


(g) Using SST, pinch the outside clamp.

SST 09521-24010

NOTICE:

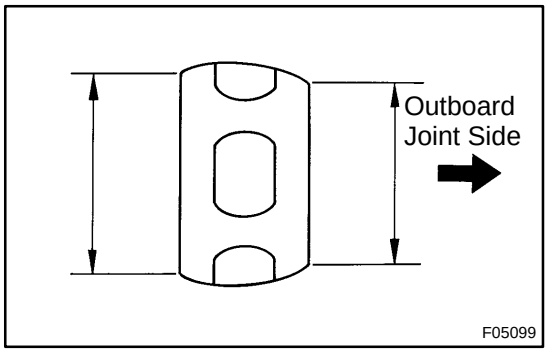
Do not overtighten SST.



(h) Using SST, adjust the clearance of the clamps.
SST 09240-00020
Clearance: 0.8 mm (0.031 in.)

4. TEMPORARILY INSTALL INBOARD JOINT BOOT AND CLAMPS

Temporarily install 2 new boot clamps and boot to the outboard joint shaft.



5. ASSEMBLE INBOARD JOINT

(a) Install the cage to the outboard joint shaft.

NOTICE:

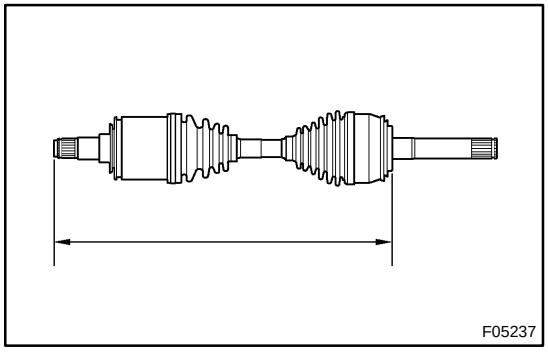
Insert the cage with its smaller inner diameter side facing to the outboard joint.

(b) Align matchmarks placed before removal.
(c) Install the inner race.
(d) Using a snap ring expander, install a new snap ring.
(e) Align matchmarks placed before removal, and install the cage to the inner race.
(f) Install the 6 balls.

HINT:

Apply grease onto the balls to keep them from falling.

(g) Pack the inboard joint tulip and boot with grease in the boot kit.
Grease capacity: 293 - 303 g (10.3 - 10.7 oz.)
(h) Align matchmarks placed before removal, and install the inboard joint tulip to the outboard joint shaft.
(i) Install a new snap ring.
(j) Temporarily install the boot to the inboard joint tulip.
(k) Make sure that the boot is on the shaft groove.



(l) Make sure that the 2 boots are not stretched or contracted when the drive shaft is at standard length.
Drive shaft standard length:
573.9 ± 5.0 mm (22.594 ± 0.197 in.)
(m) Using a screwdriver, bend the clamps and lock them.

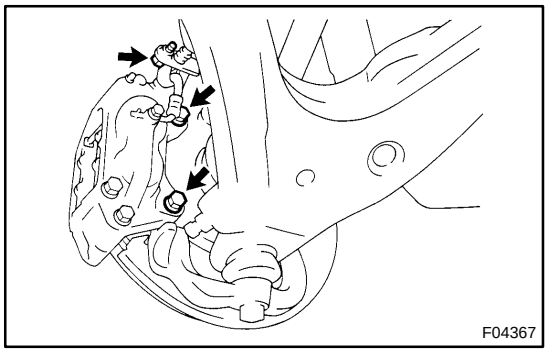
6. CHECK DRIVE SHAFT (See page SA-29)

SA14F-04

REMOVAL

1. REMOVE FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)



2. REMOVE BRAKE CALIPER

(a) Remove the bolt and disconnect the flexible hose from the steering knuckle.

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

(b) Remove the 2 bolts, washers and brake caliper.

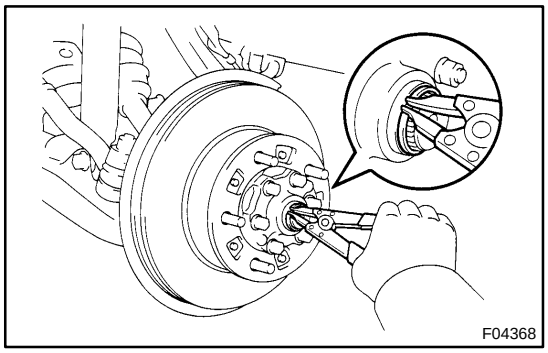
Torque: 123 N·m (1,250 kgf·cm, 91 ft·lbf)

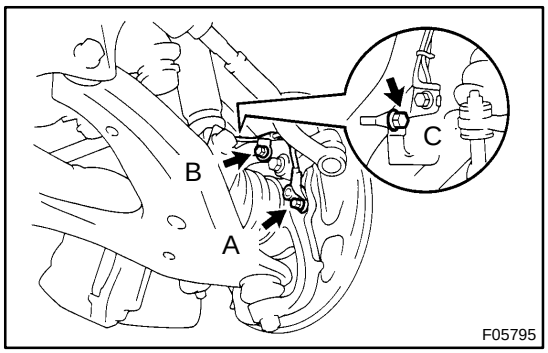
(c) Support the brake caliper securely.

3. REMOVE SNAP RING

(a) Using a screwdriver and hammer, remove the grease cap from the flange.

(b) Using snap ring pliers, remove the snap ring.





4. DISCONNECT ABS SPEED SENSOR AND WIRE HARNESS

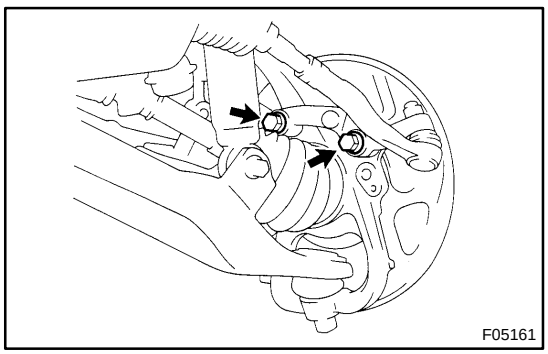
Remove the 3 bolts and disconnect the ABS speed sensor and wire harness.

Torque:

A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

B: 13 N·m (130 kgf·cm, 10 ft·lbf)

C: 28 N·m (290 kgf·cm, 21 ft·lbf)



5. DISCONNECT STEERING KNUCKLE ARM

Remove the 2 bolts and disconnect the steering knuckle arm.

Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

HINT:

At the time of installation, please refer to the following items.

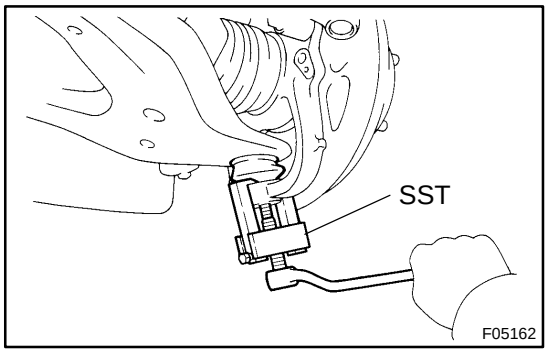
- Clean the threads of the 2 bolts and steering knuckle with toluene or trichloroethylene.

- Apply sealant to the 2 bolt threads.
  Sealant:
  Part No. 08833-00070, THREE BOND 1324 or equivalent

6. DISCONNECT STEERING KNUCKLE FROM LOWER SUSPENSION ARM

(a) Remove the cotter pin and nut.
Torque: 159 N·m (1,625 kgf·cm, 117 ft·lbf)

HINT:
At the time of installation, if the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

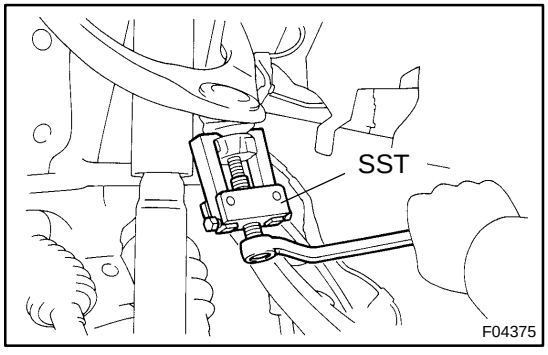


(b) Using SST, disconnect the steering knuckle from the lower suspension arm.
SST 09628-6201 1

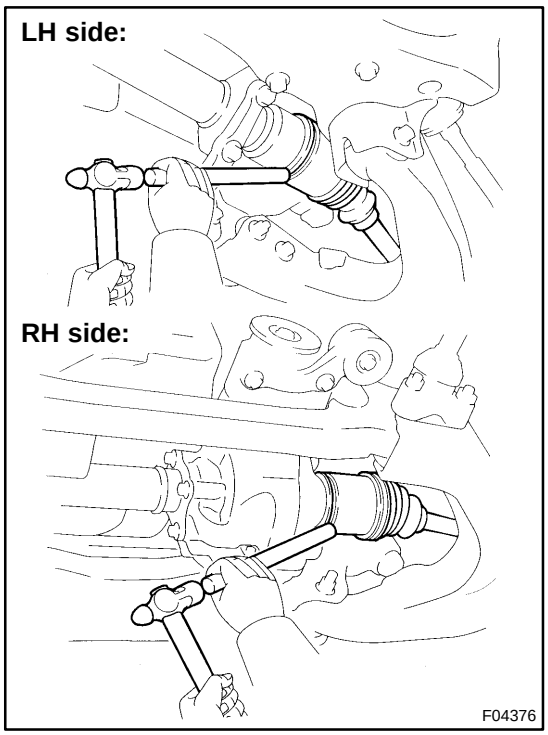
7. REMOVE STEERING KNUCKLE WITH AXLE HUB

(a) Temporarily install the nut to the lower suspension arm.
(b) Support the lower suspension arm with a jack.
(c) Remove the cotter pin and nut.
Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

HINT:
At the time of installation, if the holes for the cotter pin are not aligned, tighten the nut further up to 60°.



(d) Using SST, disconnect the steering knuckle from the upper suspension arm.
SST 09628-6201 1
(e) Remove the nut and steering knuckle with axle hub.



8. REMOVE DRIVE SHAFT

(a) Using a brass bar and hammer, remove the drive shaft.

NOTICE:

Be careful not to damage the boot, dust cover and oil seal.

(b) Using a screwdriver, remove the snap ring from the inboard joint tulip.

HINT:

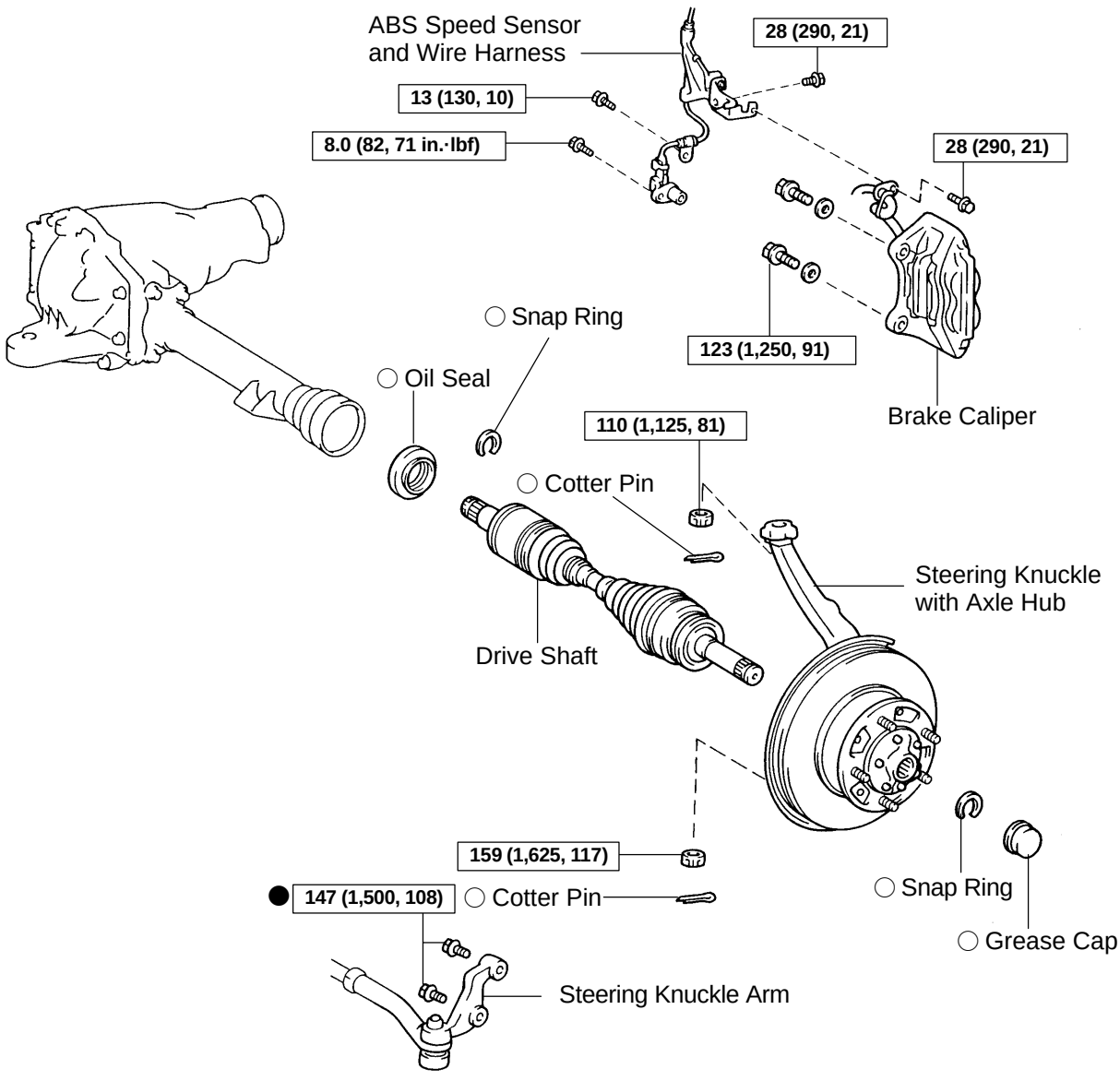
At the time of installation, please refer to the following items.

- Coat the oil seal lip with MP grease.
- Before installation, set a new snap ring with opening side facing downward.
- After installation, check that the drive shaft cannot be pulled out by hand.

FRONT DIFFERENTIAL SIDE GEAR SHAFT OIL SEAL

SA14J-04

COMPONENTS



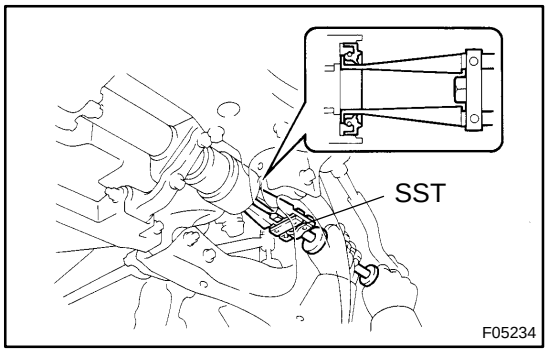
N·m (kgf·cm, ft·lbf) : Specified torque
○ Non-reusable part
● Precoated part

F05437

SA14K-04

REPLACEMENT

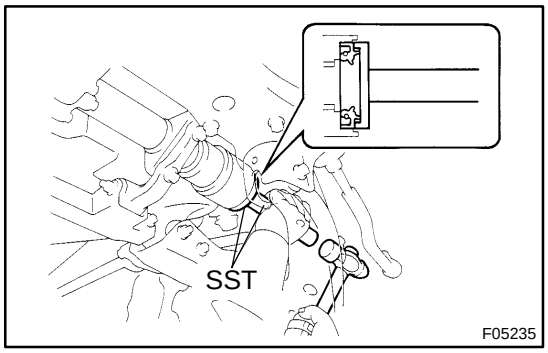
1. **REMOVE FRONT WHEELS**
   Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)
2. **REMOVE FRONT DRIVE SHAFT**
   (See page SA-26)



3. **REPLACE OIL SEAL**

(a) Using SST, remove the oil seal.
SST 09308-00010

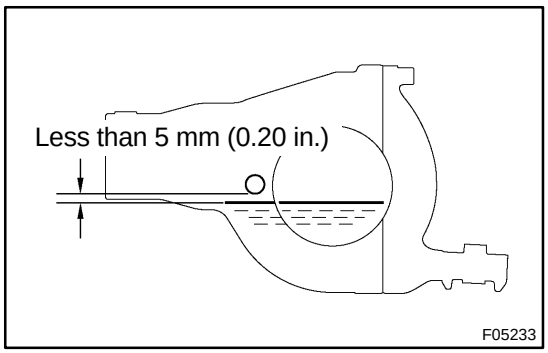
(b) Coat the hypoid gear oil to a new oil seal periphery.



(c) Using SST and a hammer, install the new oil seal.
SST 09550-00032, 09950-70010 (09951-07100)

(d) Coat the MP grease to the oil seal lip.

4. **INSTALL FRONT DRIVE SHAFT**
   (See page SA-33)

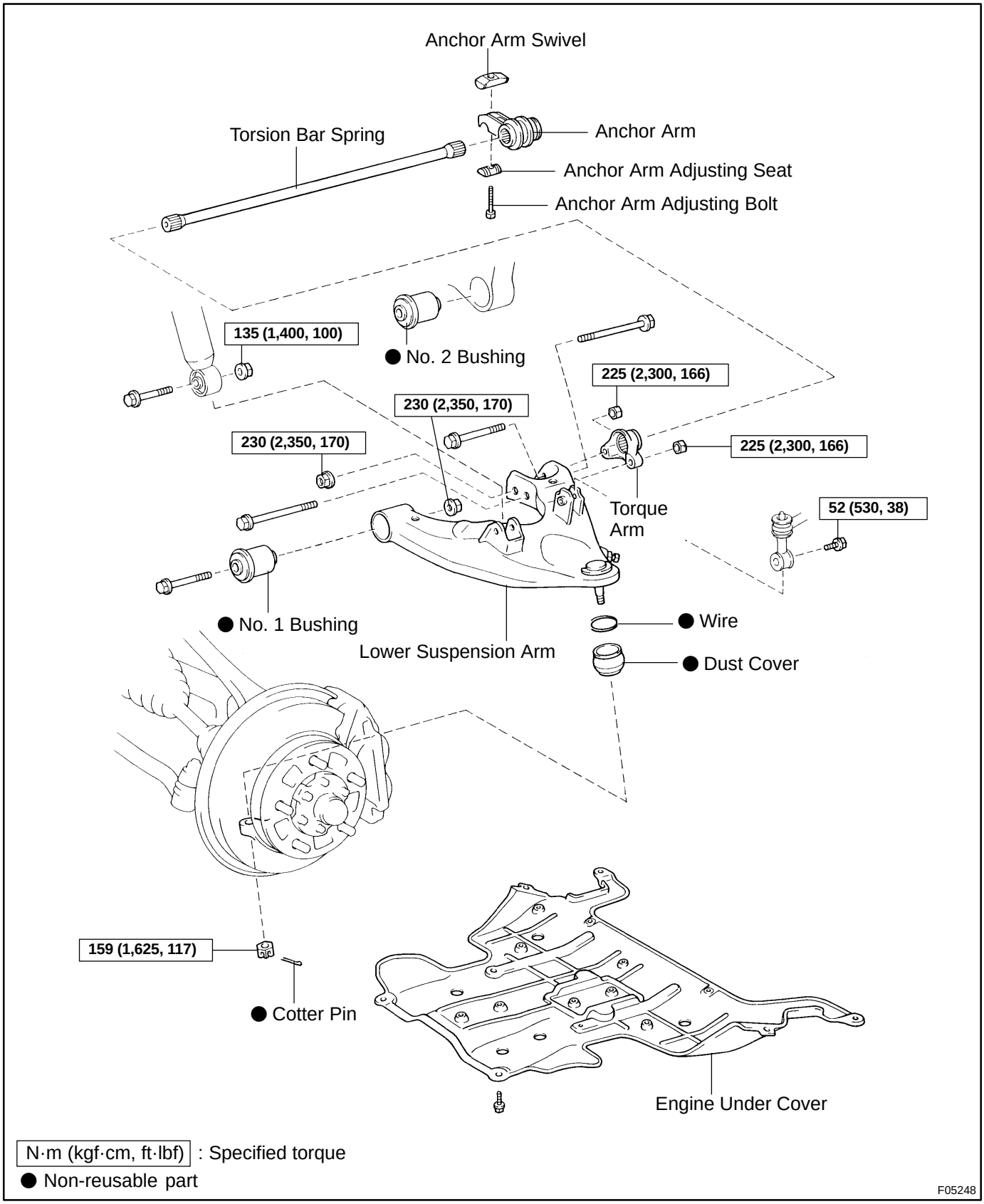


5. **FILL DIFFERENTIAL WITH HYPOID GEAR OIL**
   Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)
   Oil type: Hypoid gear oil API GL-5
   Recommended oil viscosity:
   Above -18˚C (0˚F) SAE 90
   Below -18˚C (0˚F) SAE 80W-90 or 80W
   Capacity: 1.70 liters (1.80 US qts, 1.50 lmp.qts)

FRONT LOWER SUSPENSION ARM

SA154-02

COMPONENTS

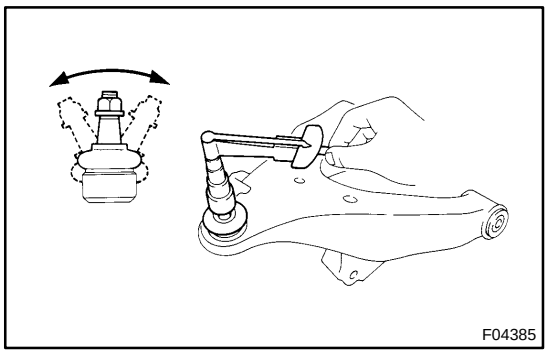


N·m (kgf·cm, ft·lbf) : Specified torque

● Non-reusable part

F05248

SA156-02



INSPECTION

INSPECT LOWER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

(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 one turn per 3 - 5 seconds and take the torque reading on the 5th turn.

Turning torque:

0.29 - 2.94 N·m (3 - 30 kgf·cm, 2.6 - 26 in.·lbf)

SA158-02

INSTALLATION

Installation is in the reverse order of removal (See page SA-75).

HINT:

After installation, check the front wheel alignment (See page SA-6).

SA155-02

REMOVAL

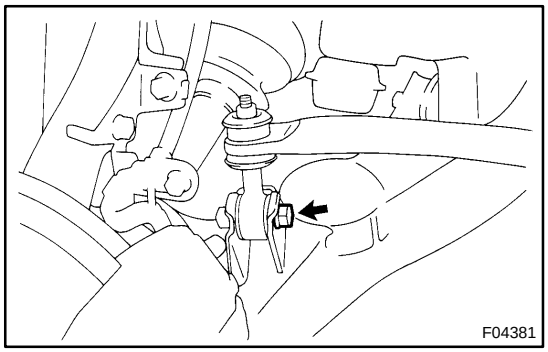
1. REMOVE FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. REMOVE ENGINE UNDER COVER

3. REMOVE FRONT TORSION BAR SPRING

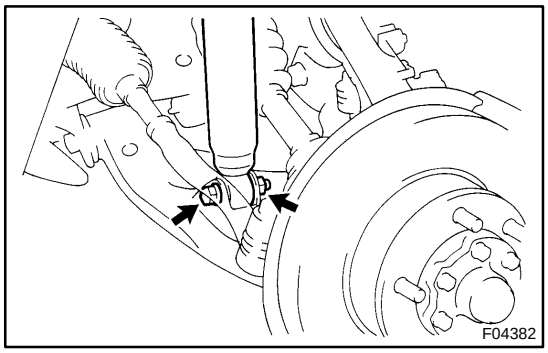
(See page SA-66)



4. DISCONNECT STABILIZER BAR LINK FROM LOWER SUSPENSION ARM

Remove the bolt and disconnect the stabilizer bar link from the lower suspension arm.

Torque: 52 N·m (530 kgf·cm, 38 ft·lbf)



5. DISCONNECT SHOCK ABSORBER FROM LOWER SUSPENSION ARM

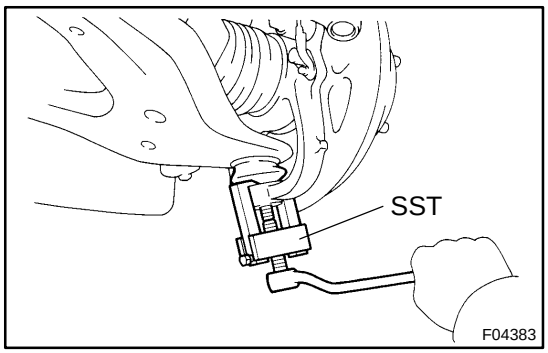
Remove the nut, bolt and disconnect the shock absorber from the lower suspension arm.

Torque: 135 N·m (1,400 kgf·cm, 100 ft·lbf)

6. DISCONNECT STEERING KNUCKLE FROM LOWER SUSPENSION ARM

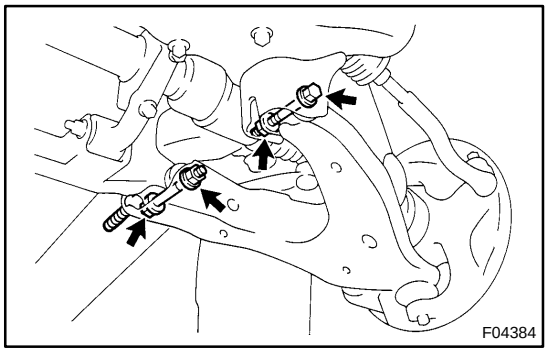
(a) Remove the cotter pin and nut.

Torque: 159 N·m (1,625 kgf·cm, 117 ft·lbf)



(b) Using SST, disconnect the steering knuckle from the lower suspension arm.

SST 09628-6201 1



7. REMOVE LOWER SUSPENSION ARM

Remove the 2 nuts, 3 bolts and lower suspension arm.

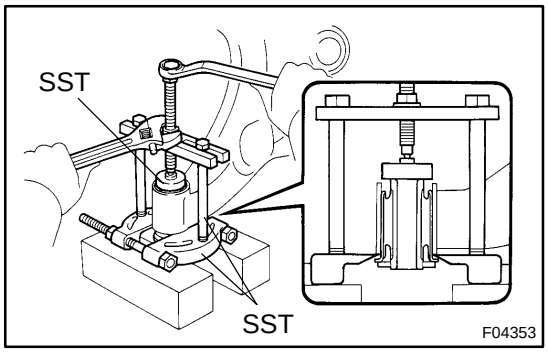
Torque: 230 N·m (2,350 kgf·cm, 170 ft·lbf)

SA157-02

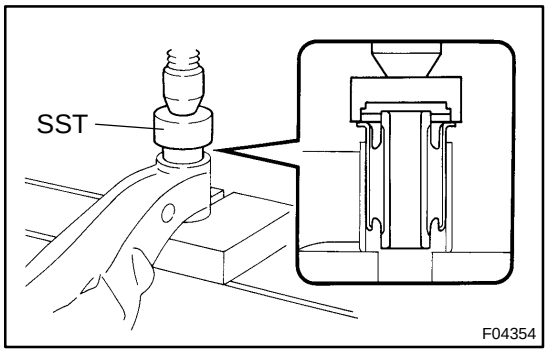
REPLACEMENT

1. REPLACE NO. 1 BUSHING

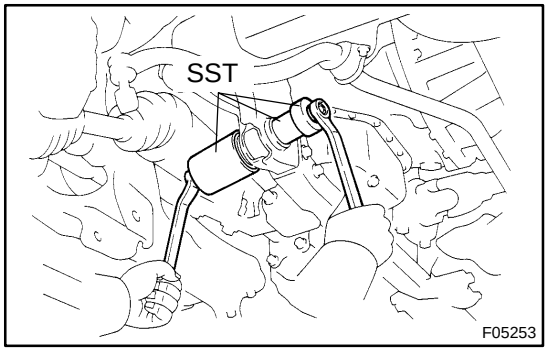
(a) Using a chisel and hammer, pry up the flange of the No. 1 bushing.



(b) Using SST, remove the No. 1 bushing.
SST 09710-30021 (09710-03101), 09950-00020, 09950-00030, 09950-4001 1 (09957-04010)

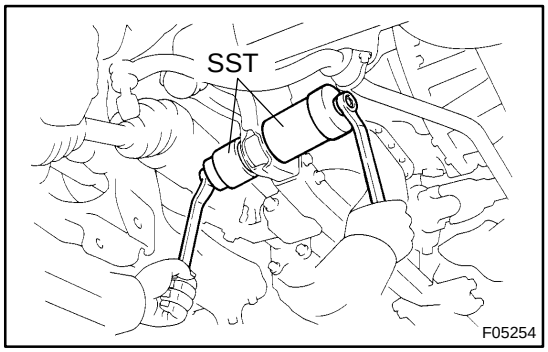


(c) Using SST and a press, install a new No. 1 bushing.
SST 09726-36010

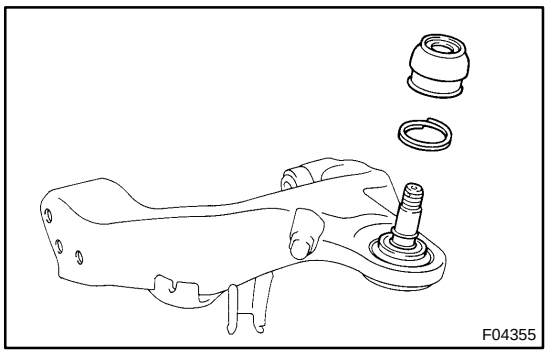


2. REPLACE NO. 2 BUSHING

(a) Using SST, remove the No. 2 bushing.
SST 09710-22021 (09710-01071), 09726-3501 1 (09726-05021), 09830-36010



(b) Using SST, install a new No. 2 bushing.
SST 09631-32020, 09830-36010



3. REPLACE DUST COVER

(a) Remove the wire and dust cover.

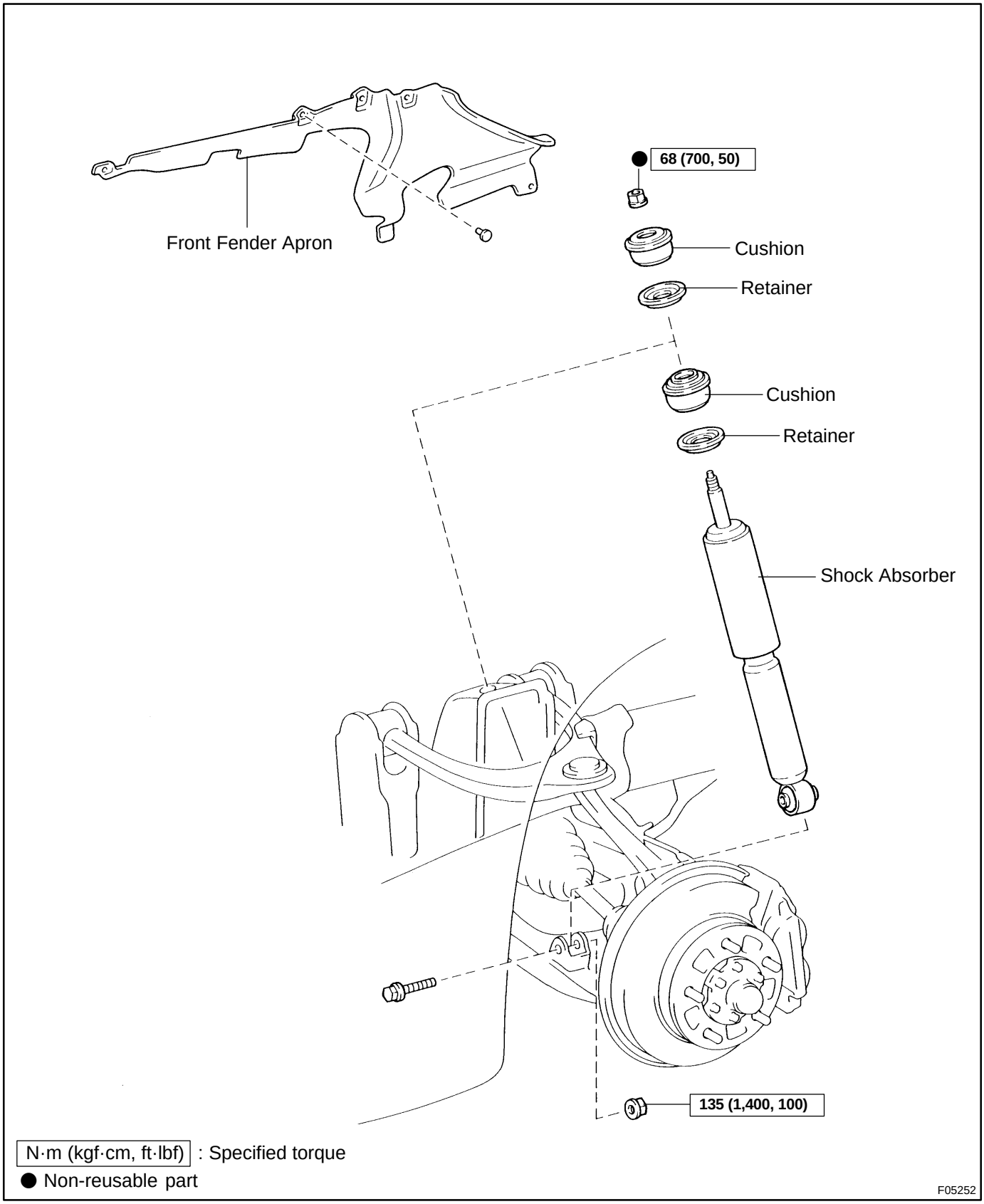
(b) Coat the ball joint with grease in the boot kit.

(c) Install a new dust cover and wire.

FRONT SHOCK ABSORBER

SA14R-02

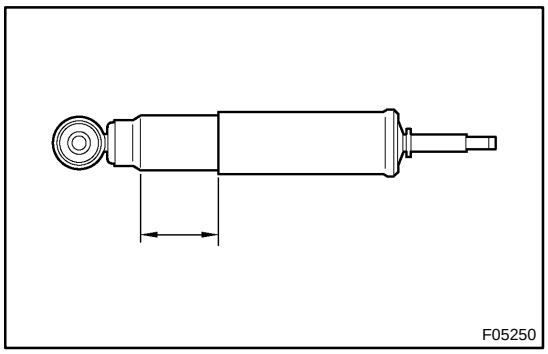
COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

F05252

SA14U-03



DISPOSAL

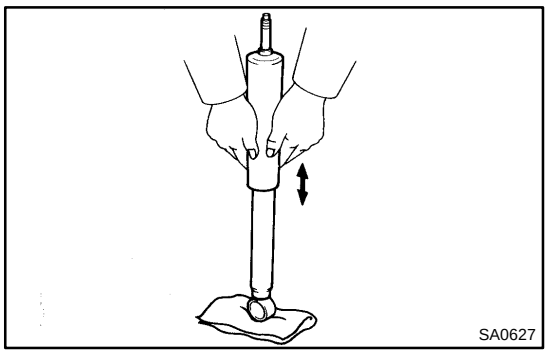
DISCARD SHOCK ABSORBER

Before discarding the shock absorber, drill a hole of 2 - 3 mm (0.079 - 0.118 in.) in diameter at the location shown in the illustration to discharge the gas inside.

NOTICE:

- **When drilling, chips may fly out, work carefully.**
- **The gas is colorless, odorless and non-poisonous.**

SA14T-02



INSPECTION

INSPECT SHOCK ABSORBER

Compress and extend the shock absorber rod and check that there is no abnormal resistance or unusual operation sounds. If there is any abnormality, replace the shock absorber with a new one.

NOTICE:

When disposing the shock absorber, see DISPOSAL on page SA-63 .

SA14V-01

INSTALLATION

Installation is in the reverse order of removal (See page SA-61).

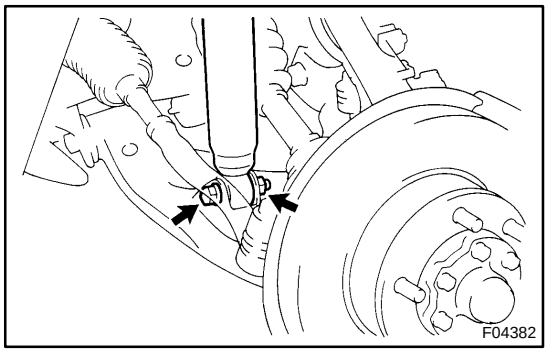
SA14S-02

REMOVAL

1. REMOVE FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

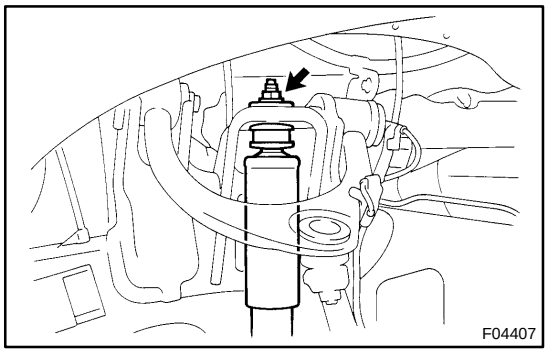
2. REMOVE FRONT FENDER APRON



3. REMOVE SHOCK ABSORBER

(a) Remove the bolt, nut and disconnect the shock absorber from the lower suspension arm.

Torque: 135 N·m (1,400 kgf·cm, 100 ft·lbf)



(b) While holding the piston rod, remove the nut, cushion, retainer and shock absorber.

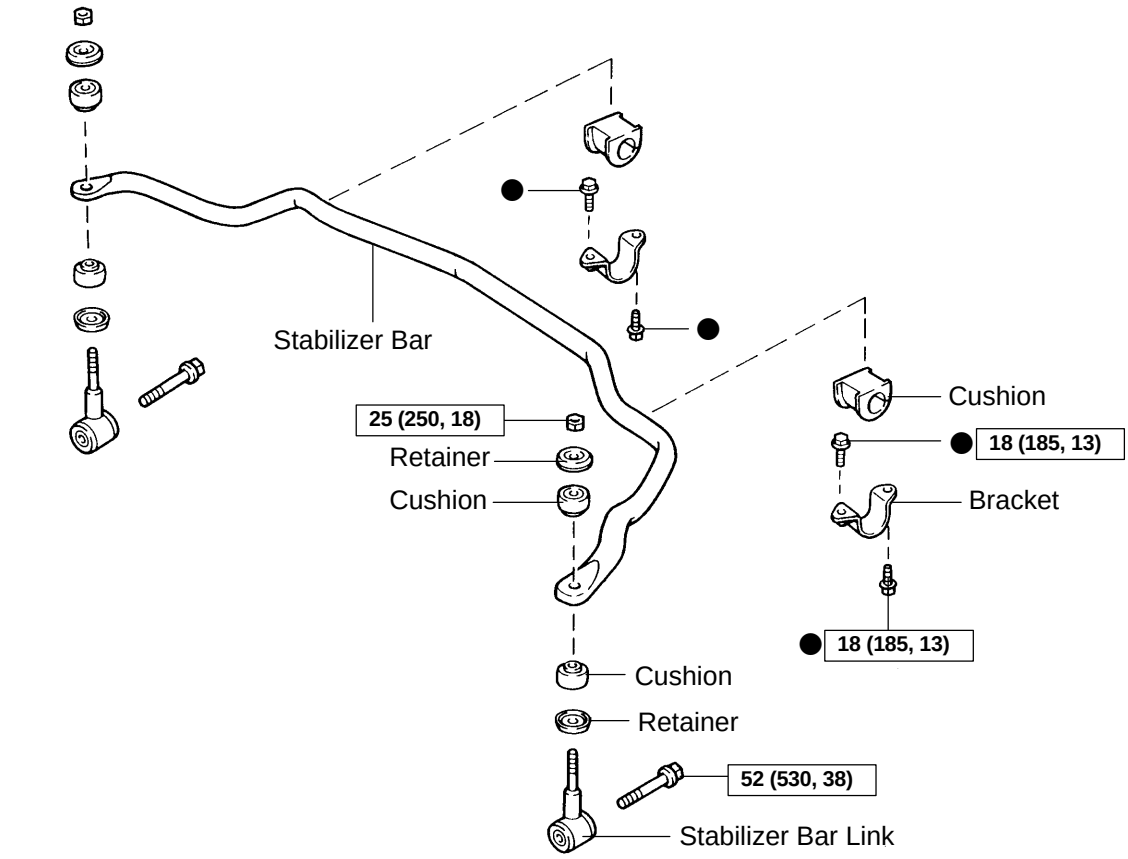
Torque: 68 N·m (700 kgf·cm, 50 ft·lbf)

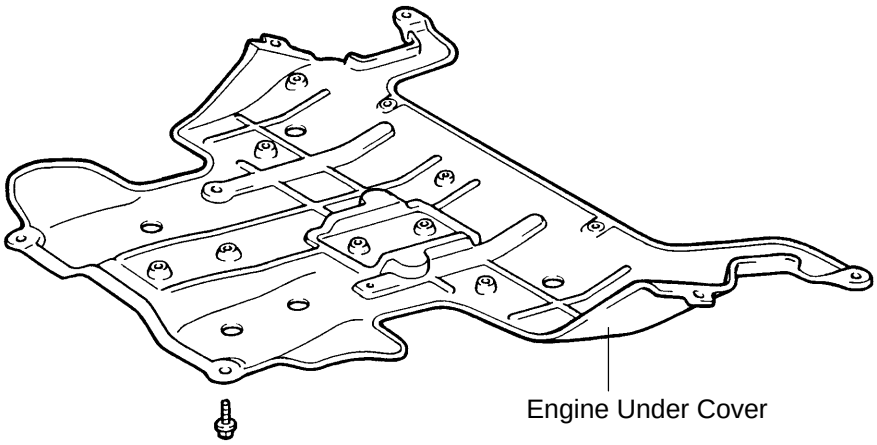
(c) Remove the cushion and retainer from the shock absorber.

FRONT STABILIZER BAR

COMPONENTS

SA159-02





N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

F05236

SA15B-01

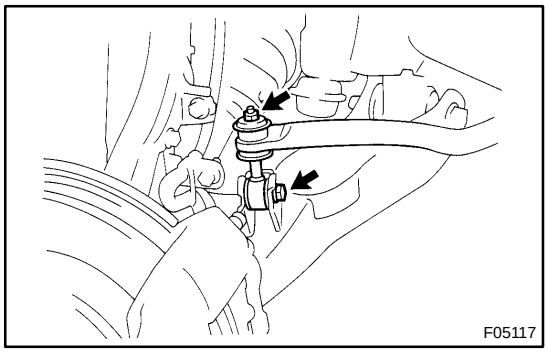
INSTALLATION

Installation is in the reverse order of removal (See page SA-81).

SA15A-02

REMOVAL

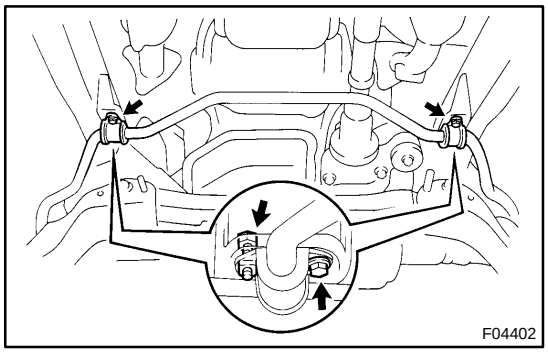
1. REMOVE ENGINE UNDER COVER



2. REMOVE LH AND RH STABILIZER BAR LINKS

(a) Remove the nut, bolt, 2 retainers, 2 cushions and stabilizer bar link.
Torque:
Bolt: 52 N·m (530 kgf·cm, 38 ft·lbf)
Nut: 25 N·m (250 kgf·cm, 18 ft·lbf)

(b) Employ the same manner described above to the other side.



3. REMOVE STABILIZER BAR

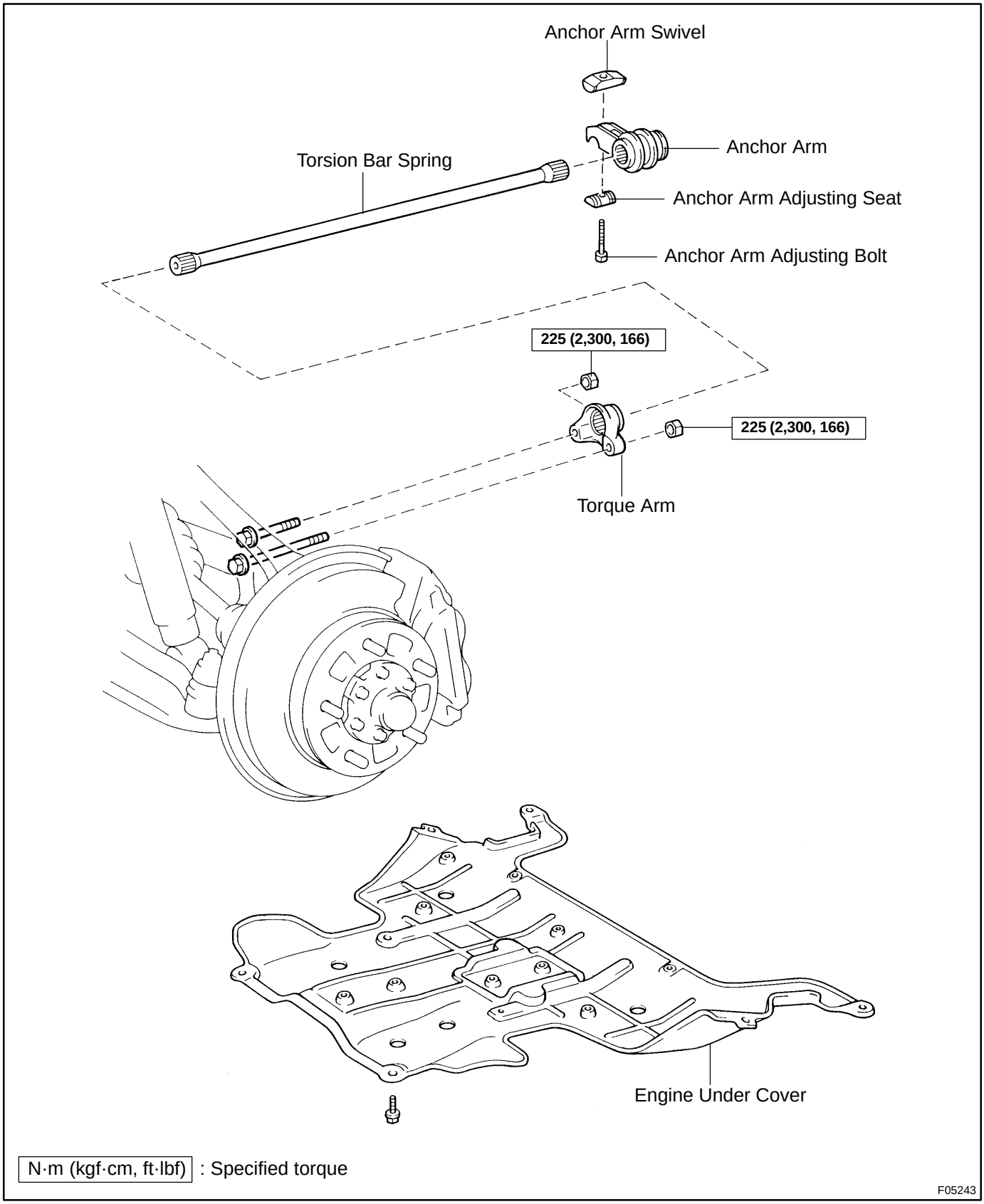
(a) Remove the 4 bolts, 2 brackets and 2 cushions.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Remove the stabilizer bar.

FRONT TORSION BAR SPRING

SA14W-02

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

F05243

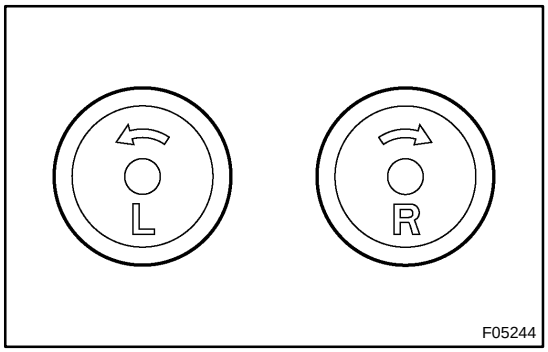
SA14Y-02

INSTALLATION

1. INSTALL TORQUE ARM

Install the bolt, torque arm and 2 nuts.

Torque: 225 N·m (2,300 kgf·cm, 166 ft·lbf)



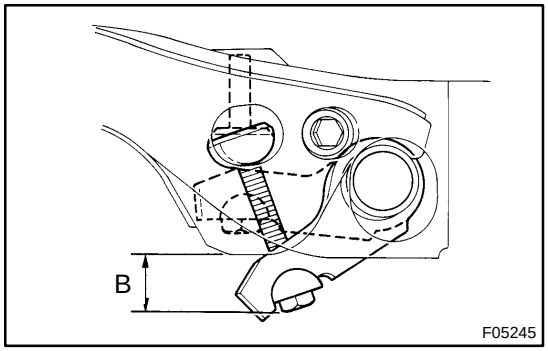
2. INSTALL TORSION BAR SPRING WITH ANCHOR ARM

HINT:

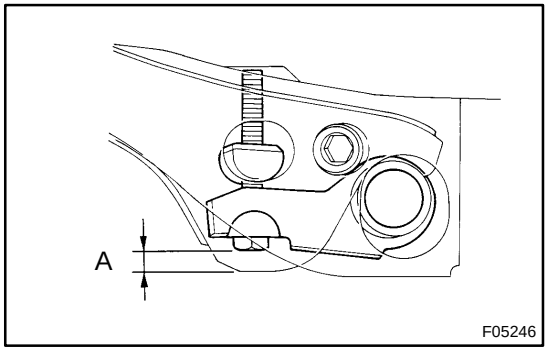
- There are right and left matchmarks on the rear end of the torsion bar springs.
- Apply a light coat of MP grease to the spline of the torsion bar springs.

(a) New torsion bar spring:
Install a new torsion bar spring and anchor arm.

(1) Install the anchor arm to a new torsion bar spring.
(2) Install the torsion bar spring with the anchor arm to the torque arm.
(3) Install the anchor arm adjusting seat, anchor arm swivel and anchor arm adjusting bolt.



(4) Check that the length of anchor arm adjusting bolt end is almost same as dimension ”B” measured when the torsion bar was removed.



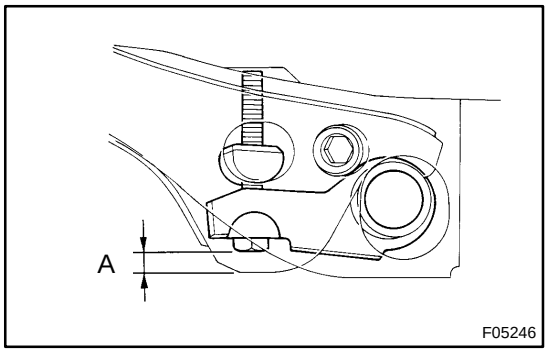
(5) Tighten the anchor arm adjusting bolt so that the dimension ”A” is within the specified value in the table below.

Reference:

LH	8 - 25 mm (0.315 - 0.984 in.)
RH	2 - 18 mm (0.079 - 0.709 in.)

(b) Reused torsion bar spring:
Install the torsion bar spring and anchor arm.

(1) Align matchmarks on the torsion bar spring and anchor arm and install them.
(2) Align matchmarks on the torsion bar spring and torque arm and install them.



(3) Tighten the anchor arm bolt adjusting so that the dimension ”A” is almost same as the dimension measured when the torsion bar spring was removed.

3. INSTALL ENGINE UNDER COVER

4. INSTALL FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

5. CHECK VEHICLE HEIGHT (See page SA-6)

HINT:

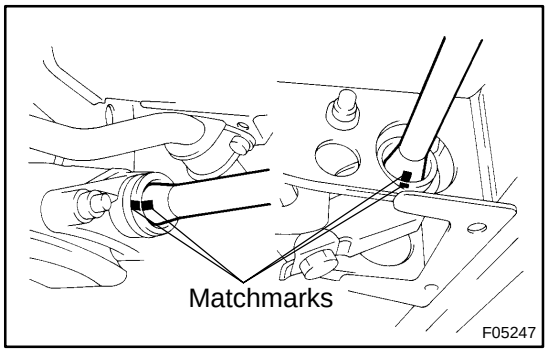
After stabilizing the suspension, adjust the vehicle height by turning the anchor arm bolt.

SA14X-02

REMOVAL

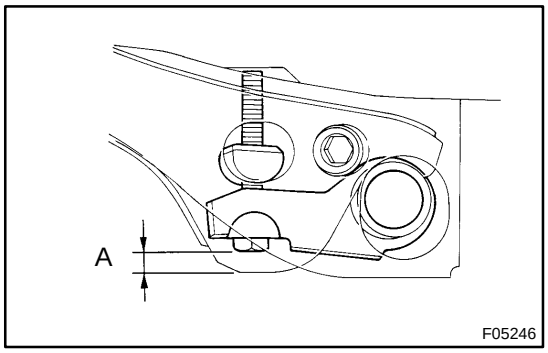
1. REMOVE FRONT WHEEL

2. REMOVE ENGINE UNDER COVER



3. REMOVE TORSION BAR SPRING WITH ANCHOR ARM

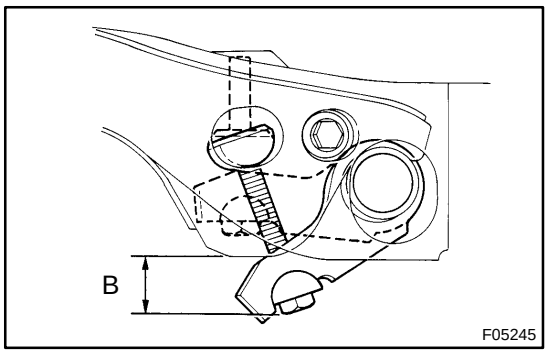
(a) Place matchmarks on the torsion bar spring, anchor arm and torque arm.



(b) Measure the dimension ”A” between the anchor arm adjusting bolt end and the frame as shown.

HINT:

Use the measurement for a reference when installing the anchor arm.



(c) Loosen the anchor arm bolt until the spring tension is free and measure the anchor arm bolt ”B”.

HINT:

Use the measurement for a reference when installing the anchor arm.

(d) Remove the anchor arm adjusting bolt, anchor arm swivel and anchor arm adjusting seat.

(e) Remove the torsion bar spring with the anchor arm.

(f) Remove the anchor arm from the torsion bar spring.

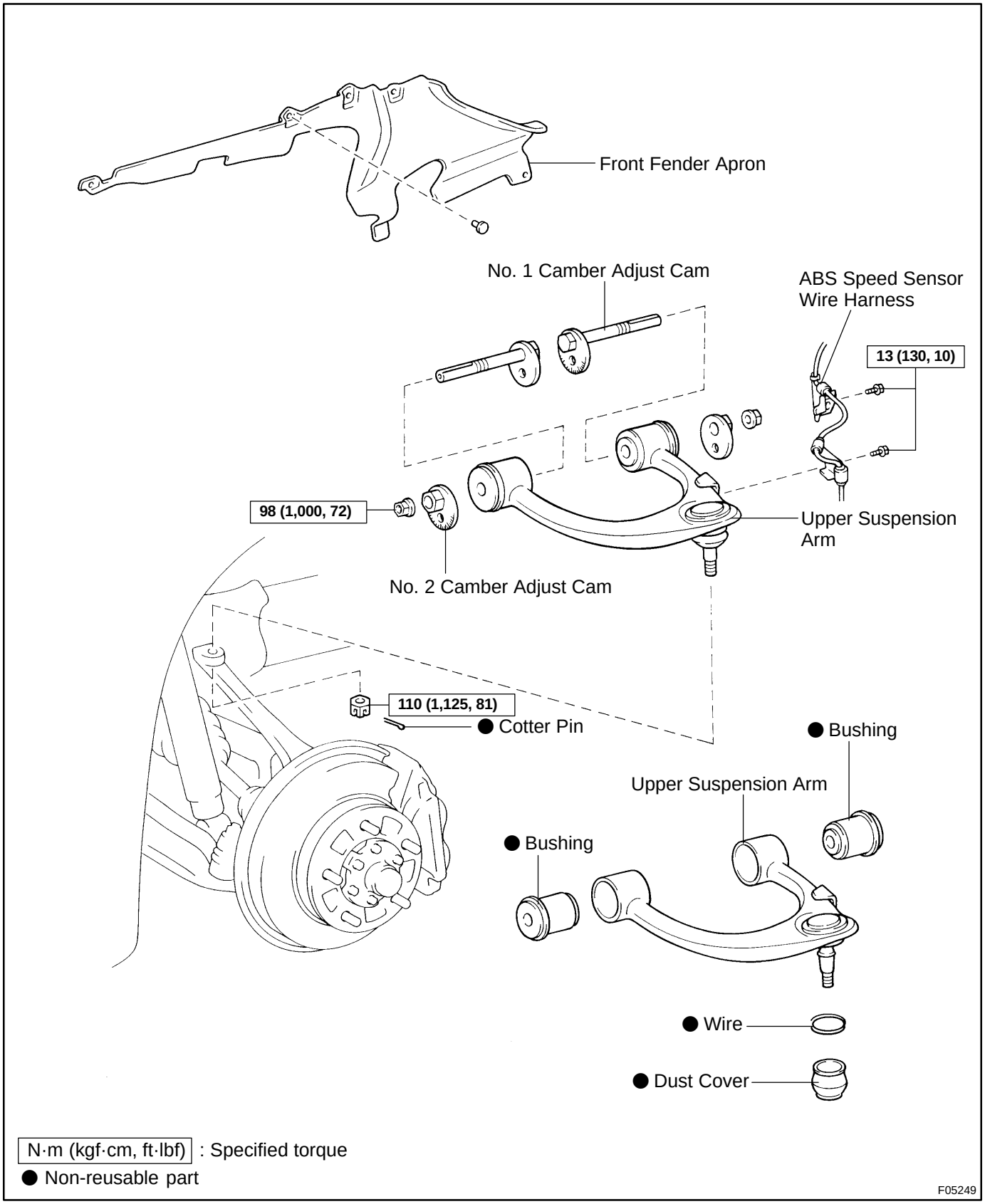
4. REMOVE TORQUE ARM

Remove the 2 nuts, bolt and torque arm.

FRONT UPPER SUSPENSION ARM

SA14Z-02

COMPONENTS

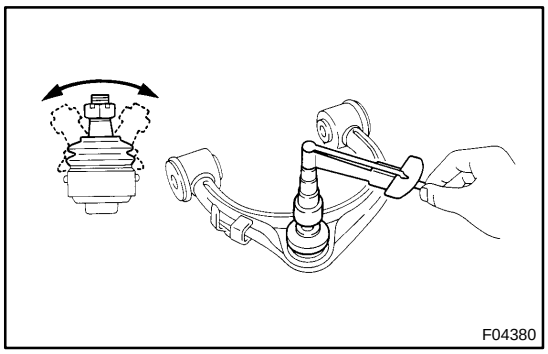


N·m (kgf·cm, ft·lbf) : Specified torque

● Non-reusable part

F05249

SA151-02



INSPECTION

INSPECT UPPER SUSPENSION ARM BALL JOINT FOR ROTATION CONDITION

(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 one turn per 3 - 5 seconds and take the torque reading on the 5th turn.

Turning torque:

1.0 - 4.4 N·m (10 - 45 kgf·cm, 8.9 - 39 in.·lbf)

SA153-02

INSTALLATION

Installation is in the reverse order of removal (See page SA-70).

HINT:

After installation, check the front wheel alignment (See page SA-6).

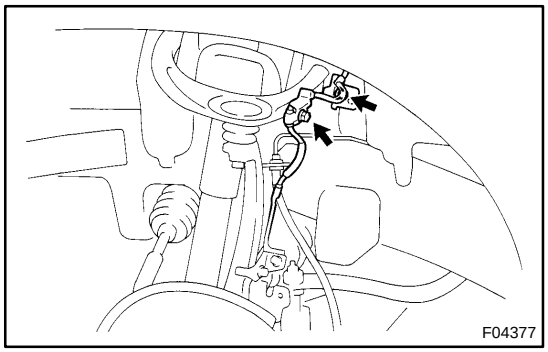
SA150-02

REMOVAL

1. REMOVE FRONT WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. REMOVE FRONT FENDER APRON



3. DISCONNECT ABS SPEED SENSOR WIRE HARNESS

Remove the 2 bolts and disconnect the ABS speed sensor wire harness.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

4. DISCONNECT STEERING KNUCKLE FROM UPPER SUSPENSION ARM

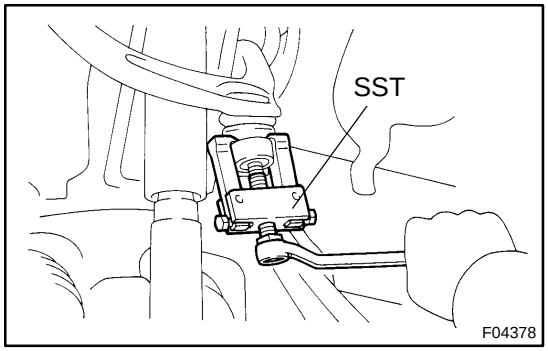
(a) Support the lower suspension arm with a jack.

(b) Remove the cotter pin and nut.

Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

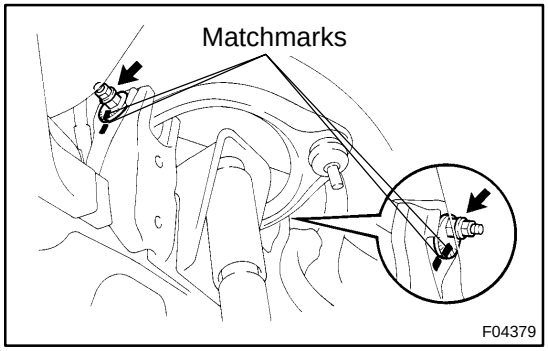
HINT:

At the time of installation, if the holes for the cotter pin are not aligned, tighten the nut further up to 60°.



(c) Using SST, disconnect the steering knuckle from the upper suspension arm.

SST 09628-6201 1



5. REMOVE UPPER SUSPENSION ARM

(a) Place matchmarks on the front and rear No. 2 adjust cams and body.

(b) Remove the 2 nuts, No. 1 and No. 2 camber adjust cams and upper suspension arm.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

HINT:

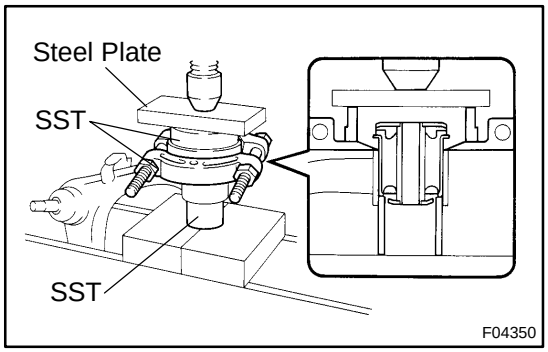
At the time of installation, after stabilizing the suspension, torque the nuts.

SA152-02

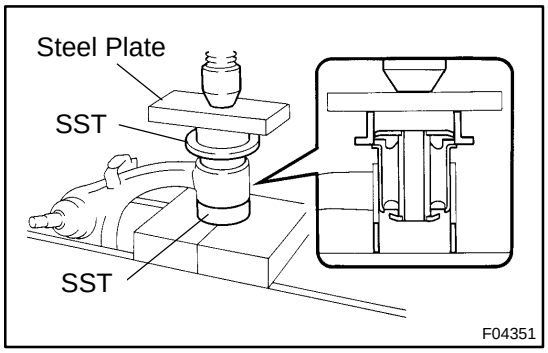
REPLACEMENT

1. REPLACE BUSHING

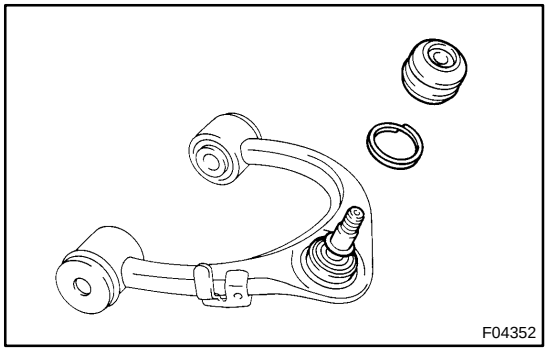
(a) Using a chisel and hammer, pry up the flange of the bushing.



(b) Using SST, a steel plate and press, remove the bushing.
SST 09527-1701 1, 09710-28021 (09710-08031), 09950-00020

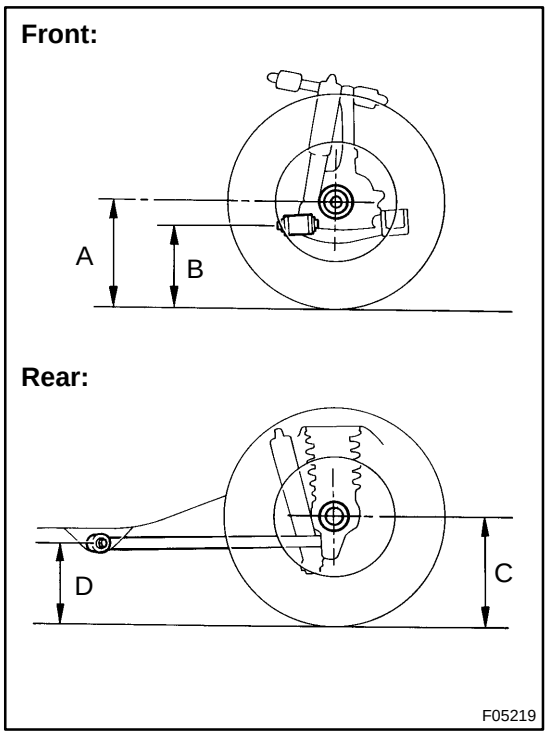


(c) Using SST, a steel plate and press, install a new bushing.
SST 09316-2001 1, 09710-28012 (09710-07062)



2. REPLACE DUST COVER

(a) Remove the wire and dust cover.
(b) Coat the ball joint with grease in the boot kit.
(c) Install a new dust cover and wire.



FRONT WHEEL ALIGNMENT

SA142-03

INSPECTION

1. MEASURE VEHICLE HEIGHT

Vehicle height:

Front	A - B: 71 mm (2.795 in.)
Rear	C - D: 51 mm (2.008 in.)

Measuring points:

A: Ground clearance of spindle center

B: Ground clearance of lower suspension arm front bolt center

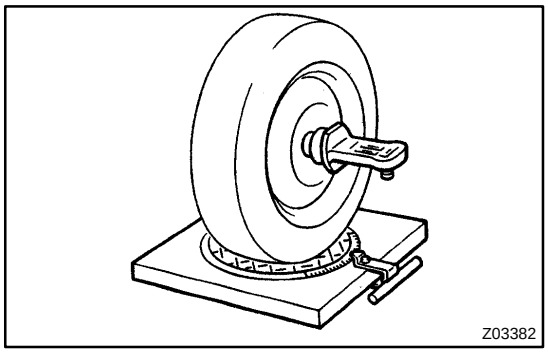
C: Ground clearance of rear axle shaft center

D: Ground clearance of lower control arm front bolt center

NOTICE:

Before inspecting the wheel alignment, adjust the vehicle height to the specified value.

If the vehicle height is not the specified value, try to adjust it by pushing down on or lifting the body.



2. INSTALL CAMBER-CASTER-KINGPIN GAUGE OR POSITION VEHICLE ON WHEEL ALIGNMENT TESTER

Follow the specific instructions of the equipment manufacturer.

3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

Camber, caster and steering axis inclination:

Camber	0°05' ± 45' (0.08° ± 0.75°)
Right-left error	30' (0.5°) or less
Caster	2°30' ± 45' (2.5° ± 0.75°)
Right-left error	30' (0.5°) or less
Steering axis inclination	12°10' ± 45' (12.17° ± 0.75°)
Right-left error	30' (0.5°) or less

If the steering axis inclination is not within the specified value, after the camber and caster have been correctly adjusted, recheck the steering knuckle and front wheel for bearing or looseness.

4. ADJUST CAMBER AND CASTER

NOTICE:

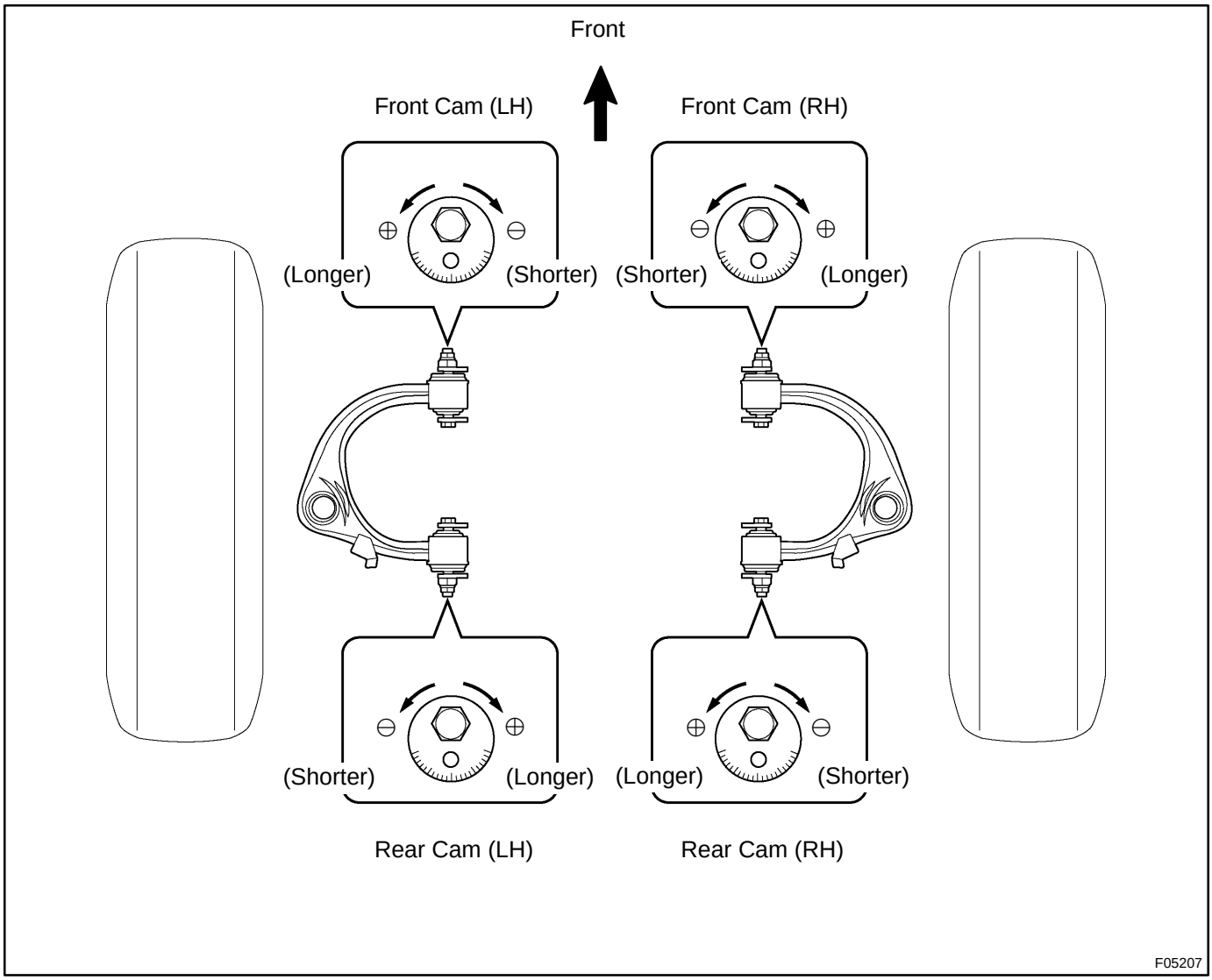
After the camber has been adjusted, inspect the toe-in.

(a) Loosen the front and/or rear adjusting cam nuts.

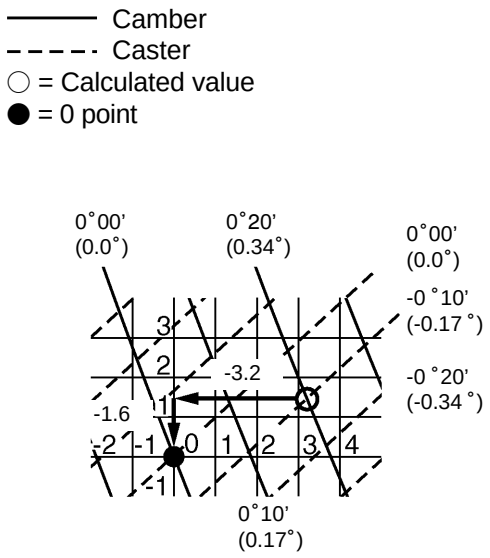
(b) Adjust the camber and caster by front and/or rear adjusting cams.

HINT:

Try to adjust the camber and caster to the center of the specified value.



(Example)



(c) How to read adjustment chart (using examples).

(1) Measure the present alignment.

Camber: -0°15' (-0.25°)

Caster: 2°40' (2.67°)

(2) Mark the difference between the standard value (A) and the measured value (B) on the adjustment chart.

Standard value:

Camber: 0°05' (0.08°)

Caster: 2°30' (2.5°)

Formula: A - B = C

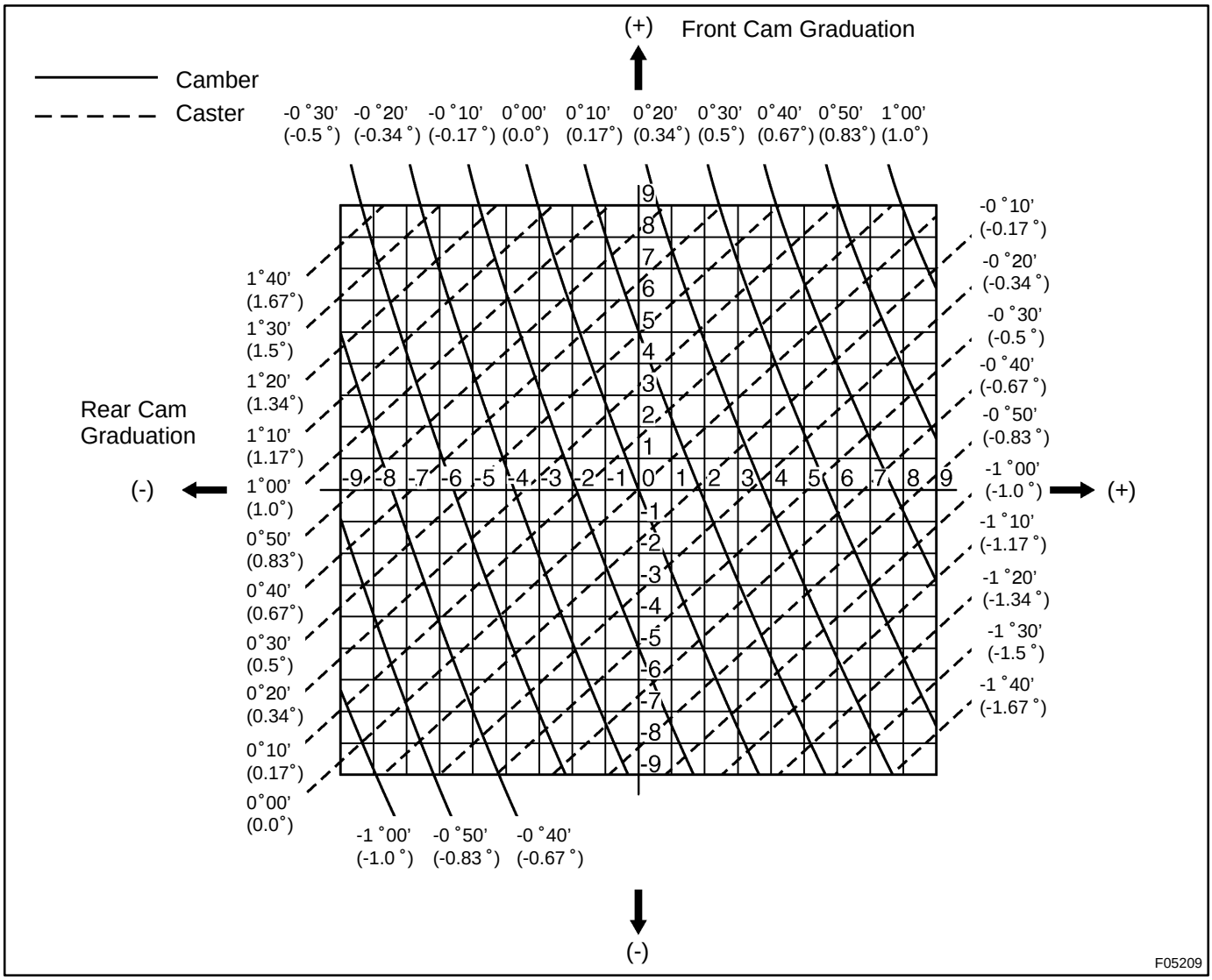
Camber: 0°05' - (-0°15') = 0°20'

Caster: 2°30' - 2°40' = -0°10'

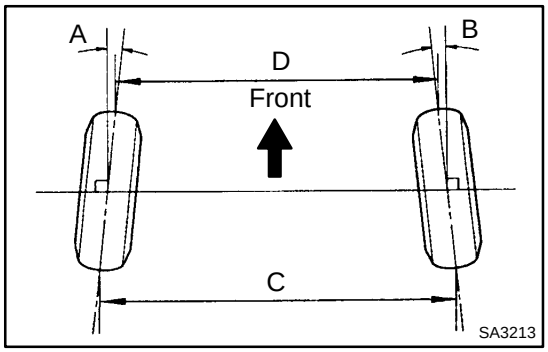
(3) As shown in the chart, read the distances from the marked point to 0 point, and adjust the front and/or rear adjusting cams accordingly.

Front cam: - (Shorter) 1.6

Rear cam: - (Shorter) 3.2



(d) Torque the front and/or rear adjusting cam nuts.
Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

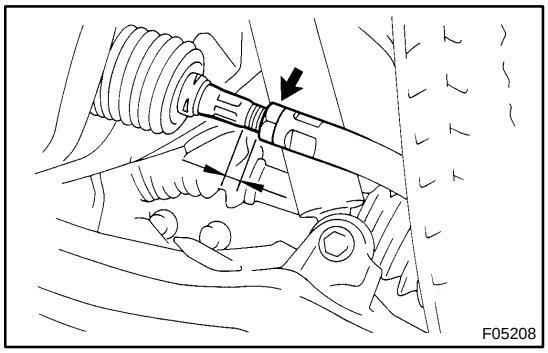


5. INSPECT TOE-IN

Toe-in:

Toe-in (total)	A + B: 0°06' ± 12' (0.1° ± 0.2°) C - D: 1 ± 2 mm (0.04 ± 0.08 in.)

If the toe-in is not within the specified value, adjust it at the rack ends.



6. ADJUST TOE-IN

(a) Check or adjust the lengths of the rack ends, then adjust the toe-in.
Rack end length difference: 3.0 mm (0.118 in.) or less

(b) Remove the boot clamps.

(c) Loosen the tie rod end lock nuts.

(d) Turn the right and left rack ends by an equal amount to adjust the toe-in.

HINT:

Try to adjust the toe-in to the center of the specified value.

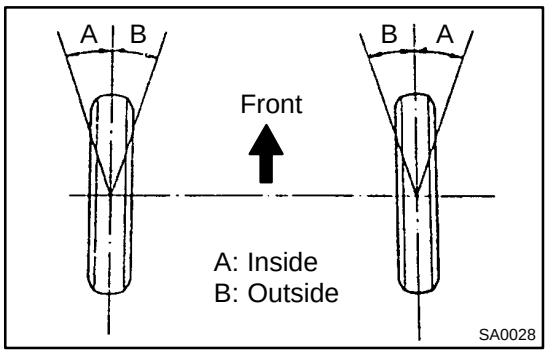
(e) Tighten the tie rod end lock nuts.
Torque: 55 N·m (560 kgf·cm, 41 ft·lbf)

(f) Place the boots on the seats and install the clamps.

HINT:

Make sure that the boots are not twisted.

(g) Perform the zero point calibration of yaw rate and deceleration sensor (See page DI-505).



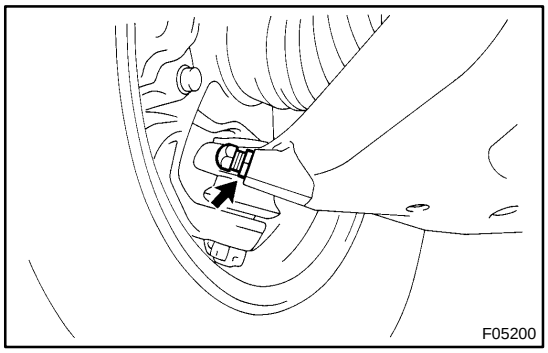
7. INSPECT AND ADJUST WHEEL ANGLE

(a) Turn the steering wheel fully, and measure the turning angle.

Wheel turning angle:

Inside wheel	36˚42' (33˚42' - 36˚42') 36.7˚ (33.7˚ - 36.7˚)
Outside wheel: Reference	32˚36' 32.6˚

If the right and left inside wheel angles differ from the specified value, check the right and left rack end lengths.



(b) When toe-in is normal after inspection, adjust wheel angle with the knuckle stopper bolt of the lower suspension arm.

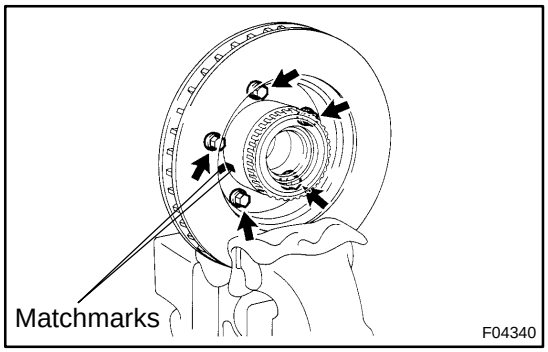
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

FRONT WHEEL HUB BOLT

SA148-04

REPLACEMENT

1. REMOVE FRONT AXLE HUB (See page SA-12)



2. REMOVE HUB BOLT

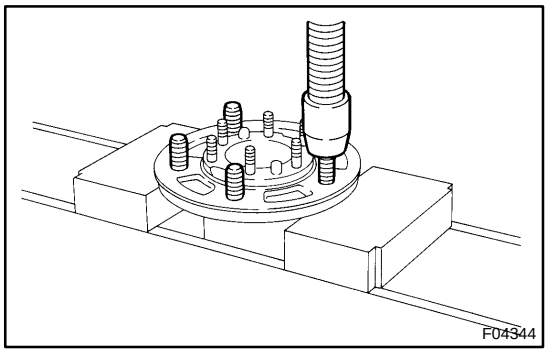
(a) Mount the axle hub with the disc in a soft jaw vice.

NOTICE:

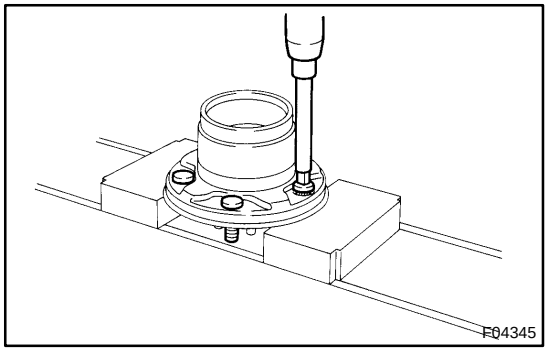
Close vice until it holds disc, do not tighten further.

(b) Place matchmarks on the axle hub and disc.

(c) Remove the 5 bolts and separate the axle hub from the disc.

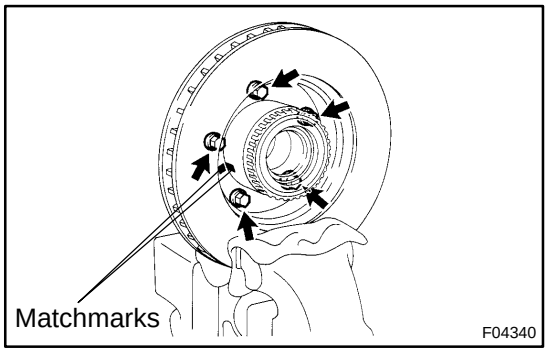


(d) Using a press, remove the hub bolt.



3. INSTALL HUB BOLT

(a) Using an extension bar and press, install a new hub bolt.



(b) Align the matchmarks on the axle hub and disc.

(c) Install the 5 bolts to the axle hub.

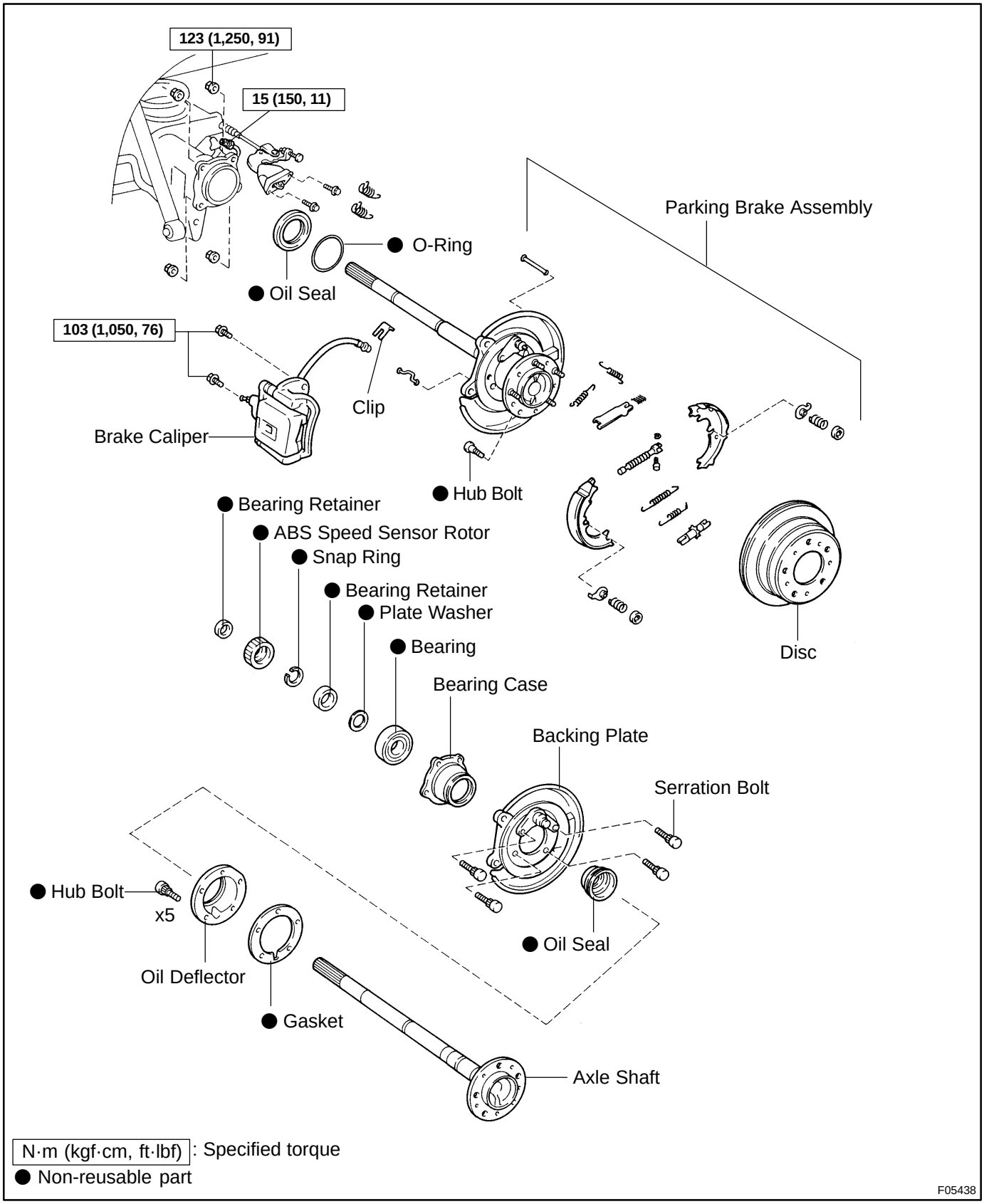
Torque: 74 N·m (750 kgf·cm, 55 ft·lbf)

4. INSTALL FRONT AXLE HUB (See page SA-16)

REAR AXLE SHAFT

COMPONENTS

SA15C-02

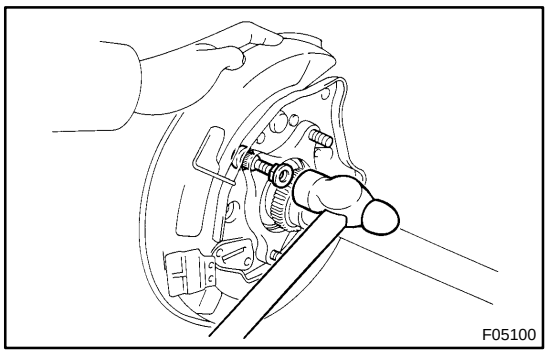


N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

F05438

SA15E-02

DISASSEMBLY

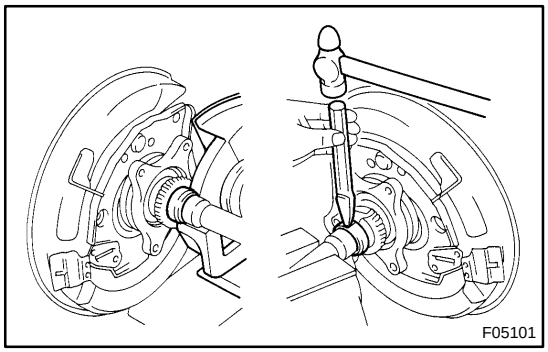


1. REMOVE BEARING RETAINER (DIFFERENTIAL SIDE) AND ABS SPEED SENSOR ROTOR

(a) Attach 4 nuts to the serration bolts and using a hammer, remove the serration bolts from the backing plate.

NOTICE:

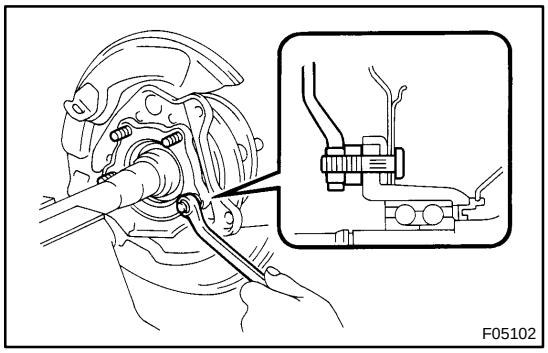
Do not reuse the nuts previously removed from the vehicle.



(b) Grind the retainer and sensor rotor surfaces using a grinder, then pry them out with a chisel and hammer.

2. REMOVE SNAP RING FROM AXLE SHAFT

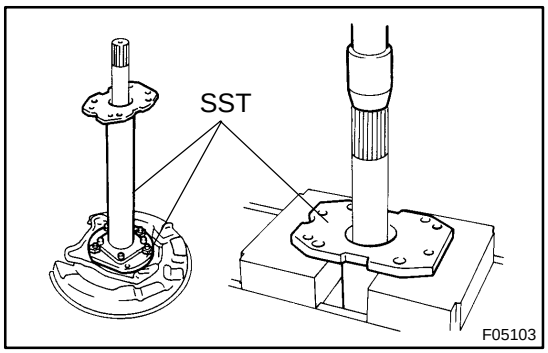
Using a snap ring expander, remove the snap ring.



3. REMOVE AXLE SHAFT FROM BACKING PLATE

(a) Attach 4 washers and nut to the serration bolts, then torque the nuts to install the serration bolts to the backing plate.

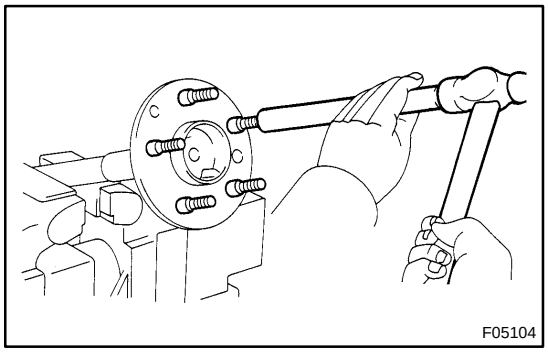
(b) Remove the 4 nuts and washers from the serration bolts.



(c) Position SST on the backing plate with the 4 nuts.
SST 09521-2501 1, 09521-25021

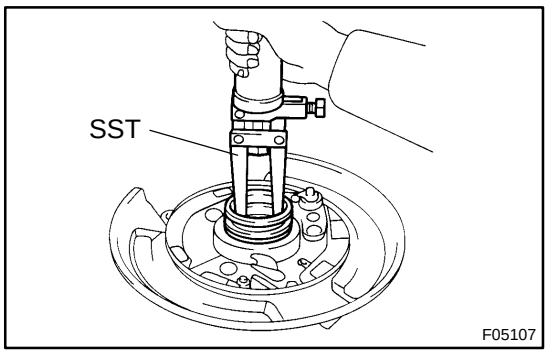
(d) Using a press, remove the axle shaft, bearing retainer and plate washer from the backing plate.

(e) Remove the SST.
SST 09521-2501 1, 09521-25021



4. REMOVE OIL DEFLECTOR

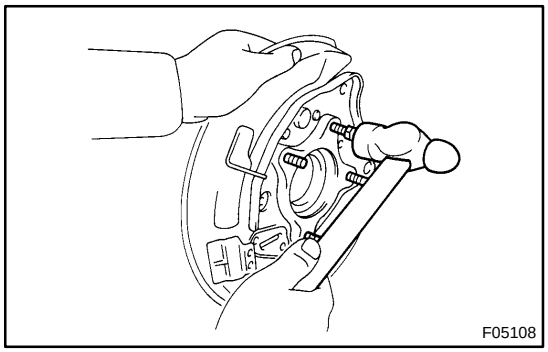
Using a brass bar and hammer, remove the 5 hub bolts, oil deflector and gasket.



5. REMOVE OUTER OIL SEAL

Using SST, remove the oil seal.

SST 09308-00010

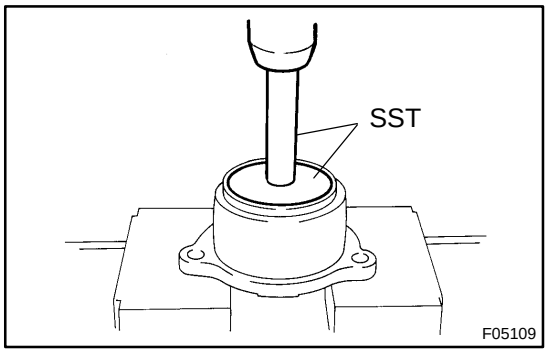


6. REMOVE BEARING CASE

Attach 4 nuts to the serration bolts and remove the serration bolts and bearing case from the backing plate using a hammer.

NOTICE:

Do not reuse the nuts previously removed from the vehicle.

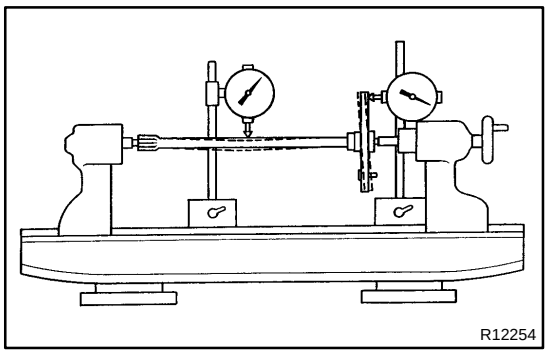


7. REMOVE REAR AXLE BEARING

Using SST and a press, remove the bearing.

SST 09950-60020 (09951-00810),
09950-70010 (09951-07100)

SA15F-02



INSPECTION

INSPECT AXLE SHAFT

Using a dial indicator, measure the runout of the shaft and flange.

Maximum shaft runout: 2.0 mm (0.079 in.)

Maximum flange runout: 0.05 mm (0.0020 in.)

If the rear axle shaft or flange are damaged or worn, or if runout is greater than the maximum, replace the rear axle shaft.

SA15I-06

INSTALLATION

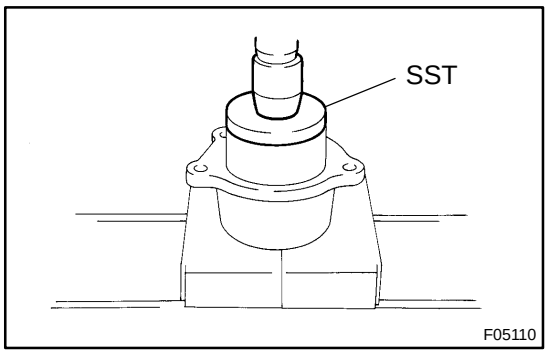
Installation is in the reverse order of removal (See page SA-84).

HINT:

After installation, fill the brake reservoir with brake fluid, bleed the brake system (See page BR-4), check for leaks and check the ABS speed sensor signal (See page DI-505).

SA15H-02

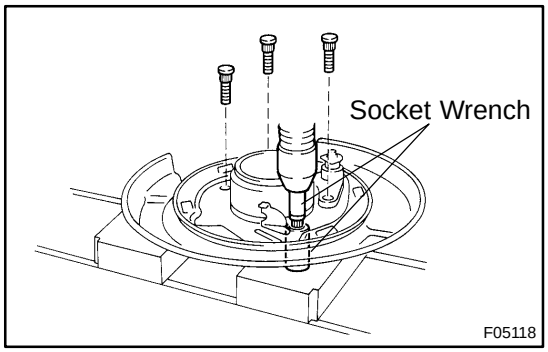
REASSEMBLY



1. INSTALL REAR AXLE BEARING

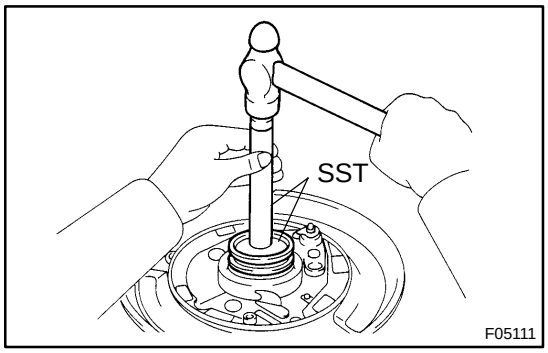
Using SST and a press, install the bearing.

SST 09950-60020 (09951-00890)



2. INSTALL BEARING CASE

Position the backing plate on the bearing case and using a press and 2 socket wrenches, install the 4 serration bolts.

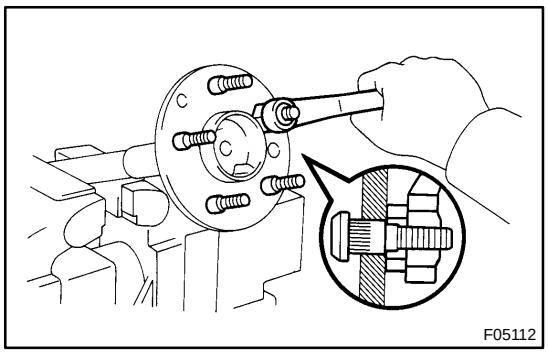


3. INSTALL OUTER OIL SEAL

(a) Using SST and a hammer, install a new oil seal.

SST 09950-60020 (09951-00810),
09950-70010 (09951-07100)

(b) Coat MP grease to the oil seal lip.

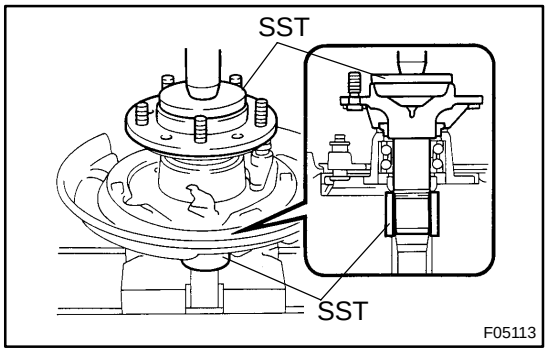


4. INSTALL OIL DEFLECTOR

Position a new gasket and oil deflector on the axle shaft and install a washer and nut to a new hub bolt, as shown in the illustration, and install the 5 hub bolts by torquing the nut.

5. INSTALL AXLE SHAFT TO BACKING PLATE

(a) Install the backing plate, plate washer and bearing retainer on the axle shaft.

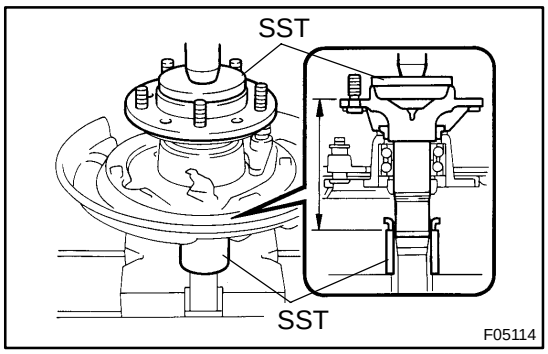


(b) Using SST and a press, install the axle shaft into the backing plate.

SST 09631-12090, 09950-60020 (09951-01030)

6. INSTALL SNAP RING TO AXLE SHAFT

Using a snap ring expander, install a new snap ring.



7. INSTALL ABS SPEED SENSOR ROTOR AND BEARING RETAINER

Using SST and a press, install a new ABS speed sensor rotor and bearing retainer.

SST 09631-12090, 09950-60020 (09951-01030)

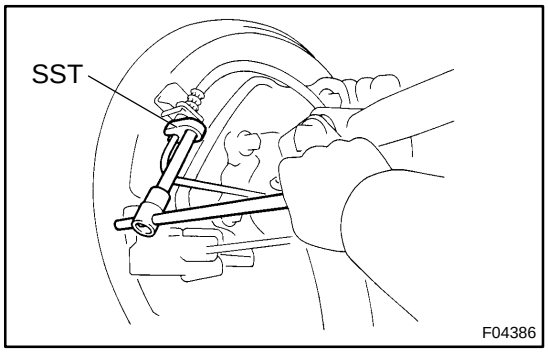
Standard length: 170.7 ± 1.0 mm (6.720 ± 0.039 in.)

SA15D-02

REMOVAL

1. REMOVE REAR WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

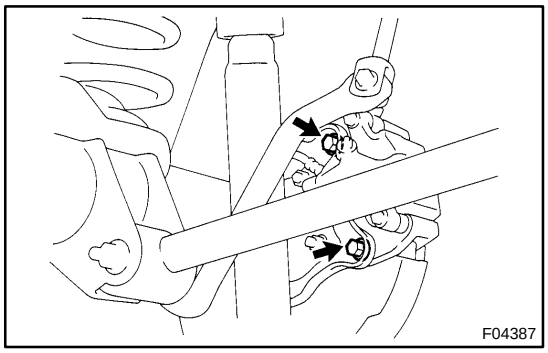


2. DISCONNECT BRAKE LINE

Using SST, disconnect the brake line and remove the clip.

SST 09023-00100

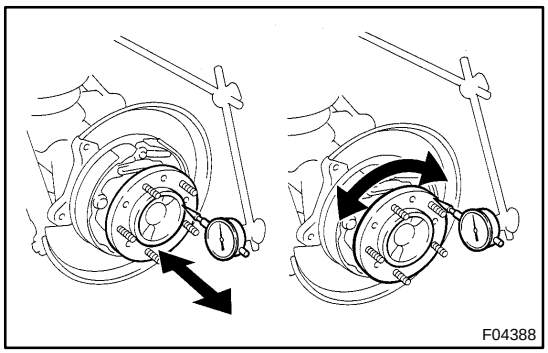
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



3. REMOVE BRAKE CALIPER AND DISC

Remove the 2 bolts, washers, brake caliper and disc.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)



4. CHECK BEARING BACKLASH AND AXLE SHAFT DEVIATION

(a) Using a dial indicator, check the backlash in the bearing shaft direction.

Maximum: 0.6 mm (0.024 in.)

If the backlash exceeds the maximum, replace the bearing.

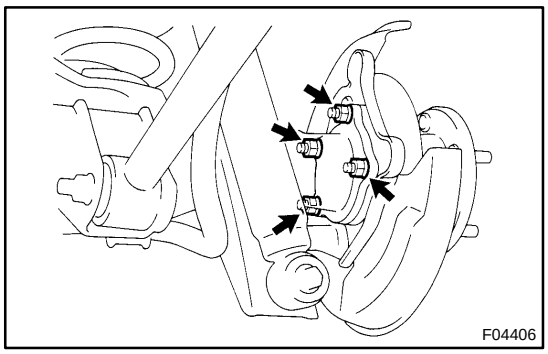
(b) Using a dial indicator, check the deviation at the surface of the axle shaft outside the hub bolt.

Maximum: 0.05 mm (0.0020 in.)

If the deviation exceeds the maximum, replace the axle shaft.

5. REMOVE PARKING BRAKE ASSEMBLY

(See page BR-33)



6. REMOVE AXLE SHAFT ASSEMBLY

(a) Remove the 4 nuts.

Torque: 123 N·m (1,250 kgf·cm, 91 ft·lbf)

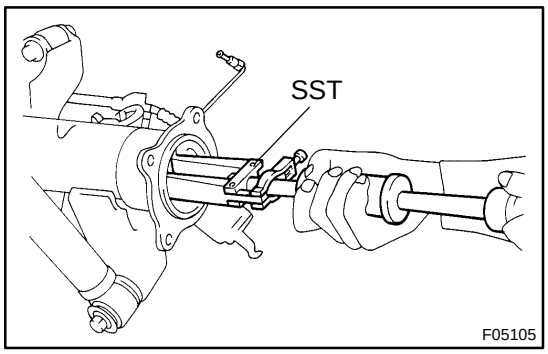
(b) Pull out the axle shaft assembly.

NOTICE:

Be careful not to damage the oil seal.

(c) Remove the O-ring from the bearing case.

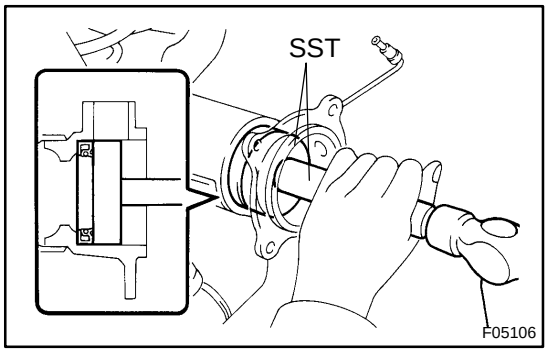
SA15G-02



REPLACEMENT

REPLACE OIL SEAL (INNER SIDE)

(a) Using SST, remove the oil seal.
SST 09308-00010



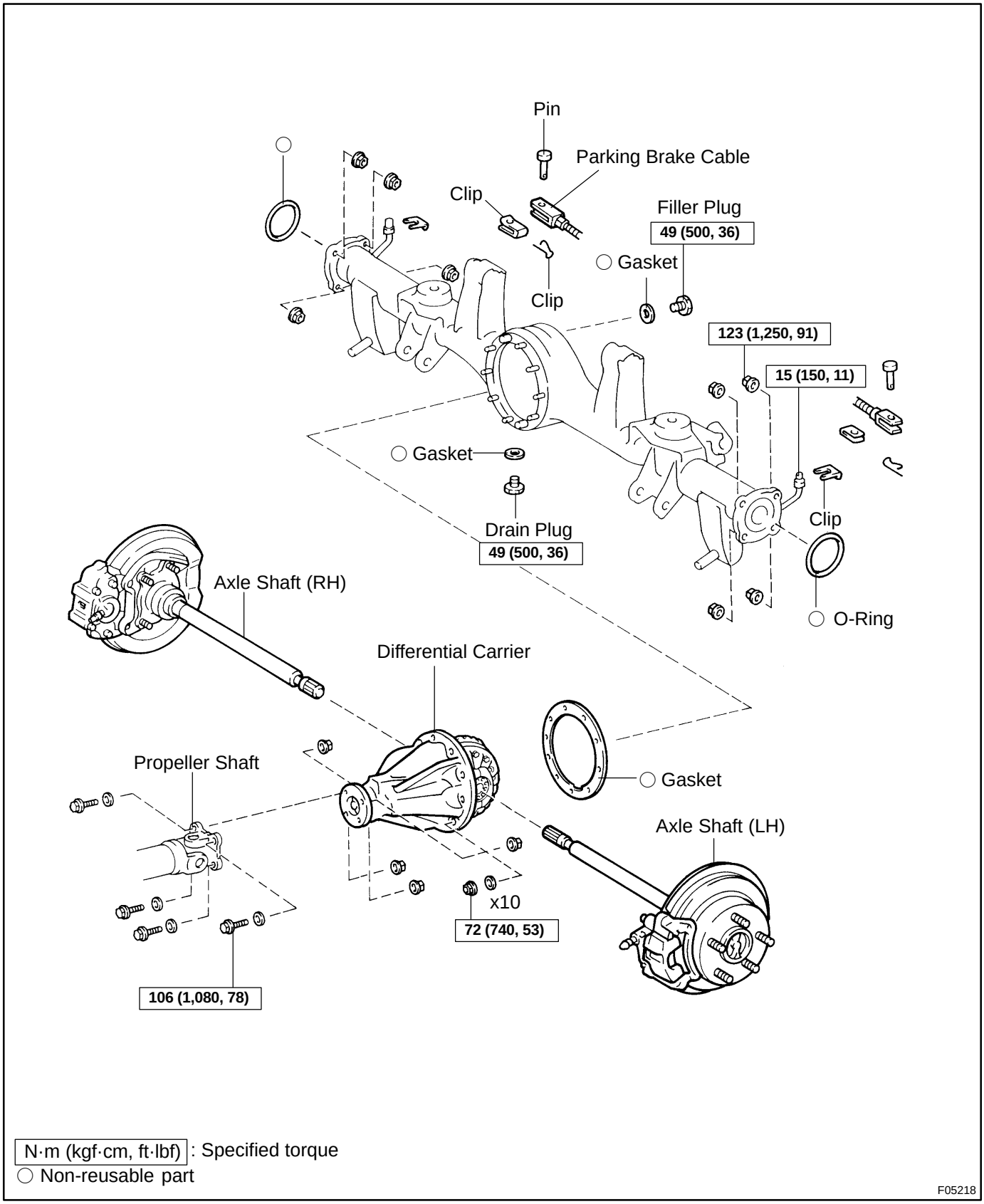
(b) Using SST and a hammer, install a new oil seal.
SST 09950-60020 (09951-00710),
09950-70010 (09951-07150)

(c) Coat MP grease to the oil seal lip.

REAR DIFFERENTIAL CARRIER

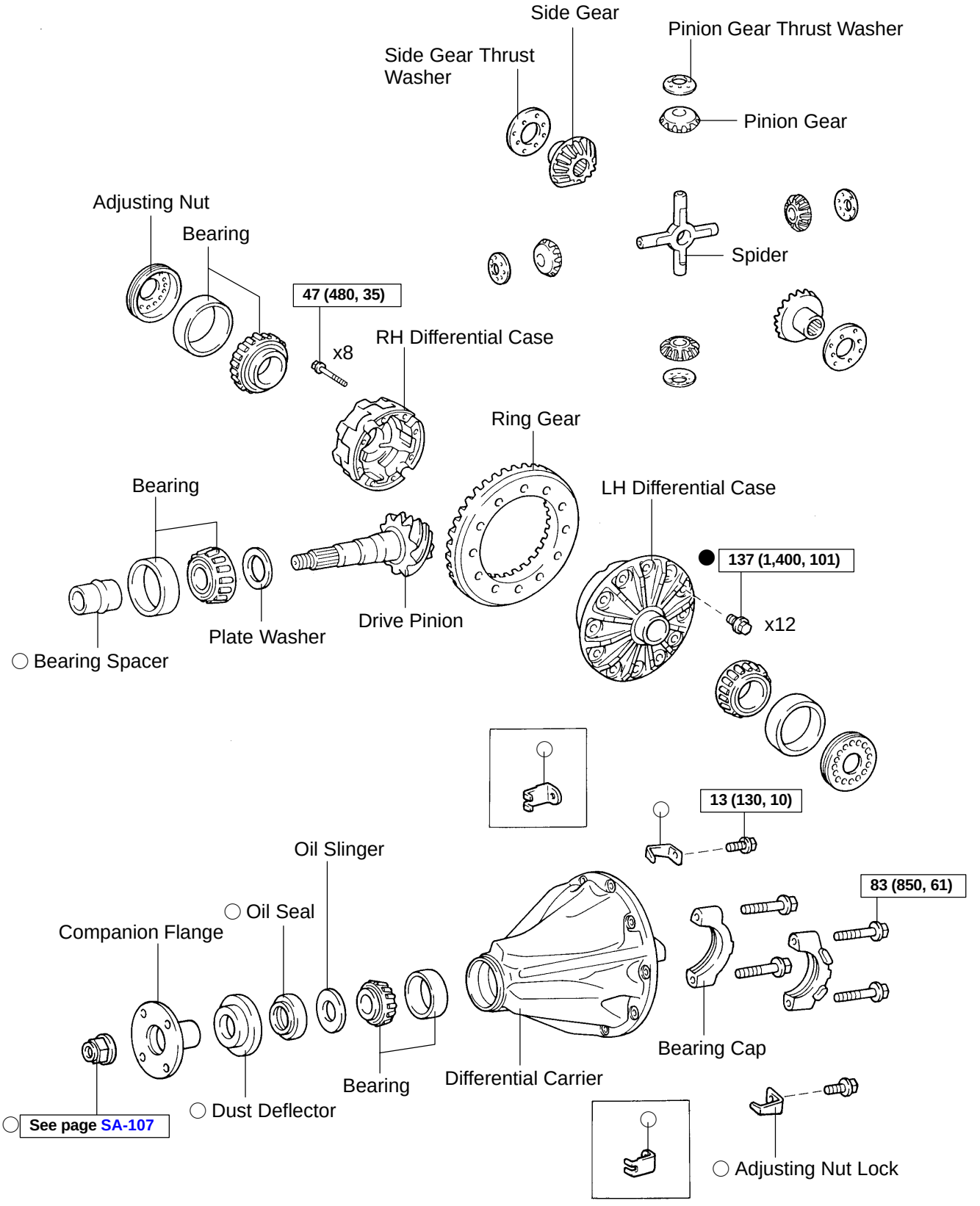
SA15M-03

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
○ Non-reusable part

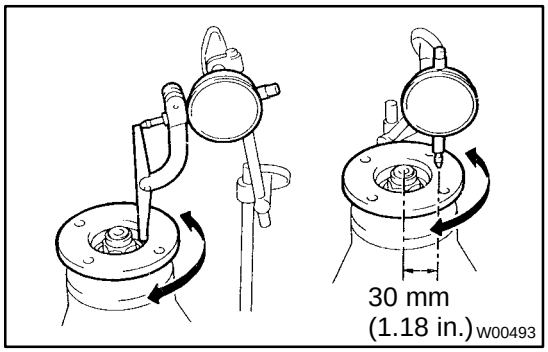
F05218


Side Gear
Pinion Gear Thrust Washer
Side Gear Thrust Washer
Pinion Gear
Adjusting Nut
Bearing
Spider
47 (480, 35)
x8
RH Differential Case
Ring Gear
Bearing
LH Differential Case
137 (1,400, 101)
x12
Drive Pinion
Plate Washer
○ Bearing Spacer
13 (130, 10)
Oil Slinger
○ Oil Seal
Companion Flange
83 (850, 61)
Bearing Cap
Differential Carrier
Bearing
○ Dust Deflector
See page SA-107
○ Adjusting Nut Lock
N·m (kgf·cm, ft·lbf): Specified torque
○ Non-reusable part
● Precoated part
F05257

SA15O-09

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND, ETC.

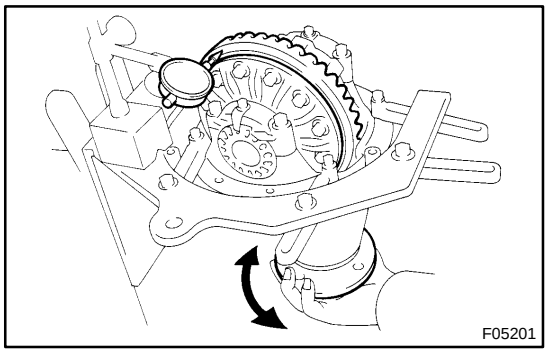


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is greater then the maximum, replace the companion flange.

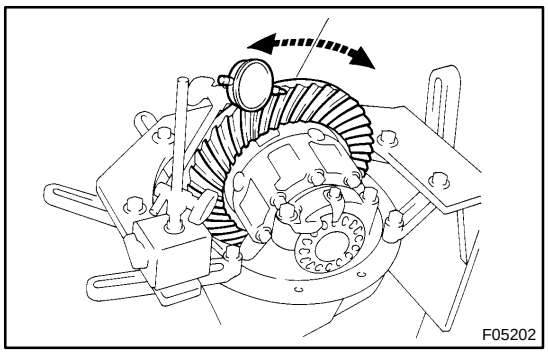


3. CHECK RING GEAR RUNOUT

Using a dial indicator, while holding the drive pinion flange, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

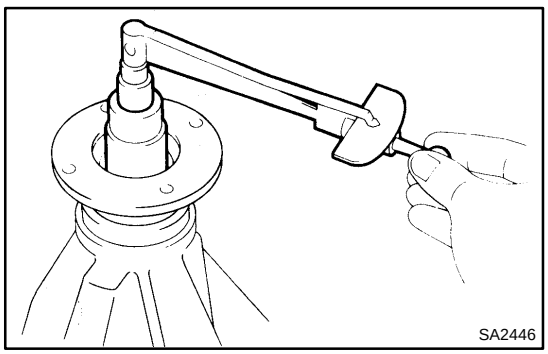
Using a dial indicator, measure the ring gear backlash.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specified value, adjust the side bearing preload or repair as necessary.



5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.

Preload (at starting):

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

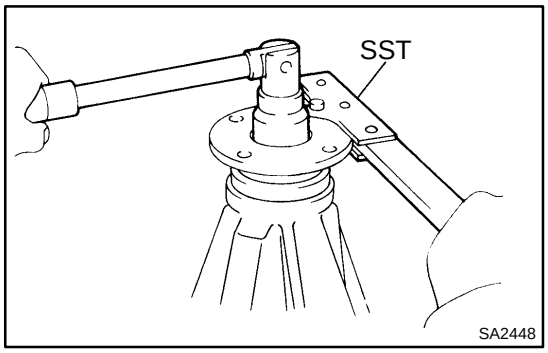
Total preload (at starting):
Drive pinion preload plus
0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)

If necessary, disassemble and inspect the differential.

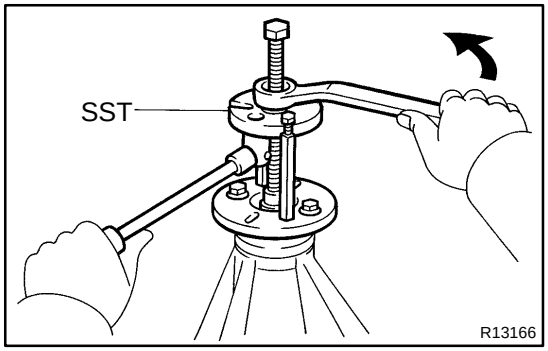
7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA-107)

8. REMOVE COMPANION FLANGE

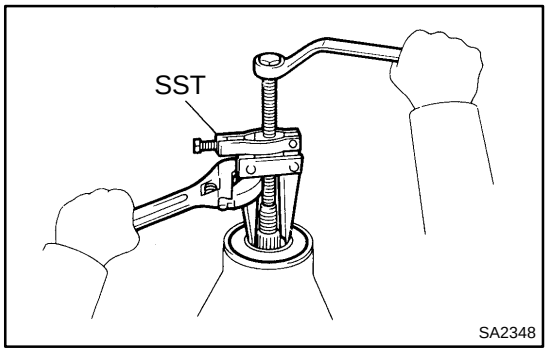
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330-00021



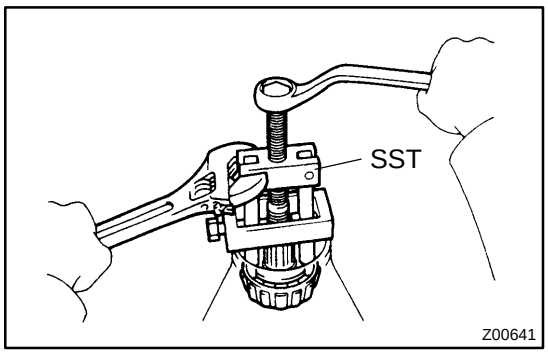
(c) Using SST, remove the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



9. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308-10010

(b) Remove the oil slinger.

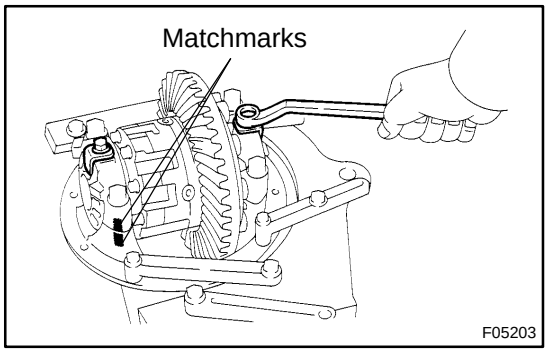


10. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.

SST 09556-22010

If the front bearing is damaged or worn, replace the bearing.



11. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 2 bolts and adjusting nut locks.

(c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.

HINT:

Tag the disassembled parts to show the location for reassembling.

(d) Remove the differential case with the bearing outer races from the carrier.

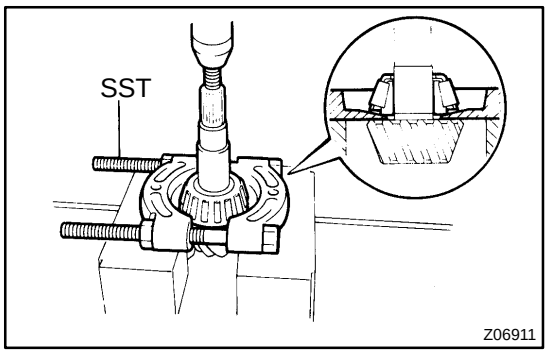
HINT:

Tag the disassembled parts to show the location for reassembling.

12. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



13. REMOVE DRIVE PINION REAR BEARING

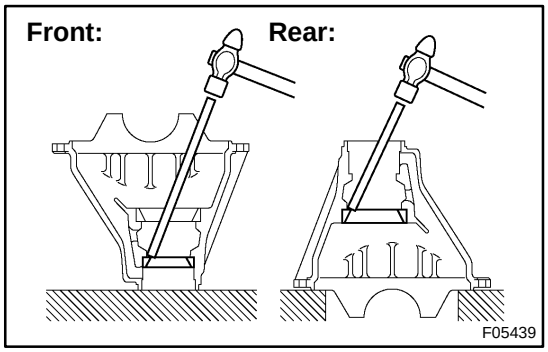
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950-00020

HINT:

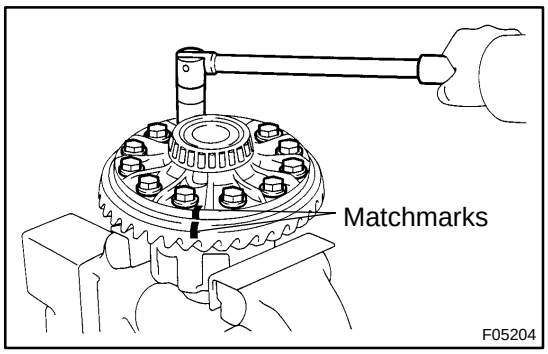
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



14. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.

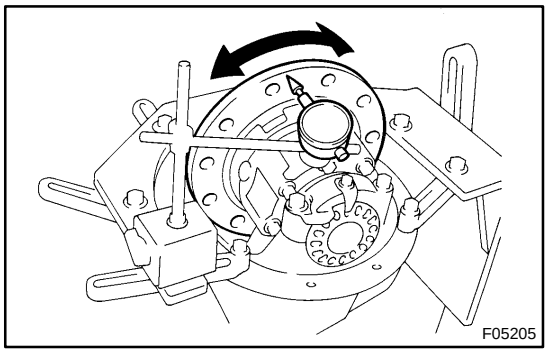


15. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to remove it from the differential case.

16. CHECK DIFFERENTIAL CASE RUNOUT

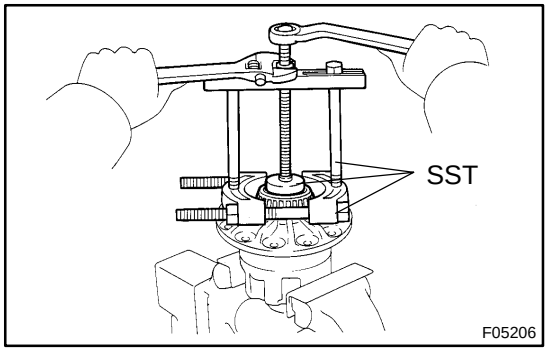
(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.
(b) Install the differential case in the differential carrier.
(c) Tighten the adjusting nut just to where there is no play in the bearing.
(d) Align the matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bearing cap bolts a little at a time.



(f) Using a dial indicator, measure the differential case runout.

Maximum case runout: 0.04 mm (0.0016 in.)

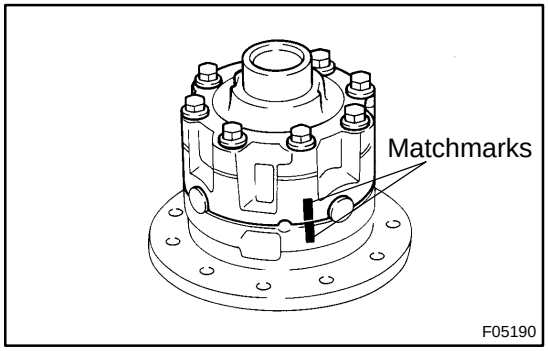
(g) Remove the differential case.



17. REMOVE SIDE BEARINGS FROM DIFFERENTIAL CASE

Using SST, remove the 2 side bearings from the differential case.

SST 09950-00020, 09950-00030, 09950-4001 1 (09957-04010), 09950-60010 (09951-00480)



18. DISASSEMBLE DIFFERENTIAL CASE

(a) Place matchmarks on the RH and LH differential cases.
(b) Remove the 8 bolts uniformly, a little at a time.
(c) Using a plastic hammer, separate the RH and LH differential cases.
(d) Remove the 2 side gear thrust washers, 2 side gears, spider, 4 pinion gears and pinion gear thrust washers.

SA15R-11

INSTALLATION

Installation is in the reverse order of removal (See page SA-100).

HINT:

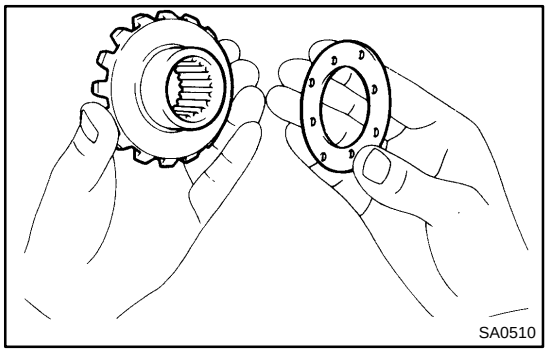
After installation, fill the differential with hypoid gear oil (See page SA-95), fill the brake reservoir with brake fluid, bleed the brake system (See page BR-4), check for leaks and check the ABS speed sensor signal (See page DI-505).

SA15Q-12

REASSEMBLY

HINT:

- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.



1. MEASURE SIDE GEAR BACKLASH

(a) Install the 2 thrust washers to the side gears.

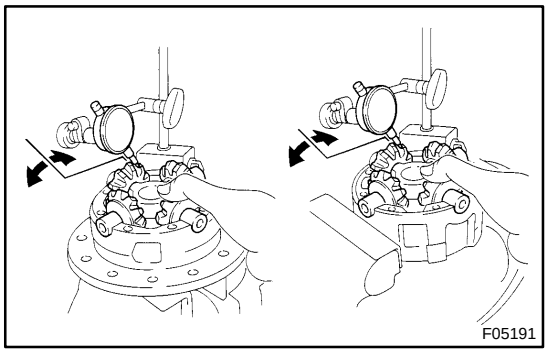
(b) Install the side gear to the differential case.

(c) Install the 4 pinion gears and thrust washers to the spider.

(d) Install the spider assembly to the differential case.

HINT:

Install the spider to the differential case tightly.



(e) Using a dial indicator, measure the side gear backlash holding the side gear and spider.

Backlash: 0.02 - 0.15 mm (0.0008 - 0.0059 in.)

HINT:

- Measure at all 4 locations.
- Measure the backlash at the RH and LH differential cases.

If the backlash is not within the specified value, install a thrust washer of a different thickness.

Thrust washer thickness:

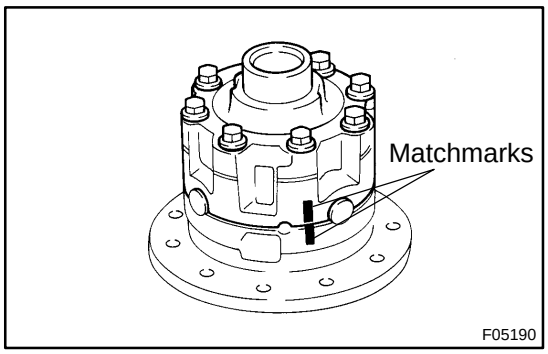
Thickness mm (in.)	Thickness mm (in.)
1.55 (0.061)	1.85 (0.073)
1.60 (0.063)	1.90 (0.075)
1.65 (0.065)	1.95 (0.077)
1.70 (0.067)	2.00 (0.079)
1.75 (0.069)	2.05 (0.081)
1.80 (0.071)	2.10 (0.083)

2. ASSEMBLE DIFFERENTIAL CASE

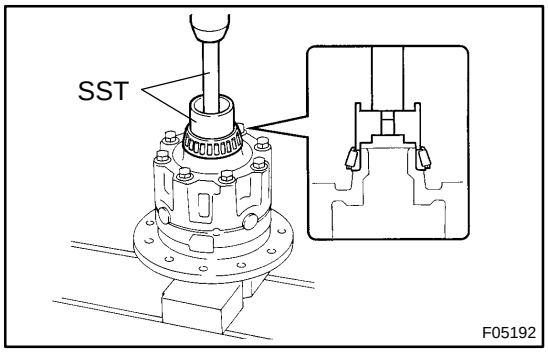
(a) Reinstall the spider to the differential case.

HINT:

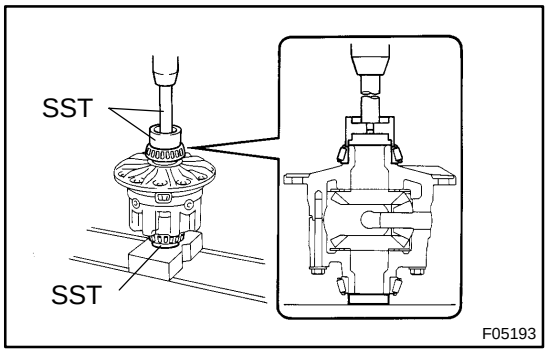
Install the spider to the differential case tightly.



(b) Align the matchmarks and assemble the RH and LH differential cases.
(c) Tighten the 8 bolts uniformly, a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)

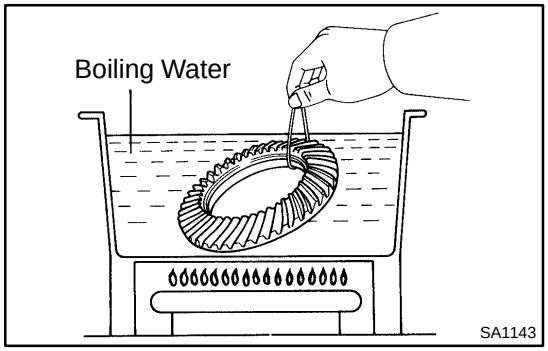


3. INSTALL SIDE BEARINGS
(a) Using SST and a press, install the RH side bearing on the differential case.
SST 09710-30050, 09950-70010 (09951-07100)

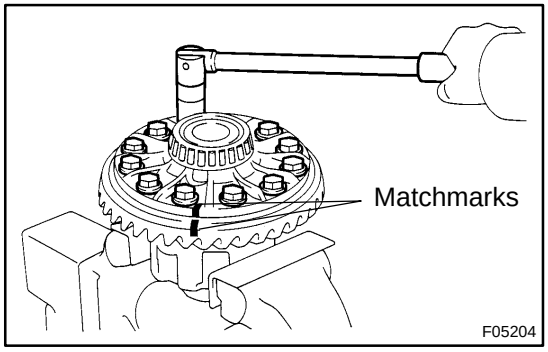


(b) Using SST and a press, install the LH side bearing on the differential case.
SST 09710- 30050, 09950- 60010 (09951- 00480), 09950-70010 (09951-07100)

4. INSTALL RING GEAR ON DIFFERENTIAL CASE
(a) Clean the threads of the bolts and differential case with the white gasoline.
(b) Clean the contact surfaces of the differential case and ring gear.



(c) Heart the ring gear to about 100 °C (212 °F) in boiling water.
(d) Carefully take the ring gear out of the boiling water.
(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.

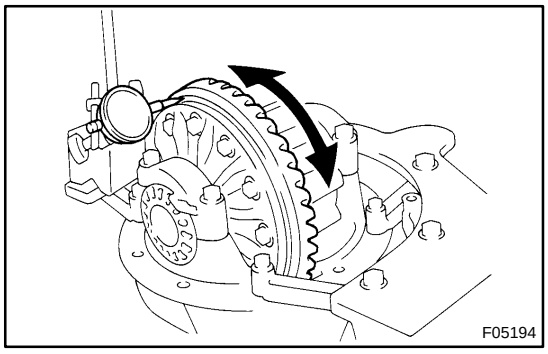


(f) Align the matchmarks on the ring gear and differential case.
(g) Temporarily install the 12 set bolts.
(h) After the ring gear cools down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No. 08833-00100, THREE BOND 1360 K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

5. CHECK RING GEAR RUNOUT

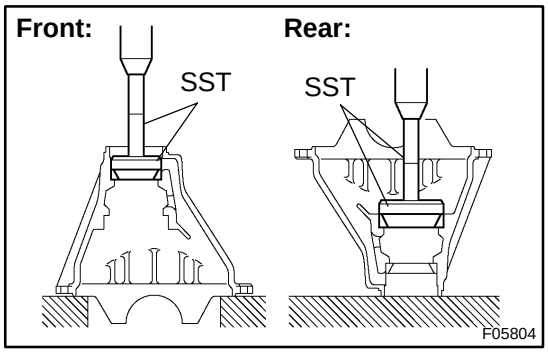
(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.

(b) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearings.



(c) Using a dial indicator, check the ring gear runout.
Maximum runout: 0.05 mm (0.0020 in.)

(d) Remove the differential case.



6. INSTALL FRONT AND REAR BEARING OUTER RACES

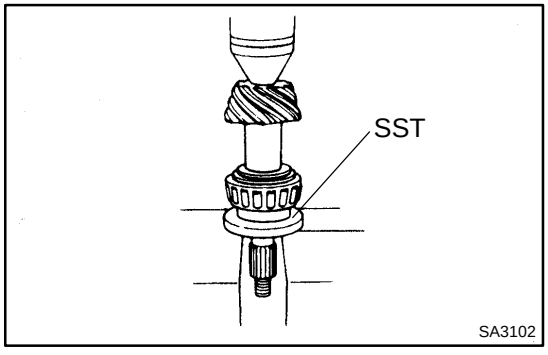
(a) Using SST and a press, install the front bearing outer race.
SST 09950-60020 (09951-00710),
09950-70010 (09951-07150)

(b) Using SST and a press, install the rear bearing outer race.
SST 09950-60020 (09951-00890),
09950-70010 (09951-07150)

7. INSTALL DRIVE PINION REAR BEARING

(a) Install the plate washer on the drive pinion.

HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



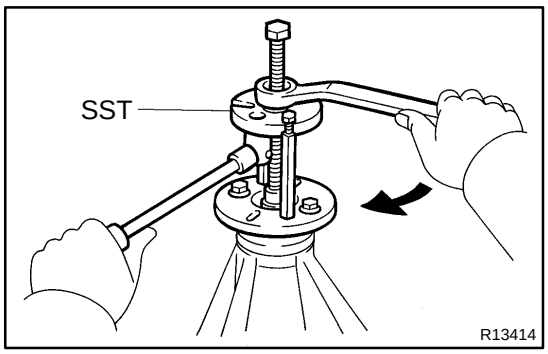
(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506-35010

8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

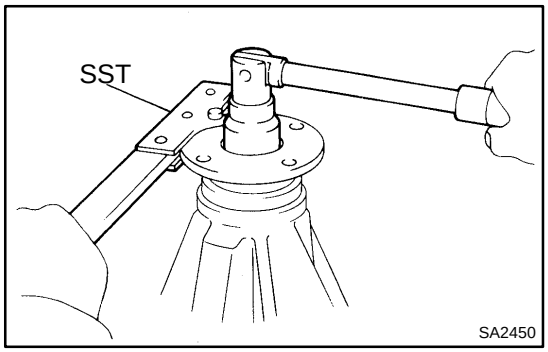
(a) Install the drive pinion and front bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



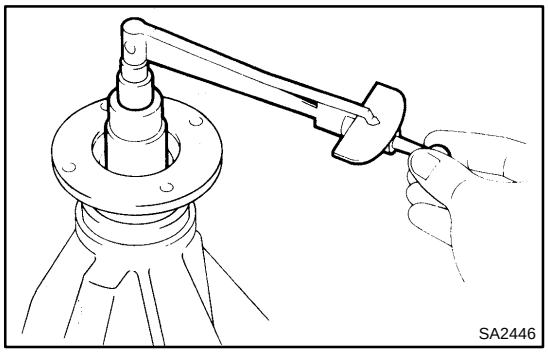
(c) Install the companion flange with SST.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330-00021

NOTICE:

- **Coat the nut and screw of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)
Reused bearing
0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

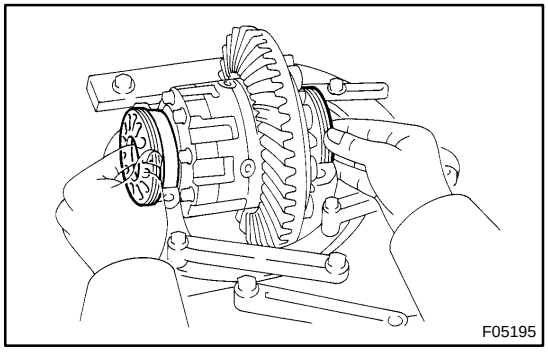
HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure that the right and left outer races are not interchanged.

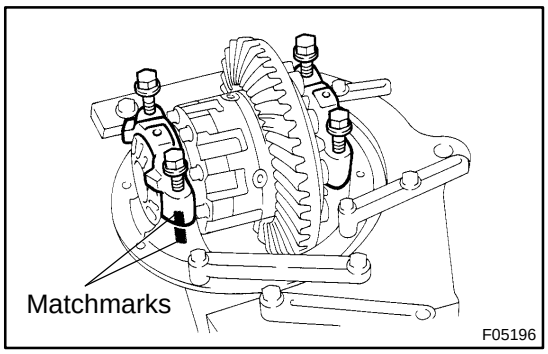
(b) Install the differential case in the carrier.

HINT:
Make sure that there is backlash between the ring gear and drive pinion.



10. INSTALL ADJUSTING NUTS

Install the 2 adjusting nuts on the carrier, making sure the nuts are engaged properly.

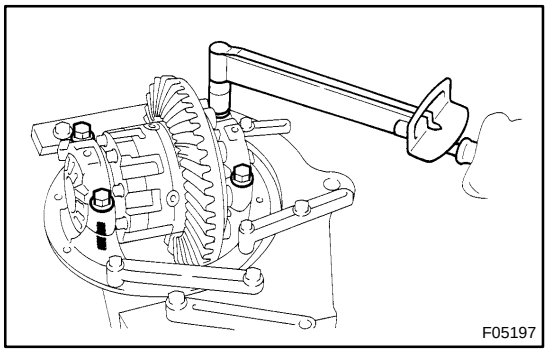


11. INSTALL BEARING CAPS

Align the matchmarks on the bearing cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

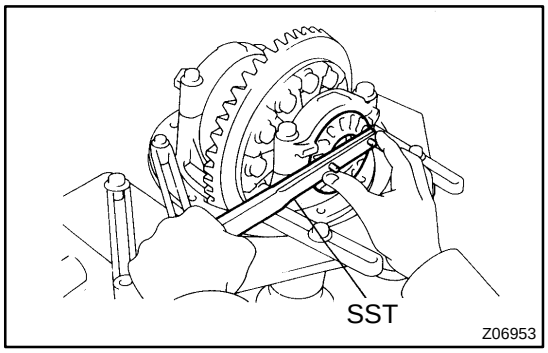
HINT:

If the bearing cap does not fit tightly on the carrier, the adjusting nuts are not engaged properly. Reinstall the adjusting nuts if necessary.



12. ADJUST SIDE BEARING PRELOAD

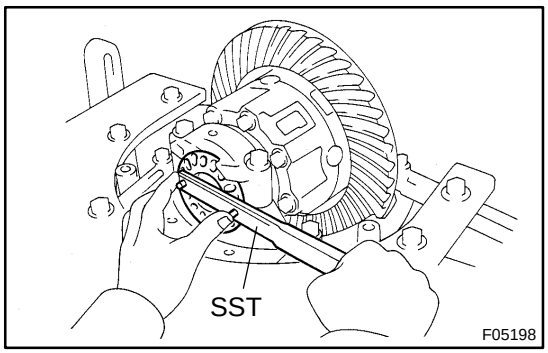
(a) Torque the 4 bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



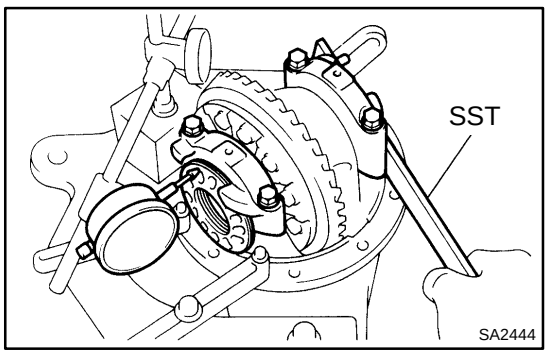
(b) Then loosen them to the point where the adjusting nuts can be turned by SST.
SST 09504-0001 1

(c) Tighten the 4 bolts.
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

(d) Using SST, torque the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).

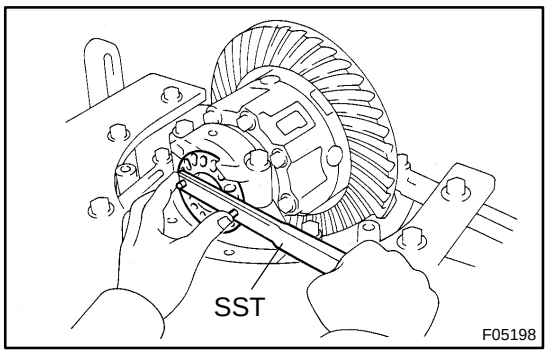


(e) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.

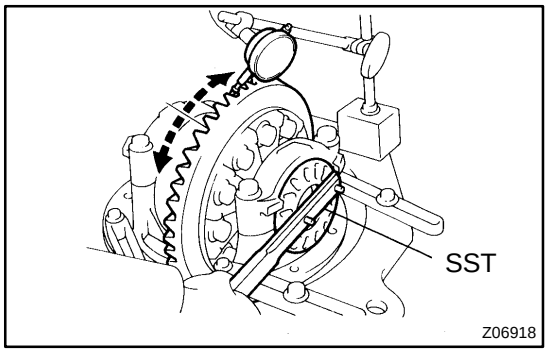


(f) Place a dial indicator on the top of the adjusting nut on the ring gear side.

(g) Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.

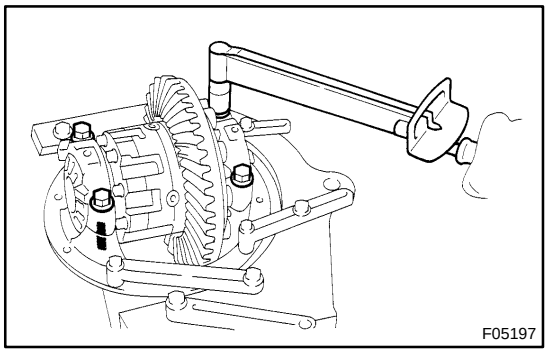


(h) Using the SST, torque the adjusting nut 1 - 1.5 notches from the zero preload position.



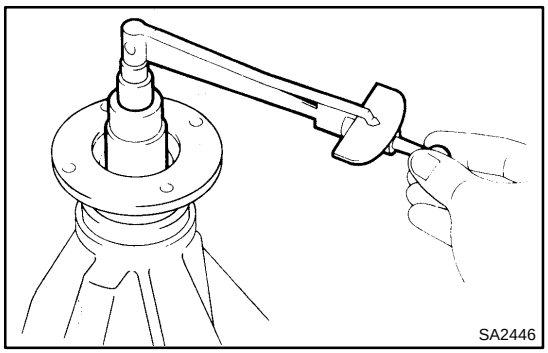
(i) Using a dial indicator, adjust the ring gear backlash until it is within the specified value.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:
The backlash is adjusted by turning the right and left adjusting nuts by equal amount. For example, loosen the nut on the left side 1 notch and torque the nut on the right side 1 notch.



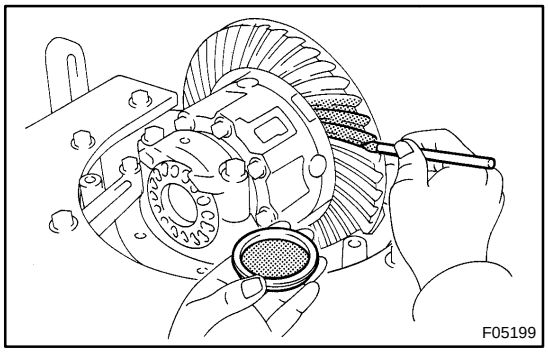
(j) Torque the 4 bearing cap bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

(k) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)



13. MEASURE TOTAL PRELOAD

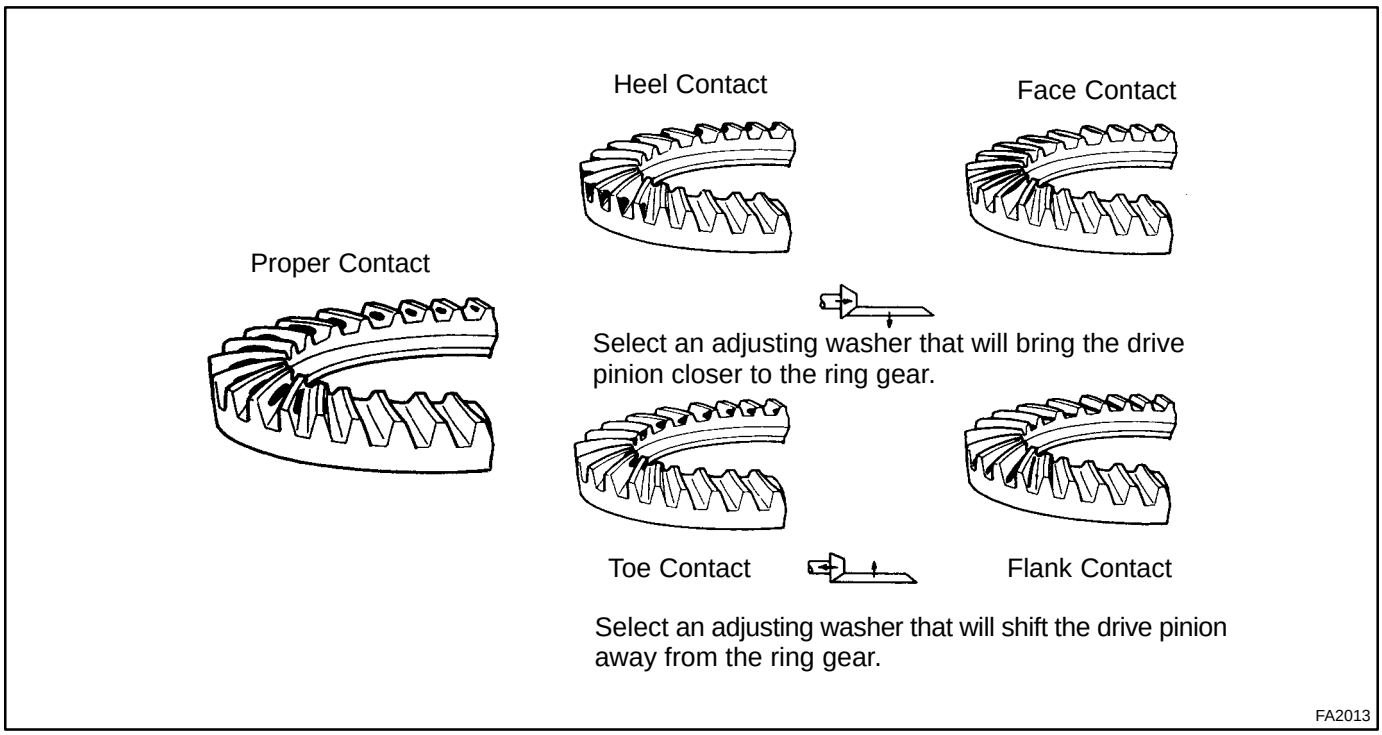
Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.
Preload (at starting):
Drive pinion preload plus
0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)

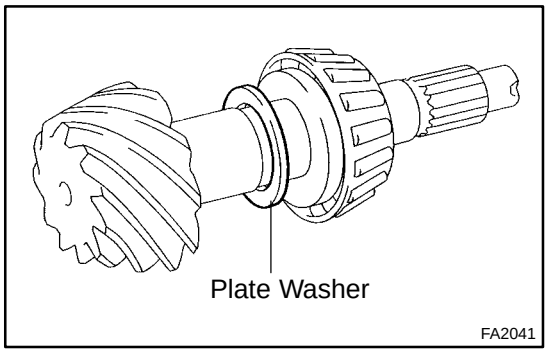


14. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.

(b) Turn the companion flange, in both directions to inspect the ring gear for proper tooth contact.





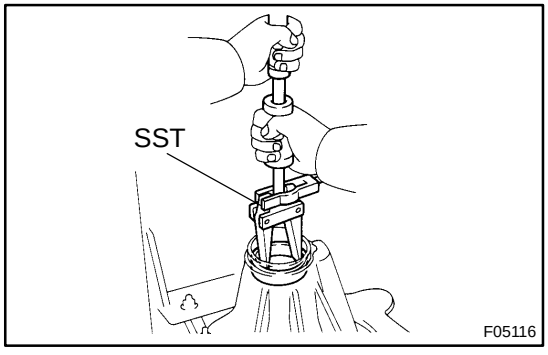
If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Plate washer thickness:

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	-

15. REMOVE COMPANION FLANGE (See page SA-102)

16. REMOVE OIL SLINGER AND FRONT BEARING (See page SA-102)

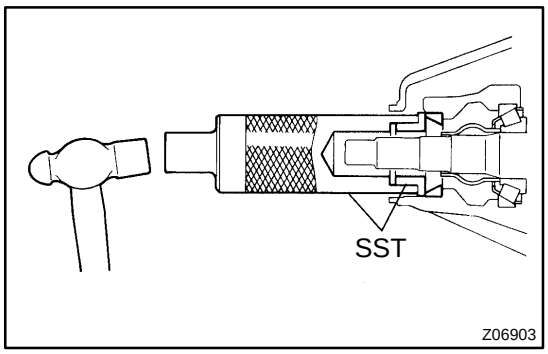


17. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308-00010

18. INSTALL NEW BEARING SPACER



19. INSTALL BEARING OUTER RACE

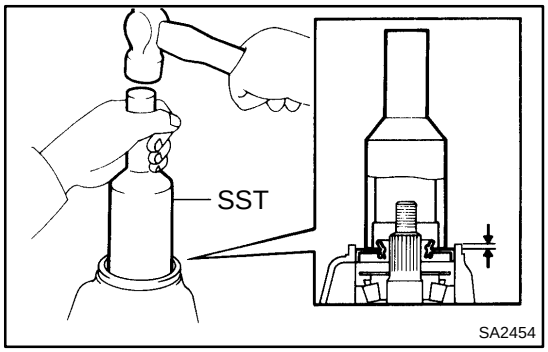
Using SST and a hammer, install the bearing outer race.

SST 09316-6001 1 (09316-00011, 09316-00021)

20. INSTALL FRONT BEARING AND OIL SLINGER

21. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

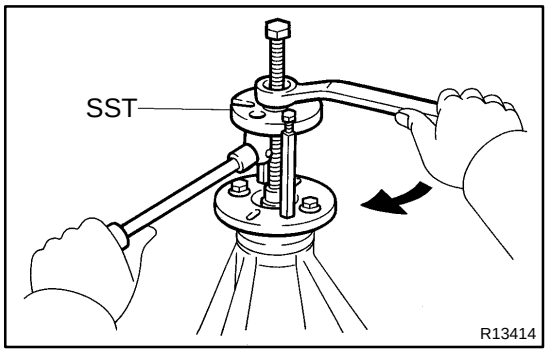


(b) Using SST and a hammer, install the oil seal.

SST 09214-7601 1

Oil seal drive in depth: 0.5 mm (0.020 in.)

(c) Coat MP grease to the oil seal lip.

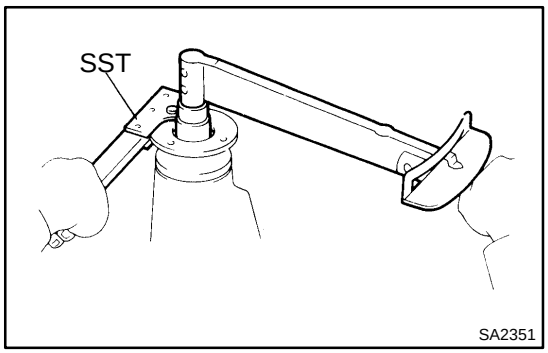


22. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange.

SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)

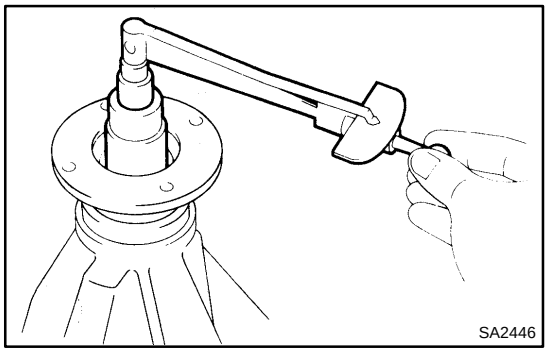
(b) Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, install the nut.

SST 09330-00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



23. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

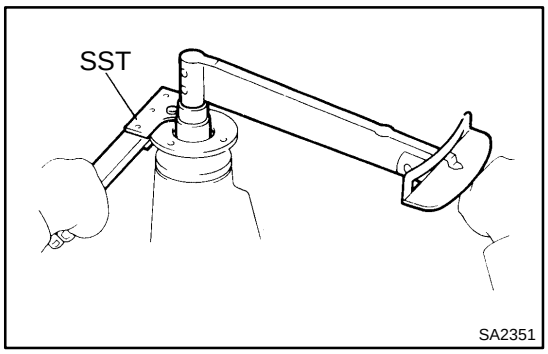
New bearing

1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)

Reused bearing

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 18.1 in.·lbf)

If the preload is greater than the specified value, replace the bearing spacer.



If the preload is less than the specified value, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.

SST 09330-00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

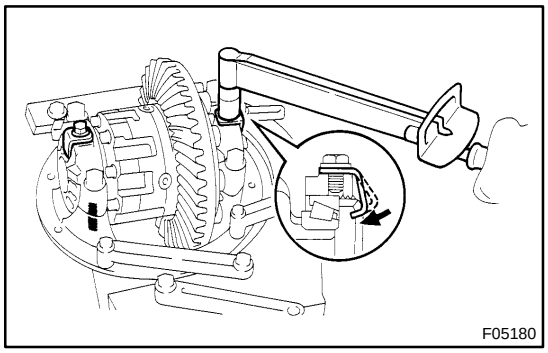
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

24. RECHECK RING GEAR BACKLASH
(See page SA-107)

25. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 14)

26. CHECK RUNOUT OF COMPANION FLANGE (See page SA-107)

27. STAKE DRIVE PINION NUT



28. INSTALL ADJUSTING NUT LOCKS

(a) Install 2 new nut locks on the bearing caps.

(b) Tightening 2 bolts, bend the nut locks.

Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

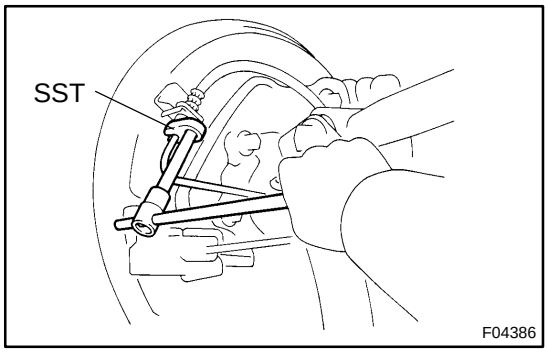
29. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

SA15N-04

REMOVAL

1. REMOVE 2 REAR WHEELS
Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. DRAIN HYPOID GEAR OIL
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



3. DISCONNECT BRAKE LINES

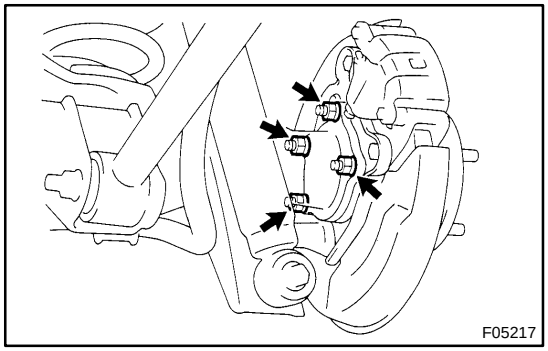
(a) Using SST, disconnect the brake line and remove the clip.
SST 09023-00100
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

4. DISCONNECT PARKING BRAKE CABLES

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.



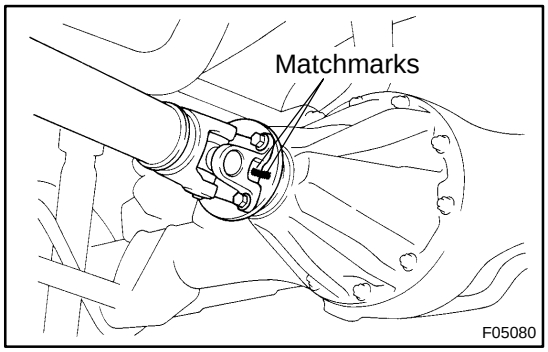
5. REMOVE AXLE SHAFTS

(a) Remove the 4 nuts.
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft and remove the O-ring.

NOTICE:
Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.

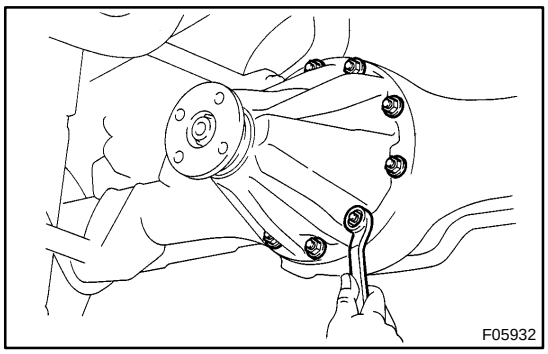


6. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.



7. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

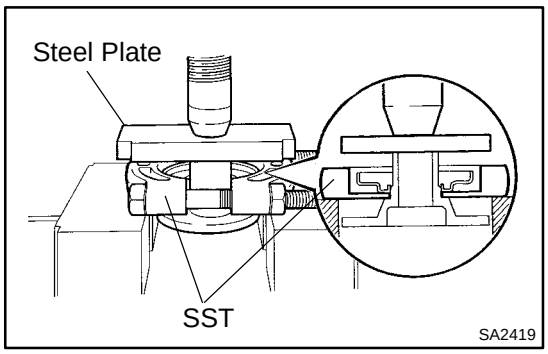
Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

SA15P-04

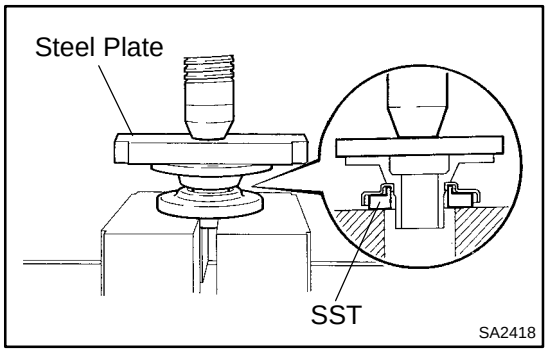
REPLACEMENT



1. REMOVE COMPANION FLANGE DUST DEFLECTOR

Using SST, a steel plate and press, remove the dust deflector.

SST 09950-00020



2. INSTALL DUST DEFLECTOR

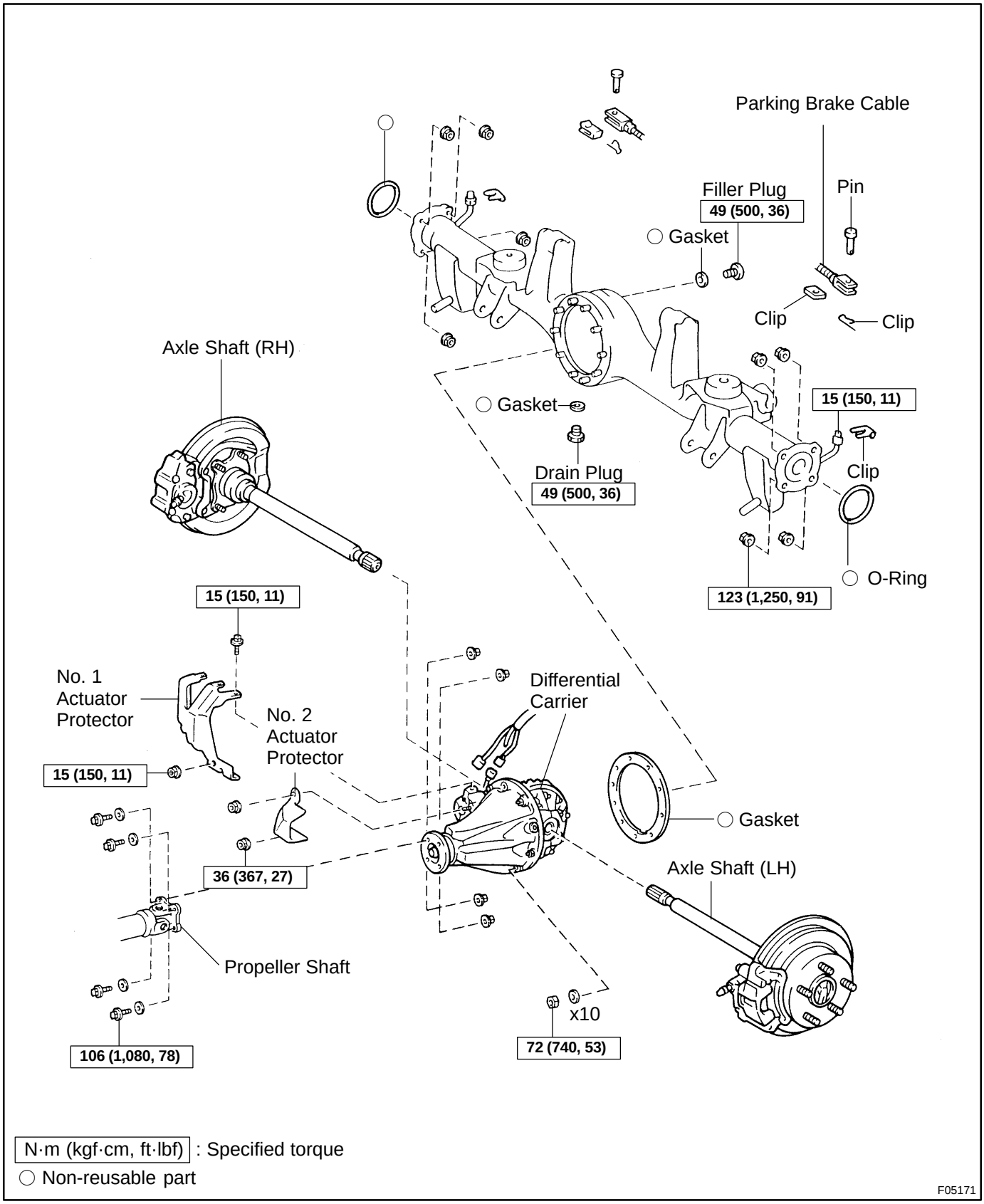
Using SST, a steel plate and press, install a new dust deflector.

SST 09726-40010

REAR DIFFERENTIAL CARRIER (w/ Diff. Lock)

SA15S-04

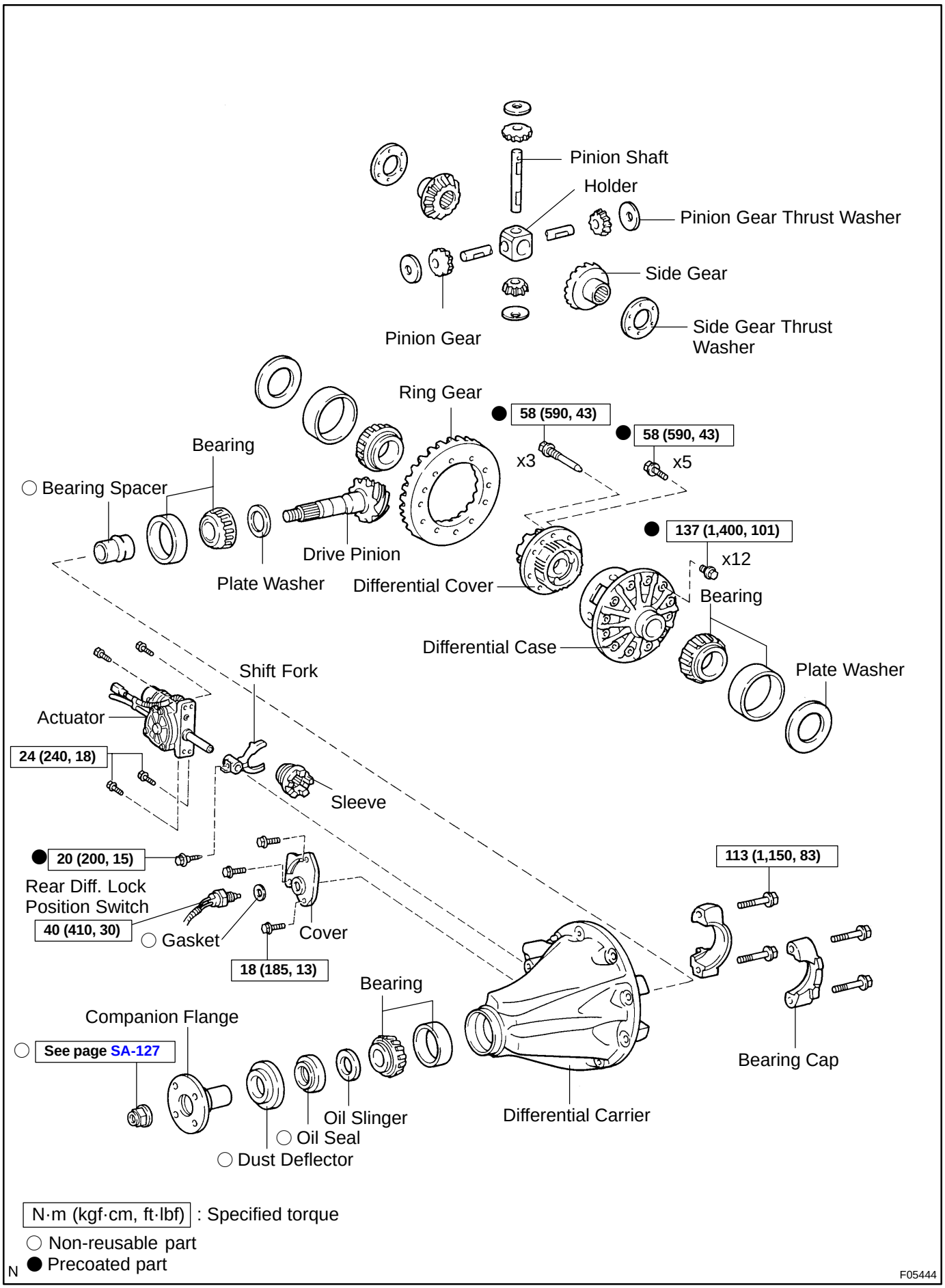
COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

○ Non-reusable part

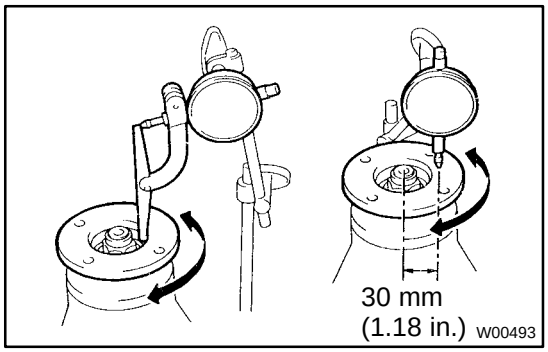
F05171


Pinion Shaft
Holder
Pinion Gear Thrust Washer
Side Gear
Side Gear Thrust Washer
Pinion Gear
Ring Gear
58 (590, 43)
x3
58 (590, 43)
x5
Bearing
Bearing Spacer
Drive Pinion
Plate Washer
Differential Cover
137 (1,400, 101)
x12
Bearing
Differential Case
Plate Washer
Shift Fork
Actuator
24 (240, 18)
Sleeve
20 (200, 15)
Rear Diff. Lock Position Switch
40 (410, 30)
Gasket
Cover
18 (185, 13)
113 (1,150, 83)
Bearing
Companion Flange
See page SA-127
Oil Slinger
Oil Seal
Dust Deflector
Differential Carrier
Bearing Cap
N·m (kgf·cm, ft·lbf) : Specified torque
Non-reusable part
Precoated part
F05444

SA15U-11

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND ETC.

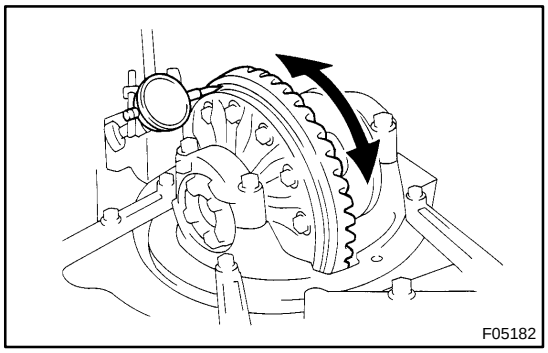


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is greater than the maximum, replace the companion flange.

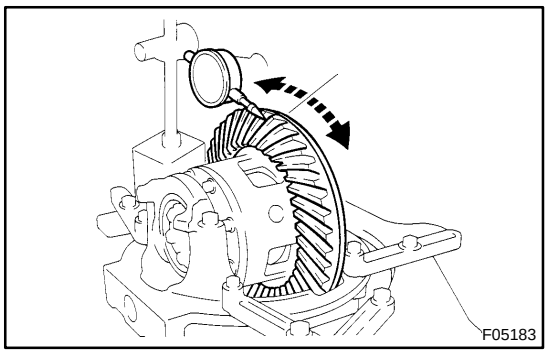


3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

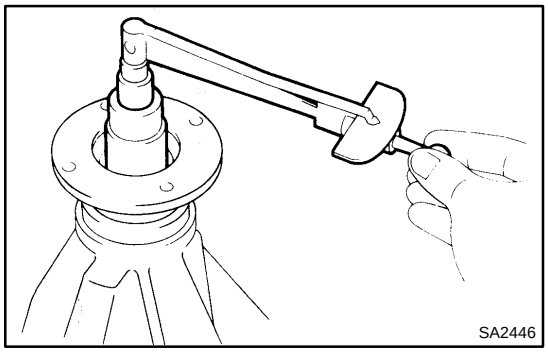
Using a dial indicator, while holding the drive pinion flange, measure the ring gear backlash.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specified value, adjust the side bearing preload or repair as necessary.



5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.

Preload (at starting):

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):
Drive pinion preload plus
0.3 - 0.5 N·m (3 - 5 kgf·cm, 2.7 - 4.4 in.·lbf)

If necessary, disassemble and inspect the differential.

7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA-127)

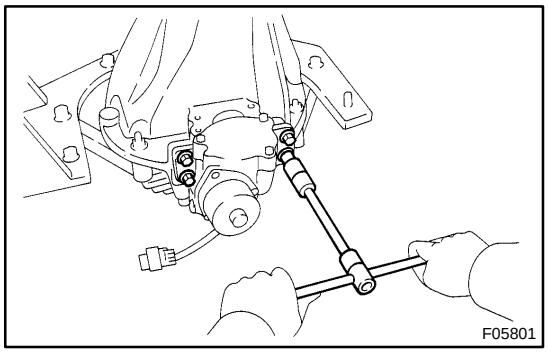
8. REMOVE REAR DIFF. LOCK POSITION SWITCH

Remove the rear diff. lock position switch and gasket.

9. REMOVE COVER

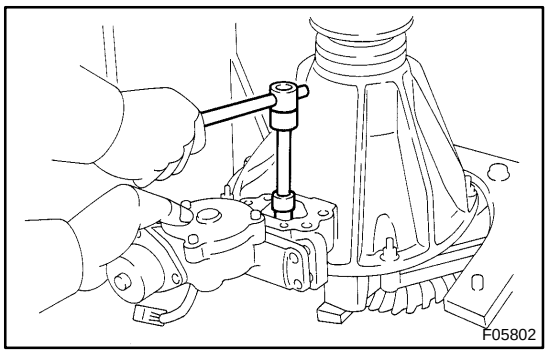
(a) Remove the 3 bolts.

(b) Using a brass bar and hammer, tap on the cover to remove it.



10. REMOVE ACTUATOR, SHIFT FORK AND SLEEVE

(a) Remove the 4 bolts.

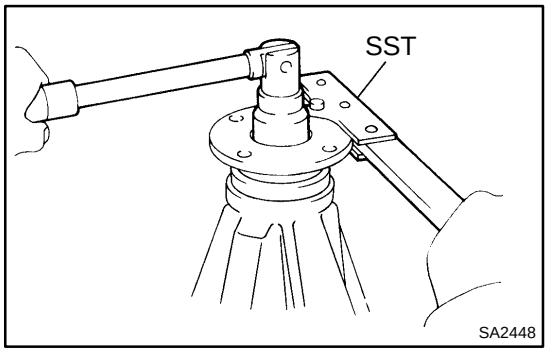


(b) Remove the shift fork shaft bolt.

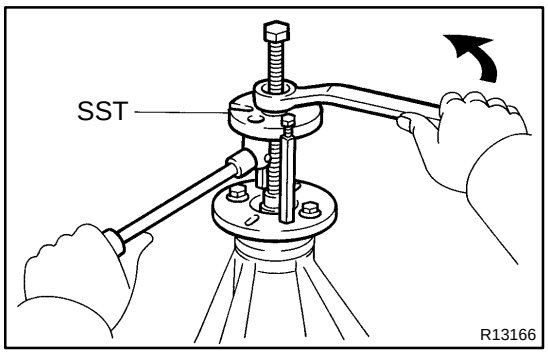
(c) Using a screwdriver, pull out the actuator and remove the sleeve and shift fork.

11. REMOVE COMPANION FLANGE

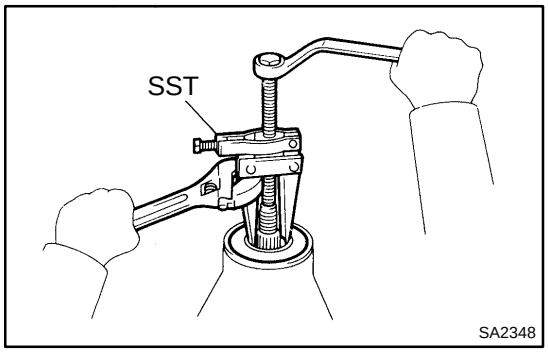
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330-00021



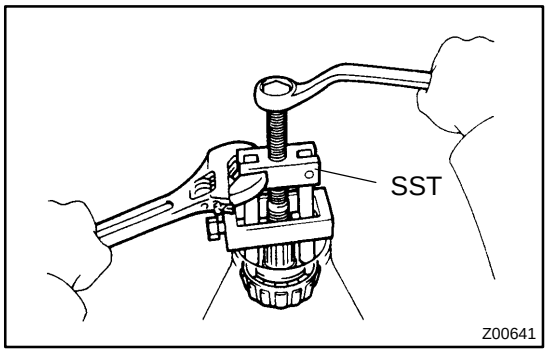
(c) Using SST, remove the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



12. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308-10010

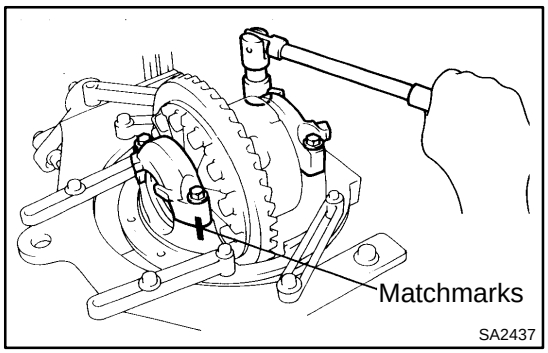
(b) Remove the oil slinger.



13. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556-22010

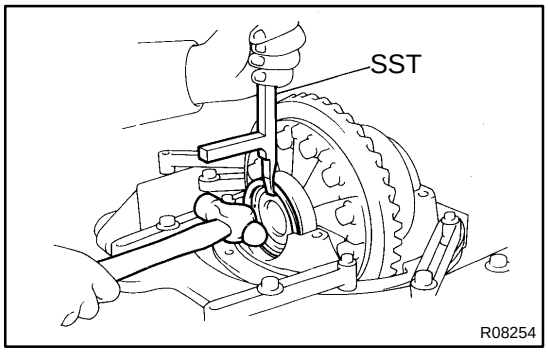
If the front bearing is damaged or worn, replace the bearing.



14. REMOVE DIFFERENTIAL CASE ASSEMBLY

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 4 bolts and 2 bearing caps.



(c) Using SST and a hammer, remove the plate washers.
SST 09504-22012

HINT:

Measure the plate thickness and note down it.

(d) Remove the differential case with the side bearing outer races from the differential carrier.

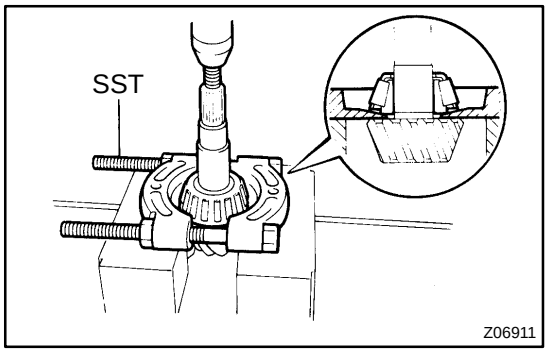
HINT:

Tag the bearing outer races to show the location for reassembling.

15. REMOVE DRIVE PINION AND BEARING SPACER FROM DIFFERENTIAL CARRIER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



16. REMOVE DRIVE PINION REAR BEARING

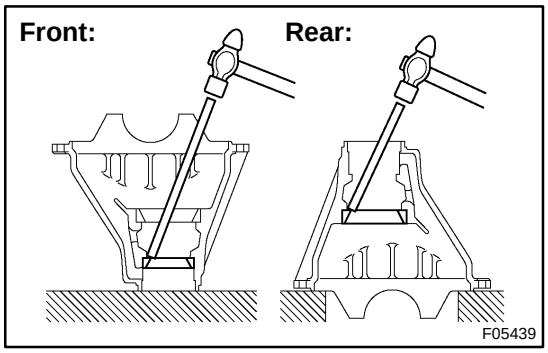
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950-00020

HINT:

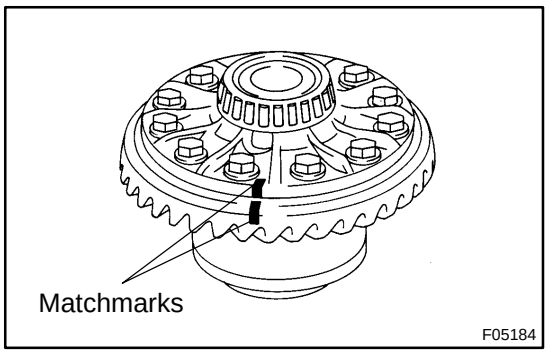
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



17. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.



18. REMOVE RING GEAR

(a) Place matchmarks on the ring gear and differential case.

(b) Remove the 12 ring gear set bolts.

(c) Using a plastic hammer, tap on the ring gear to remove it from the differential case.

19. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.

(b) Install the assembled plate washers onto the side bearing.

(c) Install the differential case in the differential carrier.

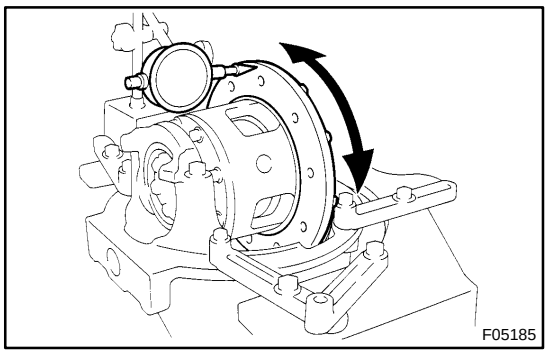
HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

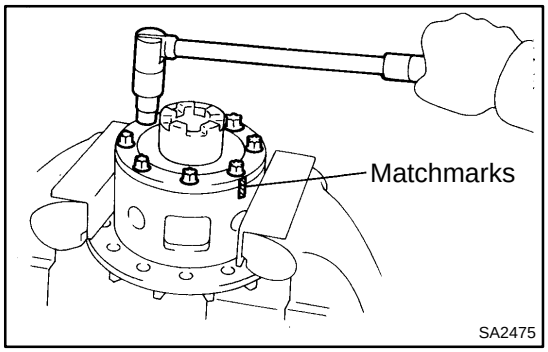
However, select a plate washer that allows no clearance between it and the carrier.

(d) Align the matchmarks on the bearing cap and differential carrier.

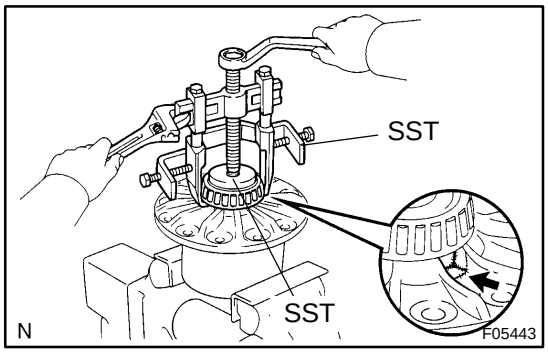
(e) Install and uniformly tighten the 4 bolts a little at a time.



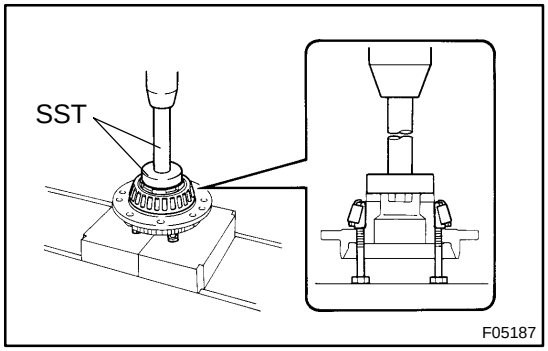
(f) Using a dial indicator, measure the differential case runout.
Maximum case runout: 0.04 mm (0.0016 in.)
(g) Remove the differential case.



20. DISASSEMBLE DIFFERENTIAL CASE
(a) Place matchmarks on the case and cover.
(b) Using a torx socket (E10), remove the 5 set bolts and 3 pinion shaft pins.
(c) Separate the cover and case.
(d) Remove the 2 side gears, side gear thrust washers, 4 pinion gears, pinion gear thrust washers, 3 pinion shafts and holder from the differential case.



21. REMOVE SIDE BEARING FROM DIFFERENTIAL CASE
Using SST, remove the side bearing.
SST 09950- 40011 (09951- 04010, 09952- 04010, 09953- 04020, 09955- 04061, 09957- 04010, 09958-0401 1), 09950-60010 (09951-00580)
HINT:
Fix the claws of SST to the notches in the differential case.



22. REMOVE SIDE BEARING FROM DIFFERENTIAL COVER
Using SST, 4 bolts and a press, remove the side bearing.
SST 09950-60010 (09951-00580), 09950-70010 (09951-07100)

SA15X-09

INSTALLATION

Installation is in the reverse order of removal (See page SA-100).

AFTER INSTALLATION, FILL DIFFERENTIAL WITH HYPOID GEAR OIL (See page SA-95)

HINT:

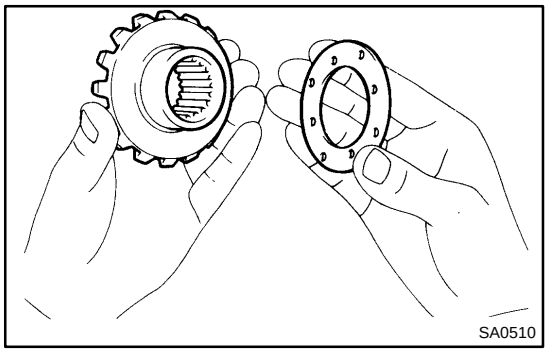
After installation, fill the differential with hypoid gear oil (See page SA-95), fill the brake reservoir with brake fluid, bleed the brake system (See page BR-4), check for leaks and check the ABS speed sensor signal (See page DI-505).

SA15W-11

REASSEMBLY

HINT:

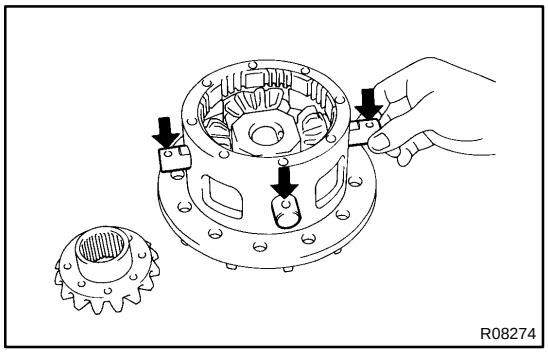
- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with hypoid gear oil.


SA0510

1. MEASURE SIDE GEAR BACKLASH

(a) Install the 2 thrust washers to the 2 side gears.

(b) Install the 4 thrust washers to the 4 pinion gears.


R08274

(c) Install the side gear into the case.

(d) Install the holder into the case.

(e) Install the 4 pinion gears with the thrust washers.

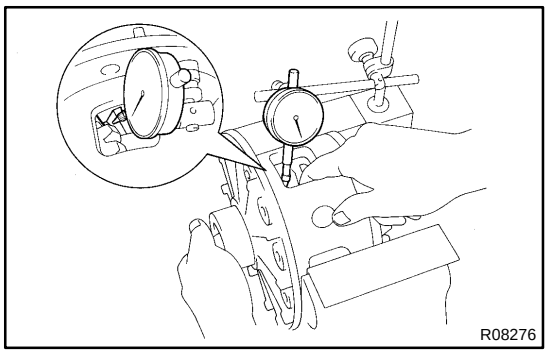
(f) Align the holes of the differential case and pinion shaft, and install the 3 pinion shafts.

(g) Install the side gear to the cover.

(h) Align the matchmarks and install the case and cover.

(i) Using a torx socket (E10), install the 5 bolts and 3 pinion shaft pins.

Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)


R08276

(j) Using a dial indicator, while holding the side gear, measure the backlash.

Backlash: 0.02 - 0.15 mm (0.0008 - 0.0059 in.)

If the backlash is not within the specified value, install the thrust washer of a different thickness.

HINT:

- Try to select washers of the same size for both sides.
- Measure at all 4 locations.

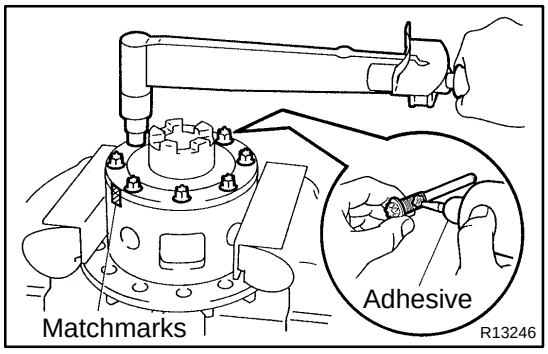
Thrust washer thickness:

Thickness mm (in.)	Thickness mm (in.)
1.55 (0.061)	1.85 (0.073)
1.60 (0.063)	1.90 (0.075)
1.65 (0.065)	1.95 (0.077)
1.70 (0.067)	2.00 (0.079)
1.75 (0.069)	2.05 (0.081)
1.80 (0.071)	2.10 (0.083)

(k) After measuring backlash, remove the 5 set bolts and 3 pinion shaft pins.

2. ASSEMBLE DIFFERENTIAL CASE

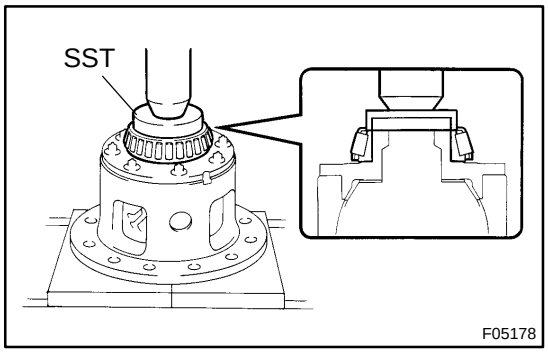
(a) Clean the threads of the bolts, pinion shaft pins, case and cover with the white gasoline.



(b) Coat the threads of the bolts and pinion shaft with adhesive.
Adhesive:
Part No. 08833-00070, THREE BOND 1324
or equivalent

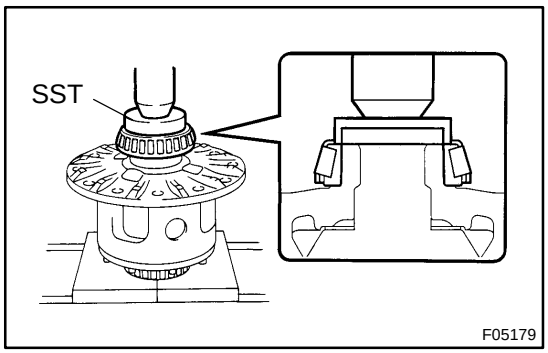
(c) Align the matchmarks, install the case and cover.

(d) Using a torx socket (E10), install the 5 bolts and 3 pinion shaft pins.
Torque: 58 N·m (590 kgf·cm, 43 ft·lbf)



3. INSTALL SIDE BEARINGS

(a) Cover side:
Using SST and a press, install the side bearing on the differential cover.
SST 09550-60010

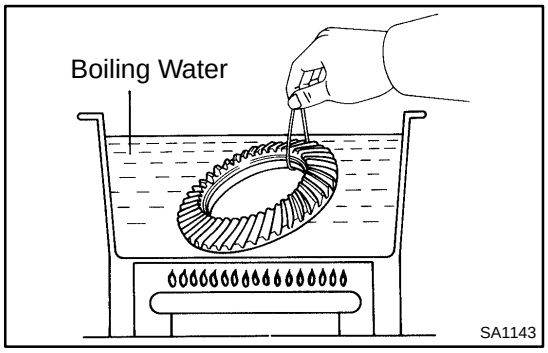


(b) Ring gear side:
Using SST and a press, install the side bearing on the differential case.
SST 09550-60010

4. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the threads of the bolts and differential case with the white gasoline.

(b) Clean the contact surfaces of the differential case and ring gear.

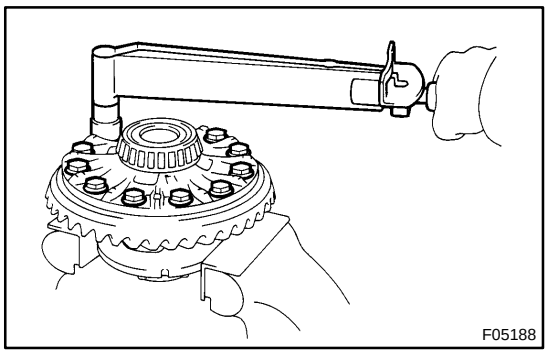


(c) Heat the ring gear to about 100 °C (212 °F) in boiling water.

(d) Carefully take the ring gear out of the boiling water.

(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear on the differential case.

(f) Align the matchmarks on the ring gear and differential case.


F05188

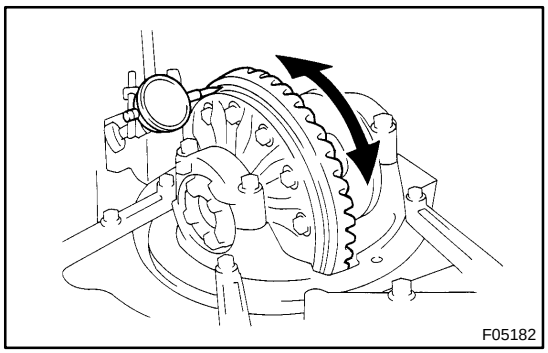
(g) Temporarily install the 12 set bolts.
(h) After the ring gear has cooled down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No.08833-00100, THREE BOND 1360K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

5. CHECK RING GEAR RUNOUT

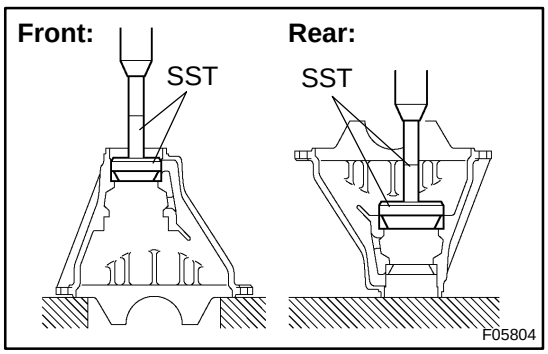
(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.
(b) Install the assembled plate washers onto the side bearing.
(c) Install the differential case in the differential carrier.

HINT:
If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.
However, select a plate washer that allows no clearance between it and the carrier.

(d) Align matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the 4 bolts a little at a time.


F05182

(f) Using a dial indicator, check the ring gear runout.
Maximum runout: 0.05 mm (0.0020 in.)
(g) Remove the differential case.



F05804

6. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

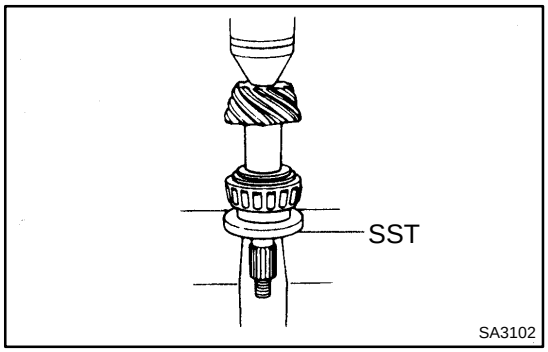
(a) Using SST and a press, install the front bearing outer race.
SST 09950-60020 (09951-00710),
09950-70010 (09951-07150)
(b) Using SST and a press, install the rear bearing outer race.
SST 09950-60020 (09951-00890),
09950-70010 (09951-07150)

7. INSTALL DRIVE PINION REAR BEARING

(a) Install the plate washer on the drive pinion.

HINT:

First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506-35010

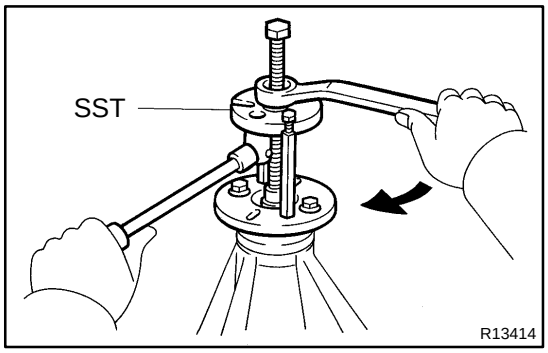
8. TEMPORARILY ADJUST DRIVE PINION PRELOAD

(a) Install the drive pinion and front bearing.

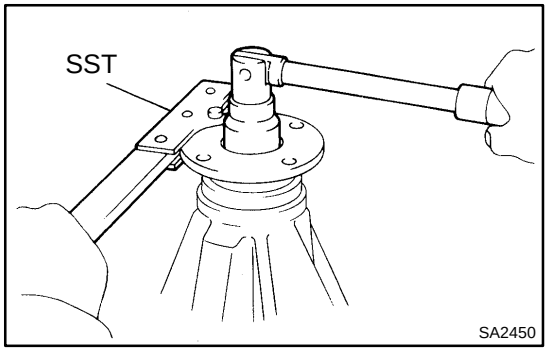
HINT:

Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



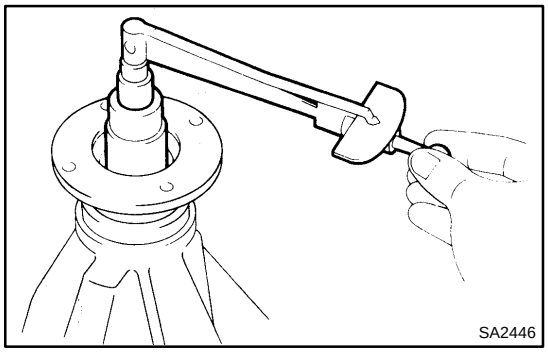
(c) Install the companion flange with SST.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330-00021

NOTICE:

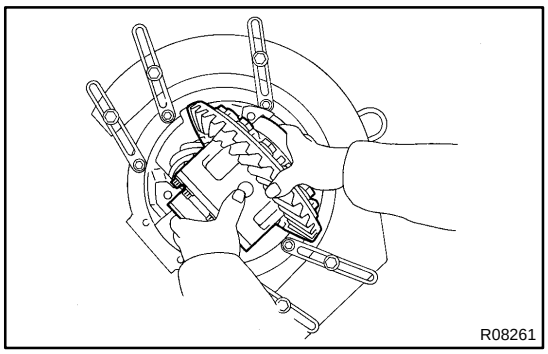
- **Coat the nut and screw of the drive pinion with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)
Reused bearing
0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

HINT:

Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

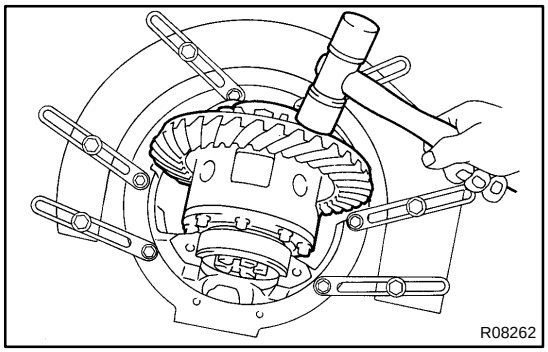


9. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure that the right and left races are not interchanged.

(b) Install the assembled plate washer onto the side bearing.

(c) Install the differential case in the carrier.

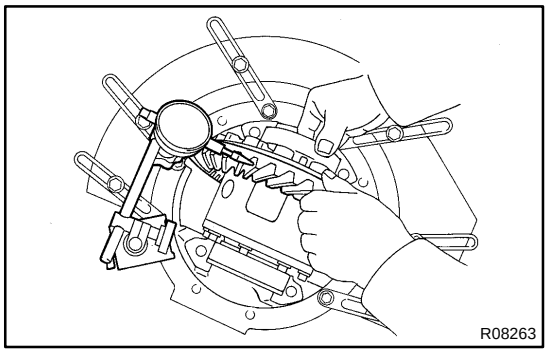


(d) Settle down the plate washer and bearing snugly by tapping on the ring gear with a plastic hammer.

HINT:

If it is difficult to install the differential case into the carrier, replace the plate washer with a thinner one.

However, select a plate washer that allows no clearance between it and the carrier.



10. ADJUST RING GEAR BACKLASH

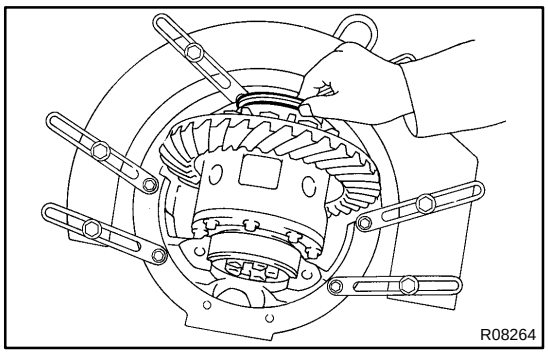
(a) Using a dial indicator, while holding the side bearing of the ring gear side measure the backlash.

Backlash (Reference): 0.15 mm (0.0059 in.)

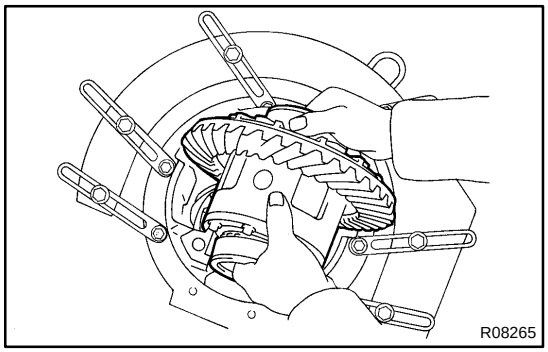
(b) Select a cover side plate washer using the backlash as a reference.

Plate washer thickness:

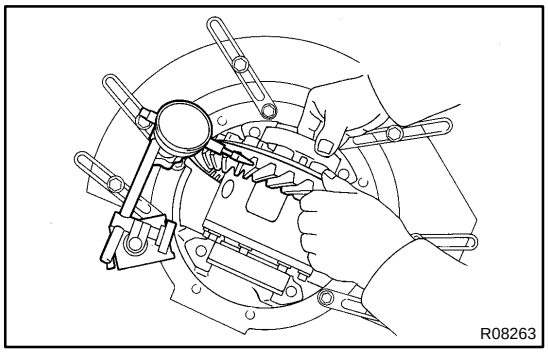
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
1	2.67 (0.1051)	13	3.03 (0.1193)
2	2.70 (0.1063)	14	3.06 (0.1205)
3	2.73 (0.1075)	15	3.09 (0.1217)
4	2.76 (0.1087)	16	3.12 (0.1228)
5	2.79 (0.1098)	17	3.15 (0.1240)
6	2.82 (0.1110)	18	3.18 (0.1252)
7	2.85 (0.1122)	19	3.21 (0.1264)
8	2.88 (0.1134)	20	3.24 (0.1276)
9	2.91 (0.1146)	21	3.27 (0.1287)
10	2.94 (0.1157)	22	3.30 (0.1299)
11	2.97 (0.1169)	23	3.33 (0.1311)
12	3.00 (0.1181)	-	-



(c) Select a ring gear side plate washer so that there is no clearance between the outer race and case.



(d) Remove the 2 plate washers and differential carrier.
(e) Install the plate washer into the lower part of the carrier.
(f) Place the plate washer onto the differential case together with the outer races, and install the differential case with the outer race into the carrier.
(g) Settle down the plate washer and bearing snugly by tapping on the ring gear with a plastic hammer.



(h) Using a dial indicator, measure the ring gear backlash.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

If it is not within the specified value, adjust it by either increasing or decreasing the thickness of washers on both sides by an equal amount.

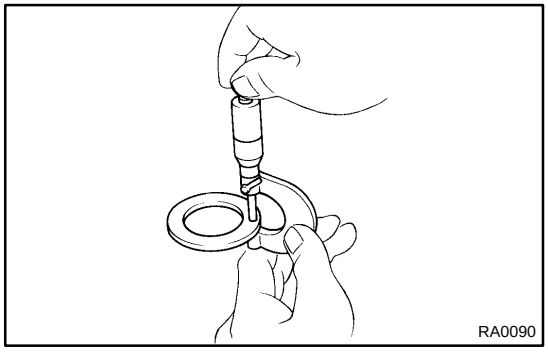
HINT:

There should be no clearance between the plate washer and case.

Ensure that there is ring gear backlash.

11. ADJUST SIDE BEARING PRELOAD

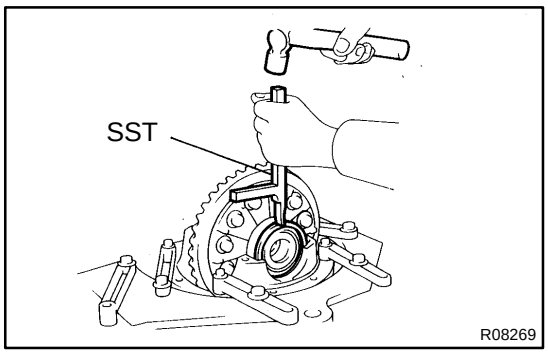
(a) After adjustment using the backlash as reference, remove the ring gear side plate washer.



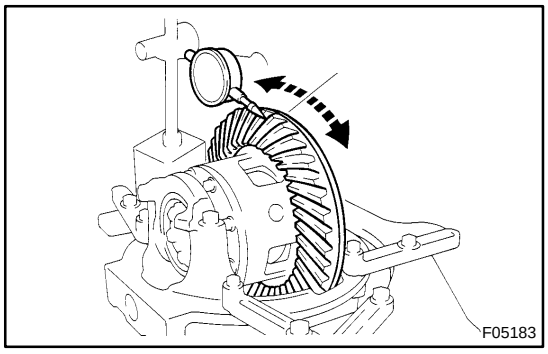
(b) Using a micrometer, measure the thickness of the removed plate washer.
(c) Install a new washer 0.06 - 0.09 mm (0.0024 - 0.0035 in.) thicker than the removed washer.

HINT:

Select a washer which can be pressed in 2/3 of the way with finger.



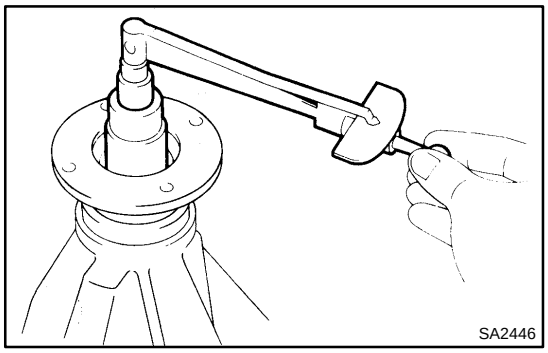
(d) Using SST, tap in the plate washer.
SST 09504-22012
(e) Align the matchmarks on the cap and carrier.
(f) Tighten the 4 bearing cap bolts to the specified torque.
Torque: 113 N·m (1,150 kgf·cm, 83 ft·lbf)



(g) Using a dial indicator, measure the ring gear backlash until it is within the specified value.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

If the backlash is not within the specified value, adjust by either increasing or decreasing the thickness of washers on both sides by an equal amount.

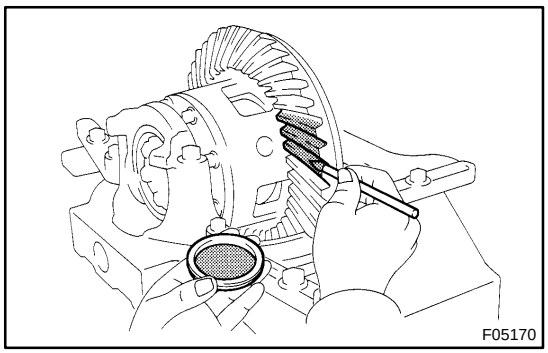
(h) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.



12. MEASURE TOTAL PRELOAD

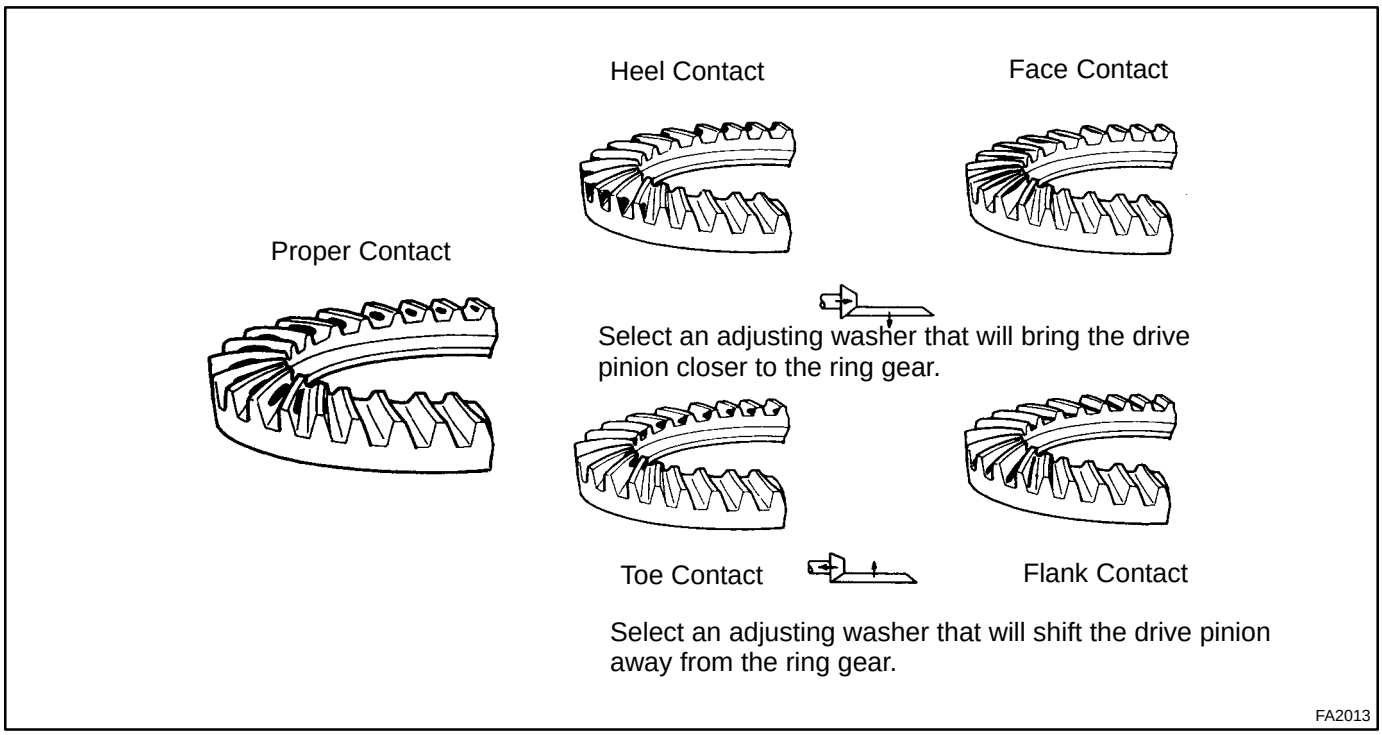
Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.

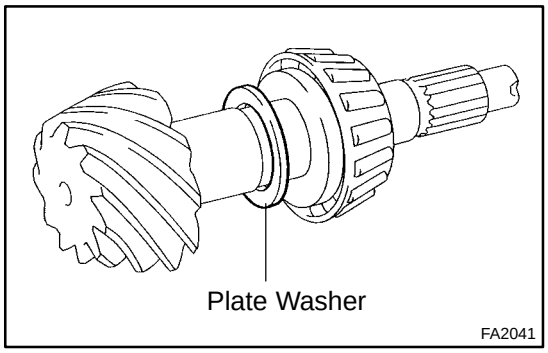
Preload (at starting):
Drive pinion preload plus
0.3 - 0.5 N·m (3 - 5 kgf·cm, 2.7 - 4.4 in.·lbf)



13. INSPECT TOOTH CONTACT BETWEEN RING GEAR

(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.
(b) Turn the companion flange, in both directions to inspect the ring gear for proper tooth contact.





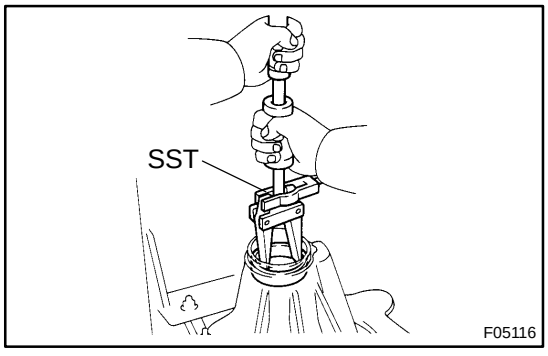
If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Plate washer thickness:

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	-

14. REMOVE COMPANION FLANGE (See page SA-121)

15. REMOVE OIL SLINGER AND FRONT BEARING (See page SA-121)

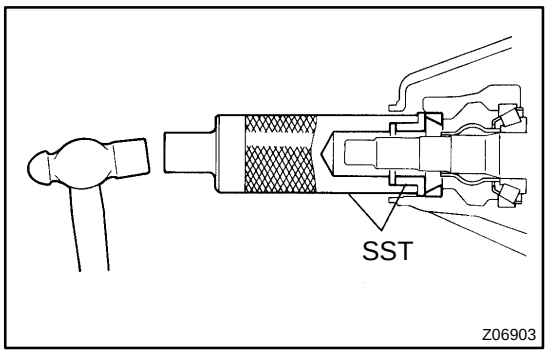


16. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308-00010

17. INSTALL NEW BEARING SPACER



18. INSTALL BEARING OUTER RACE

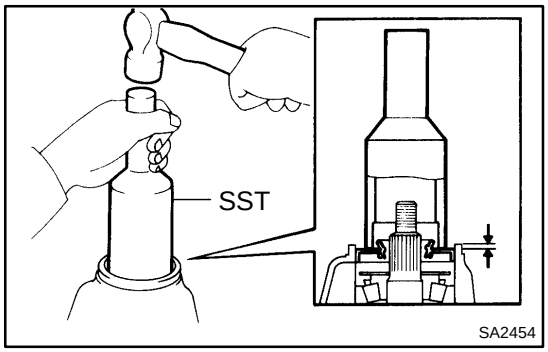
Using SST and a hammer, install the bearing outer race.

SST 09316-6001 1 (09316-00011, 09316-00021)

19. INSTALL FRONT BEARING AND OIL SLINGER

20. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

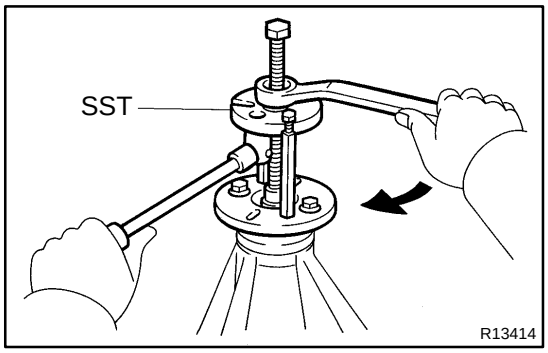


(b) Using SST and a hammer, install the oil seal, as shown.

SST 09214-7601 1

Oil seal drive in depth: 0.5 mm (0.020 in.)

(c) Coat MP grease to the oil seal lip.

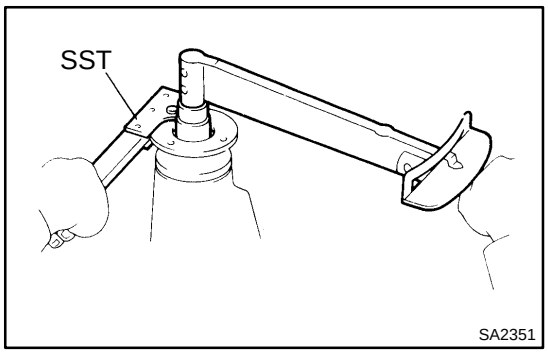


21. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange.

SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)

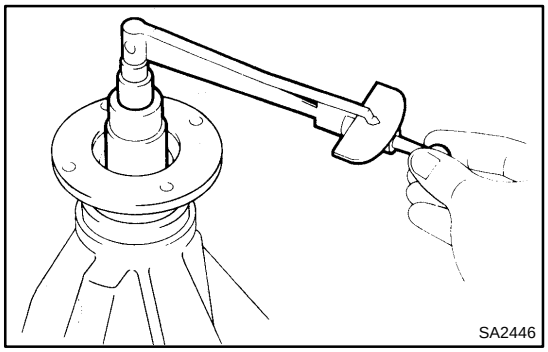
(b) Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, install the nut.

SST 09330-00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



22. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

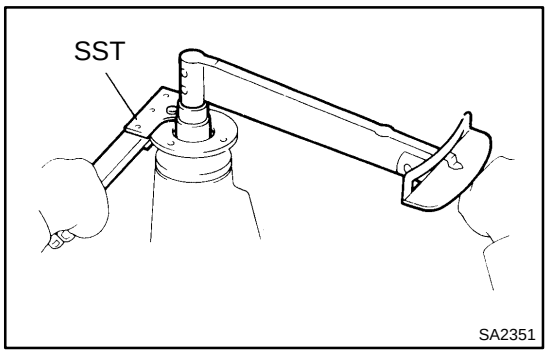
New bearing

1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)

Reused bearing

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

If the preload is greater than the specified value, replace the bearing spacer.



If the preload is less than the specified value, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.

SST 09330-00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

23. RECHECK RING GEAR BACKLASH
(See page SA-121)

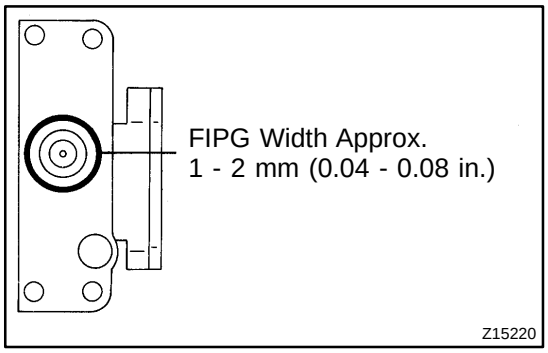
24. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 13)

25. CHECK RUNOUT OF COMPANION FLANGE (See page SA-121)

26. STAKE DRIVE PINION NUT

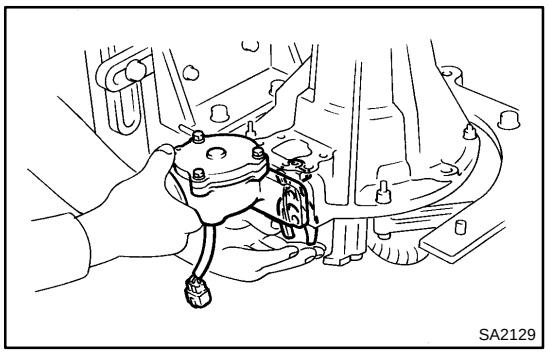
27. INSTALL ACTUATOR, SHIFT FORK AND SLEEVE

(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.



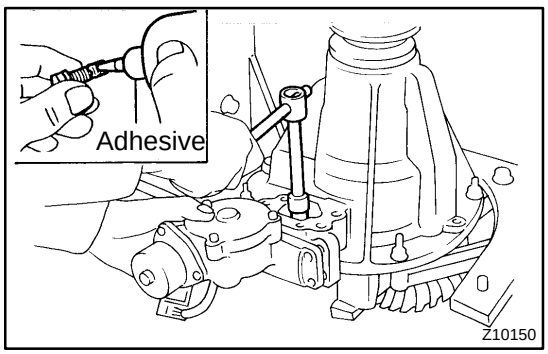
(b) Apply FIPG to the actuator.
FIPG:
Part No. 08826-00090, THREE BOND 1281
or equivalent

HINT:
Install the actuator within 10 minutes after applying FIPG.



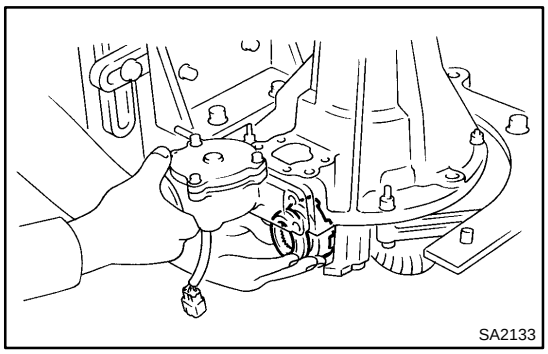
(c) Install the shift fork and actuator to the differential and match the shift fork hole with the shift fork.

(d) Clean the threads of the set bolt and fork shaft with the white gasoline.

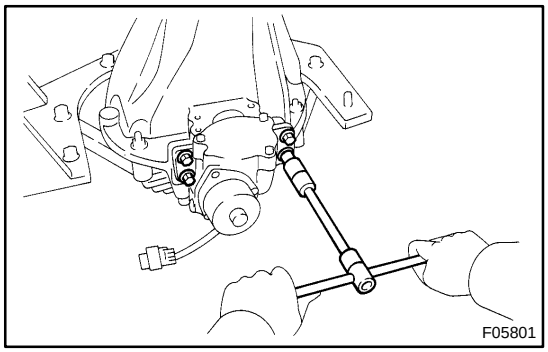


(e) Coat the threads of the set bolt with adhesive.
Adhesive:
Part No. 08833-00070, THREE BOND 1324
or equivalent

(f) Install the shift fork shaft set bolt.
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)


SA2133

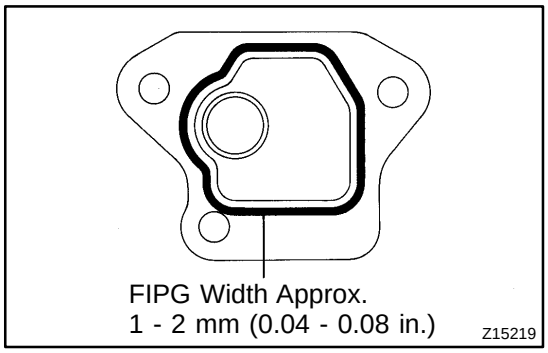
(g) Engage the sleeve with the dog clutch of the differential case.


F05801

(h) Install the 4 bolts.
Torque: 24 N·m (240 kgf·cm, 18 ft·lbf)

28. INSTALL COVER

(a) Clean contacting surfaces of any FIPG material using gasoline or alcohol.



(b) Apply FIPG to the cover.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

HINT:
Install the cover within 10 minutes after applying FIPG.

(c) Install the cover with the 3 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

29. INSTALL REAR DIFF. LOCK POSITION SWITCH

Install the rear diff. lock position switch with a new gasket.
Torque: 40 N·m (410 kgf·cm, 30 ft·lbf)

30. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND, ETC.

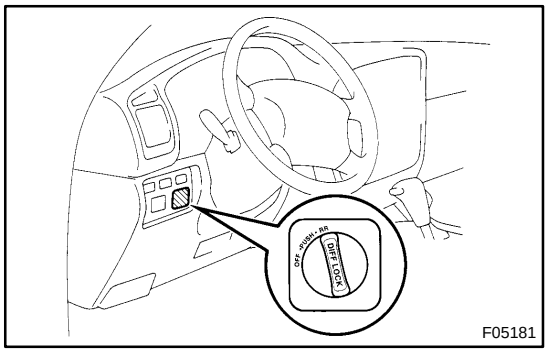
SA15T-04

REMOVAL

1. SHIFTING REAR DIFF. LOCK

(a) Turn the ignition switch to the ON position.

(b) Shift the transfer shift lever to L position.



(c) Turn the differential lock control switch to the RR position and lock the rear differential.

HINT:

While rotating the tires, check they are in the differential lock condition.

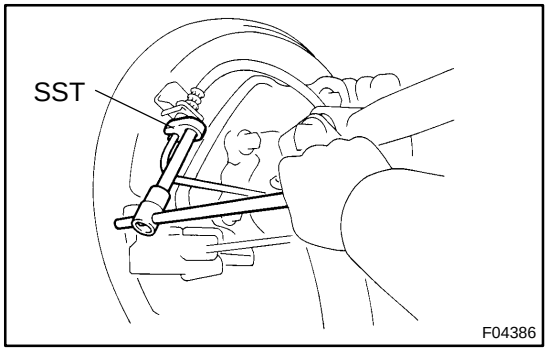
(d) Disconnect the cable from the negative terminal of the battery.

2. REMOVE 2 REAR WHEELS

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

3. DRAIN HYPOID GEAR OIL

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



4. DISCONNECT BRAKE LINES

(a) Using SST, disconnect the brake line and remove the clip.

SST 09023-00100

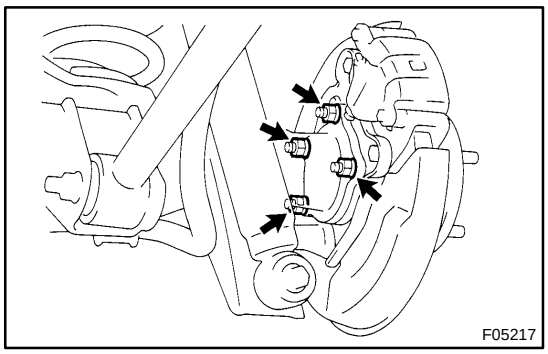
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

5. DISCONNECT PARKING BRAKE CABLES

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.



6. REMOVE AXLE SHAFTS

(a) Remove the 4 nuts.

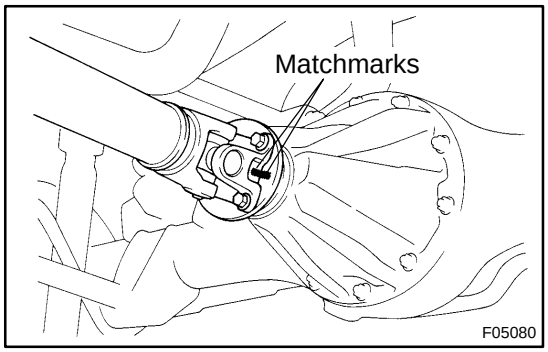
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly and remove the nut.

NOTICE:

Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.



7. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.

Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.

8. REMOVE NO. 1 AND NO. 2 ACTUATOR PROTECTORS

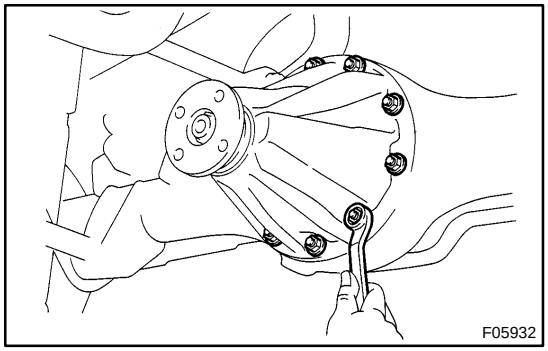
(a) Remove the nut, bolt and No. 1 actuator protector.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Remove the 2 nuts and No. 2 actuator protector.

Torque: 36 N·m (367 kgf·cm, 27 ft·lbf)

9. DISCONNECT CONNECTORS AND HOSE



10. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

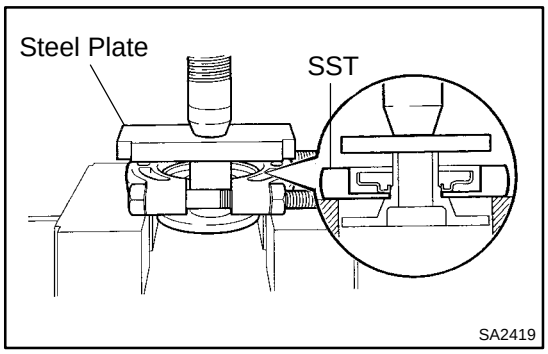
HINT:

At the time of installation, please refer to the following items.

- Before installation, connect the connectors of the actuator to the connector on the vehicle side, check the differential lock is in operation.
- Before installation, check that the sleeves are in operation while switching over the differential lock control switch.
- After installation, check that the rear differential lock is in operation.

SA15V-04

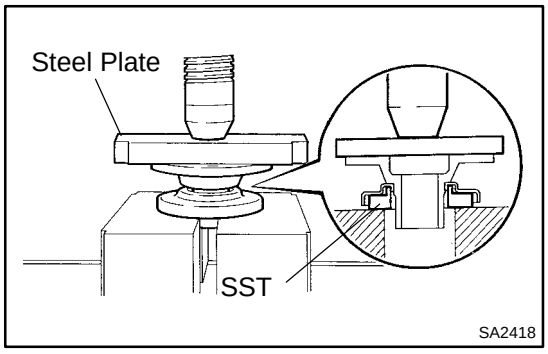
REPLACEMENT



1. REMOVE COMPANION FLANGE DUST DEFLECTOR

Using SST, a steel plate and press, remove the dust deflector.

SST 09950-00020



2. INSTALL DUST DEFLECTOR

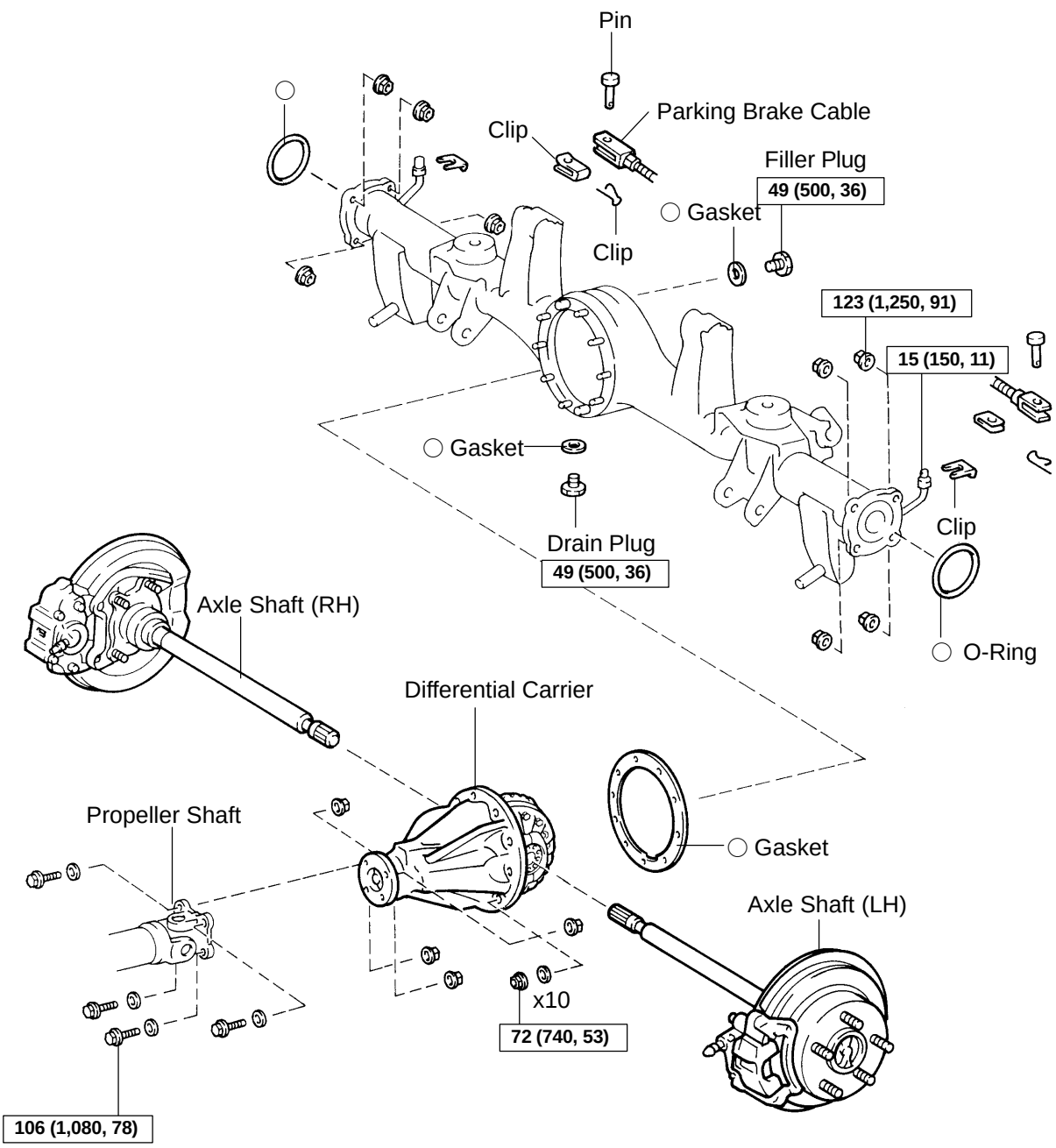
Using SST, a steel plate and press, install a new dust deflector.

SST 09726-40010

REAR DIFFERENTIAL CARRIER (w/ LSD)

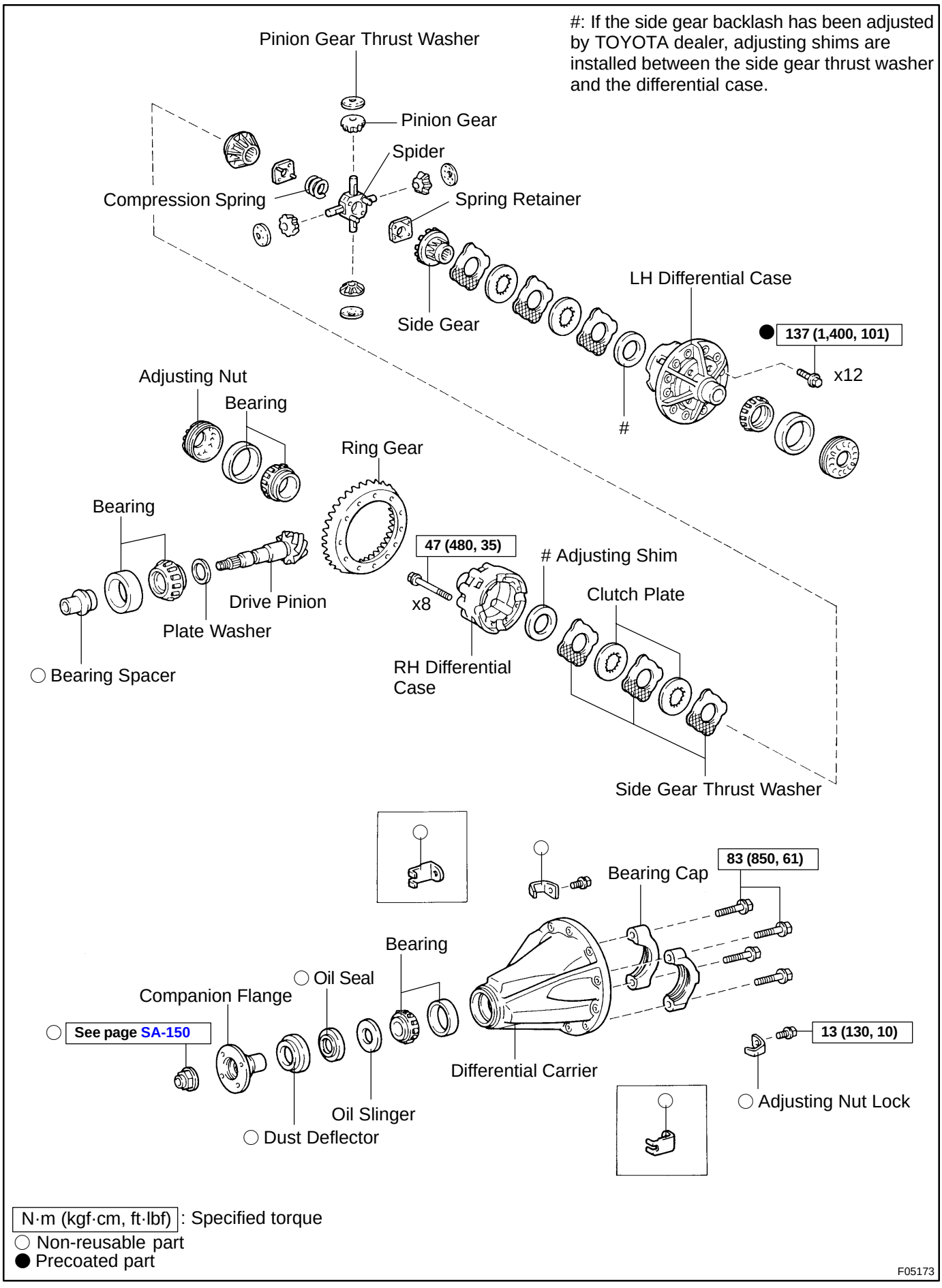
SA15Y-03

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
○ Non-reusable part

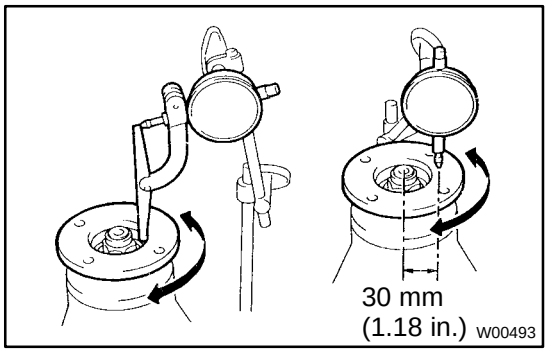
F05218


#: If the side gear backlash has been adjusted by TOYOTA dealer, adjusting shims are installed between the side gear thrust washer and the differential case.
Pinion Gear Thrust Washer
Pinion Gear
Spider
Compression Spring
Spring Retainer
Side Gear
LH Differential Case
137 (1,400, 101)
x12
#
Adjusting Nut
Bearing
Ring Gear
Bearing
47 (480, 35)
x8
Adjusting Shim
Clutch Plate
Drive Pinion
Plate Washer
Bearing Spacer
RH Differential Case
Side Gear Thrust Washer
Bearing Cap
83 (850, 61)
Bearing
Oil Seal
Companion Flange
See page SA-150
Differential Carrier
13 (130, 10)
Adjusting Nut Lock
Oil Slinger
Dust Deflector
N·m (kgf·cm, ft·lbf): Specified torque
Non-reusable part
Precoated part
F05173

SA160-09

DISASSEMBLY

1. SET DIFFERENTIAL CARRIER TO OVERHAUL STAND, ETC.

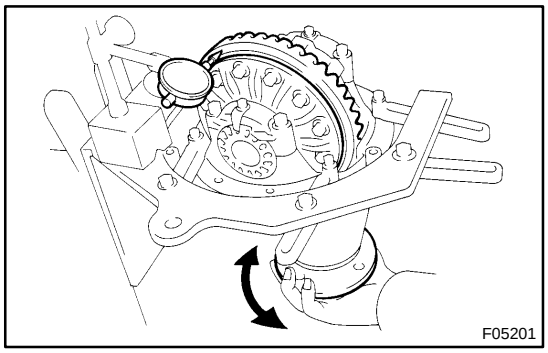


2. CHECK RUNOUT OF COMPANION FLANGE

Using a dial indicator, measure the vertical and lateral runout of the companion flange.

Maximum runout: 0.10 mm (0.0039 in.)

If the runout is greater then the maximum, replace the companion flange.

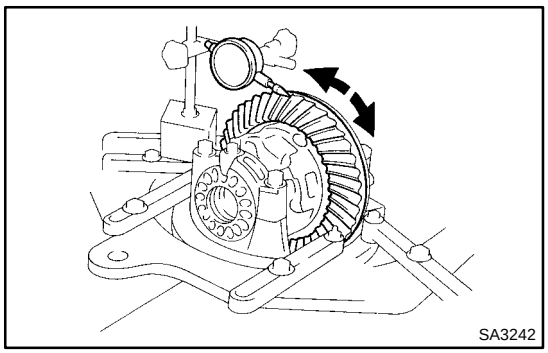


3. CHECK RING GEAR RUNOUT

Using a dial indicator, measure the ring gear runout.

Maximum runout: 0.05 mm (0.0020 in.)

If the runout is greater than the maximum, replace the ring gear.



4. CHECK RING GEAR BACKLASH

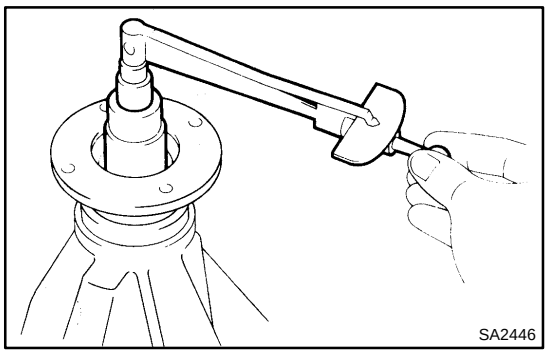
Using a dial indicator, while holding the drive pinion flange, measure the ring gear backlash.

Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:

Perform the measurements at 3 or more positions around the circumference of the ring gear.

If the backlash is not within the specified value, adjust the side bearing preload or repair as necessary.



5. MEASURE DRIVE PINION PRELOAD

Using a torque wrench, measure the drive pinion preload using the backlash of the drive pinion and ring gear.

Preload (at starting):

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

6. CHECK TOTAL PRELOAD

Using a torque wrench, measure the total preload with the teeth of the drive pinion and ring gear in contact.

Total preload (at starting):

Drive pinion preload plus

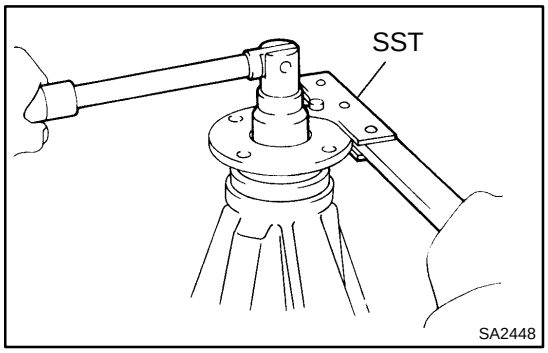
0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)

If necessary, disassemble and inspect the differential.

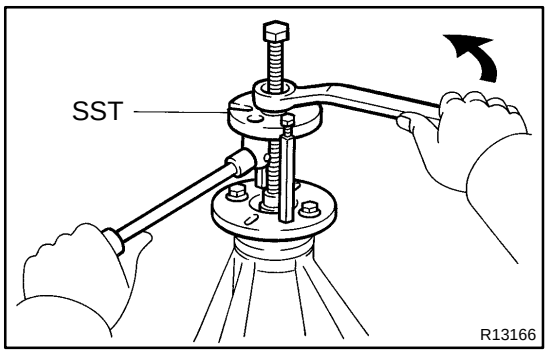
7. CHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See page SA-150)

8. REMOVE COMPANION FLANGE

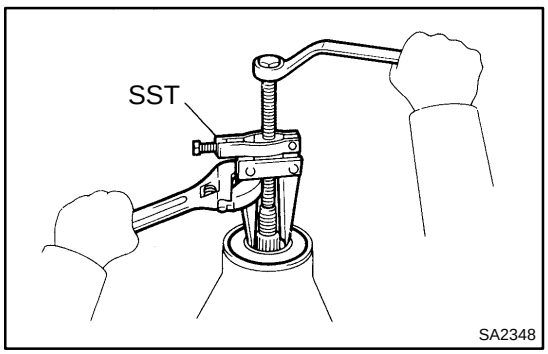
(a) Using a chisel and hammer, unstake the nut.



(b) Using SST to hold the flange, remove the nut.
SST 09330-00021



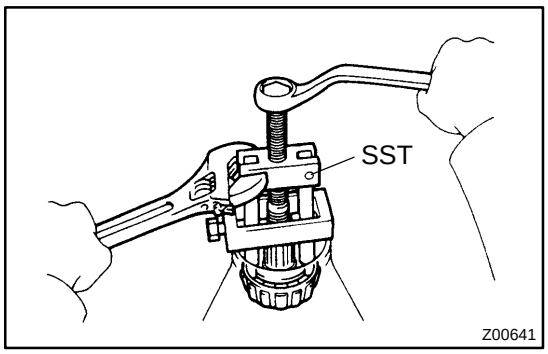
(c) Using SST, remove the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



9. REMOVE OIL SEAL AND OIL SLINGER

(a) Using SST, remove the oil seal from the differential carrier.
SST 09308-10010

(b) Remove the oil slinger.

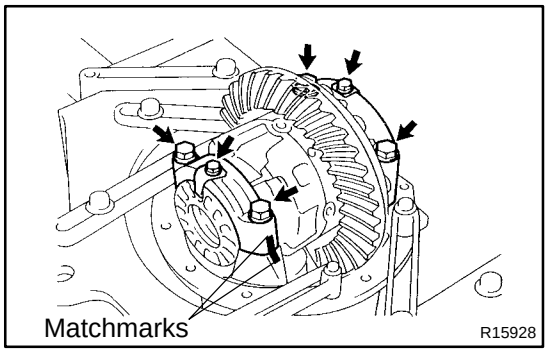


10. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.

SST 09556-22010

If the front bearing is damaged or worn, replace the bearing.



11. REMOVE DIFFERENTIAL CASE

(a) Place matchmarks on the bearing cap and differential carrier.

(b) Remove the 2 bolts and adjusting nut locks.

(c) Remove the 4 bolts, 2 bearing caps and adjusting nuts.

HINT:

Tag the disassembled parts to show the location for reassembling.

(d) Remove the differential case with the bearing outer races.

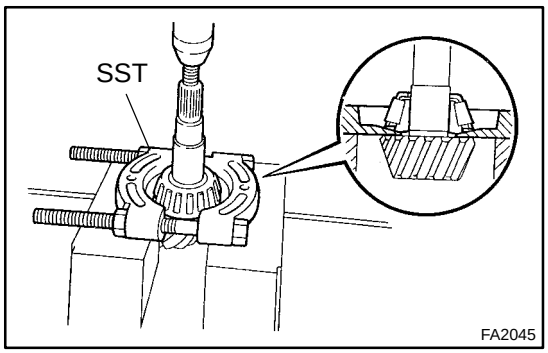
HINT:

Tag the disassembled parts to show the location for reassembling.

12. REMOVE DRIVE PINION AND BEARING SPACER

(a) Remove the drive pinion with the rear bearing.

(b) Remove the bearing spacer.



13. REMOVE DRIVE PINION REAR BEARING

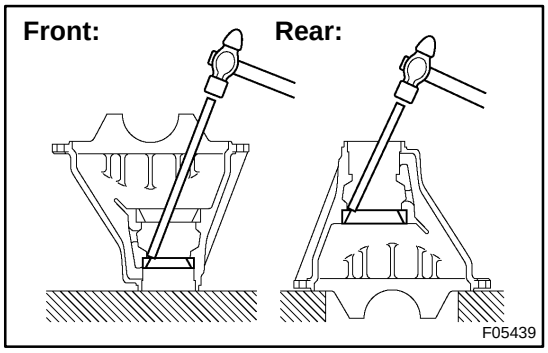
(a) Using SST and a press, remove the rear bearing from the drive pinion.

SST 09950-00020

HINT:

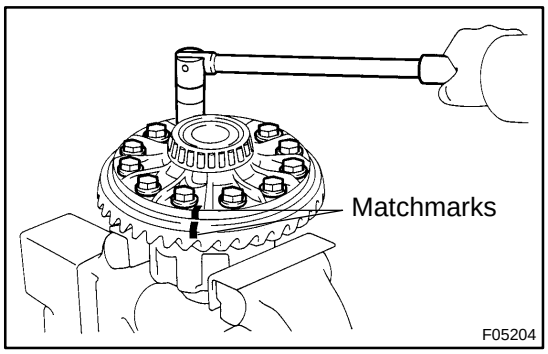
If the drive pinion or ring gear is damaged, replace them as a set.

(b) Remove the plate washer from the drive pinion.



14. REMOVE FRONT AND REAR BEARING OUTER RACES

Using a brass bar and hammer, remove the outer races.

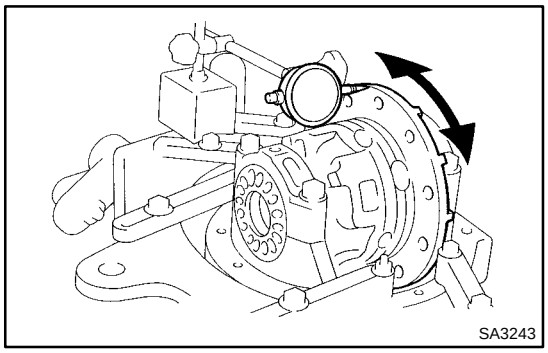


15. REMOVE RING GEAR

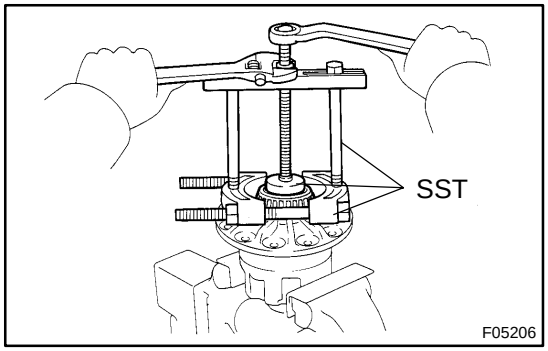
(a) Place matchmarks on the ring gear and differential case.
(b) Remove the 12 ring gear set bolts.
(c) Using a plastic hammer, tap on the ring gear to remove it from the differential case.

16. CHECK DIFFERENTIAL CASE RUNOUT

(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.
(b) Install the differential case in the differential carrier.
(c) Tighten the adjusting nut just to where there is no play in the bearing.
(d) Align the matchmarks on the bearing cap and differential carrier.
(e) Install and uniformly tighten the bearing cap bolts a little at a time.



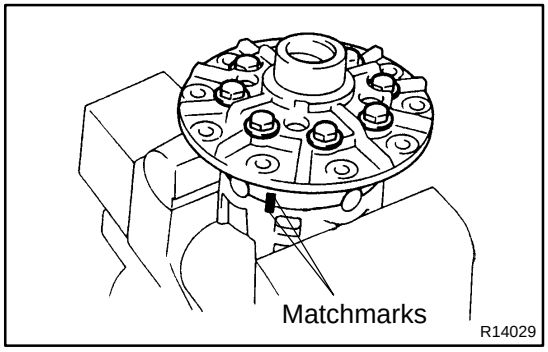
(f) Using a dial indicator, measure the differential case runout.
Maximum runout: 0.04 mm (0.0016 in.)
(g) Remove the differential case.



17. REMOVE SIDE BEARINGS FROM DIFFERENTIAL CASE

Using SST, remove the 2 side bearings from the differential case.

SST 09950-00020, 09950-00030, 09950-4001 1 (09957-04010), 09950-60010 (09951-00480)



18. DISASSEMBLE DIFFERENTIAL CASE

(a) Place matchmarks on the RH and LH cases.
(b) Remove the 8 bolts uniformly, a little at a time.
(c) Using a plastic hammer, separate the RH and LH cases.

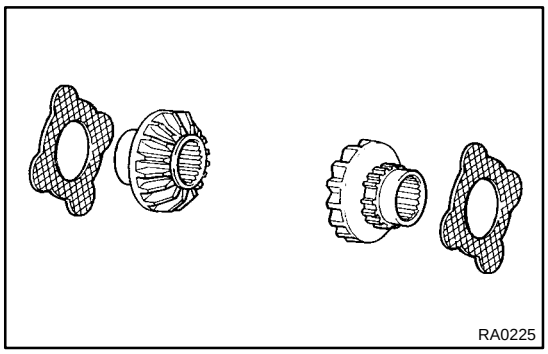
(d) Remove the 2 side gears, 6 side gear thrust washers, 4 clutch plates, 2 spring retainers, compression spring, 4 pinion gears, 4 pinion gear thrust washers and spider from the differential case.

HINT:

- Keep the disassembled parts in order.
- If the side gear backlash has been adjusted by TOYOTA dealer, adjusting shims are installed between the side gear thrust washer and the differential case.

SA161-04

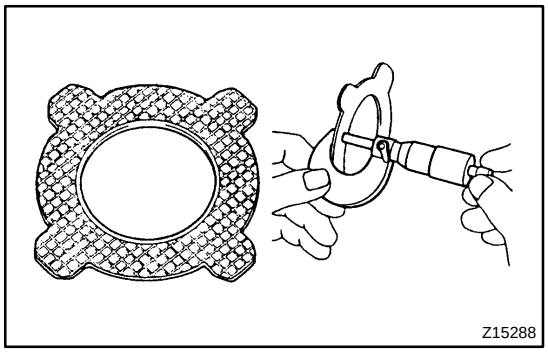
INSPECTION


RA0225

1. REPLACE PARTS THAT ARE DAMAGED OR WORN

HINT:

If replacing the side gear, also replace the thrust washer that contact with it.


Z15288

2. INSPECT SIDE GEAR THRUST WASHERS FOR WEAR OR DAMAGE

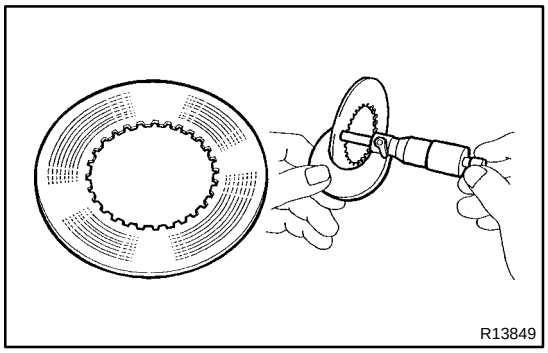
Using a micrometer, measure that the contact surface of the thrust washer is even and check that no bare metal is showing.

Thickness (Reference):
1.97 - 2.06 mm (0.0776 - 0.0811 in.)

If necessary, replace the thrust washer.

HINT:

If replacing the thrust washer, also replace the clutch plate that contacts with it.

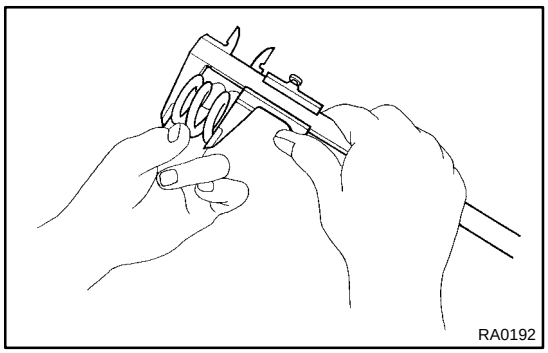

R13849

3. INSPECT CLUTCH PLATE FOR WEAR OR DAMAGE

Using a micrometer, measure the contact surface of the clutch plate and check that there is no abnormal wear.

Thickness (Reference):
1.97 - 2.03 mm (0.0776 - 0.0799 in.)

If necessary, replace the clutch plate.


RA0192

4. INSPECT COMPRESSION SPRING FREE LENGTH

Using vernier calipers, measure the free length of the spring.

Length (Reference): 32.8 mm (1.291 in.)

SA164-10

INSTALLATION

Installation is in the reverse order of removal (See page SA-141).

HINT:

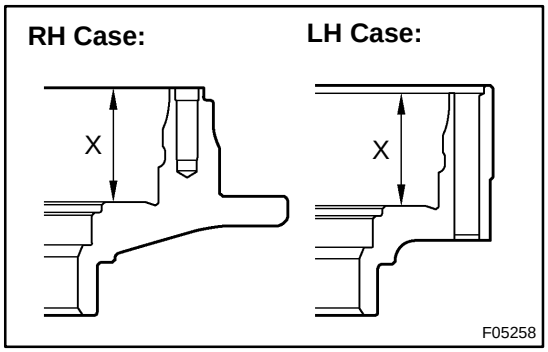
After installation, fill the differential with hypoid gear oil for LSD (See page SA-95), fill the brake reservoir with brake fluid, bleed the brake system (See page BR-4), check for leaks and check the ABS speed sensor signal (See page DI-505).

SA1DA-04

REASSEMBLY

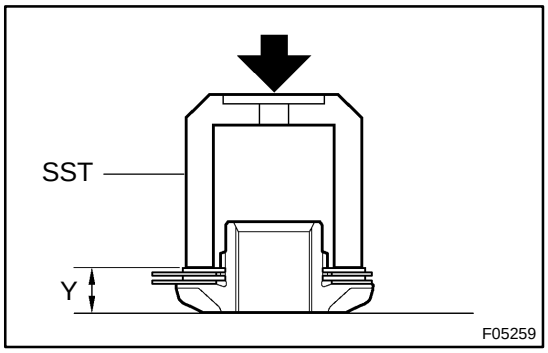
HINT:

- When reusing the side gear, thrust washers and clutch plates, skip the STEP 1.
- Using a shop rag, clean off any foreign object from the parts.
- Apply all of the sliding and rotating surfaces with LSD oil.



1. SELECT ADJUSTING SHIM

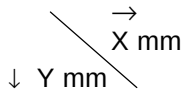
(a) Measure the RH and LH differential case dimensions ”X”, as shown in the illustration.



(b) Install the thrust washers and clutch plates on the side gear.

(c) Using SST to press down the thrust washers and clutch plates with about pressure of 10 kgf (22 lbf), measure dimension ”Y”, as shown in the illustration.
SST 09649-17010

(d) Referring to the following selection table on the next page, select the proper adjusting shim.
Adjust shim thickness =
X - Y - 19.08 mm (0.7511 in.)



	46.05	46.06	46.07	46.08	46.09	46.10	46.11	46.12	46.13	46.14	46.15	46.16	46.17	46.18	46.19	46.20	46.21	46.22
26.45																		
26.46																		
26.47																C + D		
26.48																		
26.49																		
26.50																		
26.51													C + C					
26.52																		
26.53																		
26.54												B + C						
26.55																		
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26.57																		
26.58										B + B								
26.59																		
26.60																		
26.61																		
26.62										A + B								
26.63																		
26.64																		
26.65																		
26.66									A + A									
26.67																		
26.68																		
26.69																		
26.70									D									
26.71																		
26.72																		
26.73																		
26.74																		
26.75								C										
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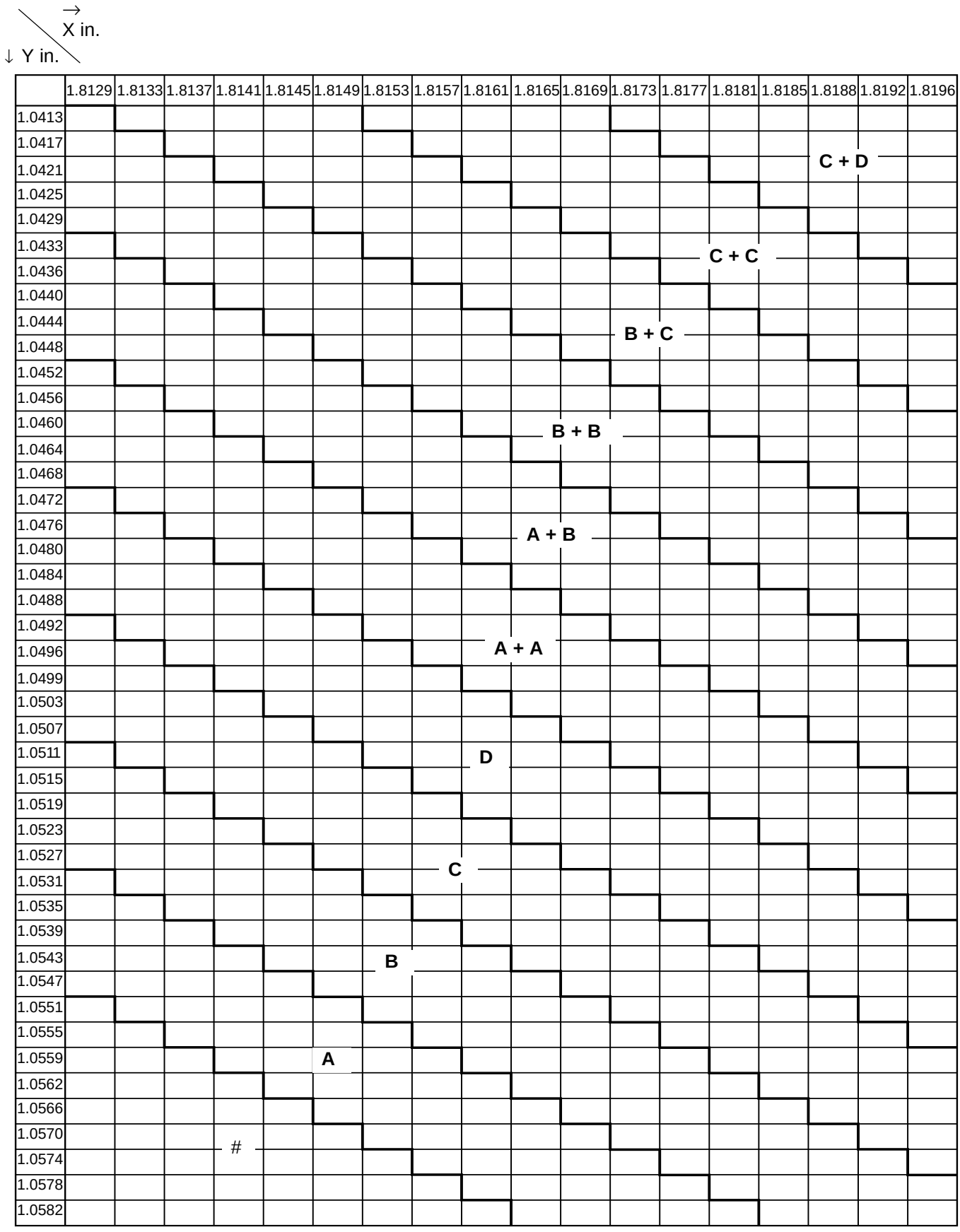
26.82						A												
26.83																		
26.84																		
26.85																		
26.86				#														
26.87																		
26.88																		

#: Reassemble another type shim or check the backlash after assembling A shim.

F05260



#: Reassemble another type shim or check the backlash after assembling A shim.

F05260

Adjust shim thickness:

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	0.20 (0.0079)	C	0.30 (0.0118)
B	0.25 (0.0098)	D	0.35 (0.0138)

2. CHECK SIDE GEAR BACKLASH

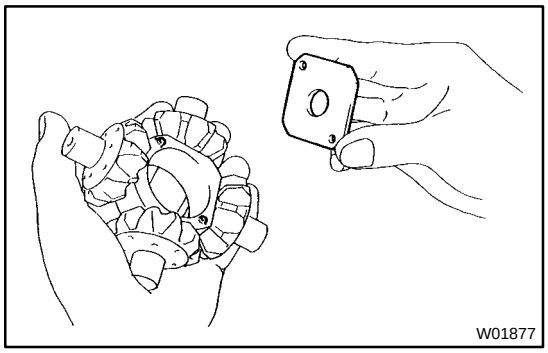
(a) Install the thrust washers, clutch plates and adjusting shim to side gear.

HINT:

Install the adjusting shim with its surface having no oil groove facing to the differential case side.

(b) Install the side gear to the differential case.

(c) Install the 4 pinion gears and thrust washers to the spider.

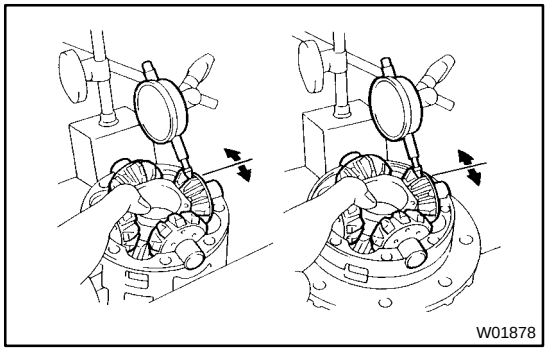

W01877

(d) Align the spring retainer holes with the straight pins and install the retainer.

(e) Install the spider to the differential case.

HINT:

Install the spider to the differential case tightly and do not move the spring retainer.


W01878

(f) Using a dial indicator, measure the side gear backlash while holding the side gear and spider.

Backlash: 0.02 - 0.15 mm (0.0008 - 0.0059 in.)

HINT:

- Measure at all 4 locations.
- Measure the backlash at the RH and LH differential cases.

If the backlash is not within the specified value, select the adjusting shim.

3. ASSEMBLE DIFFERENTIAL CASE

(a) Reinstall the spider to the LH differential case.

HINT:

Install the spider to the LH differential case tightly and do not move the spring retainer.

(b) Install the compression spring and RH spring retainer.

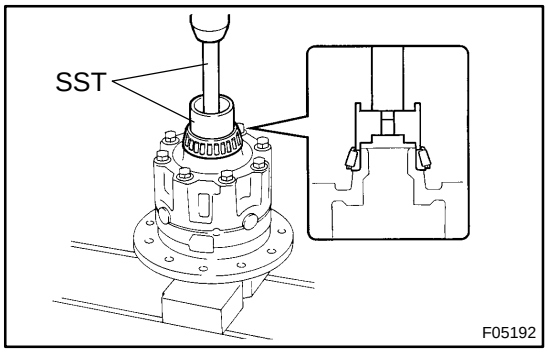
(c) Install the RH side gear.

(d) Align the matchmarks and assemble the RH and LH differential cases.

HINT:

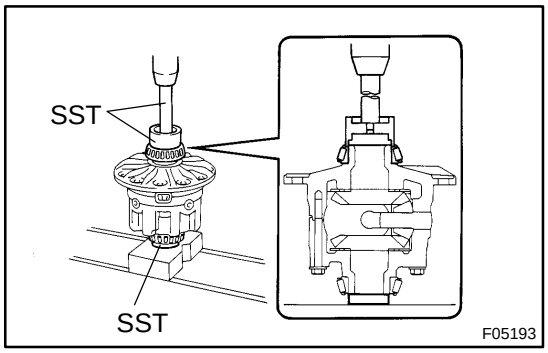
- Be careful not to drop the side gear.
- Check the pinion and side gear alignment.

(e) Tighten the 8 bolts uniformly, a little at a time.
Torque: 47 N·m (480 kgf·cm, 35 ft·lbf)



4. INSTALL SIDE BEARING

(a) Using SST and a press, install the RH side bearing on the differential case.
SST 09710-30050, 09950-70010 (09951-07100)

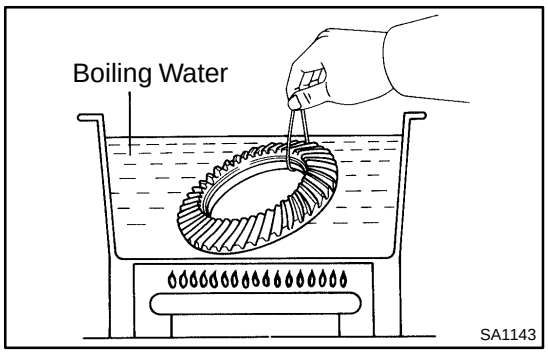


(b) Using SST and a press, install the LH side bearing on the differential case.
SST 09710- 30050, 09950- 60010 (09951- 00480), 09950-70010 (09951-07100)

5. INSTALL RING GEAR ON DIFFERENTIAL CASE

(a) Clean the threads of the bolts and differential case with the white gasoline.

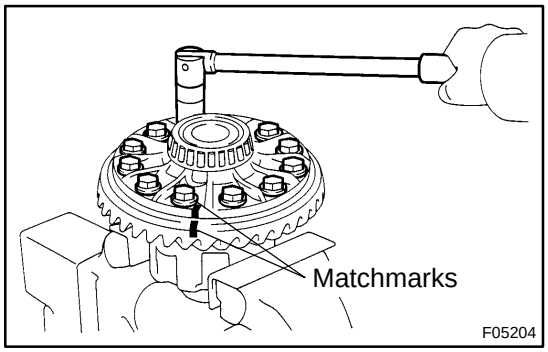
(b) Clean the contact surfaces of the differential case and ring gear.



(c) Heat the ring gear to about 100 °C (212 °F) in boiling water.

(d) Carefully take the ring gear out of the boiling water.

(e) After the moisture on the ring gear has completely evaporated, quickly install the ring gear to the differential case.



(f) Align the matchmarks on the ring gear and differential case.

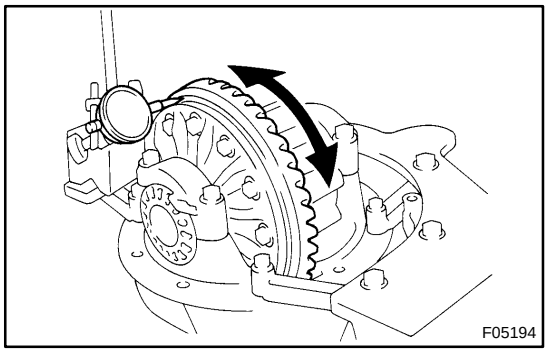
(g) Temporarily install the 12 set bolts.

(h) After the ring gear has cooled down enough, torque the 12 set bolts to which thread lock has been applied.
Thread lock:
Part No. 08833-00100, THREE BOND 1360K or equivalent
Torque: 137 N·m (1,400 kgf·cm, 101 ft·lbf)

6. CHECK RING GEAR RUNOUT

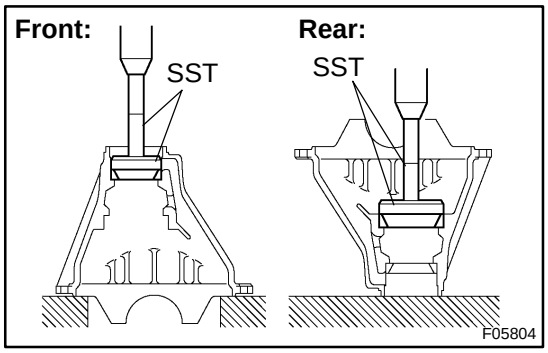
(a) Place the bearing outer races on their respective bearings. Check that the right and left outer races are not interchanged.

(b) Install the differential case onto the carrier and tighten the adjusting nut just to where there is no play in the bearings.



(c) Using a dial indicator, measure the ring gear runout.
Maximum runout: 0.05 mm (0.0020 in.)

(d) Remove the differential case.



7. INSTALL DRIVE PINION FRONT AND REAR BEARING OUTER RACES

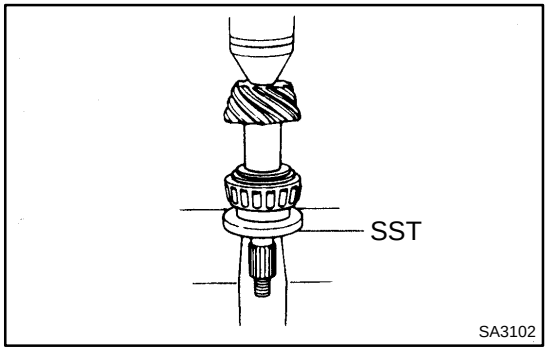
(a) Using SST and a press, install the front bearing outer race.
SST 09950-60020 (09951-00710),
09950-70010 (09951-07150)

(b) Using SST and a press, install the rear bearing outer race.
SST 09950-60020 (09951-00890),
09950-70010 (09951-07150)

8. INSTALL DRIVE PINION REAR BEARING

(a) Install the plate washer on the drive pinion.

HINT:
First fit a washer with the same thickness as the washer which was removed, then after checking the tooth contact pattern, replace the washer with one of a different thickness if necessary.



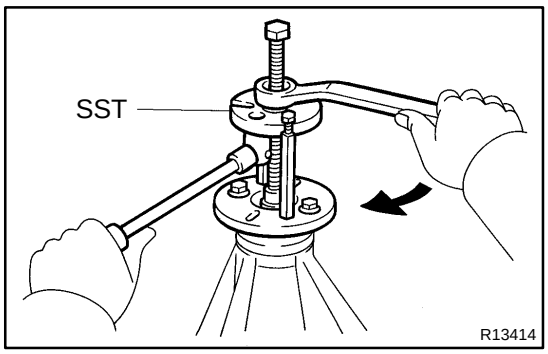
(b) Using SST and a press, install the rear bearing onto the drive pinion.
SST 09506-35010

9. TEMPORARILY ADJUST DRIVE PINION PRELOAD

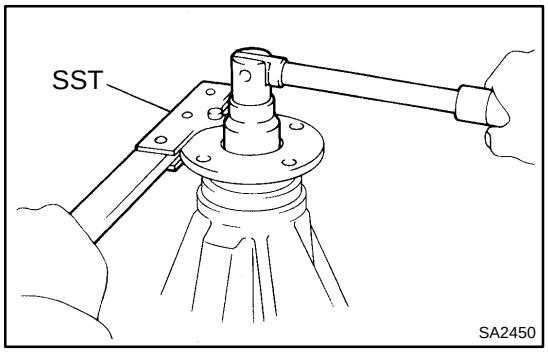
(a) Install the drive pinion and front bearing.

HINT:
Assemble the spacer and oil seal after adjusting the gear contact pattern.

(b) Install the oil slinger.



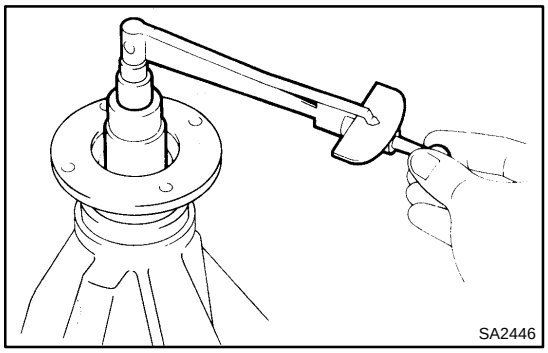
(c) Install the companion flange with SST.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



(d) Using SST to hold the flange and adjust the drive pinion preload by tightening the companion flange nut.
SST 09330-00021

NOTICE:

- **Coat the nut and screw of the drive pinon with gear oil.**
- **As there is no spacer, tighten the nut a little at a time, being careful not to overtighten.**



(e) Using a torque wrench, measure the preload.
Preload (at starting):
New bearing
1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)
Reused bearing
0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

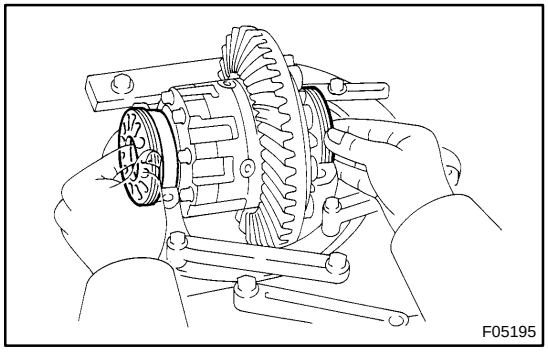
HINT:
Measure the total preload after turning the bearing clockwise and counterclockwise several times to make the bearing smooth.

10. INSTALL DIFFERENTIAL CASE IN CARRIER

(a) Place the 2 bearing outer races on their respective bearings. Make sure that the right and left outer races are not interchanged.

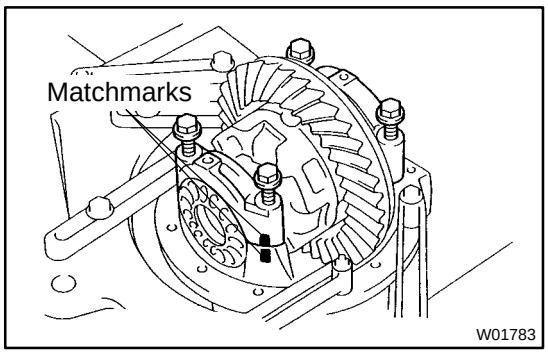
(b) Install the differential case in the carrier.

HINT:
Make sure that there is backlash between the ring gear and drive pinion.



11. INSTALL ADJUSTING NUTS

Install the 2 adjusting nuts on the carrier, making sure the nuts are engaged properly.



12. INSTALL BEARING CAPS

Align the matchmarks on the bearing cap and carrier. Screw in the 2 bearing cap bolts 2 or 3 turns and press down the bearing cap by hand.

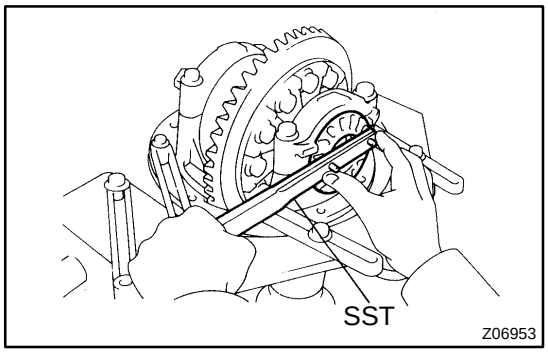
HINT:

If the bearing cap does not fit tightly on the carrier, the adjusting nuts are not engaged properly. Reinstall the adjusting nuts if necessary.

13. ADJUST SIDE BEARING PRELOAD

(a) Torque the 4 bolts.

Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)



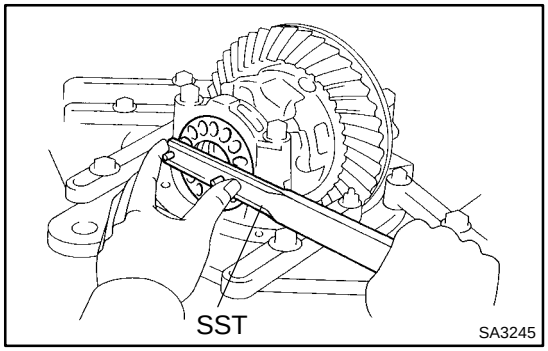
(b) Then loosen them to the point where the adjusting nuts can be turned by SST.

SST 09504-0001 1

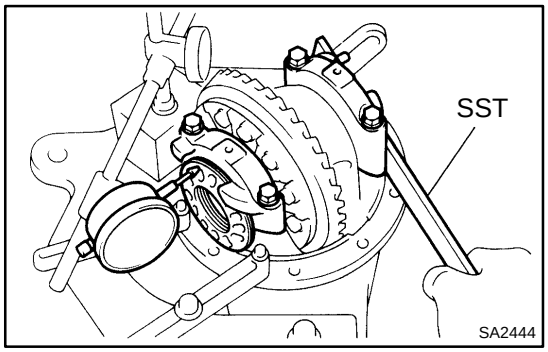
(c) Tighten the 4 bolts.

Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

(d) Using SST, torque the adjusting nut on the ring gear side until the ring gear has a backlash of about 0.2 mm (0.008 in.).

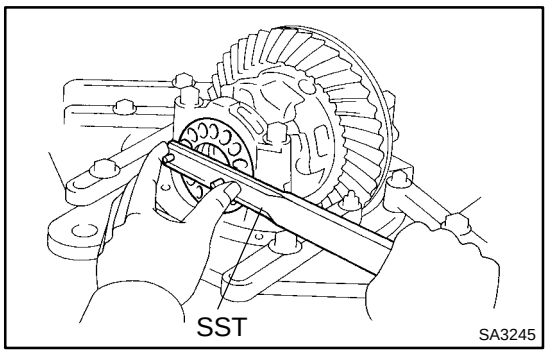


(e) While turning the ring gear, use the SST to fully tighten the adjusting nut on the drive pinion side. After the bearings are settled, loosen the adjusting nut on the drive pinion side.

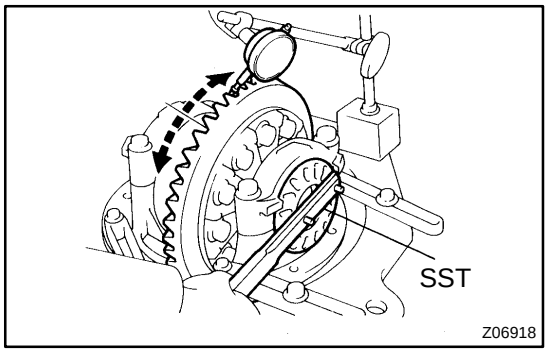


(f) Place a dial indicator on the top of the adjusting nut on the ring gear side.

(g) Adjust the side bearing to zero preload by tightening the other adjusting nut until the pointer on the indicator begins to move.



(h) Using the SST, torque the adjusting nut 1 - 1.5 notches from the zero preload position.

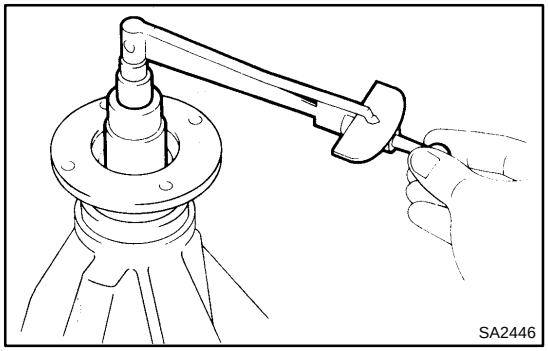


(i) Using a dial indicator, adjust the ring gear backlash until it is within the specified value.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)

HINT:
The backlash is adjusted by turning the right and left adjusting nuts equal amounts. For example, loosen the nut on the left side 1 notch and torque the nut on the right side 1 notch.

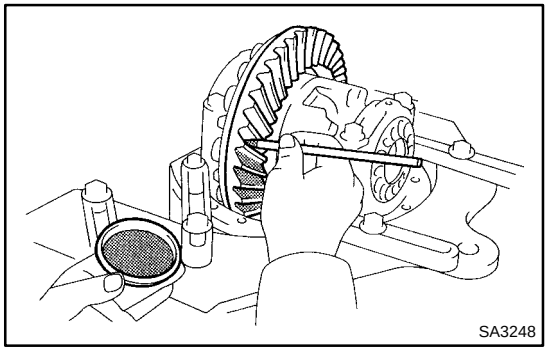
(j) Torque the 4 bolts.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

(k) After rotating the ring gear 5 turns or more, recheck the ring gear backlash.
Backlash: 0.13 - 0.18 mm (0.0051 - 0.0071 in.)



14. MEASURE TOTAL PRELOAD

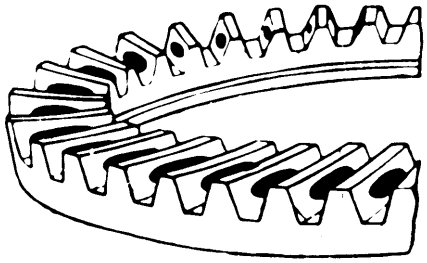
Using a torque wrench, measure the preload with the teeth of the drive pinion and ring gear in contact.
Preload (at starting):
Drive pinion preload plus
0.38 - 0.63 N·m (3.9 - 6.5 kgf·cm, 3.3 - 5.6 in.·lbf)



15. INSPECT TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION

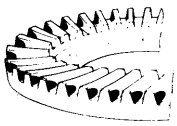
(a) Coat 3 or 4 teeth at 3 different positions on the ring gear with red lead primer.

(b) Turn the companion flange, in both directions to inspect the ring gear for proper tooth contact.

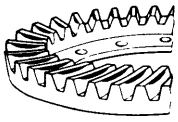


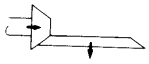
Proper Contact

Heel Contact



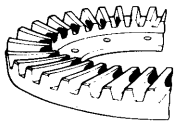
Face Contact



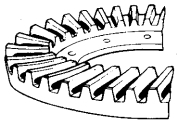


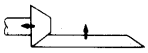
Select an adjusting washer that will bring the drive pinion closer to the gear.

Toe Contact



Flank Contact





Select an adjusting washer that will shift the drive pinion gear away from the ring gear.

R02495

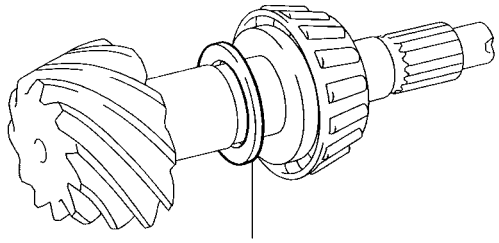


Plate Washer

FA2041

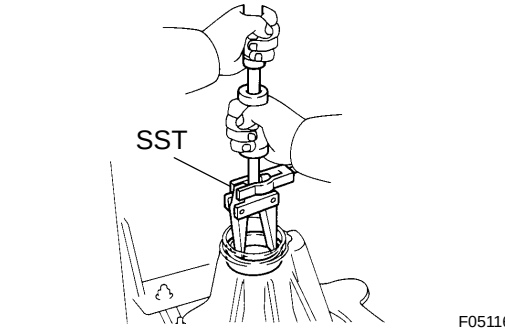
If the teeth are not contacting properly, use the following table to select a proper washer for correction.

Plate washer thickness:

Thickness mm (in.)	Thickness mm (in.)
1.050 (0.04134)	1.325 (0.05217)
1.075 (0.04232)	1.350 (0.05315)
1.100 (0.04331)	1.375 (0.05413)
1.125 (0.04429)	1.400 (0.05512)
1.150 (0.04528)	1.425 (0.05610)
1.175 (0.04626)	1.450 (0.05709)
1.200 (0.04724)	1.475 (0.05807)
1.225 (0.04823)	1.500 (0.05906)
1.250 (0.04921)	1.525 (0.06004)
1.275 (0.05020)	1.550 (0.06102)
1.300 (0.05118)	-

16. REMOVE COMPANION FLANGE (See page SA-143)

17. REMOVE OIL SLINGER AND FRONT BEARING (See page SA-143)



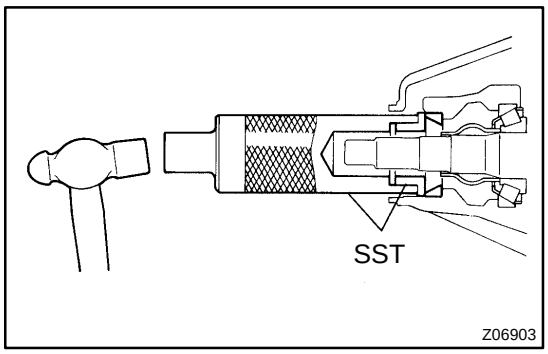
F05116

18. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

SST 09308-00010

19. INSTALL NEW BEARING SPACER



20. INSTALL BEARING OUTER RACE

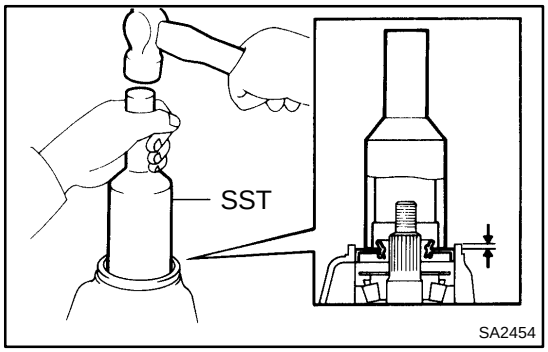
Using SST and a hammer, install the bearing outer race.

SST 09316-6001 1 (09316-00011, 09316-00021)

21. INSTALL FRONT BEARING AND OIL SLINGER

22. INSTALL OIL SEAL

(a) Coat the hypoid gear oil to a new oil seal periphery.

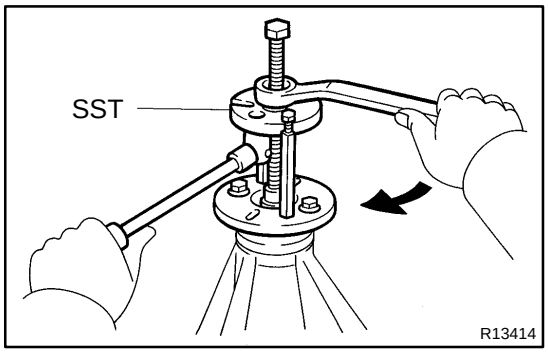


(b) Using SST and a hammer, install the oil seal, as shown.

SST 09214-7601 1

Oil seal driven in depth: 0.5 mm (0.020 in.)

(c) Coat MP grease to the oil seal lip.

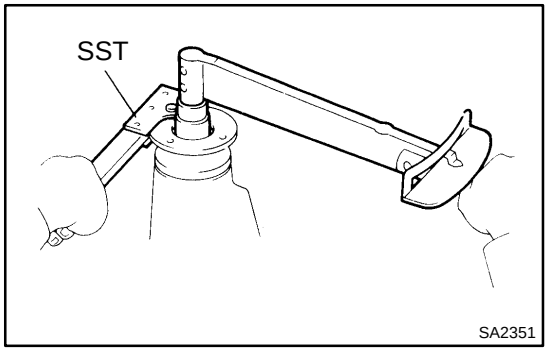


23. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange.

SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)

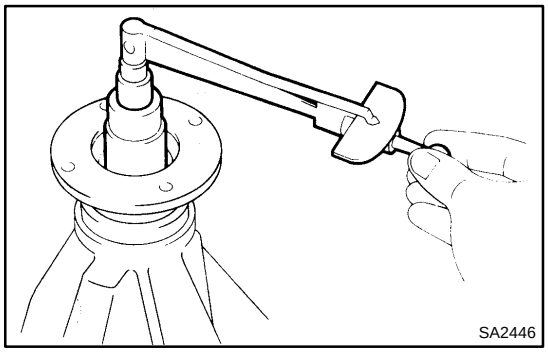
(b) Coat the threads of a new nut with gear oil.



(c) Using SST to hold the flange, install the nut.

SST 09330-00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)



24. ADJUST DRIVE PINION PRELOAD

Using a torque wrench, measure the preload of the backlash between the drive pinion and ring gear.

Preload (at starting):

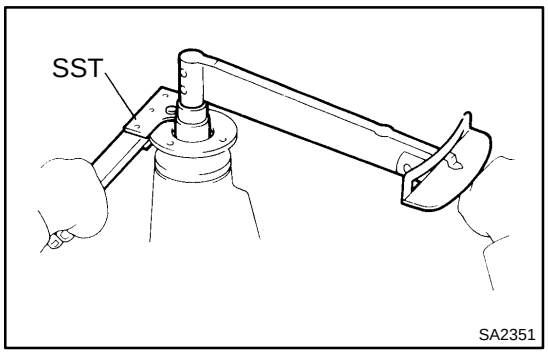
New bearing

1.3 - 1.8 N·m (13 - 19 kgf·cm, 11.5 - 15.9 in.·lbf)

Reused bearing

0.64 - 0.92 N·m (6.5 - 9.4 kgf·cm, 5.7 - 8.1 in.·lbf)

If the preload is greater than the specified value, replace the bearing spacer.



If the preload is less than the specified value, retighten the nut with a force of 13 N·m (130 kgf·cm, 9 ft·lbf) at a time until the specified preload is reached.

SST 09330-00021

Torque: 441 N·m (4,500 kgf·cm, 326 ft·lbf) or less

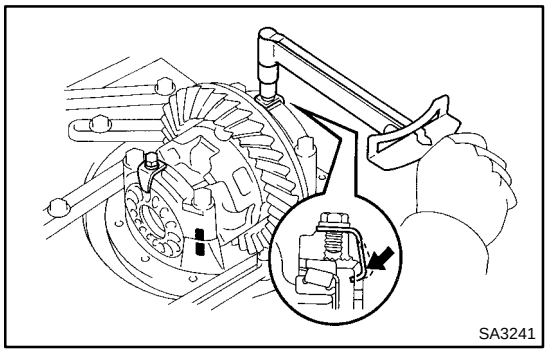
If the maximum torque is exceeded while retightening the nut, replace the bearing spacer and repeat the preload procedure. Do not loosen the pinion nut to reduce the preload.

25. RECHECK RING GEAR BACKLASH
(See page SA-143)

26. RECHECK TOOTH CONTACT BETWEEN RING GEAR AND DRIVE PINION (See step 15)

27. CHECK RUNOUT OF COMPANION FLANGE (See page SA-143)

28. STAKE DRIVE PINION NUT



29. INSTALL ADJUSTING NUT LOCKS

(a) Install 2 new nut locks on the bearing caps.

(b) After tightening 2 bolts, bend the nut locks.

Torque: 13 N·m (130 kgf·cm, 10 ft·lbf)

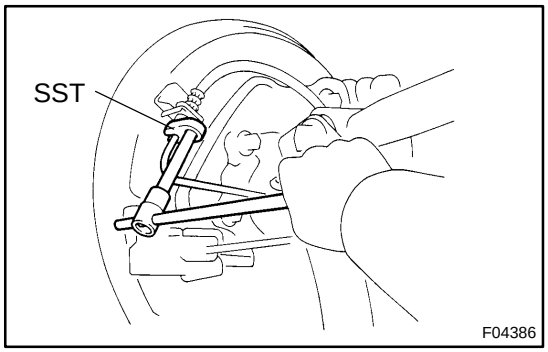
30. REMOVE DIFFERENTIAL CARRIER FROM OVERHAUL STAND ETC.

SA15Z-04

REMOVAL

1. REMOVE 2 REAR WHEELS
Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

2. DRAIN HYPOID GEAR OIL
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)



3. DISCONNECT BRAKE LINES

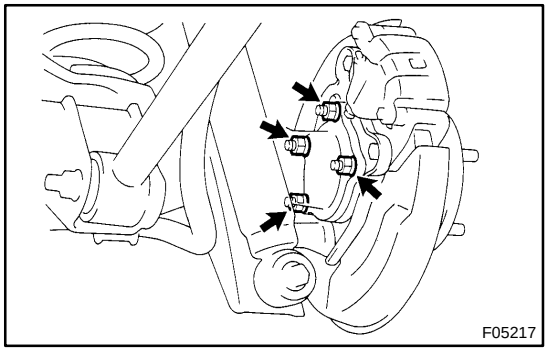
(a) Using SST, disconnect the brake line and remove the clip.
SST 09023-00100
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

4. DISCONNECT PARKING BRAKE CABLES

(a) Remove the 2 clips, pin and disconnect the parking brake cable from the bellcrank.

(b) Employ the same manner described above to the other side.



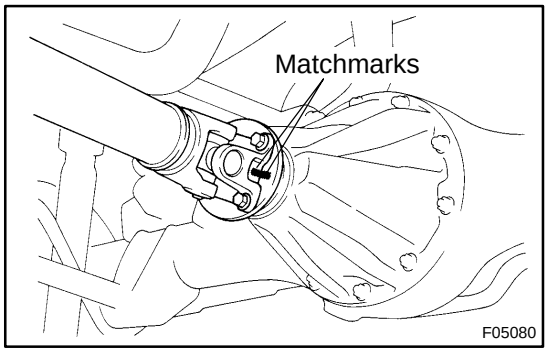
5. REMOVE AXLE SHAFTS

(a) Remove the 4 nuts.
Torque: 123 N·m (1,250 kgf·cm, 90 ft·lbf)

(b) Pull out the axle shaft assembly and remove the O-ring.

NOTICE:
Be careful not to damage the oil seal.

(c) Employ the same manner described above to the other side.

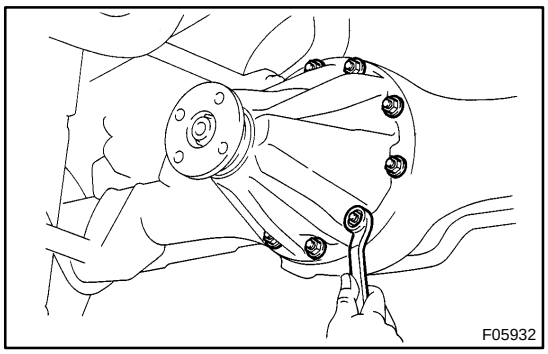


6. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and differential flange.

(b) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.
Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)

(c) Support the propeller shaft securely.



7. REMOVE DIFFERENTIAL CARRIER ASSEMBLY

(a) Remove the 10 nuts, washers and differential carrier assembly.

NOTICE:

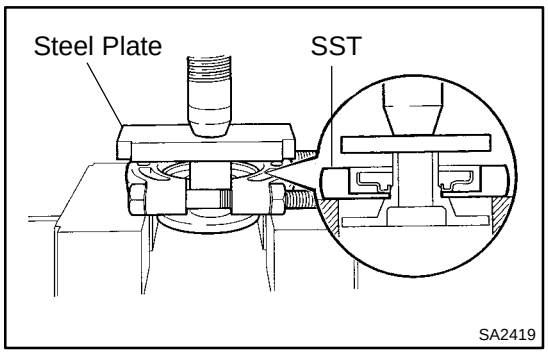
Be careful not to damage the installation surface.

Torque: 72 N·m (740 kgf·cm, 53 ft·lbf)

(b) Remove the gasket.

SA162-04

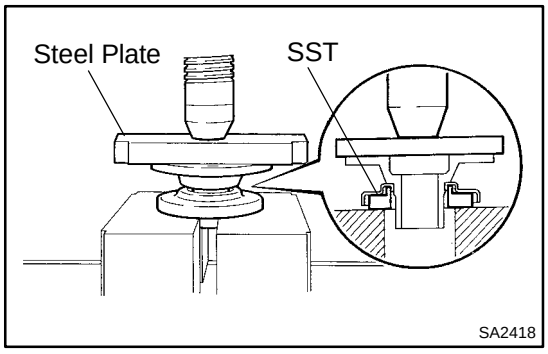
REPLACEMENT



1. REMOVE COMPANION FLANGE DUST DEFLECTOR

Using SST, a steel plate and press, remove the dust deflector.

SST 09950-00020



2. INSTALL DUST DEFLECTOR

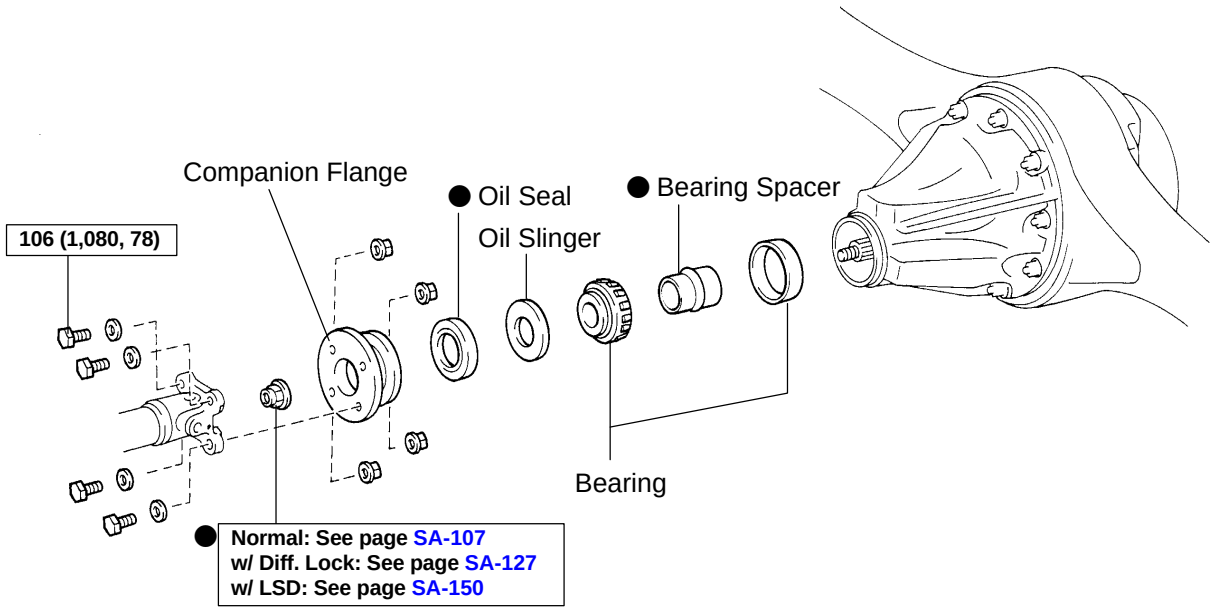
Using SST, a steel plate and press, install a new dust deflector.

SST 09726-40010

REAR DIFFERENTIAL FRONT OIL SEAL

COMPONENTS

SA15K-04

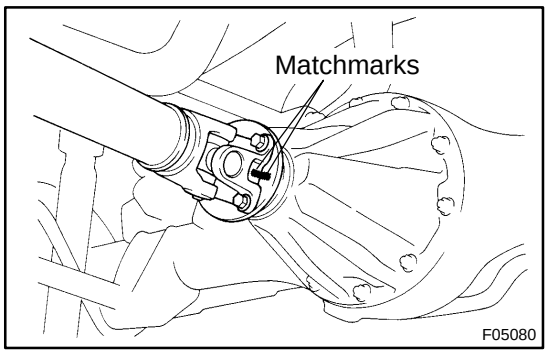


N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

F05115

SA15L-08

REPLACEMENT



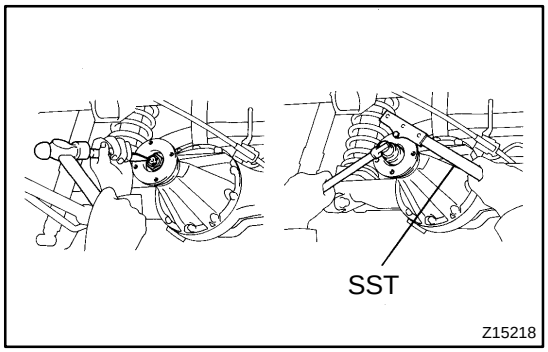
1. DISCONNECT REAR PROPELLER SHAFT

(a) Place matchmarks on the propeller shaft and companion flange.

(b) Remove the 4 nuts, bolts, washers and disconnect the propeller shaft.

(c) Support the propeller shaft securely.

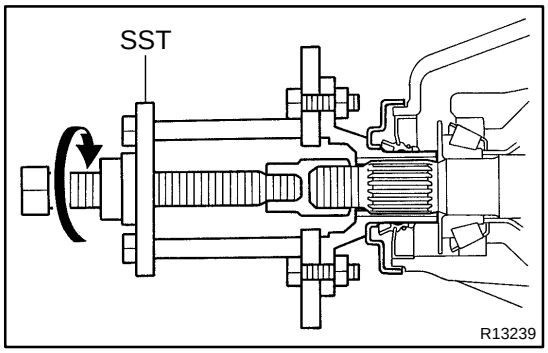
2. DRAIN HYPOID GEAR OIL



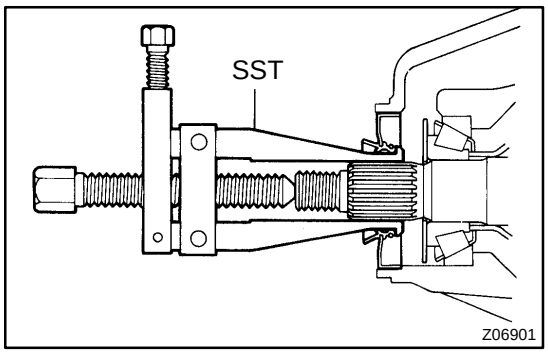
3. REMOVE COMPANION FLANGE

(a) Using a chisel and hammer, unstake the nut.

(b) Using SST to hold the flange, remove the nut.
SST 09330-00021



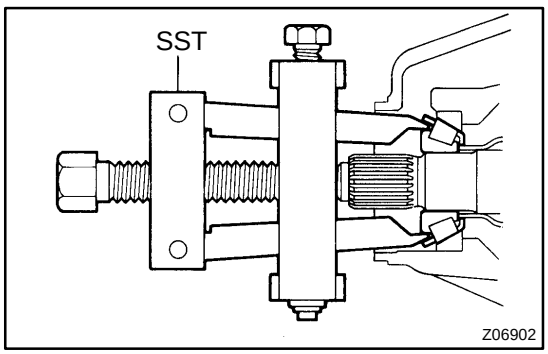
(c) Using SST, remove the companion flange.
SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)



4. REMOVE OIL SEAL AND OIL SLINGER

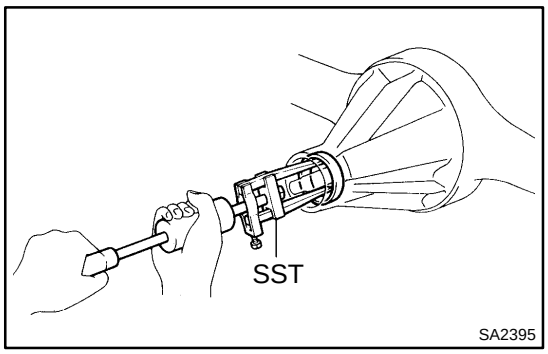
(a) Using SST, remove the oil seal.
SST 09308-10010

(b) Remove the oil slinger.



5. REMOVE FRONT BEARING

Using SST, remove the front bearing from the drive pinion.
SST 09556-22010



6. REMOVE BEARING OUTER RACE

Using SST, remove the bearing outer race.

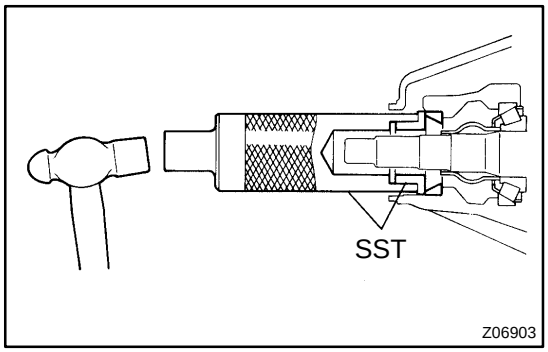
SST 09308-00010

NOTICE:

Do not scratch the taper surface of the outer race.

7. REMOVE BEARING SPACER

8. INSTALL NEW BEARING SPACER



9. INSTALL BEARING OUTER RACE

Using SST and a hammer, install the bearing outer race.

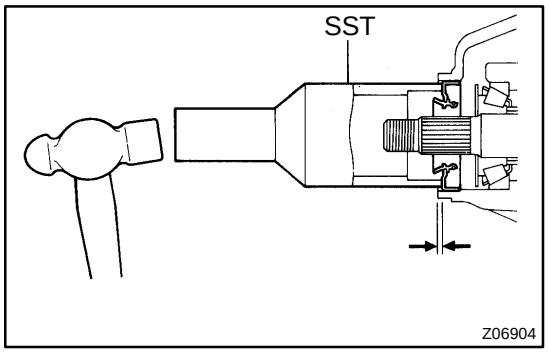
SST 09316-6001 1 (09316-00011, 09316-00021)

10. INSTALL FRONT BEARING

11. INSTALL OIL SLINGER AND OIL SEAL

(a) Install the oil slinger.

(b) Coat the hypoid gear oil to a new oil seal periphery.

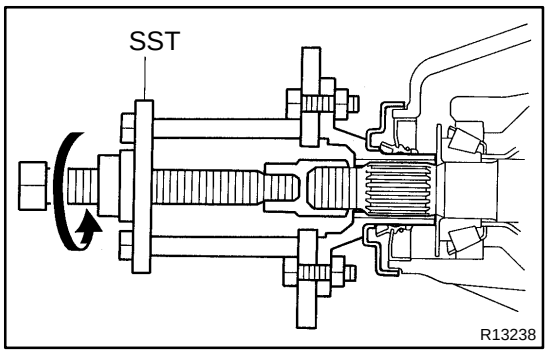


(c) Using SST and a hammer, install the new oil seal.

SST 09214-7601 1

Oil seal drive in depth: 0.5 mm (0.020 in.)

(d) Coat MP grease to the oil seal lip.

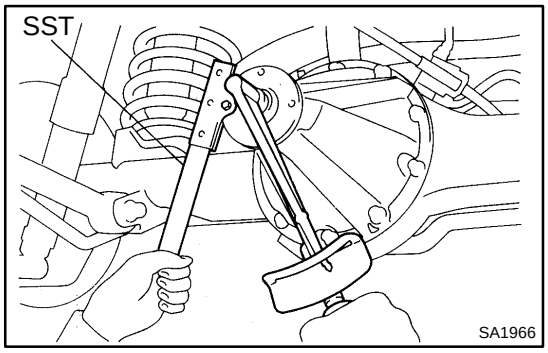


12. INSTALL COMPANION FLANGE

(a) Using SST, install the companion flange on the drive pinion.

SST 09950- 30012 (09951- 03010, 09953- 03010, 09954-03010, 09955-03030, 09956-03040)

(b) Coat the threads of a new companion flange nut with gear oil.



(c) Using SST to hold the flange, install a new nut.

SST 09330-00021

Torque: 245 N·m (2,500 kgf·cm, 181 ft·lbf)

13. ADJUST DRIVE PINION PRELOAD

(See page SA-107 , SA-127 or SA-150)

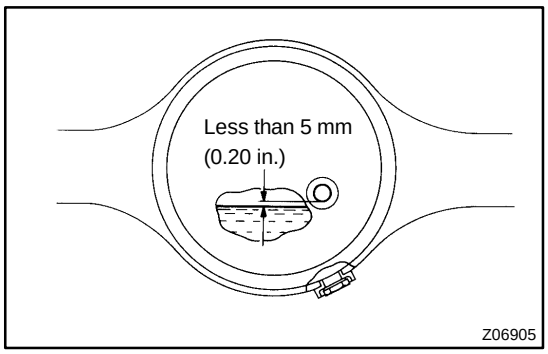
14. STAKE DRIVE PINION NUT

15. CONNECT REAR PROPELLER SHAFT

(a) Align the matchmarks on the propeller shaft and flange.

(b) Install the 4 bolts, washers and nuts.

Torque: 106 N·m (1,080 kgf·cm, 78 ft·lbf)



16. FILL DIFFERENTIAL WITH HYPOID GEAR OIL

Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

Oil type:

w/o LSD: Hypoid gear oil API GL-5

w/ LSD: Hypoid gear oil LSD API GL-5

Recommended oil viscosity:

Above -18˚C (0˚F) SAE 90

Below -18˚C (0˚F) SAE 80W-90 or 80W

Capacity:

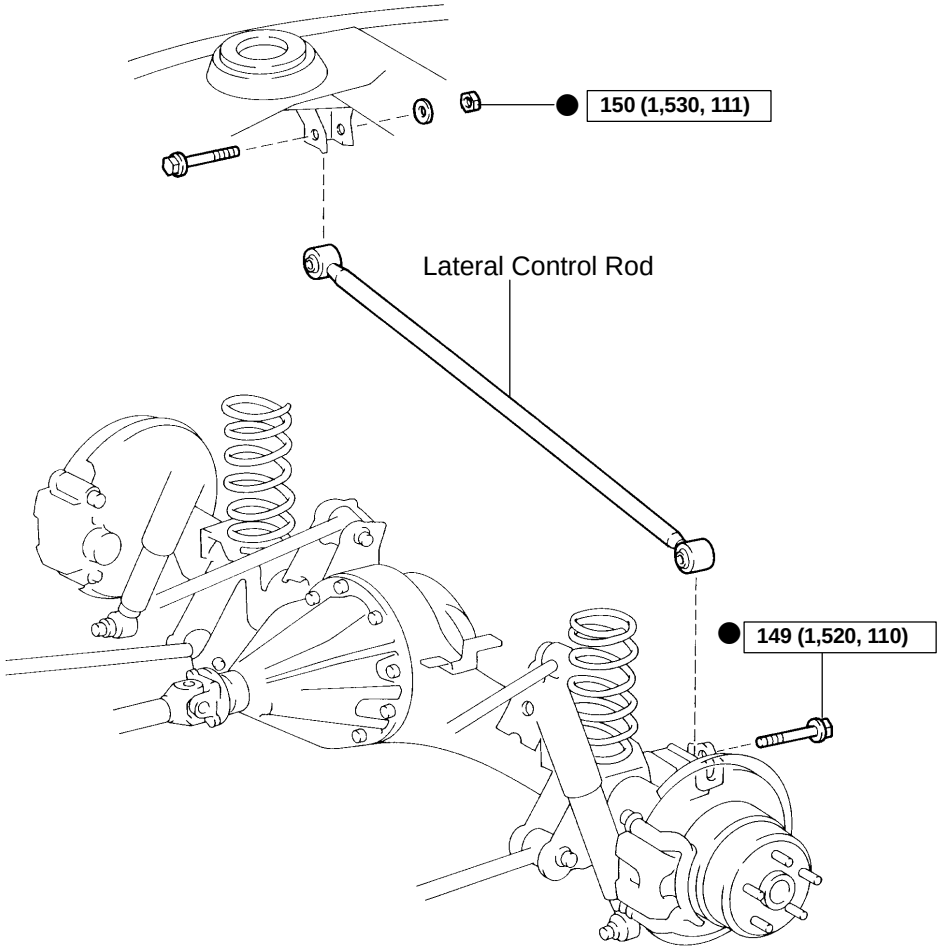
w/ Diff. Lock: 3.20 liters (3.38 US qts, 2.82 lmp.qts)

Others: 3.30 liters (3.49 US qts, 2.90 lmp.qts)

REAR LATERAL CONTROL ROD

SA16F-02

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque
● Non-reusable part

F05238

SA16H-01

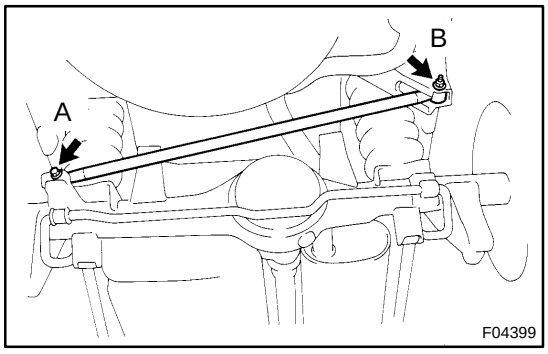
INSTALLATION

Installation is in the reverse order of removal (See page SA-179).

SA16G-02

REMOVAL

1. SUPPORT REAR AXLE HOUSING WITH JACK



2. REMOVE LATERAL CONTROL ROD

Remove the 2 bolts, nut, washer and lateral control rod.

Torque:

A: 149 N·m (1,520 kgf·cm, 110 ft·lbf)

B: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

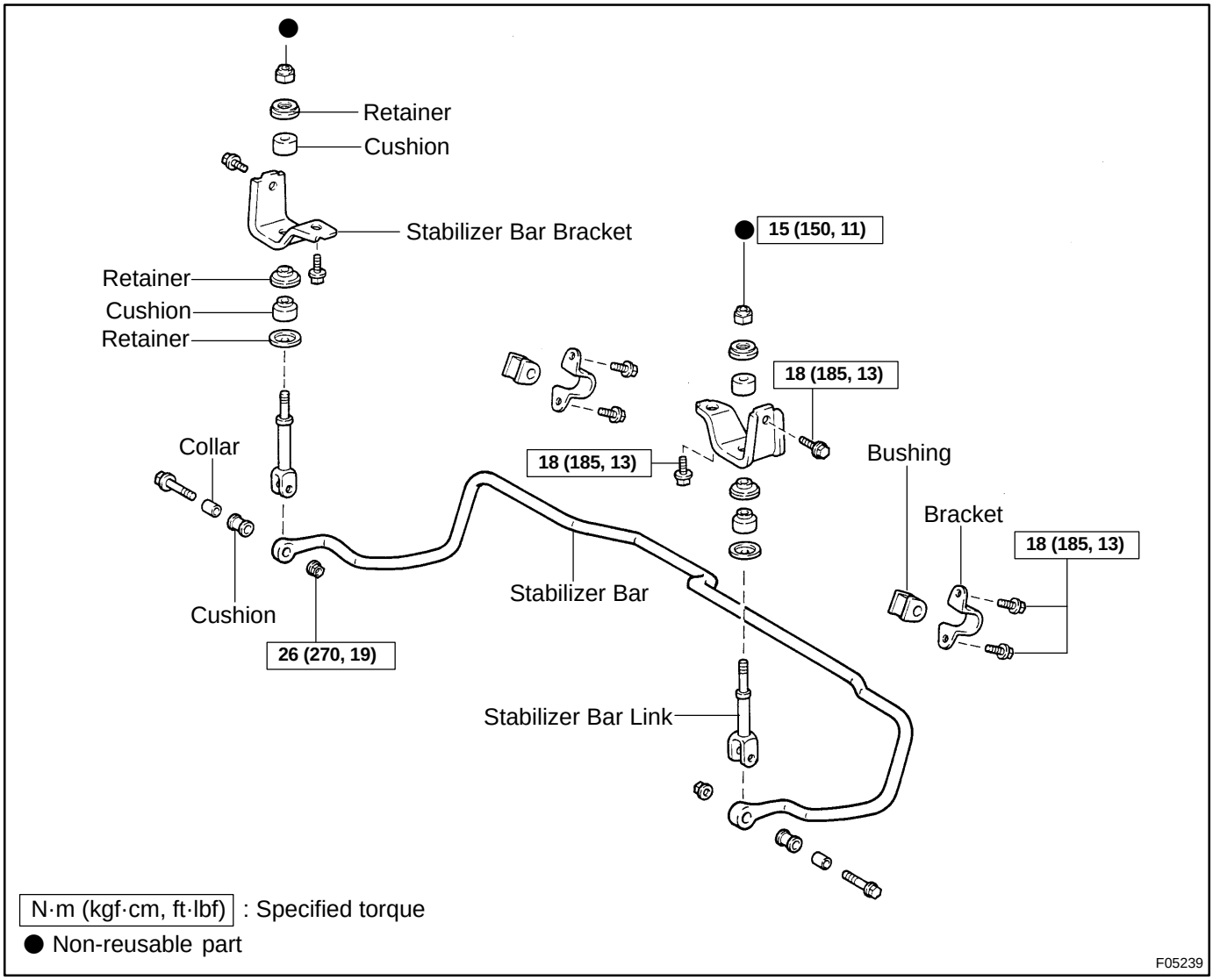
HINT:

At the time of installation, after stabilizing the suspension, torque the nut and bolt.

REAR STABILIZER BAR

SA16L-02

COMPONENTS



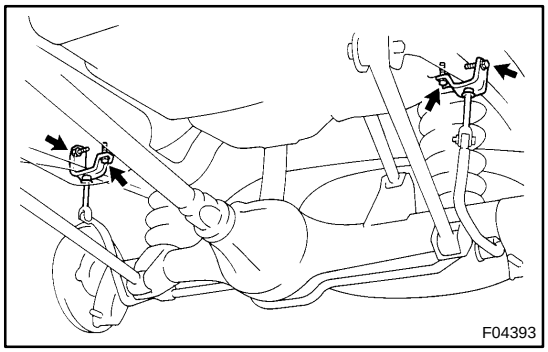
SA16M-02

REMOVAL

1. REMOVE REAR WHEELS

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

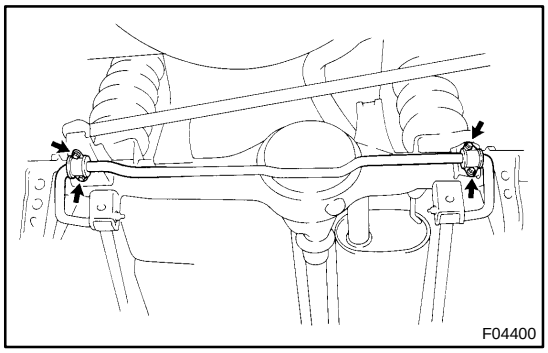
2. SUPPORT REAR AXLE HOUSING WITH JACK



3. DISCONNECT LH AND RH STABILIZER BAR BRACKETS

Remove the 4 bolts and disconnect the LH and RH stabilizer bar brackets.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)



4. REMOVE STABILIZER BAR

(a) Remove the 4 bolts and stabilizer bar with the bushings and brackets.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

(b) Remove the 2 brackets and 2 bushings from the stabilizer bar.

5. REMOVE BOTH STABILIZER BAR LINKS FROM STABILIZER BAR

(a) Remove the nut, 3 retainers, 2 cushions and disconnect the stabilizer bar link from the bracket.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Employ the same manner described above to the other side.

(c) Remove the 2 nuts, bolts and stabilizer bar links.

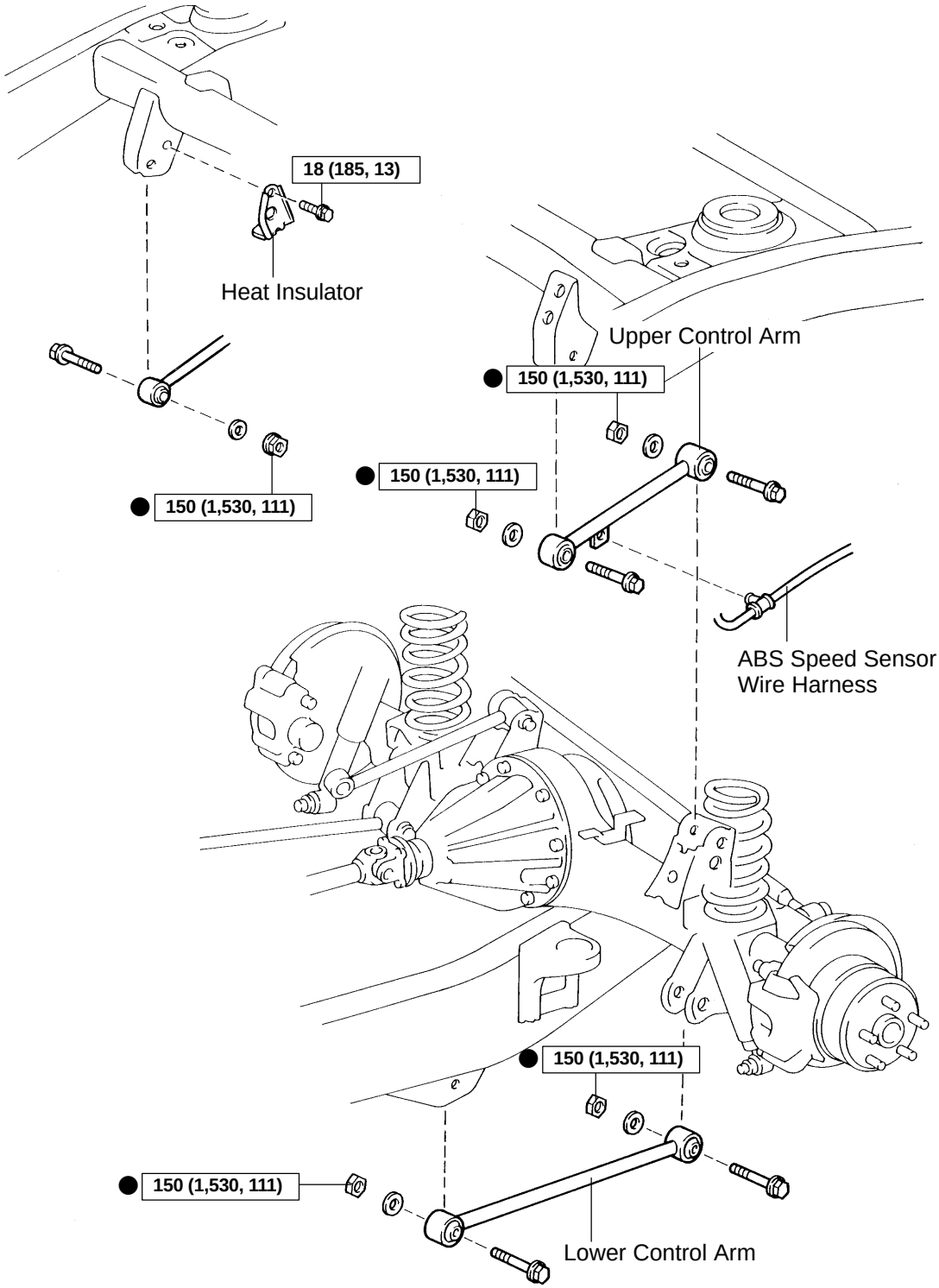
Torque: 26 N·m (270 kgf·cm, 19 ft·lbf)

(d) Remove the 2 collars and cushions.

REAR UPPER AND LOWER CONTROL ARM

SA16I-02

COMPONENTS



N·m (kgf·cm, ft·lbf) : Specified torque

● Non-reusable part

F05240

SA16K-01

INSTALLATION

Installation is in the reverse order of removal (See page SA-182).

SA16J-02

REMOVAL

1. REMOVE REAR WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

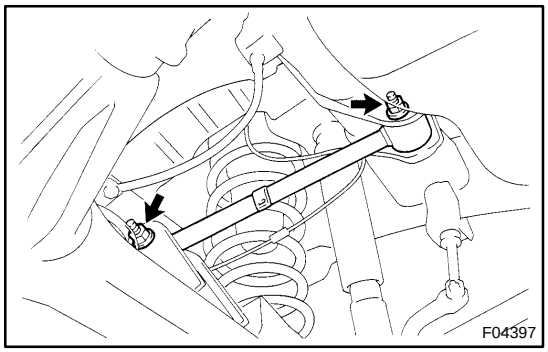
2. SUPPORT REAR AXLE HOUSING WITH JACK

3. REMOVE UPPER CONTROL ARM

(a) Disconnect the ABS speed sensor wire harness.

(b) RH side:
Remove the bolt and heat insulator.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

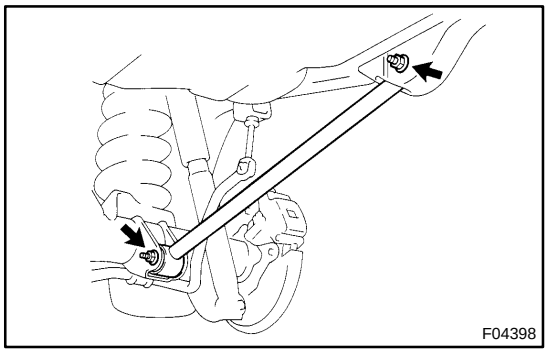


(c) Remove the 2 nuts, washers, bolts and upper control arm.

Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:

At the time of installation, after stabilizing the suspension, torque the nuts.



4. REMOVE LOWER CONTROL ARM

Remove the 2 nuts, washers, bolts and lower control arm.

Torque: 150 N·m (1,530 kgf·cm, 111 ft·lbf)

HINT:

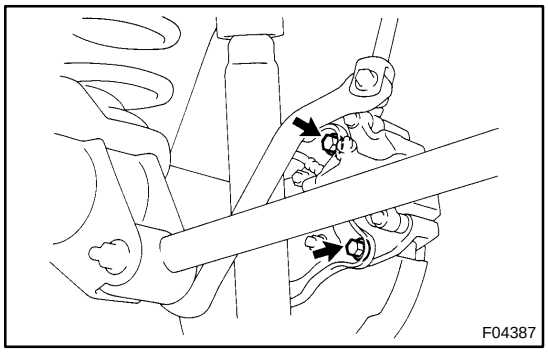
At the time of installation, after stabilizing the suspension, torque the nuts.

REAR WHEEL HUB BOLT

SA15J-02

REPLACEMENT

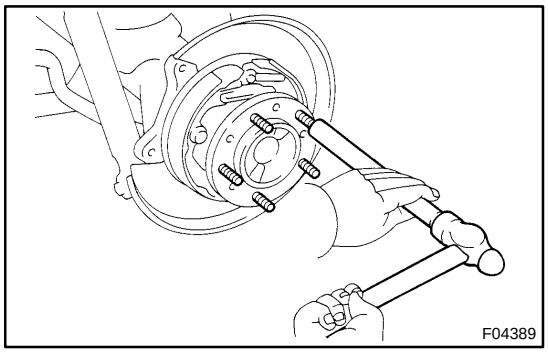
1. REMOVE REAR WHEEL



2. REMOVE BRAKE CALIPER AND DISC

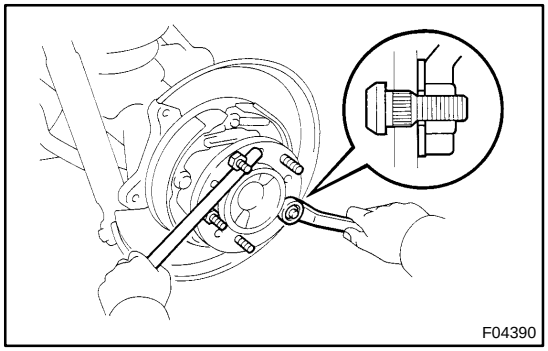
(a) Remove the 2 bolts, brake caliper and disc.

(b) Support the brake caliper securely.



3. REMOVE HUB BOLT

Using a brass bar and hammer, remove the hub bolt.



4. INSTALL HUB BOLT

Install a washer and nut to a new hub bolt, as shown in the illustration, and install the hub bolt by torquing the nut.

5. INSTALL DISC AND BRAKE CALIPER

Install the disc and brake caliper with the 2 bolts.

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

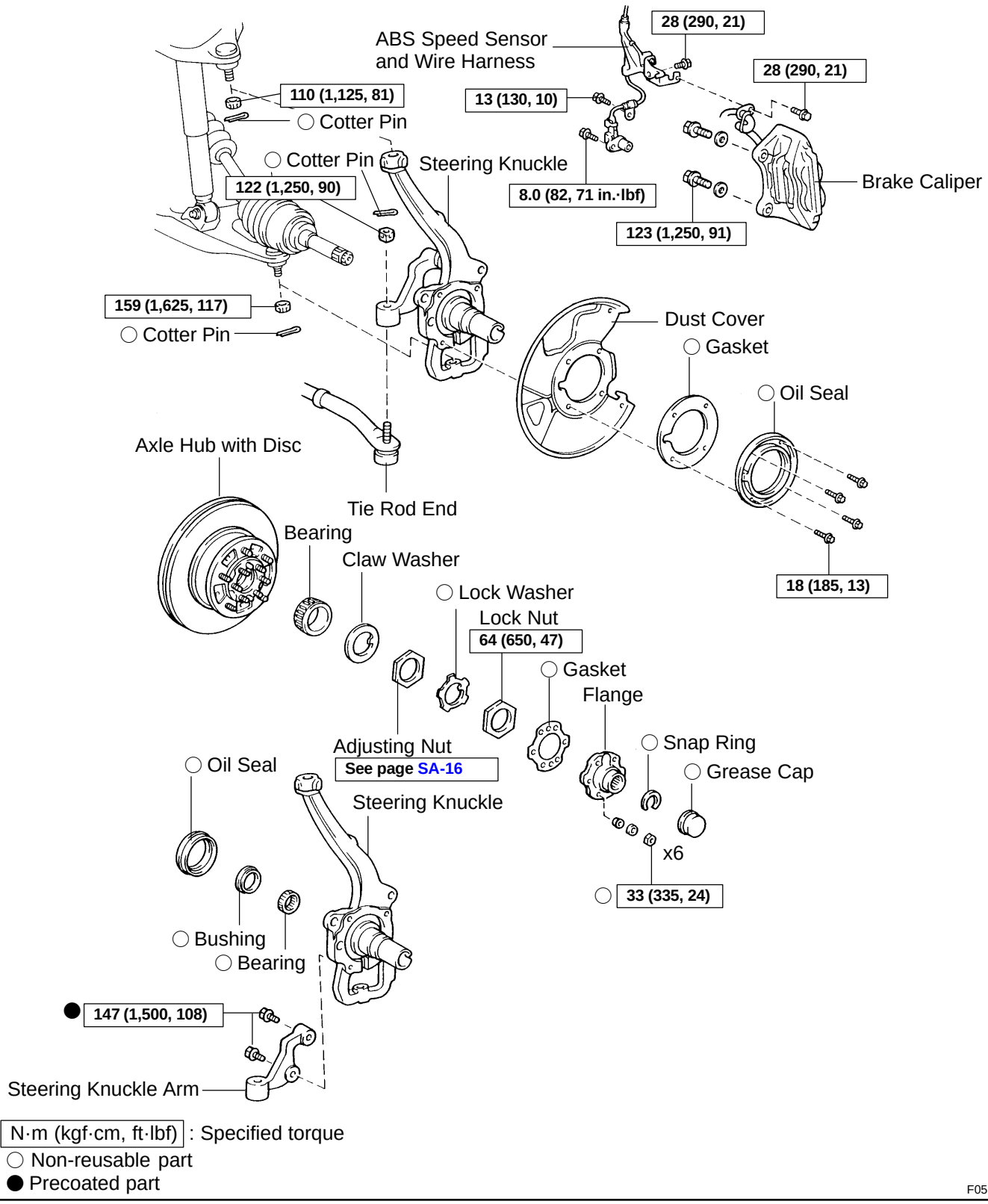
6. INSTALL REAR WHEEL

Torque: 131 N·m (1,340 kgf·cm, 97 ft·lbf)

STEERING KNUCKLE

COMPONENTS

SA149-05



SA14B-04

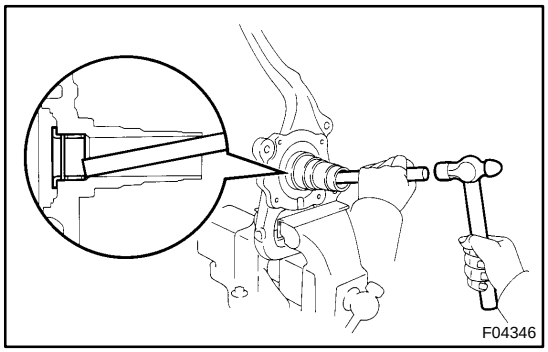
DISASSEMBLY

1. REMOVE STEERING KNUCKLE ARM

Remove the 2 bolts and steering knuckle arm.

2. REMOVE OIL SEAL

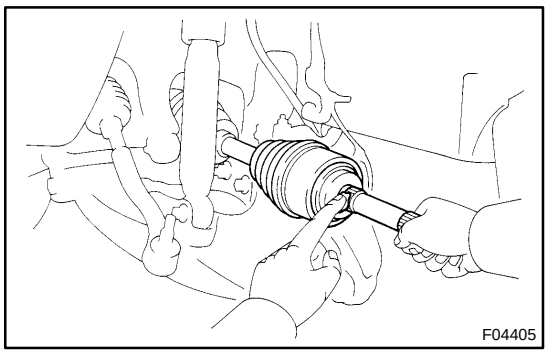
Using a screwdriver and hammer, remove the oil seal.



3. REMOVE BEARING AND BUSHING

Using a brass and hammer, remove the bearing and bushing.

SA14D-04


F04405

INSTALLATION

1. INSTALL STEERING KNUCKLE

(a) Apply synthetic oil and lithium soap base chassis grease, NLGI No. 1 to the drive shaft.

(b) Support the lower suspension arm with jack and connect the steering knuckle to the lower suspension arm.

NOTICE:

Be careful not to damage the oil seal.

(c) Temporarily install the nut to lower suspension arm.

(d) Raise up the lower suspension arm using a jack and install the steering knuckle to the upper suspension arm with a nut.

Torque: 110 N·m (1,125 kgf·cm, 81 ft·lbf)

(e) Install a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.

(f) Torque the nut of the lower suspension arm.

Torque: 159 N·m (1,625 kgf·cm, 117 ft·lbf)

(g) Install a new cotter pin.

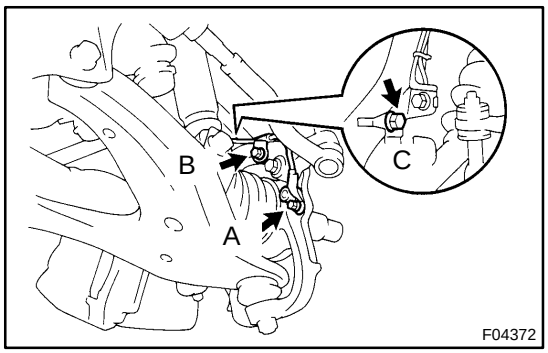
2. CONNECT TIE ROD END

(a) Connect the tie rod end to steering knuckle with nut.

Torque: 122 N·m (1,250 kgf·cm, 91 ft·lbf)

(b) Install a new cotter pin.

If the holes for the cotter pin are not aligned, tighten the nut further up to 60°.



F04372

3. CONNECT ABS SPEED SENSOR AND WIRE HARNESS

Install the wire harness and 3 bolts.

Torque:

A: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

B: 13 N·m (130 kgf·cm, 10 ft·lbf)

C: 28 N·m (290 kgf·cm, 21 ft·lbf)

4. INSTALL DUST COVER, GASKET AND OIL SEAL

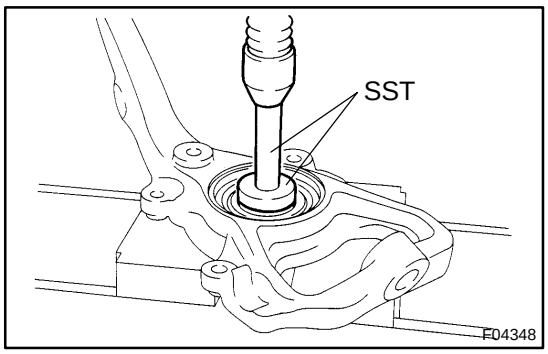
Install the dust cover, new gasket and oil seal with the 4 bolts.

Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

5. INSTALL FRONT AXLE HUB (See page SA-16)

SA14C-04

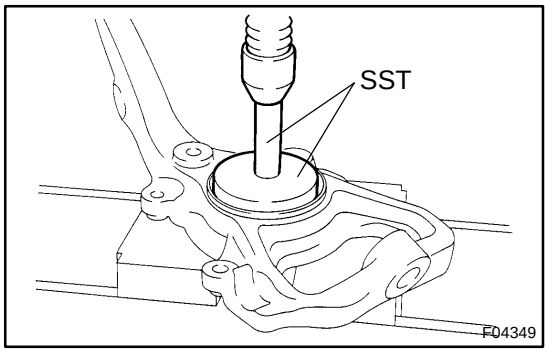
REASSEMBLY



1. INSTALL BEARING AND BUSHING

(a) Using SST and a press, install a new bearing and bushing.
SST 09950-60010 (09951-00540),
09950-70010 (09951-07100)

(b) Apply synthetic oil and lithium soap base chassis grease, NLGI No. 1 to the steering knuckle inner side of the bushing.



2. INSTALL OIL SEAL

(a) Using SST and a press, install a new oil seal.
SST 09950-60020 (09951-00910),
09950-70010 (09951-07100)

(b) Coat the lip of the oil seal with MP grease.

3. INSTALL STEERING KNUCKLE ARM

(a) Clean the threads of the 2 bolts and steering knuckle with toluene or trichloroethylene.

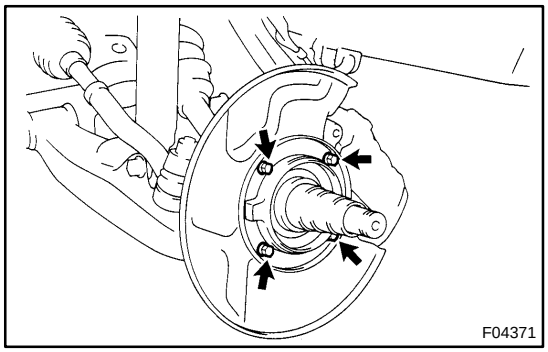
(b) Apply sealant to the bolt threads.
Sealant:
Part No. 08833-00070, THREE BOND 1324
or equivalent

(c) Install the steering knuckle arm with the 2 bolts.
Torque: 147 N·m (1,500 kgf·cm, 108 ft·lbf)

SA14A-04

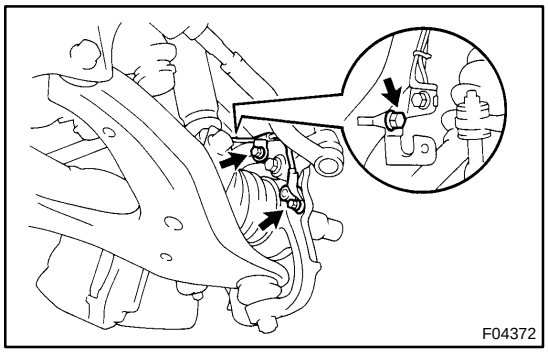
REMOVAL

1. REMOVE FRONT AXLE HUB (See page SA-12)



2. REMOVE OIL SEAL, GASKET AND DUST COVER

Remove the 4 bolts, oil seal, gasket and dust cover.

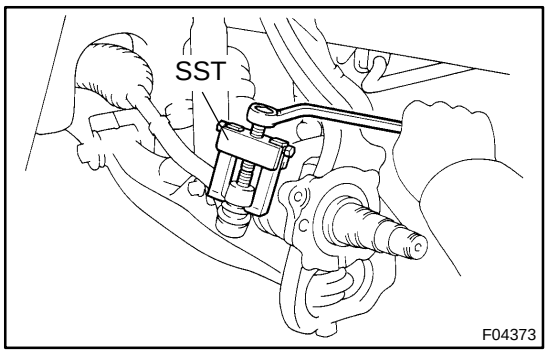


3. DISCONNECT ABS SPEED SENSOR AND WIRE HARNESS

Remove the 3 bolts and disconnect the ABS speed sensor and wire harness.

4. DISCONNECT TIE ROD END FROM STEERING KNUCKLE ARM

(a) Remove the cotter pin and nut.

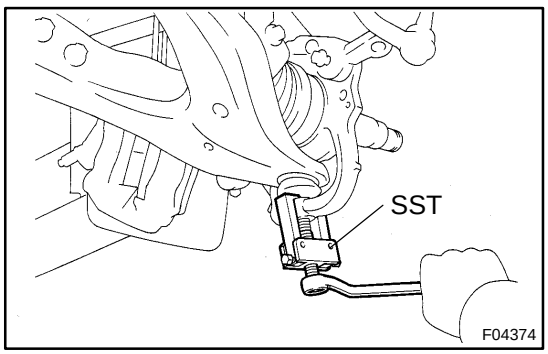


(b) Using SST, disconnect the tie rod end from the steering knuckle arm.

SST 09628-6201 1

5. DISCONNECT LOWER SUSPENSION ARM FROM STEERING KNUCKLE

(a) Remove the cotter pin and nut.



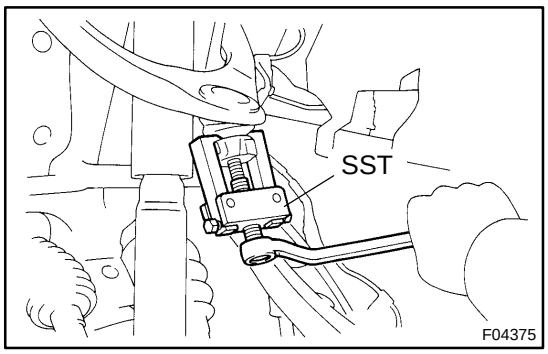
(b) Using SST, disconnect the lower suspension arm from the steering knuckle.

SST 09628-6201 1

6. REMOVE STEERING KNUCKLE

(a) Remove the cotter pin and nut.

(b) Temporarily install the nut to the lower suspension arm.



(c) Using SST, disconnect the steering knuckle from the upper suspension arm.
SST 09628-6201 1

(d) Remove the nut and steering knuckle from the lower suspension arm.

TIRE AND WHEEL

SA141-04

INSPECTION

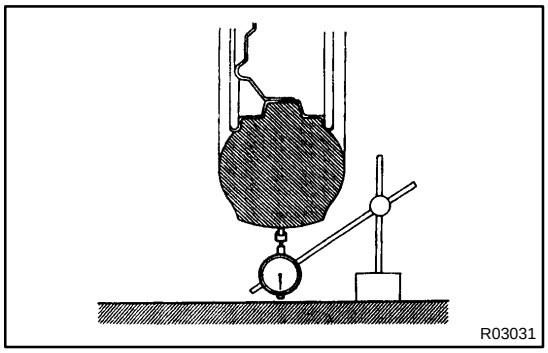
1. INSPECT TIRE

(a) Check the tires for wear and proper inflation pressure.

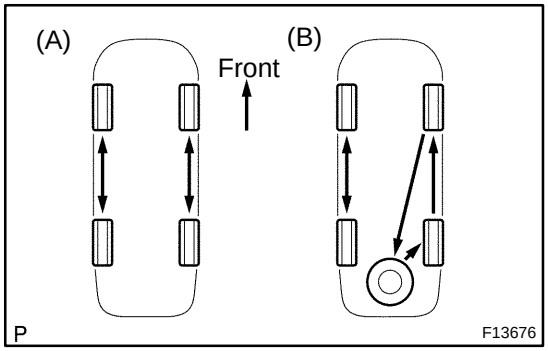
Cold tire inflation pressure:

Tire size	Front kPa (kgf/cm^2, psi)	Rear kPa (kgf/cm^2, psi)
P275/70R16	200 (2.0, 29) *220 (2.2, 32)	220 (2.2, 32) *240 (2.4, 35)

*: Trailer towing



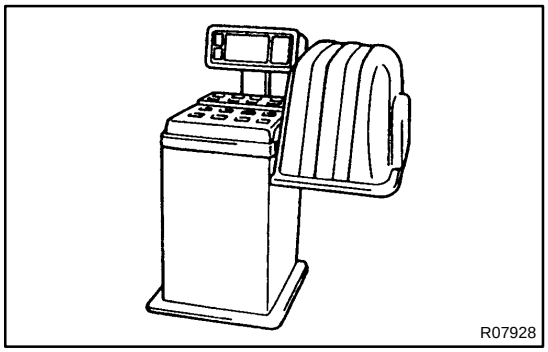
(b) Check the tire runout.
Tire runout: 3.0 mm (0.118 in.) or less



2. ROTATE TIRE

HINT:

- Rotate tires as shown in the illustration.
- Rotate as shown in (B) if the spare tire is included in the rotation.



3. INSPECT WHEEL BALANCE

(a) Check and adjust the Off-the car balance.
(b) If necessary, check and adjust the On-the car balance.
Imbalance after adjustment: 14.0 g (0.031 lb) or less

4. CHECK FRONT SUSPENSION FOR LOOSENESS

5. CHECK STEERING LINKAGE FOR LOOSENESS

6. CHECK BALL JOINT FOR LOOSENESS

7. CHECK SHOCK ABSORBER WORKS PROPERLY

- Check that oil leaks
- Check the mounting bushings for wear
- Bounce front and rear of the vehicle

TROUBLESHOOTING

SA140-09

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

(w/ Differential locking system):

- **Check that the transfer shift lever is shifted to the L position.**
- **When switching differential Free ↔ Lock, the indicator light will blink if the gears of the differential lock sleeve are not meshed. If this occurs, when the tires are rotated to apply differential power to the differential, the differential locks and the indicator light lights up.**

Symptom	Suspect Area	See page
Bottoming	1. Vehicle (Overloaded) 2. Spring (Weak) 3. Shock absorber (Worn)	- SA-65 SA-171 SA-62 SA-174
Sways/pitches	1. Tire (Worn or improperly inflated) 2. Stabilizer bar (Bent or broken) 3. Shock absorber (Worn)	SA-4 SA-80 SA-184 SA-62 SA-174
Front wheel shimmy	1. Tire (Worn or improperly inflated) 2. Wheel (Out of balance) 3. Shock absorber (Worn) 4. Wheel alignment (Incorrect) 5. Ball joint (Worn) 6. Hub bearing (Loosen or worn) 7. Steering linkage (Loosen or worn) 8. Steering gear (Out of adjustment or broken)	SA-4 SA-4 SA-62 SA-6 SA-71 SA-76 SA-11 - SR-48
Abnormal tire wear	1. Tire (Improperly inflated) 2. Wheel alignment (Incorrect) 3. Shock absorber (Worn) 4. Suspension parts (Worn)	SA-4 SA-6 SA-62 SA-174 -
Noise in front differential	1. Oil level (Low or wrong grade) 2. Excessive backlash between pinion and ring gear 3. Ring, pinion or side gears (Worn or chipped) 4. Pinion shaft bearing (Worn) 5. Side bearing (Worn)	SA-35 SA-40 SA-40 SA-40 SA-40
Oil leak from front differential	1. Oil level (Too high or wrong grade) 2. Front differential rear oil seal (Worn or damaged) 3. Side gear oil seal (Worn or damaged) 4. Companion flange (Loosen or damaged) 5. Side gear shaft (Damaged)	SA-35 SA-40 SA-40 SA-40 SA-40

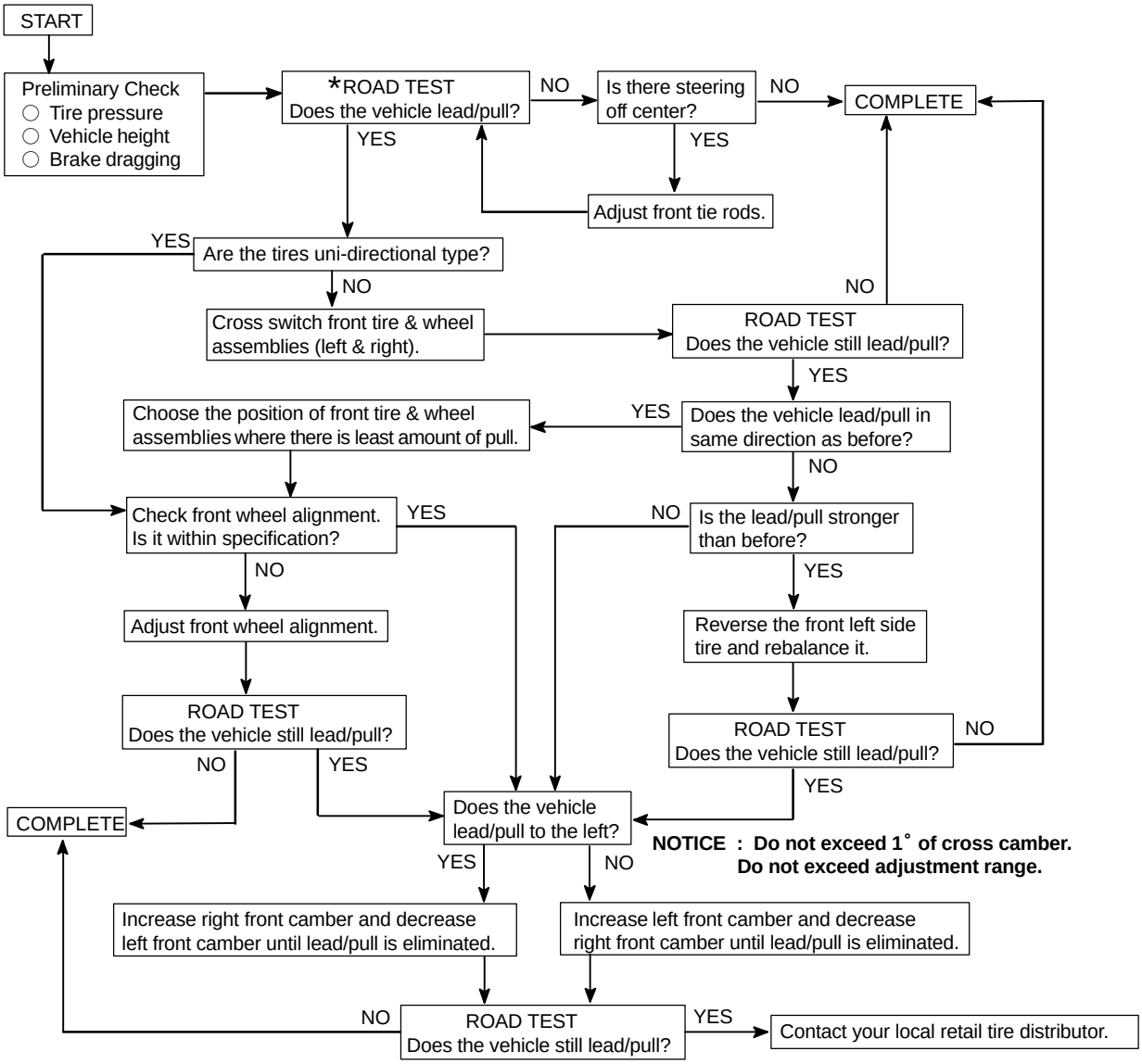
Noise in rear axle	1. Oil level (Low or wrong grade) 2. Excessive backlash between pinion and ring gear 3. Ring, pinion or side gears (Worn or chipped) 4. Pinion shaft bearing (Worn) 5. Axle shaft bearing (Worn)	SA-95 SA-102 SA-121 SA-143 SA-102 SA-121 SA-143 SA-102 SA-121 SA-143 SA-83
Oil leak from rear axle	1. Oil seal (Worn or damaged) 2. Rear axle housing (Cracked)	SA-83 -
Oil leak from rear differential	1. Oil level (Too high or wrong grade) 2. Rear differential front oil seal (Worn or damaged) 3. Companion flange (Loosen or damaged)	SA-95 SA-95 SA-102 SA-121 SA-143
Diff. lock Indicator lights do not light up	1. Fusible link (Blown) 2. GAUGE fuse (Blown) 3. Bulb (Burned out) 4. Wiring or ground (Faulty)	- - - -
Diff. lock Indicator lights do not light up (Diff. lock control switch RR position)	1. Diff. fuse (Blown) 2. Diff. lock control switch (Faulty) 3. Diff. lock ECU (Faulty) 4. Wiring or ground (Faulty)	- SA-163 SA-163 -
Differential lock does not operate	1. Diff. lock control switch (Faulty) 2. Diff. lock actuator (Faulty) 3. Diff. lock ECU (Faulty) 4. Differential carrier (Faulty) 5. Wiring or ground (Faulty)	SA-163 SA-163 SA-163 - -
After differential lock, lock is not released When vehicle speed is at 8 km/h (5 mph) or more	1. Speed sensor (Faulty) 2. Diff. lock ECU (Faulty) 3. Wiring or ground (Faulty)	SA-163 SA-163 -

SA28F-03

REPAIR PROCEDURES

HINT:

This is a flow chart for vehicle pull.



* Select a flat road where the vehicle can be driven in a straight line for 100 meters at a constant speed of 35mph. Please confirm safety and set the steering wheel to its straight position. Drive the vehicle in a straight line for 100 meters at a constant speed of 35mph without holding the steering wheel.

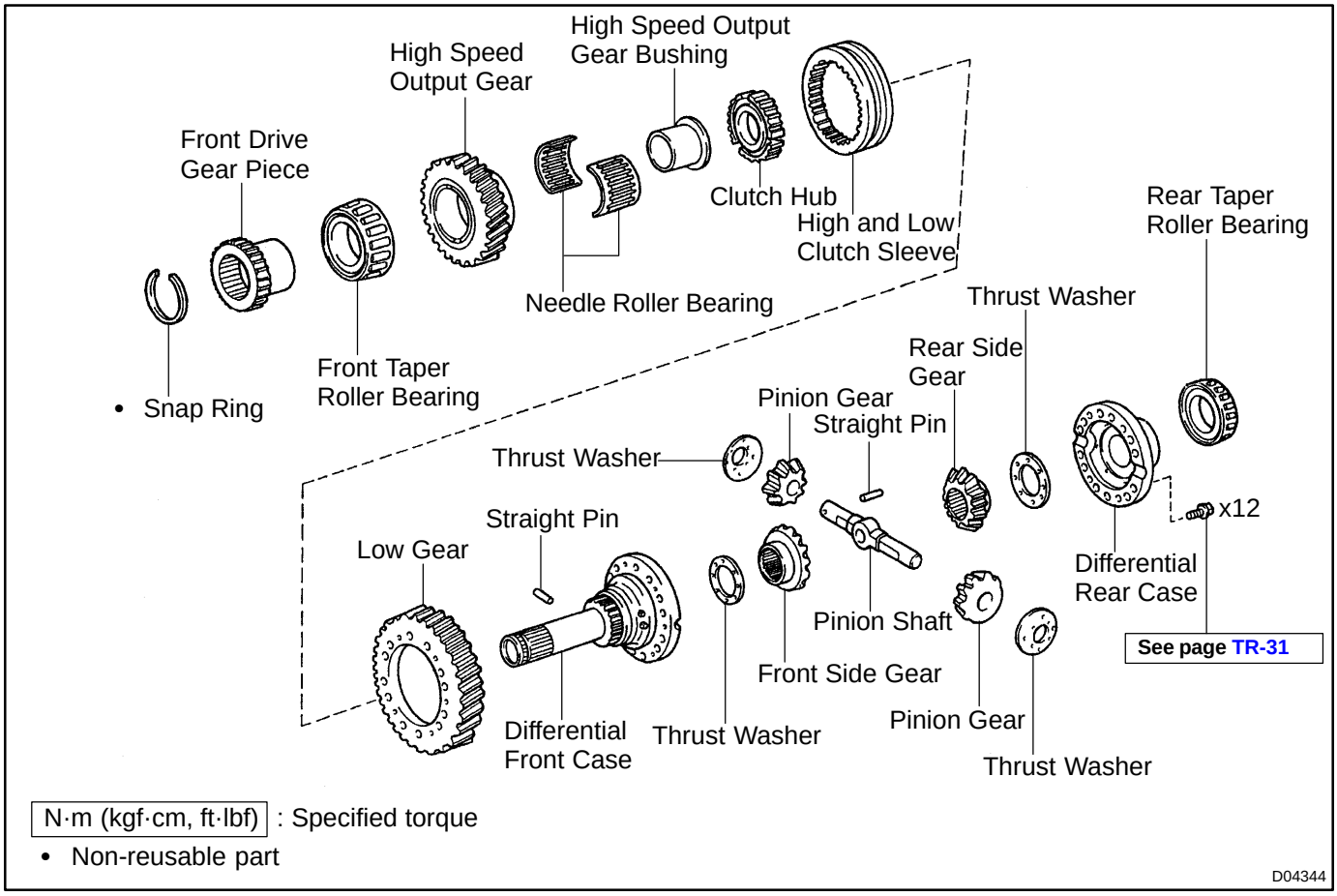
(1) The vehicle can keep straight but the steering wheel has some angle.
→ STEERING OFF CENTER (See page SR-10)

(2) The vehicle cannot keep straight.
→ STEERING PULL

CENTER DIFFERENTIAL

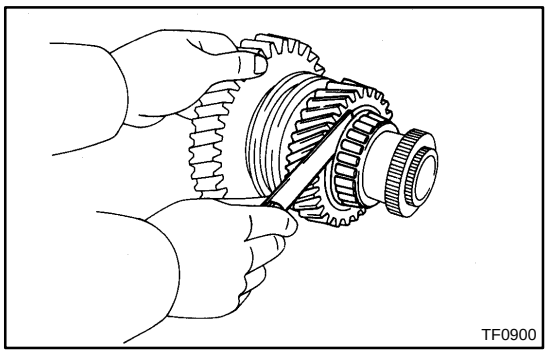
COMPONENTS

TR06J-02



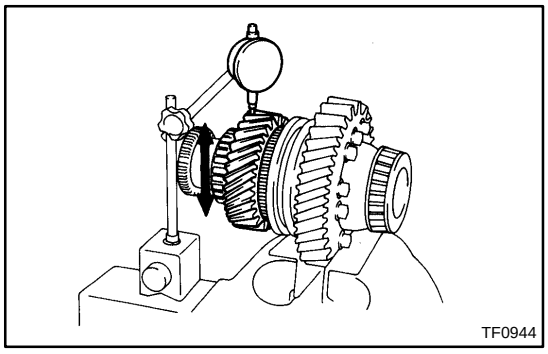
TR06K-02

DISASSEMBLY

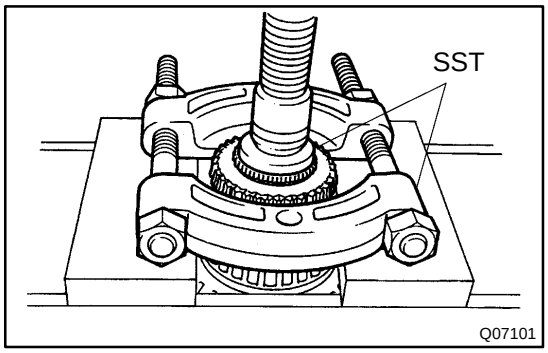

TF0900

1. INSPECT HIGH SPEED OUTPUT GEAR RADIAL AND THRUST CLEARANCE

(a) Using a feeler gauge, measure the high speed output gear thrust clearance.
Standard clearance:
0.10 - 0.25 mm (0.0039 - 0.0098 in.)
Maximum clearance:
0.25 mm (0.0098 in.)


TF0944

(b) Using a dial indicator, measure the high speed output gear radial clearance.
Standard clearance:
0.035 - 0.091 mm (0.00138 - 0.00358 in.)
Maximum clearance:
0.091 mm (0.00358 in.)



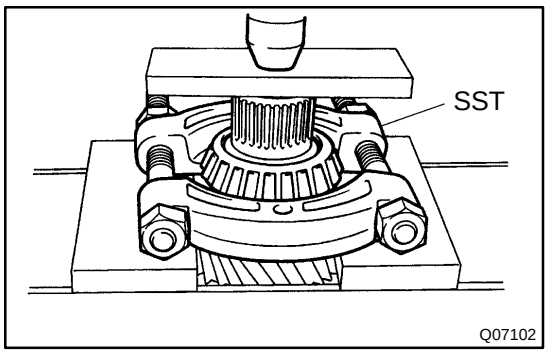
Q07101

2. REMOVE FRONT DRIVE GEAR PIECE

(a) Using a snap ring expander, remove the snap ring.

(b) Using SST and a press, remove the front drive gear piece.
SST 09950-00020, 09950-60010 (09951-00320)

NOTICE:
Be careful not to drop the center differential assembly.

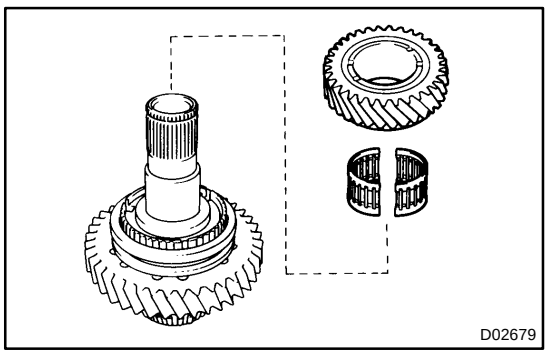


Q07102

3. REMOVE FRONT TAPER ROLLER BEARING

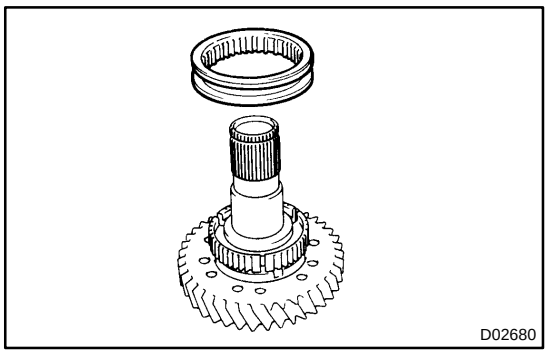
Using SST and a press, remove the front taper roller bearing.
SST 09950-00020

NOTICE:
Set the claw of SST to the bearing inner race securely.

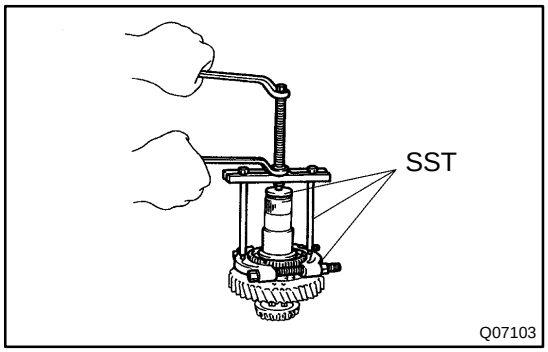

D02679

4. REMOVE HIGH SPEED OUTPUT GEAR

5. REMOVE 2 NEEDLE ROLLER BEARINGS



6. REMOVE HIGH AND LOW CLUTCH SLEEVE

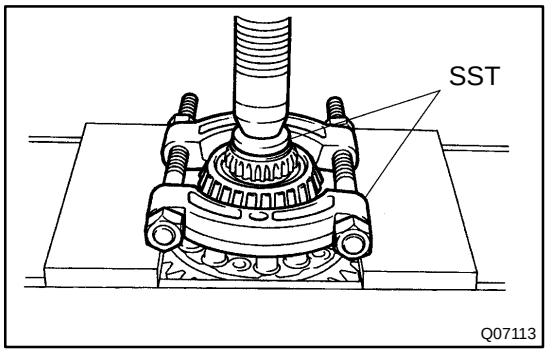


7. REMOVE HIGH SPEED OUTPUT GEAR BUSHING AND CLUTCH HUB

(a) Using SST, remove the high speed output gear bushing and clutch hub.

SST 09950- 00020, 09950- 00030, 09950- 60010 (09951-00320)

(b) Using a magnetic finger, remove the straight pin from the differential front case.



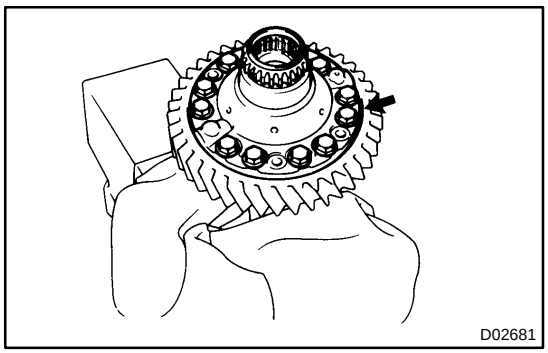
8. REMOVE REAR TAPER ROLLER BEARING

Using SST and a press, remove the rear taper roller bearing.

SST 09950-00020, 09950-60010 (09951-00320)

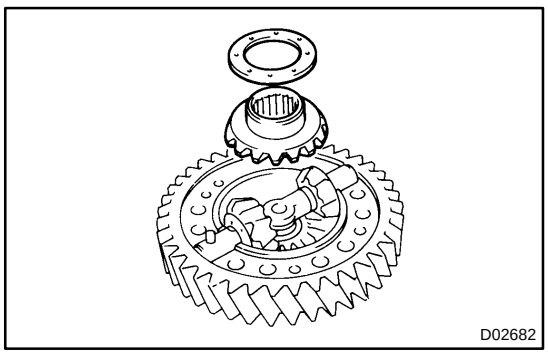
NOTICE:

Set the claw of SST to the bearing inner race securely.

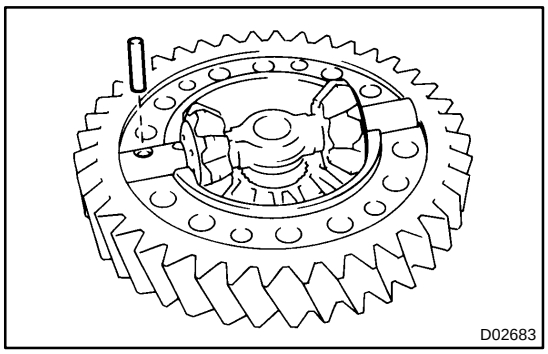


9. REMOVE DIFFERENTIAL REAR CASE

Remove the 12 bolts and differential rear case.

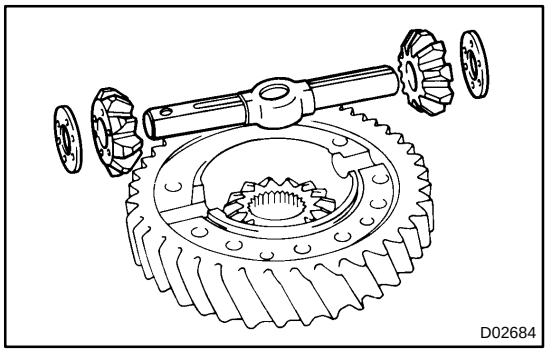


10. REMOVE THRUST WASHER AND REAR SIDE GEAR

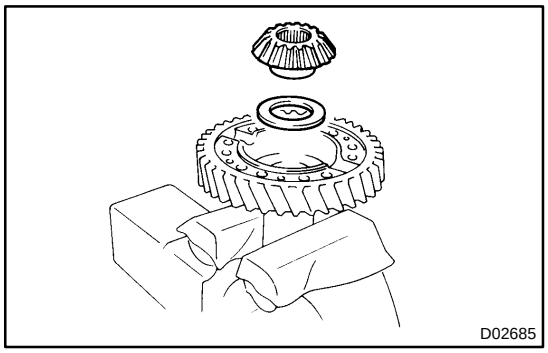

D02683

11. REMOVE PINION SHAFT, 2 PINION GEARS AND 2 THRUST WASHERS

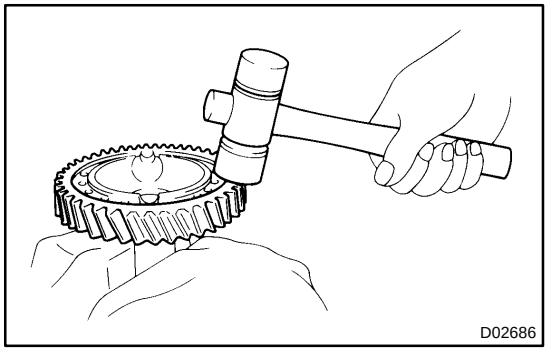
(a) Remove the straight pin from the pinion shaft.


D02684

(b) Remove the pinion shaft, 2 pinion gears and thrust washers.


D02685

(c) Remove the front side gear and thrust washer.


D02686

12. REMOVE LOW GEAR

Using a plastic hammer, tap and remove the low gear.

NOTICE:

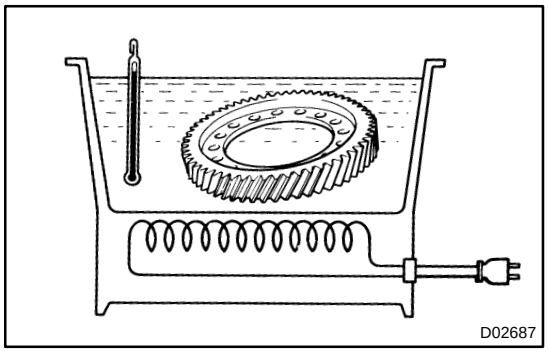
Be careful not to damage the low gear.

TR06L-02

REASSEMBLY

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.



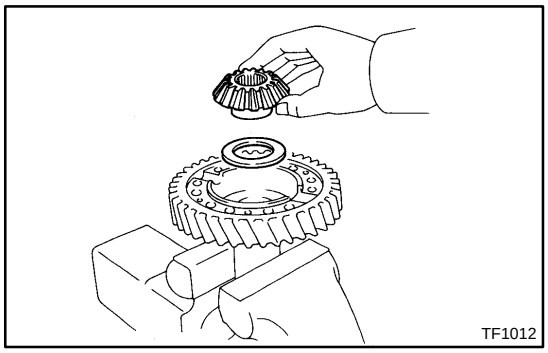
1. INSTALL LOW GEAR

(a) Clean the contact surface of the differential case.

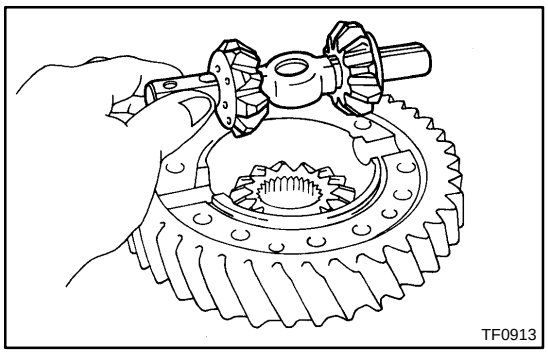
(b) Heat the low gear in boiling water.

(c) Carefully remove the low gear from the water.

(d) After the moisture on the low gear has completely evaporated, quickly install the low gear to the differential case.

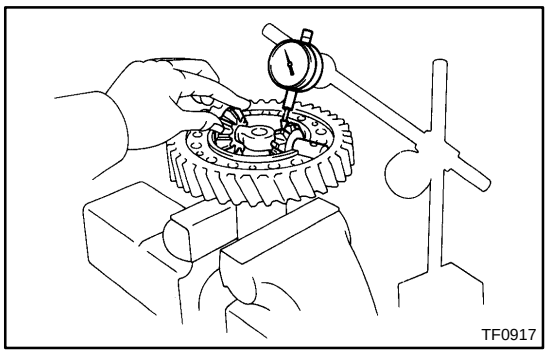


2. INSTALL THRUST WASHER AND FRONT SIDE GEAR



3. INSTALL PINION SHAFT, 2 PINION GEARS AND 2 THRUST WASHERS

(a) Install the pinion shaft, 2 pinion gears and thrust washers to the differential front case.


TF0917

(b) Using a dial indicator, measure the front case backlash.
HINT:
Push the pinion shaft.

Maximum backlash: 0.05 mm (0.0020 in.)

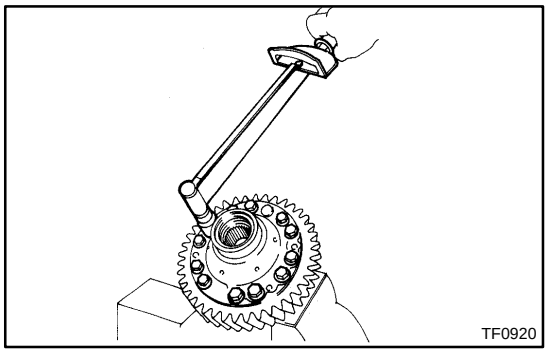
If the backlash is not within the specification, replace the thrust washer with one of the correct size and reinstall the thrust washer.

Thickness mm (in.)	Thickness mm (in.)
1.70 (0.0669)	2.45 (0.0965)
1.85 (0.0728)	2.60 (0.1024)
2.00 (0.0787)	2.75 (0.1083)
2.15 (0.0846)	2.90 (0.1142)
2.30 (0.0906)	3.05 (0.1201)

(c) In the same way, measure the rear case backlash.

4. INSTALL STRAIGHT PIN TO PINION SHAFT

5. INSTALL REAR SIDE GEAR AND THRUST WASHER


TF0920

6. INSTALL DIFFERENTIAL REAR CASE

(a) Install the differential rear case and 12 set bolts.

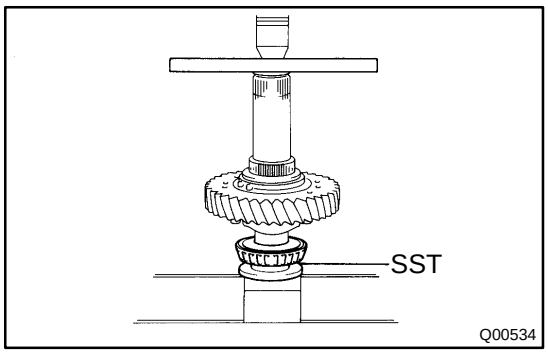
Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

(b) Turn the pinion gear.

(c) Loosen the 12 rear case set bolts.

(d) Torque the 12 rear case set bolts.

Torque: 98 N·m (1,000 kgf·cm, 72 ft·lbf)

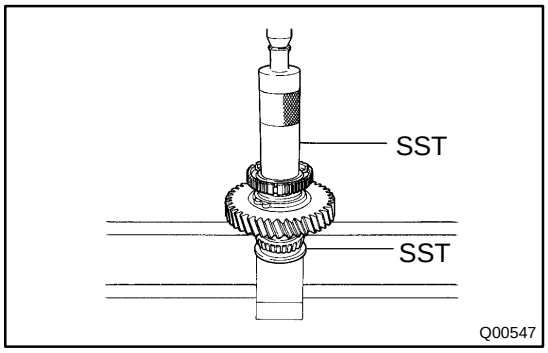


Q00534

7. INSTALL REAR TAPER ROLLER BEARING

Using SST and a press, install the rear taper roller bearing.

SST 09316-12010

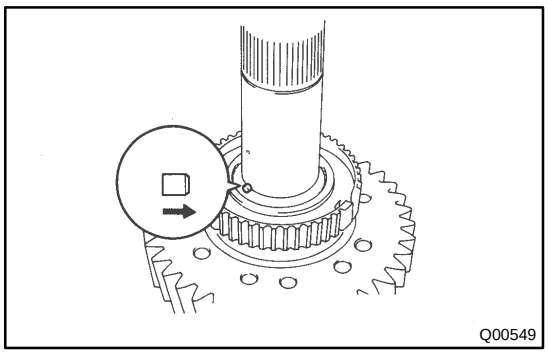


Q00547

8. INSTALL CLUTCH HUB

Using SST and a press, install the clutch hub.

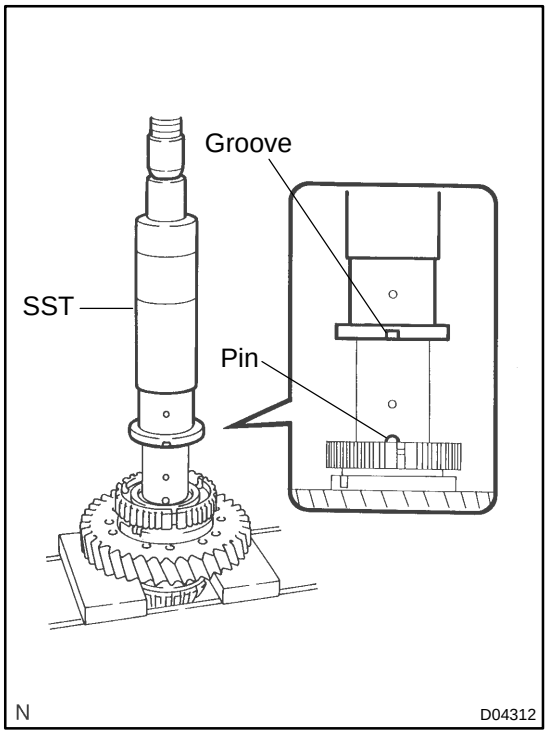
SST 09316-12010, 09316-60011 (09316-00011)



9. INSTALL HIGH SPEED OUTPUT GEAR BUSHING

(a) Apply MP grease to the straight pin.

(b) Install the straight pin, as shown.

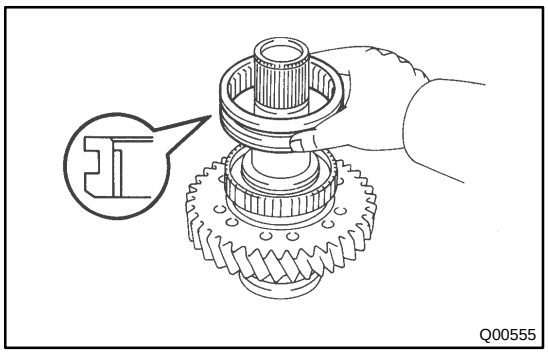


(c) Using SST and a press, install the high speed output gear bushing.

SST 09316-12010, 09316-60011 (09316-00011)

NOTICE:

Before pressing on the differential front case, align the groove on the bushing with the pin on the shaft.



10. INSTALL HIGH AND LOW CLUTCH SLEEVE

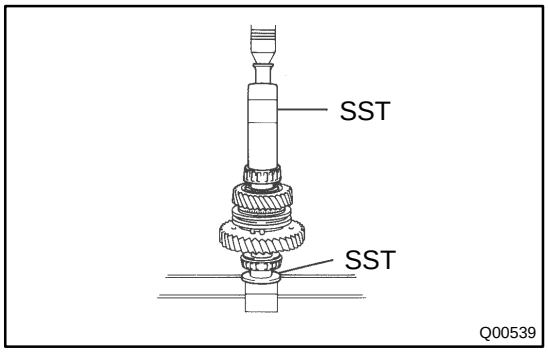
HINT:

Make sure to install the high and low clutch sleeve in the correct direction.

11. INSTALL NEEDLE ROLLER BEARING AND HIGH SPEED OUTPUT GEAR

(a) Apply gear oil to the needle roller bearing.

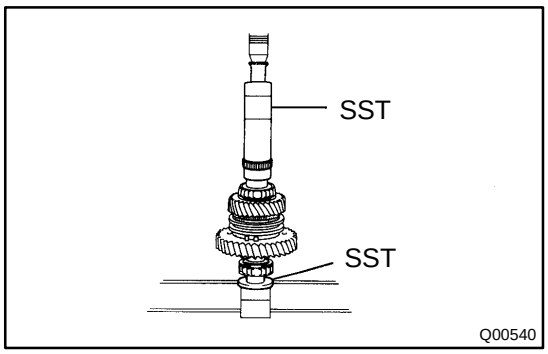
(b) Install the needle roller bearing and high speed output gear.



12. INSTALL FRONT TAPER ROLLER BEARING

Using SST and a press, install the front taper roller bearing.

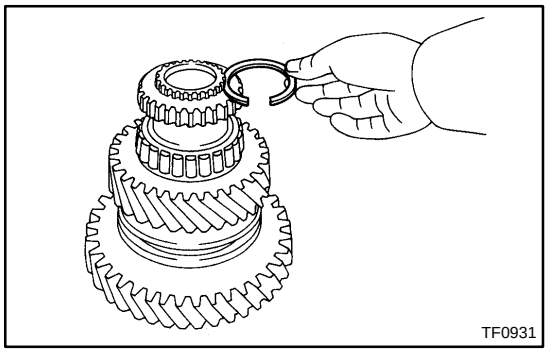
SST 09316-12010, 09316-60011 (09316-00011)



13. INSTALL FRONT DRIVE GEAR PIECE

Using SST and a press, install the front drive gear piece.

SST 09316-12010, 09316-60011 (09316-00011)



14. INSTALL SNAP RING

(a) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.00 (0.0787)	G	2.60 (0.1024)
B	2.10 (0.0827)	H	2.70 (0.1063)
C	2.20 (0.0866)	J	2.80 (0.1102)
D	2.30 (0.0906)	K	1.80 (0.0709)
E	2.40 (0.0945)	L	1.90 (0.0748)
F	2.50 (0.0984)	-	-

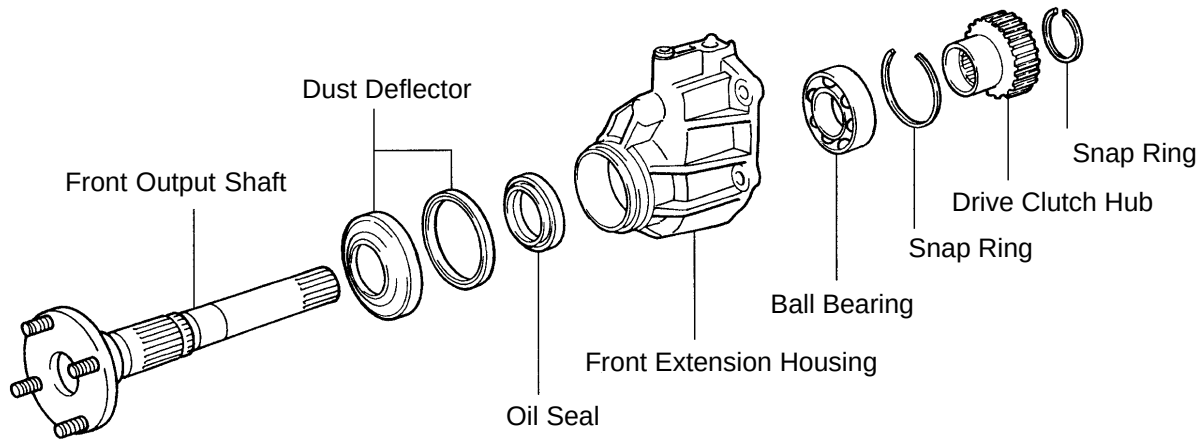
(b) Using a snap ring expander, install a new snap ring.

15. INSPECT HIGH SPEED OUTPUT GEAR RADIAL AND THRUST CLEARANCE (See page TR-28)

FRONT EXTENSION HOUSING

TR06M-02

COMPONENTS

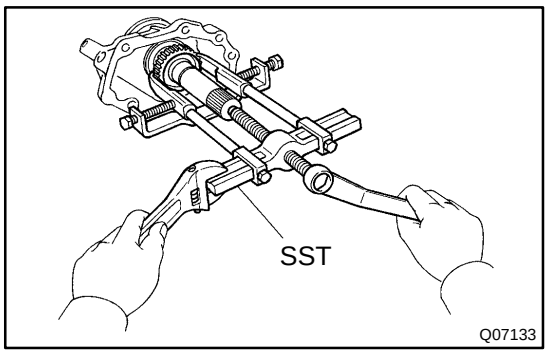


Non-reusable part

Z18836

TR06N-03

DISASSEMBLY

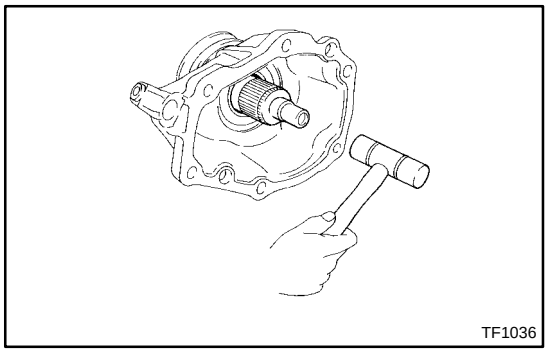


1. REMOVE DRIVE CLUTCH HUB

(a) Using a snap ring expander, remove the snap ring.

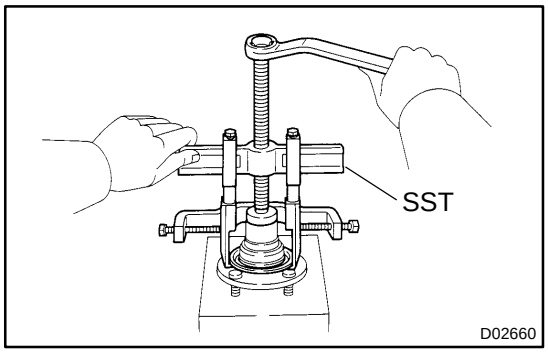
(b) Using SST, remove the drive clutch hub.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04030, 09954- 04020, 09955- 04021, 09957-04010, 09958-04011)



2. REMOVE FRONT OUTPUT SHAFT

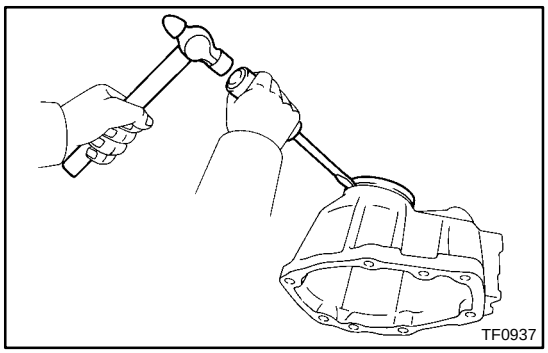
Using a plastic hammer, drive out the front output shaft.



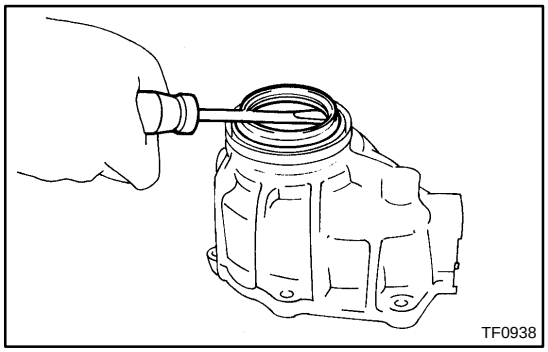
3. REMOVE DUST DEFLECTOR

(a) Using SST, remove the dust deflector.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04030, 09954- 04010, 09955- 04051, 09957-04010, 09958-04011)

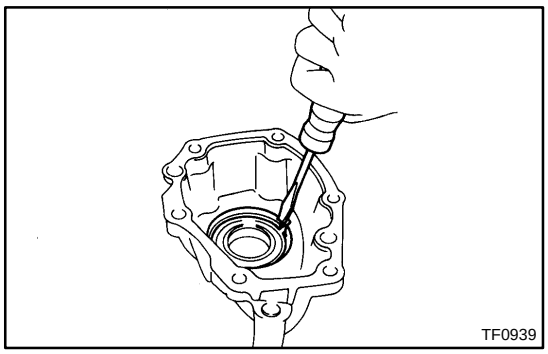


(b) Using a screwdriver and hammer, tap the dust deflector and remove it from the extension housing.



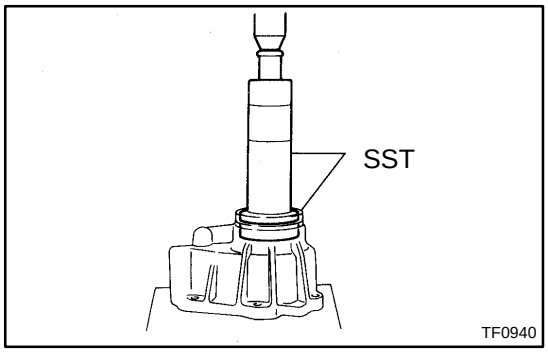
4. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal from the front extension housing.



5. REMOVE BALL BEARING

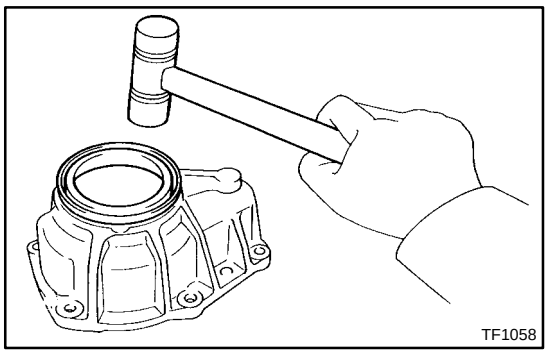
(a) Using a screwdriver, remove the snap ring.



(b) Using SST and a press, remove the ball bearing.
SST 09316-6001 1 (09316-00011, 09316-00071)

TR06O-02

REASSEMBLY

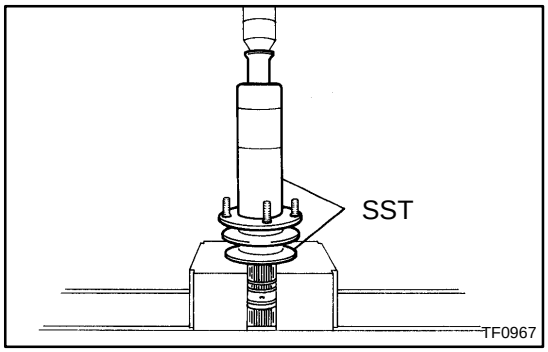

TF1058

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL DUST DEFLECTOR

(a) Using a plastic hammer, install a new dust deflector to the front extension housing.

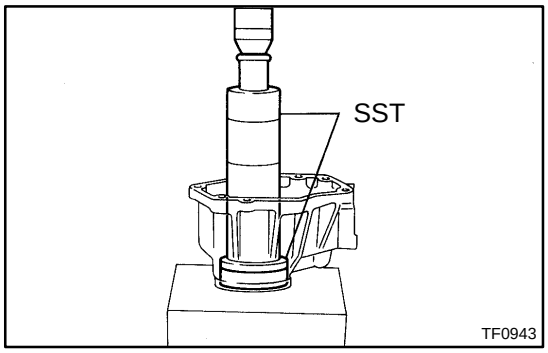


TF0967

(b) Using SST and a press, install a new dust deflector to the front output shaft.

SST 09316-2001 1, 09316-60011 (09316-00011)

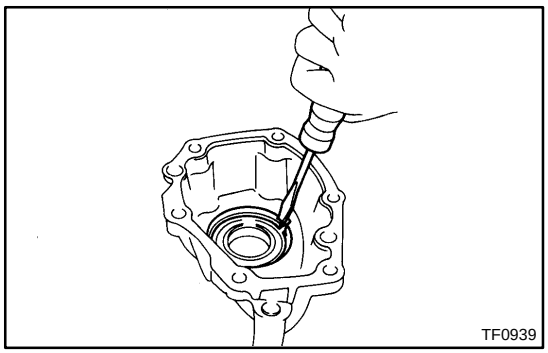
2. INSTALL BALL BEARING



TF0943

(a) Using SST and a press, install the ball bearing to the front extension housing.

SST 09316-6001 1 (09316-00011, 09316-00031)

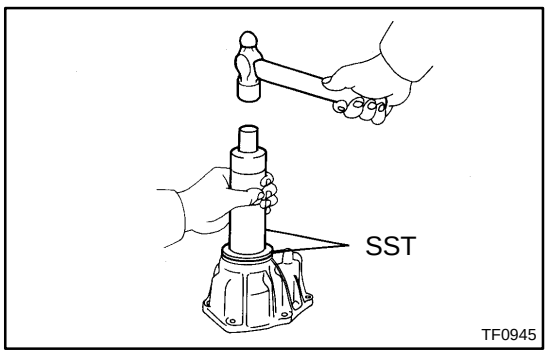

TF0939

(b) Select a snap ring that will allow the minimum axial play.

Mark	Thickness mm (in.)
A	1.70 (0.0669)
B	1.80 (0.0709)

(c) Using a screwdriver, install a new snap ring.

3. INSTALL OIL SEAL

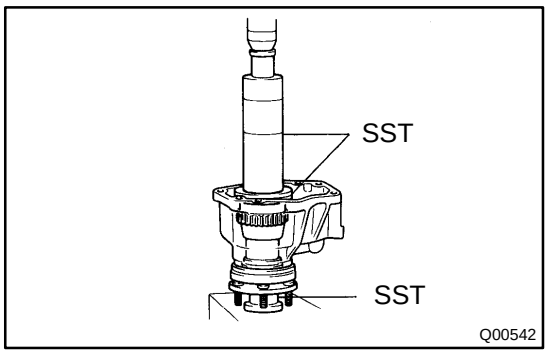


TF0945

(a) Apply MP grease to the lip of a new oil seal.

(b) Using SST and a hammer, drive in a new oil seal to the front extension housing.

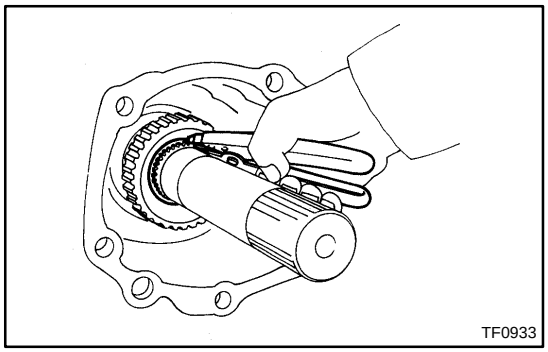
SST 09316-6001 1 (09316-00011, 09316-00061)



4. INSTALL FRONT OUTPUT SHAFT AND DRIVE CLUTCH HUB

(a) Using SST and a press, install the front output shaft and drive clutch hub.

SST 09316-2001 1, 09316-60011 (09316-00011, 09316-00041, 09316-00071)



(b) Select a snap ring that will allow the minimum axial play.

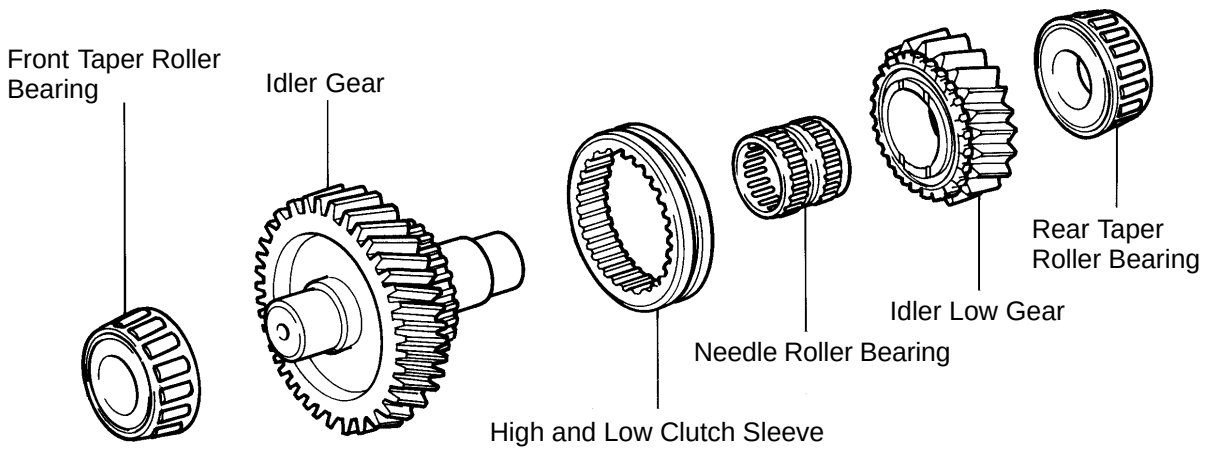
Mark	Thickness mm (in.)
A	1.80 (0.0709)
B	1.90 (0.0748)
C	2.00 (0.0787)
D	2.10 (0.0827)
E	2.20 (0.0866)

(c) Using a snap ring expander, install a new snap ring.

IDLER GEAR

COMPONENTS

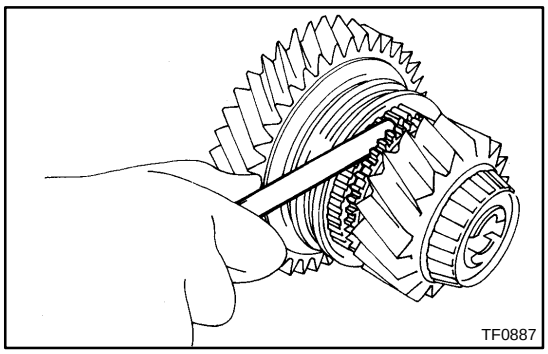
TR06F-02



Z15264

TR06G-03

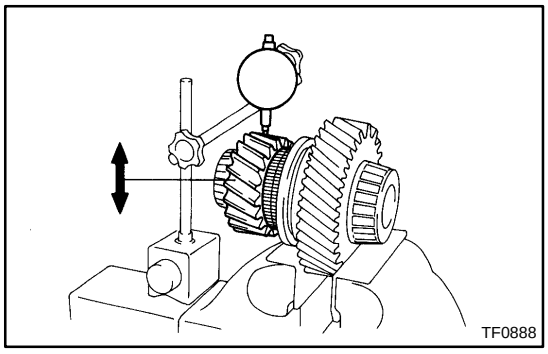
DISASSEMBLY



1. INSPECT IDLER LOW GEAR RADIAL AND THRUST CLEARANCE

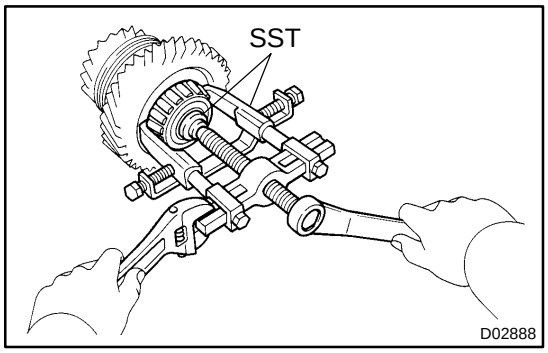
(a) Using a feeler gauge, measure the idler low gear thrust clearance.

Standard clearance:
0.125 - 0.275 mm (0.00492 - 0.01083 in.)
Maximum clearance:
0.275 mm (0.01083 in.)



(b) Using a dial indicator, measure the idler low gear radial clearance.

Standard clearance:
0.015 - 0.068 mm (0.00059 - 0.00268 in.)
Maximum clearance:
0.068 mm (0.00268 in.)

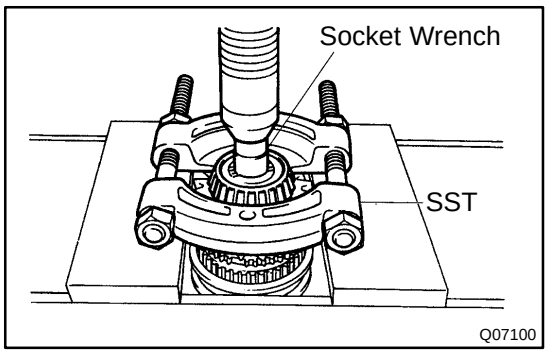


2. REMOVE FRONT TAPER ROLLER BEARING

Using SST, remove the front taper roller bearing.

SST 09950- 40011 (09951- 04010, 09952- 04010, 09953- 04030, 09954- 04010, 09955- 04061, 09957- 04010, 09958- 04011), 09950- 60010 (09951-00330)

NOTICE:
Set the claw of SST to the bearing inner race securely.

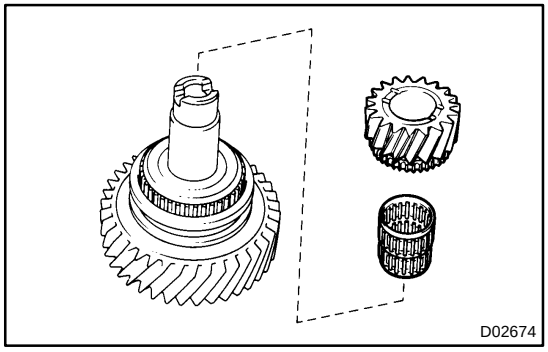


3. REMOVE REAR TAPER ROLLER BEARING

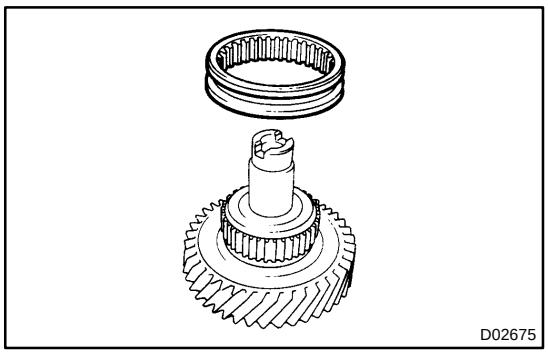
Using SST, a press and socket wrench, remove the rear taper roller bearing.

SST 09950-00020

NOTICE:
Set the claw of SST to the bearing inner race securely.

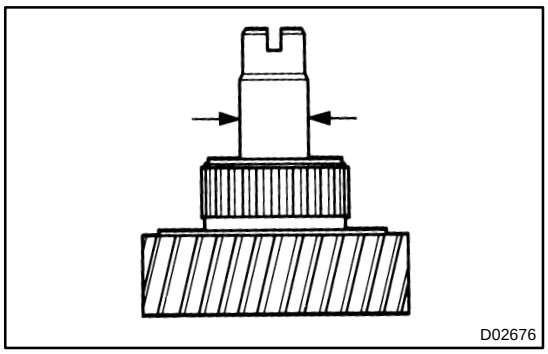


4. REMOVE IDLER LOW GEAR AND NEEDLE ROLLER BEARING FROM IDLER GEAR



5. REMOVE HIGH AND LOW CLUTCH SLEEVE FROM IDLER GEAR

TR06H-02

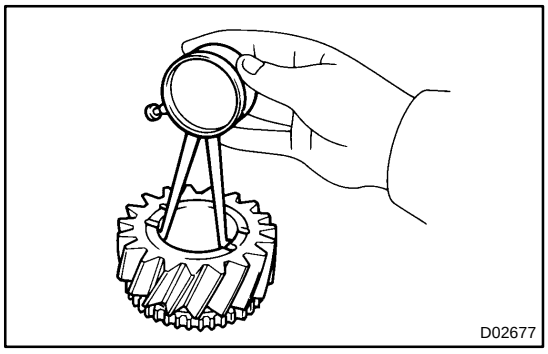


INSPECTION

1. INSPECT IDLER GEAR

Using a micrometer, measure the idler gear diameter.

Standard diameter:
38.48 - 38.50 mm (1.5149 - 1.5157 in.)
Maximum diameter:
38.50 mm (1.5157 in.)



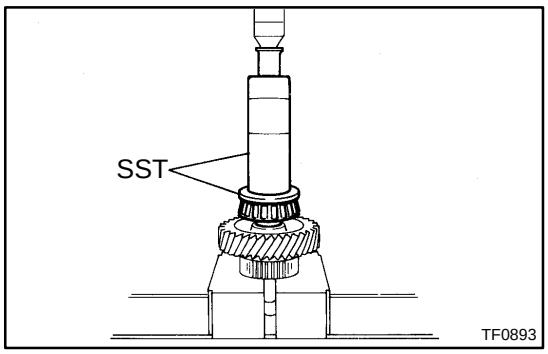
2. INSPECT IDLER LOW GEAR

Using a cylinder gauge, measure the idler low gear diameter.

Standard diameter:
45.52 - 45.54 mm (1.7922 - 1.7930 in.)
Maximum diameter:
45.54 mm (1.7930 in.)

TR06I-02

REASSEMBLY



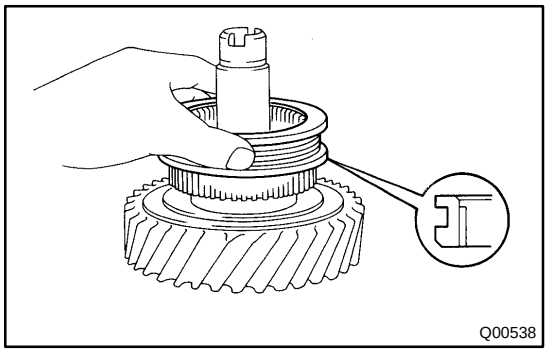
HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL FRONT TAPER ROLLER BEARING

Using SST and a press, install the front taper roller bearing.

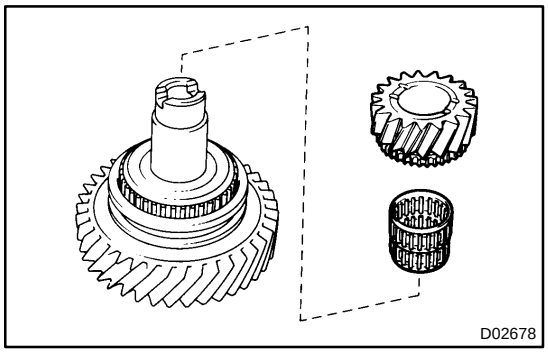
SST 09316-6001 1 (09316-00011, 09316-00031)



2. INSTALL HIGH AND LOW CLUTCH SLEEVE

HINT:

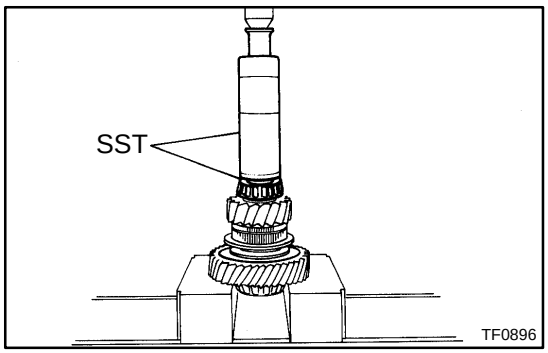
Make sure to install the high and low clutch sleeve in the correct direction.



3. INSTALL NEEDLE ROLLER BEARING AND IDLER LOW GEAR TO IDLER GEAR

(a) Apply gear oil to the needle roller bearing.

(b) Install the needle roller bearing and idler low gear.



4. INSTALL REAR TAPER ROLLER BEARING

Using SST and a press, install the rear taper roller bearing.

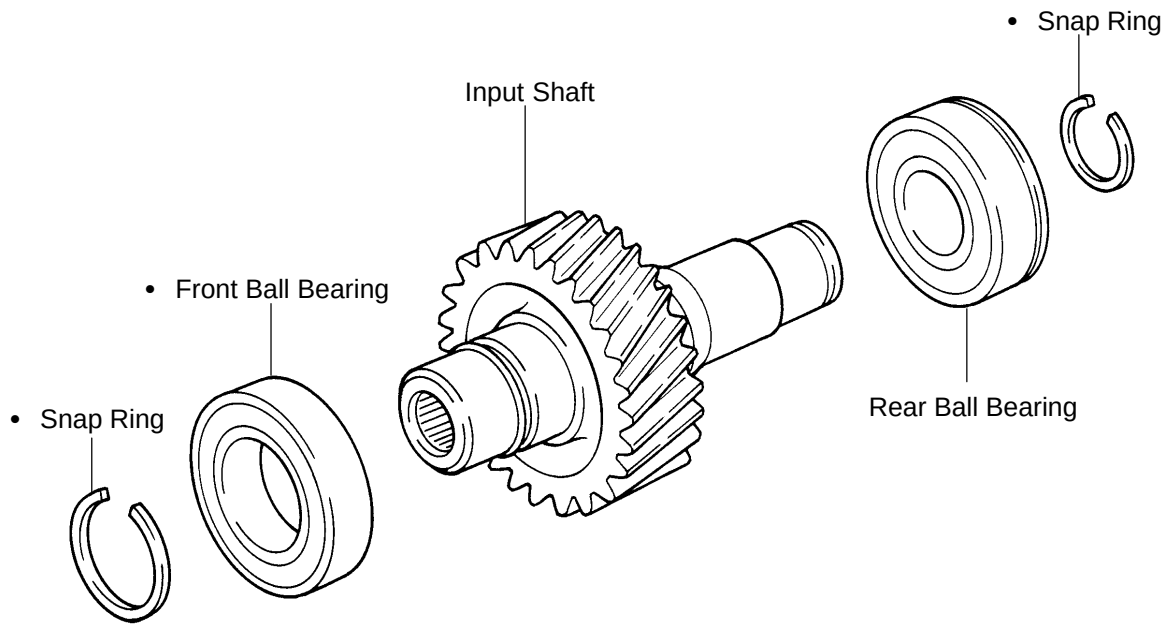
SST 09316-6001 1 (09316-00011, 09316-00071)

5. INSPECT IDLER LOW GEAR RADIAL AND THRUST CLEARANCE (See page TR-25)

INPUT SHAFT

COMPONENTS

TR06C-02

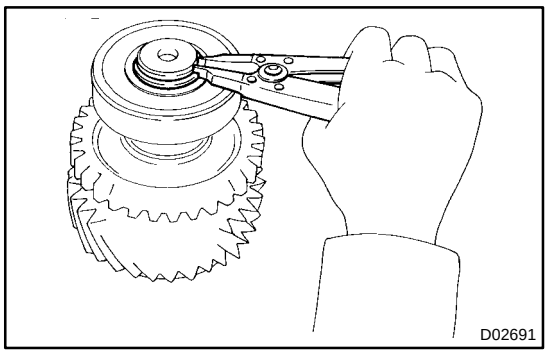


• Non-reusable part

D02654

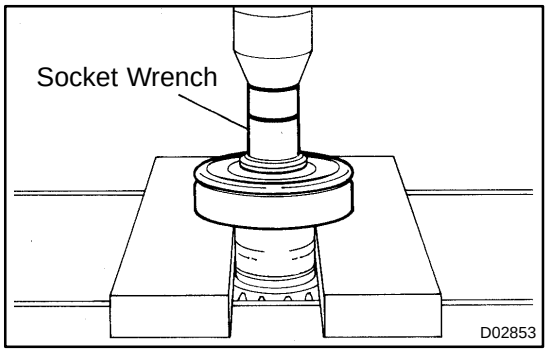
TR06D-03

DISASSEMBLY

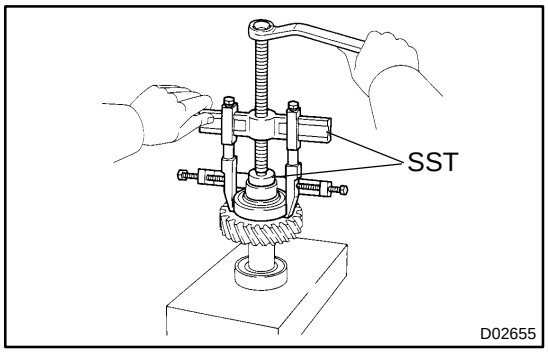


1. REMOVE REAR BALL BEARING

(a) Using a snap ring expander, remove the snap ring.



(b) Using a socket wrench and press, remove the rear ball bearing.



2. REMOVE FRONT BALL BEARING

(a) Using a snap ring expander, remove the snap ring.

(b) Using SST, remove the front ball bearing.

SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04030, 09954- 04010, 09955- 04011, 09957- 04010, 09958- 04011), 09950- 60010 (09951-00400)

TR06E-02

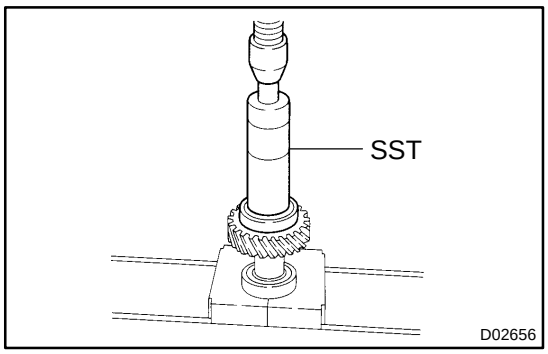
REASSEMBLY

HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL FRONT BALL BEARING

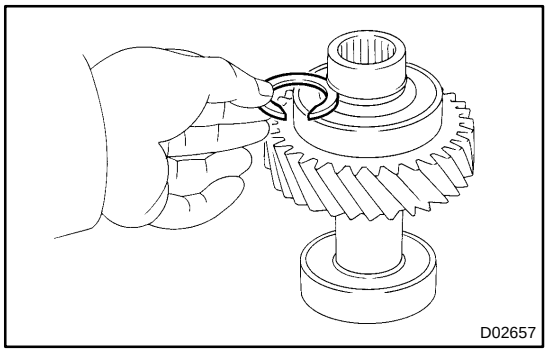
(a) Using SST and a press, install a new front ball bearing.
SST 09316-6001 1 (09316-00011)



(b) Select a snap ring that will allow the minimum axial play.

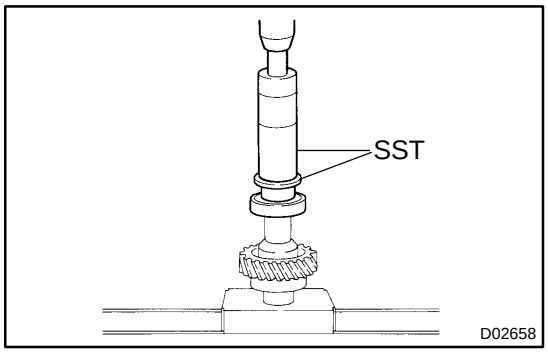
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
A	2.90 (0.1141)	D	3.05 (0.1201)
B	2.95 (0.1161)	E	3.10 (0.1220)
C	3.00 (0.1181)	F	3.15 (0.1240)

(c) Using a snap ring expander, install a new snap ring.



2. INSTALL REAR BALL BEARING

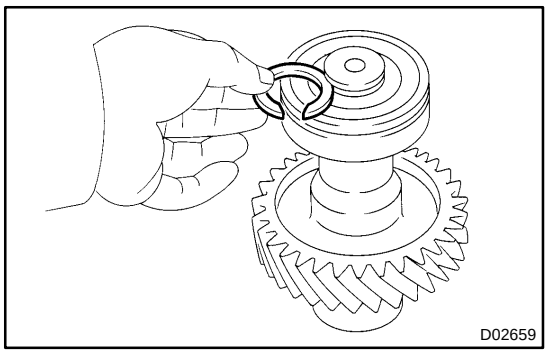
(a) Using SST and a press, install the rear ball bearing.
SST 09316-6001 1 (09316-00011, 09316-00031)



(b) Select a snap ring that will allow the minimum axial play.

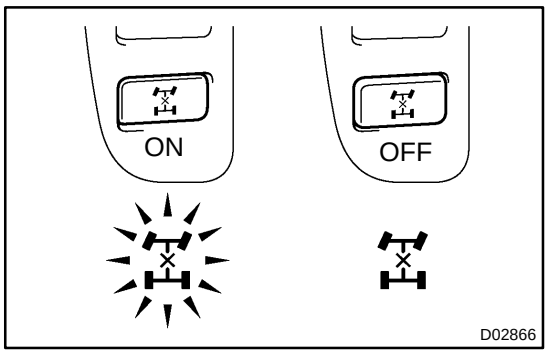
Mark	Thickness mm (in.)
A	2.00 (0.0787)
B	2.10 (0.0827)
C	2.20 (0.0866)
D	2.30 (0.0906)
E	2.40 (0.0945)

(c) Using a snap ring expander, install a new snap ring.



TR06V-02

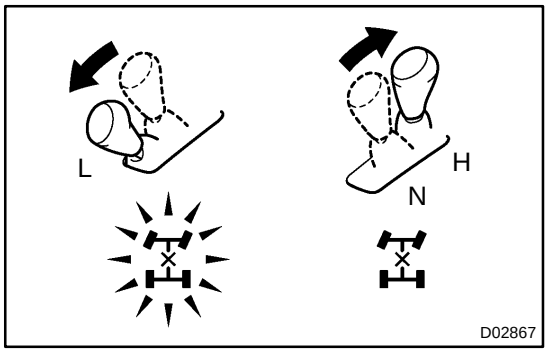
INSPECTION



1. INSPECT SWITCH POSITION

(a) Start the engine, and shift the transfer shift lever to the ”H” position.

(b) Check that the center diff. indicator light comes on when the the switch is in ”ON” position. Check that the light goes off when the switch is in ”OFF” position.

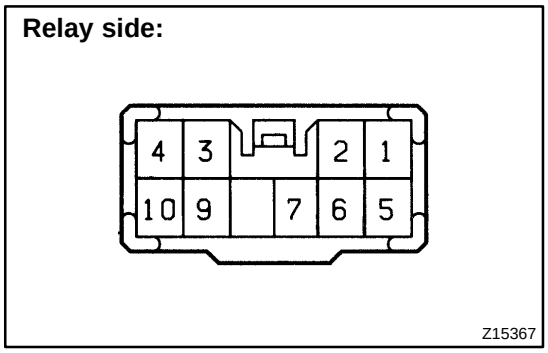


2. INSPECT SHIFT LEVER POSITION

(a) Start the engine, and turn the center diff. lock switch to OFF.

(b) Check that the center diff. indicator light comes on when the transfer shift lever is shifted to the ”L” position. Check that the light goes off when the lever is shifted to the ”N” or ”H” position.

Relay side:



3. INSPECT CENTER DIFF. LOCK CONTROL RELAY

(a) Check that continuity exists between each terminal, as shown in the chart.

Tester connected terminal number	Specified condition
1 - 2	Continuity
2 - 4	Continuity
6 - 7	*

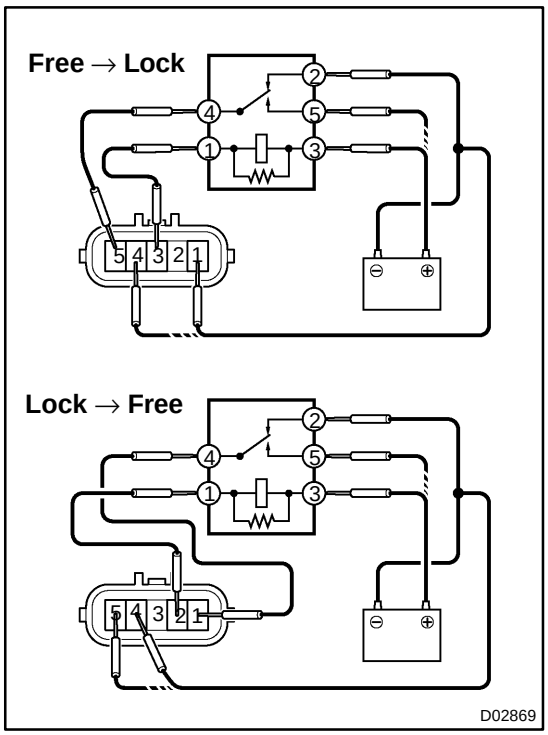
*: There is a diode between the terminals 6 and 7.

If no continuity exists, check that continuity exists when changing the position of ⊕ probe for the position of negative ⊖ probe of tester.

(b) Apply battery positive voltage between each terminal and check that continuity exists between each terminal, as shown in the chart.

Battery voltage applied terminal	Tester connected terminal number	Specified condition
6 (+) - 5 (-)	1 - 3 1 - 2	Continuity No continuity
7 (+) - 2 (-)	9 - 10	No continuity
9 (+) - 10 (-)	3 - 4 2 - 4	Continuity No continuity

If continuity is not as specified, replace the relay.



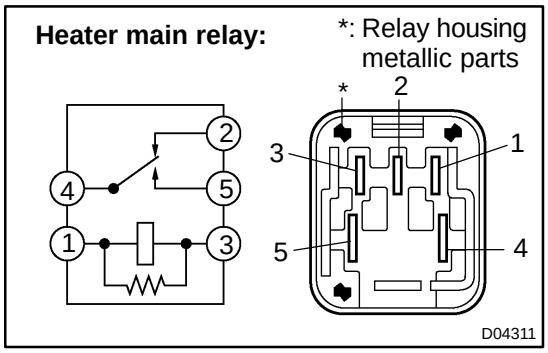
4. INSPECT ACTUATOR OPERATION

(a) Raise up the front wheels, place the stopper under the rear wheels to block them, and pull up the parking brake.

(b) Disconnect the connector of the actuator and connect it to the relay using wire.

(c) Check that the front propeller shaft can be rotated by hand.

Inspection Item	Standard
Center Diff. Free → Lock	Front propeller shaft cannot be rotated.
Center Diff. Lock → Free	Front propeller shaft can be rotated.

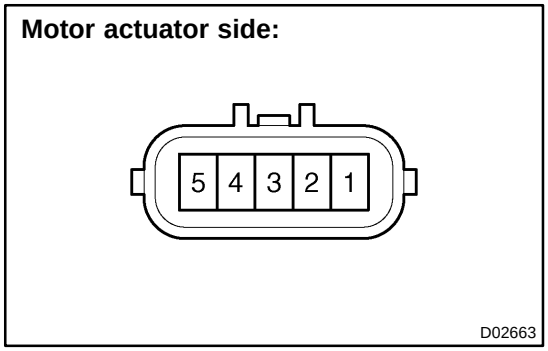


HINT:

When inspecting the operation described above, use a heater main relay.

NOTICE:

Connect the terminals being careful not to touch the neighboring terminals or metallic parts of relay housing.



5. INSPECT MOTOR ACTUATOR (MOTOR)

(a) Remove the motor actuator (See page TR-8).

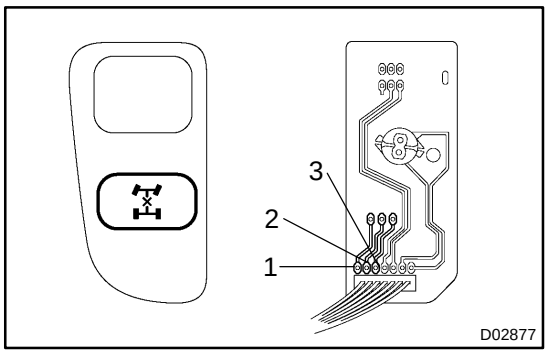
(b) Measure the resistance between the terminals 1 and 5.

Standard resistance: 0.3 - 100 Ω

(c) Measure the resistance between the terminals 1 or 5 and body ground.

Standard resistance: More than 0.5 MΩ

If the resistance value is not as specified, replace the motor actuator.

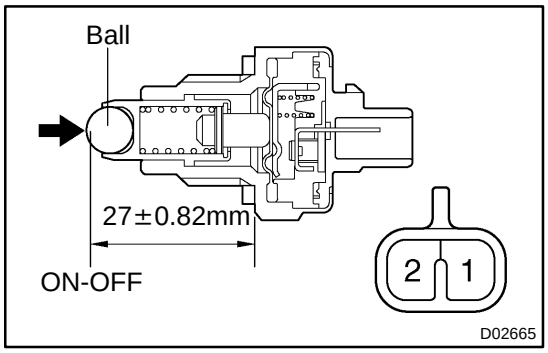


6. INSPECT CENTER DIFF. LOCK SWITCH CONTINUITY

(a) Remove the center diff. lock switch (See page AC-102).

(b) Inspect the continuity between each terminal.

Center diff. lock switch condition	Tester connected terminal number	Specified condition
ON	1 - 2 1 - 3 2 - 3	No continuity No continuity Continuity
OFF	1 - 2 1 - 3 2 - 3	Continuity No continuity No continuity



7. INSPECT TRANSFER INDICATOR SWITCH CONTINUITY

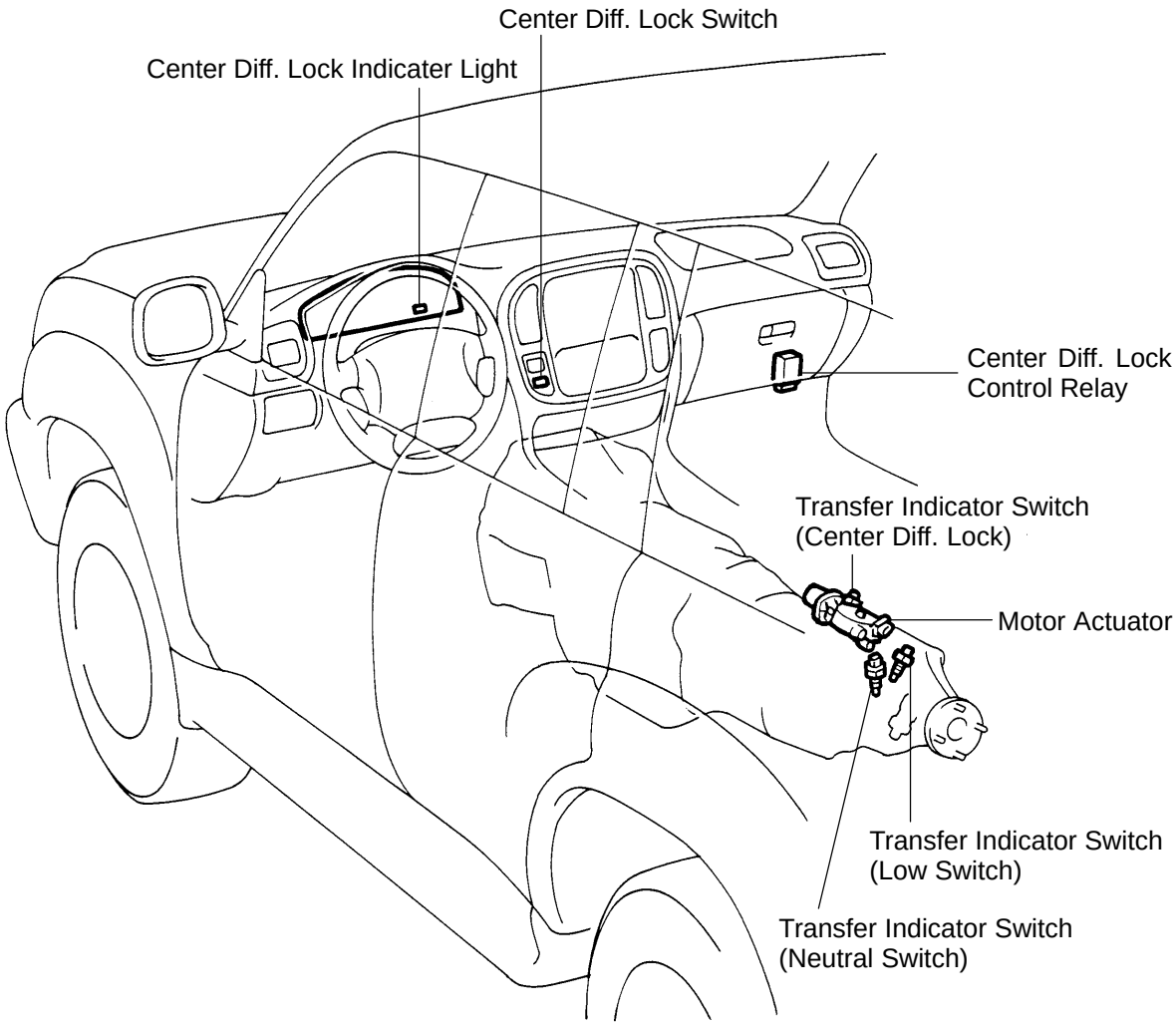
(a) Remove the 3 transfer indicator switches (See page TR-8).

(b) Check that continuity exists between terminals 1 and 2 when pushing the ball at the tip of the switch.

MOTOR SHIFT CONTROL SYSTEM

TR06U-02

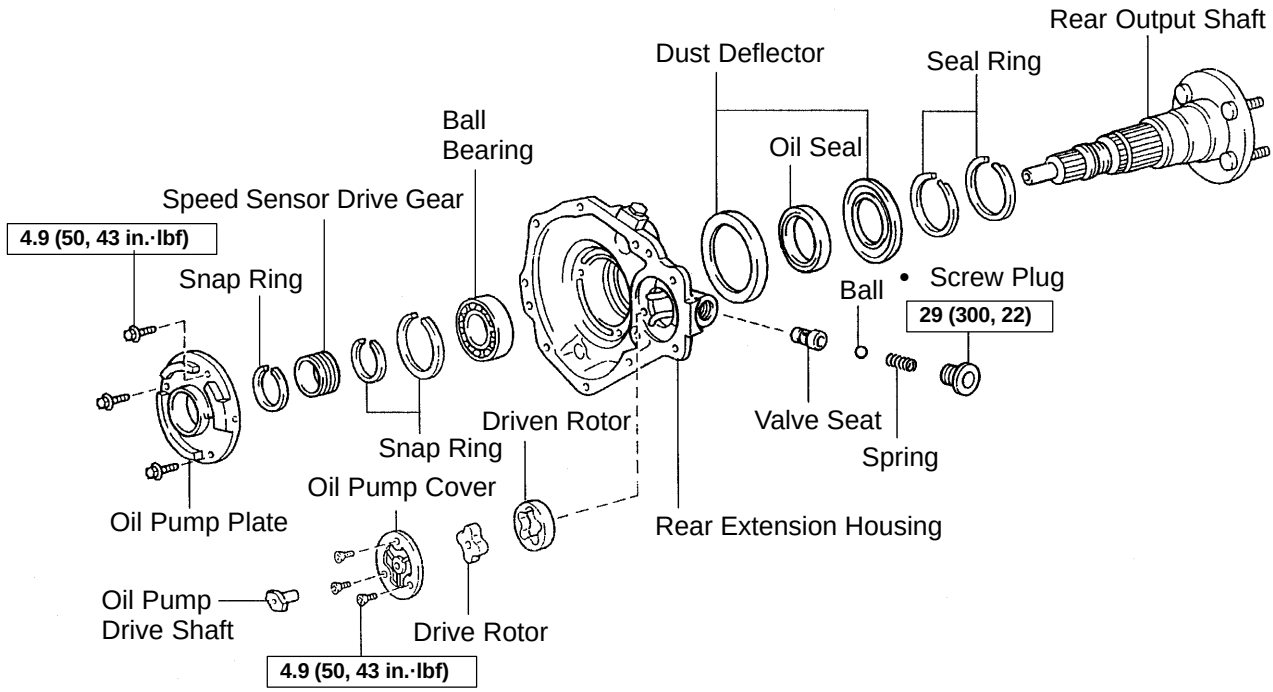
LOCATION



REAR EXTENSION HOUSING

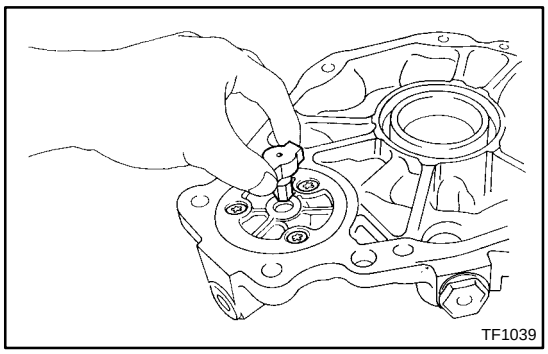
COMPONENTS

TR06P-02

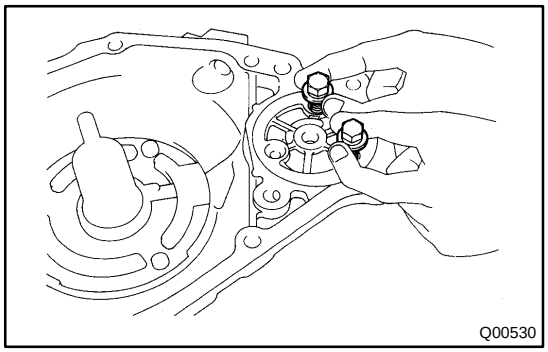


TR06Q-02

DISASSEMBLY

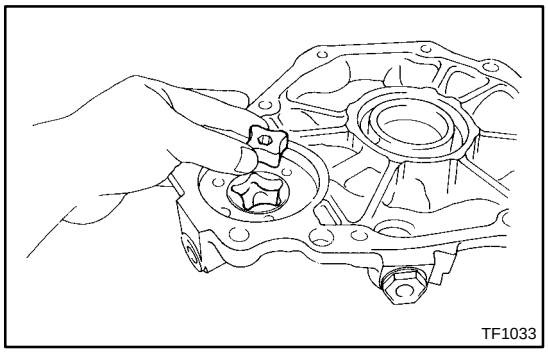

TF1039

1. REMOVE OIL PUMP DRIVE SHAFT

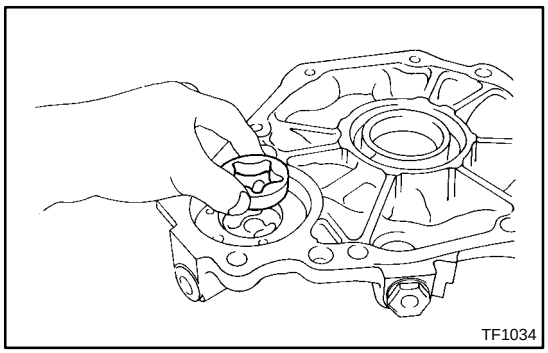

Q00530

2. REMOVE OIL PUMP COVER

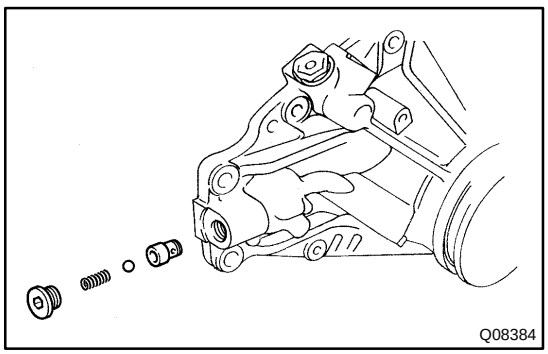
(a) Using a torx socket wrench (T30), remove the 3 screws.
(b) Install the 2 suitable bolts to the pump cover.
(c) Remove the pump cover from the rear extension housing.


TF1033

3. REMOVE DRIVE ROTOR FROM DRIVEN ROTOR

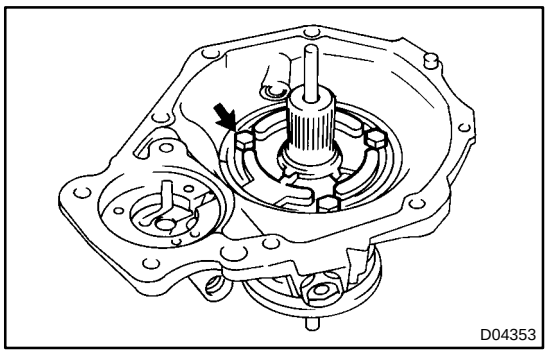

TF1034

4. REMOVE DRIVEN ROTOR FROM REAR EXTENSION HOUSING


Q08384

5. REMOVE SCREW PLUG, SPRING, BALL AND VALVE SEAT

(a) Using a hexagon wrench, remove the screw plug.
(b) Using a magnetic finger, remove the spring, ball and valve seat from the rear extension housing.



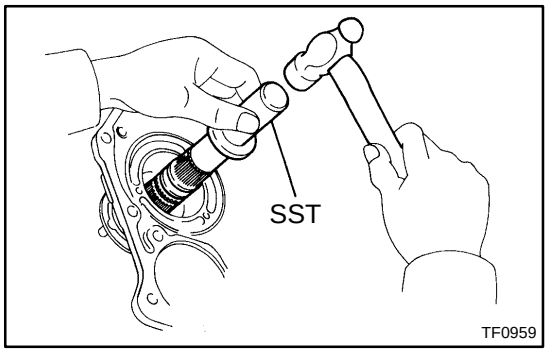
6. REMOVE OIL PUMP PLATE

Remove the 3 bolts and oil pump plate.

7. REMOVE SPEED SENSOR DRIVE GEAR

(a) Using a snap ring expander, remove the snap ring.

(b) Remove the speed sensor drive gear.



8. REMOVE REAR OUTPUT SHAFT

(a) Using a snap ring expander, remove the snap ring.

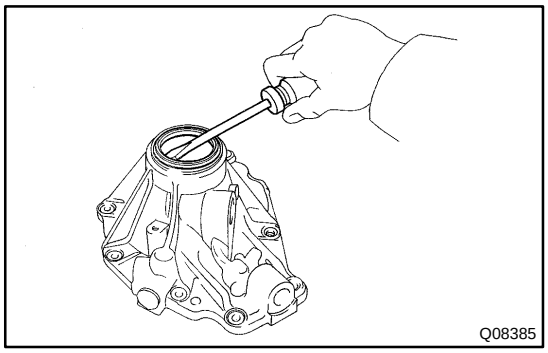
(b) Using SST and a hammer, remove the rear output shaft.
SST 09325-12010

(c) Remove the 2 seal rings from the rear output shaft.

9. REMOVE DUST DEFLECTOR

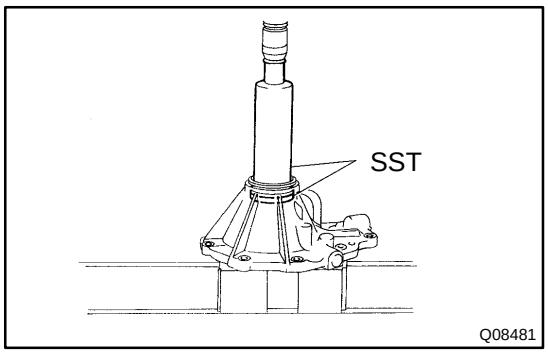
(a) Using a screwdriver and hammer, remove the rear extension housing dust deflector.

(b) Using a screwdriver and hammer, remove the rear output shaft dust deflector.



10. REMOVE OIL SEAL

Using a screwdriver, pry out the oil seal from the rear extension housing.



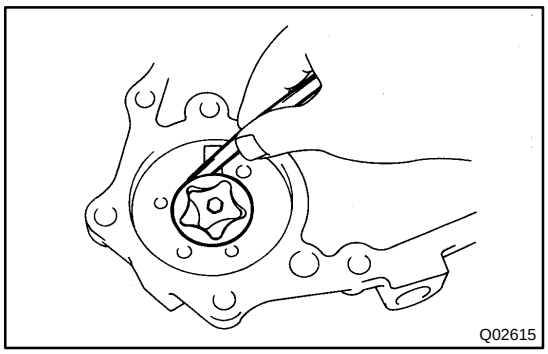
11. REMOVE BALL BEARING

(a) Using a screwdriver, remove the snap ring.

(b) Using SST and a press, remove the ball bearing from the rear extension housing.
SST 09316-6001 1 (09316-00011, 09316-00021)

TR06R-02

INSPECTION



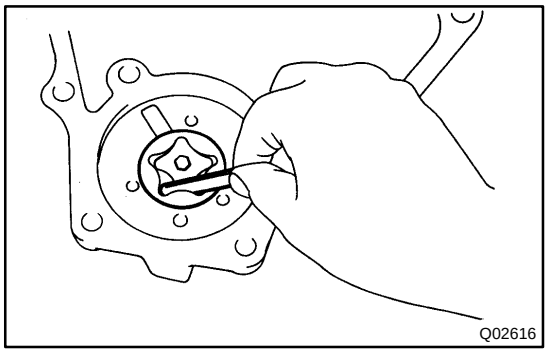
1. INSPECT DRIVEN ROTOR BODY CLEARANCE

(a) Install the drive rotor and driven rotor to the rear extension housing.

(b) Using a feeler gauge, measure the body clearance between the drive rotor and extension housing.

Standard clearance:
0.08 - 0.17 mm (0.0031 - 0.0067 in.)
Maximum clearance:
0.17 mm (0.0067 in.)

If the body clearance exceeds the maximum, replace the drive rotor and driven rotor.

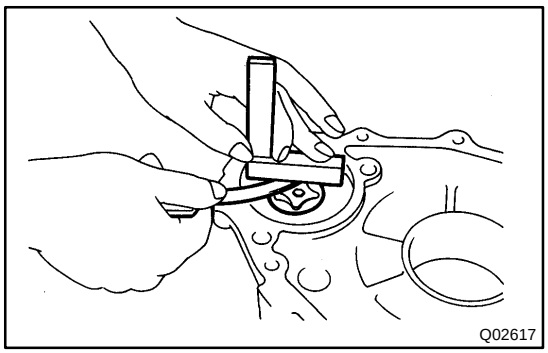


2. INSPECT DRIVEN ROTOR TIP CLEARANCE

Using a feeler gauge, measure the tip clearance between the drive rotor and driven rotor.

Standard clearance:
0.05 - 0.15 mm (0.0020 - 0.0059 in.)
Maximum clearance:
0.15 mm (0.0059 in.)

If the tip clearance exceeds the maximum, replace the drive rotor and driven rotor.



3. INSPECT OIL PUMP SIDE CLEARANCE

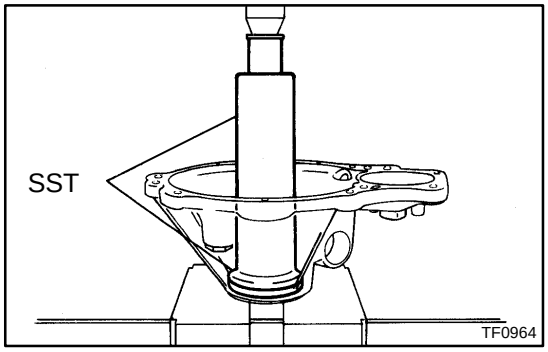
Using a steel straight edge and feeler gauge, measure the side clearance of oil pump.

Standard clearance:
0.03 - 0.10 mm (0.0012 - 0.0039 in.)
Maximum clearance:
0.10 mm (0.0039 in.)

If the side clearance exceeds the maximum, replace the drive rotor and driven rotor.

TR06S-02

REASSEMBLY

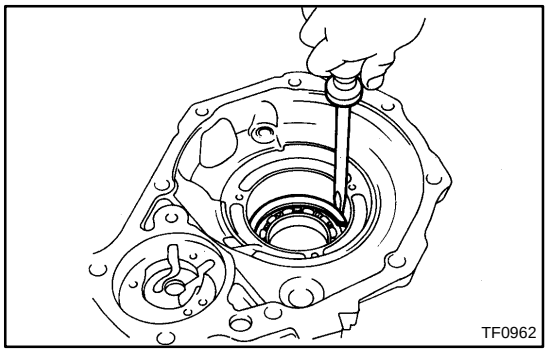


HINT:

Coat all of the sliding and rotating surfaces with gear oil before reassembly.

1. INSTALL BALL BEARING

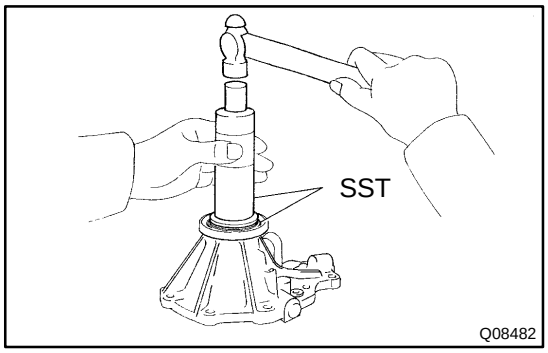
(a) Using SST and a press, install the ball bearing.
SST 09316-6001 1 (09316-00011, 09316-00031)



(b) Select a snap ring that will allow the minimum axial play.

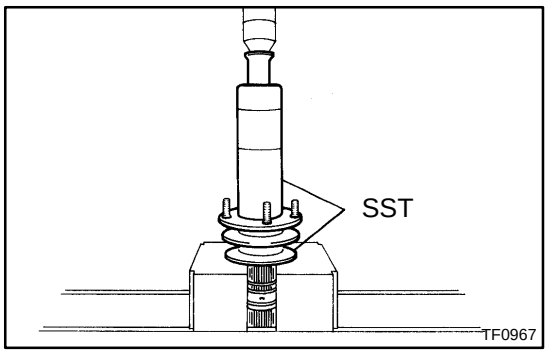
Mark	Thickness mm (in.)
A	1.70 (0.0669)
B	1.80 (0.0709)

(c) Using a screwdriver, install a new snap ring.

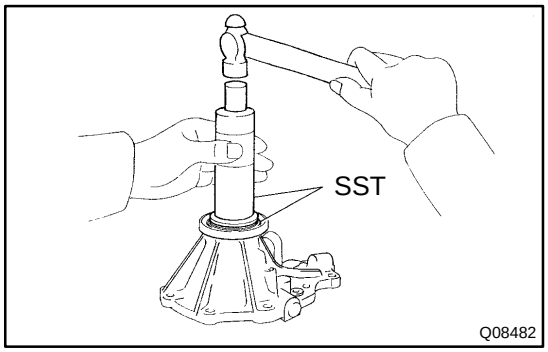


2. INSTALL DUST DEFLECTOR

(a) Using SST and a hammer, install a new rear extension housing dust deflector.
SST 09316-6001 1 (09316-00011, 09316-00041)



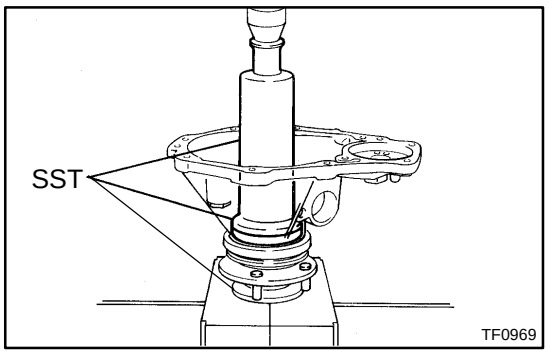
(b) Using SST and a press, install a new rear output shaft dust deflector.
SST 09316-2001 1, 09316-60011 (09316-00011)



3. INSTALL OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

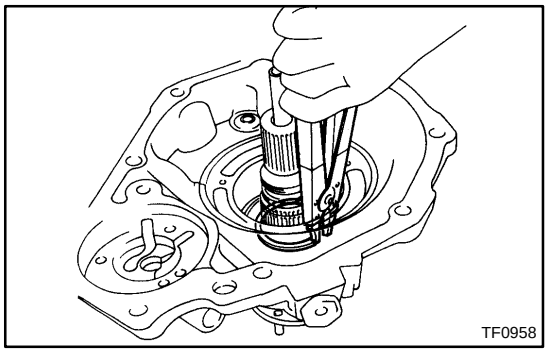
(b) Using SST and a hammer, drive in the oil seal.
SST 09316-6001 1 (09316-00011, 09316-00031)



4. INSTALL REAR OUTPUT SHAFT

(a) Using SST and a press, install the rear output shaft.
SST 09316- 20011, 09316- 60011 (09316- 00011, 09316-00031)

(b) Install the 2 seal rings to the rear output shaft.



(c) Select a snap ring that will allow the minimum axial play.

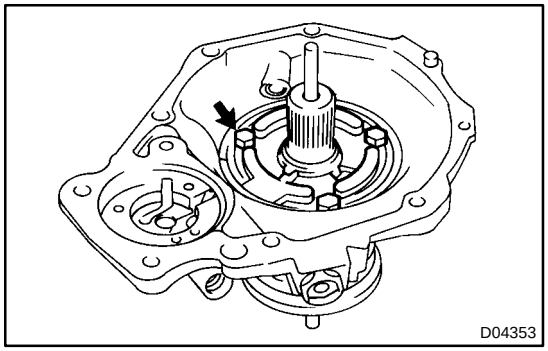
Mark	Thickness mm (in.)
1	1.95 (0.0768)
2	2.05 (0.0807)
3	2.15 (0.0847)
4	2.25 (0.0886)

(d) Using a snap ring expander, install a new snap ring.

5. INSTALL SPEED SENSOR DRIVE GEAR

(a) Install the speed sensor drive gear.

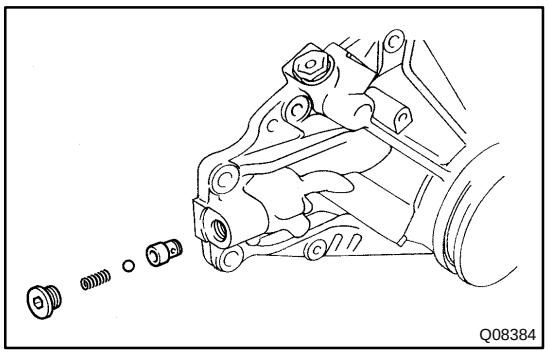
(b) Using a snap ring expander, install the snap ring.



6. INSTALL OIL PUMP PLATE

(a) Install the oil pump plate.

(b) Install and torque the 3 bolts.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)



7. INSTALL VALVE SEAT, BALL, SPRING AND SCREW PLUG

(a) Apply gear oil to the ball.

(b) Install the valve seat, ball and spring.

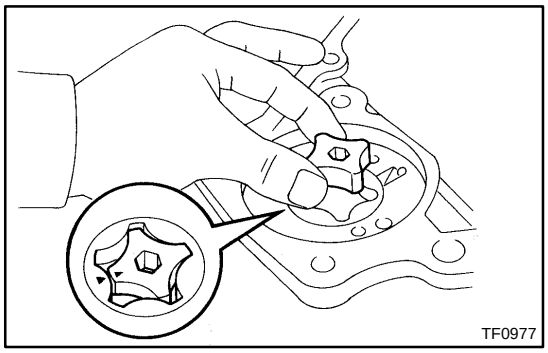
(c) Apply liquid sealer to the screw plug threads.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Using a hexagon wrench, install and torque the screw plug.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)



8. INSTALL DRIVEN ROTOR

(a) Apply gear oil to the driven rotor.

(b) Install the driven rotor.

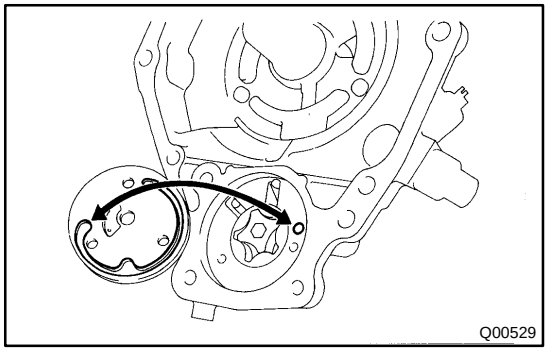
9. INSTALL DRIVE ROTOR

(a) Apply gear oil to the drive rotor.

(b) Install the drive rotor.

HINT:

Align the alignment marks.



10. INSTALL OIL PUMP COVER

(a) Install the oil pump cover.

(b) Using a torx socket wrench (T30), install and torque the 3 screws.

Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)

NOTICE:

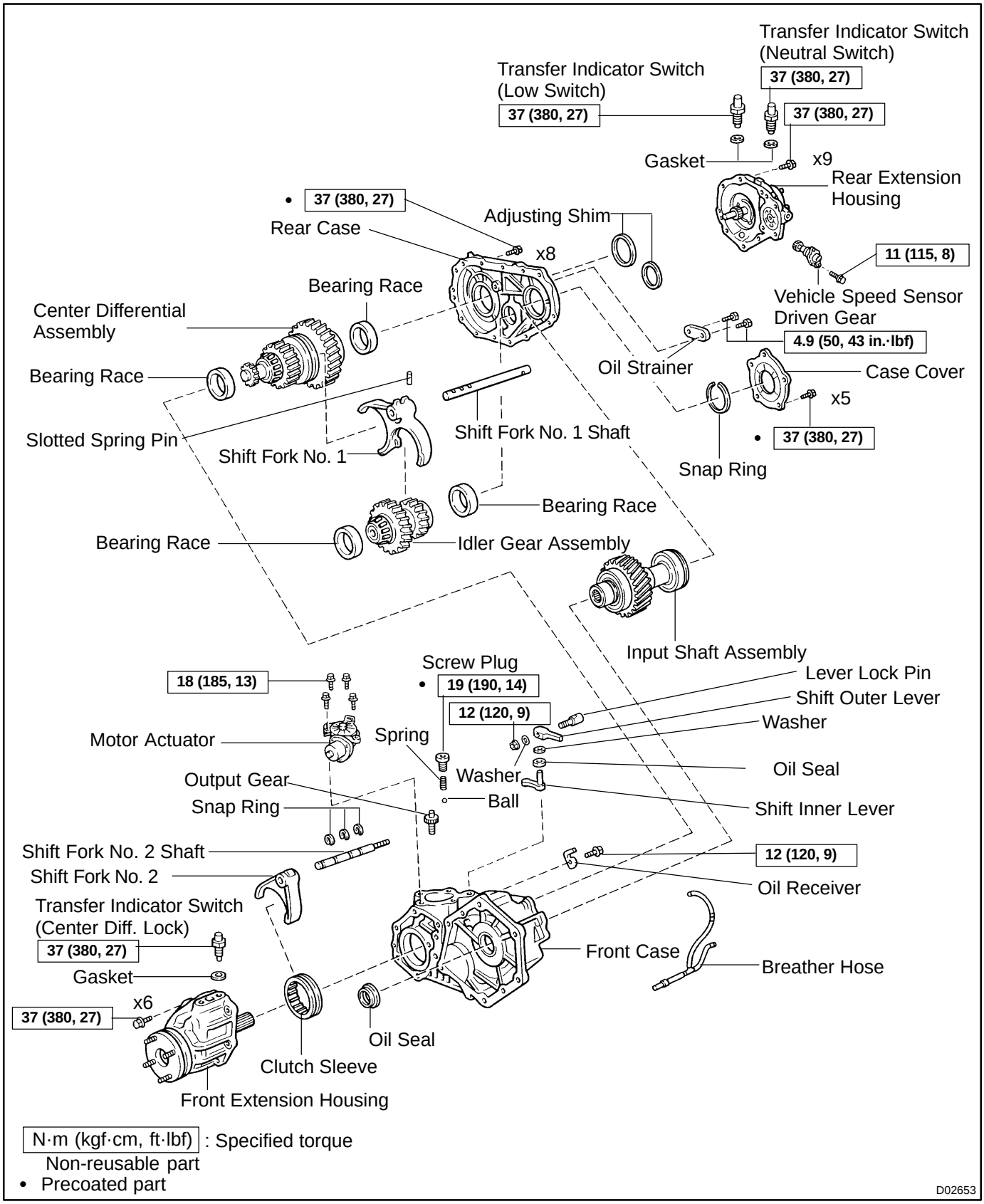
Align the oil hole of the rear extension housing and oil groove end of the oil pump cover.

11. INSTALL OIL PUMP DRIVE SHAFT

TRANSFER ASSEMBLY

COMPONENTS

TR069-02



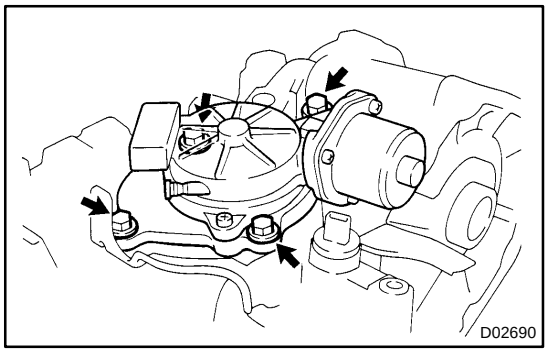
TR06X-02

DISASSEMBLY

1. REMOVE BREATHER HOSE

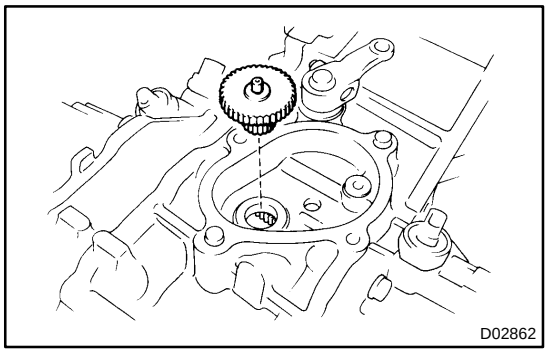
2. REMOVE VEHICLE SPEED SENSOR DRIVEN GEAR

Remove the bolt and driven gear.

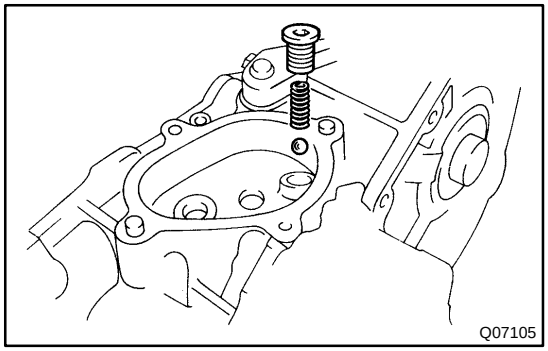


3. REMOVE MOTOR ACTUATOR

Remove the 4 bolts and motor actuator.



4. REMOVE OUTPUT GEAR FROM FRONT CASE



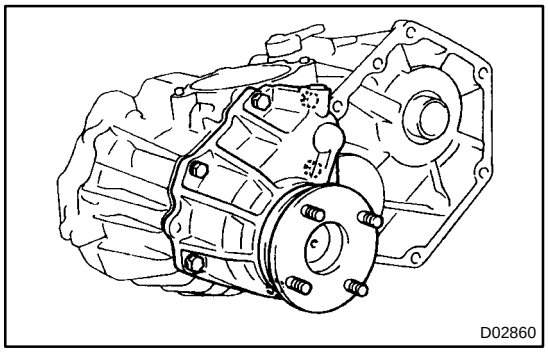
5. REMOVE SCREW PLUG, SPRING AND BALL

(a) Using a torx socket wrench (T40), remove the screw plug.

(b) Using a magnetic finger, remove the spring and ball.

6. REMOVE TRANSFER INDICATOR SWITCH

Remove the 3 transfer indicator switches and 3 gaskets.

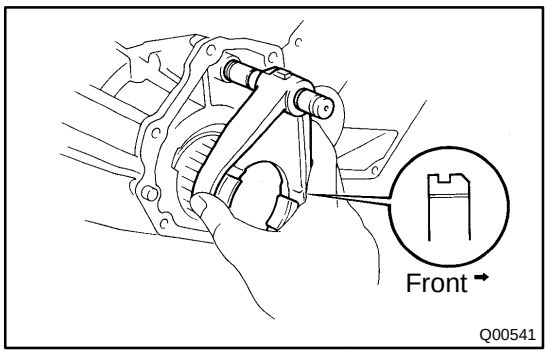


7. REMOVE FRONT EXTENSION HOUSING

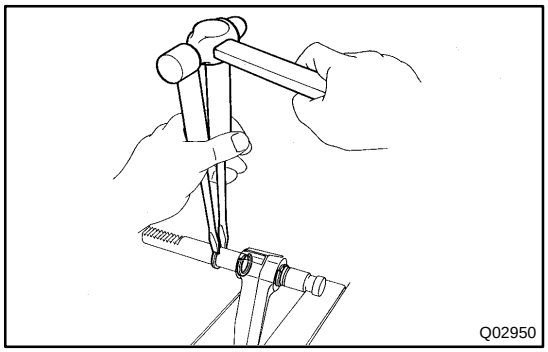
Remove the 6 bolts and front extension housing.

HINT:

If necessary, tap the front extension housing lightly with a plastic hammer.



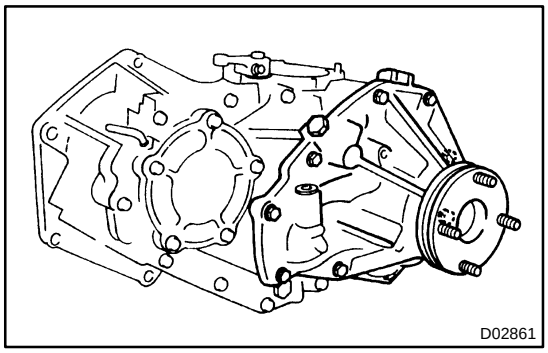
8. REMOVE CLUTCH SLEEVE WITH SHIFT FORK NO. 2 SHAFT AND SHIFT FORK NO. 2



9. SEPARATE SHIFT FORK NO. 2 SHAFT AND SHIFT FORK NO. 2

(a) Using 2 screwdrivers and a hammer, tap out the 3 snap rings from the shift fork No. 2 shaft.

(b) Separate the shift fork No. 2 shaft and shift fork No. 2.



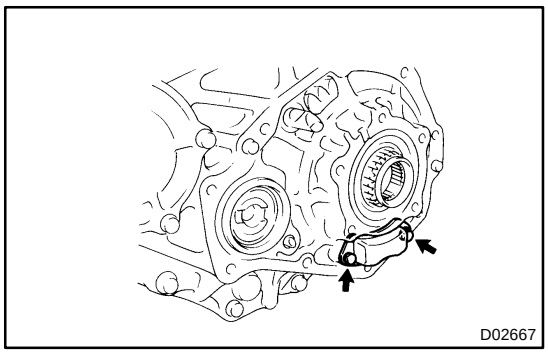
10. REMOVE REAR EXTENSION HOUSING

Remove the 9 bolts and rear extension housing.

HINT:

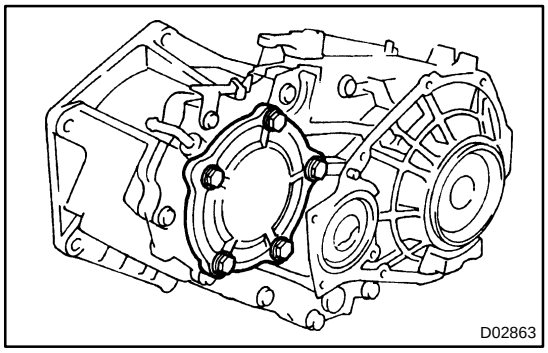
If necessary, tap the rear extension housing lightly with a plastic hammer.

11. REMOVE ADJUSTING SHIMS



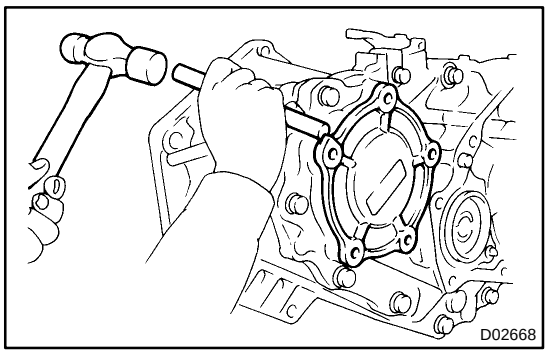
12. REMOVE OIL STRAINER FROM REAR CASE

Remove the 2 bolts and oil strainer.

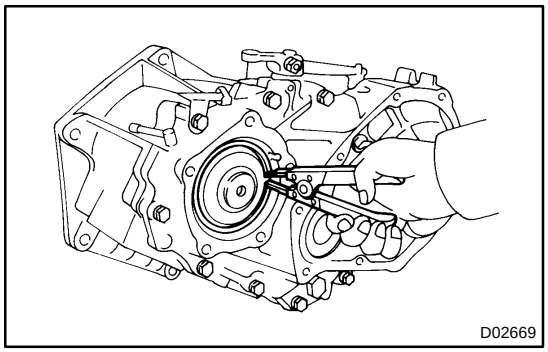


13. REMOVE CASE COVER

(a) Remove the 5 bolts.

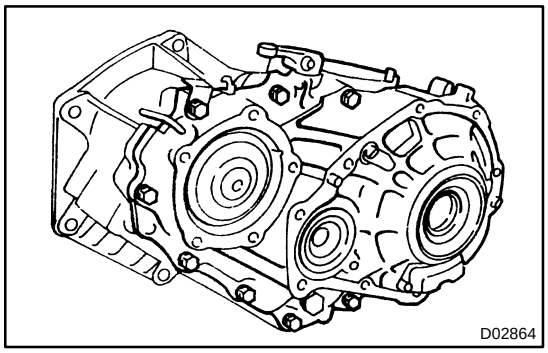


(b) Using a brass bar and hammer, tap the case cover and remove it.



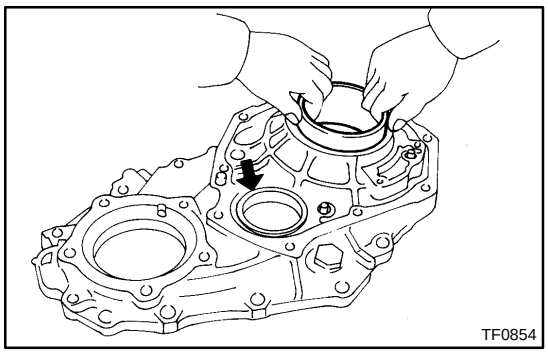
14. SEPARATE FRONT CASE AND REAR CASE

(a) Using a snap ring expander, remove the snap ring from the rear case.

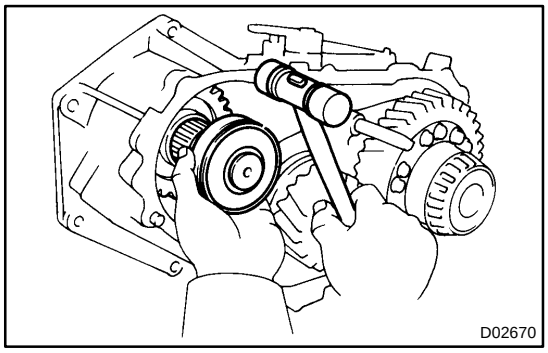


(b) Remove the 8 bolts.

(c) Using a brass bar and hammer, tap the rear case and separate it.

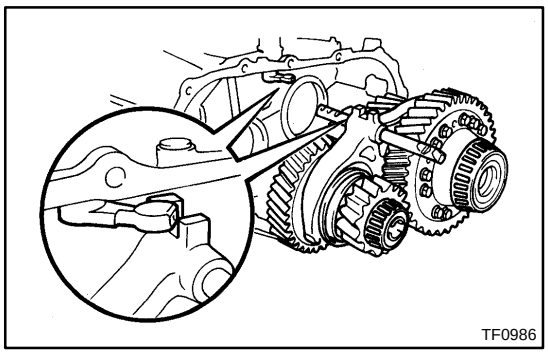


15. REMOVE 2 BEARING RACES FROM REAR CASE

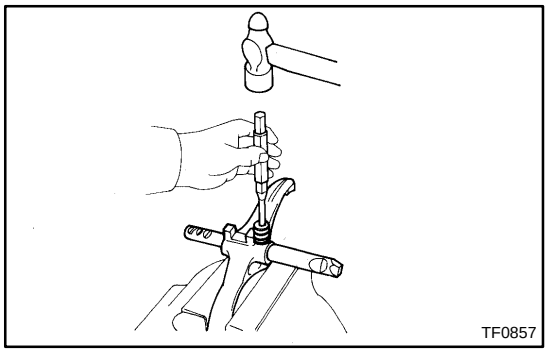


16. REMOVE INPUT SHAFT ASSEMBLY

Using a plastic hammer, remove the input shaft assembly from the front case.



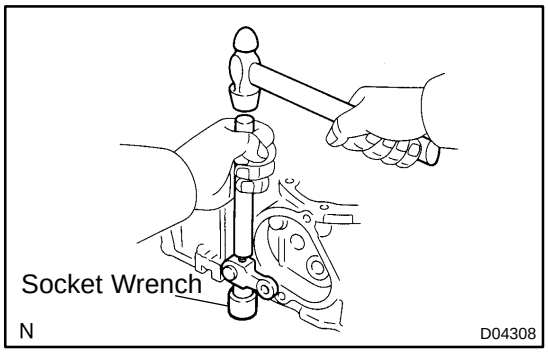
17. REMOVE IDLER GEAR ASSEMBLY WITH CENTER DIFFERENTIAL ASSEMBLY, SHIFT FORK NO. 1 AND SHIFT FORK NO. 1 SHAFT FROM FRONT CASE



18. SEPARATE SHIFT FORK NO. 1 AND SHIFT FORK NO. 1 SHAFT

(a) Using a pin punch and hammer, drive out the slotted spring pin.

(b) Separate the shift fork No. 1 and shift fork No. 1 shaft.

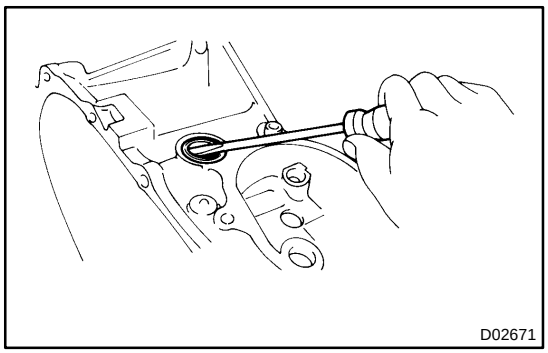


19. REMOVE SHIFT OUTER LEVER AND INNER LEVER

(a) Remove the nut and washer from the shift outer lever.

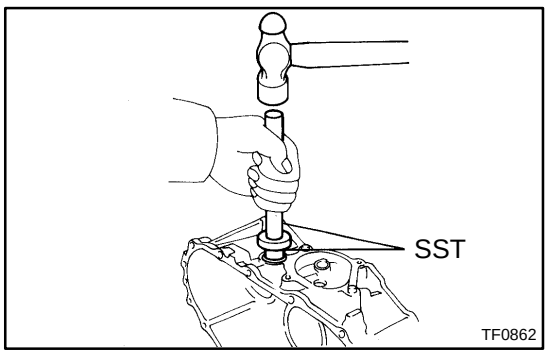
(b) Using a brass bar, hammer and socket wrench, tap out the lever lock pin.

(c) Remove the shift outer lever, washer and inner lever from the front case.



20. IF NECESSARY, REPLACE INNER SHIFT LEVER OIL SEAL

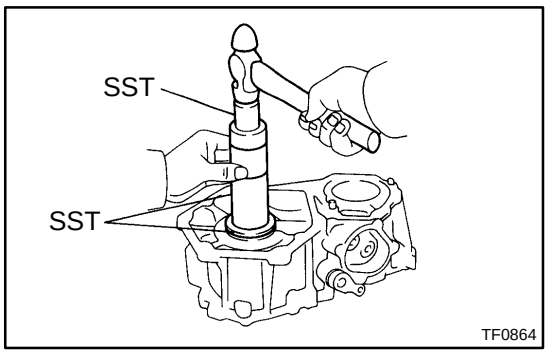
(a) Using a screwdriver, pry out the oil seal from the front case.



(b) Apply MP grease to the lip of a new oil seal.

(c) Using SST and a hammer, drive in a new oil seal.

SST 09950- 60010 (09951- 00270), 09950- 70010 (09951-07150)

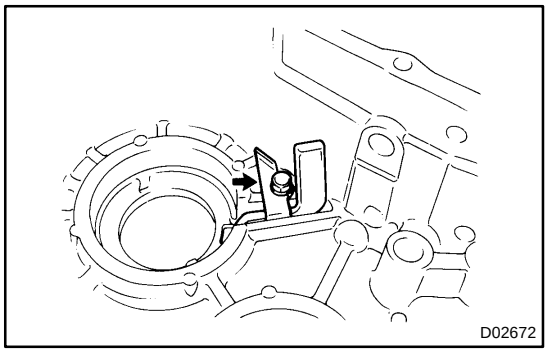


21. IF NECESSARY, REPLACE INPUT SHAFT OIL SEAL

(a) Using SST and a hammer, drive out the oil seal.
SST 09316-6001 1 (09316-00011)

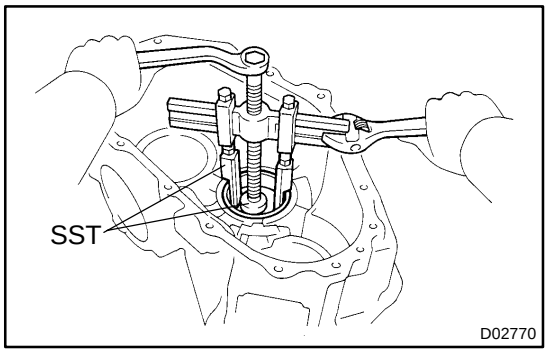
(b) Apply MP grease to the lip of a new oil seal.

(c) Using SST and a hammer, drive in a new oil seal.
SST 09316-6001 1 (09316-00011, 09316-00031)



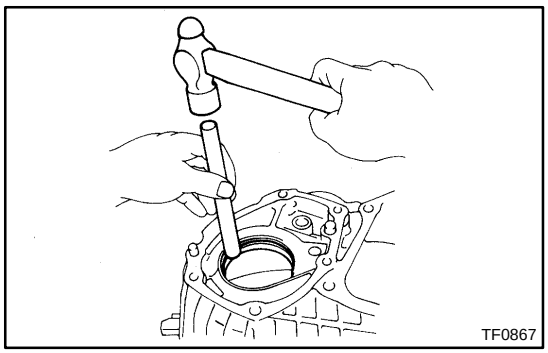
22. REMOVE OIL RECEIVER FROM FRONT CASE

Remove the bolt and oil receiver.



23. REMOVE 2 BEARING RACES FROM FRONT CASE

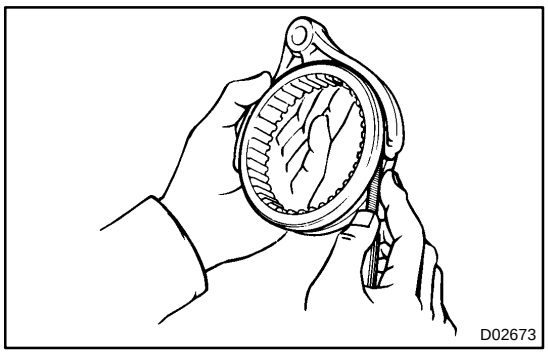
(a) Using SST, remove the bearing race (for the idler gear).
SST 09950- 40011 (09951- 04020, 09952- 04010, 09953- 04030, 09954- 04010, 09955- 04061, 09957-04010), 09950-60010 (09951-00320)



(b) Using a brass bar and hammer, remove the bearing race (for the output shaft).

TR06Y-01

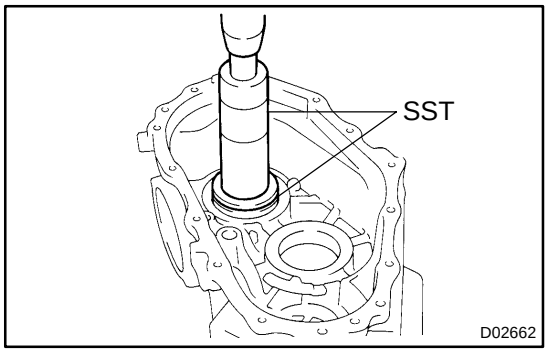
REASSEMBLY



1. INSPECT SHIFT FORK NO. 2 AND CLUTCH SLEEVE CLEARANCE

Using a feeler gauge, measure the clearance between the shift fork No. 2 and clutch sleeve.

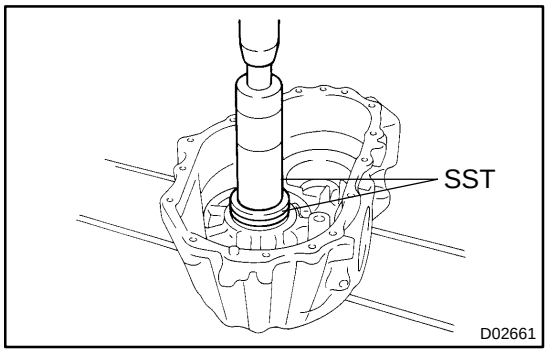
Standard clearance:
0.10 - 0.40 mm (0.0039 - 0.0157 in.)
Maximum clearance:
0.40 mm (0.0157 in.)



2. INSTALL THE BEARING RACE (FOR THE OUTPUT SHAFT)

Using SST and a press, install the bearing race.

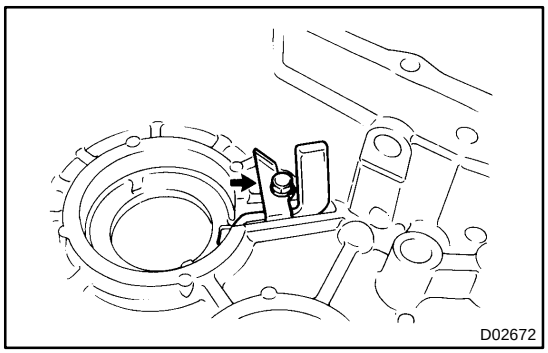
SST 09316-6001 1 (09316-00011, 09316-00031), 09950-60020 (09951-00890)



3. INSTALL THE BEARING RACE (FOR THE IDLER GEAR)

Using SST and a press, install the bearing race.

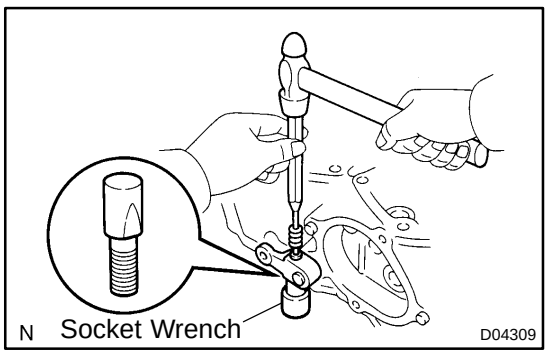
SST 09316-6001 1 (09316-00011, 09316-00031), 09950-60020 (09951-00790)



4. INSTALL OIL RECEIVER TO FRONT CASE

Install the oil receiver and bolt.

Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)

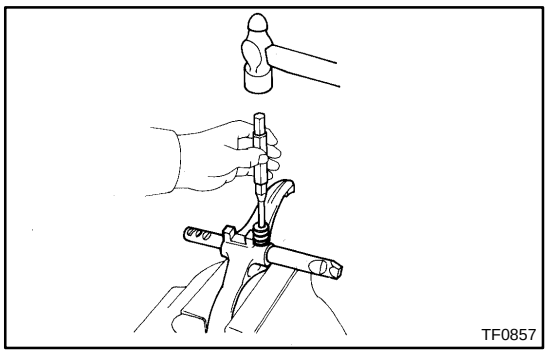


5. INSTALL SHIFT OUTER LEVER AND INNER LEVER

(a) Install the shift inner lever, washer and outer lever to the front case.

(b) Using a pin punch, hammer and socket wrench, tap in the lever lock pin.

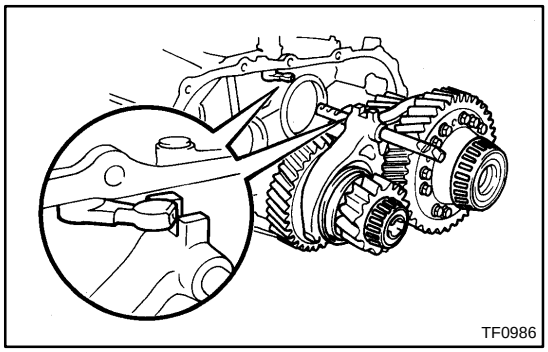
(c) Install the washer and nut to the shift outer lever.
Torque: 12 N·m (120 kgf·cm, 9 ft·lbf)


TF0857

6. ASSEMBLE SHIFT FORK NO. 1 AND SHIFT FORK NO. 1 SHAFT

(a) Assemble the shift fork No. 1 and shift fork No. 1 shaft.

(b) Using a pin punch and hammer, drive in the slotted spring pin.


TF0986

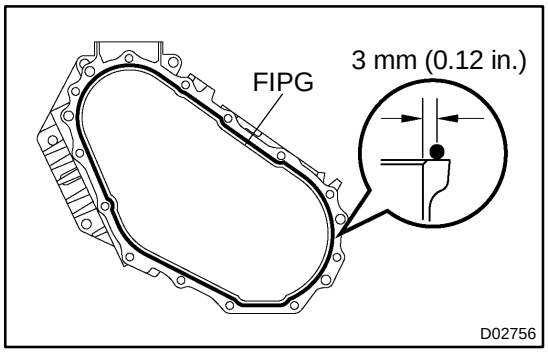
7. INSTALL IDLER GEAR ASSEMBLY WITH CENTER DIFFERENTIAL ASSEMBLY, SHIFT FORK NO. 1 AND SHIFT FORK NO. 1 SHAFT TO FRONT CASE

NOTICE:

Set the shift inner lever into the fork head part of the shift fork No. 1 securely.

8. INSTALL INPUT SHAFT ASSEMBLY

9. INSTALL 2 BEARING RACES TO REAR CASE



D02756

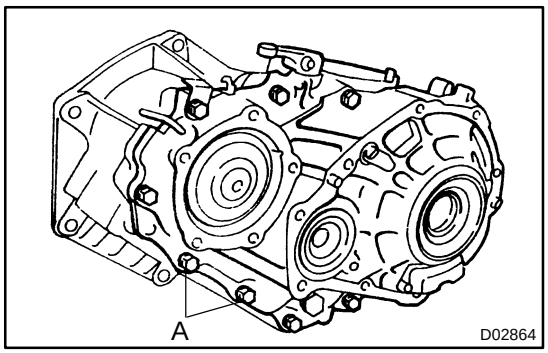
10. ASSEMBLY FRONT CASE AND REAR CASE

(a) Apply FIPG to the front case.

FIPG:

Part No. 08826-00090, THREE BOND 1281 or equivalent

(b) Assemble the front case and rear case.



D02864

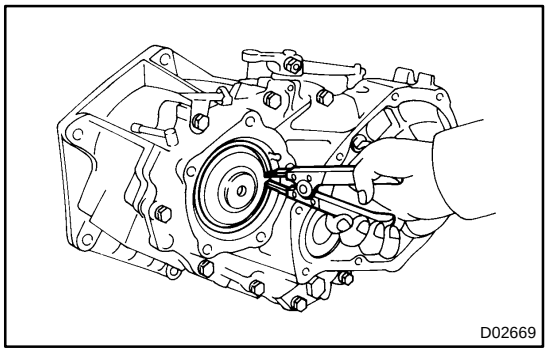
(c) Apply liquid sealer to the ”A” bolt threads.

Sealant:

Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

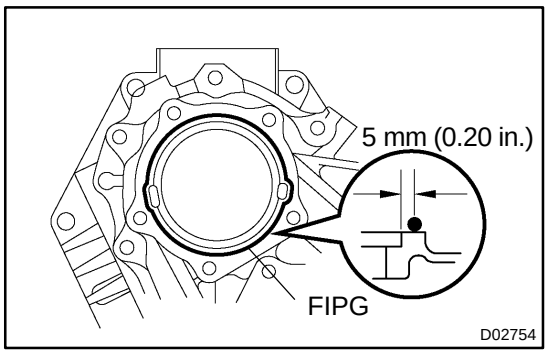
(d) Install the 8 bolts.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)


D02669

11. ASSEMBLE FRONT CASE AND REAR CASE

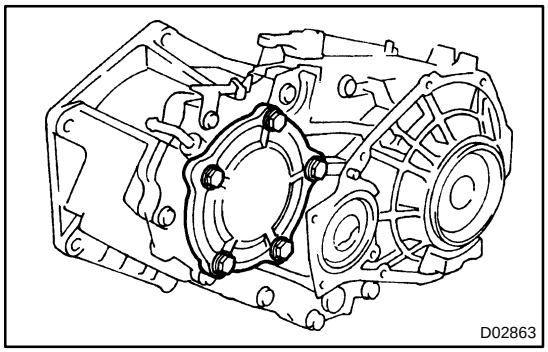
Using a snap ring expander, install the snap ring to the rear case.



12. INSTALL CASE COVER

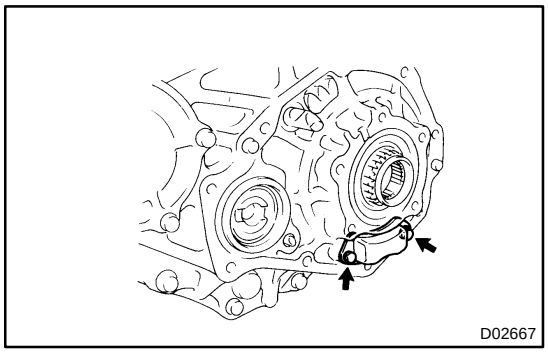
(a) Apply FIPG to the rear case.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

(b) Install the case cover.



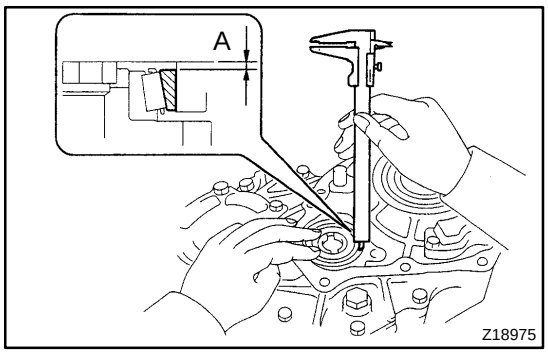
(c) Apply liquid sealer to the bolt threads.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

(d) Install the 5 bolts.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)



13. INSTALL OIL STRAINER TO REAR CASE

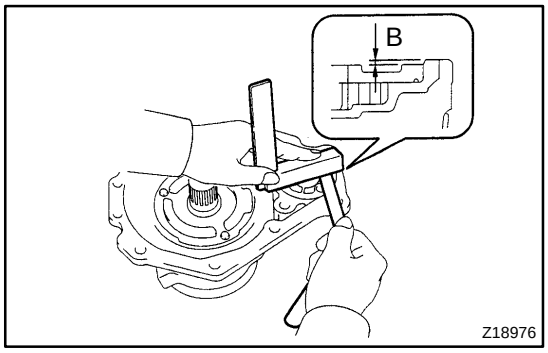
Install the oil strainer and 2 bolts.
Torque: 4.9 N·m (50 kgf·cm, 43 in.·lbf)



14. SELECT ADJUSTING SHIM FOR IDLER GEAR REAR TAPER ROLLER BEARING

(a) Using vernier calipers, measure dimension ”A”.

(b) Lightly hole down the bearing outer race in the thrust direction to eliminate any looseness before making the measurement.

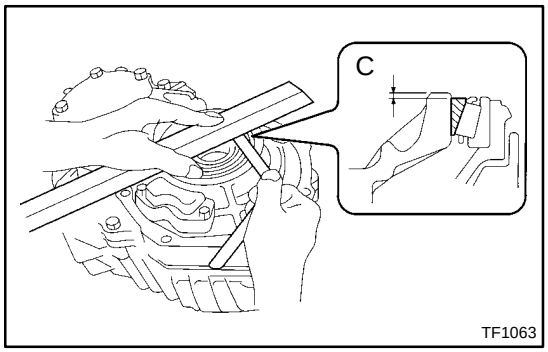


(c) Using a steel straight edge and feeler gauge, measure the clearance of dimension ”B”.

(d) Calculate the required thickness of the adjusting shim.
Thickness: Dimension ”A” + Dimension ”B” + [0.022 - 0.049 mm, (0.0009 - 0.0019 in.)]

(e) From the following table, select a shim so that its thickness is within the range of the calculation.

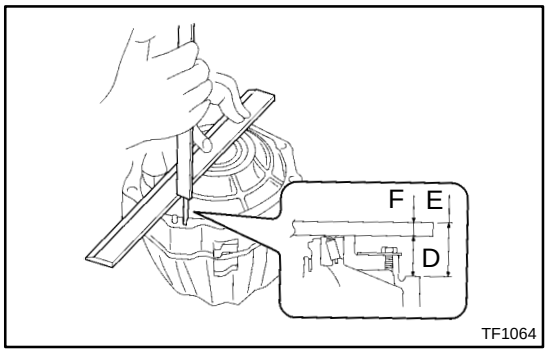
Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
2	0.30 (0.0118)	8	3.20 (0.1260)
3	0.45 (0.0177)	9	3.40 (0.1339)
4	2.40 (0.0945)	10	3.60 (0.1417)
5	2.60 (0.1024)	11	3.80 (0.1496)
6	2.80 (0.1102)	12	4.00 (0.1575)
7	3.00 (0.1181)	13	0.55 (0.0216)



15. SELECT ADJUSTING SHIM FOR OUTPUT SHAFT TAPER ROLLER BEARING

(a) Using a steel straight edge and feeler gauge, measure the clearance of dimension "C".

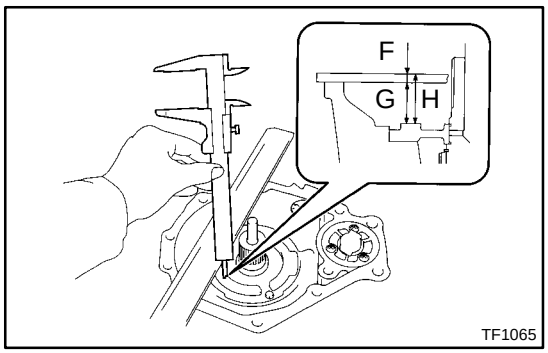
(b) Lightly hold down the bearing outer race in the thrust direction to eliminate any looseness before making the measurement.



(c) Using a steel straight edge and vernier calipers with depth gauge, measure dimension "D".

(d) Dimension "D" is the straight edge thickness (Dimension "F") subtracted from dimension "E" in the illustration to the left.

Dimension "D": Dimension "E" - Dimension "F"



(e) Using a steel straight edge and vernier calipers with depth gauge, measure dimension "G".

(f) Dimension "G" is the straight edge thickness (Dimension "F") subtracted from Dimension "H".

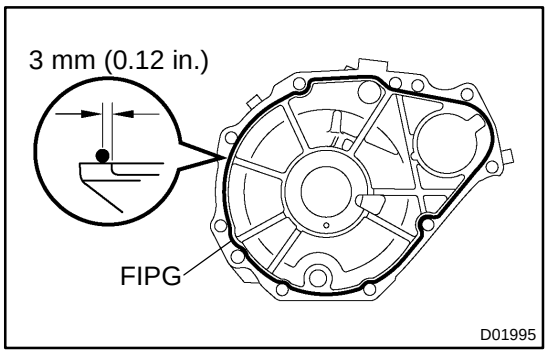
Dimension "G": Dimension "H" - Dimension "F"

(g) Calculate the required thickness of the adjusting shim.

Thickness: Dimension "G" - (Dimension "D" - Dimension "C") + [0.014 ~ 0.039 mm, (0.0006 ~ 0.0015 in.)]

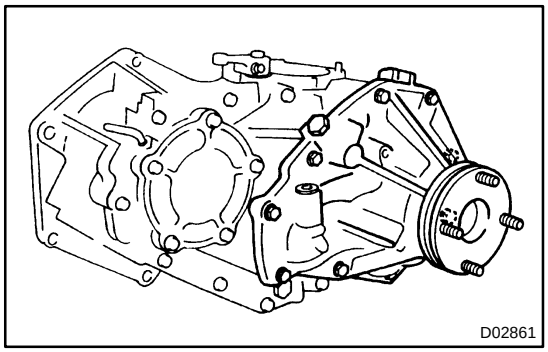
(h) From the following table, select a shim so that its thickness is within the range of the calculation.

Mark	Thickness mm (in.)	Mark	Thickness mm (in.)
B	0.30 (0.0118)	H	1.80 (0.0709)
C	0.45 (0.0177)	J	2.00 (0.0787)
D	1.00 (0.0394)	K	2.20 (0.0866)
E	1.20 (0.0472)	L	2.40 (0.0945)
F	1.40 (0.0551)	M	2.60 (0.1024)
G	1.60 (0.0630)	N	0.55 (0.0216)



16. INSTALL REAR EXTENSION HOUSING

(a) Apply FIPG to the rear extension housing.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

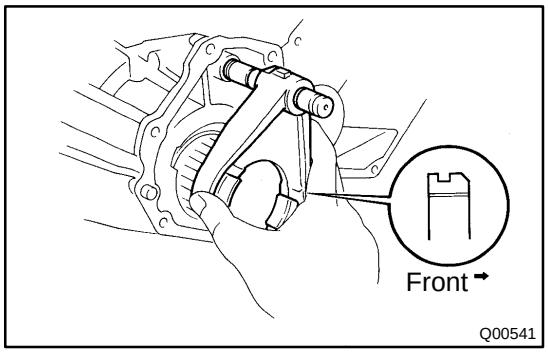


(b) Install the rear extension housing and 9 bolts.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

17. ASSEMBLE SHIFT FORK NO. 2 SHAFT AND SHIFT FORK NO. 2

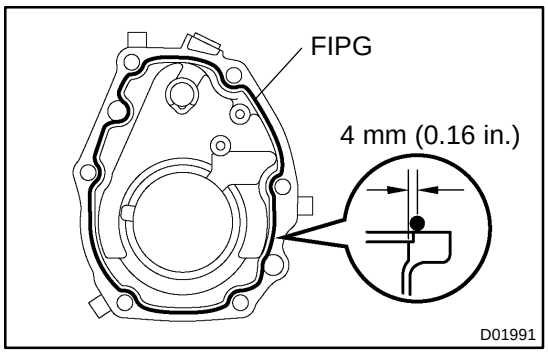
(a) Install the shift fork No. 2 to the shift fork No. 2 shaft.

(b) Install the 3 snap rings to the shift fork No. 2 shaft.



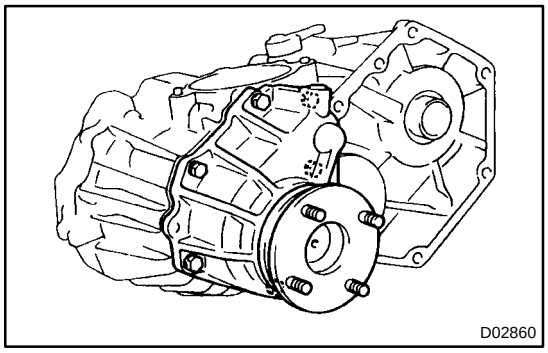
18. INSTALL CLUTCH SLEEVE WITH SHIFT FORK NO. 2 SHAFT AND SHIFT FORK NO. 2

HINT:
Make sure to install the clutch sleeve in the correct direction.



19. INSTALL FRONT EXTENSION HOUSING

(a) Apply FIPG to the front extension housing.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent

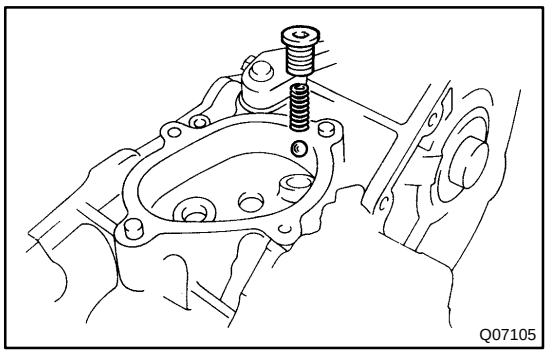


(b) Install the front extension housing and 6 bolts.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

HINT:
Set the clutch sleeve in differential lock condition.

20. INSTALL TRANSFER INDICATOR SWITCH

Install the 3 transfer indicator switches with 3 new gaskets.
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

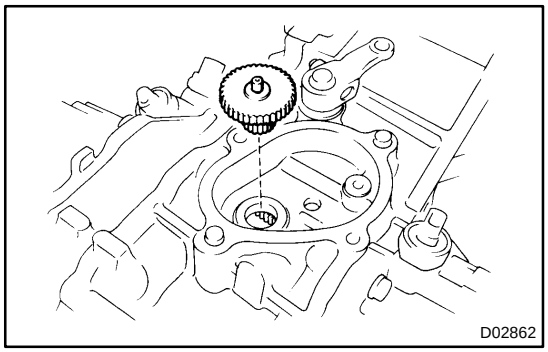


21. INSTALL BALL, SPRING AND SCREW

(a) Install the ball and spring.

(b) Apply liquid sealer to the screw plug threads.
Sealant:
Part No. 08833-00080, THREE BOND 1344, LOCTITE 242 or equivalent

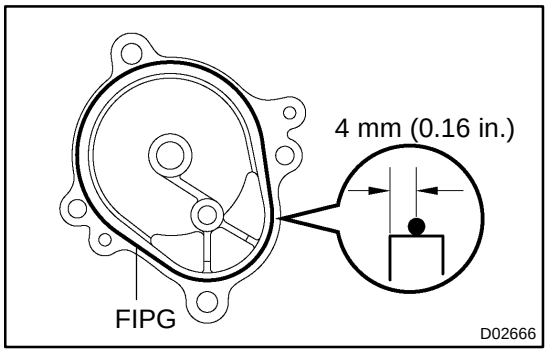
(c) Using a torx socket wrench (T40), install the screw plug.
Torque: 19 N·m (190 kgf·cm, 14 ft·lbf)



22. INSTALL OUTPUT GEAR TO FRONT CASE

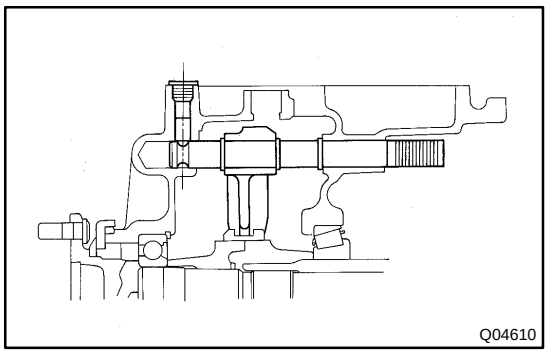
HINT:
Apply gear oil to the output gear.

NOTICE:
Do not turn the output gear.

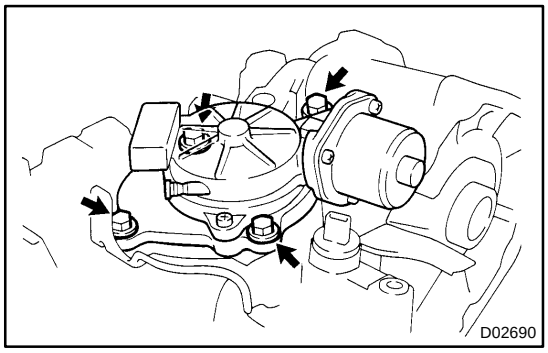


23. INSTALL MOTOR ACTUATOR

(a) Apply FIPG to the motor actuator.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent



HINT:
Set the motor actuator in differential lock condition.



(b) Install the motor actuator and 4 bolts.
Torque: 18 N·m (185 kgf·cm, 13 ft·lbf)

24. INSTALL SPEED SENSOR DRIVE GEAR

Install the driven gear and bolt.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

25. INSTALL BREATHER HOSE

TRANSFER SYSTEM

TR064-02

PRECAUTION

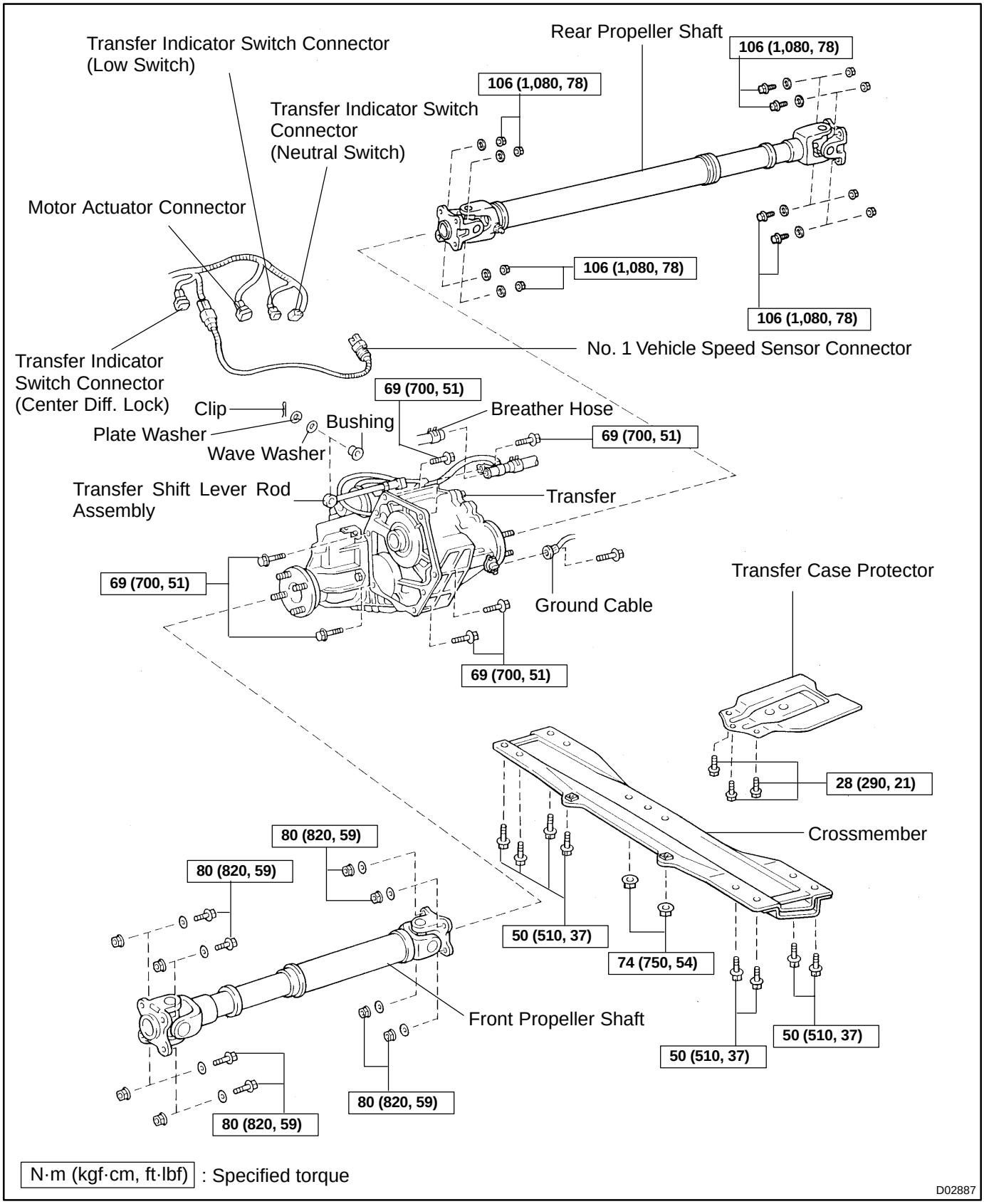
When working with FIPG material, you must observe the following.

- **Using a razor blade and gasket scraper, remove all the old FIPG material from the gasket surfaces.**
- **Thoroughly clean all components to remove all the loose material.**
- **Clean both sealing surfaces with a non-residue solvent.**
- **Apply FIPG in an approx. 1.2 mm (0.047 in.) wide bead along the sealing surface.**
- **Parts must be assembled within 10 minutes of application. Otherwise, the FIPG material must be removed and reapplied.**

TRANSFER UNIT

COMPONENTS

TR066-02



TR068-02

INSTALLATION

Installation is in the reverse order of removal (See page TR-4).

HINT:

- Apply MP grease to the transfer adaptor oil seal.
- After install, do the road test.

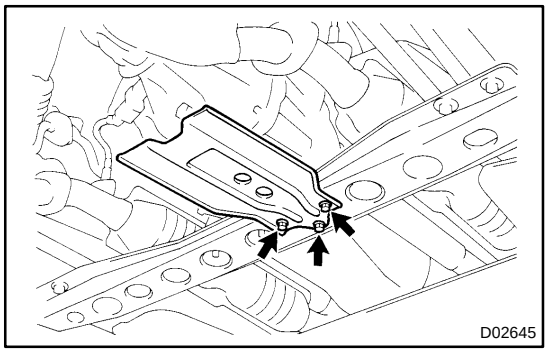
TR067-02

REMOVAL

1. RAISE VEHICLE

NOTICE:

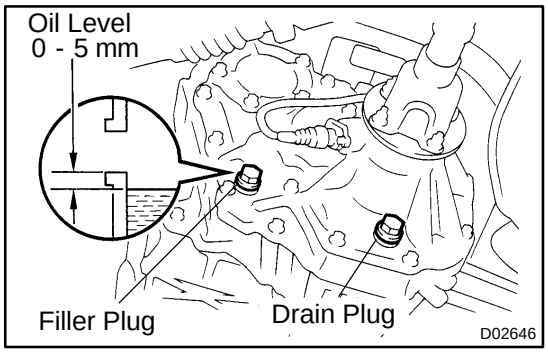
Make sure that the vehicle is securely supported.



2. REMOVE TRANSFER CASE PROTECTOR

Remove the 3 bolts and transfer case protector.

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

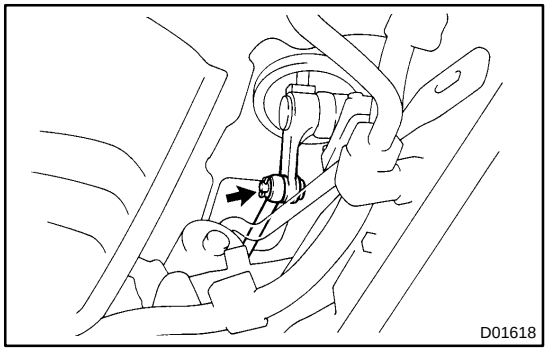


3. DRAIN TRANSFER OIL

Oil grade: API GL-4 or GL-5
Viscosity: SAE 75 W-90
Capacity: 1.3 liters (1.4 US qts, 1.1 lmp. qts)
Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

4. REMOVE FRONT AND REAR PROPELLER SHAFTS

(See page PR-4)

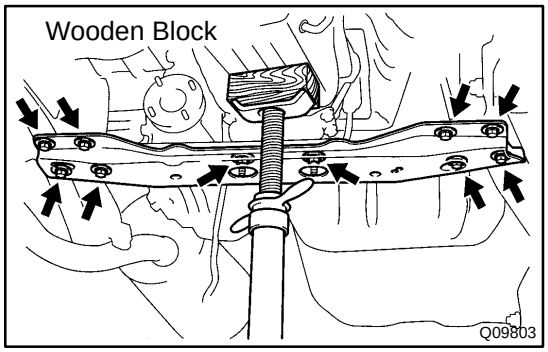


5. DISCONNECT TRANSFER SHIFT LEVER ROD ASSEMBLY

Remove the clip, plate washer, wave washer and bushing, and disconnect the transfer shift lever rod assembly.

6. DISCONNECT GROUND CABLE

Remove the bolt and disconnect the ground cable from the transfer.



7. REMOVE CROSSMEMBER

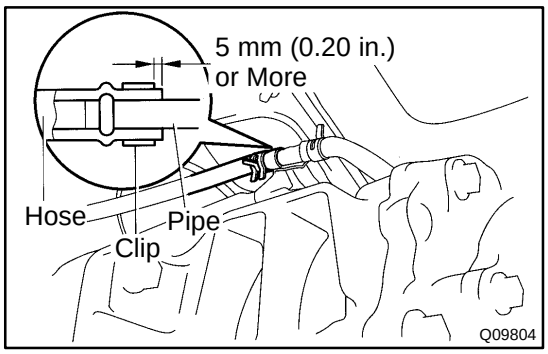
(a) Support the transmission, as shown.

NOTICE:

Use a wooden block so not to damage the transmission oil pan.

(b) Remove the 8 bolts, 2 nuts and crossmember.

Torque:
Bolt: 50 N·m (510 kgf·cm, 37 ft·lbf)
Nut: 74 N·m (750 kgf·cm, 54 ft·lbf)



8. DISCONNECT BREATHER HOSE

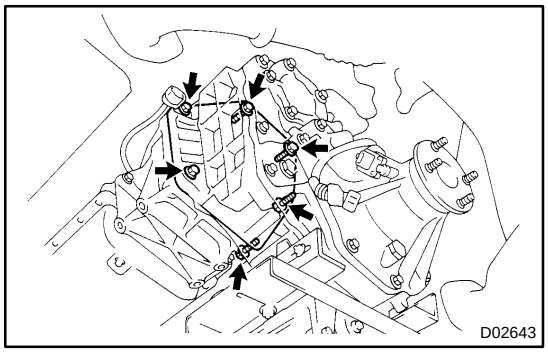
HINT:

At the time of installation, assemble the clip to the position shown in the illustration.

9. DISCONNECT NO. 1 VEHICLE SPEED SENSOR, 3 TRANSFER INDICATOR SWITCH AND MOTOR ACTUATOR CONNECTORS

10. JACK UP TRANSFER SLIGHTLY

Using a transmission jack, support the transfer.



11. REMOVE TRANSFER FROM TRANSMISSION

(a) Disconnect the wire harness from the transfer.

(b) Remove the 6 transfer adaptor rear mounting bolts.
Torque: 69 N·m (700 kgf·cm, 51 ft·lbf)

(c) Pull out the transfer down and toward the rear.

TROUBLESHOOTING

TR065-02

PROBLEM SYMPTOMS TABLE

Use the table below to help you find the cause of the problem. The numbers indicate the priority of the likely cause of the problem. Check each part in order. If necessary, replace these parts.

Symptom	Suspect Area	See page
Noise	6. Oil (Level low) 7. Oil (Wrong) 8. Transfer faulty	TR-4 TR-4 TR-7
Oil leakage	1. Oil (Level too high) 2. Gasket (Damaged) 3. Oil seal (Worn or damaged) 4. O-ring (Worn or damaged)	TR-4 TR-7 TR-7 -
Transfer corner braking	Center differential or transfer faulty	TR-7

TRANSFER SHIFT LEVER ASSEMBLY

TR06Z-02

COMPONENTS