AUTOMATIC TRANSAXLE SYSTEM

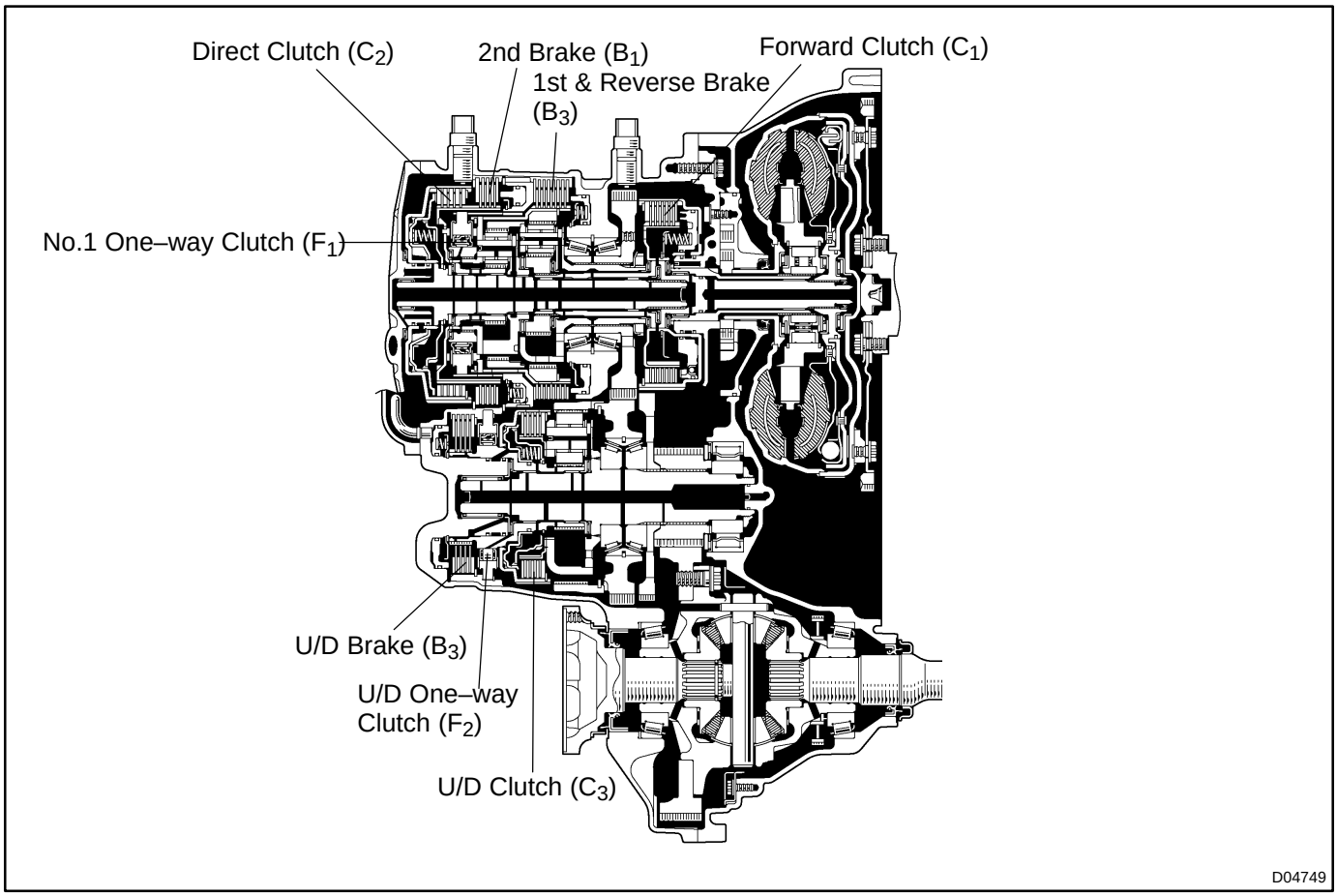
AX0CL–01

PRECAUTION

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

AX0CM–01

OPERATION



• ... Operating

Shift lever position	Gear position	C_1	C_2	C_3	B_1	B_2	B_3	F_1	F_2
P	Parking						•		
R	Reverse		•			•	•		
N	Neutral						•		
D	1st	•					•	•	•
	2nd	•			•		•		•
	3rd	•	•				•		•
	O/D	•	•	•					
2	1st	•					•	•	•
	2nd	•			•	•	•		•
L	1st	•					•	•	•

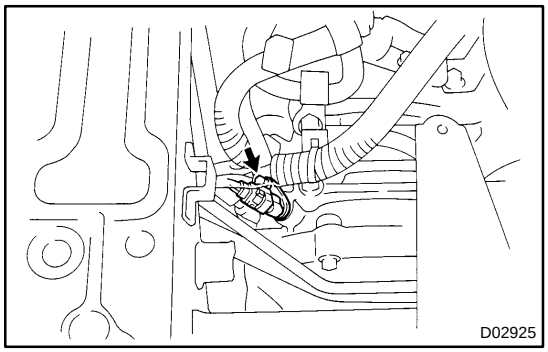
SPEED SENSOR

AX0CP–01

ON–VEHICLE REPAIR

1. REMOVE BATTERY

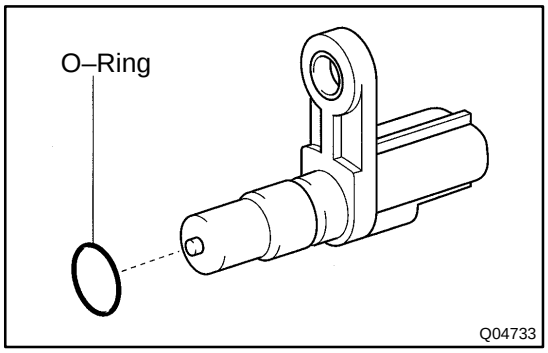
2. REMOVE AIR CLEANER ASSEMBLY



3. DISCONNECT INPUT TURBINE SPEED SENSOR CONNECTOR

4. REMOVE INPUT TURBINE SPEED SENSOR

(a) Remove the bolt and input turbine speed sensor.



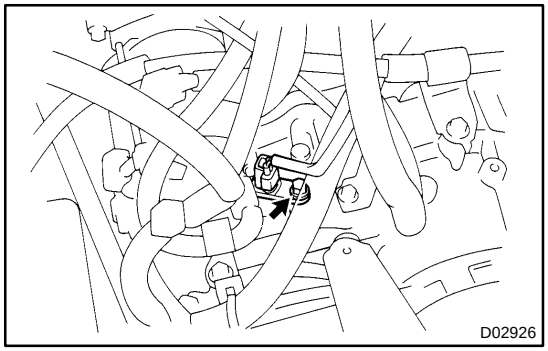
(b) Remove the O–ring from the input turbine speed sensor.

5. INSTALL INPUT TURBINE SPEED SENSOR

(a) Coat a new O–ring with ATF and install it to the input turbine speed sensor.

(b) Install the input turbine speed sensor with the bolt.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

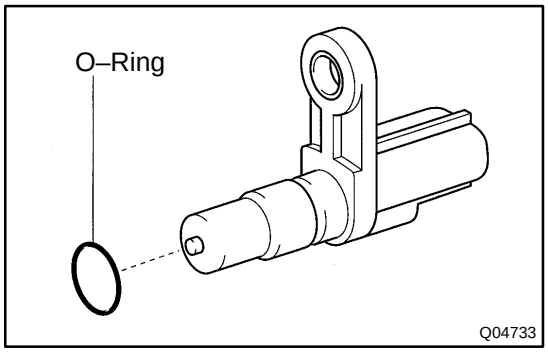
6. CONNECT INPUT TURBINE SPEED SENSOR CONNECTOR



7. DISCONNECT COUNTER GEAR SPEED SENSOR CONNECTOR

8. REMOVE COUNTER GEAR SPEED SENSOR

(a) Remove the bolt and counter gear speed sensor.



(b) Remove the O–ring from the counter gear speed sensor.

9. INSTALL COUNTER GEAR SPEED SENSOR

(a) Coat a new O–ring with ATF and install it to the counter gear speed sensor.

(b) Install the counter gear speed sensor with the bolt.
Torque: 11 N·m (115 kgf·cm, 8 ft·lbf)

10. CONNECT COUNTER GEAR SPEED SENSOR CONNECTOR

11. INSTALL AIR CLEANER ASSEMBLY

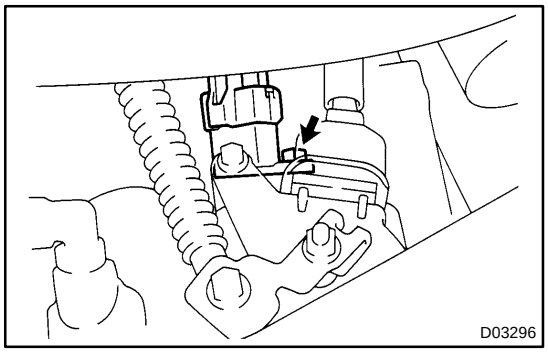
12. INSTALL BATTERY

ATF TEMPERATURE SENSOR

AX0CQ–01

ON–VEHICLE REPAIR

1. **REMOVE OIL PAN AND GASKET (See page AX–7)**
2. **DISCONNECT 5 SHIFT SOLENOID VALVE CONECTORS (See page AX–7)**
3. **DISCONNECT ATF TEMPERATURE SENSOR FROM VALVE BODY (See page AX–7)**



4. **REMOVE ATF TEMPERATURE SENSOR**

Remove the bolt and solenoid wire.

5. **INSTALL ATF TEMPERATURE SENSOR**

Install the solenoid wire with the bolt.

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

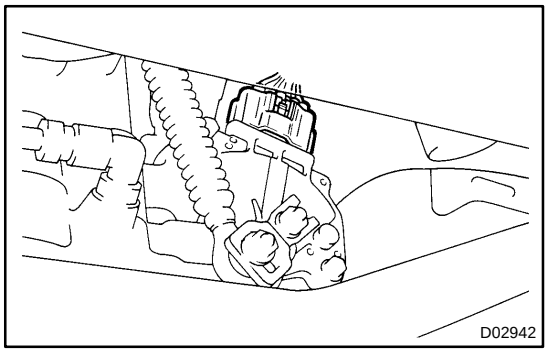
6. **CONNECT ATF TEMPERATURE SENSOR TO VALVE BODY (See page AX–7)**
7. **CONNECT 5 SHIFT SOLENOID VALVE CONECTORS (See page AX–7)**
8. **INSTALL OIL PAN AND GASKET (See page AX–7)**

PARK/NEUTRAL POSITION (PNP) SWITCH

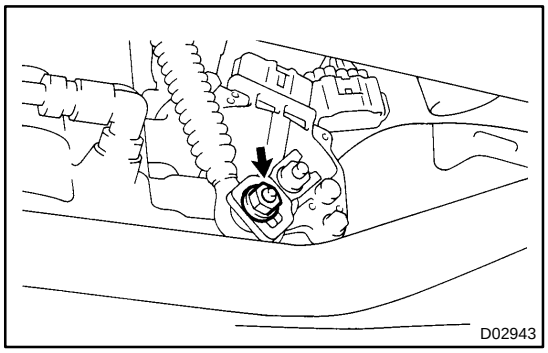
AX0CR–01

ON–VEHICLE REPAIR

1. REMOVE ENGINE UNDER COVER

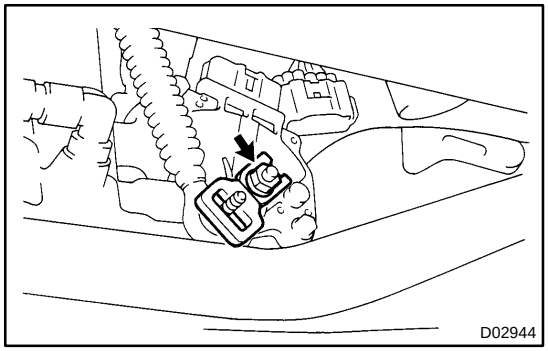


2. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR

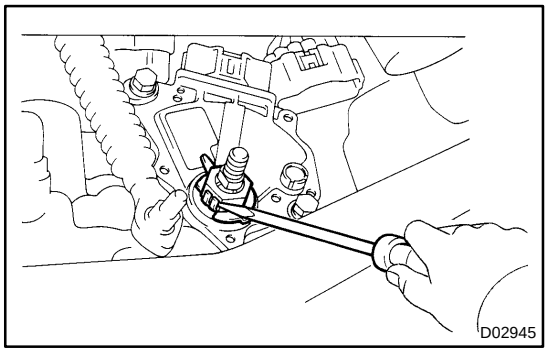


3. REMOVE PARK/NEUTRAL POSITION SWITCH

(a) Remove the nut.

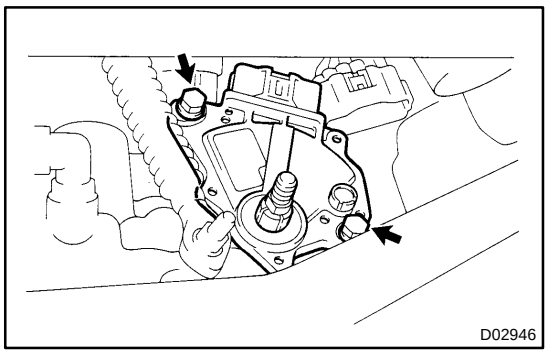


(b) Remove the nut, washer and control shaft lever.



(c) Using a screwdriver, pry off the lock plate.

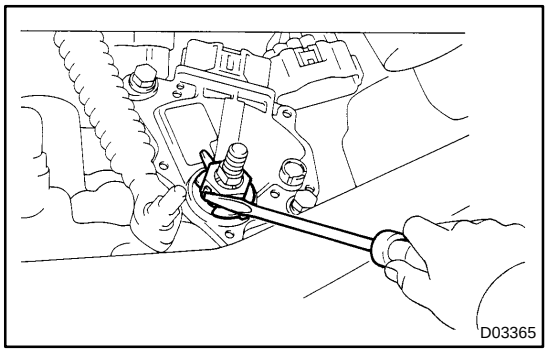
(d) Remove the nut and lock plate.



(e) Remove the 2 bolts and pull out the park/neutral position switch.

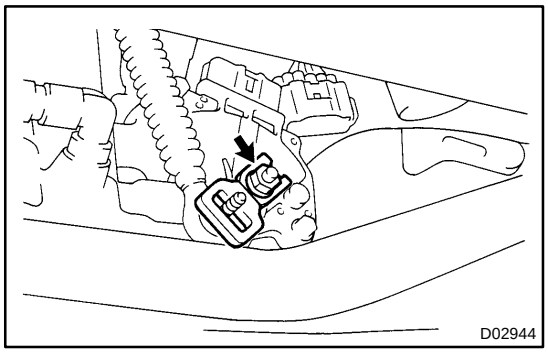
4. INSTALL AND ADJUST PARK/NEUTRAL POSITION SWITCH

(a) Install the park/neutral position switch with the 2 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

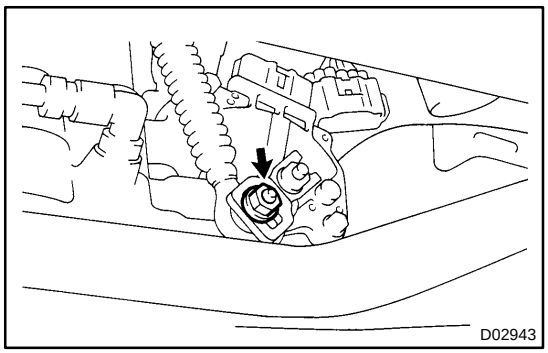


(b) Install a new lock plate and nut.
Torque: 6.9 N·m (70 kgf·cm, 61 in.·lbf)

(c) Bend the claws on the lock plate to fix the nut.

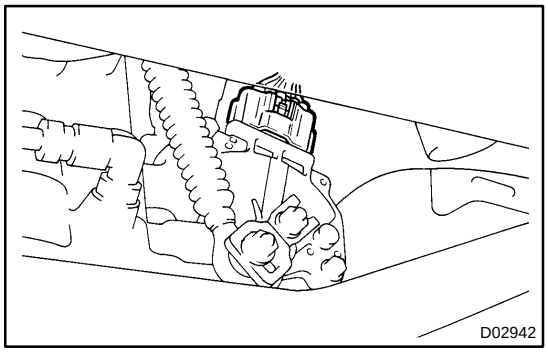


(d) Install the control shaft lever with the nut.
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



(e) Connect the shift control cable to the control shaft lever.

(f) Install the nut.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



5. CONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR

6. CHECK PARK/NEUTRAL POSITION OPERATION

Check that the engine can be started with the shift lever only in the N or P position, but not in other position.

If the engine can not be stated not as started above, carry out the adjustment procedure (See page DI–163).

7. INSTALL ENGINE UNDER COVER

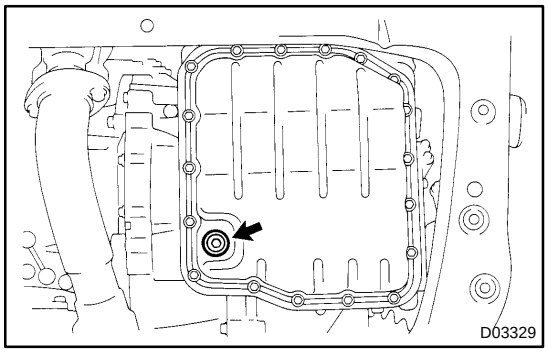
8. TEST DRIVE VEHICLE

VALVE BODY ASSEMBLY

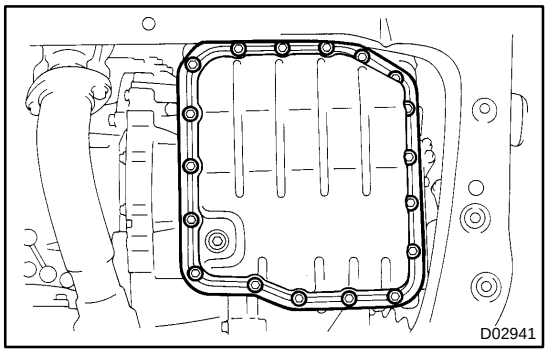
AX0CO–01

ON–VEHICLE REPAIR

1. REMOVE ENGINE UNDER COVER



2. REMOVE DRAIN PLUG AND DRAIN ATF

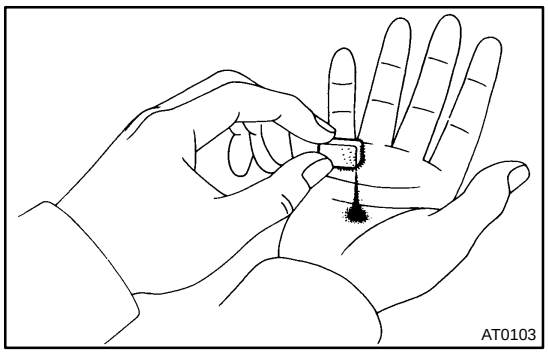


3. REMOVE OIL PAN AND GASKET

Remove the 18 bolts, and carefully remove the oil pan. Discard the gasket.

NOTICE:

Some fluid will remain in the oil pan.

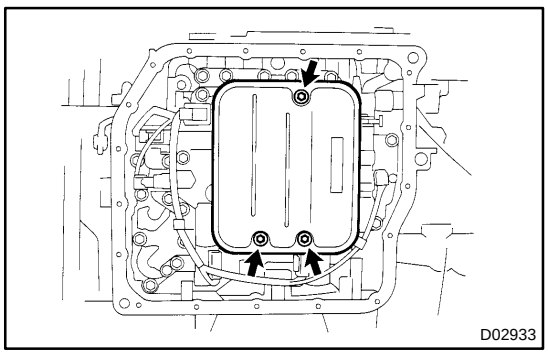


4. EXAMINE PARTICLES IN OIL PAN

Remove the magnets and use them to collect any steel chips. Look carefully at the chips and particles in the pan and on the magnet to anticipate what type of wear you will find in the transaxle.

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

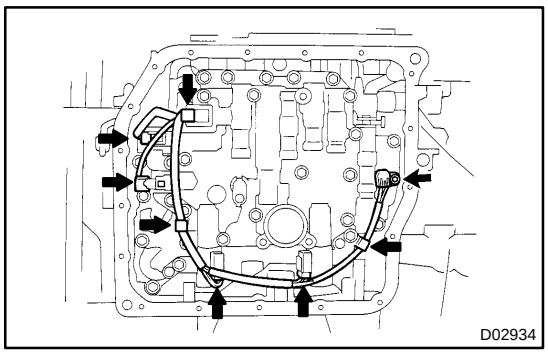
Brass (non–magnetic)... bushing wear



5. REMOVE OIL STRAINER

(a) Remove the 3 bolts and oil strainer.

(b) Remove the O–ring from the oil strainer.

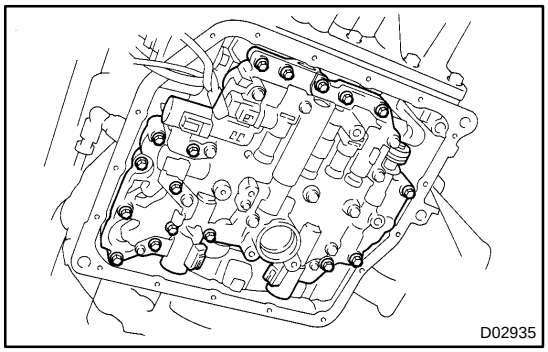


6. DISCONNECT 5 SHIFT SOLENOID VALVE CONNECTORS

7. REMOVE ATF TEMPERATURE SENSOR

Remove the bolt and lock plate, and remove the ATF temperature sensor.

8. SEPARATE WIRE HARNESS FROM 2 CLAMPS

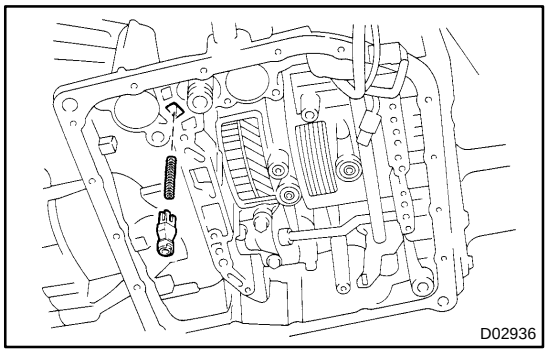


9. REMOVE VALVE BODY

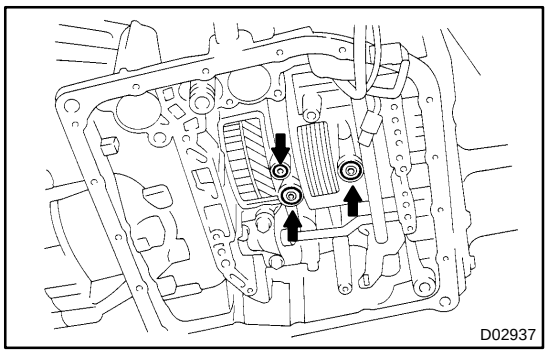
Remove the 17 bolts and valve body.

NOTICE:

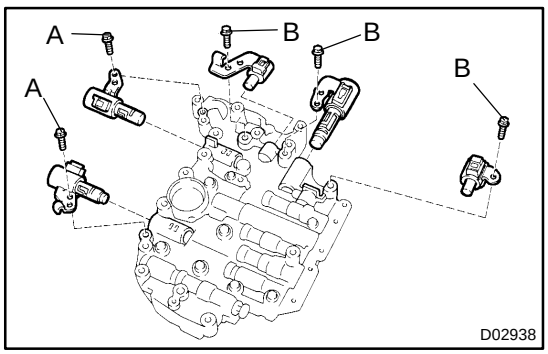
Be careful not to drop the check valve body, spring and accumulator piston.



10. REMOVE CHECK BALL BODY AND SPRING



11. REMOVE 3 APPLY GASKETS



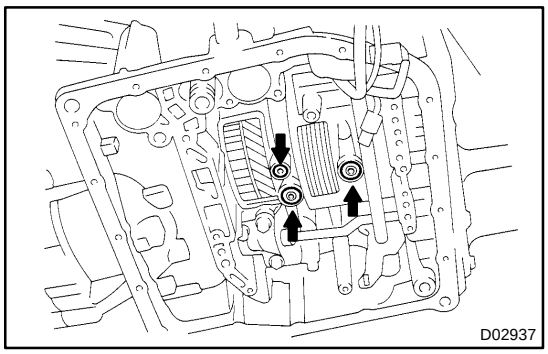
12. REMOVE SHIFT SOLENOID VALVE

Remove the 5 bolts and shift solenoid valves.

13. INSTALL SHIFT SOLENOID VALVE

Install the 5 shift solenoid valves with the 5 bolts.

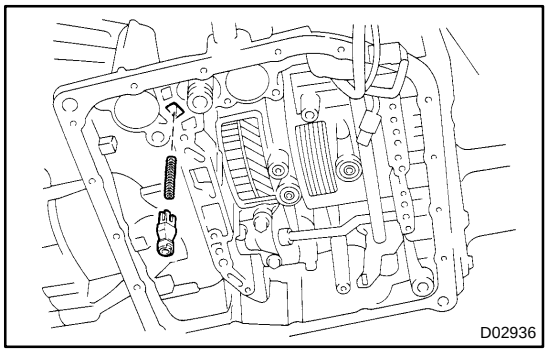
Torque:
Bolt A: 6.6 N·m (67 kgf·cm, 58 in.·lbf)
Bolt B: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt length:
Bolt A: 12 mm (0.47 in.)
Bolt B: 45 mm (1.77 in.)



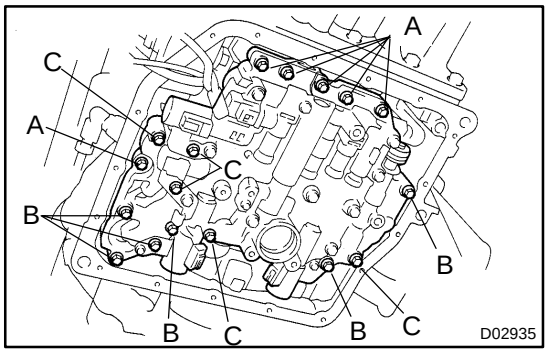
14. INSTALL APPLY GASKET

(a) Coat 3 new apply gaskets with ATF.

(b) Install the gaskets to the transaxle case.



15. INSTALL CHECK BALL BODY AND SPRING



16. INSTALL VALVE BODY

(a) Align the groove of the manual valve with the pin of the manual valve lever.

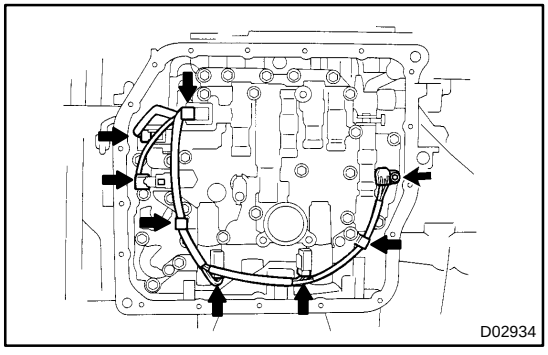
(b) Temporarily install the valve body with the 17 bolts.

Bolt length:
Bolt A: 25 mm (0.98 in.)
Bolt B: 41 mm (1.61 in.)
Bolt C: 45 mm (1.77 in.)

(c) Check that the manual valve lever contacts the center of the roller at the tip of the detent spring.

(d) Tighten the 17 bolts.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



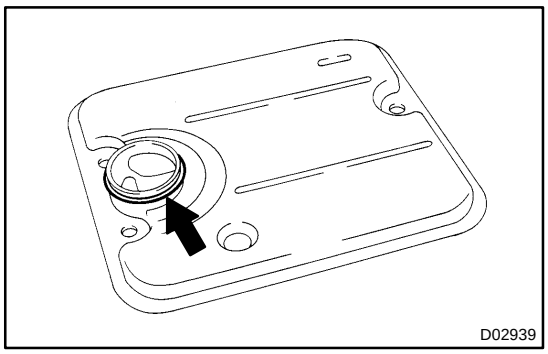
17. INSTALL ATF TEMPERATURE SENSOR

Install the ATF temperature sensor with the lock plate and bolt.

Torque: 6.6 N·m (67 kgf·cm, 58 in.·lbf)

18. CONNECT 5 SHIFT SOLENOID VALVE CONNECTORS

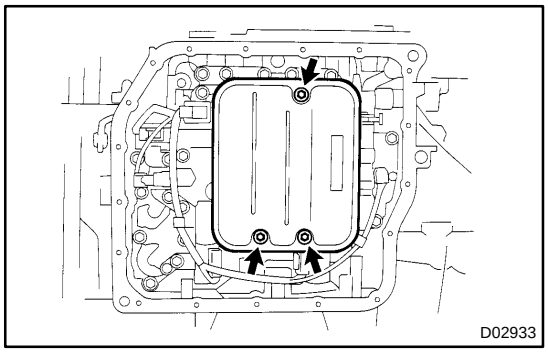
19. CLAMP WIRE HARNESS TO 2 CLAMPS



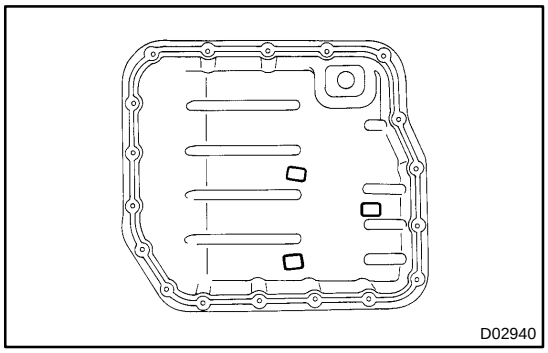
20. INSTALL OIL STRAINER

(a) Coat a new O–ring with ATF.

(b) Install the O–ring to the oil strainer.

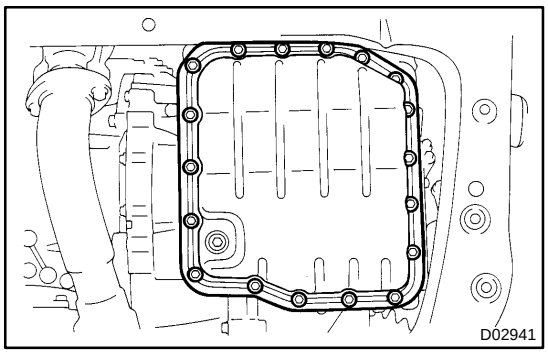


(c) Install the oil strainer with the 3 bolts.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



21. INSTALL MAGNET IN OIL PAN

Install the 3 magnets in the oil pan, as shown in the illustration.



22. INSTALL OIL PAN

Install the oil pan and a new gasket with the 18 bolts.
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

23. INSTALL DRAIN PLUG

Install the drain plug and a new gasket.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

24. FILL ATF AND CHECK ATF LEVEL
(See page DI–163)

25. INSTALL ENGINE UNDER COVER

DIFFERENTIAL OIL SEAL

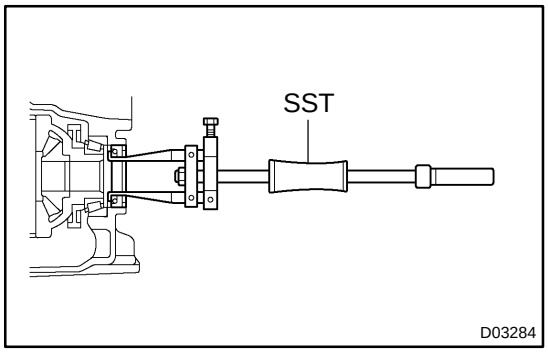
AX0CN–01

ON–VEHICLE REPAIR

1. REMOVE DRAIN PLUG AND DRAIN ATF

2. REMOVE LH AND RH DRIVE SHAFTS

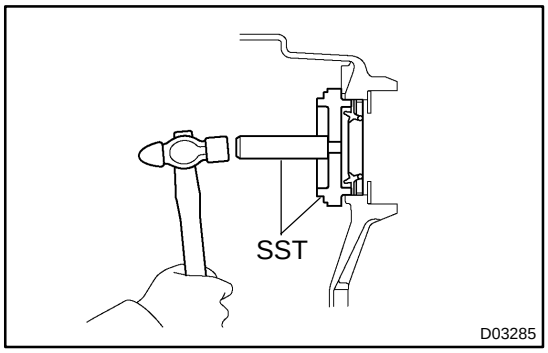
(See page SA–16)



3. REMOVE LH AND RH SIDE OIL SEAL

Using SST, remove both the side oil seals.

SST 09308–00010



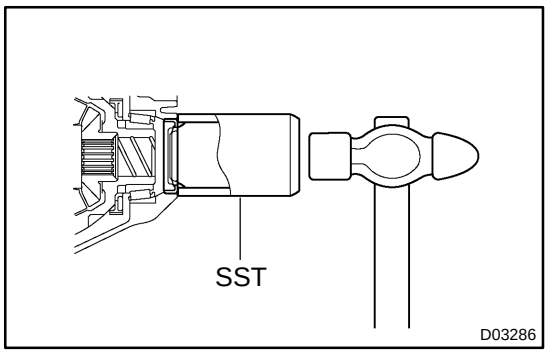
4. INSTALL LH SIDE OIL SEAL

(a) Using SST and a hammer, drive in a new oil seal.

SST 09350–32014 (09351–32111, 09351–32130)

Oil seal drive in depth: 0 ± 0.5 mm (0 ± 0.020 in.)

(b) Coat the oil seal lip with MP grease.



5. INSTALL RH SIDE OIL SEAL

(a) Using SST and a hammer, drive in a new oil seal.

SST 09223–00010

Oil seal drive in depth: 0 ± 0.5 mm (0 ± 0.020 in.)

(b) Coat the oil seal lip with MP grease.

6. INSTALL LH AND RH DRIVE SHAFTS

(See page SA–23)

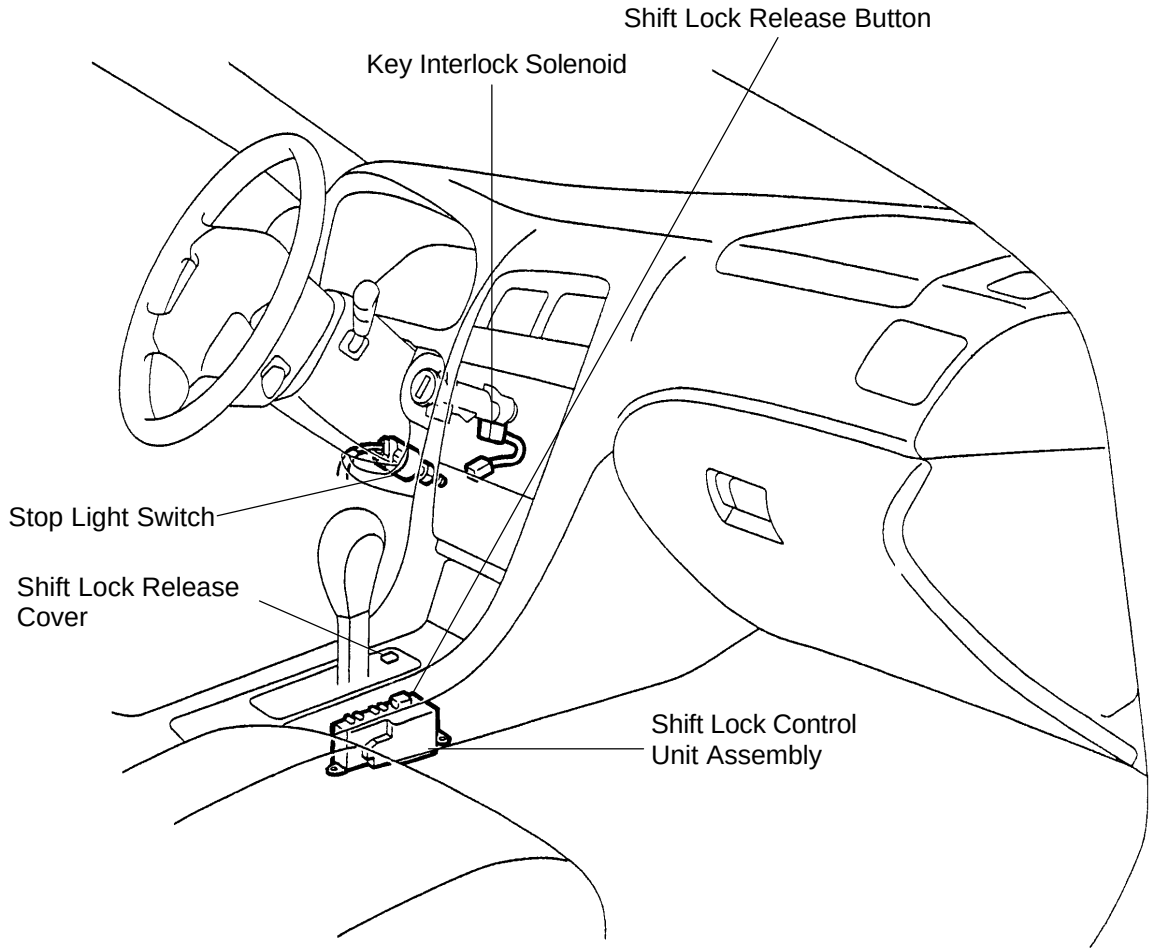
7. FILL ATF AND CHECK ATF LEVEL

(See page DI–163)

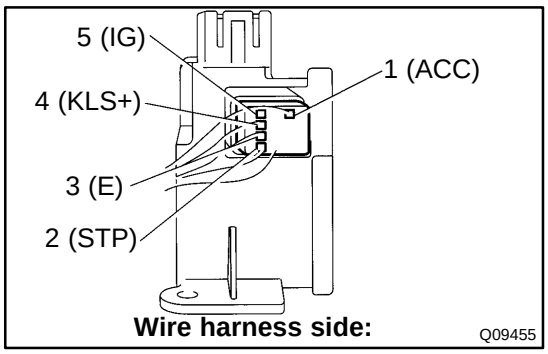
SHIFT LOCK SYSTEM

AX0CS–01

LOCATION



AX0CT–01



INSPECTION

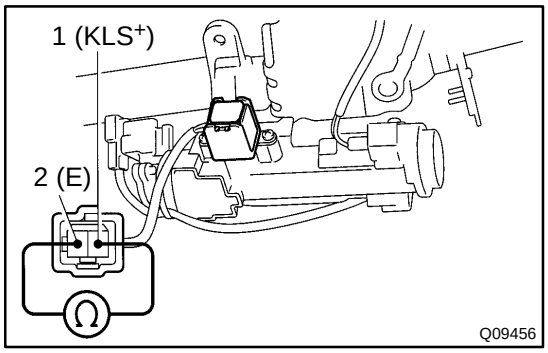
1. INSPECT SHIFT LOCK CONTROL UNIT ASSEMBLY

Using a voltmeter, measure the voltage at each terminal.

HINT:

Do not disconnect the shift lock control unit assembly connector.

Terminal (Symbol)	Measuring Condition	Voltage (V)
1 (ACC) – 3 (E)	Ignition switch ACC	10 – 14
5 (IG) – 3 (E)	Ignition switch ON	10 – 14
2 (STP) – 3 (E)	Depressing brake pedal	10 – 14
4 (KLS^+) – 3 (E)	(1) Ignition switch ACC and P position (2) Ignition switch ACC and except P position (3) Ignition switch ACC and except P position (After approx. 1 second)	0 7.5 – 11 6 – 9.5



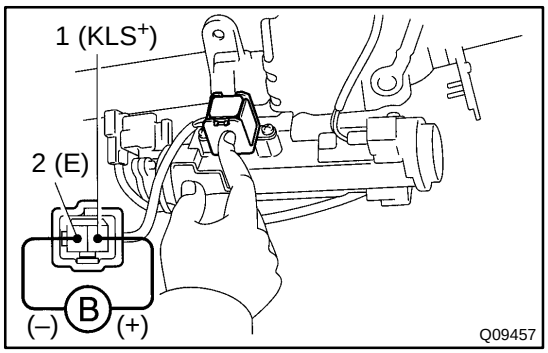
2. INSPECT KEY INTERLOCK SOLENOID

(a) Disconnect the solenoid connector.

(b) Using an ohmmeter, measure resistance between terminals.

Standard resistance: 12.5–16.5 Ω

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



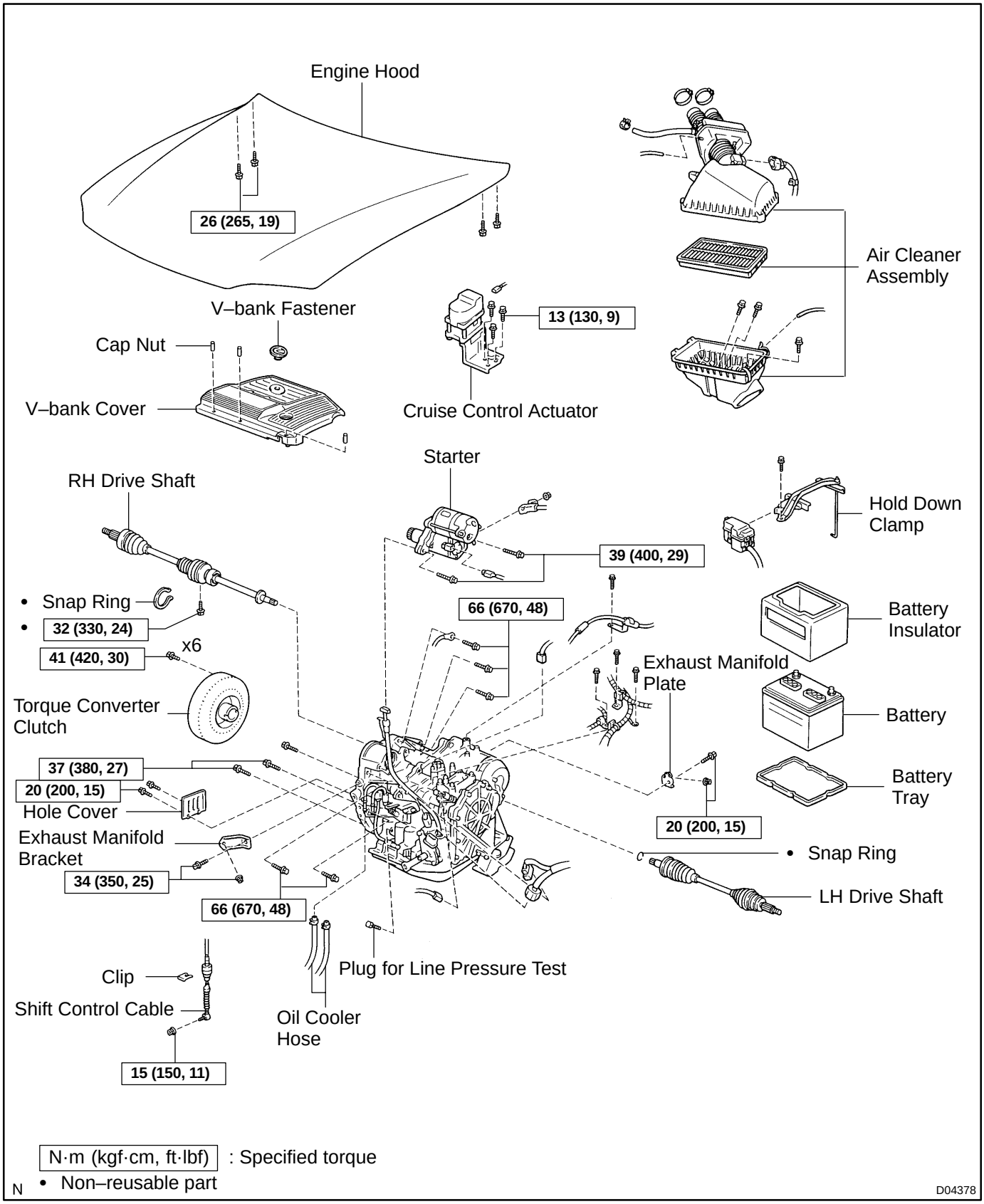
(c) Apply battery positive voltage between terminals. Check that an operation noise can be heard from the solenoid.

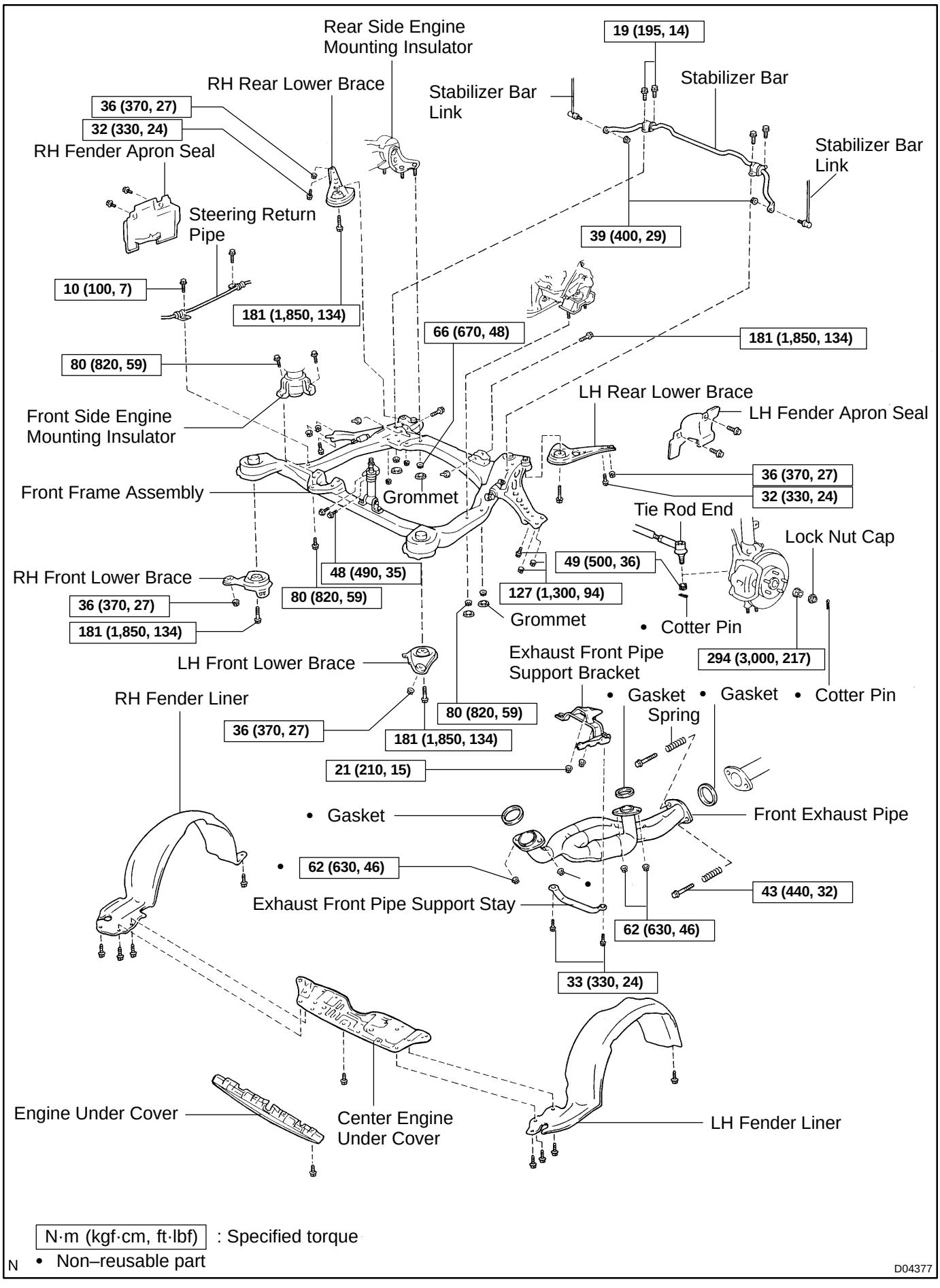
If the solenoid does not operated, replace the solenoid.

AUTOMATIC TRANSAXLE UNIT

AX0CV–01

COMPONENTS

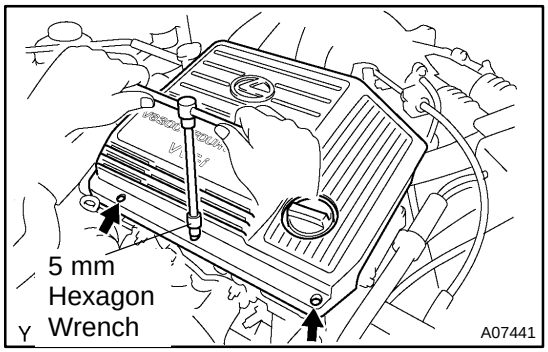



Rear Side Engine Mounting Insulator
19 (195, 14)
Stabilizer Bar
RH Rear Lower Brace
Stabilizer Bar Link
36 (370, 27)
32 (330, 24)
RH Fender Apron Seal
Stabilizer Bar Link
Steering Return Pipe
39 (400, 29)
10 (100, 7)
181 (1,850, 134)
66 (670, 48)
181 (1,850, 134)
80 (820, 59)
LH Rear Lower Brace
LH Fender Apron Seal
Front Side Engine Mounting Insulator
36 (370, 27)
32 (330, 24)
Front Frame Assembly
Grommet
Tie Rod End
Lock Nut Cap
49 (500, 36)
48 (490, 35)
RH Front Lower Brace
80 (820, 59)
127 (1,300, 94)
36 (370, 27)
Grommet
• Cotter Pin
181 (1,850, 134)
Exhaust Front Pipe Support Bracket
294 (3,000, 217)
LH Front Lower Brace
• Gasket • Gasket • Cotter Pin
RH Fender Liner
Spring
80 (820, 59)
36 (370, 27)
181 (1,850, 134)
21 (210, 15)
• Gasket
Front Exhaust Pipe
• 62 (630, 46)
43 (440, 32)
Exhaust Front Pipe Support Stay
62 (630, 46)
33 (330, 24)
Engine Under Cover
Center Engine Under Cover
LH Fender Liner
N·m (kgf·cm, ft·lbf) : Specified torque
N • Non–reusable part
D04377

AX0CW–01

REMOVAL

1. REMOVE ENGINE HOOD (See page BO–6)

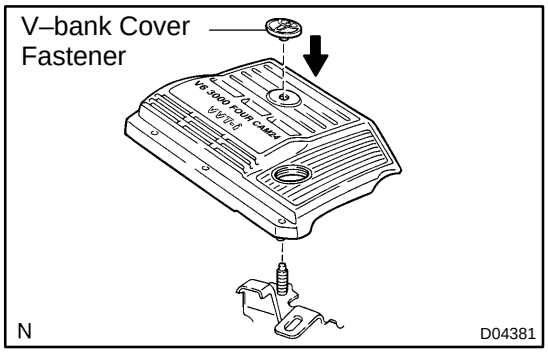


2. REMOVE V–BANK COVER

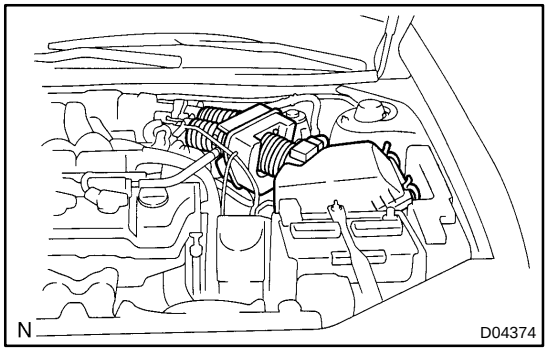
(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Turn the V–bank cover fastener counterclockwise and loosen it.

(c) Remove the V–bank cover.

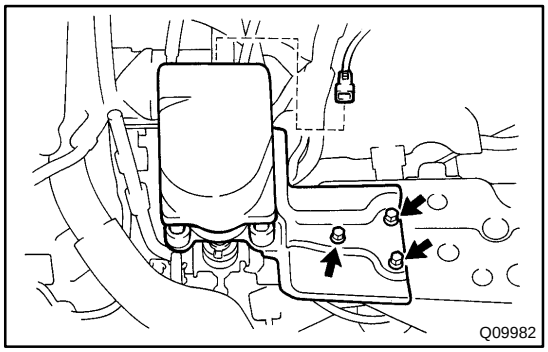


HINT:
At the time of installation, please refer to the following item.
When installing the V–bank cover fastener, remove the fastener once, then position and push in it.



3. REMOVE AIR CLEANER ASSEMBLY

4. REMOVE BATTERY

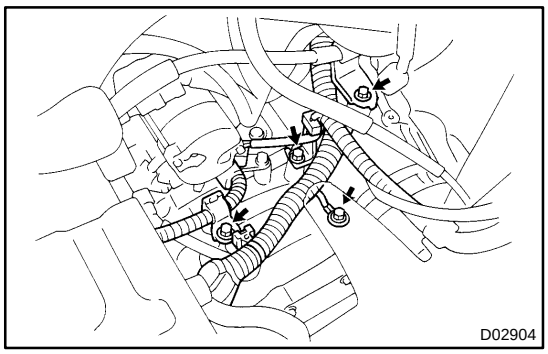


5. REMOVE CRUISE CONTROL ACTUATOR

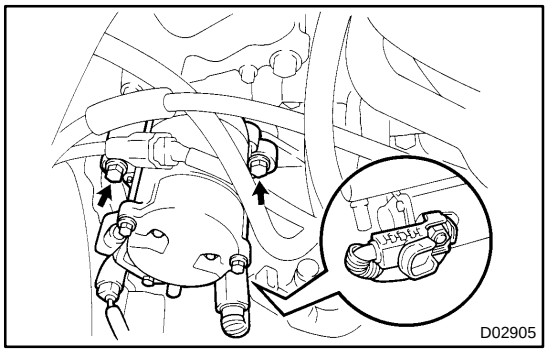
(a) Disconnect the connector.

(b) Remove the 3 bolts and disconnect cruise control actuator with the bracket.

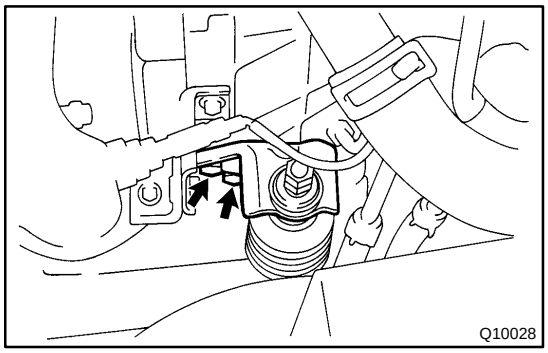
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)



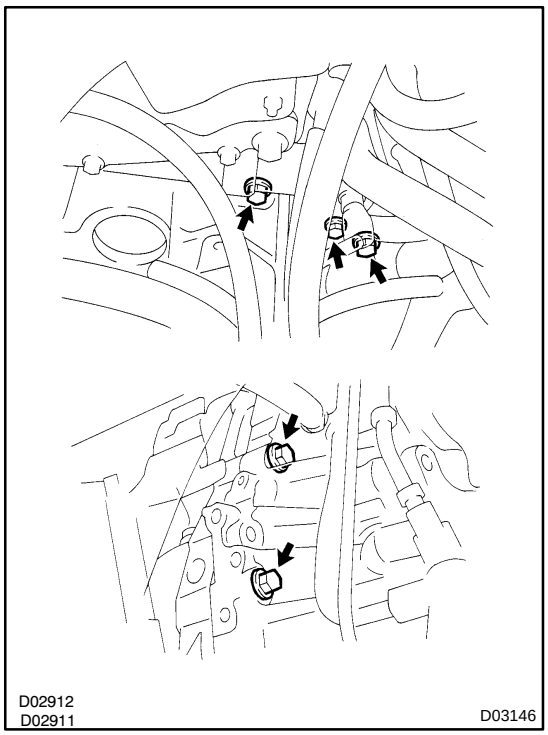
6. DISCONNECT 2 SPEED SENSOR CONNECTORS
7. REMOVE 2 WIRE HARNESS MOUNTING BOLTS
8. REMOVE GROUND TERMINAL MOUNTING BOLT
9. REMOVE SHIFT CABLE CLAMP



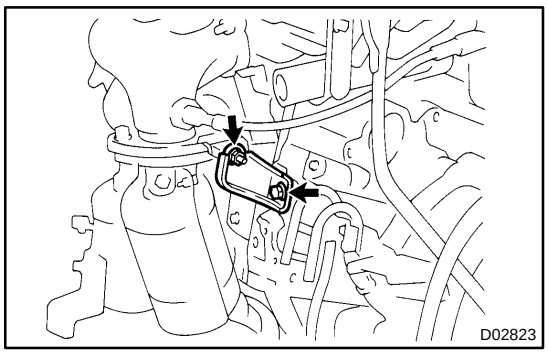
10. REMOVE STARTER
(a) Disconnect the connector.
(b) Remove the 2 starter mounting bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(c) Remove the nut and disconnect the terminal.
(d) Remove the starter.



11. REMOVE 2 ENGINE MOUNTING ABSORBER BRACKET BOLTS
Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)



12. REMOVE 5 TRANSAXLE UPPER SIDE MOUNTING BOLTS
(a) Remove the 5 transaxle upper side mounting bolts.
Torque: 66 N·m (670 kgf·cm, 48 ft·lbf)
(b) Disconnect the ground cable.

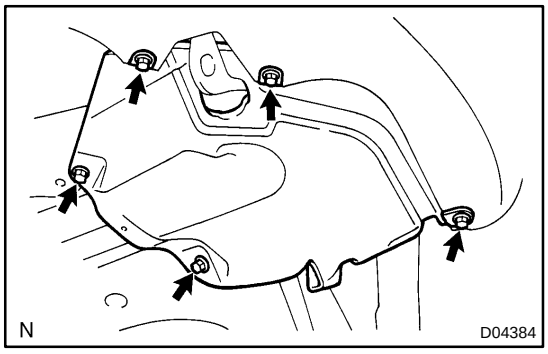


13. REMOVE EXHAUST MANIFOLD BRACKET MOUNTING BOLT
Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)

14. RAISE AND SUPPORT VEHICLE SECURELY

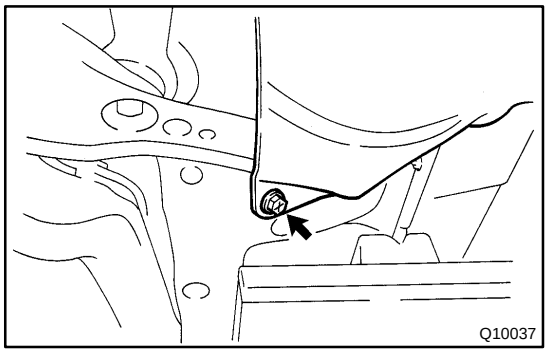
15. REMOVE LH AND RH FRONT WHEELS
Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

16. REMOVE DRAIN PLUG AND DRAIN ATF



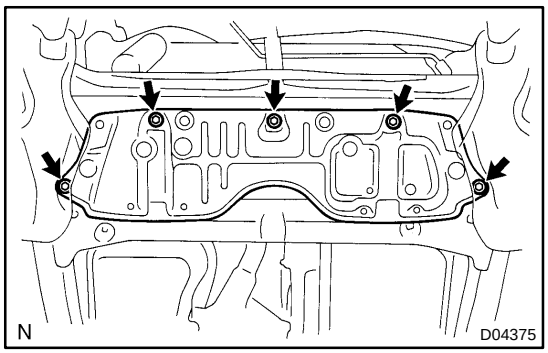
17. REMOVE ENGINE UNDER COVER

(a) Remove the 10 screws and turn over the front side of the LH and RH fender liners.



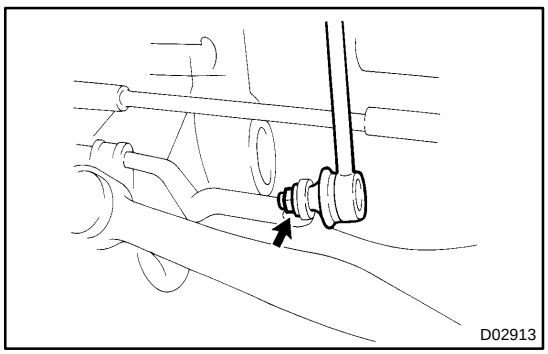
(b) Remove the 2 screws and turn over the rear side of LH and RH fender liners.

(c) Remove the engine under cover.

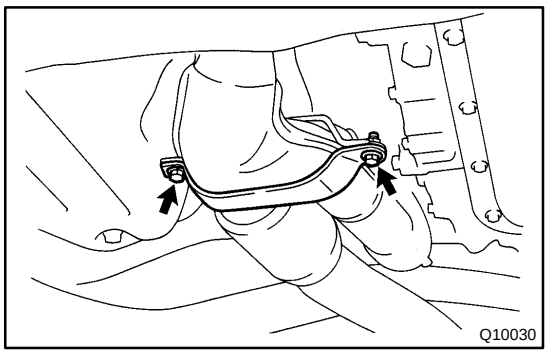


(d) Remove the 5 bolts and center engine under cover.

18. REMOVE LH AND RH FRONT DRIVE SHAFTS (See page SA–16)



19. DISCONNECT LH AND RH STABILIZER BAR LINKS (See page SA–41)



20. REMOVE FRONT EXHAUST PIPE

(a) Remove the 2 bolts and exhaust front pipe support stay.
Torque: 33 N·m (330 kgf·cm, 24 ft·lbf)

(b) Remove the 4 nuts from the exhaust manifold.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)

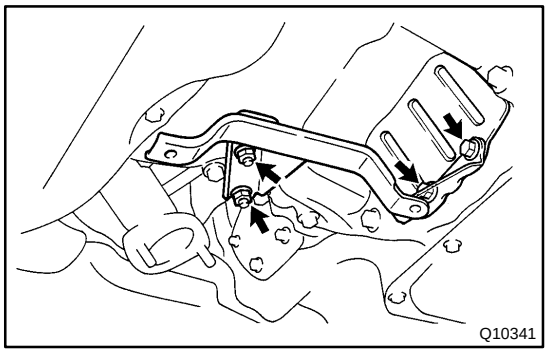
HINT:
At the time of installation, please refer to the following item.
Replace the used nuts with new once.

(c) Remove the 2 bolts and springs.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

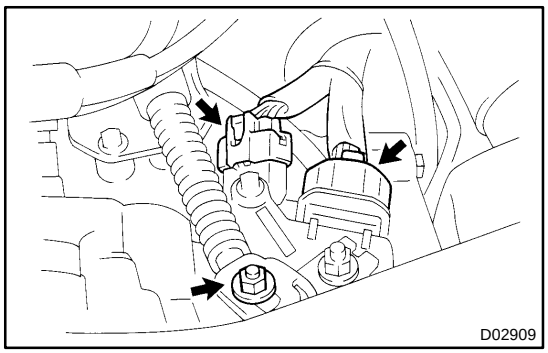
HINT:
At the time of installation, please refer to the following item.
Replace the used nuts with new once.

(d) Remove the 3 gaskets.

HINT:
At the time of installation, please refer to the following item.
Replace the used gaskets with new once.



(e) Remove the 2 nuts, bolts, exhaust front pipe support bracket and hole cover.
Torque:
Exhaust front pipe support bracket mounting nut:
21 N·m (210 kgf·cm, 15 ft·lbf)
Hole cover mounting bolt:
20 N·m (200 kgf·cm, 15 ft·lbf)

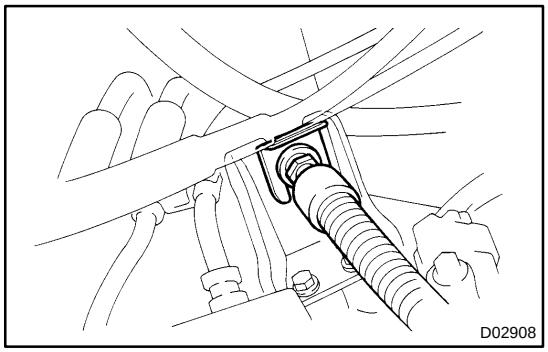


21. DISCONNECT PARK/NEUTRAL POSITION SWITCH CONNECTOR

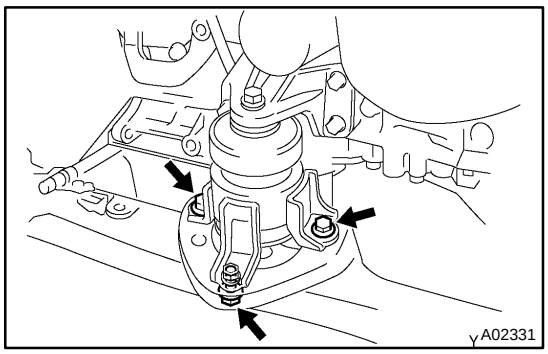
22. DISCONNECT SOLENOID CONNECTOR

23. DISCONNECT SHIFT CONTROL CABLE

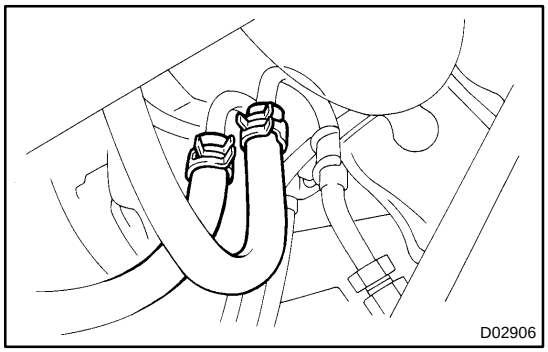
(a) Remove the nut and disconnect the shift control cable from the lever.
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



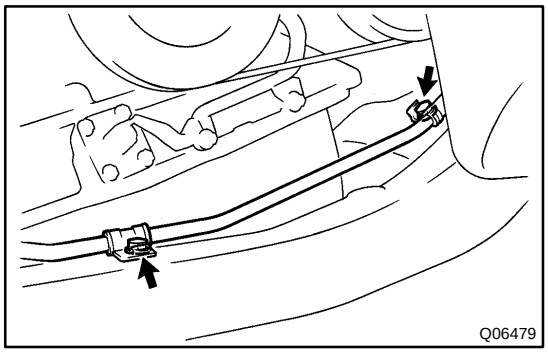
(b) Remove the clip and disconnect the shift control cable from the bracket.



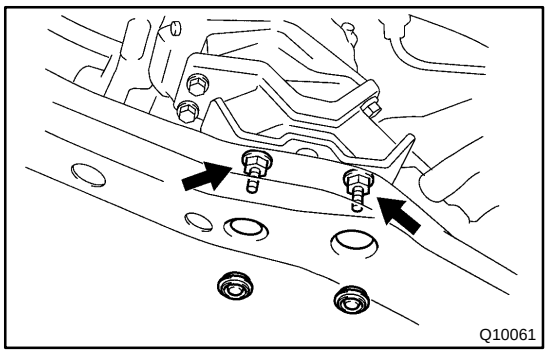
24. REMOVE 3 FRONT SIDE ENGINE MOUNTING BOLTS
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



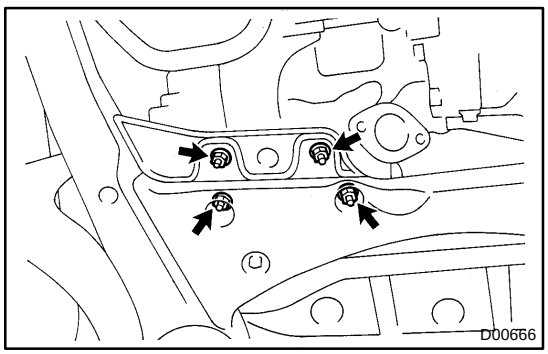
25. DISCONNECT OIL COOLER HOSE
Loosen the 2 clamps and disconnect the 2 oil cooler hoses.



26. DISCONNECT STEERING RETURN PIPE
Remove the 2 bolts and disconnect the steering return pipe.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)

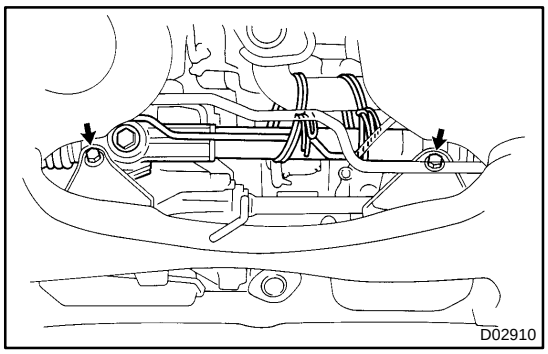


27. REMOVE LEFT SIDE TRANSAXLE MOUNTING NUT
Remove the 2 grommets and nuts.
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



28. REMOVE REAR SIDE ENGINE MOUNTING NUT
Remove the 2 grommets and 4 nuts.
Torque: 66 N·m (670 kgf·cm, 48 ft·lbf)

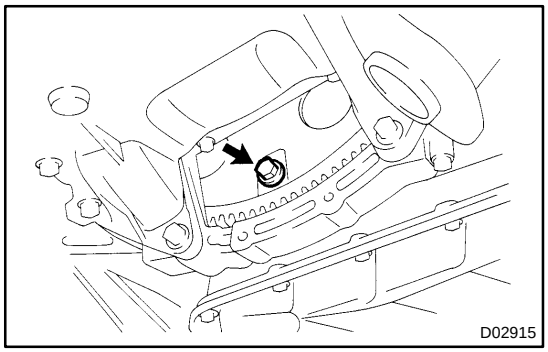
29. REMOVE 4 FRONT STABILIZER BAR BRACKET MOUNTING BOLTS
Torque: 19 N·m (195 kgf·cm, 14 ft·lbf)



30. TIE STEERING GEAR ASSEMBLY WITH CODE OR EQUIVALENT TO SUSPEND ASSEMBLY SECURELY, AS SHOWN

31. REMOVE 2 STEERING GEAR ASSEMBLY MOUNTING BOLTS

Torque: 181 N·m (1,850 kgf·cm, 134 ft·lbf)



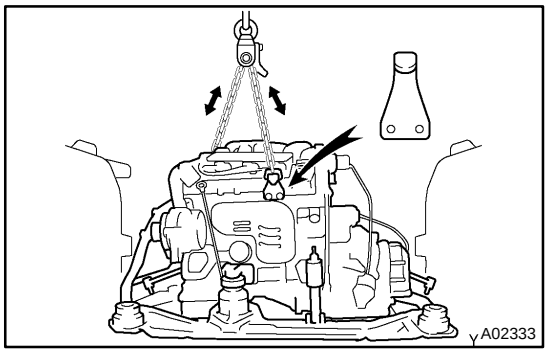
32. REMOVE TORQUE CONVERTER CLUTCH MOUNTING BOLT

Turn the crankshaft to gain access to each bolt, remove the 6 bolts with holding the crankshaft pulley bolt with a wrench.

Torque: 41 N·m (420 kgf·cm, 30 ft·lbf)

HINT:

At the time of installation, please refer to the following item.
First install green colored bolt and then the 5 other bolts.



33. ATTACH ENGINE SLINK DEVICE TO ENGINE HANGER

(a) Install the No.2 engine hanger in the correct direction.

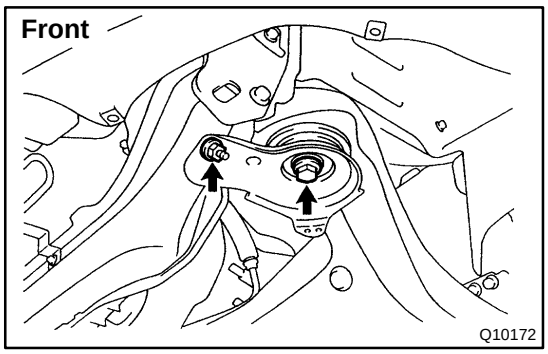
Parts No.:
No.2 engine hanger: 12282–20020
Bolt: 91621–60822
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

(b) Attach the engine chain hoist to the engine hangers.

CAUTION:
Do not attempt to hang the engine by hooking the chain to any other part.

(c) Support the front frame assembly with a jack.

34. SUPPORT TRANSAXLE WITH JACK

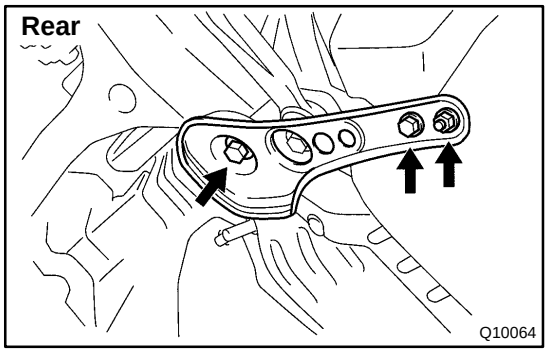


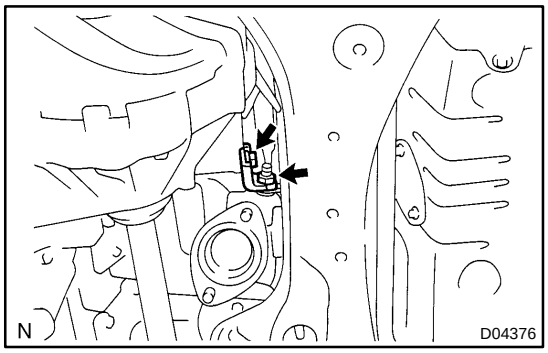
35. REMOVE FRONT FRAME ASSEMBLY

(a) Remove the 6 bolts and 4 nuts.

Torque:
19 mm head bolt: 181 N·m (1,850 kgf·cm, 134 ft·lbf)
14 mm head bolt: 32 N·m (330 kgf·cm, 24 ft·lbf)
Nut: 36 N·m (370 kgf·cm, 27 ft·lbf)

(b) Remove the front frame assembly.

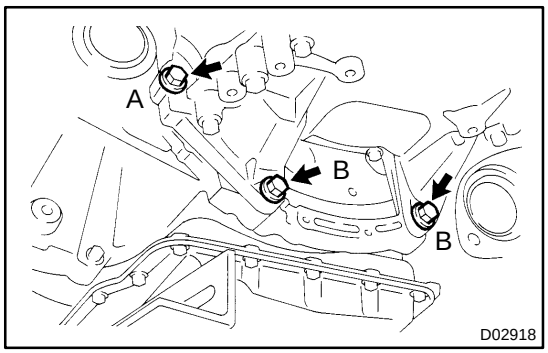




36. REMOVE EXHAUST MANIFOLD PLATE

Remove the bolt, nut and exhaust manifold plate.

Torque: 20 N·m (200 kgf·cm, 15 ft·lbf)



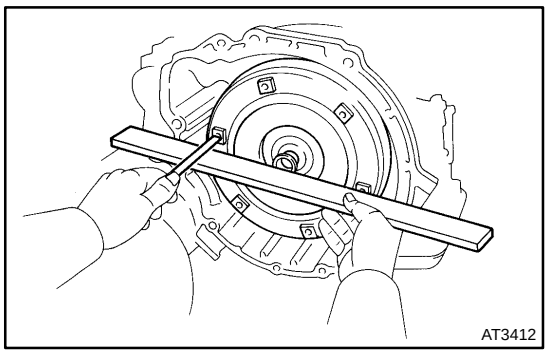
37. REMOVE TRANSAXLE 3 LOWER SIDE MOUNTING BOLTS

Torque:
A bolt: 48 N·m (490 kgf·cm, 35 ft·lbf)
B bolt: 37 N·m (380 kgf·cm, 27 ft·lbf)

38. REMOVE TRANSAXLE ASSEMBLY

Separate the transaxle from engine, and lower the transaxle.

AX0CX–01



INSTALLATION

1. CHECK TORQUE CONVERTER CLUTCH INSTALLATION

Using calipers and a straight edge, measure the distance between the installed surface and the front surface of the transaxle housing.

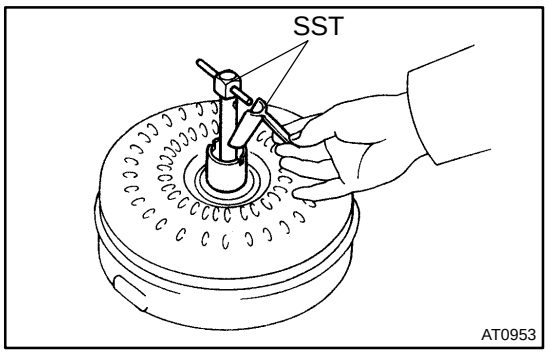
Correct distance: More than 12.75 mm (0.5020 in.)

2. TRANSAXLE INSTALLATION

Installation is in the reverse order of removal (See page AX–16).

HINT:

- After installation, adjust the shift control cable and park/neutral position switch (See page DI–163).
- Fill ATF and check the fluid level (See page DI–163).
- Perform the test drive of the vehicle.



TORQUE CONVERTER CLUTCH AND DRIVE PLATE

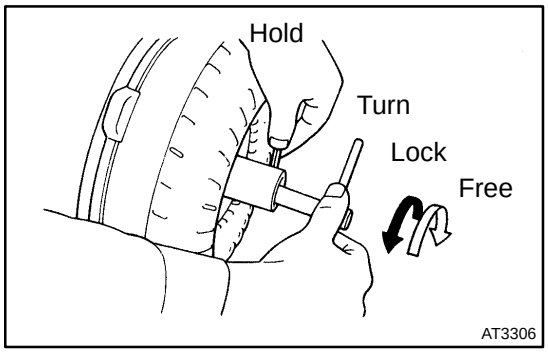
AX0CU–01

INSPECTION

1. INSPECT ONE–WAY CLUTCH

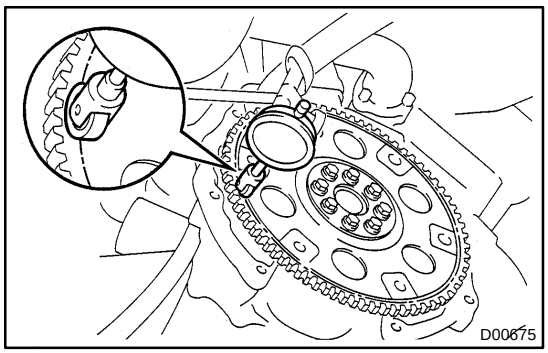
(a) Install SST into the inner race of the one–way clutch.
SST 09350–32014 (09351–32010)

(b) Install SST so that it fits in the notch of the converter hub and outer race of the one–way clutch.
SST 09350–32014 (09351–32020)



(c) With the torque converter clutch setting up on its side, check that the clutch locks when turned counterclockwise, and rotates smoothly clockwise.

If necessary, clean the converter and retest the clutch. Replace the converter clutch if the clutch still fails the test.



2. MEASURE DRIVE PLATE RUNOUT AND INSPECT RING GEAR

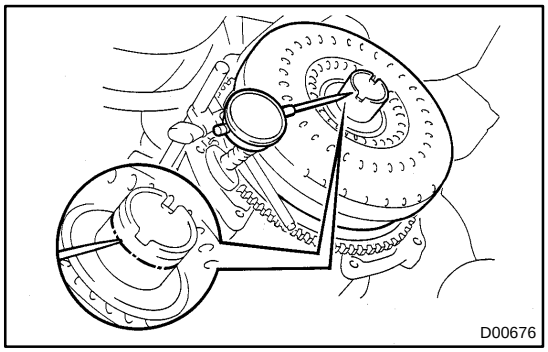
(a) Set up a dial indicator and measure the drive plate runout.

(b) Check the damage of the ring gear.

Maximum runout: 0.20 mm (0.0079 in.)

If the runout is not within the specification or ring gear is damaged, replace the drive plate.

Torque: 83 N·m (850 kgf·cm 61 ft·lbf)



3. MEASURE TORQUE CONVERTER CLUTCH SLEEVE RUNOUT

Temporarily mount the torque converter clutch on the drive plate. Set a dial indicator and measure the torque converter clutch sleeve runout.

Maximum runout: 0.30 mm (0.0118 in.)

If the runout is not within the specification, try to correct by reorienting the installation of the converter.

HINT:
Mark the position of the converter clutch to ensure the installation is correctly performed.

HOW TO USE THIS MANUAL

IN047-01

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.

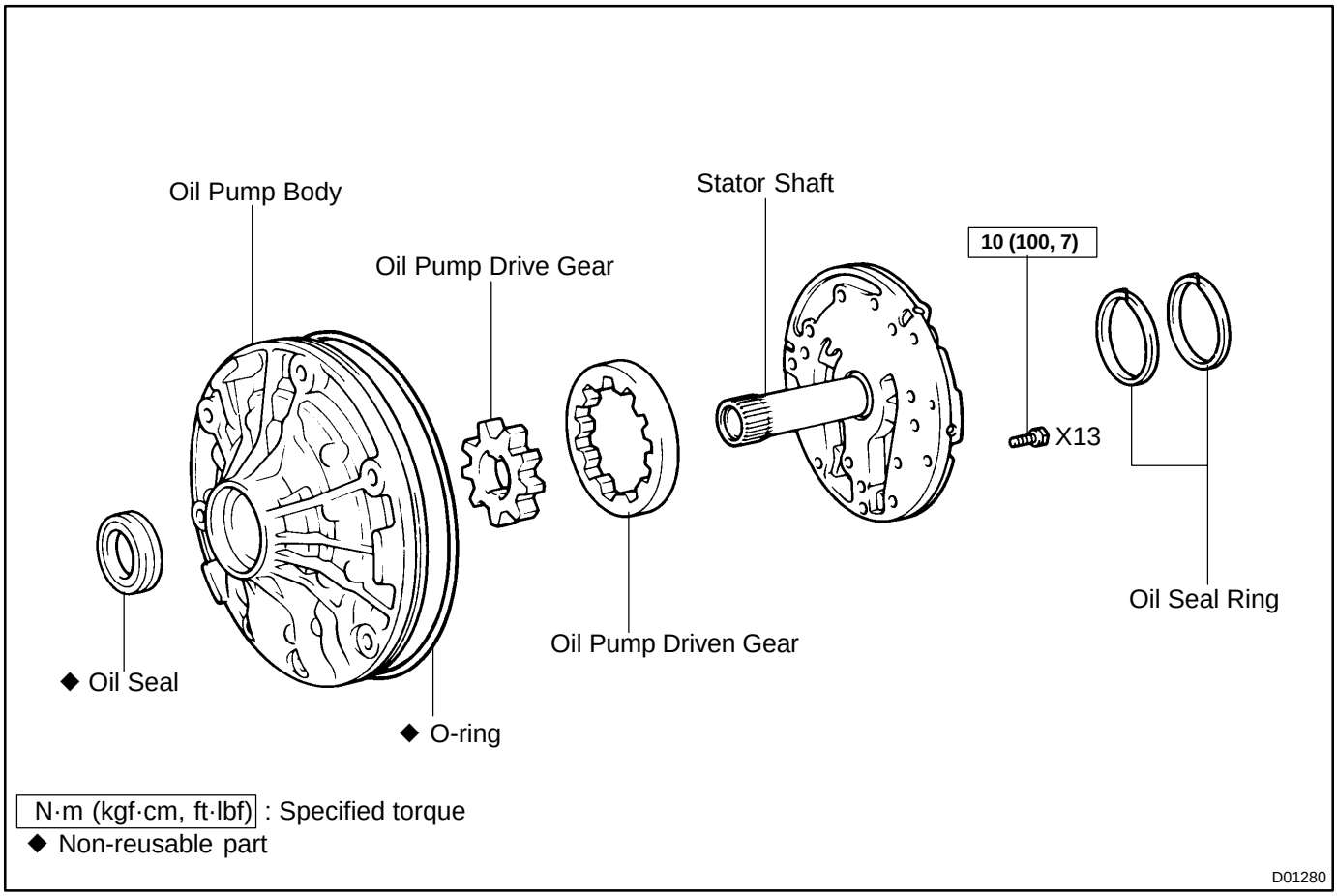
2. PREPARATION

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.

3. REPAIR PROCEDURES

Most repair operations begin with an overview illustration. It identifies the components and shows how the parts fit together.

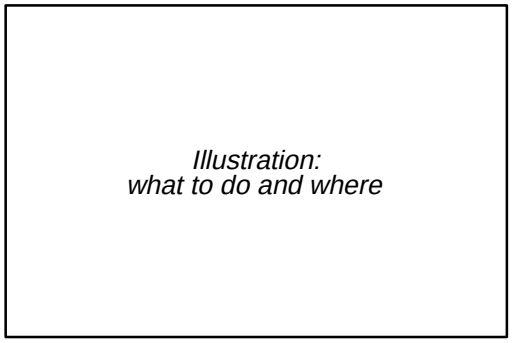
Example:



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.

4. REFERENCES

References have been kept to a minimum. However, when they are required you are given the page to refer to.

5. 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 at the end of each section, for quick reference.

6. CAUTIONS, NOTICES, HINTS:

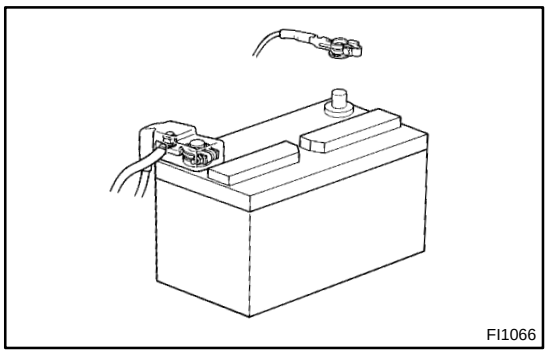
- ○ CAUTIONS are presented in bold type, and indicate there is a possibility of injury to you or other people.
- ○ NOTICES are also presented in bold type, and indicate the possibility of damage to the components being repaired.
- ○ HINTS are separated from the text but do not appear in bold. They provide additional information to help you perform the repair efficiently.

7. 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)


FI1066

REPAIR INSTRUCTIONS

IN048-01

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) Observe the following operations:

(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, always disconnect the negative (-) terminal cable which is grounded to the vehicle body.

(3) To prevent damage to the 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 with the nut loose, 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 secure and correct.

(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.

(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, or loosened or caused to move in any way, it must be precoated with the specified adhesive.

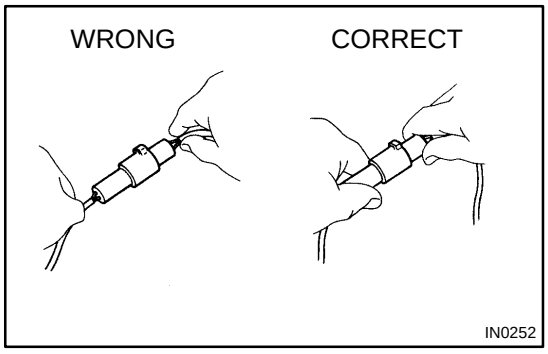
(2) When reusing precoated parts, clean off the old adhesive and dry with compressed air. Then apply the specified seal lock adhesive to the bolt, nut or threads.

(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 the preparation of AT section.



(j) To pull apart electrical connectors, pull the connector itself, not the wires.

IN049-03

ABBREVIATIONS USED IN THIS MANUAL

Abbreviations	Meaning
A/X	Automatic Transaxle
ATF	Automatic Transaxle Fluid
B_1	2nd brake
B_2	1st & reverse brake
B_3	U/D brake
C_1	Forward Clutch
C_2	Direct Clutch
C_3	Underdrive Clutch
D	Disc
F	Flange
F_1	No.1 One-way Clutch
F_2	No.2 One-way Clutch
FIPG	Formed in Place Gasket
MP	Multipurose
O/D	Overdrive
P	Plate
SSM	Special Service Materials
SST	Special Service Tools
U/D	Underdrive
w/	with
w/o	without
1st	First
2nd	Second

IN03Q-01

GLOSSARY OF SAE AND LEXUS TERMS

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

SAE ABBREVIATIONS	SAE TERMS	LEXUS TERMS ( )--ABBREVIATIONS
A/C	Air Conditioning	Air Conditioner
ACL	Air Cleaner	Air Cleaner
AIR	Secondary Air Injection	Air Injection (AI)
AP	Accelerator Pedal	-
B+	Battery Positive Voltage	+B, Battery Voltage
BARO	Barometric Pressure	-
CAC	Charge Air Cooler	Intercooler
CARB	Carburetor	Carburetor
CFI	Continuous Fuel Injection	-
CKP	Crankshaft Position	Crank Angle
CL	Closed Loop	Closed Loop
CMP	Camshaft Position	Cam Angle
CPP	Clutch Pedal Position	-
CTOX	Continuous Trap Oxidizer	-
CTP	Closed Throttle Position	-
DFI	Direct Fuel Injection (Diesel)	Direct Injection (DI)
DI	Distributor Ignition	-
DLC1 DLC2 DLC3	Data Link Connector 1 Data Link Connector 2 Data Link Connector 3	1: Check Connector 2: Total Diagnosis Comunication Link (TDCL) 3: OBD II Diagnostic Connector
DTC	Diagnostic Trouble Code	Diagnostic Code
DTM	Diagnostic Test Mode	-
ECL	Engine Control Level	-
ECM	Engine Control Module	Engine ECU (Electronic Control Unit)
ECT	Engine Coolant Temperature	Coolant Temperature, Water Temperature (THW)
EEPROM	Electrically Erasable Programmable Read Only Memory	Electrically Erasable Programmable Read Only Memory (EEPROM), Erasable Programmable Read Only Memory (EPROM)
EFE	Early Fuel Evaporation	Cold Mixture Heater (CMH), Heat Control Valve (HCV)
EGR	Exhaust Gas Recirculation	Exhaust Gas Recirculation (EGR)
EI	Electronic Ignition	Distributorless Ignition (DI)
EM	Engine Modification	Engine Modification (EM)
EPROM	Erasable Programmable Read Only Memory	Programmable Read Only Memory (PROM)
EVAP	Evaporative Emission	Evaporative Emission Control (EVAP)
FC	Fan Control	-
FEEPROM	Flash Electrically Erasable Programmable Read Only Memory	-
FEPROM	Flash Erasable Programmable Read Only Memory	-
FF	Flexible Fuel	-
FP	Fuel Pump	Fuel Pump
GEN	Generator	Alternator
GND	Ground	Ground (GND)

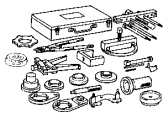
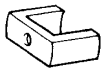
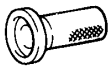
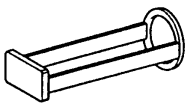
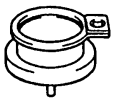
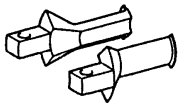
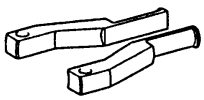
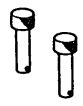
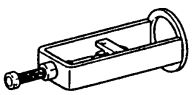
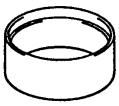
HO2S	Heated Oxygen Sensor	Heated Oxygen Sensor (HO2S)
IAC	Idle Air Control	Idle Speed Control (ISC)
IAT	Intake Air Temperature	Intake or Inlet Air Temperature
ICM	Ignition Control Module	-
IFI	Indirect Fuel Injection	Indirect Injection
IFS	Inertia Fuel-Shutoff	-
ISC	Idle Speed Control	-
KS	Knock Sensor	Knock Sensor
MAF	Mass Air Flow	Air Flow Meter
MAP	Manifold Absolute Pressure	Manifold Pressure Intake Vacuum
MC	Mixture Control	Electric Bleed Air Control Valve (EBCV) Mixture Control Valve (MCV) Electric Air Control Valve (EACV)
MDP	Manifold Differential Pressure	-
MFI	Multiport Fuel Injection	Electronic Fuel Injection (EFI)
MIL	Malfunction Indicator Lamp	Check Engine Light
MST	Manifold Surface Temperature	-
MVZ	Manifold Vacuum Zone	-
NVRAM	Non-Volatile Random Access Memory	-
O2S	Oxygen Sensor	Oxygen Sensor, O_2 Sensor (O_2S)
OBD	On-Board Diagnostic	On-Board Diagnostic (OBD)
OC	Oxidation Catalytic Converter	Oxidation Catalyst Converter (OC), CCo
OP	Open Loop	Open Loop
PAIR	Pulsed Secondary Air Injection	Air Suction (AS)
PCM	Powertrain Control Module	-
PNP	Park/Neutral Position	-
PROM	Programmable Read Only Memory	-
PSP	Power Steering Pressure	-
PTOX	Periodic Trap Oxidizer	Diesel Particulate Filter (DPF) Diesel Particulate Trap (DPT)
RAM	Random Access Memory	Random Access Memory (RAM)
RM	Relay Module	-
ROM	Read Only Memory	Read Only Memory (ROM)
RPM	Engine Speed	Engine Speed
SC	Supercharger	Supercharger
SCB	Supercharger Bypass	-
SFI	Sequential Multiport Fuel Injection	Electronic Fuel Injection (EFI), Sequential Injection
SPL	Smoke Puff Limiter	-
SRI	Service Reminder Indicator	-
SRT	System Readiness Test	-
ST	Scan Tool	-
TB	Throttle Body	Throttle Body
TBI	Throttle Body Fuel Injection	Single Point Injection Central Fuel Injection (Ci)
TC	Turbocharger	Turbocharger
TCC	Torque Converter Clutch	Torque Converter

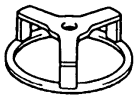
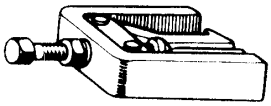
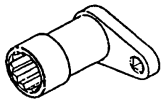
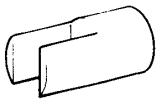
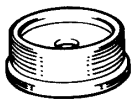
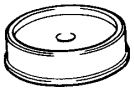
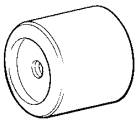
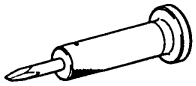
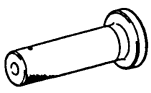
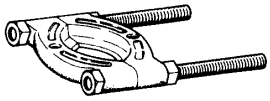
TCM	Transmission Control Module	Transmission ECU (Electronic Control Unit)
TP	Throttle Position	Throttle Position
TR	Transmission Range	-
TVV	Thermal Vacuum Valve	Bimetallic Vacuum Switching Valve (BVSV) Thermostatic Vacuum Switching Valve (TVSV)
TWC	Three-Way Catalytic Converter	Three-Way Catalytic (TWC) CC_{RO}
TWC+OC	Three-Way + Oxidation Catalytic Converter	CC_R + CCo
VAF	Volume Air Flow	Air Flow Meter
VR	Voltage Regulator	Voltage Regulator
VSS	Vehicle Speed Sensor	Vehicle Speed Sensor (Read Switch Type)
WOT	Wide Open Throttle	Full Throttle
WU-OC	Warm Up Oxidation Catalytic Converter	-
WU-TWC	Warm Up Three-Way Catalytic Converter	Manifold Converter
3GR	Third Gear	-
4GR	Fourth Gear	-

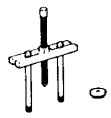
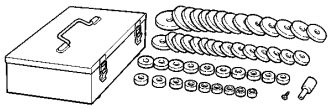
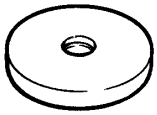
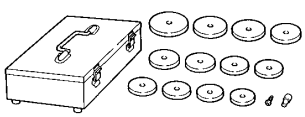
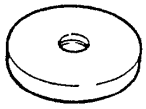
AUTOMATIC TRANSAXLE

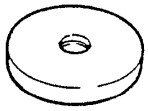
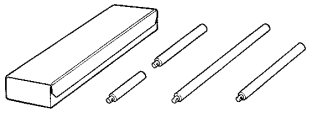
PP1TS-01

SST (Special Service Tools)

	09308-00010	Oil Seal Puller	
	09350-32014	TOYOTA Automatic Transmission Tool Set	
	(09351-32070)	No.2 Piston Spring Compressor	
	(09351-32140)	Oil Seal Replacer	
	09387-00020	Direct Clutch Wrench	
	09387-00030	Counter Drive Gear Holding Tool	
	09387-00040	Bearing Puller Assembly	
	(09387-01010)	Claw No.1	
	(09387-01020)	Claw No.2	
	(09387-01030)	Pin	
	(09387-01040)	Bearing Puller Body	
	09387-00050	Under Drive Gear Puller	

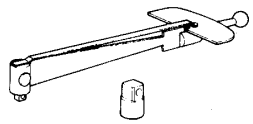
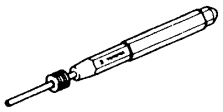
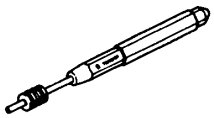
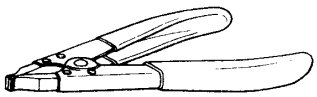
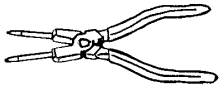
	09387-00060	Second Brake Wrench	
	09387-00070	First & Reverse Brake Wrench	
	09387-00080	Counter Drive Gear Nut Wrench	
	09514-3501 1	Rear Wheel Bearing Puller	
	09564-16020	Drive Pinion Lock Nut Wrench	
	09564-3201 1	Differential Preload Adaptor	
	09608-10010	Steering Knuckle Oil Seal Replacer	
	09608-32010	Steering Knuckle Oil Seal Replacer	
	09649-17010	Steering Knuckle Tool	
	09930-00010	Drive Shaft Nut Chisel	
	(09931-00010)	Handle	
	(09931-00020)	Nut Chisel	
	09950-00020	Bearing Remover	

	09950-00030	Bearing Remover Attachment	
	09950-60010	Replacer Set	
	(09951-00230)	Replacer 23	
	(09951-00320)	Replacer 32	
	(09951-00340)	Replacer 34	
	(09951-00350)	Replacer 35	
	(09951-00400)	Replacer 40	
	(09951-00450)	Replacer 45	
	(09951-00480)	Replacer 48	
	(09951-00500)	Replacer 50	
	(09951-00600)	Replacer 60	
	09950-60020	Replacer Set No.2	
	(09951-00810)	Replacer 81	

	(09951-00890) Replacer 89	
	09950-70010 Handle Set	
	(09951-07100) Handle 100	
	(09951-07150) Handle 150	

PP1TT-01

RECOMMENDED TOOLS

	09025-00010	Torque Wrench (30 kgf-cm)	
	09031-00030	Pin Punch .	
	09031-00040	Pin Punch .	
	09905-00012	Snap Ring No.1 Expander .	
	09905-00013	Snap Ring Pliers .	

PP1TU-01

EQUIPMENT

Dial indicator with magnetic base	
Feeler gauge	
Vernier calipers	
Torque wrench	
Plastic hammer	
Straight edge	
Seal packing 2403, THREE BOND 2403 or equivalent	
Seal packing 2430, THREE BOND 2430 or equivalent	

PP1TV-01

LUBRICANT

Item	Capacity	Classification
(U140E) Automatic transaxle fluid Dry fill Drain and refill	 8.25 liters (8.72 US qts, 7.26 Imp. qts) 3.5 liters (3.7 US qts, 3.1 Imp. qts)	ATF TYPE T-IV or equivalent

PP1TW-01

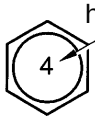
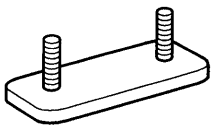
SSM (Special Service Materials)

	08826-00090	Seal Packing 1281, THREE BOND 1281 or equivalent (FIPG)

STANDARD BOLT

HOW TO DETERMINE BOLT STRENGTH

SS00F-01

	Mark	Class		Mark	Class
Hexagon head bolt	 4- 5- 6- 7- 8- 9- 10- 11-	4T 5T 6T 7T 8T 9T 10T 11T	Hexagon flange bolt w/ washer hexagon bolt	4 Protruding lines	9T
			Hexagon flange bolt w/ washer hexagon bolt	5 Protruding lines	10T
	No mark	4T	Hexagon flange bolt w/ washer hexagon bolt	6 Protruding lines	11T
Hexagon flange bolt w/ washer hexagon bolt	No mark	4T	Stud bolt		4T
Hexagon head bolt	2 Protruding lines	5T			
Hexagon flange bolt w/ washer hexagon bolt	2 Protruding lines	6T			6T
Hexagon head bolt	3 Protruding lines	7T	Welded bolt		4T
Hexagon head bolt	4 Protruding lines	8T			

V06821

SS00G-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	

V00079

AUTOMATIC TRANSAXLE

SERVICE DATA

SS0ZA-01

Oil pump		
Body clearance	STD	0.07 - 0.15 mm (0.0028 - 0.0059 in.)
	Max.	0.30 mm (0.0118 in.)
Tip clearance	STD	0.11 - 0.14 mm (0.0043 - 0.0055 in.)
	Max.	0.30 mm (0.0118 in.)
Side clearance	STD	0.02 - 0.04 mm (0.0008 - 0.0016 in.)
	Max.	0.10 mm (0.0039 in.)
Pump body bushing inside diameter	STD	38.12 - 38.13 mm (1.5008 - 1.5012 in.)
	Max.	38.18 mm (1.5031 in.)
Stator shaft bushing inside diameter	STD	21.50 - 21.52 mm (0.8465 - 0.8472 in.)
	Max.	21.57 mm (0.8492 in.)

Direct clutch		
Piston stroke		0.61 - 0.77 mm (0.0240 - 0.0303 in.)
Piston return spring free length		22.58 mm (0.8890 in.)
Flange thickness	Mark	
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)

Froward clutch		
Piston stroke		2.09 - 2.33 mm (0.0823 - 0.0917 in.)
Piston return spring free length		28.23 mm (1.1114 in.)
Multiple disc clutch hub bushing inside diameter	STD	23.03 - 23.04 mm (0.9067 - 0.9071 in.)
	Max.	23.09 mm (0.9091 in.)
Flange thickness	Mark	
	1	3.00 mm (0.1181 in.)
	2	3.15 mm (0.1240 in.)
	3	3.30 mm (0.1299 in.)
	4	3.45 mm (0.1358 in.)
	5	3.60 mm (0.1417 in.)

2nd brake		
Piston stroke		0.65 - 0.75 mm (0.0256 - 0.0295 in.)
Piston return spring free length		16.61 mm (0.6539 in.)
Flange thickness	Mark	
	1	3.0 mm (0.118 in.)
	2	3.1 mm (0.122 in.)
	3	3.2 mm (0.126 in.)
	4	3.3 mm (0.130 in.)
	5	3.4 mm (0.134 in.)
	6	3.5 mm (0.138 in.)
	7	3.6 mm (0.142 in.)

Input shaft	
End play	0.27 - 1.24 mm (0.0106 - 0.0417 in.)

U/D clutch	
Piston stroke	1.51 - 1.77 mm (0.0594 - 0.0697 in.)

U/D clutch drum bushing inside diameter		
	STD	37.06 - 37.08 mm (1.4591 - 1.4598 in.)
	Max.	37.13 mm (1.4618 in.)
Piston return spring free length		17.14 mm (0.6748 in.)
Flange thickness	Mark	
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)
	3	3.4 mm (0.134 in.)

U/D brake		
Piston stroke		1.81 - 2.07 mm (0.0713 - 0.0815 in.)
Piston return spring free length		13.24 mm (0.521 in.)
Flange thickness	Mark	
	1	3.0 mm (0.118 in.)
	2	3.2 mm (0.126 in.)
	3	3.4 mm (0.134 in.)

1st & reverse brake		
Piston stroke		1.10 - 1.24 mm (0.0433 - 0.0488 in.)
Piston return spring free length		17.61 mm (0.6933 in.)
Flange thickness	Mark	
	1	1.8 mm (0.071 in.)
	2	1.9 mm (0.075 in.)
	3	2.0 mm (0.079 in.)
	4	2.1 mm (0.083 in.)
	5	2.2 mm (0.087 in.)
	6	2.3 mm (0.091 in.)
	7	2.4 mm (0.094 in.)
	8	2.5 mm (0.098 in.)

Valve body spring			
Spring (Color)	Free length	Coil outer diameter	Total No. of coils
Upper valve body			
Rock-up relay valve (None)	29.25 mm (1.1516 in.)	9.7 mm (0.382 in.)	10.50
Rock -up control valve (Green)	23.95 mm (0.9429 in.)	5.4 mm (0.213 in.)	14.94
Secondary regulator valve (Blue)	58.35 mm (2.2972 in.)	8.7 mm (0.343 in.)	20.58
C-2 lock valve (Yellow)	33.65 mm (1.3248 in.)	7.4 mm (0.291 in.)	11.82
Solenoid modulator valve (Red)	62.40 mm (2.4567 in.)	9.8 mm (0.386 in.)	22.31
B-3 orifice control valve (Grey)	62.65 mm (2.4665 in.)	7.8 mm (0.307 in.)	19.60
B-1 lock valve (White)	37.40 mm (1.4724 in.)	9.8 mm (0.386 in.)	8.84
Clutch apply control valve (Purple)	40.25 mm (1.5846 in.)	9.0 mm (0.354 in.)	13.00
C-2 exhaust check valve (Orange)	40.25 mm (1.5846 in.)	7.4 mm (0.291 in.)	17.10

Lower valve body			
3-4 shift valve (None)	29.25 mm (1.1516 in.)	9.7 mm (0.382 in.)	10.5
B-1 control valve (Green)	48.55 mm (1.9114 in.)	9.8 mm (0.386 in.)	13.43
B-2 control valve (Pink)	57.05 mm (2.2461 in.)	9.8 mm (0.386 in.)	15.34
Primary regulator valve (Orange)	57.55 mm (2.2657 in.)	19.9 mm (0.783 in.)	7.87
C-2 control valve (Brown)	34.20 mm (1.3465 in.)	9.9 mm (0.390 in.)	8.79

Valve body key			
Key	Height	Width	Thickness
Upper valve body			
Lock-up relay valve	10.0 mm (0.394 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Lock-up control valve	10.0 mm (0.394 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Secondary regulator valve	8.0 mm (0.315 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
C-2 lock valve	10.0 mm (0.394 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Solenoid modulator valve	8.0 mm (0.315 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
B-3 orifice control valve	18.5 mm (0.728 in.)	-	2.3 mm (0.091 in.)
B-1 lock valve	8.0 mm (0.315 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
C-2 exhaust check valve	8.0 mm (0.315 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
3-way check valve	8.0 mm (0.315 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
Lower valve body			
3-4 shift valve	25.5 mm (1.004 in.)	-	2.3 mm (0.091in.)
B-1 control valve	14.5 mm (0.571 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
B-2 control valve	14.5 mm (0.571 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)
C-2 control valve	14.5 mm (0.571 in.)	5.0 mm (0.197 in.)	3.2 mm (0.126 in.)

Accumulator			
Spring		Free length/Outer diameter	Color
B_3	Inner	60.24 mm (2.3716 in.) / 15.9 mm (0.626 in.)	Green
	Outer	72.61 mm (2.8587 in.) / 16.7 mm (0.626 in.)	Blue
C_3		86.66 mm (3.4118 in.) / 19.2 mm (0.756in.)	Yellow
C_1		90.53 mm (3.5642 in.) / 18.5 mm (0.728 in.)	Red
C_2	Inner	47.58 mm (1.8732 in.) / 11.2 mm (0.441 in.)	Brown
	Outer	47.61 mm (1.8744 in.) / 12.0 mm (0.472 in.)	
B_1	Inner	43.88 mm (1.7276 in.) / 11.0 mm (0.433 in.)	Purple
	Outer	45.12 mm (1.7764 in.) / 11.8 mm (0.465 in.)	White

Differential	
Side gear backlash	0.05 - 0.20 mm (0.0020 - 0.0079 in.)
Thrust washer thickness	1.625 mm (0.06398 in.) 1.725 mm (0.06791 in.) 1.525 mm (0.07185 in.)

Preload (at starting) New bearing Used bearing		 0.8 - 1.3 N·m (8 - 13 kgf·cm, 6.9 - 11.3 in.·lbf) 0.4 - 0.6 N·m (4 - 6 kgf·cm, 3.5 - 5.2 in.·lbf)
Shim thickness	Mark	
	0	2.00 mm (0.0787 in.)
	1	2.05 mm (0.0807 in.)
	2	2.10 mm (0.0827 in.)
	3	2.15 mm (0.0846 in.)
	4	2.20 mm (0.0866 in.)
	5	2.25 mm (0.0886 in.)
	6	2.30 mm (0.0906 in.)
	7	2.35 mm (0.0925 in.)
	8	2.40 mm (0.0945 in.)
	9	2.45 mm (0.0965 in.)
	A	2.50 mm (0.0984 in.)
	B	2.55 mm (0.1004 in.)
	C	2.60 mm (0.1024 in.)
	D	2.65 mm (0.1043 in.)
	E	2.70 mm (0.1063 in.)
	F	2.75 mm (0.1083 in.)
	G	2.80 mm (0.1102 in.)
	H	2.85 mm (0.1122 in.)

SS0ZB-01

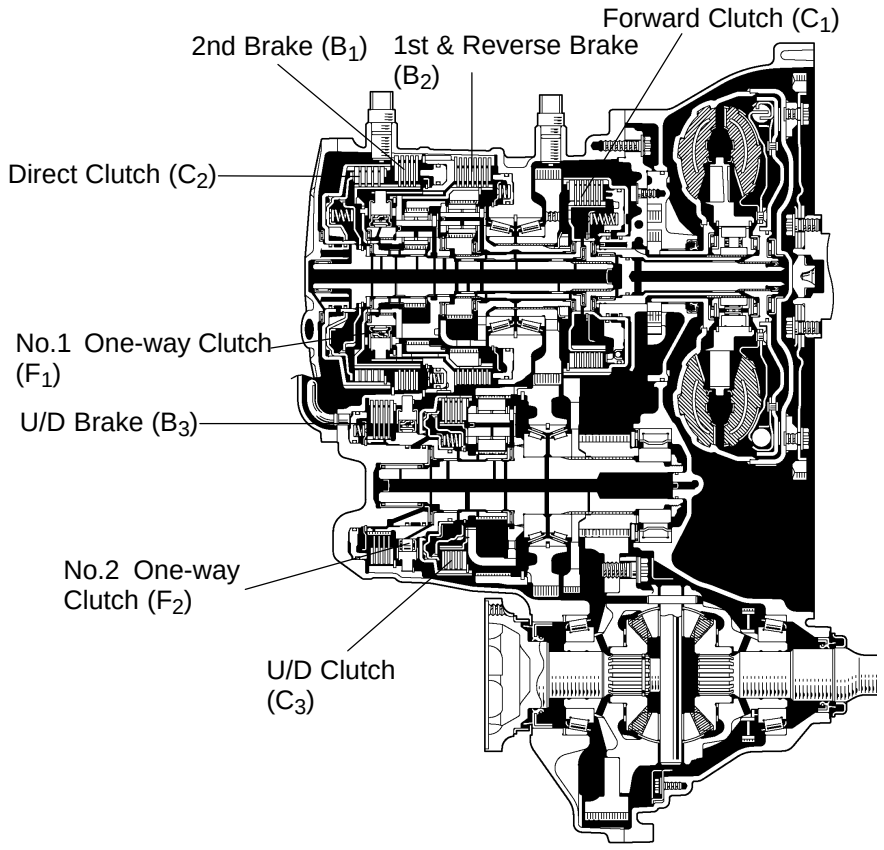
TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Separator x Transaxle housing	9.8	100	7
Apply pipe clamp x Transaxle housing	9.8	100	7
Apply pipe clamp x Transaxle case	5.4	55	48 in.·lbf
Transaxle rear cover x Transaxle case	24.5	250	18
Parking pawl shaft clamp x Transaxle case	9.8	100	7
Oil pump x Transaxle case	22	226	16
Parking bracket x Transaxle case	20	205	15
Detent spring x Transaxle case	12	120	9
Valve body x Transaxle case	11	110	8
Oil strainer x Valve body	11	110	8
Transaxle solenoid wire x Transaxle case	5.4	55	48 in.·lbf
ATF temperature sensor clamp x Valve body	6.6	67	58 in.·lbf
Oil pan x Transaxle case	7.8	80	69 in.·lbf
Counter gear speed sensor x Transaxle case	11.3	115	8
Input turbin speed sensor x Transaxle case	11.3	115	8
Union	27	276	20
Elbow	27	276	20
Park/neutral start switch Bolt: Nut:	5.4 6.9	55 70	48 in.·lbf 61 in.·lbf
Control shaft lever	6.9	70	61 in.·lbf
Counter drive gear lock nut	280	2855	207
U/D output shaft lock nut	262 (280)	2,672 (2,855)	194 (207)
Differential ring gear x Differential case	96.5	985	71

AUTOMATIC TRANSAXLE SYSTEM

AX0AG-02

OPERATION

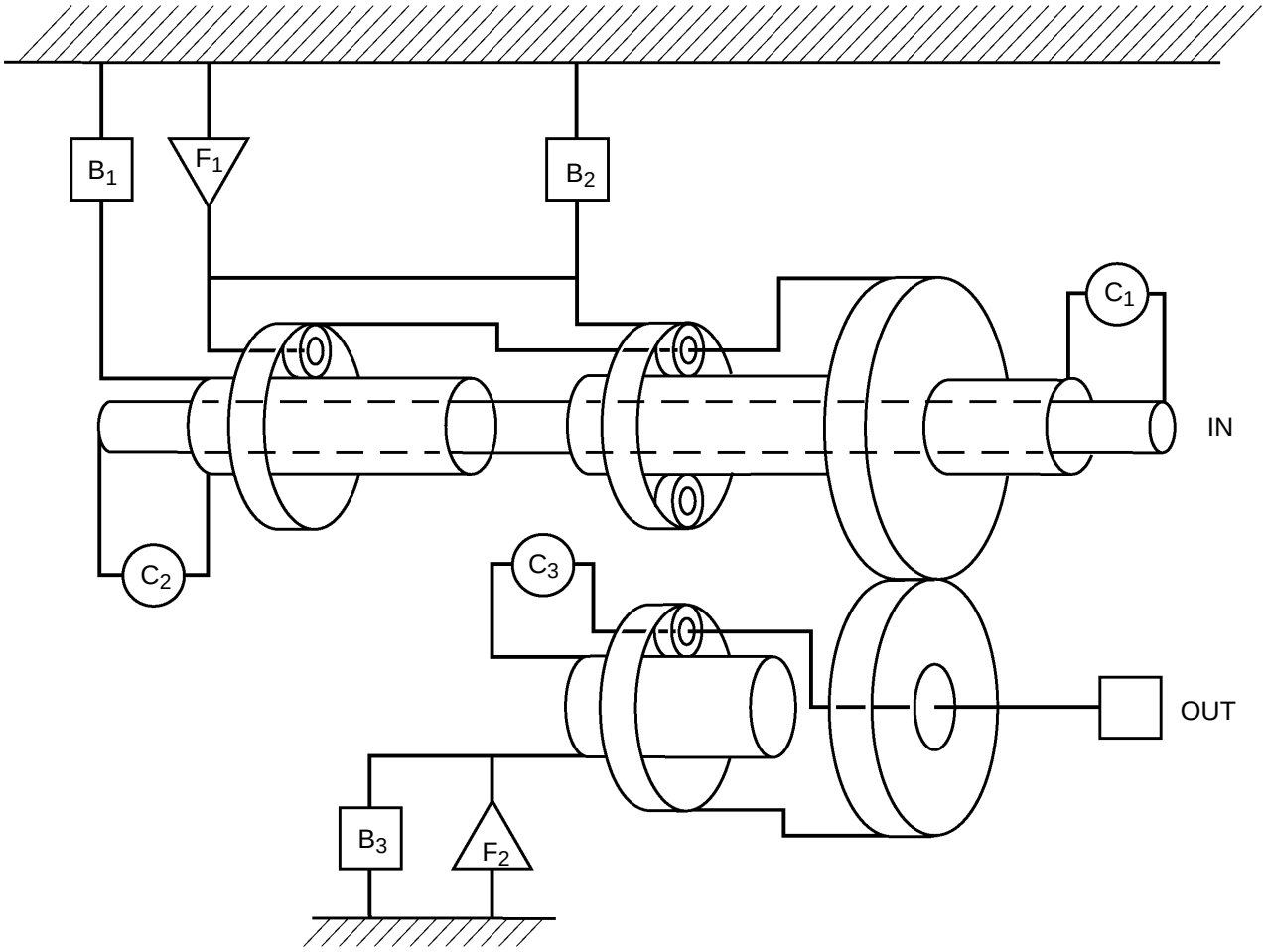


D03856

○ ... Operating

Shift lever position	Gear position	C_1	C_2	C_3	B_1	B_2	B_3	F_1	F_2
P	Parking						○		
R	Reverse		○			○	○		
N	Neutral						○		
D	1st	○					○	○	○
	2nd	○			○		○		○
	3rd	○	○				○		○
	O/D	○	○	○					
2	1st	○					○	○	○
	2nd	○			○	○	○		○
L	1st	○					○	○	○

FUNCTION OF COMPONENTS

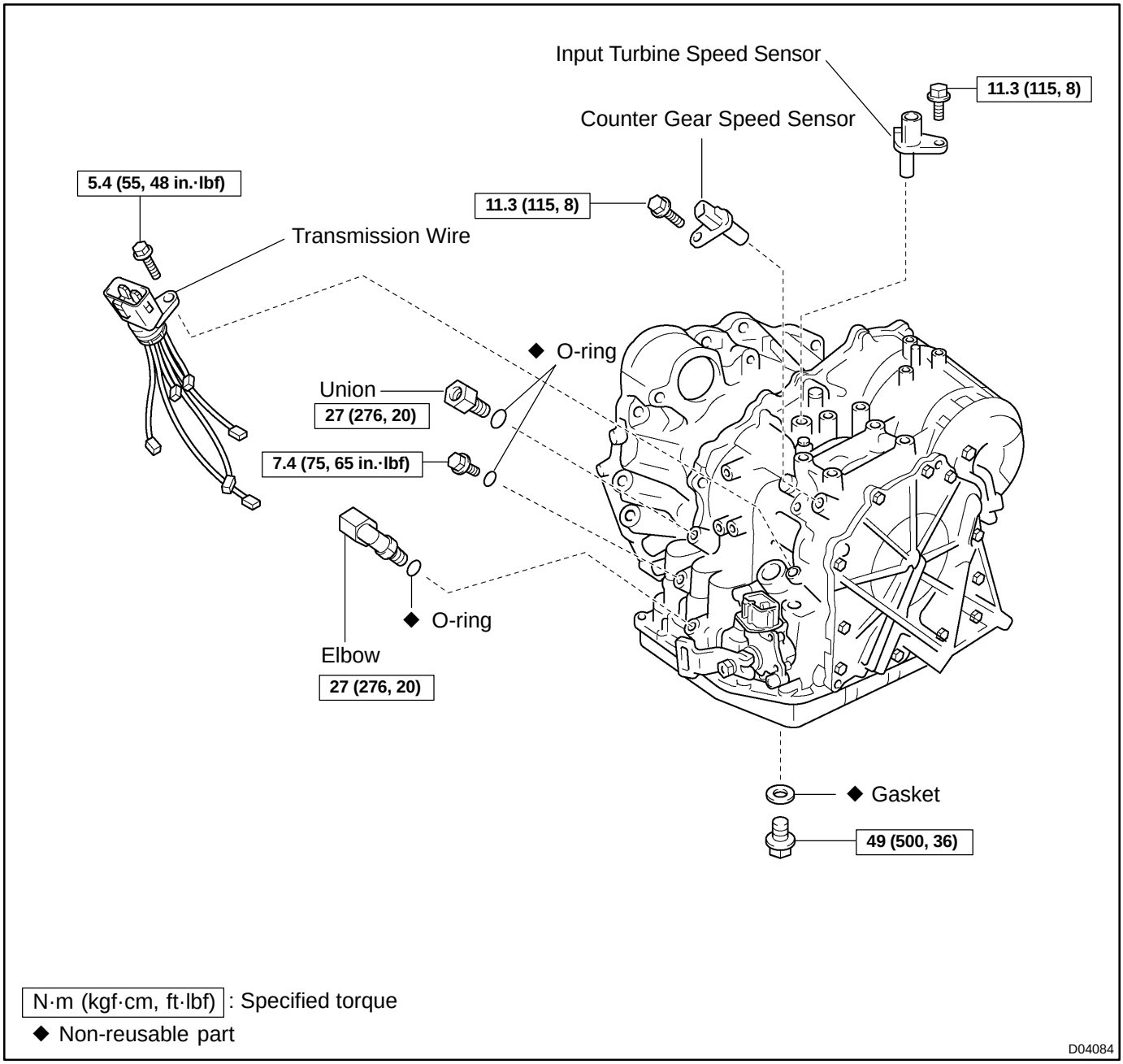


Component		Function
C_1	Forward Clutch	Connects input shaft and front planetary sun gear.
C_2	Direct Clutch	Connects input shaft and rear planetary sun gear.
C_3	U/D Clutch	Connects U/D sun gear and U/D planetary carrier.
B_1	2nd Brake	Prevents rear planetary sun gear from turning either clockwise or counterclockwise.
B_2	1st & Reverse Brake	Prevents rear planetary carrier and front planetary ring gear from turning either clockwise or counterclockwise.
B_3	U/D Brake	Prevents U/D sun gear from turning either clockwise or counterclockwise.
F_1	No.1 One-way Clutch	Prevents rear planetary carrier from turning counterclockwise.
F_2	No.2 One-way Clutch	Prevents U/D planetary sun gear from turning clockwise.
Planetary Gears		These gears change the route through which driving force is transmitted, in accordance with the operation of each clutch and brake, in order to increase or reduce the input and output speed.

COMPONENT PARTS

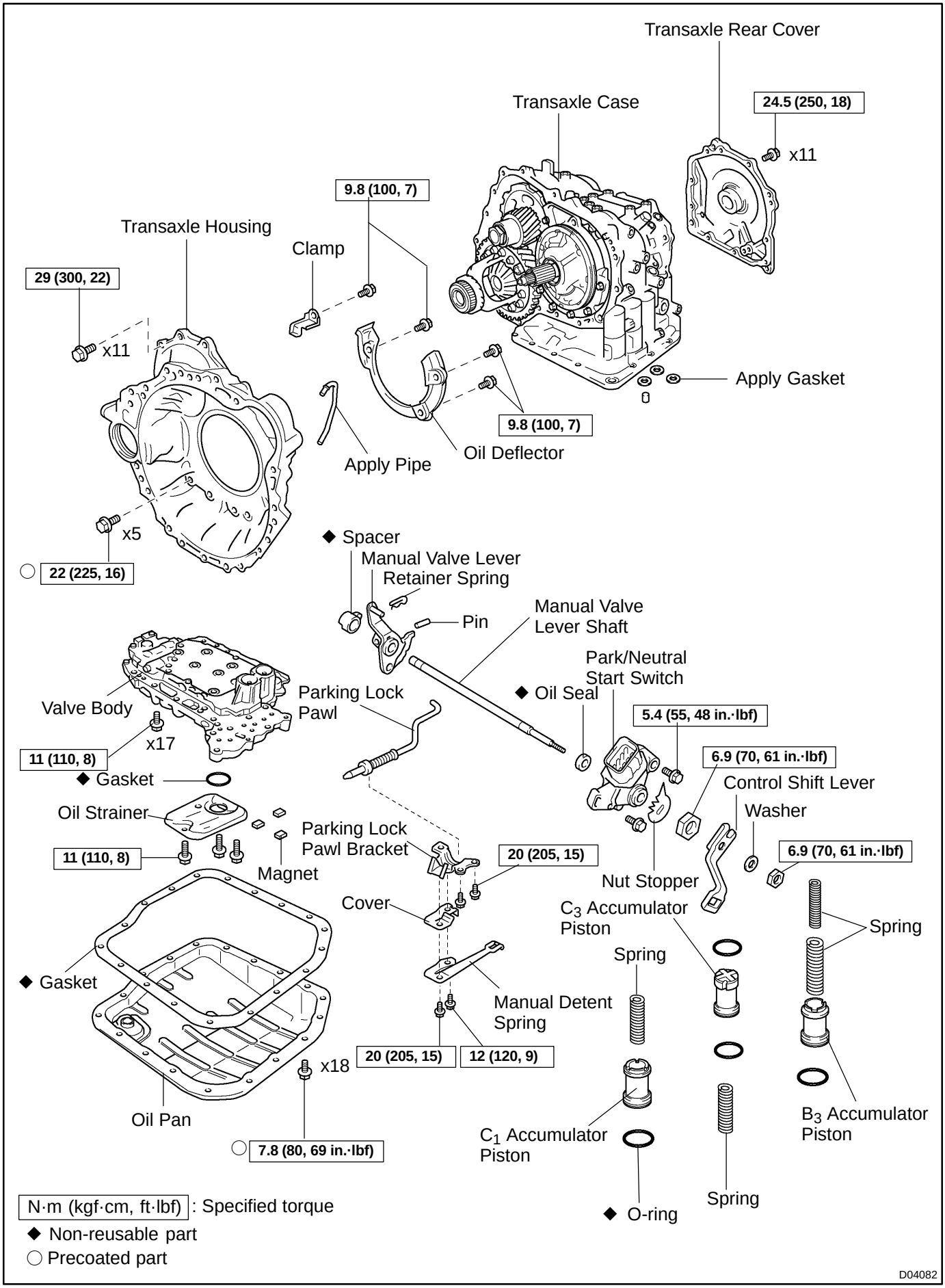
COMPONENTS

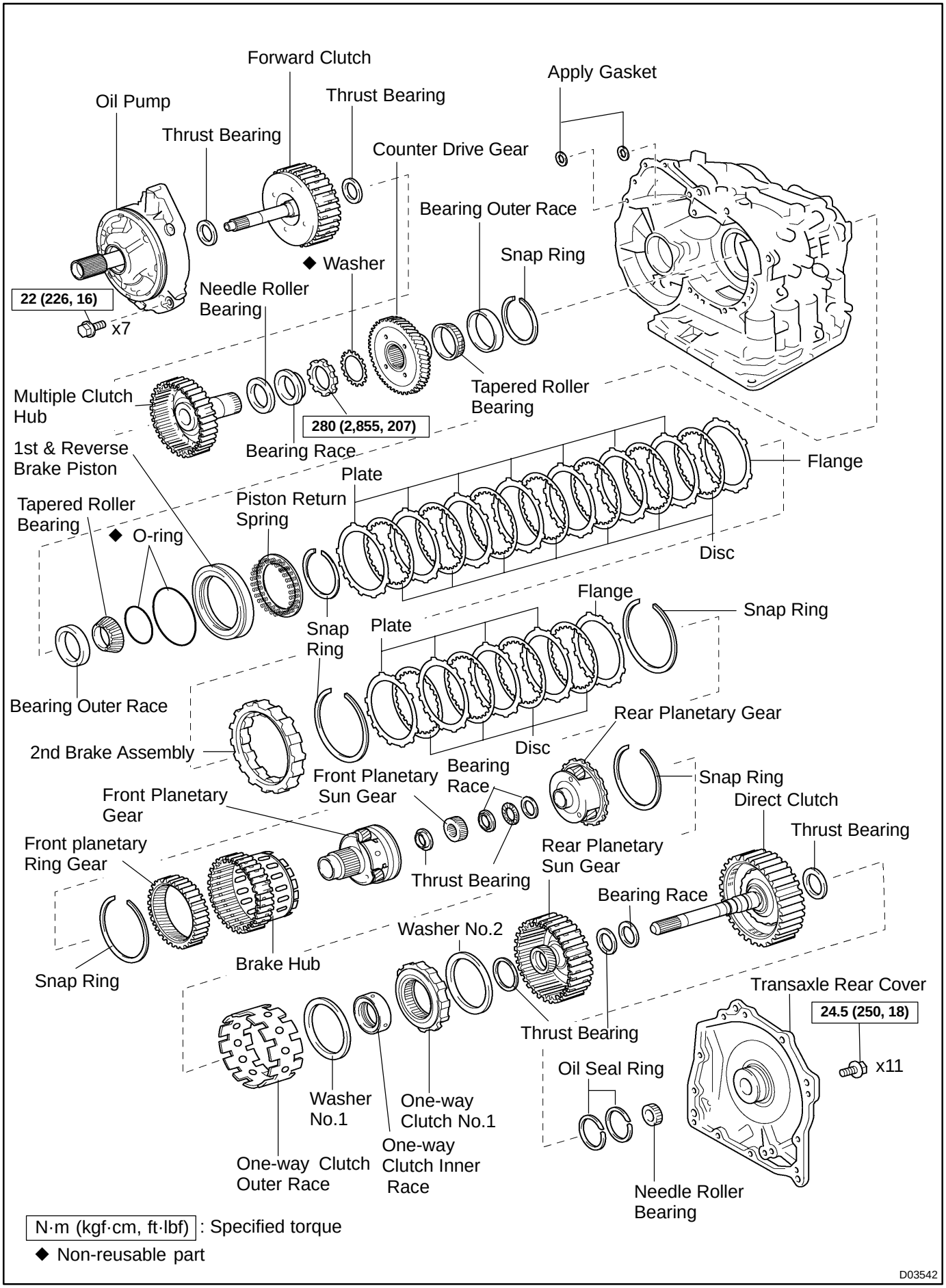
AX0AH-02



N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part

D04084

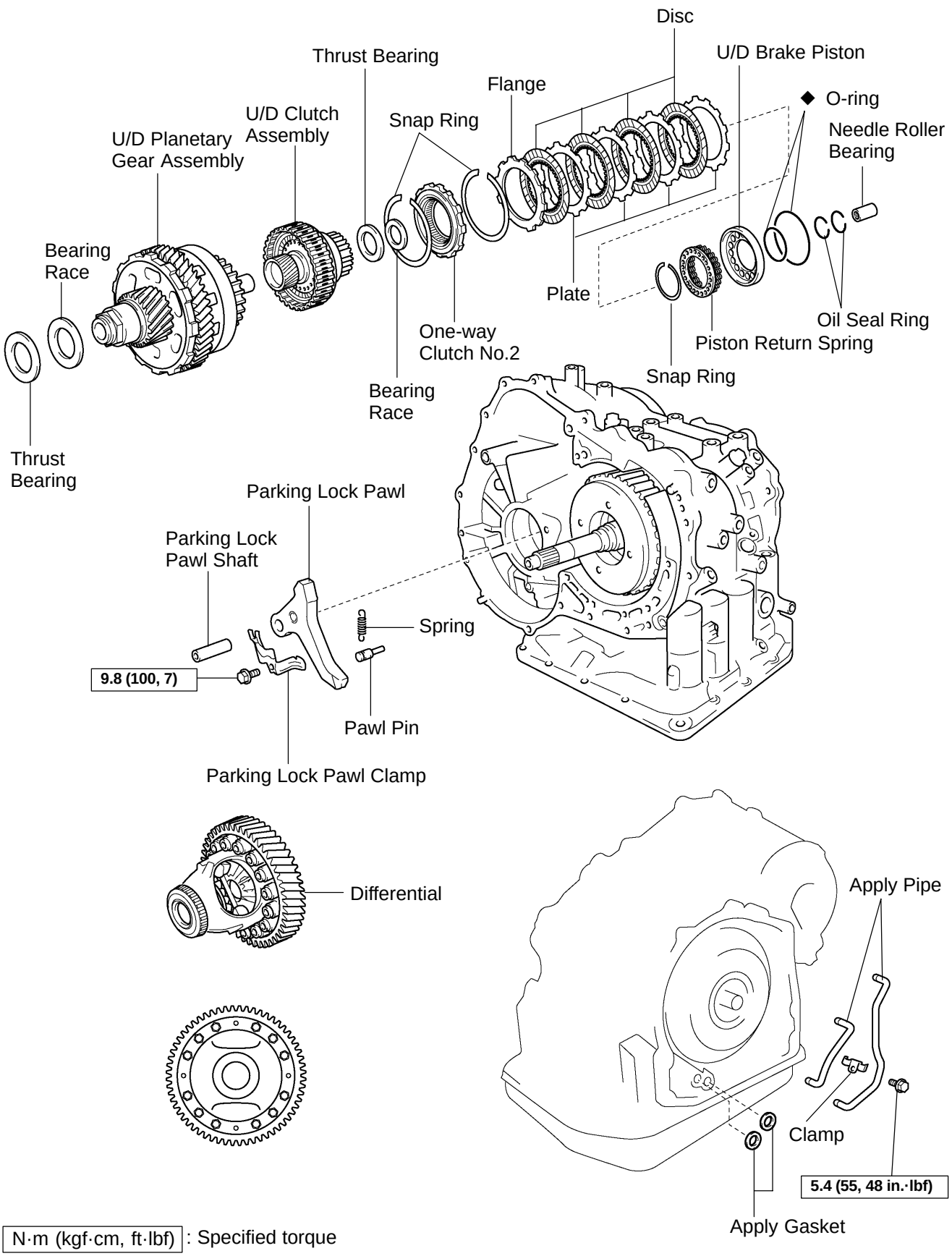

Transaxle Rear Cover
Transaxle Case
24.5 (250, 18)
x11
9.8 (100, 7)
Transaxle Housing
Clamp
29 (300, 22)
x11
Apply Gasket
9.8 (100, 7)
Apply Pipe
Oil Deflector
x5
◆ Spacer
Manual Valve Lever
Retainer Spring
○ 22 (225, 16)
Pin
Manual Valve
Lever Shaft
Park/Neutral
Start Switch
Valve Body
Parking Lock
Pawl
◆ Oil Seal
5.4 (55, 48 in.·lbf)
6.9 (70, 61 in.·lbf)
x17
11 (110, 8)
Control Shift Lever
◆ Gasket
Oil Strainer
Washer
Parking Lock
Pawl Bracket
20 (205, 15)
6.9 (70, 61 in.·lbf)
11 (110, 8)
Magnet
Nut Stopper
Cover
C3 Accumulator
Piston
Spring
◆ Gasket
Spring
Manual Detent
Spring
20 (205, 15)
12 (120, 9)
x18
B3 Accumulator
Piston
Oil Pan
C1 Accumulator
Piston
○ 7.8 (80, 69 in.·lbf)
Spring
◆ O-ring
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
○ Precoated part
D04082



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

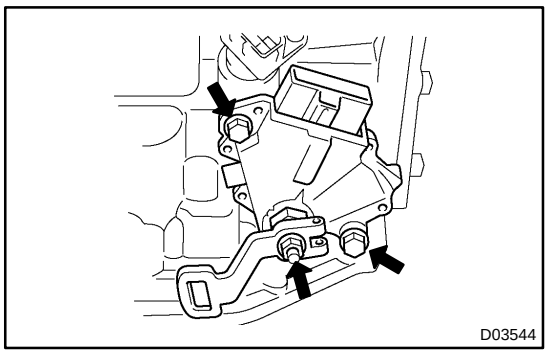
◆ Non-reusable part

D03542


Disc
Thrust Bearing
U/D Brake Piston
Flange
◆ O-ring
U/D Clutch Assembly
Snap Ring
Needle Roller Bearing
U/D Planetary Gear Assembly
Bearing Race
Plate
Oil Seal Ring
One-way Clutch No.2
Piston Return Spring
Snap Ring
Bearing Race
Thrust Bearing
Parking Lock Pawl
Parking Lock Pawl Shaft
Spring
9.8 (100, 7)
Pawl Pin
Parking Lock Pawl Clamp
Differential
Apply Pipe
Clamp
5.4 (55, 48 in.·lbf)
Apply Gasket
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non-reusable part
D03871

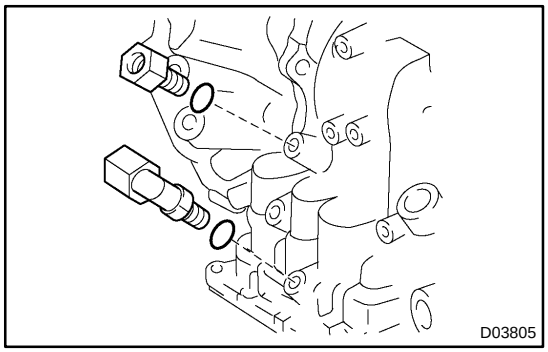
AX0BM-01

DISASSEMBLY



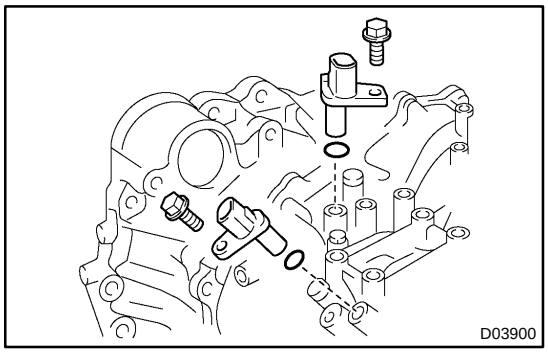
1. REMOVE PARK/NEUTRAL POSITION SWITCH

(a) Remove the nut, washer and control shaft lever.
(b) Using a screwdriver, unstake the lock washer.
(c) Remove the 2 bolts and nut, and pull out the park/neutral position switch.



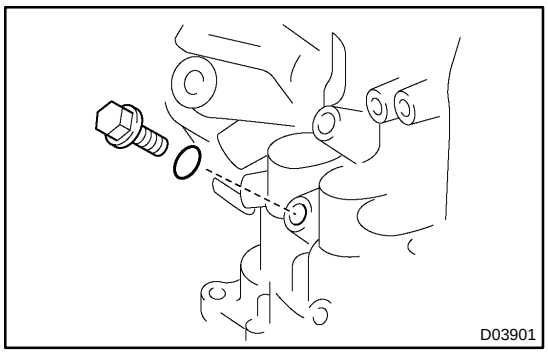
2. REMOVE UNION AND ELBOW

(a) Remove the union and elbow.
(b) Remove the 2 O-rings form the union and elbow.



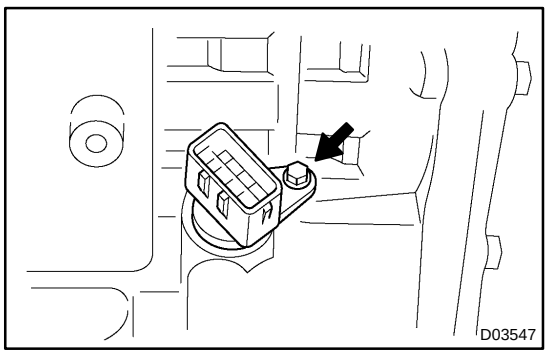
3. REMOVE SPEED SENSOR

(a) Remove the 2 bolts and the 2 speed sensors from the transaxle.
(b) Remove the 2 O-rings from the sensors.



4. REMOVE TRANSAXLE CASE PLUG NO.1

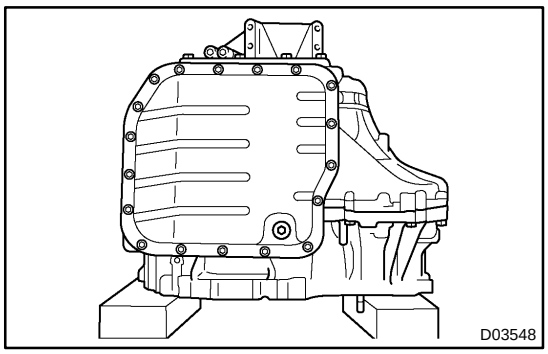
(a) Remove the transaxle case plug No.1 from the transaxle case.
(b) Remove the O-ring from the transaxle case plug No.1.



5. REMOVE SOLENOID WIRE RETAINING BOLT

NOTICE:

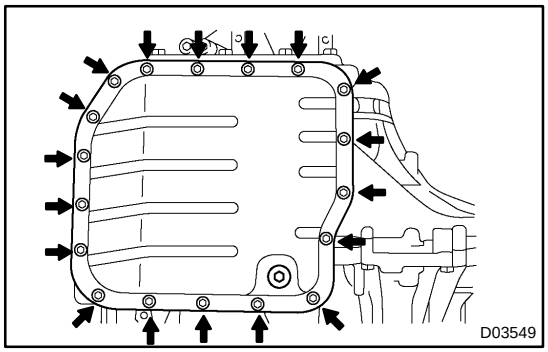
Remove the bolt only and do not remove the solenoid wire.



6. PLACE TRANSAXLE ON WOODEN BLOCKS

NOTICE:

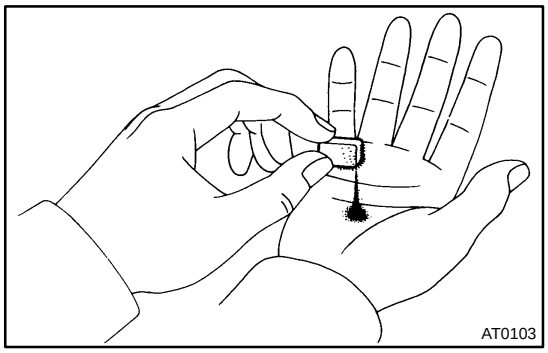
Be careful not to damage the oil seal.



7. REMOVE OIL PAN AND GASKET

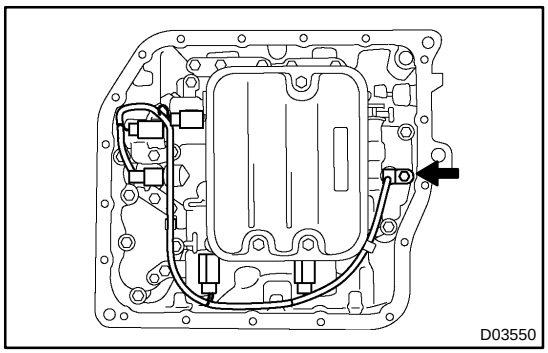
(a) Remove the 18 bolts.

(b) Remove the oil pan and gasket.



8. EXAMINE PARTICLES IN PAN

Remove the magnets and use them to collect any steel chips.
Examine the chips and particles in the pan and on the magnet to determine what type of wear has occurred in the transaxle:
Steel (magnetic)..... bearing, gear and plate wear
Brass (non-magnetic)..... bushing wear

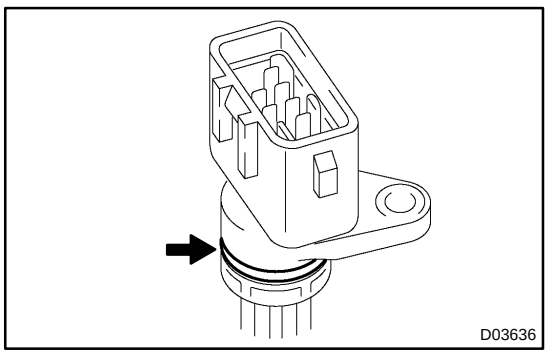


9. REMOVE TRANSAXLE SOLENOID WIRE

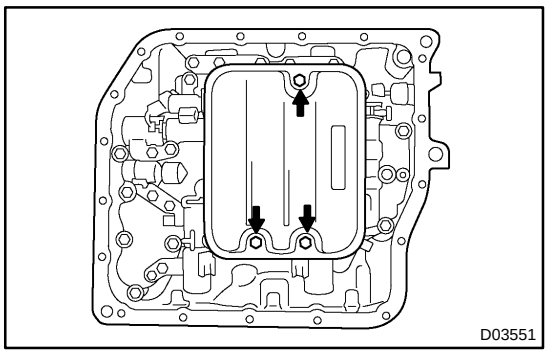
(a) Remove the 5 connectors from shift solenoid valves.

(b) Remove the bolt, the clamp and the ATF temperature sensor.

(c) Remove the transaxle solenoid wire from the transaxle case.

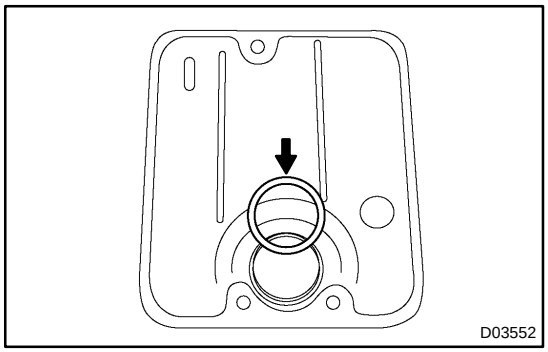


(d) Remove the O-ring from the transaxle solenoid wire.

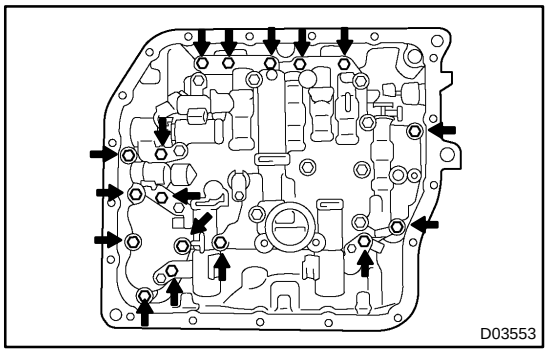


10. REMOVE OIL STRAINER

(a) Remove the 3 bolts and oil strainer.

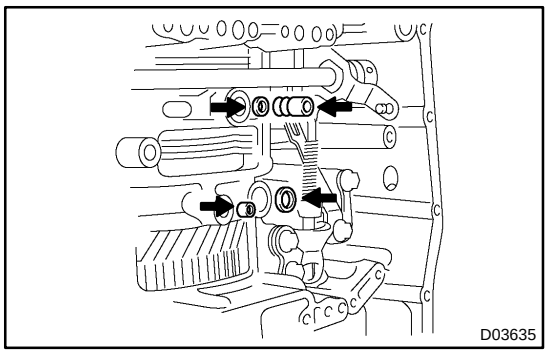


(b) Remove the gasket from the oil strainer.

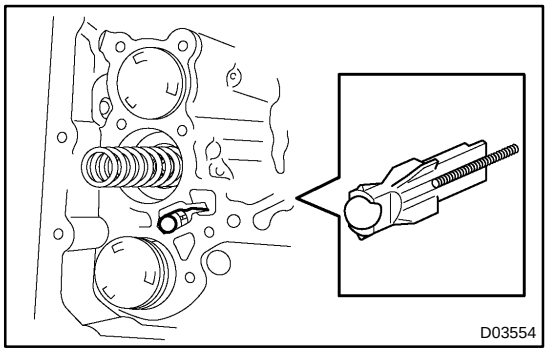


11. REMOVE VALVE BODY ASSEMBLY

Support the valve body assembly and remove the 17 bolts and the valve body assembly.

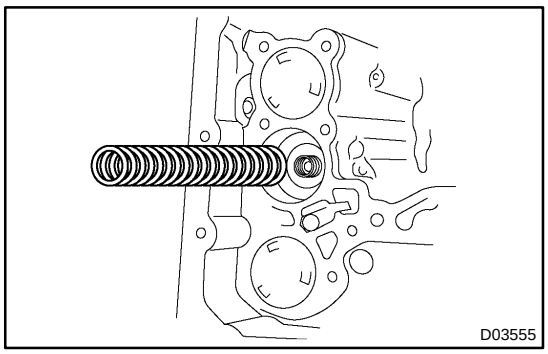


12. REMOVE 4 APPLY GASKETS



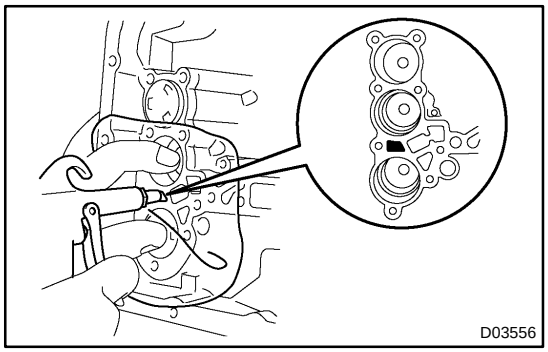
13. REMOVE CHECK BALL BODY

Remove the check ball body and spring.



14. REMOVE ACCUMULATOR SPRING AND PISTON

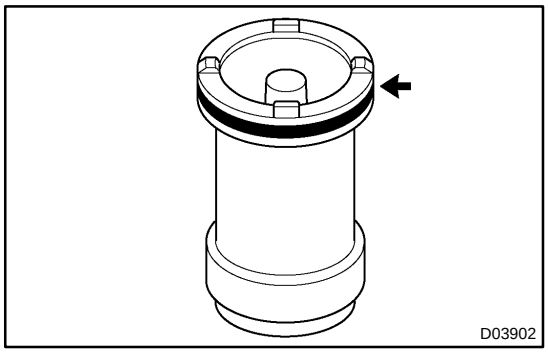
(a) Remove the spring from the C_3 accumulator piston.



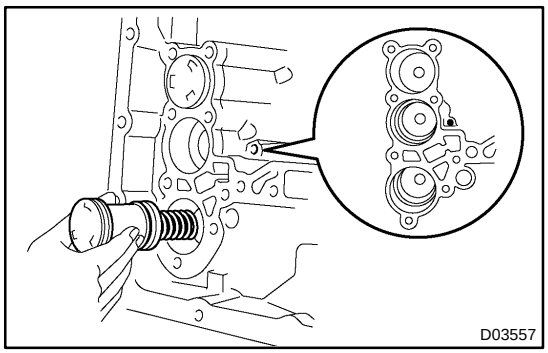
(b) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C_3 accumulator piston.

NOTICE:

- **Blowing off the air may cause the piston's jump-out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when air-blowing.**



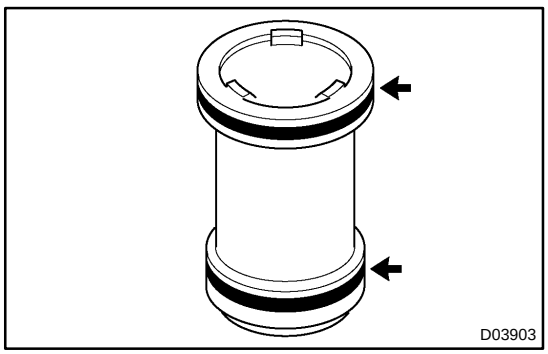
(c) Remove the O-ring from the piston.



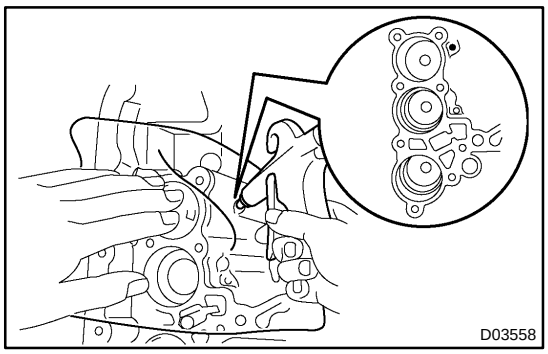
(d) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the C_1 accumulator piston and spring.

NOTICE:

- **Blowing off the air may cause the piston's jump-out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when air-blowing.**



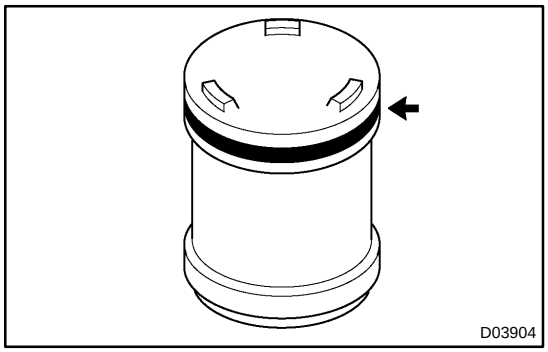
(e) Remove the 2 O-rings from the piston.



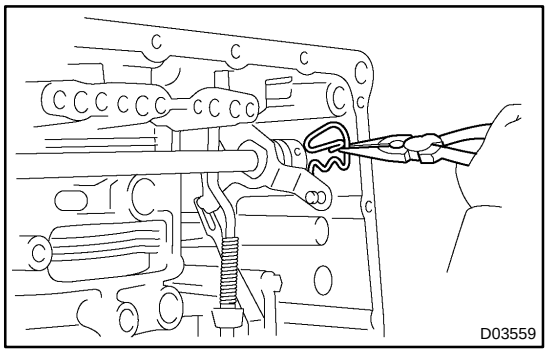
(f) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil hole and remove the B_3 accumulator piston and 2 springs.

NOTICE:

- **Blowing off the air may cause the piston's jump-out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when air-blowing.**

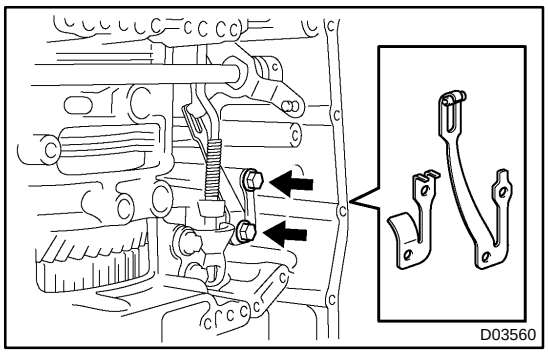


(g) Remove the O-ring from the piston.

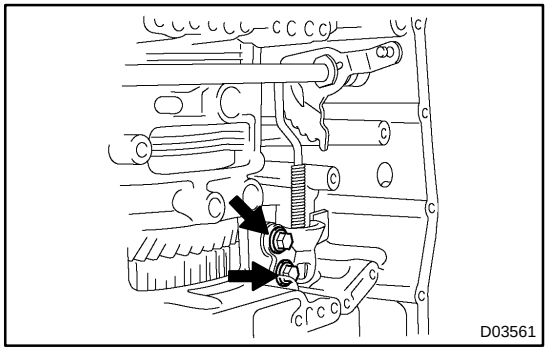


15. REMOVE MANUAL VALVE LEVER SHAFT

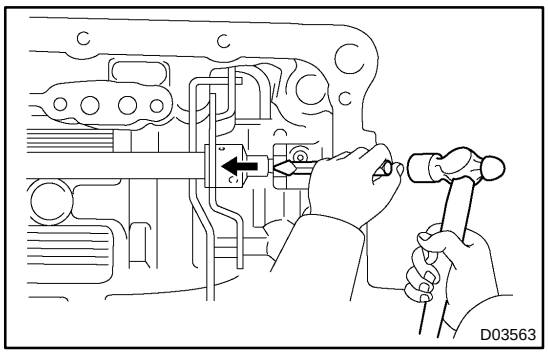
(a) Using needle-nose pliers, remove the retainer spring.



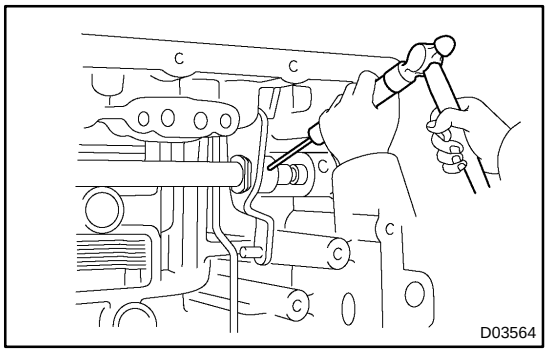
(b) Remove the 2 bolts, the manual detent spring and cover.



(c) Remove the 2 bolts and the parking lock pawl bracket.



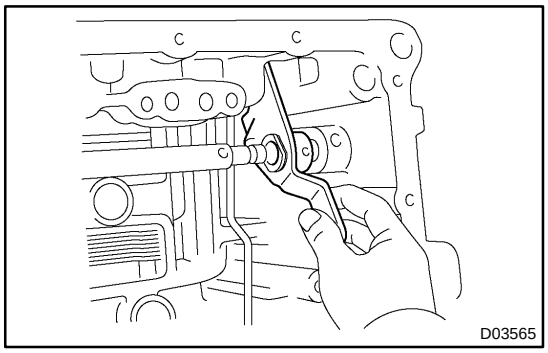
(d) Using a chisel and a hammer, unstake and remove the spacer.



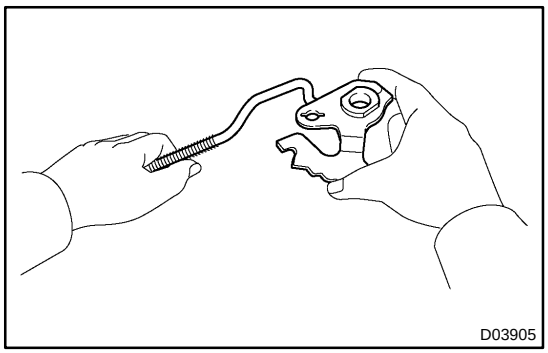
(e) Using a pin punch and a hammer, drive out the pin.

HINT:

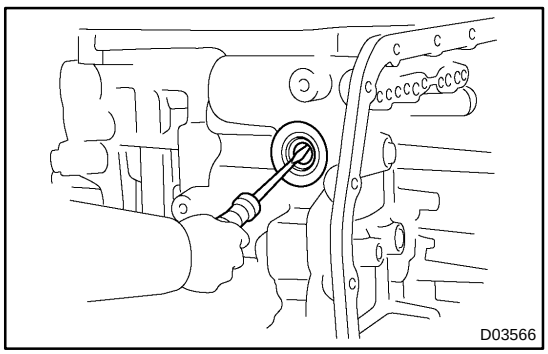
Slowly drive out the pin so that it will not fall into the transaxle case.



(f) Remove the manual valve lever shaft and the manual valve lever.



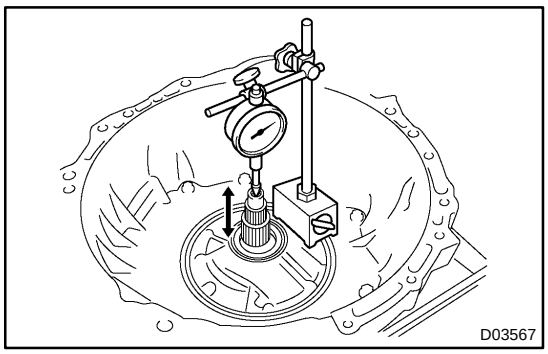
(g) Remove the parking lock rod from the manual valve lever shaft.



(h) Using a screwdriver, remove the oil seal.

16. PLACE TRANSAXLE CASE

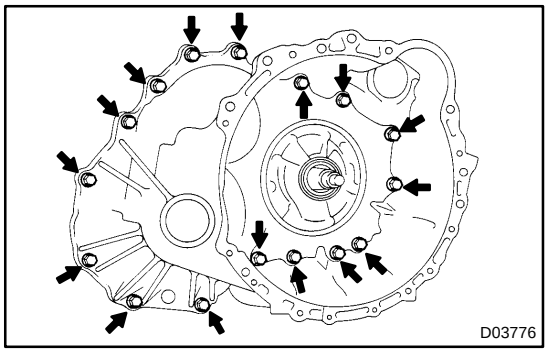
Fix the transaxle case with the oil pump side facing up.



17. INSPECT INPUT SHAFT END PLAY

Using a dial indicator, measure the input shaft end play.

End play: 0.27 - 1.24 mm (0.0106 - 0.0488 in.)



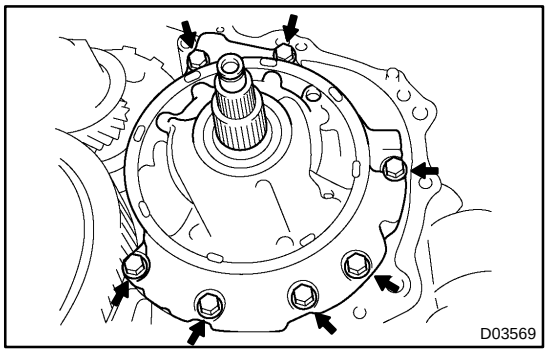
18. REMOVE TRANSAXLE HOUSING

(a) Remove the 16 bolts.

(b) Tap on the circumference of the transaxle housing with a plastic hammer to remove the transaxle housing from the transaxle case.

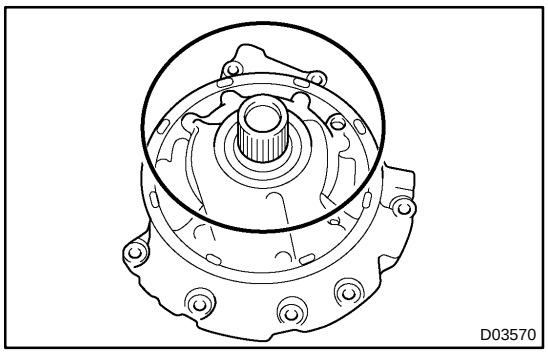
NOTICE:

Differential may be accidentally removed when the transaxle housing is removed.

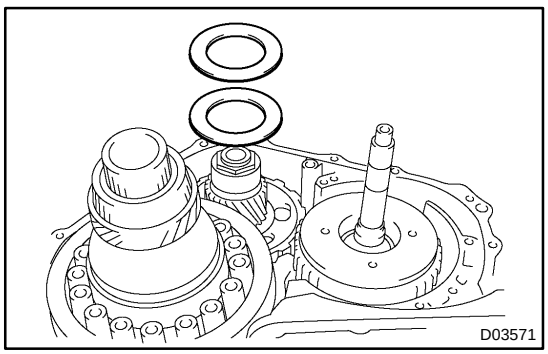


19. REMOVE OIL PUMP

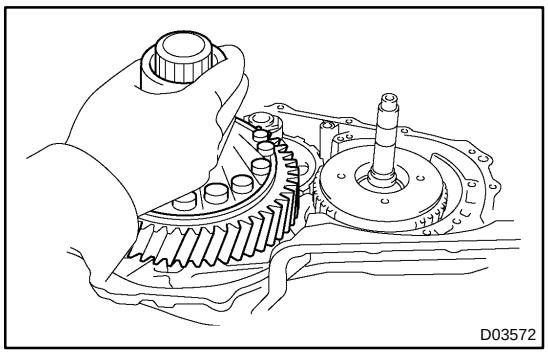
(a) Remove the 7 bolts and the oil pump.



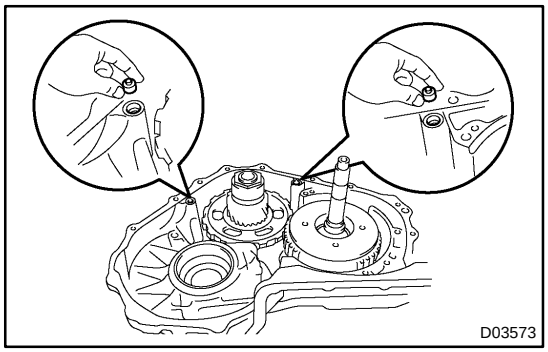
(b) Remove the O-ring from the oil pump.



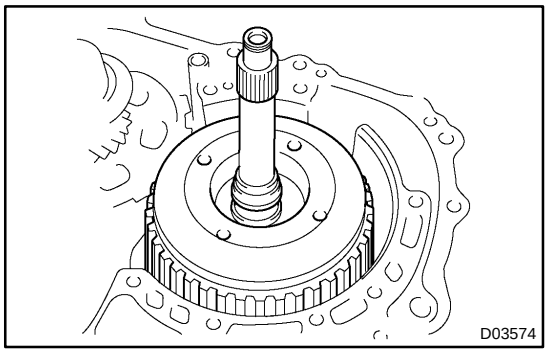
20. REMOVE THRUST BEARING AND BEARING RACE



21. REMOVE DIFFERENTIAL ASSEMBLY

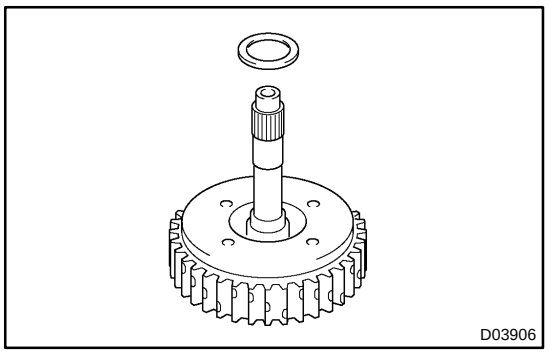


22. REMOVE 2 APPLY GASKETS

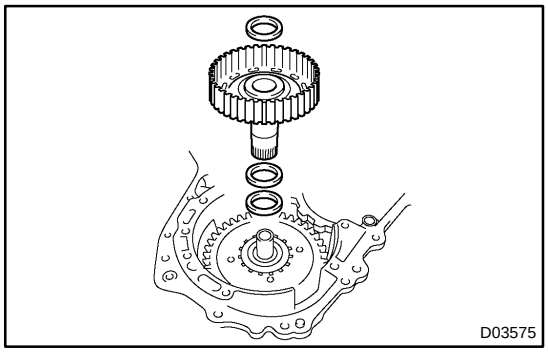


23. REMOVE FORWARD CLUTCH

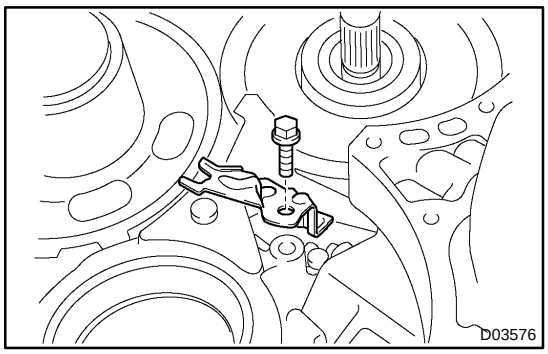
(a) Remove the forward clutch from the transaxle case.



(b) Remove the thrust bearing from the forward clutch.

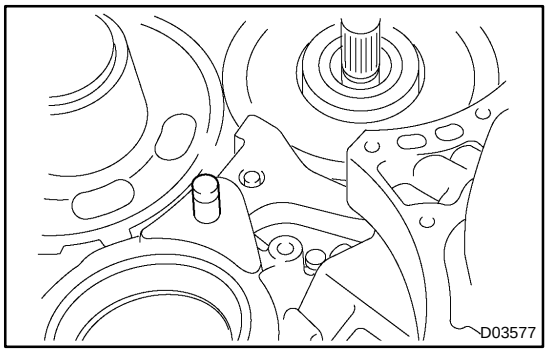


(c) Remove the multiple clutch hub, 2 thrust bearing and bearing race from the transaxle case.

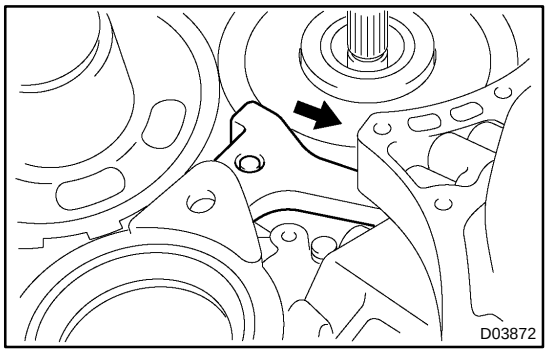


24. REMOVE U/D PLANETARY GEAR ASSEMBLY

(a) Remove a bolt and the pawl shaft clamp.



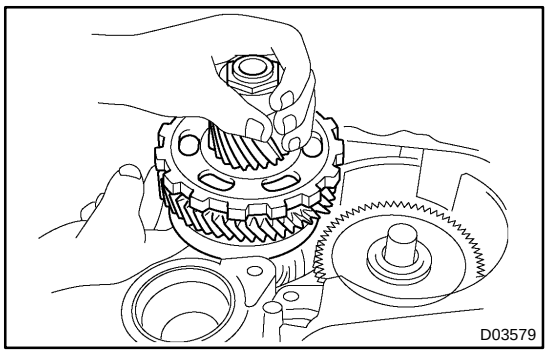
(b) Remove the parking lock pawl shaft.



(c) Push the parking lock pawl.

HINT:

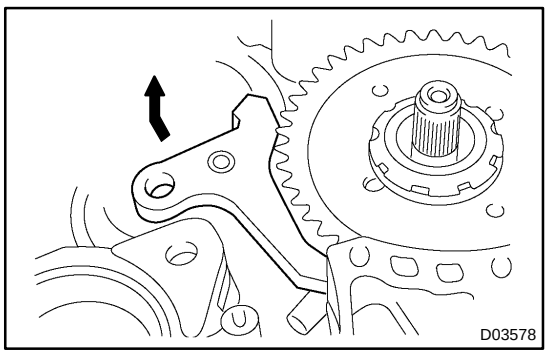
Failure to do so will cause interference when the U/D planetary gear is removed.



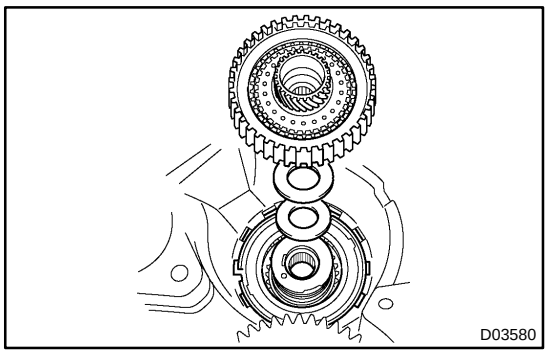
(d) Remove the U/D planetary gear assembly from the transaxle case.

NOTICE:

Be careful that the U/D planetary gear assembly do not fall out.

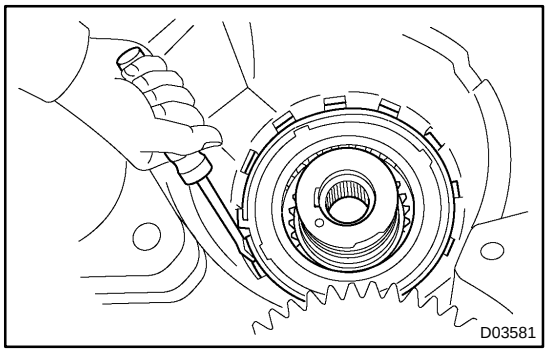


(e) Remove the spring, the pin and the parking lock pawl.



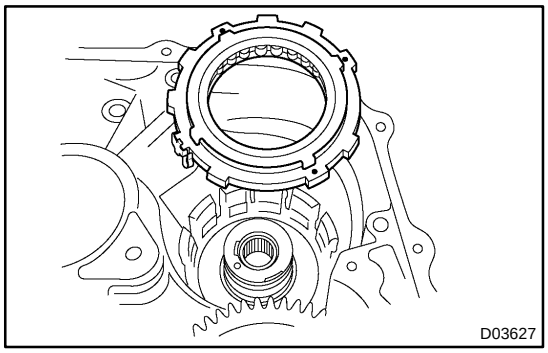
25. REMOVE U/D CLUTCH ASSEMBLY

Remove the U/D clutch assembly, the thrust bearing and the bearing race from the transaxle case.

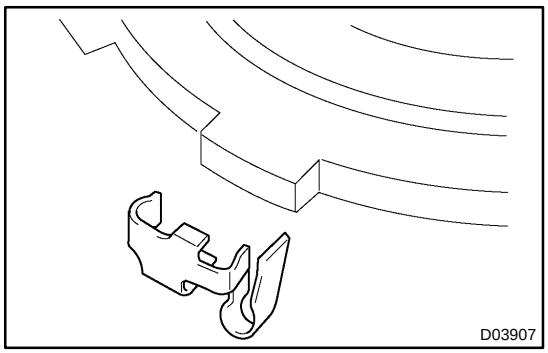


26. REMOVE ONE-WAY CLUTCH NO.2

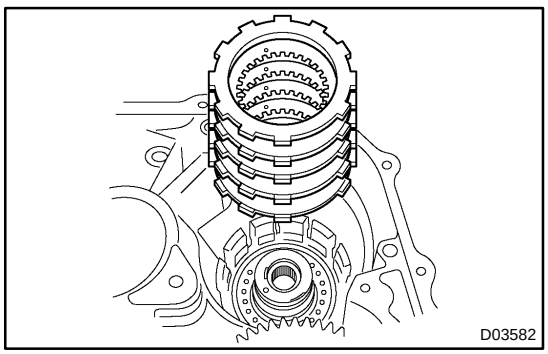
(a) Using a screwdriver, remove the snap ring.



(b) Remove the one-way clutch No.2 from the transaxle case.



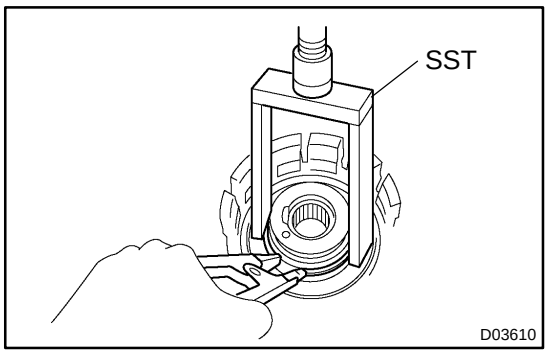
(c) Remove the outer race retainer from the one-way clutch No.2.



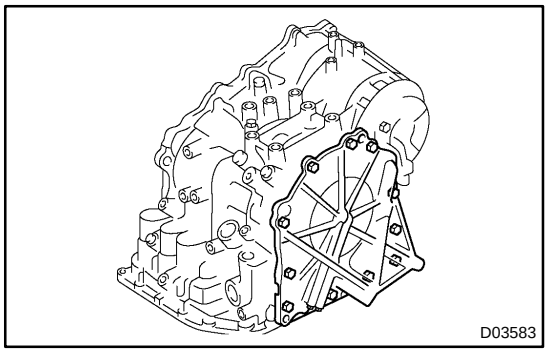
27. REMOVE U/D BRAKE

(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the transaxle case.



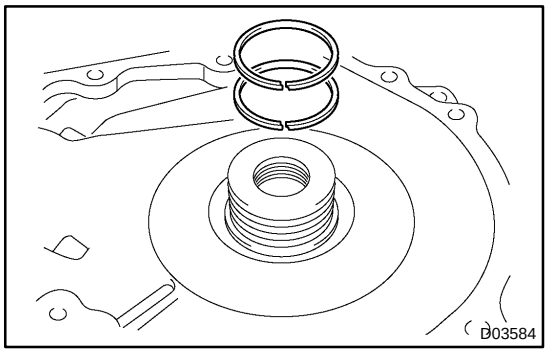
(c) Using SST, a snap ring expander and a press, remove the snap ring and return spring.
SST 09387-00020



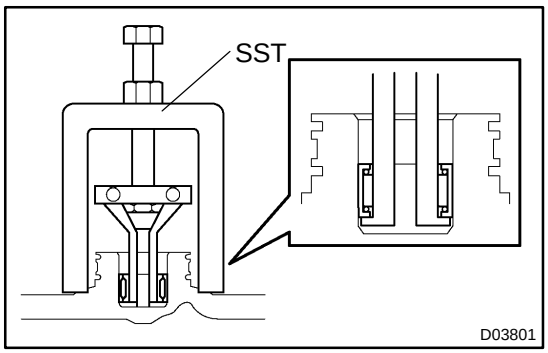
28. REMOVE TRANSAXLE REAR COVER

(a) Remove the 11 bolts.

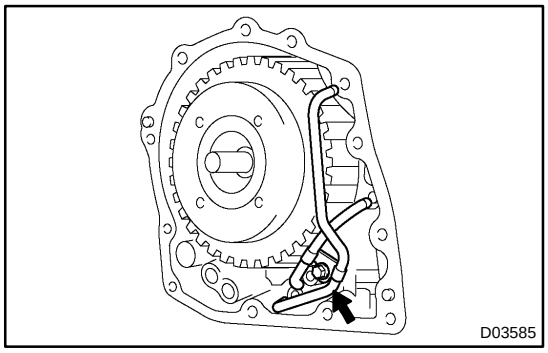
(b) Tap on the circumference of the rear cover with a plastic hammer to remove the transaxle rear cover from the transaxle case.



(c) Remove the 2 oil seal rings from the transaxle rear cover.

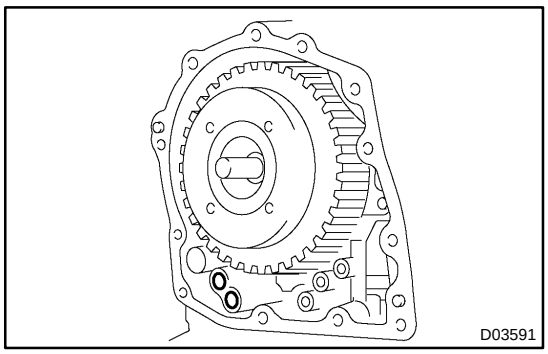


(d) Using SST, remove the needle-roller bearing.
SST 09387-00040 (09387-01010, 09387-01030, 09387-01040)



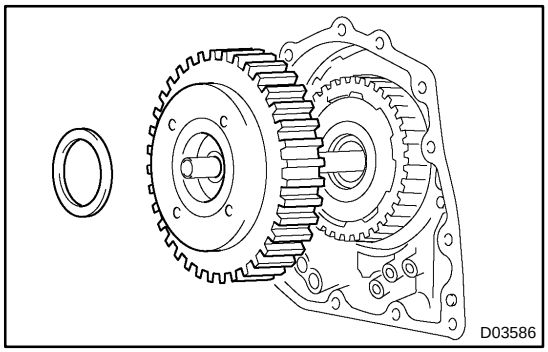
29. REMOVE BRAKE APPLY PIPE

(a) Remove a bolt, clamp and 2 brake apply pipes.



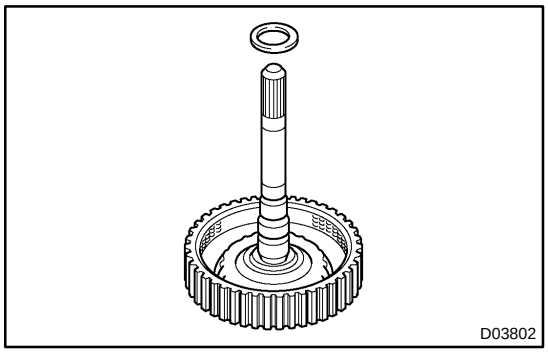
30. REMOVE TRANSAXLE CASE APPLY GASKET

Using a screwdriver, remove the 2 apply gaskets.

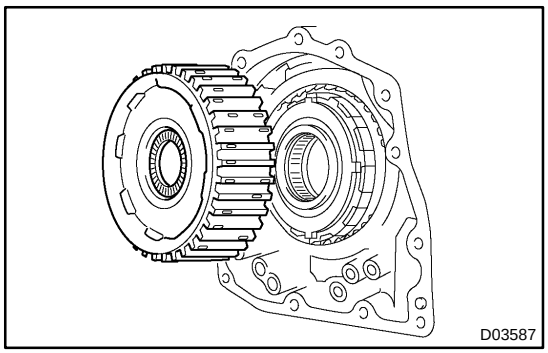


31. REMOVE DIRECT CLUTCH ASSEMBLY

(a) Remove the thrust bearing and the direct clutch from the transaxle case.

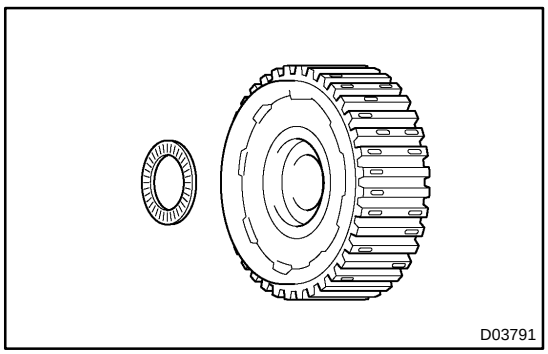


(b) Remove the bearing race from the direct clutch.

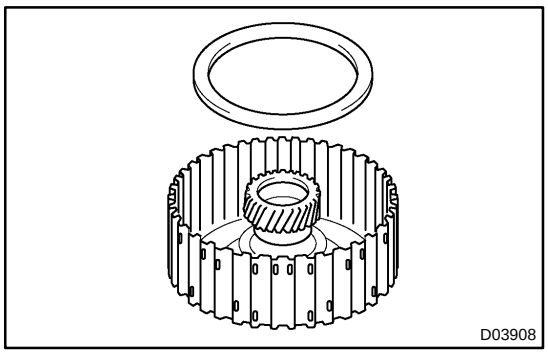


32. REMOVE REAR PLANETARY SUN GEAR ASSEMBLY

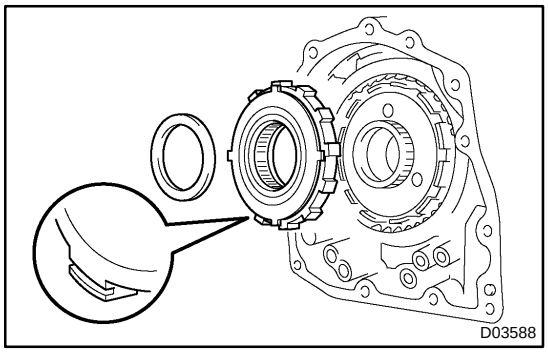
(a) Remove the rear planetary sun gear assembly from the transaxle case.



(b) Remove the thrust bearing from the rear planetary sun gear.

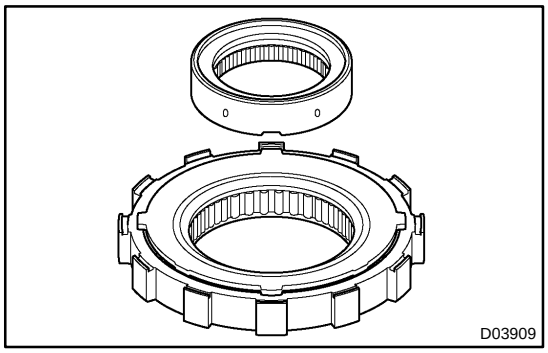


(c) Remove the thrust washer No.1 from the rear planetary sun gear.

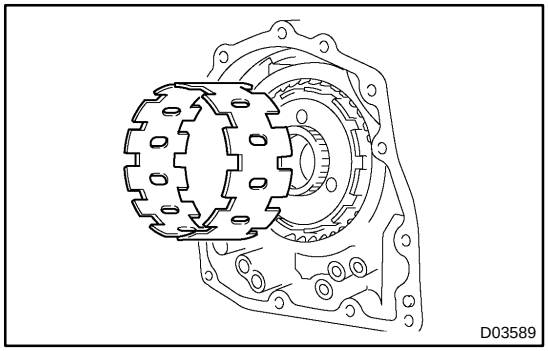


33. REMOVE ONE-WAY CLUTCH NO.1

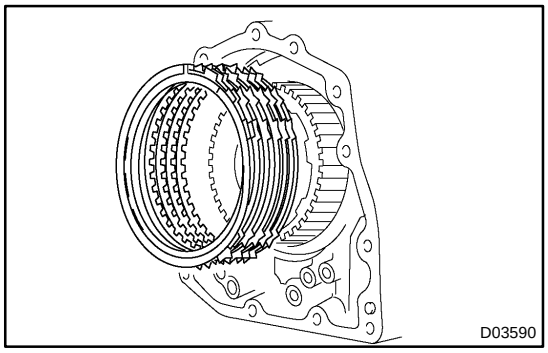
(a) Remove the one-way clutch No.1 and the thrust bearing from the transaxle case.



(b) Remove the inner race from the one-way clutch No.1.



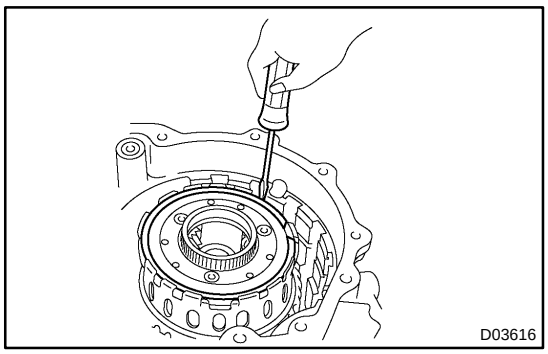
34. REMOVE ONE-WAY CLUTCH OUTER SLEEVE



35. REMOVE 2ND BRAKE

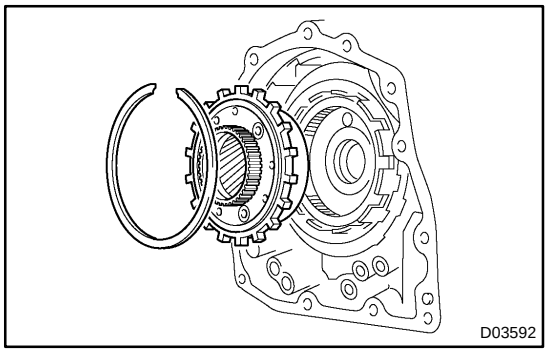
(a) Using a screwdriver, remove the snap ring.

(b) Remove the flange, 4 discs and 4 plates from the transaxle case.

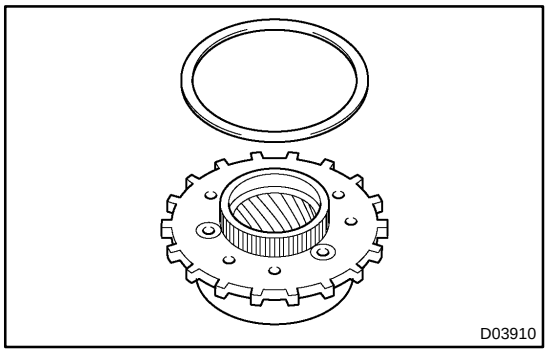


36. REMOVE REAR PLANETARY GEAR

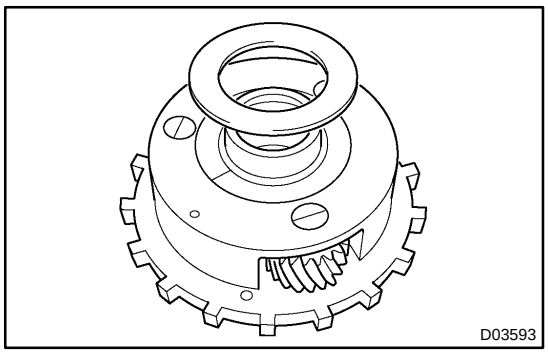
(a) Using a screwdriver, remove the snap ring.



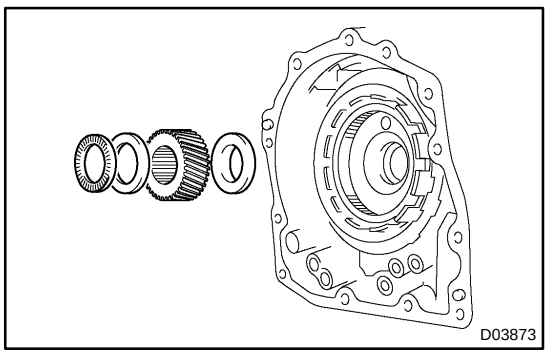
(b) Remove the rear planetary gear from the transaxle case.



(c) Remove the thrust washer No.2 from the rear planetary gear.

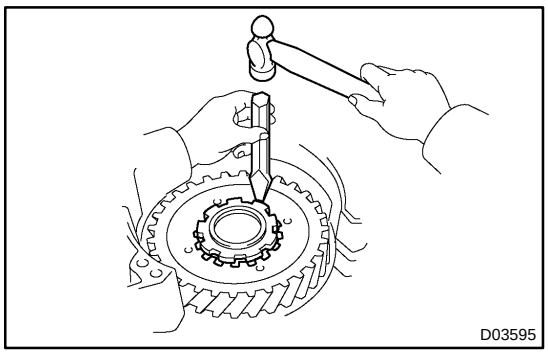


(d) Remove the bearing race from the rear planetary gear.



37. REMOVE FRONT PLANETARY SUN GEAR

(a) Remove the 2 thrust bearings, the bearing race and the front planetary sun gear from the transaxle case.

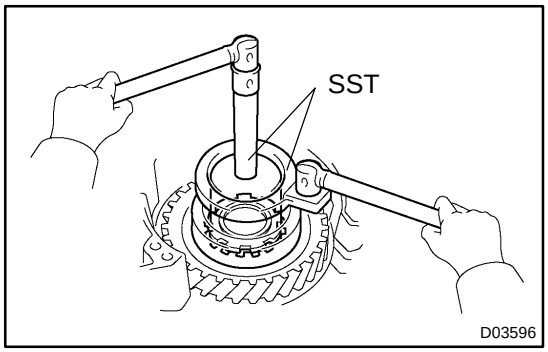


38. REMOVE FRONT PLANETARY GEAR ASSEMBLY AND BRAKE HUB

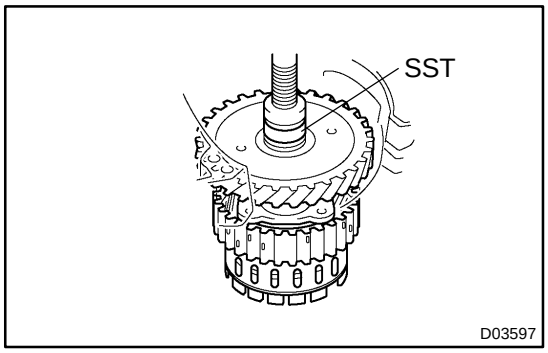
(a) Using a chisel and a hammer, unstake the lock washer.

NOTICE:

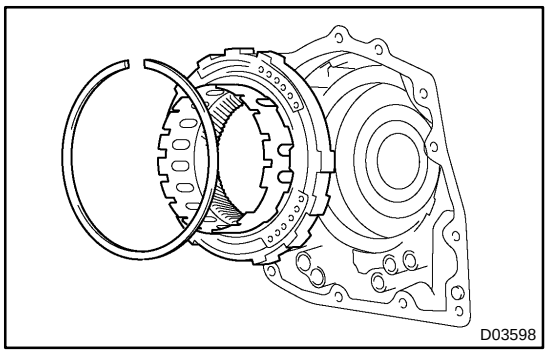
Push down all claws of the washer. Otherwise SST can not be fully pressed again the nut and can not loosen the nut.



(b) Using SST, remove the nut.
SST 09387-00030, 09387-00080

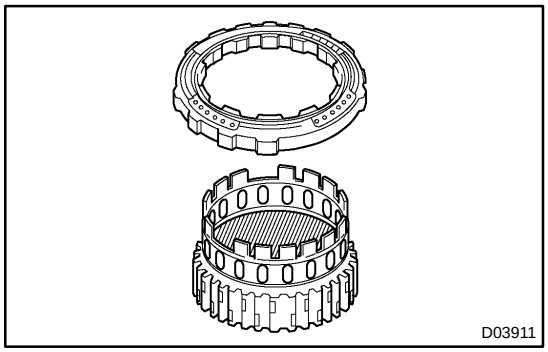


(c) Using SST and a press, remove the front planetary gear assembly from the counter drive gear.
SST 09950-60010 (09951-00450)

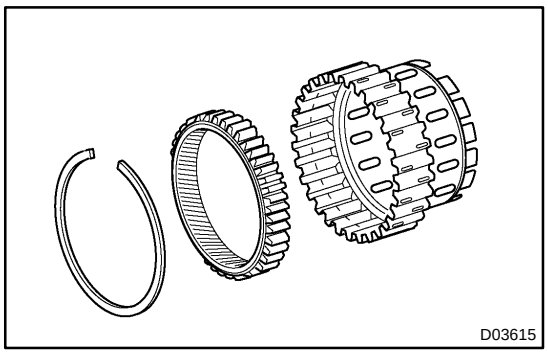


39. REMOVE 2ND BRAKE ASSEMBLY AND FRONT PLANETARY RING GEAR

(a) Using a screwdriver, remove the snap ring and the brake hub with 2nd brake cylinder assembly.

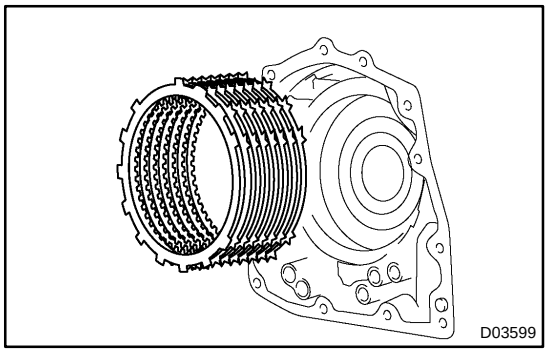


(b) Remove the brake hub from the 2nd brake cylinder assembly.



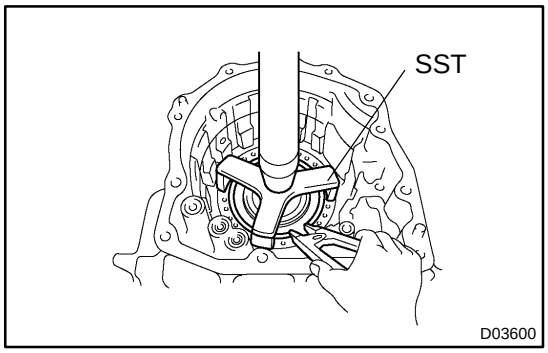
40. REMOVE FRONT PLANETARY RING GEAR

Using a screwdriver, remove the snap ring and front planetary ring gear from the brake hub.



41. REMOVE 1ST & REVERSE BRAKE

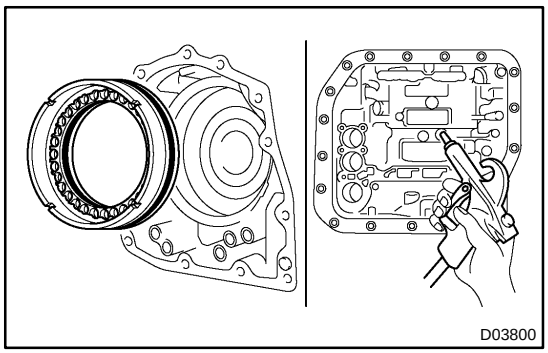
(a) Remove the flange, 7 discs and 7 plates from the transaxle case.



(b) Using SST, a press and a snap ring expander, remove the snap ring and the piston return spring.
SST 09387-00070

NOTICE:

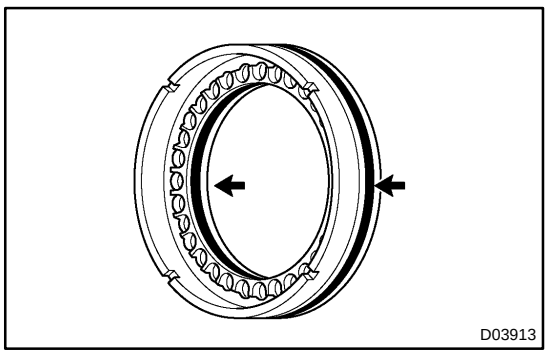
- **Stop the press when the spring sheet is lowered 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from deforming.**
- **Do not expand the snap ring excessively.**



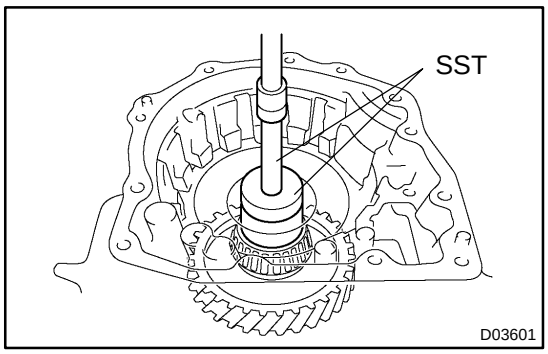
(c) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove 1st & reverse brake piston.

NOTICE:

- **Blowing off the air may cause the piston jump-out. When removing the piston, hold it with your hand using a waste cloth.**
- **Take care not to splash ATF when air-blowing.**

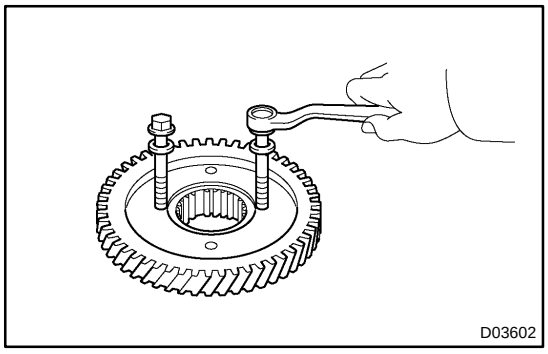


(d) Remove 2 O-rings from the 1st & reverse brake piston.

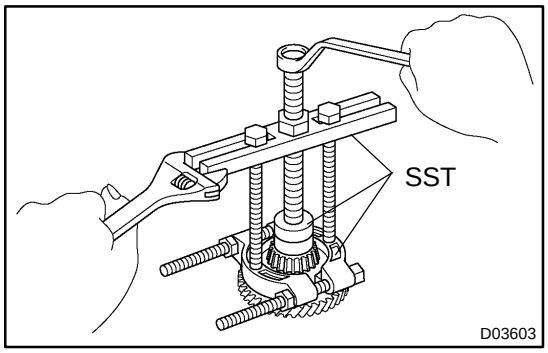


42. REMOVE COUNTER DRIVE GEAR

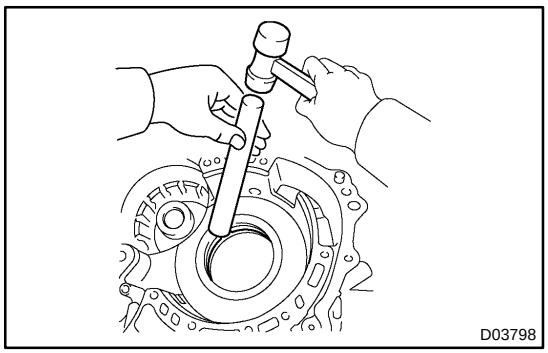
(a) Using SST and a press, remove the counter drive gear from the transaxle case.
SST 09950-60010 (09951-00600), 09950-70010 (09951-07100)



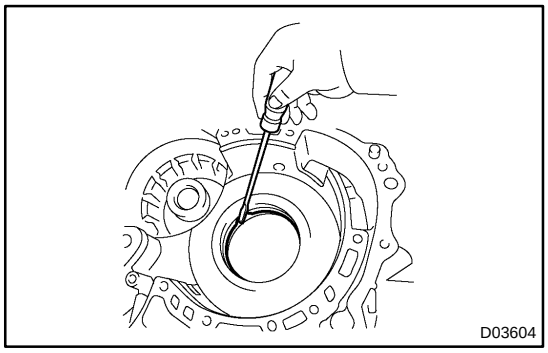
(b) As shown in the illustration, tighten 2 bolts evenly and make clearance of approx. 20.0 mm (0.797 in.) between the counter drive gear and the inner race.



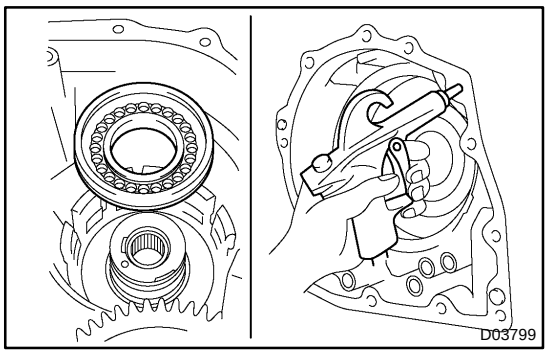
(c) Using SST, remove the tapered roller bearing RH.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00590)



(d) Using a brass bar and a hammer, remove the 2 bearing outer races.

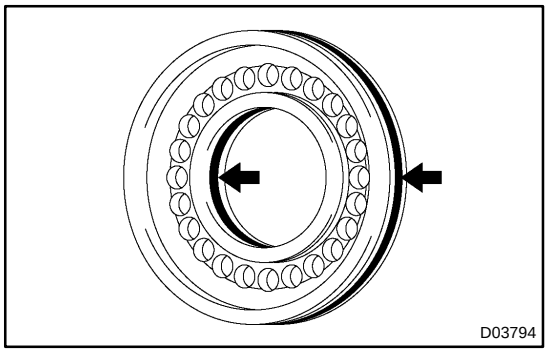


(e) Using a screwdriver, remove the snap ring from the transaxle case.

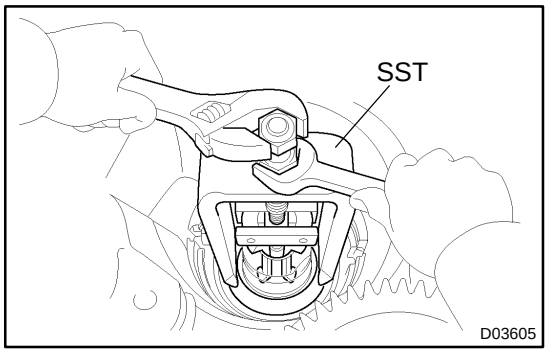


43. REMOVE U/D BRAKE PISTON

(a) Apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the U/D brake piston.

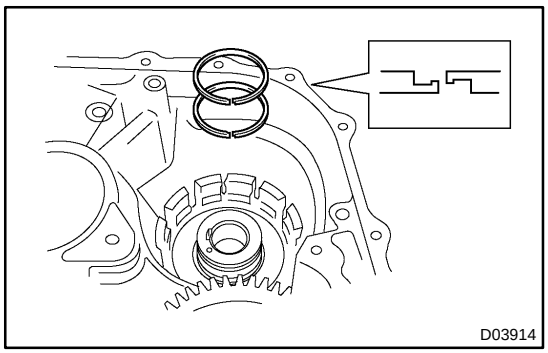


(b) Remove the 2 O-rings from the U/D brake piston.

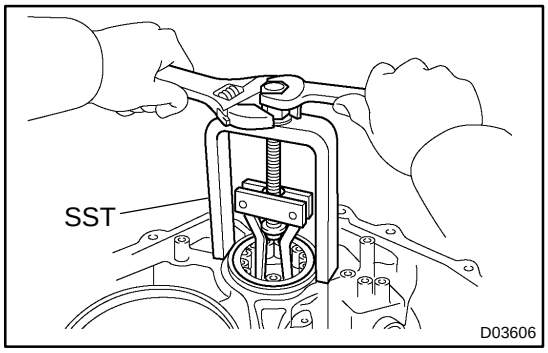


(c) Using SST, remove the needle-roller bearing from the transaxle case.

SST 09387-00040, (09387-01020, 09387-01030, 09387-01040)



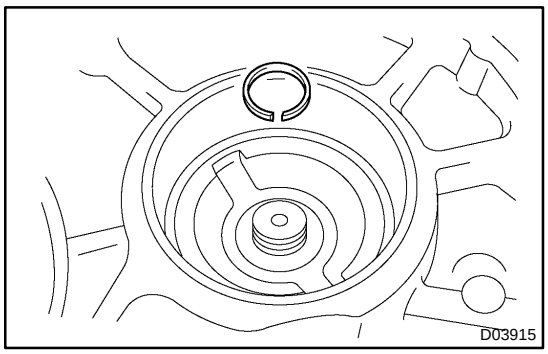
(d) Remove the 2 oil seal rings from the transaxle case.



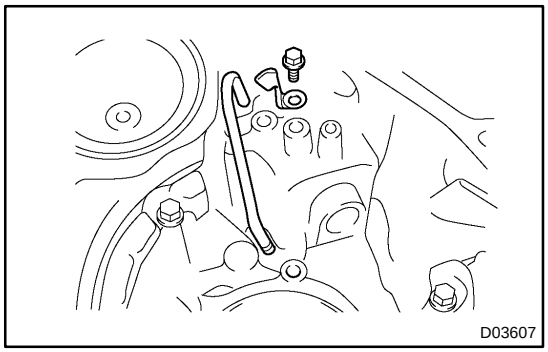
44. REMOVE U/D CYLINDRICAL ROLLER BEARING

(a) Using SST, remove the cylindrical roller bearing from the transaxle case.

SST 09514-3501 1

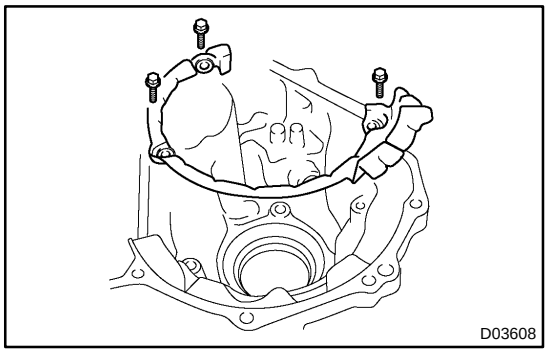


(b) Remove the oil seal ring from the transaxle housing.



45. REMOVE APPLY PIPE

Remove the bolt, the clamp and the apply pipe from the transaxle case.



46. REMOVE OIL SEPARATOR

(a) Remove the 3 bolts and oil separator from the transaxle case.

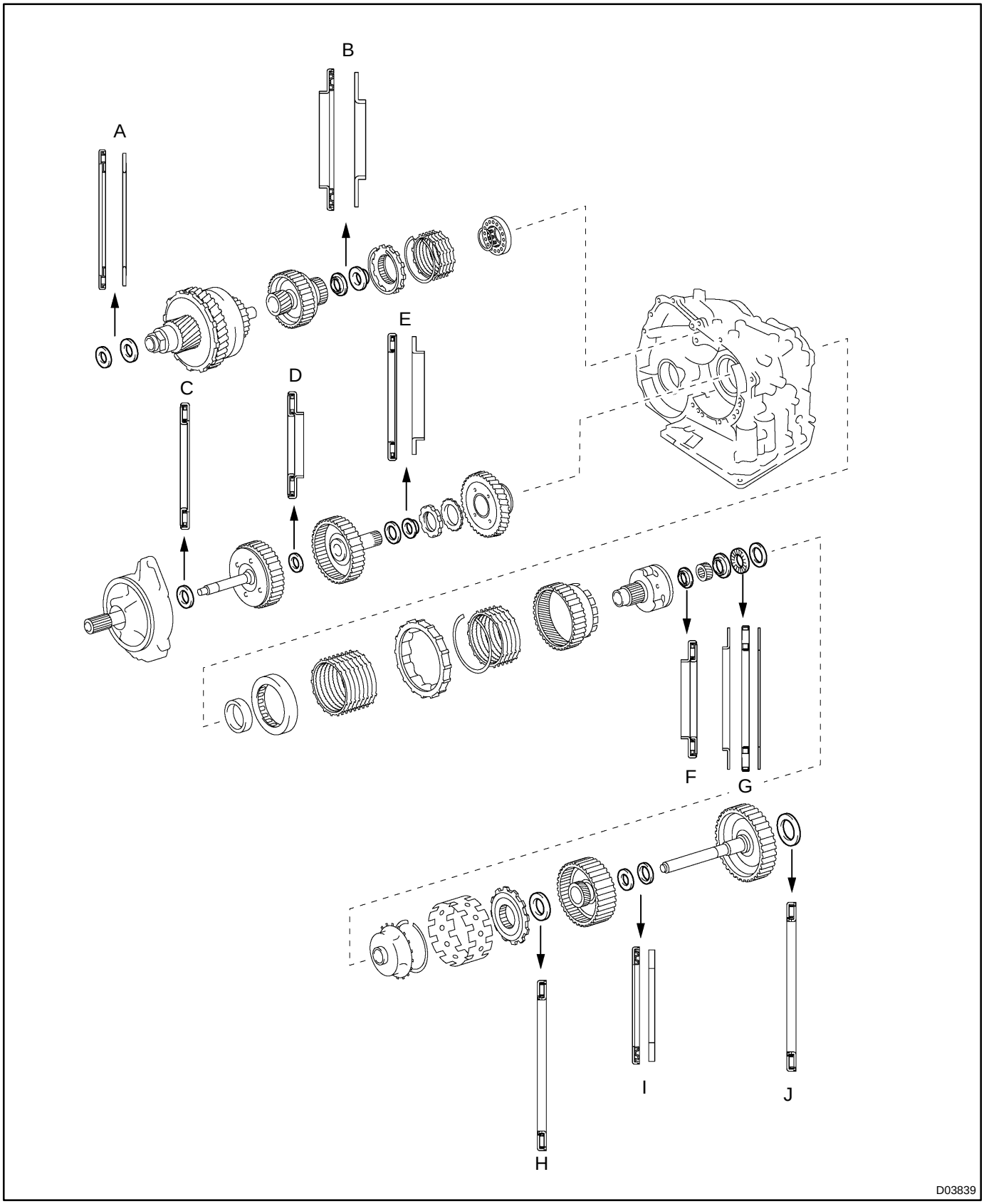
AX0BN-01

REASSEMBLY

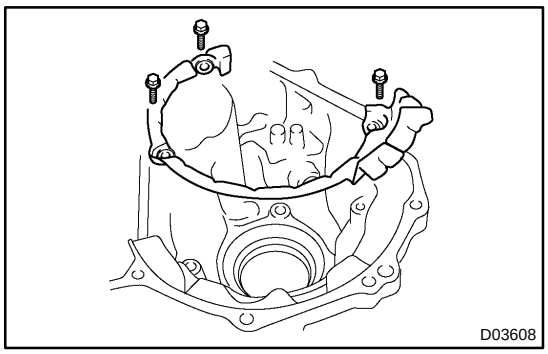
NOTICE:

- **The automatic transaxle is composed of highly precision-finished parts, necessitating careful inspection before reassembly because even a small nick could cause fluid leakage or affect the performance. The instructions here are organized so that you work on only one component group at a time. This will help avoid confusion from similar-looking parts of different sub-assemblies being on your workbench at the same time. The component groups are inspected and repaired from the converter housing side. As much as possible, complete the inspection, repair and reassembly before proceeding to the next component group. If a defect is found in a certain component group during reassembly, inspect and repair this group immediately. If a component group cannot be assembled because parts are being ordered, be sure to keep all parts of the group in a separate container while proceeding with disassembly, inspection, repair and reassembly of other component groups.**
  Recommended ATF: D-II or DEXRON® III (DEXRON® II)
- **All disassembled parts should be washed clean and any fluid passages and holes should be blown through with compressed air.**
- **Dry all parts with compressed air-never use shop rags.**
- **When using compressed air, always aim away from yourself to prevent accidentally spraying ATF or kerosene on your face.**
- **The recommended automatic transaxle fluid or kerosene should be used for cleaning.**
- **After cleaning, the parts should be arranged in the correct order for efficient inspection, repairs, and reassembly.**
- **When disassembling a valve body, be sure to match each valve together with the corresponding spring.**
- **New discs for the brakes and clutches that are to be used for replacement must be soaked in ATF for at least 15 minutes before reassembly.**
- **All oil seal rings, clutch discs, clutch plates, rotating parts, and sliding surfaces should be coated with ATF prior to reassembly.**
- **All gaskets and rubber O-rings should be replaced.**
- **Do not apply adhesive cements to gaskets and similar parts.**
- **Make sure that the ends of a snap ring are not aligned with one of the cutouts and are installed in the groove correctly.**
- **If a worn bushing is to be replaced, the sub-assembly containing the bushing must also be replaced.**
- **Check thrust bearings and races for wear or damage. Replace if necessary.**
- **Use petroleum jelly to keep parts in place.**
- **When working with FIPG material, you must observe the following.**
  Using a razor blade and a gasket scraper, remove all the old packing (FIPG) material from the gasket surface.
  Thoroughly clean all components to remove all the loose material.
  Clean both sealing surfaces with a non-residue solvent.
  Parts must be reassembled within 10 minutes of application. Otherwise, the packing (FIPG) material must be removed and reapplied.

BEARING AND RACES INSTALLATION POSITION AND DIRECTION



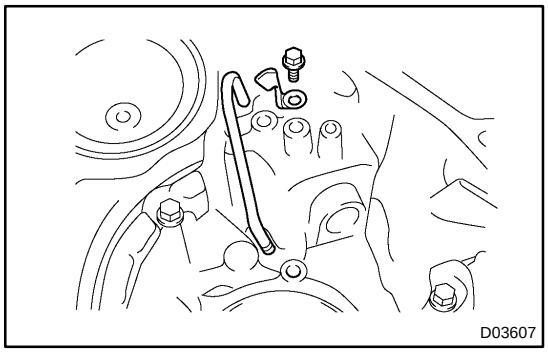
Mark	Front Race Diameter Inside / Outside mm (in.)	Thrust Bearing Diameter Inside / Outside mm (in.)	Rear Race Diameter Inside / Outside mm (in.)
A	-	57.2 (2.252) / 84.96 (3.3449)	56.4 (2.220) / 83.0 (3.268)
B	-	37.73 (1.4854) / 58.0 (2.283)	29.9 (1.177) / 55.5 (2.185)
C	-	33.85 (1.3327) / 52.2 (2.055)	-
D	-	23.5 (0.925) / 44.0 (1.732)	-
E	-	36.3 (1.429) / 52.2 (2.055)	34.5 (1.358) / 48.5 (1.909)
F	-	34.6 (1.362) / 48.5 (1.963)	-
G	40.3 (1.587) / 58.0 (2.283)	38.6 (1.520) / 60.0 (2.362)	38.6 (1.520) / 58.0 (2.283)
H	-	53.6 (2.110) / 69.6 (2.740)	-
I	-	33.7 (1.327) / 48.2 (1.898)	30.3 (1.193) / 46.0 (1.811)
J	-	53.6 (2.110) / 70.18 (2.763) or 69.6 (2.740)	-



1. INSTALL OIL SEPARATOR

Install the oil separator with the 3 bolts to the transaxle housing.

Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)



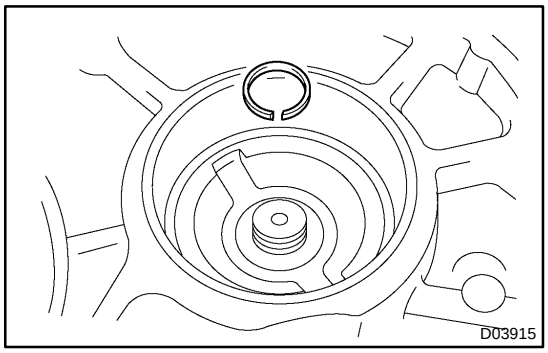
2. INSTALL APPLY PIPE

(a) Install the apply pipe, and clamp with the bolt to the transaxle case.

Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)

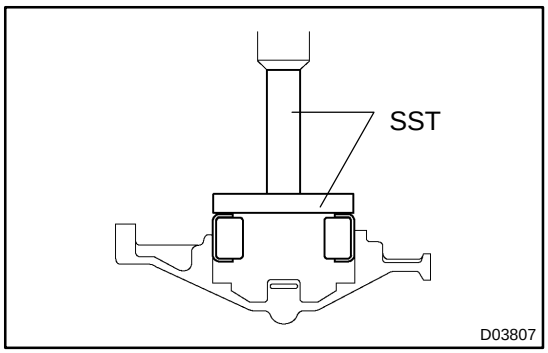
NOTICE:

Make sure to insert the pipe to the stopper.



3. INSTALL U/D CYLINDRICAL ROLLER BEARING

(a) Install the oil seal ring to the transaxle housing.

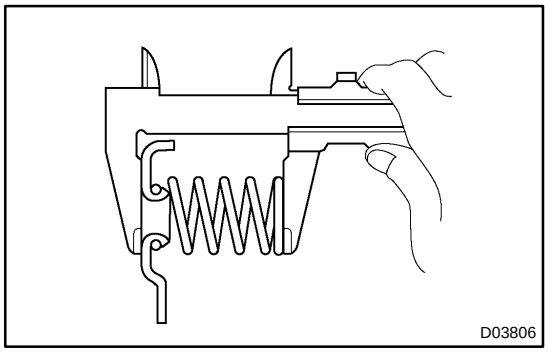


(b) Using SST and a press, install the U/D cylindrical roller bearing.

SST 09950-60020, (09951-00810), 09950-70010, (09951-07100)

NOTICE:

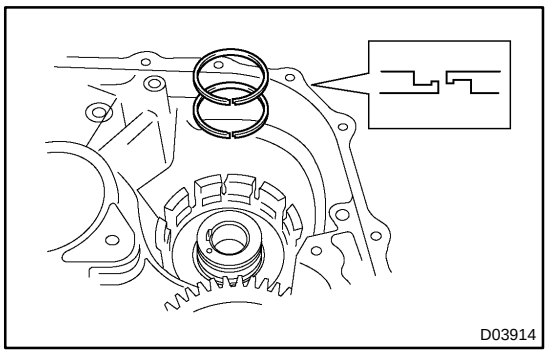
Do not apply excessive pressure to it.



4. CHECK U/D BRAKE PISTON RETURN SPRING

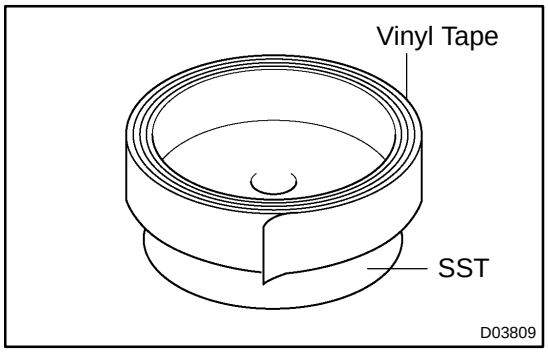
Using vernier caripers, measure the free length of the spring together with the spring seat.

Standard free length: 13.24 mm (0.5212 in.)



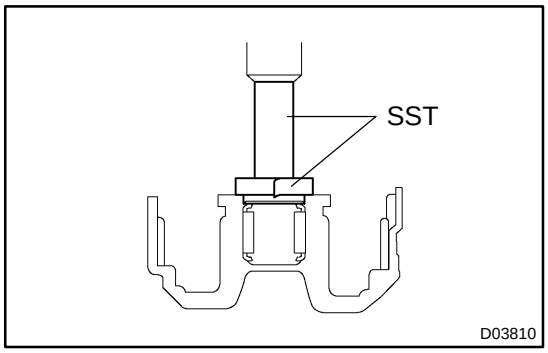
5. INSTALL U/D BRAKE

(a) Install the 2 oil seal rings to the transaxle case.



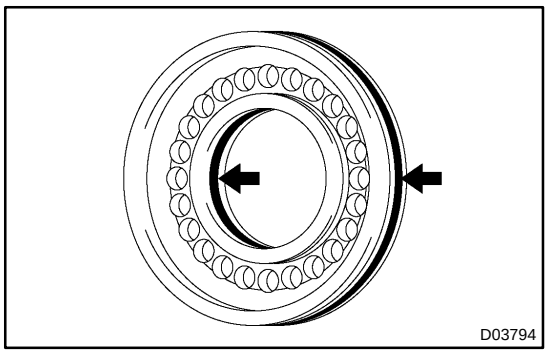
(b) Wind a vinyl tape around SST at the place 4.0 mm (0.157 in.) above from the bottom end until the thickness of the wound tape is about 5.0 mm (0.197 in.).
SST 09550-60010 (09951-00320)

NOTICE:
Clean SST to remove deposited oil, before winding a vinyl tape.

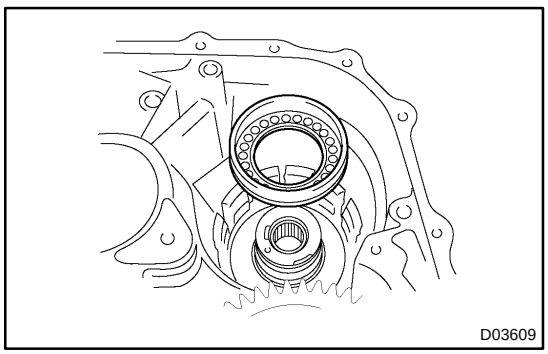


(c) Using SST and a press, install the needle-roller bearing to the transaxle case.
SST 09950-60010, (09951-00320), 09950-70010 (09951-07100)

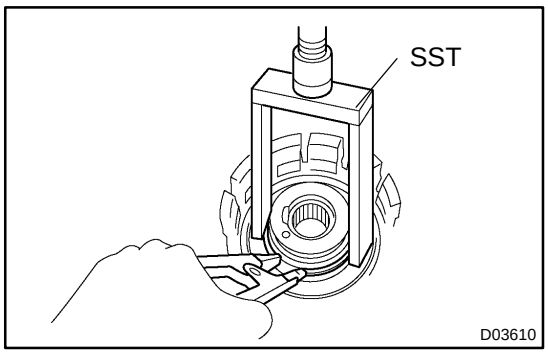
NOTICE:
When the wound vinyl tape contacts the transaxle case, stop press-fitting.



(d) Coat 2 new O-rings with ATF, install them to the U/D brake piston.



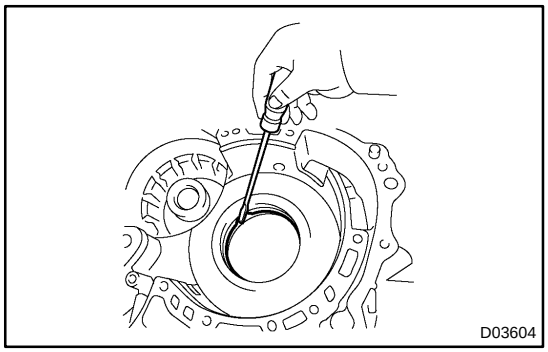
(e) Install the U/D clutch piston to the transaxle case.



(f) Using SST, a snap ring expander and a press, install the piston return spring and snap ring to the transaxle case.
SST 09387-00020

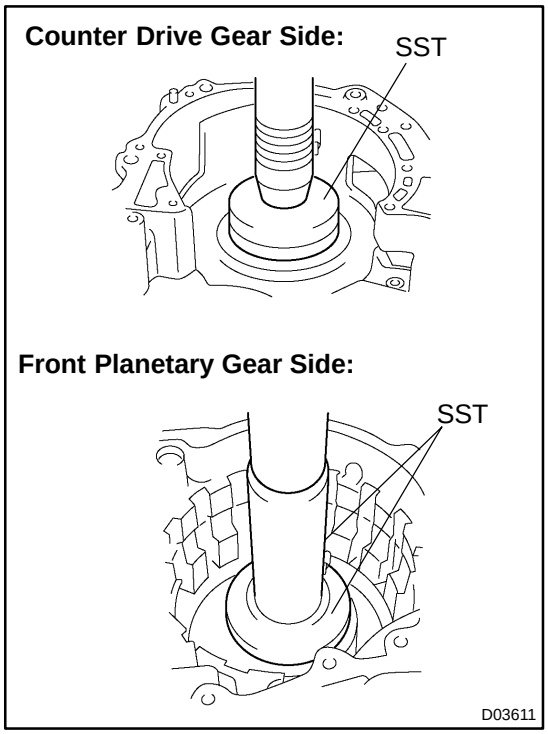
NOTICE:

- **Press-fit the bearing race RH until it contacts the snap ring.**
- **Do not apply excessive pressure to it.**



6. INSTALL COUNTER DRIVE GEAR

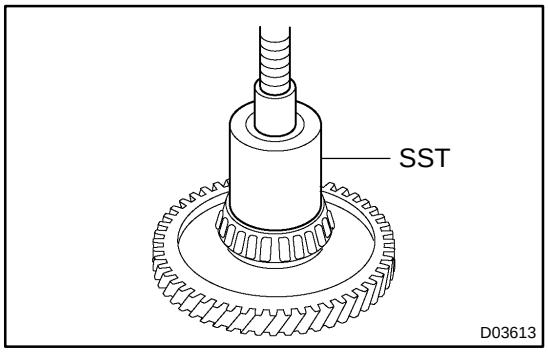
(a) Using a screwdriver, install the snap ring to the transaxle case.



(b) Using SST and a press, install the 2 bearing outer races to the transaxle case.
SST 09950-60020 (09951-00890), 09950-70010 (09951-07150)

NOTICE:

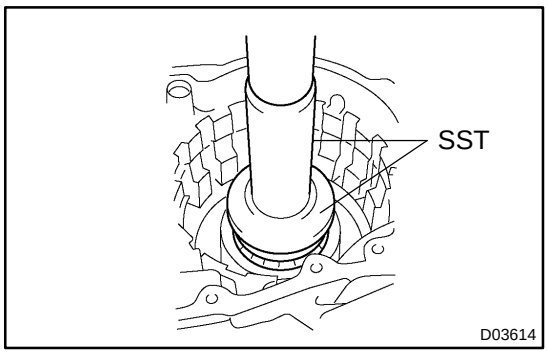
- **Press-fit the bearing race until it contacts the snap ring.**
- **Do not apply excessive pressure to it.**



(c) Using SST and a press, install the tapered roller bearing to the counter drive gear.
SST 09649-17010

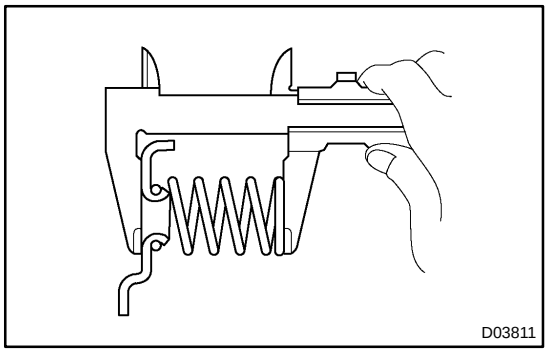
NOTICE:

- **Press-fit the bearing inner race until it contacts the counter drive gear.**
- **Do not apply excessive pressure to it.**



(d) Using SST and a press, install the counter drive gear and bearing to the transaxle case.
SST 09950-60010, (09951-00890), 09950-70010 (09951-07150)

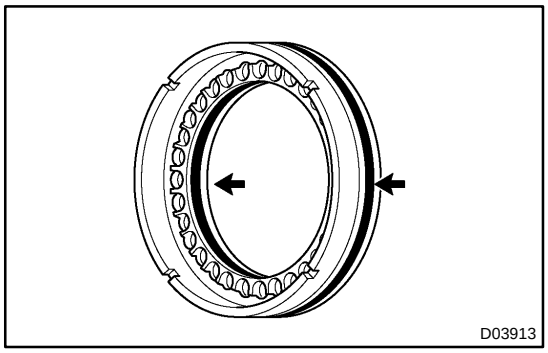
NOTICE:
Do not apply excessive pressure to it.



7. CHECK 1ST & REVERSE BRAKE PISTON RETURN SPRING

Using vernier caripers measure the free length of the spring together with the spring seat.

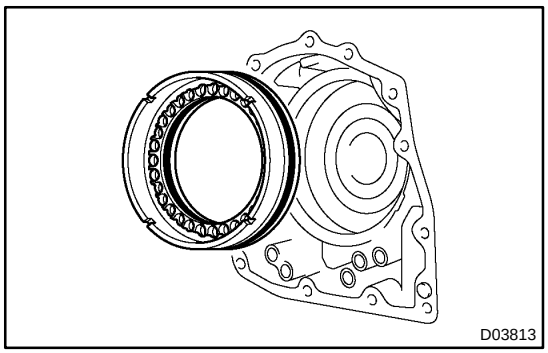
Standard free length: 17.61 mm (0.6933 in.)



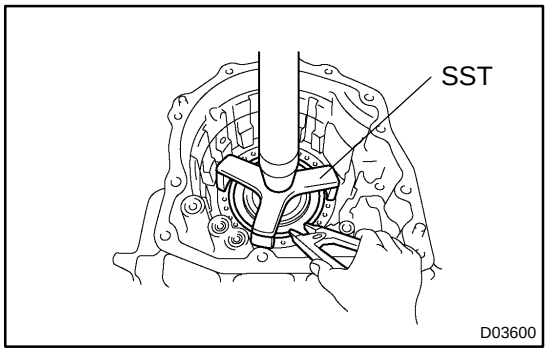
8. INSTALL 1ST & REVERSE BRAKE PISTON

(a) Coat 2 new O-rings with ATF.

(b) Install the 2 O-rings to the 1st & reverse brake piston.



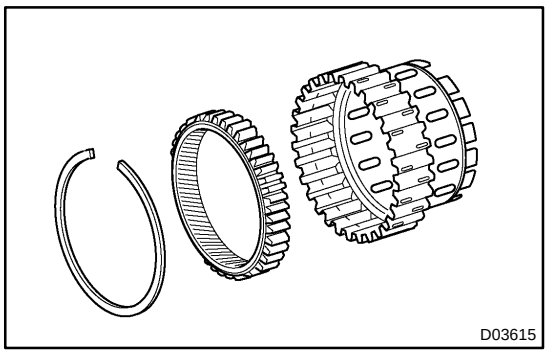
(c) Coat a 1st & reverse brake piston with ATF, install the 1st & reverse brake piston to the transaxle case.



(d) Using SST, a press, and snap ring pliers, install the piston return spring and snap ring to the transaxle case.
SST 09387-00070

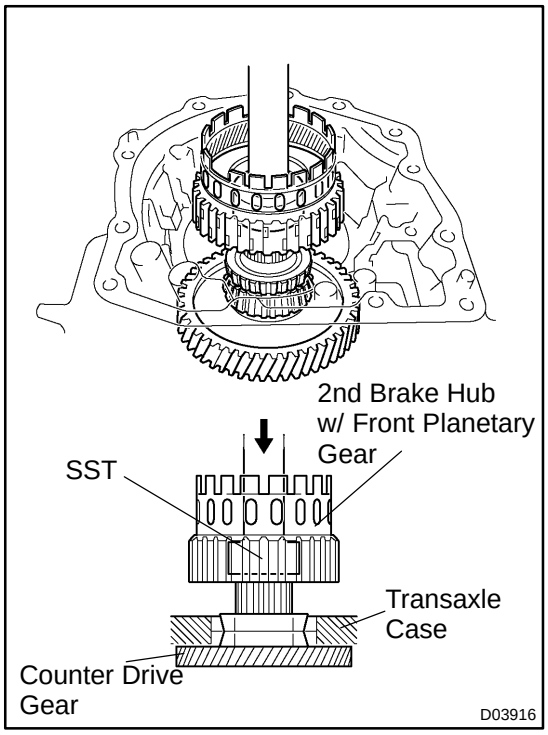
NOTICE:

- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from deforming.**
- **Do not expand the snap ring excessively.**



9. INSTALL FRONT PLANETARY GEAR ASSEMBLY

(a) Using a screwdriver, install the front planetary ring gear and the snap ring to the brake hub.

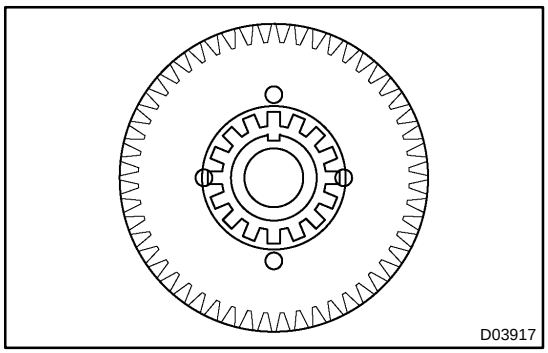


(b) Install the front planetary gear to the 2nd brake.

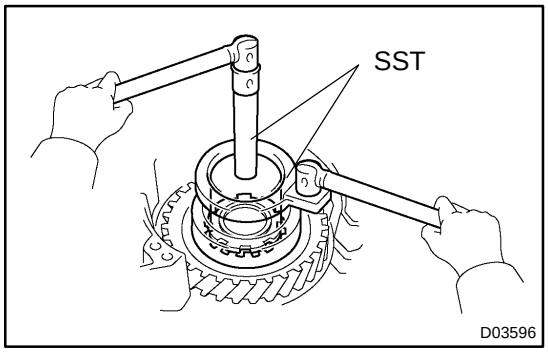
(c) Using SST, a press and press-fit the front planetary gear.
SST 09950-60010 (09951-00400)

NOTICE:

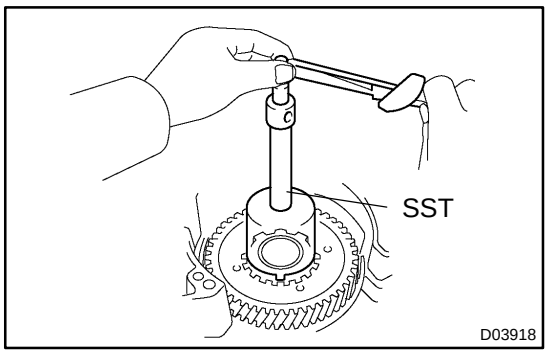
Do not apply excessive pressure to it.



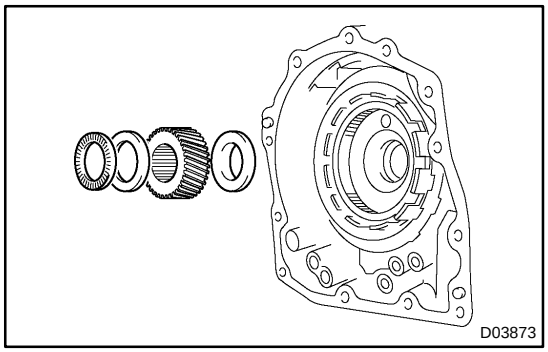
(d) Install the washer, as shown in the illustration.



(e) Using SST, install the nut.
SST 09387-00030, 09387-00080
Torque: 280 N·m (2855 kgf·cm, 207 ft·lbf)

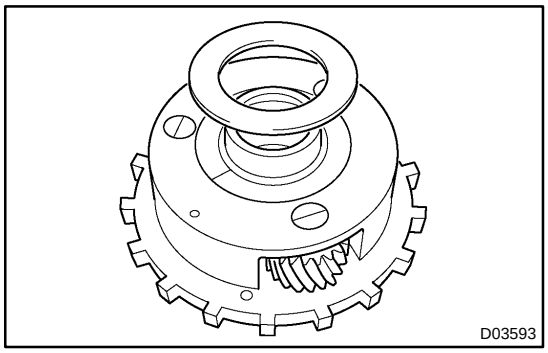


(f) Using SST and a torque wrench, measure the starting torque of the bearing. When the measured value is not within the specified value, gradually tighten the nut until it reaches the specified value.
SST 09387-00080
Starting torque:
0.6 - 1.0 N·m (5.5 - 10.0 kgf·cm, 4.8 - 8.7 in.·lbf)



(g) Install the 2 bearings, 2 races and front planetary sun gear to the front planetary gear.
Bearing and race diameter: mm (in.)

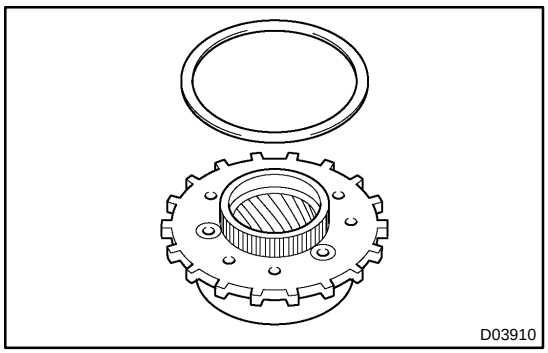
	inside	out side
Bearing	34.6 (1.362)	48.5 (1.909)
race	40.3 (1.587)	58.0 (2.283)
Bearing	38.6 (1.520)	60.0 (2.362)



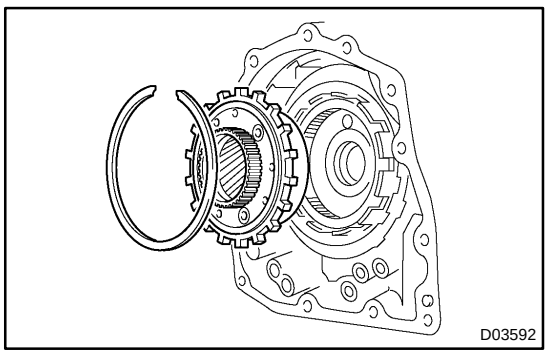
10. INSTALL REAR PLANETARY GEAR

(a) Coat a bearing race with ATF, install it to the rear planetary gear assembly.
Bearing race diameter:

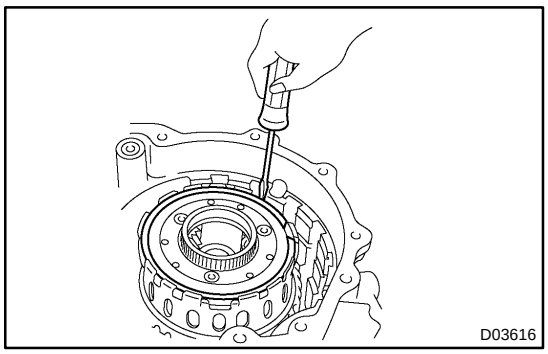
	inside	out side
race	38.6 (1.520)	58.0 (2.283)



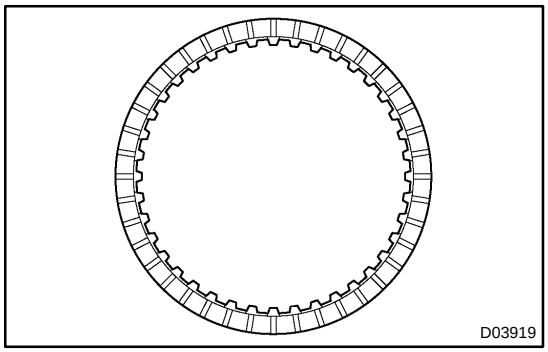
(b) Install the thrust washer No.2.



(c) Install the rear planetary gear from the rear planetary ring gear.



(d) Using a screwdriver, install the and snap ring.

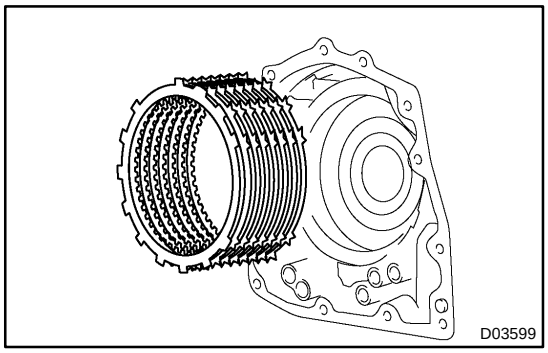


11. INSPECT DISC AND FLANGE OF 1ST & REVERSE BRAKE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

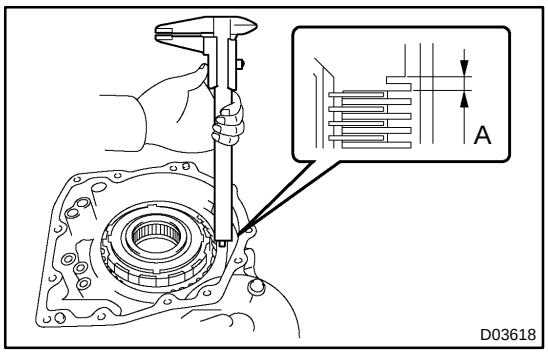
HINT:

- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



12. INSTALL 1ST & REVERSE BRAKE

(a) Install the 7 plates and 7 discs.



(b) Using vernier calipers, measure the distance between the disc surface and the contact surface of the 2nd brake cylinder and transaxle case.(Dimension A)

(c) Select an appropriate flange so that the piston stroke will meet the specified value.

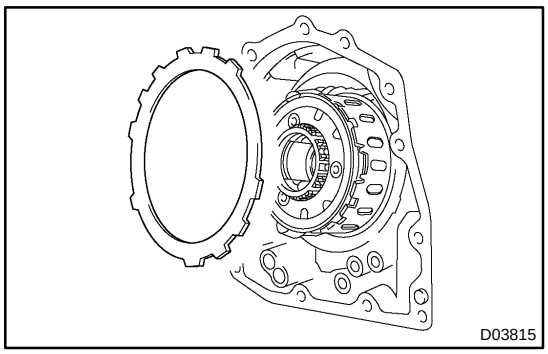
Piston stroke: 1.10 - 1.24 mm (0.0433 - 0.0488 in.)

HINT:

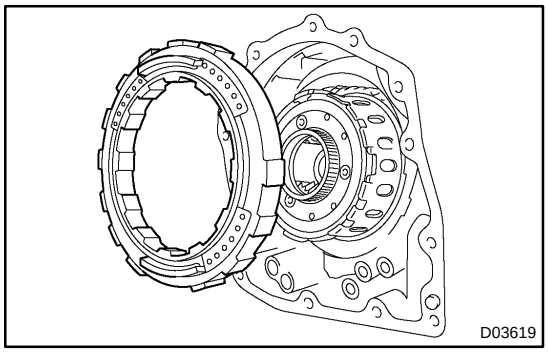
Piston stroke = Dimension A - Flange thickness

Flange thickness = mm (in.)

Mark	Thickness	Mark	Thickness
1	1.8 (0.071)	5	2.2 (0.087)
2	1.9 (0.075)	6	2.3 (0.091)
3	2.0 (0.079)	7	2.4 (0.094)
4	2.1 (0.083)	8	2.5 (0.098)



(d) Install the flange.



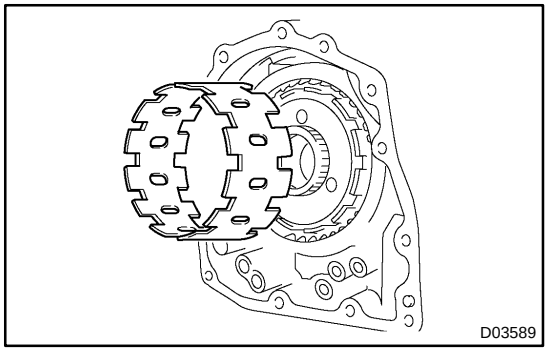
13. INSTALL 2ND BRAKE CYLINDER ASSEMBLY, ONE-WAY CLUTCH NO.1 AND REAR PLANETARY SUN GEAR ASSEMBLY

(a) Install the 2nd brake cylinder assembly to the transaxle case.

(b) Install the snap ring and measure the inside diameter.
Inside diameter: More than 167 mm (6.57 in.)

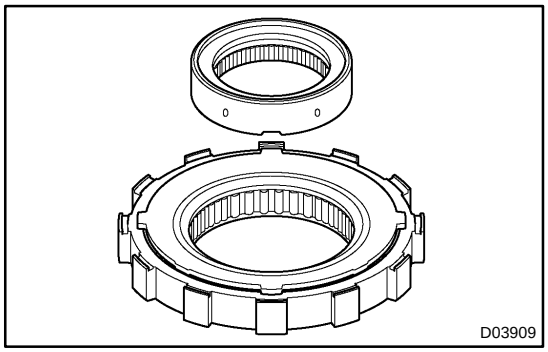
NOTICE:

- **Because the taper snap ring has the positioning direction, check it when installing.**
- **When the diameter does not satisfy the specified value, replace the snap ring with new one.**



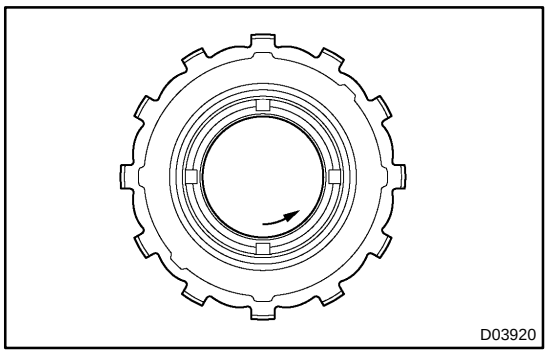
(c) Install the one-way clutch outer race sleeve to the 2nd brake cylinder assembly.

NOTICE:
Check the positioning direction of the outer sleeve.

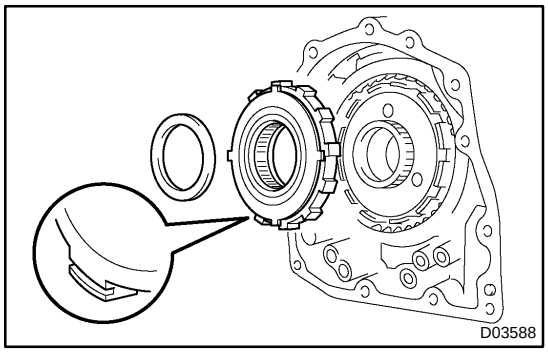


(d) Install the inner race to the one-way clutch.

NOTICE:
Check the direction of the inner race.



(e) Check the rotating direction of one-way clutch for the lock or free operation as shown in illustration.

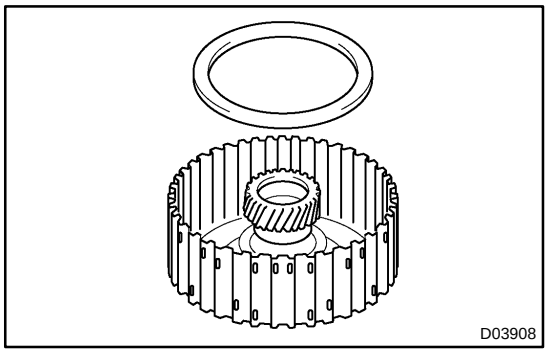


(f) Install the one-way clutch No.1 and bearing to the one-way clutch outer race sleeve.

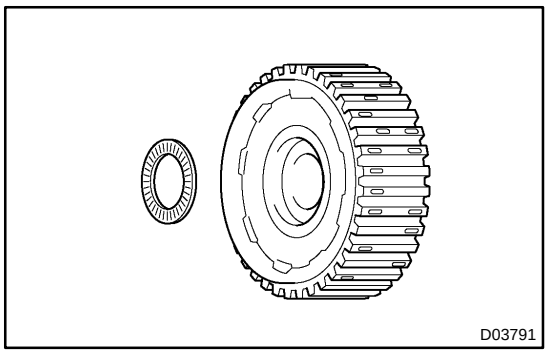
Bearing diameter: mm (in.)

	Inside	Outside
Bearing	53.6 (2.110)	69.6 (2.740)

NOTICE:
Install the thrust bearing properly so that the black race will be risible.



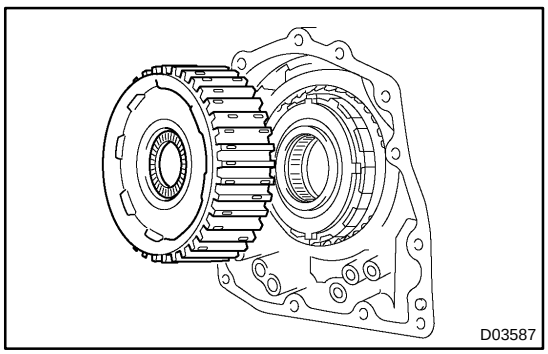
(g) Coat the thrust washer No.1 with petroleum jelly install it onto the rear planetary sun gear.



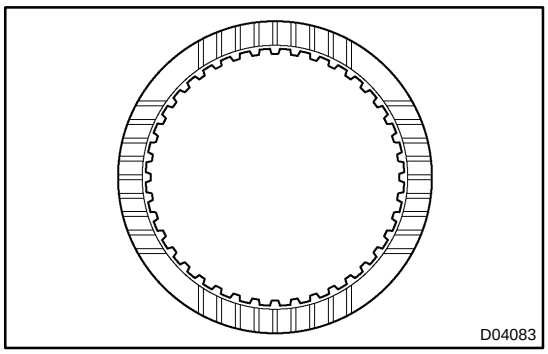
(h) Coat the bearing with petroleum jelly and install it onto the rear planetary sun gear.

Bearing diameter: mm (in.)

	Inside	Outside
Bearing	33.7 (1.327)	48.2 (1.898)



(i) Install the rear planetary sun gear assembly to the rear planetary gear.

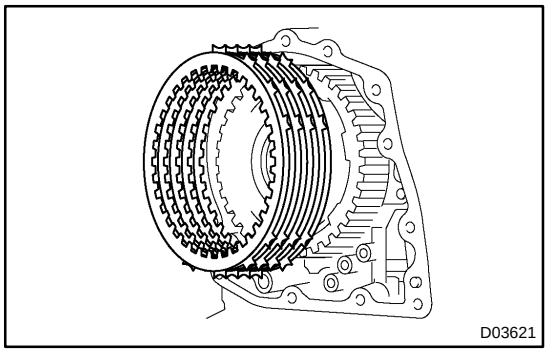


14. INSPECT DISC AND FLANGE OF 2ND BRAKE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

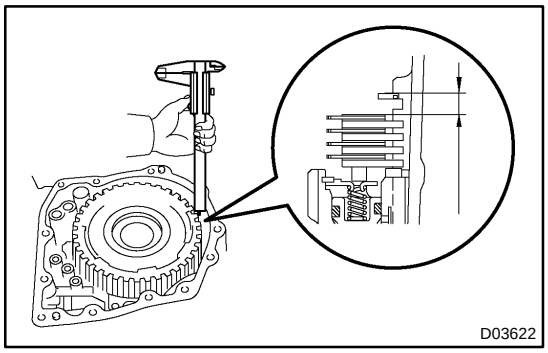
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



15. INSTALL 2ND BRAKE

(a) Install the 4 discs and 4 plates to the transaxle case.

(b) Temporarily install the snap ring.



(c) Using vernier calipers, measure the distance between the disk surface and snap ring surface.

(d) Select an appropriate flange so that the piston stroke will meet the specified value.

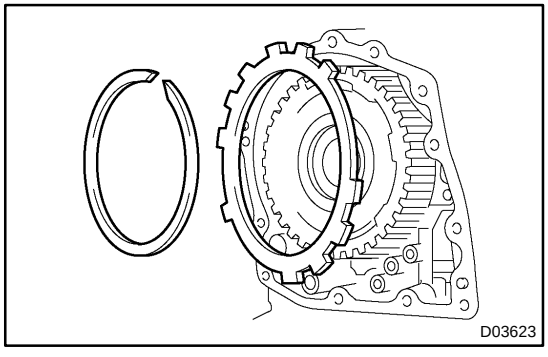
Piston stroke: 0.65 - 0.75 mm (0.0256 - 0.0295 in.)

HINT:

Piston stroke = Clearance - Flange thickness - Snap ring thickness 1.6 mm (0.063 in.).

Flange thickness: mm (in.)

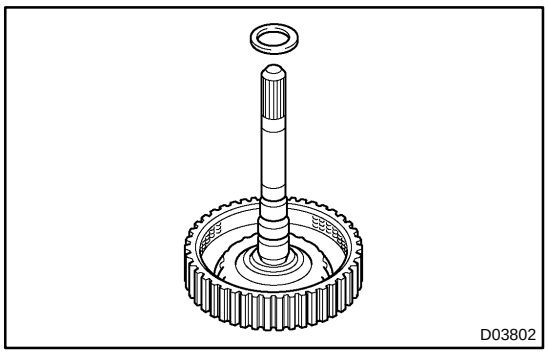
Mark	Thickness	Mark	Thickness
1	3.0 (0.118)	5	3.4 (0.134)
2	3.1 (0.122)	6	3.5 (0.138)
3	3.2 (0.126)	7	3.6 (0.142)
4	3.3 (0.130)	-	-



(e) Temporarily remove the snap ring, attach the selected flange and restore the snap ring.

NOTICE:

Secure the snap ring so that its end gap is visible through the groove of the transaxle case.

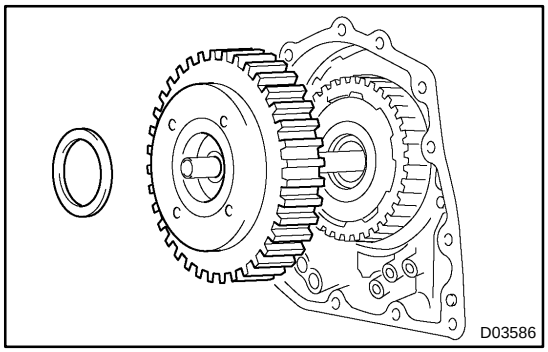


16. INSTALL DIRECT CLUTCH ASSEMBLY

(a) Install the bearing race to the direct clutch.

Bearing race diameter:

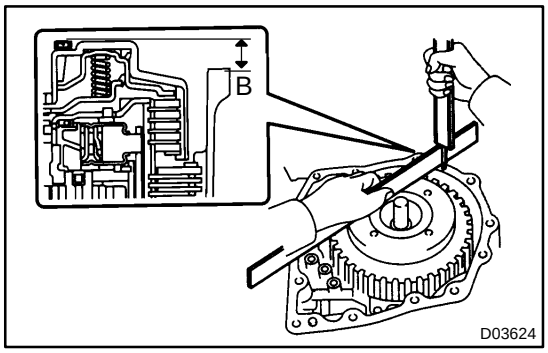
	Inside	Outside
Bearing race	30.3 (1.193)	46.0 (1.811)



(b) Install direct clutch assembly and thrust bearing to the rear planetary sun gear assembly.

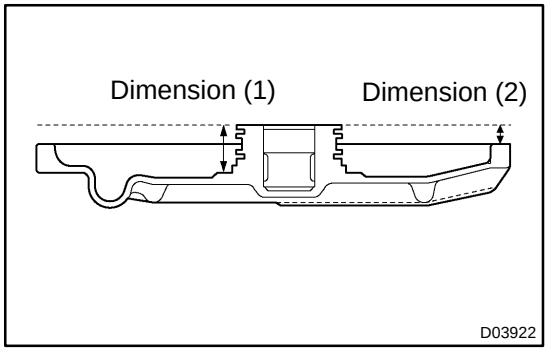
NOTICE:

The disk in the direct clutch should completely mate with the hub attached outside the rear planetary sun gear. Otherwise, the rear cover can not be installed.



(c) Clean the connected part of the transaxle case and rear cover.

(d) As shown in the illustration, place a straight edge on the direct clutch drum and measure the distance between the transaxle case and the straight edge using vernier calipers. (Dimension B)



(e) Measure the 2 places of the rear cover as shown in the illustration and calculate a dimension C using the following formula.

HINT:

Dimension C = Dimension (1) - Dimension (2)

(f) Calculate the end play value using the following formula. Select a thrust bearing which satisfies the end play value and install it.

End play: 0.2 - 0.9 mm (0.008 - 0.035 in.)

NOTICE:

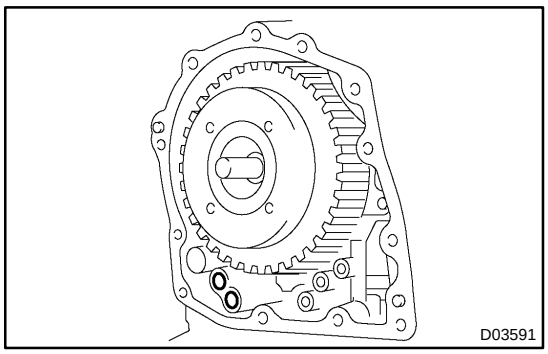
Make sure that the black race side is facing the rear cover.

HINT:

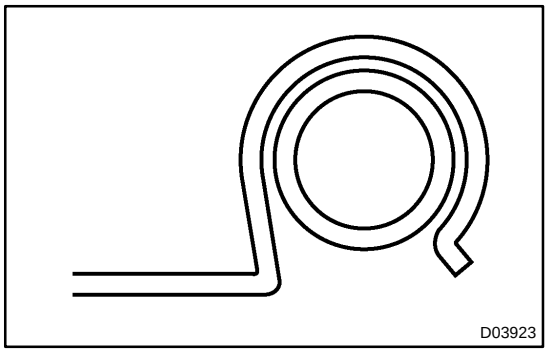
End play = Dimension C - Dimension B

Bearing thickness and diameter: mm (in.)

Thickness	Inside	Outside
3.55 (0.1397)	53.6 (2.110)	69.6 (2.740)
3.85 (0.1515)	53.6 (2.110)	70.18 (2.763)



17. INSTALL 2 NEW APPLY GASKETS

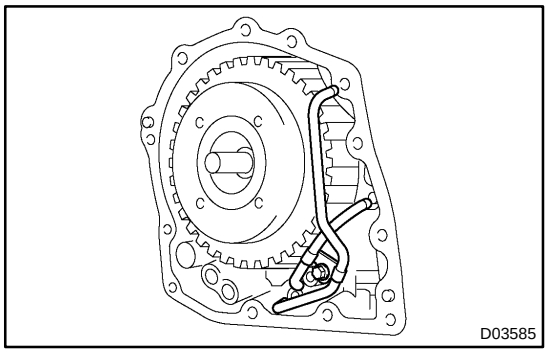


18. INSTALL APPLY TUBE

(a) Install the clamp to the apply pipe.

NOTICE:

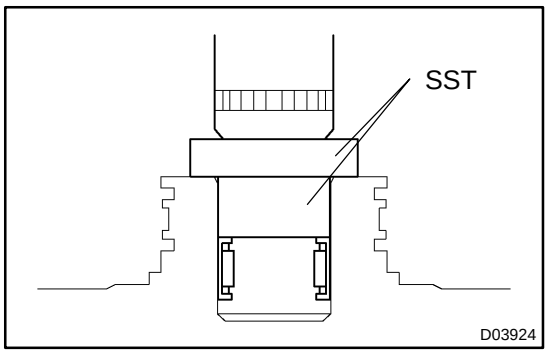
Make sure to install the clamp to the apply pipe before installing the apply tube to the transaxle case. This prevents the apply pipe from being deformed or damaged.



(b) Install the 2 apply pipe and a bolt to the transaxle case.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

NOTICE:

Each pipe is securely inserted until it reaches the stopper.

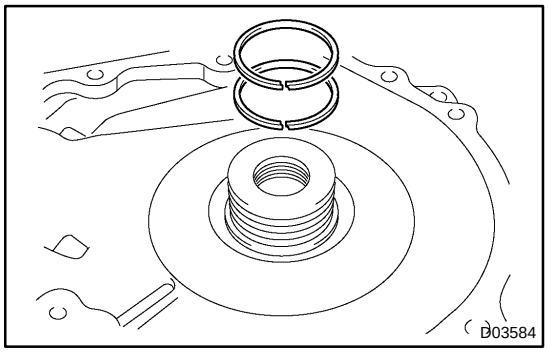


19. INSTALL TRANSAXLE REAR COVER

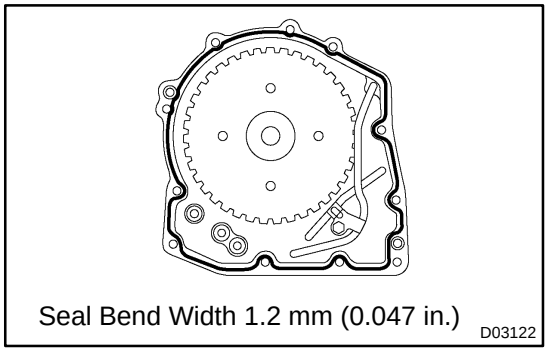
(a) Using SST and a press, install the bearing.
SST 09950-60010 (09951-00230, 09951-00350)
Press fit depth: 12.05 - 12.75 mm (0.4744 - 0.5020 in.)

NOTICE:

- **Face the inscribed mark side of the bearing race up.**
- **Repeat the press fit and the measurement until the specified value above is obtained.**



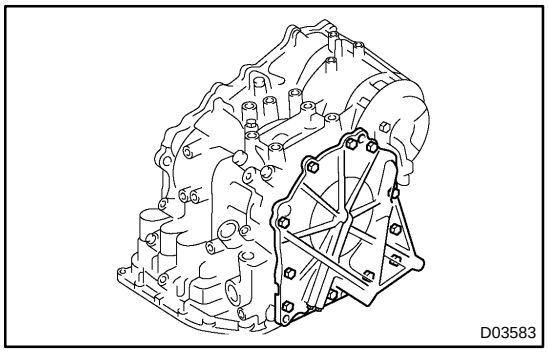
(b) Coat 2 oil seal rings with ATF, install them to transaxle rear cover.



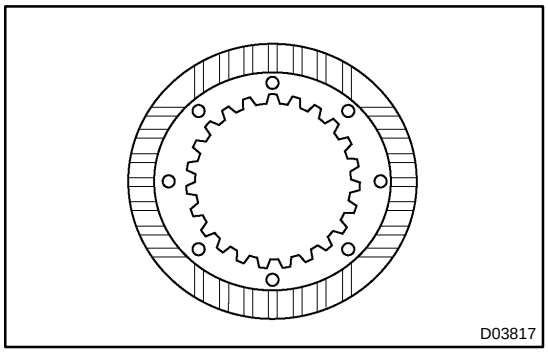
(c) Remove any packing material and be careful not to get oil on the contacting surfaces of the transaxle rear cover or the transaxle case.

(d) Apply FIPG to the rear cover.
FIPG:
Part No. 08826-00090, THREE BOND 1281 or equivalent.

(e) Coat a needle roller bearing with ATF.



(f) Install the transaxle rear cover and 11 bolts to the transaxle case.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

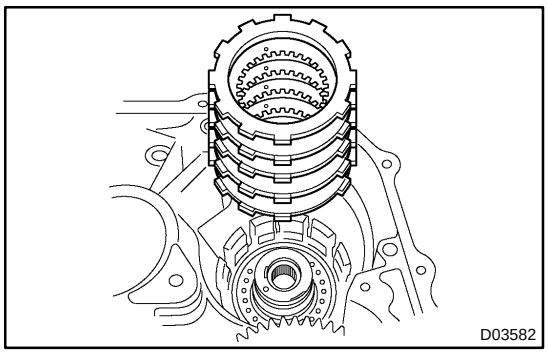


20. INSPECT DISC AND FLANGE OF U/D BRAKE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. if necessary, replace them.

HINT:

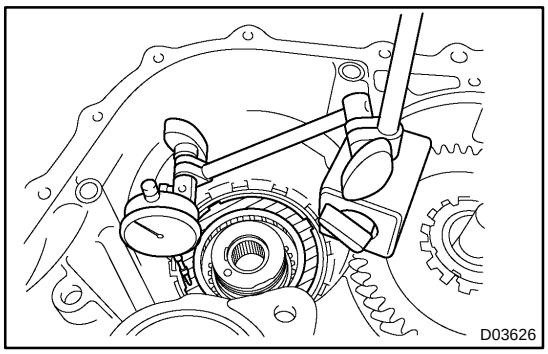
- If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- Before assembling new discs, soak them in ATF for at least 15 minutes.



21. INSTALL U/D BRAKE

(a) Install the 4 discs and 4 plates to the transaxle case.

(b) Using a screwdriver, install the snap ring.



(c) Using a dial indicator, measure the U/D brake piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Piston stroke: 1.81 - 2.07 mm (0.0713 - 0.0815 in.)

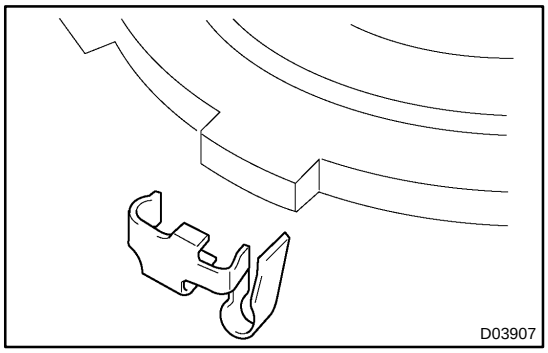
HINT:

Select an appropriate flange from the table below so that it will meet the specified value.

Flange thickness: mm (in.)

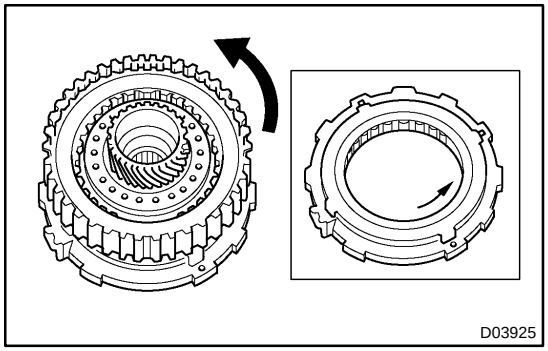
Mark	Thickness	Mark	Thickness
1	3.0 (0.118)	3	3.4 (0.134)
2	3.2 (0.126)	-	-

(d) Temporarily remove the snap ring and attach the flange. Restore the snap ring.

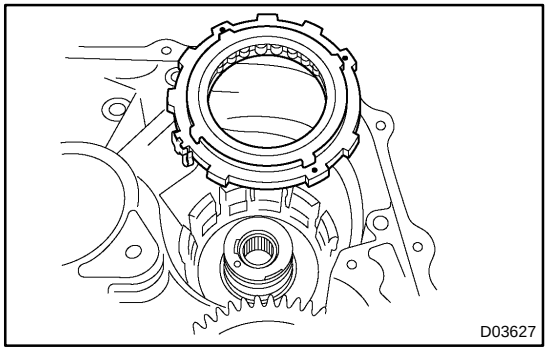


22. INSTALL ONE-WAY CLUTCH NO.2

(a) Install the outer race retainer to the one-way clutch No.2.



(b) Install the U/D clutch assembly to the one-way clutch. Rotate the U/D clutch assembly to check the rotating direction for the lock or free operation.

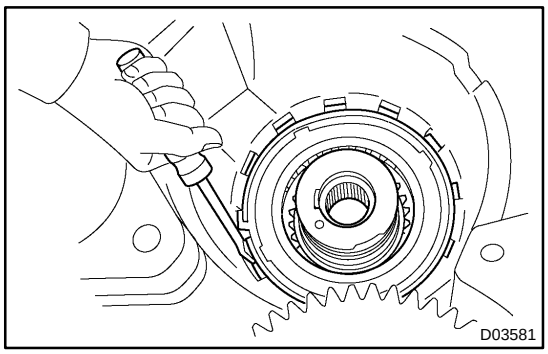


23. INSTALL ONE-WAY CLUTCH NO.2

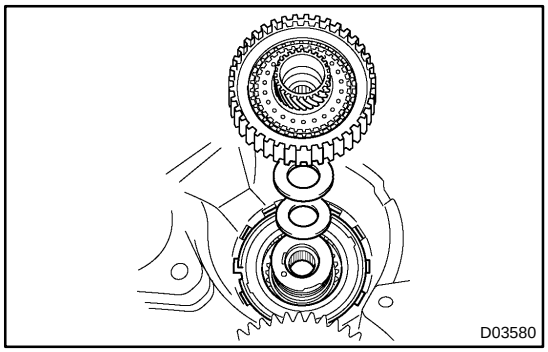
(a) Install the one-way clutch No.2 to the transaxle case.

NOTICE:

Make sure that the mark on the one-way clutch outer race is visible.



(b) Using a screwdriver, install the snap ring to the transaxle case.



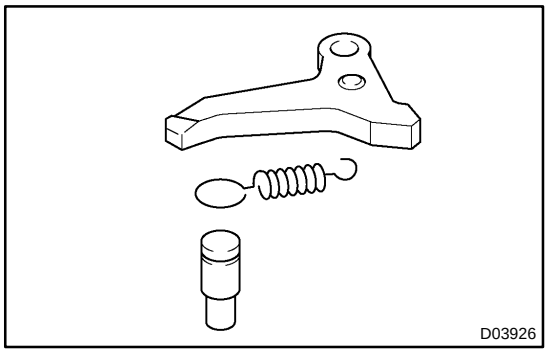
24. INSTALL U/D CLUTCH ASSEMBLY

(a) Coat the bearing and bearing race with petroleum jelly and install it onto the U/D clutch.

Race diameter: mm (in.)

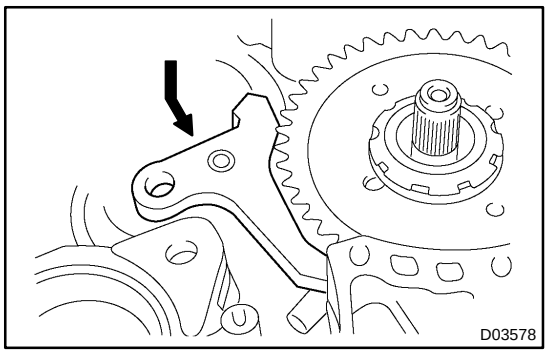
	Inside	Outside
Bearing	37.73 (1.485)	58.0 (2.283)
Race	29.9 (1.177)	55.5 (2.185)

(b) Install the U/D clutch assembly to the transaxle case.

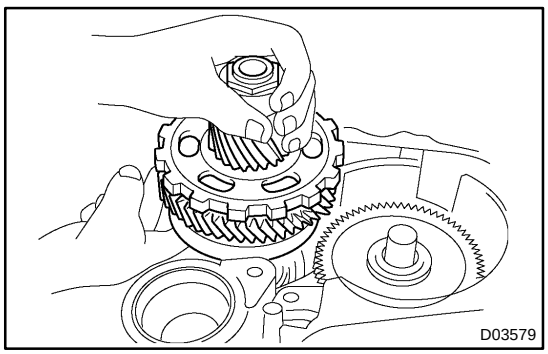


25. INSTALL U/D PLANETARY GEAR ASSEMBLY AND DIFFERENTIAL ASSEMBLY

(a) Install the pawl pin and spring to the parking lock pawl.



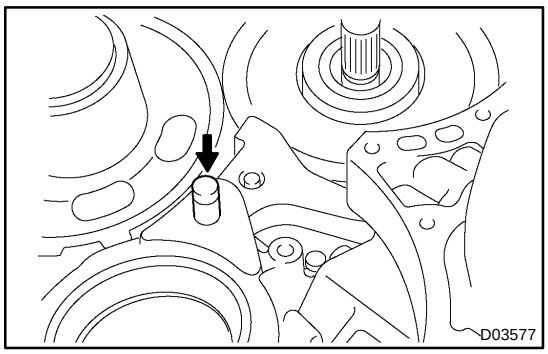
(b) Temporarily install the parking lock pawl, shaft and spring to the transaxle case as shown in the illustration.



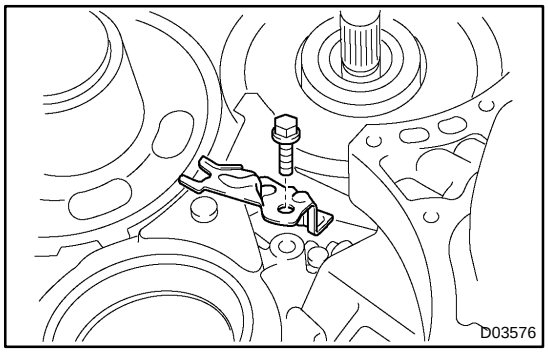
(c) Install the U/D planetary gear assembly to the transaxle case.

NOTICE:

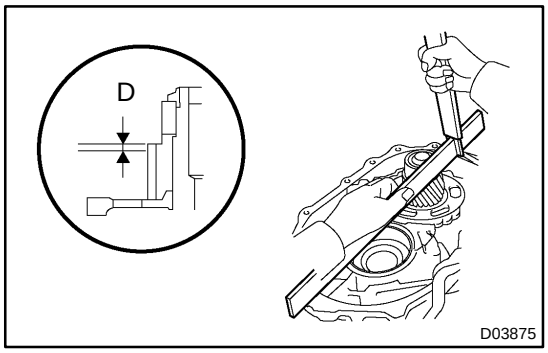
Engage all the discs of U/D clutch and hub sprine of the U/D planetary gear assembly firmly and assemble them securely.



(d) Install the parking lock pawl shaft.

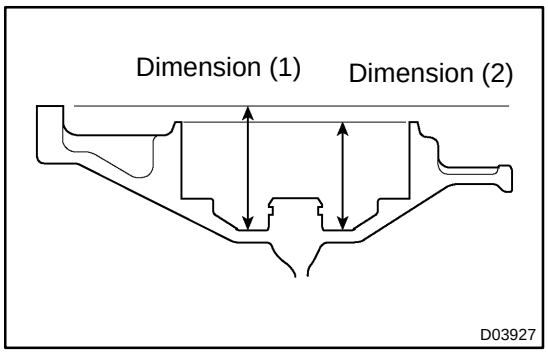


(e) Install the pawl shaft with the bolt.
Torque: 9.8 N·m (100 kgf·cm, 7 ft·lbf)



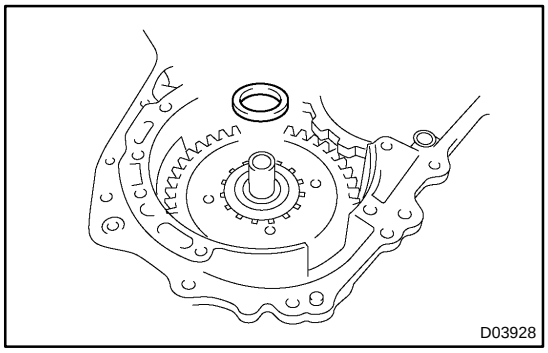
(f) Using a straight edge and vernier calipers as shown in the illustration, measure the gap between the top of the differential drive pinion in the U/D planetary gear and contact surface of the transaxle case and housing. (Dimension D)

NOTICE:
Note down the dimension D as it is necessary for the following process.



(g) As shown in the illustration, measure the 2 places of the transaxle housing. Calculate the dimension E using the formula.

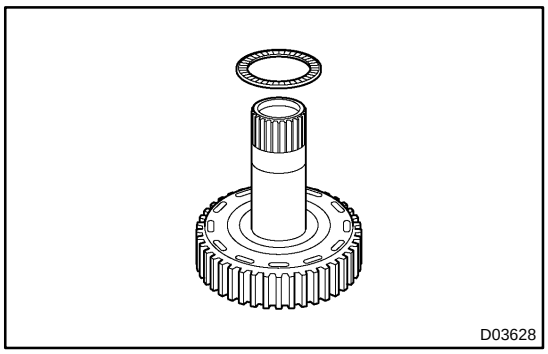
NOTICE:
Note down the dimension E as it is necessary for the following process.
HINT:
Dimension E = Dimension (1) - Dimension (2)



26. INSTALL MULTIPLE DISC CLUTCH HUB

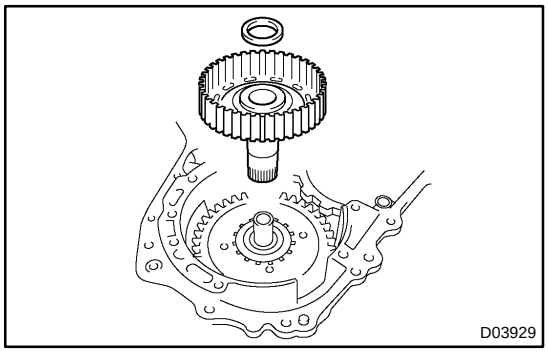
(a) Install the bearing race to the transaxle while checking its direction.
Bearing race diameter: mm (in.)

	Inside	Outside
Bearing race	34.5 (1.358)	48.5 (1.909)



(b) Coat the thrust bearing and race with petroleum jelly and install them onto the multiple disc clutch hub.
Thrust bearing and race diameter: mm (in.)

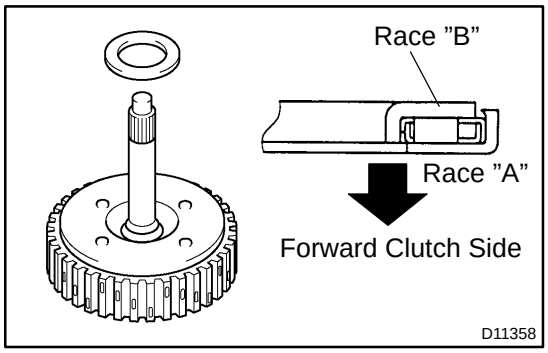
	Inside	Outside
Bearing	36.3 (1.429)	52.2 (2.055)



(c) Install the bearing to the forward clutch hub.
Bearing diameter: mm (in.)

	Inside	Outside
Bearing	23.5 (0.925)	44.0 (1.732)

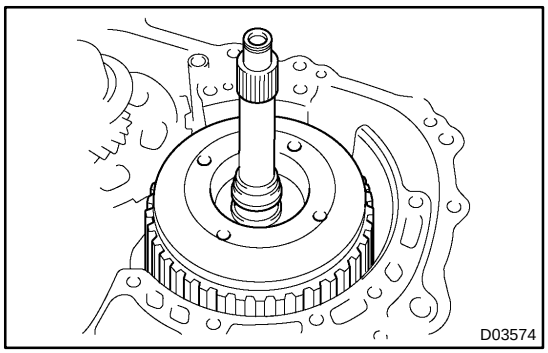
(d) Install the forward clutch hub to the transaxle case.



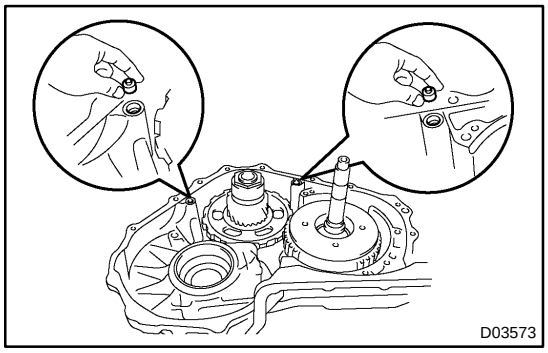
(e) Install the thrust bearing to the forward clutch.
Bearing diameter: mm (in.)

	Inside	Outside
Bearing	33.85 (1.3327)	52.2 (2.055)

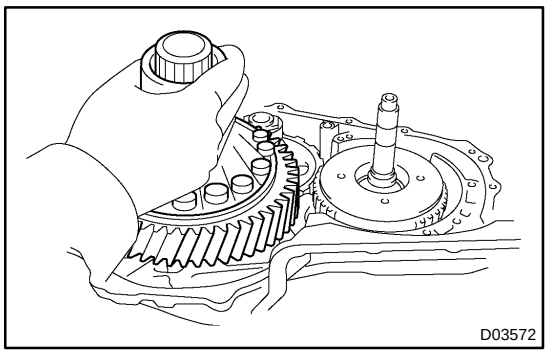
NOTICE:
Install the thrust bearing properly so that the race “B” will be visible.



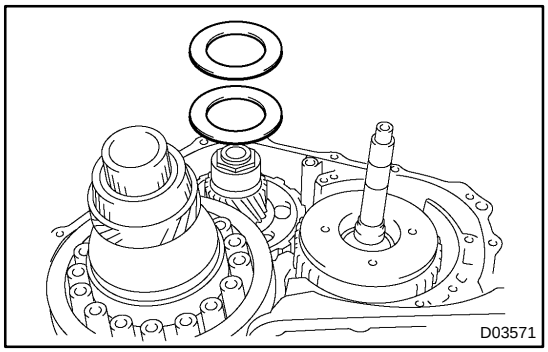
(f) Install the forward clutch to the multiple clutch hub.
NOTICE:
Align the splines of all discs in the forward clutch with those of multiple clutch hub to assemble them securely.



27. INSTALL 2 NEW APPLY GASKET



28. INSTALL DIFFERENTIAL ASSEMBLY



29. INSTALL TRANSAXLE HOUSING

(a) Calculate the end play value using the following formula and values of Dimension D and E that were measured when installing cylindrical roller bearing and U/D planetary gear. Select an appropriate U/D planetary gear thrust bearing race No.2 which satisfies the specified end play value, and install it.

End play: 0.50 - 0.99 mm (0.0197 - 0.0390 in.)

HINT:

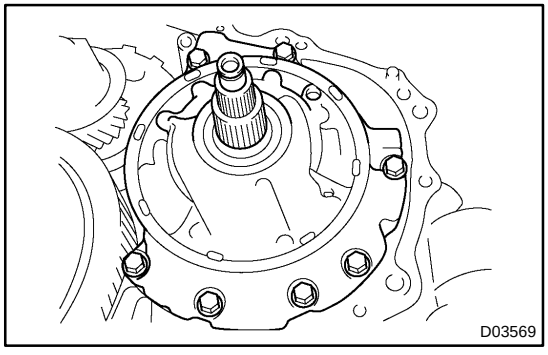
End play = Dimension E - Dimension D - thrust bearing thickness 3.28 mm (0.1291 in.) - U/D gear thrust bearing race No.2 thickness

Race thickness: mm (in.)

E - D	Thickness
Less than 7.42 (0.2921)	3.5 (0.138)
7.42 (0.2921) or more	3.8 (0.150)

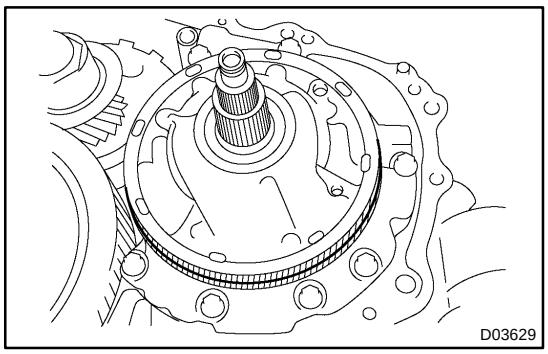
Bearing and bearing race diameter: mm (in.)

	Inside	Outside
Bearing	57.2 (2.252)	84.96 (3.3449)
Bearing race	56.4 (2.220)	83.0 (3.2649)

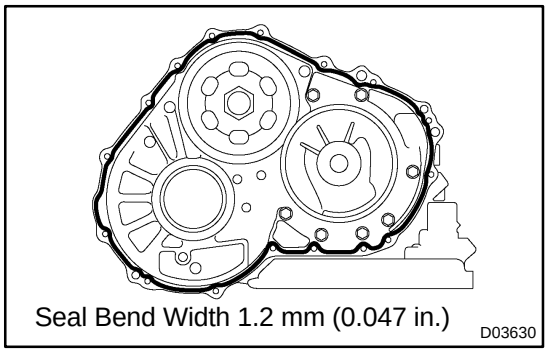


(b) Install the oil pump and 7 bolts to the transaxle case

Torque: 22 N·m (226 kgf·cm, 16 ft·lbf)



(c) Coat on O-ring of oil pump with ATF.

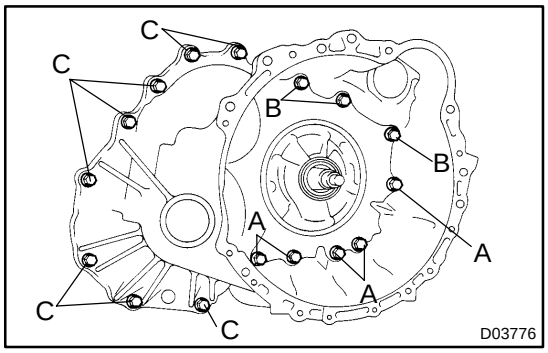


(d) Remove any packing material and be careful not to get oil on the contacting surfaces of the transaxle case or transaxle housing.

(e) Apply FIPG to the transaxle case.

FIPG:

Part No. 08826-00090, THREE BOND 1281 or equivalent



(f) Install the transaxle housing and 16 bolts to the transaxle case.

Torque:

Bolt A: 22 N·m (226 kgf·cm, 16 ft·lbf)

Bolt B and C: 29 N·m (300 kgf·cm, 22 ft·lbf)

HINT:

Apply seal packing or equivalent to the bolt A.

Seal packing:

THREE BOND 2403 or equivalent

Bolt length:

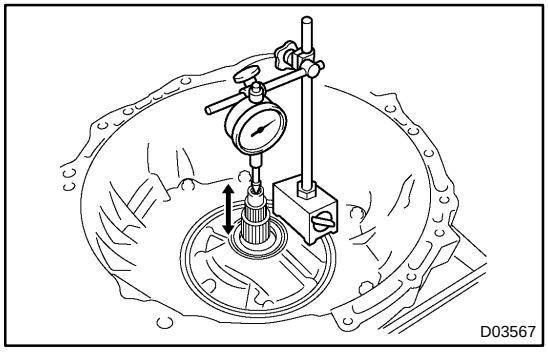
Bolt A: 50 mm (1.969 in.)

Bolt B: 50 mm (1.969 in.)

Bolt C: 42 mm (1.654 in.)

NOTICE:

Because the bolt A is a seal bolt, apply the seal packing to new bolts and tighten them within 10 minutes after application.



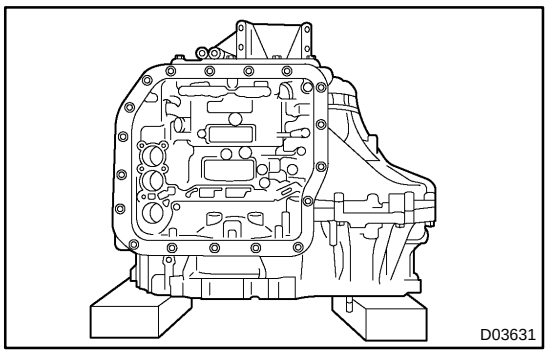
30. INSPECT INPUT SHAFT END PLAY

Using a dial indicator, measure the input shaft end play.

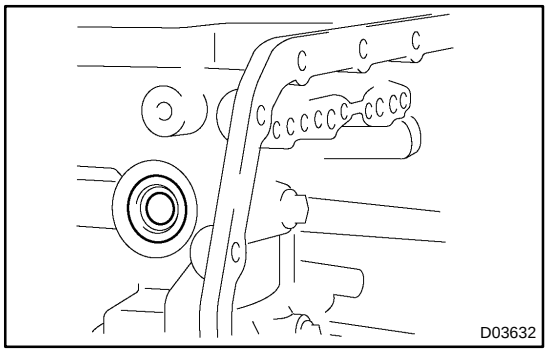
End play: 0.27 - 1.24 mm (0.0106 - 0.0417 in.)

31. CHECK DIFFERENTIAL PRELOAD

(See page AX-106)



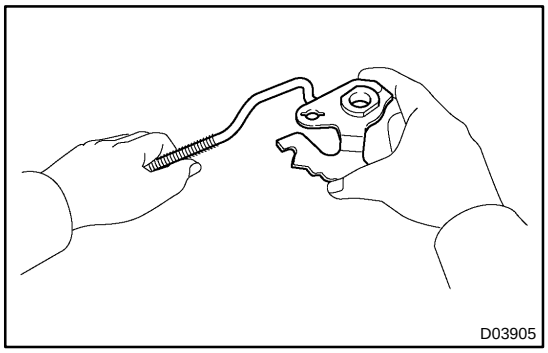
32. PLACE TRANSAXLE HOUSING



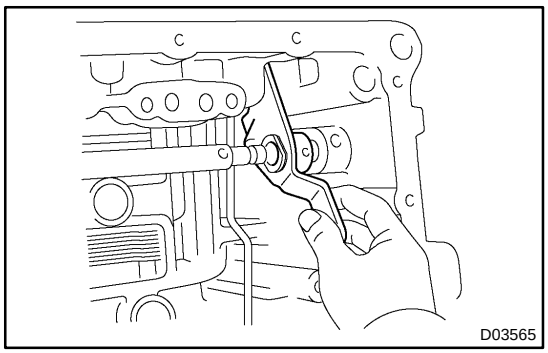
33. INSTALL MANUAL VALVE LEVER SHAFT

(a) Coat the new oil seal with ATF.

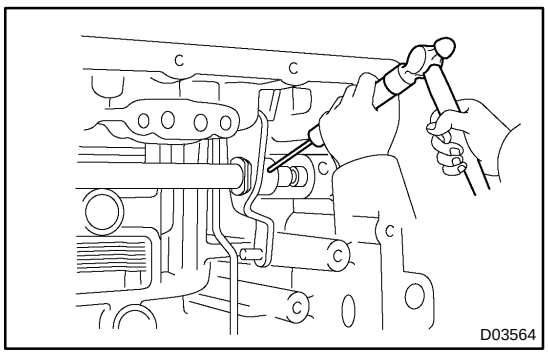
(b) Install the oil seal to the transaxle case.



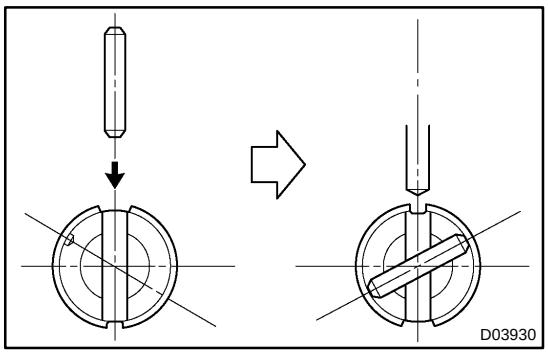
(c) Install the parking lock rod to the manual valve lever.



(d) Install a new spacer and manual valve lever shaft to the transaxle case.



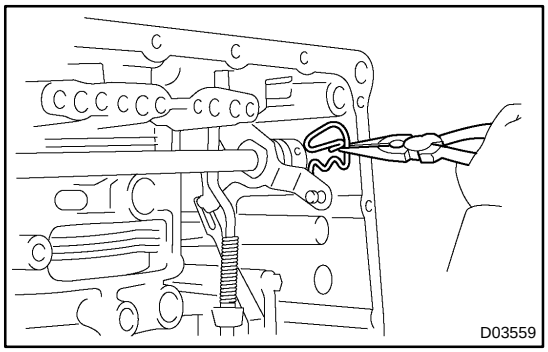
(e) Using a pin punch and a hammer, drive in a new pin.



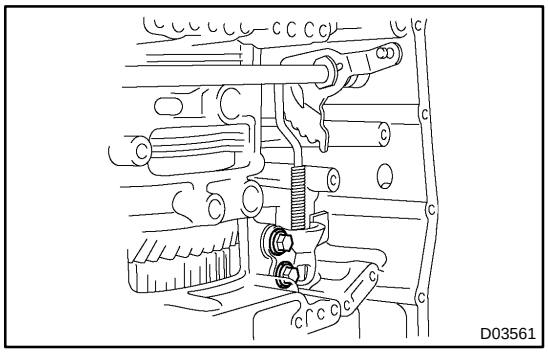
(f) Turn the spacer and the lever shaft to aligh the small hole for locating the staking position in the spacer with the staking position mark on the lever shaft.

(g) Using a pin punch, stake the spacer through the small hole.

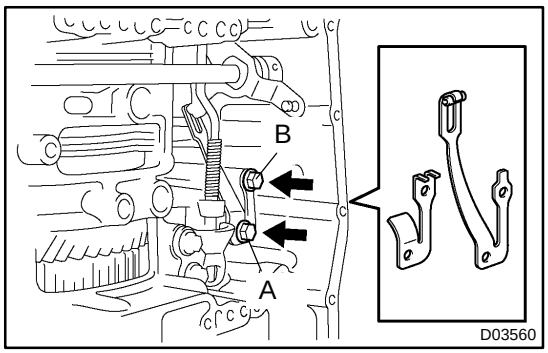
(h) Check that the spacer does not turn.



(i) Using needle-nose pliers, install the return spring.



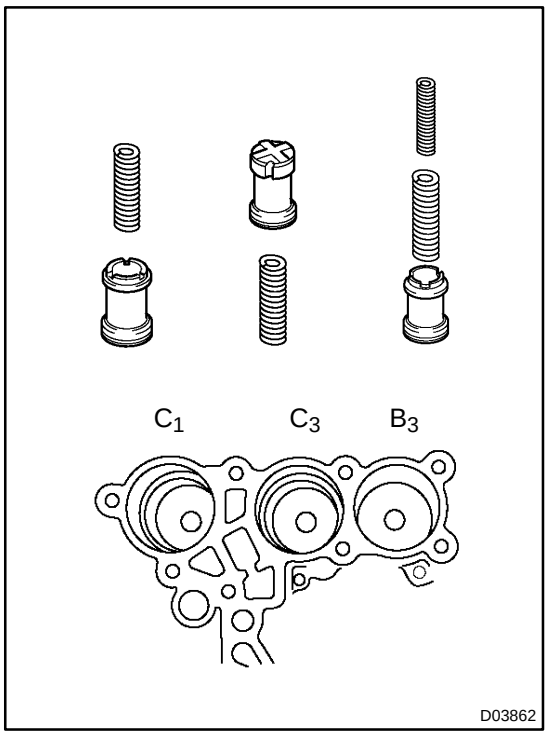
(j) Install the parking lock pawl bracket with 2 bolts.
Torque: 20 N·m (205 kgf·cm, 15 ft·lbf)
Bolt length: 25 mm (0.984 in.)



(k) Install the manual detent spring with 2 bolts.

NOTICE:
Make sure to install the manual detent spring and cover in this order.

Torque:
Bolt A: 20 N·m (205 kgf·cm, 15 ft·lbf)
Bolt B: 12 N·m (120 kgf·cm, 9 ft·lbf)
Bolt length:
Bolt A: 27 mm (1.063 in.)
Bolt B: 16 mm (0.630 in.)



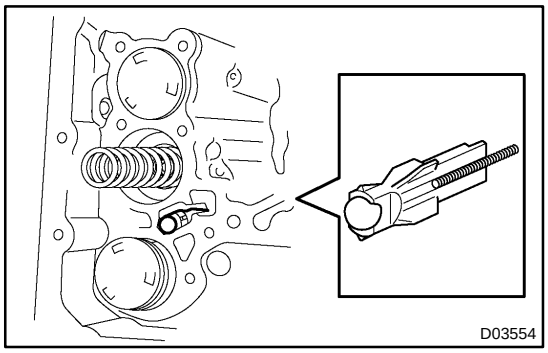
34. INSTALL ACCUMULATOR PISTONS AND SPRINGS

(a) Coat new 4 O-rings with ATF and install them to the pistons.

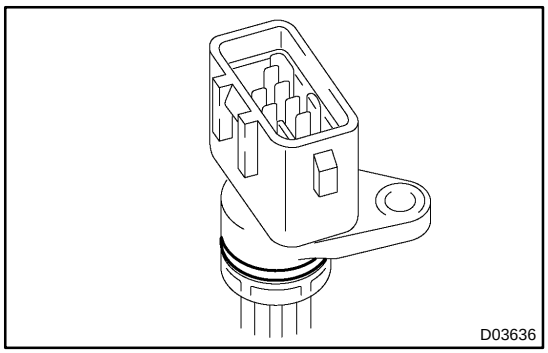
(b) Coat the 4 springs and 3 accumulator pistons with ATF, install them to the holes.

Accumulator spring:

Spring		Free length Outer diameter mm (in.)	Color
B_3	Inner	60.24 (2.3716) / 15.9 (0.626)	Green
	Outer	72.61 (2.8587) / 16.7 (0.657)	Blue
C_3		86.66 (3.4118) / 19.2 (0.756)	Yellow
C_1		90.53 (3.5642) / 18.5 (0.728)	Red

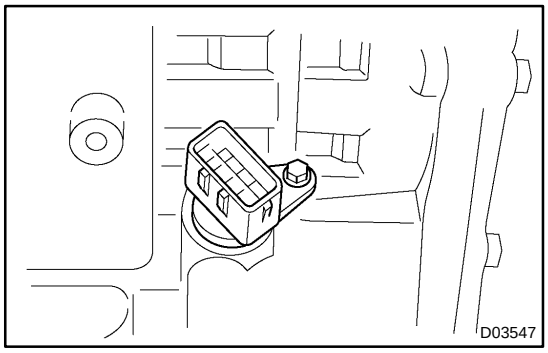


35. INSTALL CHECK BALL BODY AND SPRING



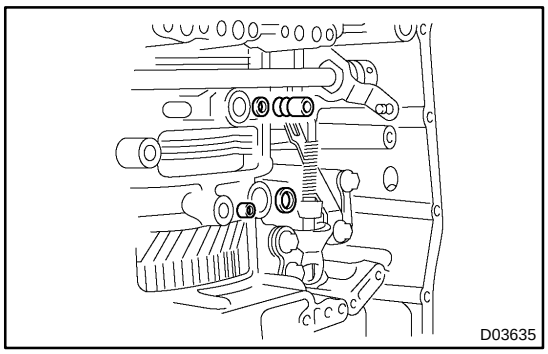
36. INSTALL TRANSAXLE SOLENOID WIRE

(a) Coat a new O-ring with ATF, install it to the transaxle solenoid wire.



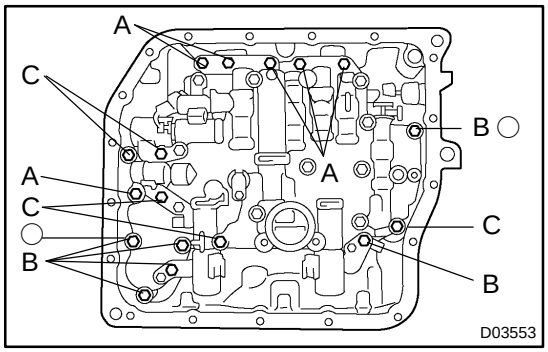
(b) Install the solenoid wire retaining bolt

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



37. INSTALL APPLY GASKET

(a) Coat 4 apply gaskets with ATF and install them to the transaxle case.



38. INSTALL VALVE BODY ASSEMBLY

(a) Align the groove of the manual valve with the pin of lever.

(b) Install the 17 bolts.

Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)

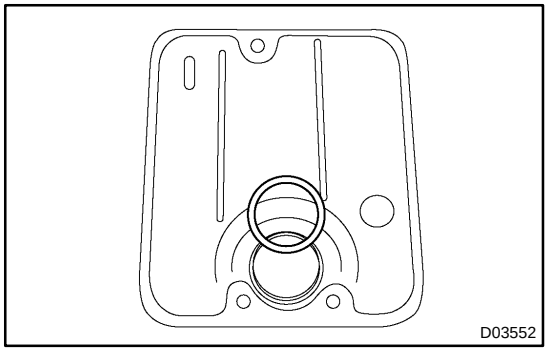
NOTICE:

- **Push the valve body against the accumulator piston spring and the check ball body to install it.**
- **Tighten those bolts marked by ○ in the illustration first temporarily because they are postioning bolts.**

HINT:

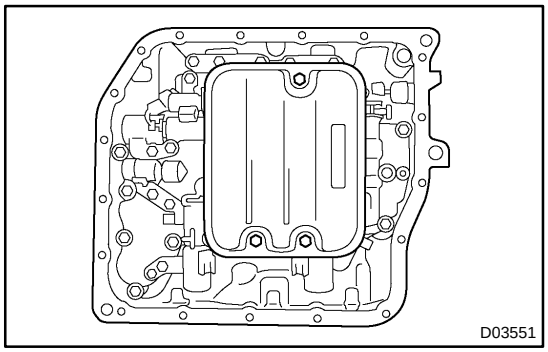
Each bolt length is indicated below.

Bolt length:
Bolt A: 25 mm (0.984 in.)
Bolt B: 41 mm (1.614 in.)
Bolt C: 45 mm (1.771 in.)



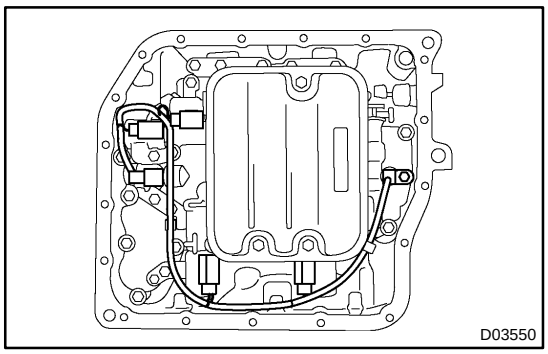
39. INSTALL OIL STRAINER

(a) Coat new gasket with ATF, install it to the oil strainer.

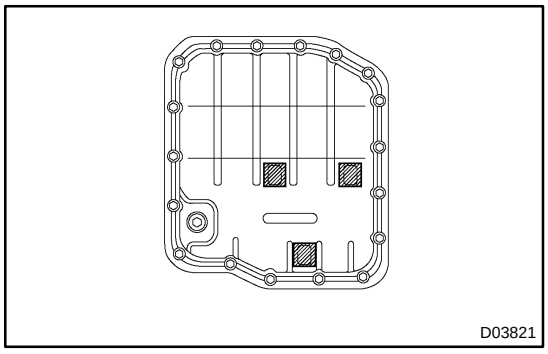


(b) Install the oil strainer and 3 bolts to the valve body.

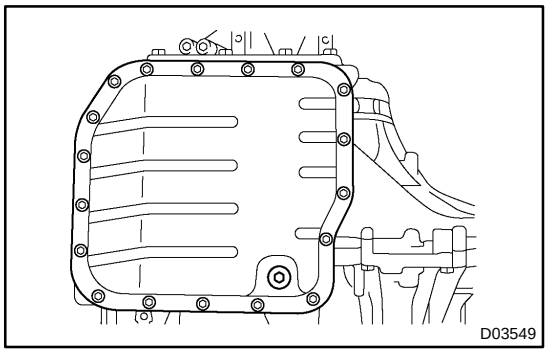
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



(c) Connect the 5 solenoid connectors.
(d) Install the ATF temperature sensor, clamp and bolt.
Torque: 6.6 N·m (67 kgf·cm, 58 in.·lbf)

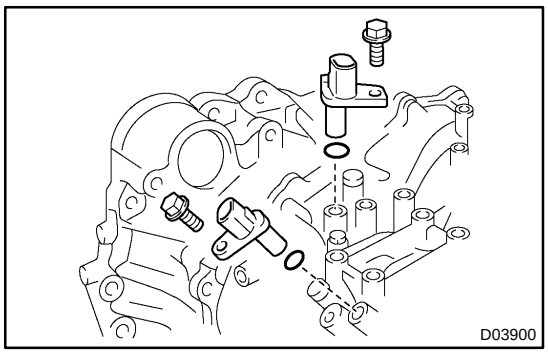


40. INSTALL OIL PAN
(a) Install the 3 magnets in the oil pan.
(b) Apply seal packing or equivalent to the new 18 bolts.
Seal packing:
THREE BOND 2430 or equivalent

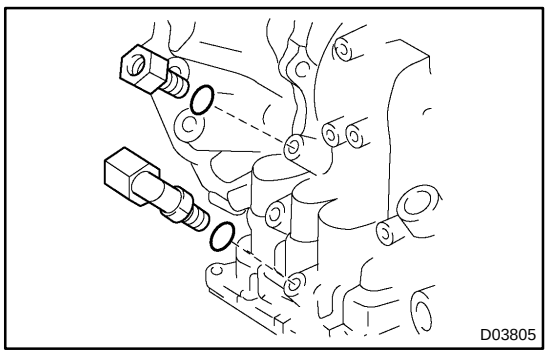


(c) Install a new gasket, oil pan and 18 bolts to the transaxle case.
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

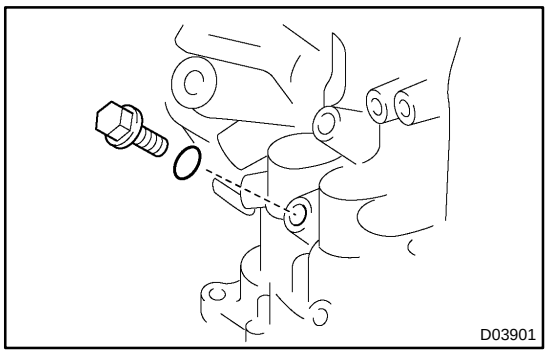
NOTICE:
Because the bolts should be seal bolts, apply seal packing to new bolts and tighten them within 10 minutes after application.



41. INSTALL SPEED SENSOR
(a) Coat new 2 O-rings with ATF, install it to the 2 sensors.
(b) Install the 2 sensors with 2 bolts to the transaxle case.
Torque: 11 N·m (110 kgf·cm, 8 in.·lbf)



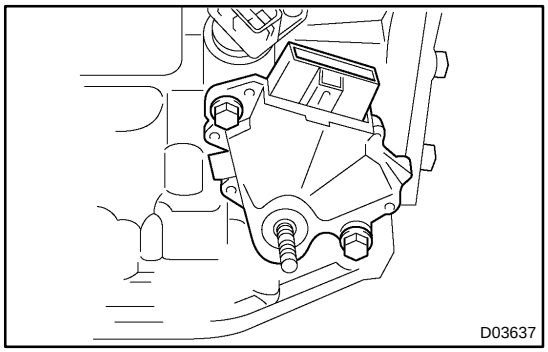
42. INSTALL UNION AND ELBOW
(a) Coat new 2 O-rings with ATF, install them to the union and elbow.
(b) Install the union and elbow to the transaxle case.
Torque: 27 N·m (276 kgf·cm, 20 ft·lbf)



43. INSTALL TRANSAXLE CASE PLUG NO.1

(a) Coat a new O-ring with ATF, install it to the transaxle case plug No.1.

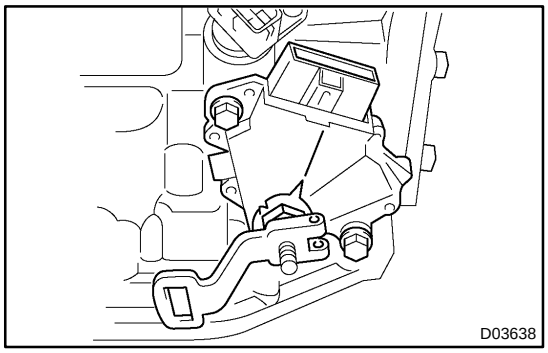
(b) Install the transaxle case plug No.1 to the transaxle case.



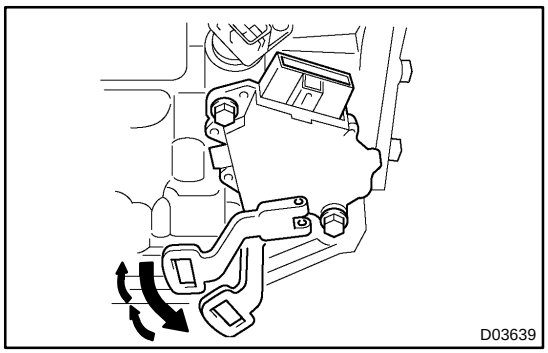
44. INSTALL PARK/NEUTRAL POSITION SWITCH

(a) Install the park/neutral position switch onto the manual valve lever shaft and temporarily install the 2 adjusting bolts.

(b) Install the new nut stopper and nut.
Torque: 6.9 N·m (70 kgf·cm, 61 in.·lbf)

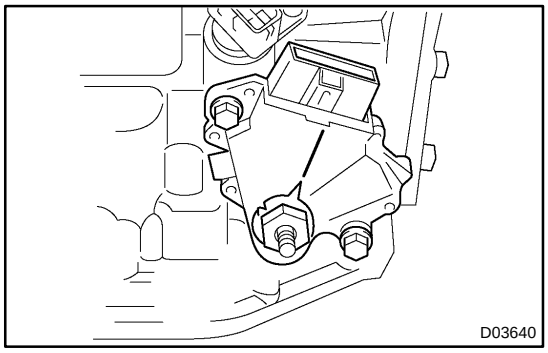


(c) Temporarily install control shaft lever.



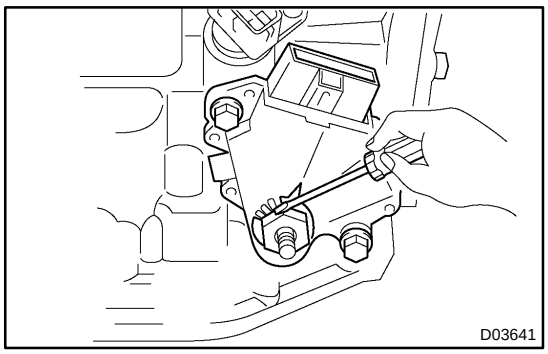
(d) Turn the lever counterclockwise until it stops, them turn it clockwise 2 notches.

(e) Remove the control shaft lever.

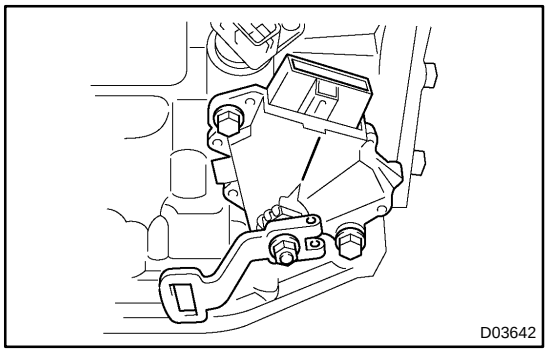


(f) Align the groove with neutral basic line.

(g) Tighten the 2 bolts.
Torque: 5.4 N·m (55 kgf·cm, 48 in.·lbf)



(h) Using a screwdriver, stake the nut with the nut stopper.

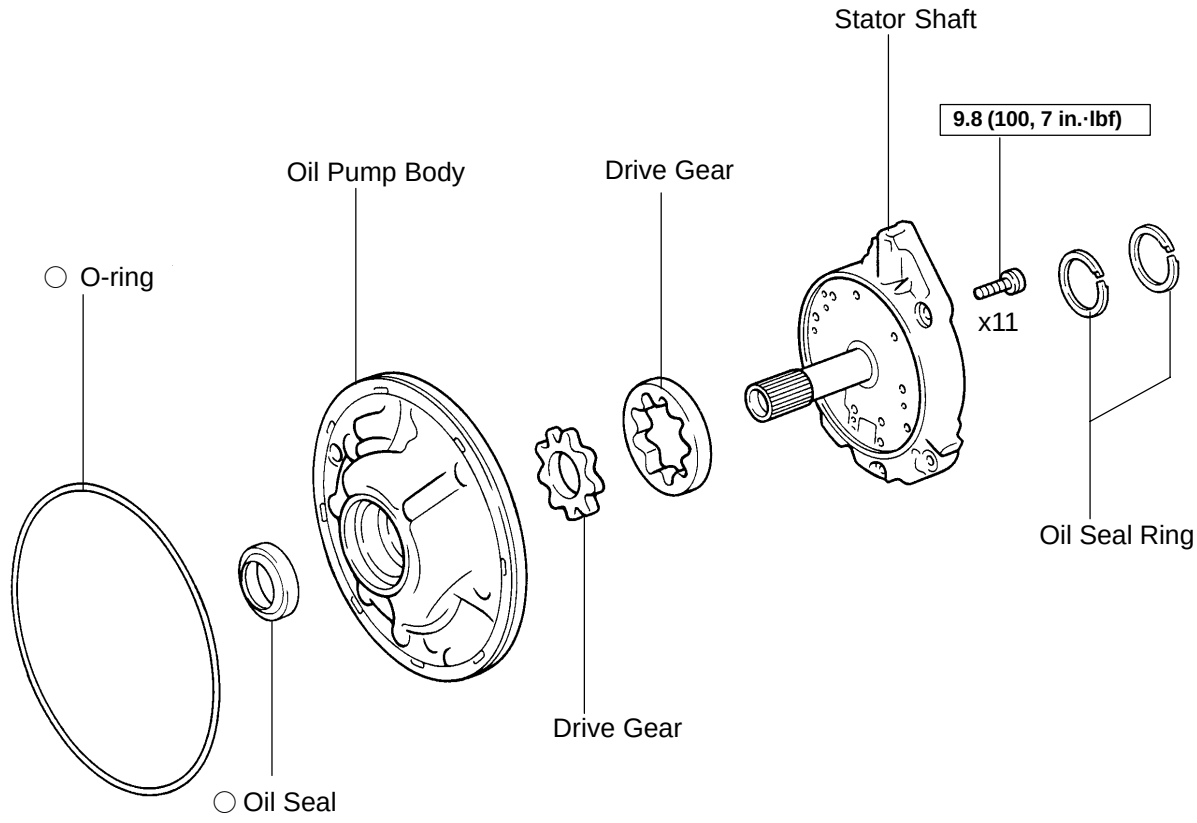


(i) Install control shaft lever, washer and nut.
Torque: 6.9 N·m (70 kgf·cm,61 in.·lbf)

OIL PUMP

COMPONENTS

AX0AK-01

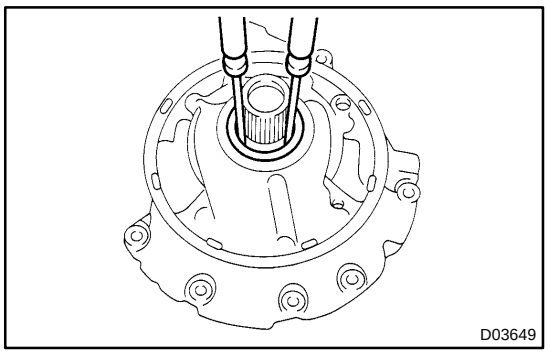


N·m (kgf·cm, ft·lbf) : Specified torque
○ Non-reusable part

D03643

AX0AL-01

DISASSEMBLY

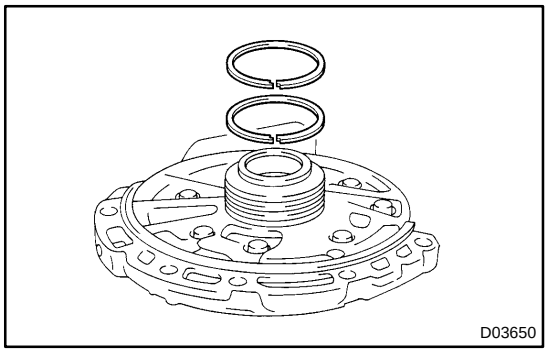


1. CHECK PUMP DRIVE GEAR ROTATION

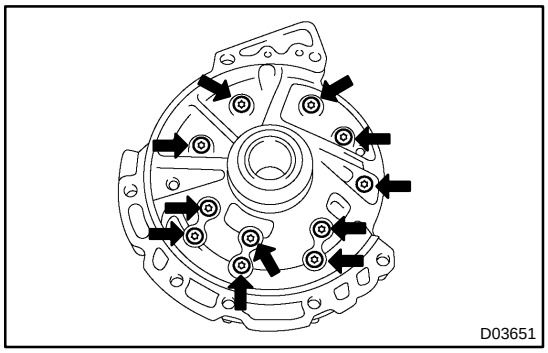
Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:

Be careful not to damage the oil seal lip.

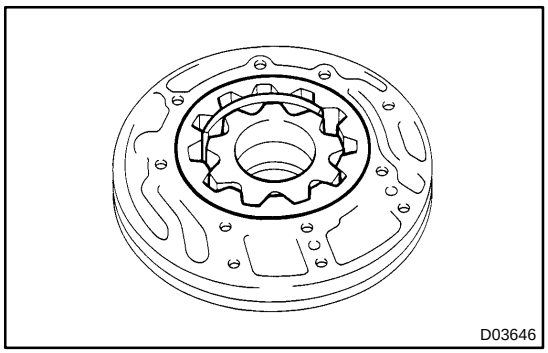


2. REMOVE 2 OIL SEAL RINGS

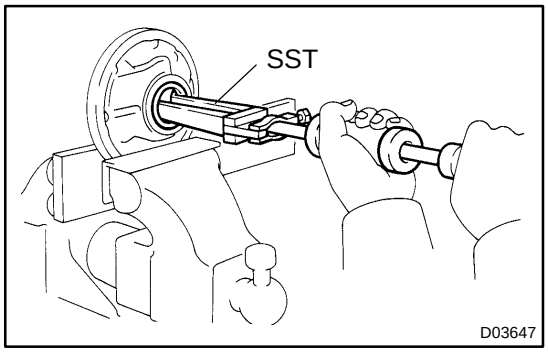


3. REMOVE STATOR SHAFT

Using a torx socket T30, remove the 11 bolts and stator shaft.
Keep the gears in assembling order.



4. REMOVE OIL PUMP DRIVE GEAR AND DRIVEN GEAR



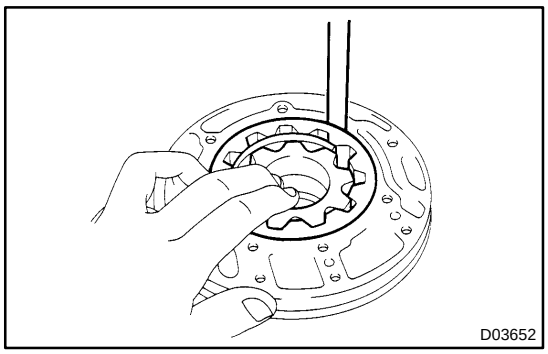
5. REMOVE OIL SEAL

(a) Mount oil pump in a soft jaw vise.

(b) Using SST, remove oil seal from the oil pump body.
SST 09308-00010

AX0AM-01

INSPECTION

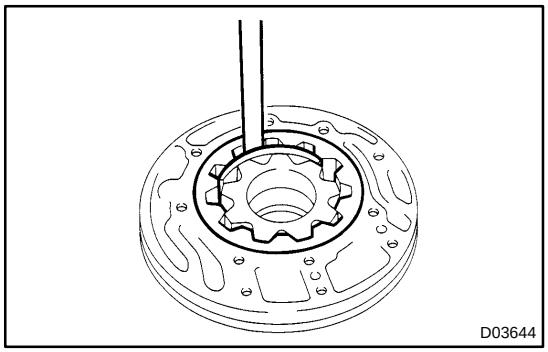

D03652

1. CHECK BODY CLEARANCE OF DRIVEN GEAR

Push the driven gear to one side of the body. Using a feeler gauge, measure the clearance.

Standard body clearance:
0.075 - 0.150 mm (0.0030 - 0.0059 in.)
Maximum body clearance: 0.30 mm (0.0118 in.)

If the body clearance is greater than the maximum, replace the oil pump body sub-assembly.

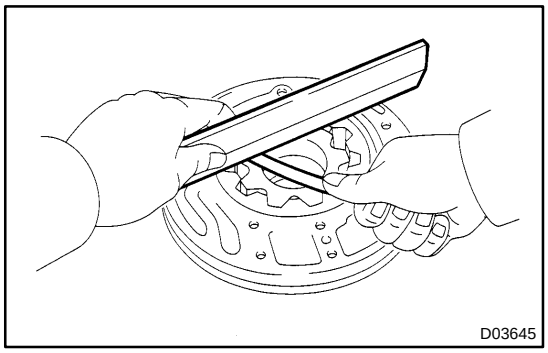

D03644

2. CHECK TIP CLEARANCE OF DRIVEN GEAR

Measure the tip clearance between the driven gear teeth and crescent-shaped part of the pump body.

Standard tip clearance:
0.11 - 0.14 mm (0.0043 - 0.0055 in.)
Maximum tip clearance: 0.30 mm (0.0118 in.)

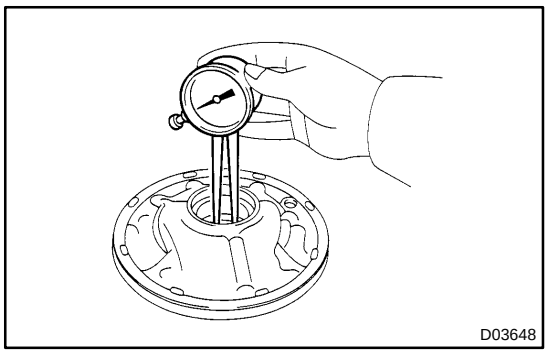
If the tip clearance is greater than the maximum, replace the oil pump body sub assembly.


D03645

3. CHECK SIDE CLEARANCE OF BOTH GEAR

Using a steel straight edge and feeler gauge, measure the side clearance of both gears.

Standard side clearance:
0.02 - 0.04 mm (0.0008 - 0.0016 in.)
Maximum side clearance: 0.10 mm (0.0039 in.)

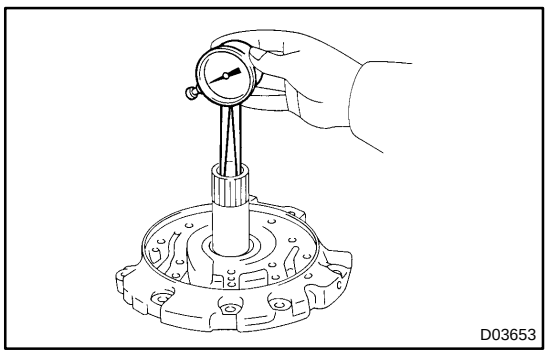

D03648

4. CHECK OIL PUMP BODY BUSHING

Using a dial indicator, measure the inside diameter of the oil pump body bushing.

Standard inside diameter:
38.12 - 38.13 mm (1.5008 - 1.5012 in.)
Maximum inside diameter: 38.18 mm (1.5031 in.)

If the inside diameter is greater than the maximum, replace the oil pump body sub-assembly.


D03653

5. CHECK STATOR SHAFT BUSHING

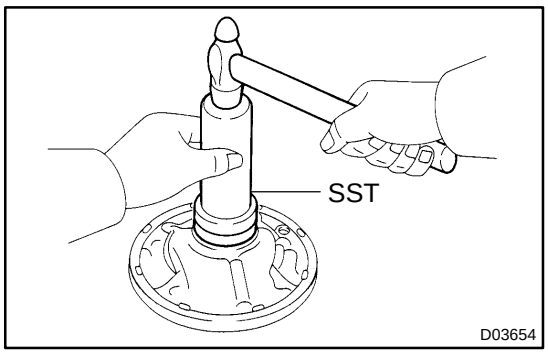
Using a dial indicator, measure the inside diameter of the stator shaft bushings.

Standard inside diameter:
21.50 - 21.52 mm (0.8465 - 0.8472 in.)
Maximum inside diameter: 21.57 (0.8492 in.)

If the inside diameter is greater than the maximum, replace the stator shaft.

AX0AN-01

REASSEMBLY

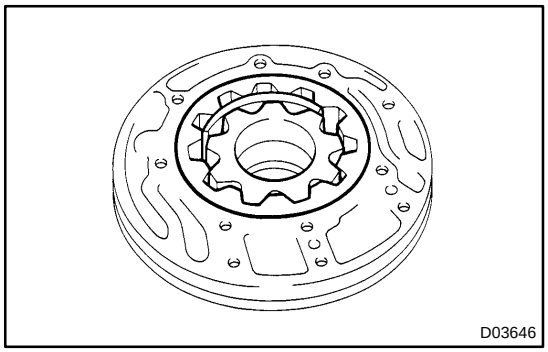


1. INSTALL OIL SEAL

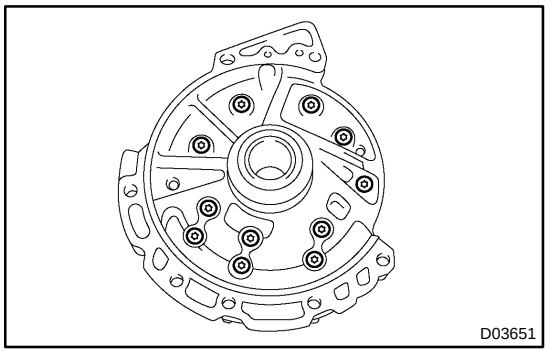
(a) Using SST, install a new oil seal from oil pump.
SST 09350-32014 (09351-32140)

HINT:
The seal end should be flat with the outer edge of the oil pump.

(b) Coat the lip of oil seal with petroleum jelly.



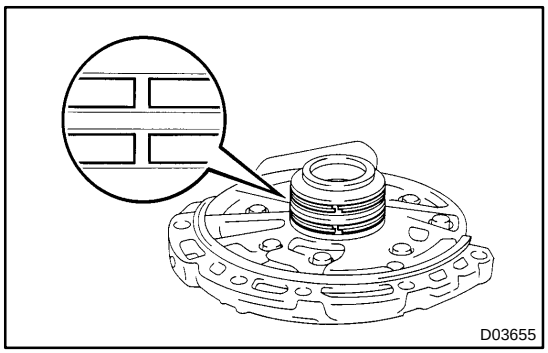
2. INSTALL OIL PUMP DRIVE GEAR AND DRIVEN GEAR



3. INSTALL STATOR SHAFT

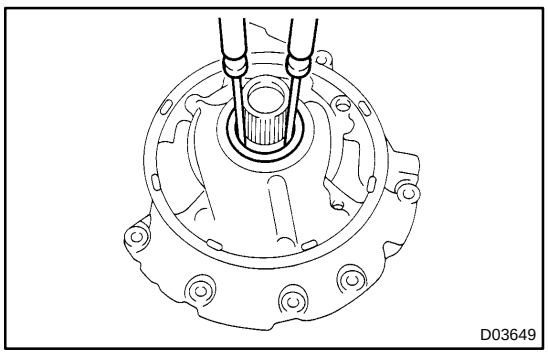
(a) Align the stator shaft with each bolt hole.

(b) Using a torx socket T30, install the 11 bolts.
Torque: 9.8 N·m (100 kgf·cm, 7 in.·lbf)



4. INSTALL 2 OIL SEAL RINGS

NOTICE:
Do not expand the ring ends excessively.



5. CHECK PUMP DRIVE GEAR ROTATION

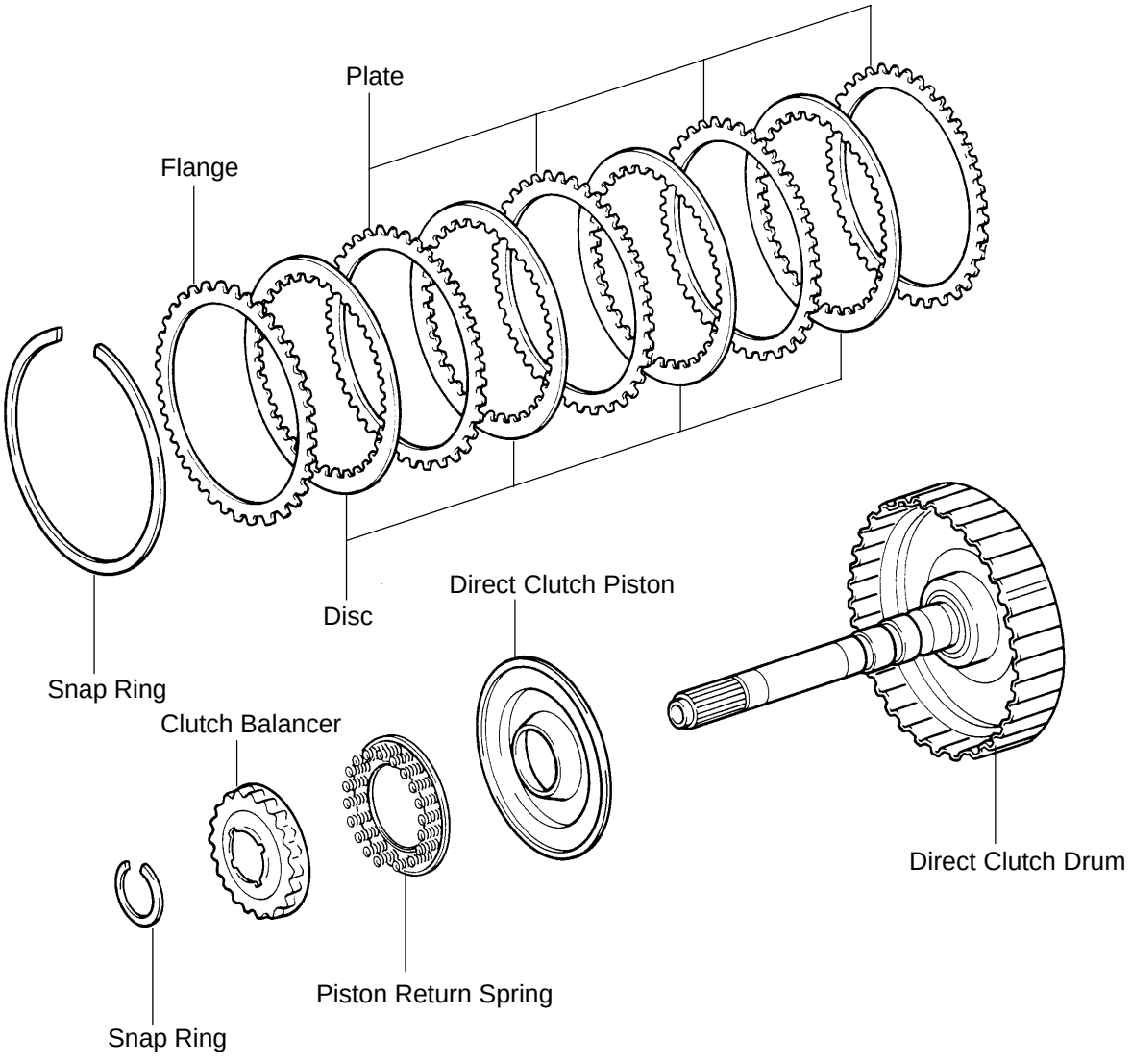
Turn the drive gear with 2 screwdrivers and make sure it rotates smoothly.

NOTICE:
Be careful not to damage the oil seal lip.

DIRECT CLUTCH

COMPONENTS

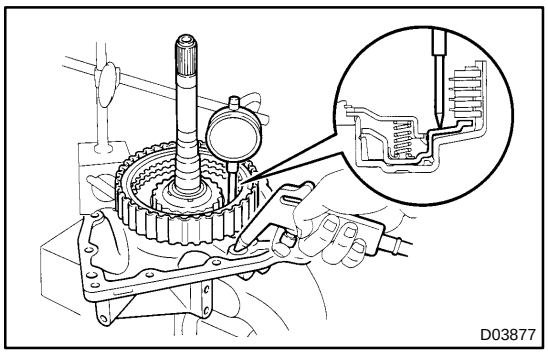
AX0AO-01



D03673

AX0AP-01

DISASSEMBLY



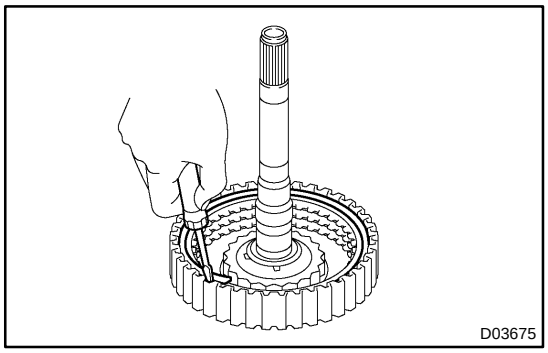
1. CHECK PISTON STROKE OF DIRECT CLUTCH

(a) Install the direct clutch and needle roller bearing on the transaxle rear cover.

(b) Using a dial indicator, measure the direct clutch piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

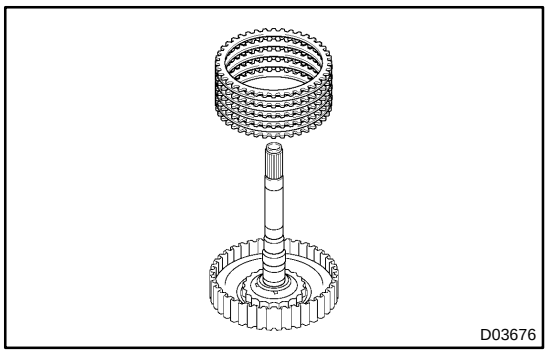
Piston stroke:0.61 - 0.77 mm (0.0240 - 0.0303 in.)

If the stroke is non-standard, inspect the discs, plates and flange.



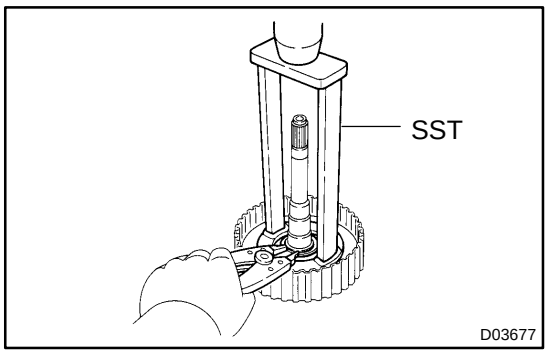
2. REMOVE SNAP RING

Using a screwdriver, remove the snap ring from the direct clutch.



3. REMOVE FLANGE, DISC AND PLATE

Remove the flange, 4 discs and 4 plates from the direct clutch drum.



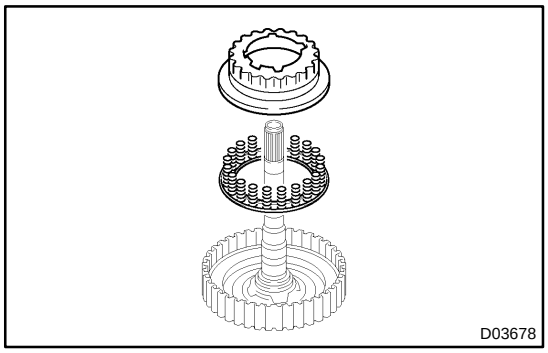
4. REMOVE PISTON RETURN SPRING

(a) Place SST on the clutch balancer and compress the springs with a press.
SST 09387-00020

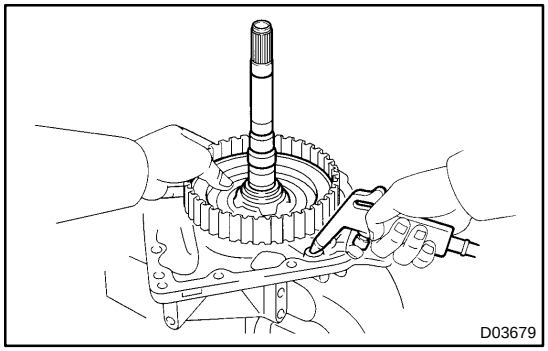
(b) Using a snap ring expander, remove the snap ring from the direct clutch drum.

NOTICE:

- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from the deforming.**
- **Do not expand the snap ring excessively.**



(c) Remove the clutch balancer and piston return spring from the direct clutch drum.

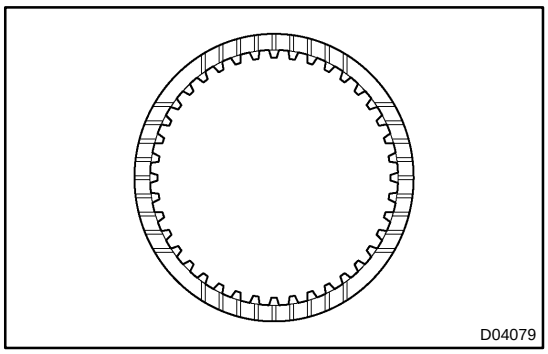


5. REMOVE DIRECT CLUTCH PISTON

(a) Install direct clutch on the transaxle rear cover.

(b) Holding the direct clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf·cm^2, 57 psi) to the transaxle rear cover to remove the direct clutch piston.

AX0AQ-01



INSPECTION

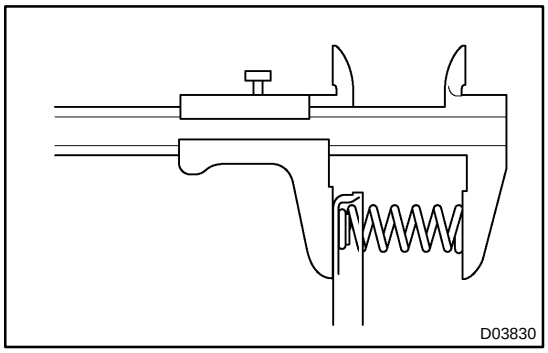
1. INSPECT DISC AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt.

If necessary, replace them.

HINT:

- ○ If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- ○ Before assembling new discs, soak them in ATF for at least 15 minutes.



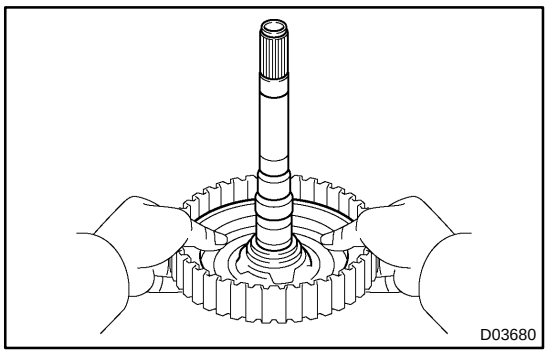
2. CHECK DIRECT CLUTCH RETURN SPRING

Using a vernier calipers, measure the free length of the spring together with the spring seat.

Standard free length: 22.58 mm (0.8890 in.)

AX0AR-01

REASSEMBLY

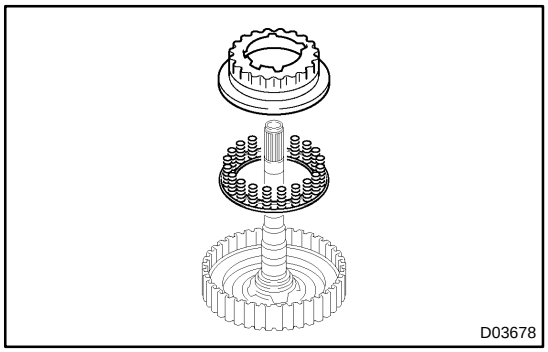


1. INSTALL DIRECT CLUTCH PISTON

Coat the direct clutch piston with ATF, install it to the direct clutch drum.

NOTICE:

Be careful not to damage the lip seal of direct clutch piston.

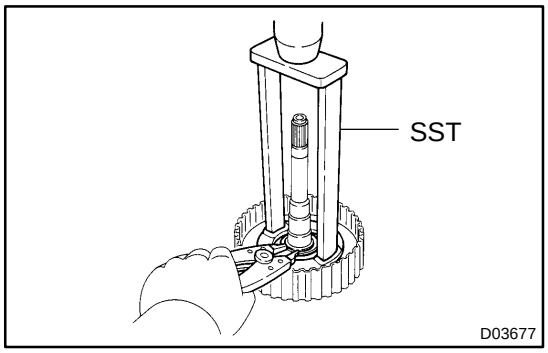


2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring and clutch balancer to the direct clutch drum.

NOTICE:

Be careful not to damage the lip seal of direct clutch balancer.

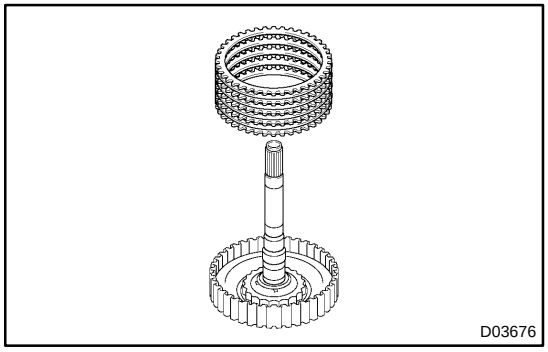


(b) Place SST, on the clutch balancer and compress the piston return spring with a press.
SST 09387-00020

(c) Using a snap ring expander, install the snap ring to the direct clutch drum.

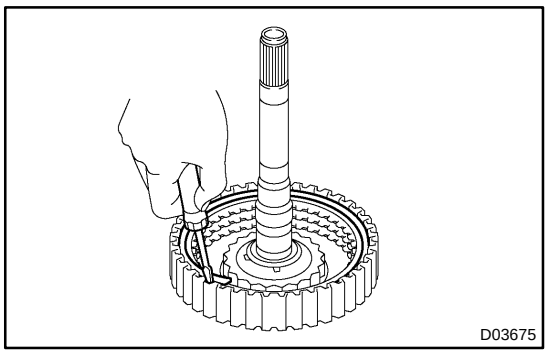
NOTICE:

- **Be sure the end gap of the snap ring is not aligned with the clutch balancer claw.**
- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from the deforming.**
- **Do not expand the snap ring excessively.**

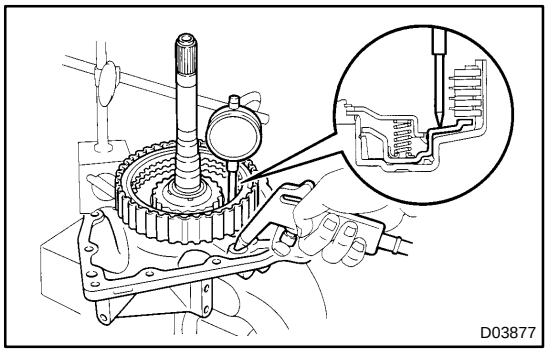


3. INSTALL PLATE, DISC AND FLANGE

(a) Install the 4 plates, 4 discs and flange.
Install in order: P=Plate, D=Disc, F=Flange
P - D - P - D - P - D - P - D - F



(b) Using a screwdriver, install the snap ring.
(c) Check that the end gap of the snap ring is not aligned with one of the cutouts.



4. CHECK PISTON STROKE OF DIRECT CLUTCH

(a) Install the direct clutch on the transaxle rear cover.
(b) Using and a dial indicator, measure the direct clutch piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Piston stroke: 0.61 - 0.77 mm (0.024 - 0.030 in.)

If the piston stroke is less than the limit of piston stroke, parts may have been assembled incorrectly, so check and reassemble again.

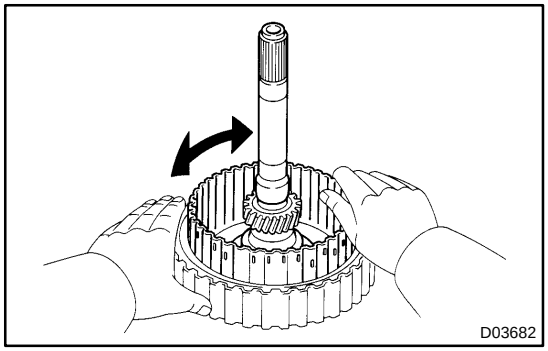
If the stroke is non-standard, select another flange.

HINT:

There are 6 flanges in different thickness.

Flange Thickness: mm (in.)

No.	Thickness	No.	Thickness
1	3.0 (0.118)	4	3.3 (0.130)
2	3.1 (0.122)	5	3.4 (0.134)
3	3.2 (0.126)	6	3.5 (0.138)



5. CHECK DISK ROTATE

Check that the disc rotates when rotating the disk after inserting the rear planetary sun gear.

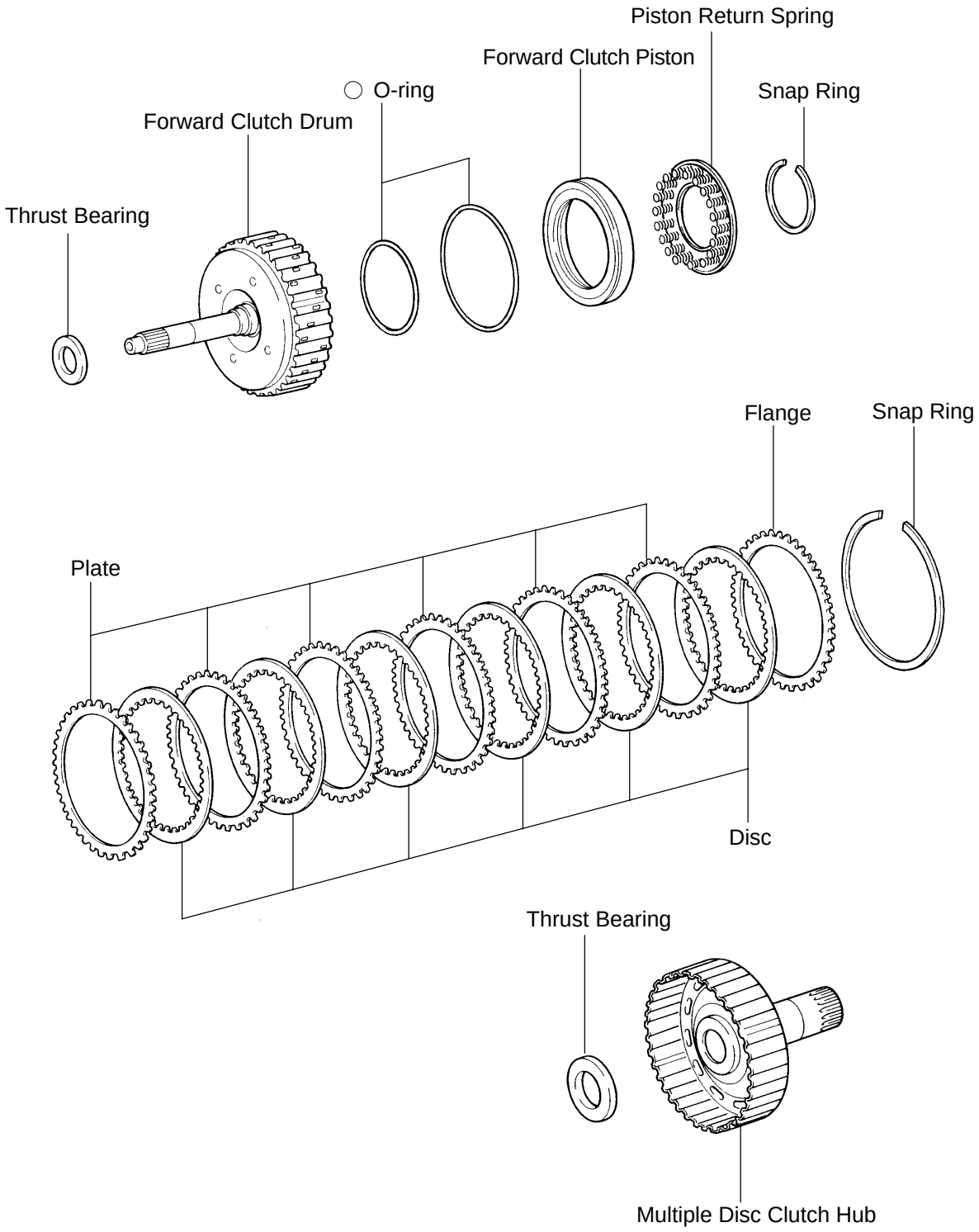
NOTICE:

Do not place the rear planetary sun gear in a vise.

FORWARD CLUTCH

AX0AS-01

COMPONENTS

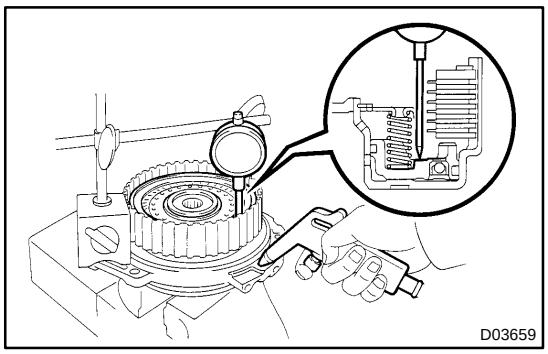


○ Non-reusable part

D03656

AX0AT-01

DISASSEMBLY



1. CHECK PISTON STROKE OF FORWARD CLUTCH

(a) Install the forward clutch on the oil pump.

NOTICE:

Be careful not to damage the oil seal ring of oil pump.

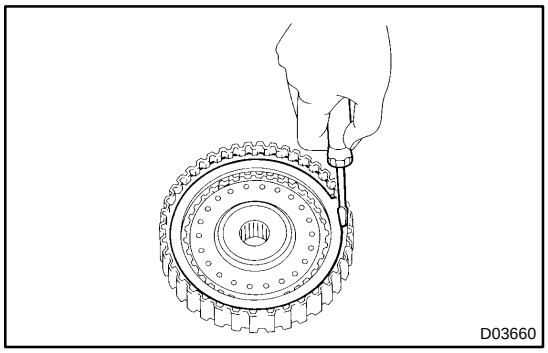
(b) Using a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi).

Piston stroke: 2.09 - 2.23 mm (0.0823 - 0.0878 in.)

If the clearance is non-standard, inspect the discs, plates flange.

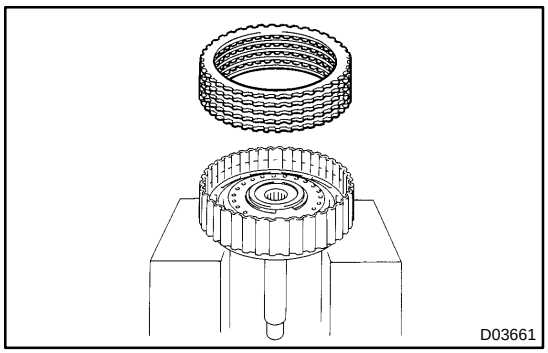
HINT:

As the opening is big, cover it with a shop rug as well as an compressed air th prevent the air from discharging.

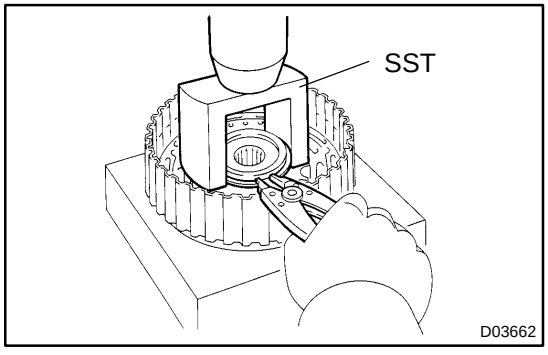


2. REMOVE FLANGE, PLATE AND DISC

(a) Using a screwdriver, remove the snap ring from the forward clutch drum.



(b) Remove the flange, 6 discs and 6 plates.

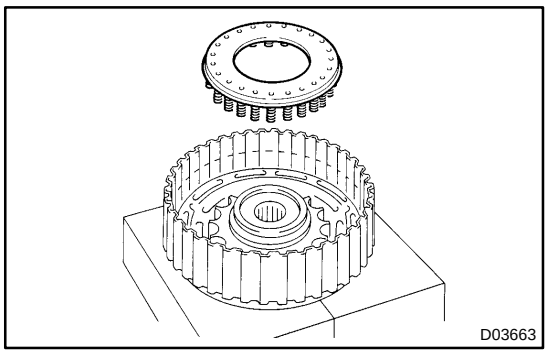


3. REMOVE PISTON RETURN SPRING

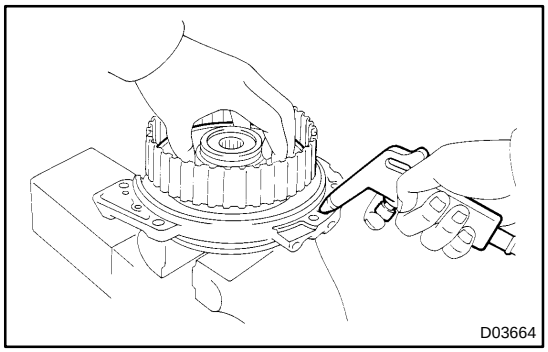
(a) Place SST on the spring retainer and compress the return spring with a press.

SST 09350-32014 (09351-32070)

(b) Using a snap ring expander, remove the snap ring.



(c) Remove the piston return spring.



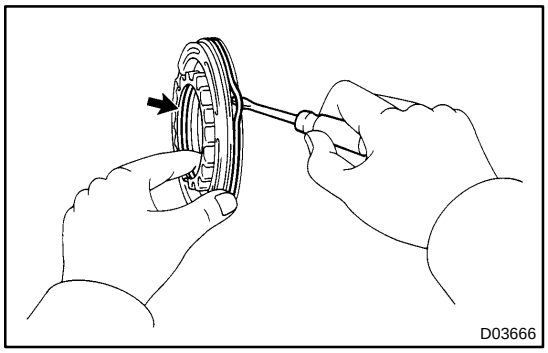
4. REMOVE FORWARD CLUTCH PISTON

(a) Place the forward clutch drum onto the oil pump.

(b) Holding the forward clutch piston with your hard, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the oil pump to remove the forward clutch piston.

HINT:

When the piston can not be removed as it is slanted, either blow the air again with the protruding side pushed or remove the piston using the needle nose plier with vinyl tape on the tip.

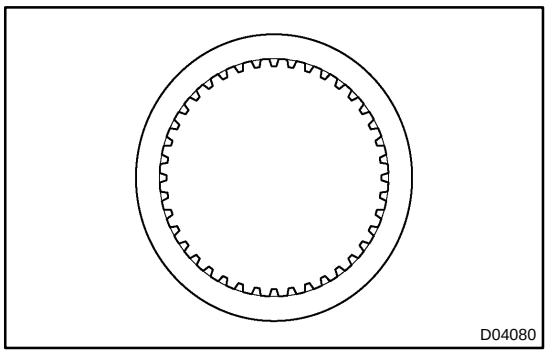


5. REMOVE O-RING

Using a small screwdriver, remove the 2 O-rings.

AX0AU-01

INSPECTION


D04080

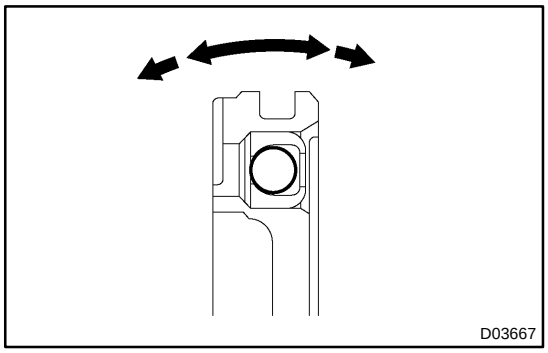
1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt.

If necessary, replace them.

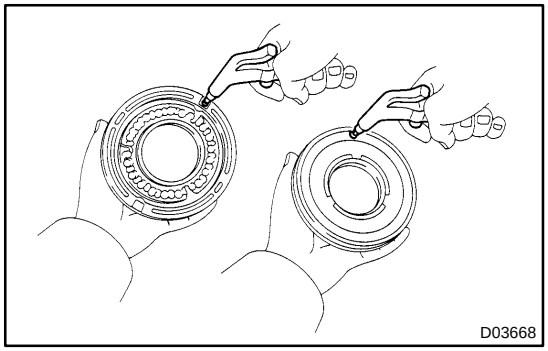
HINT:

- ○ If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- ○ Before assembling new discs, soak them in ATF for at least 15 minutes.

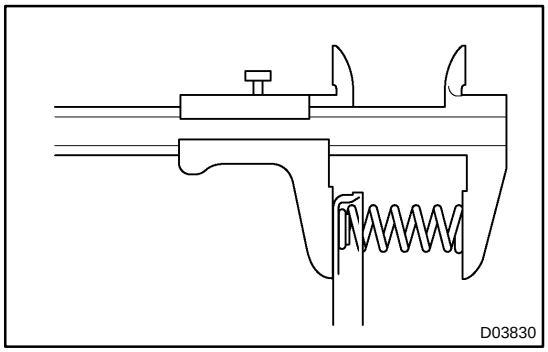

D03667

2. CHECK FORWARD CLUTCH PISTON

(a) Shake the piston to check that the check ball is not stuck.


D03668

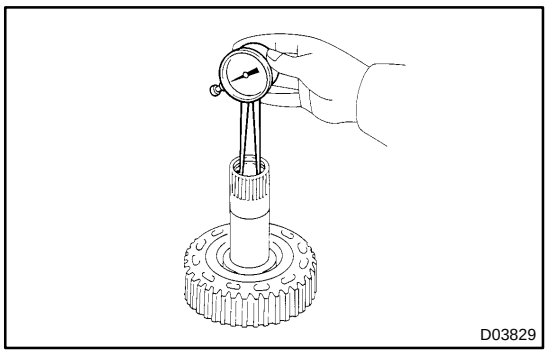
(b) Check that the valve does not leak when applying low compressed air (392 kgf/cm^2, 4.0 pKa, 57 psi).


D03830

3. CHECK FORWARD CLUTCH PISTON RETURN SPRING

Using a vernier caripers, measure the free length of the spring together with the spring seat.

Standard free length: 28.23 mm (1.1114 in.)



4. CHECK MULTIPLE DISC CLUTCH HUB BUSHING

Using a dial indicator, measure the inside diameter of the forward clutch hub bushing.

Standard inside diameter:
23.03 - 23.04 mm (0.9067 - 0.9071 in.)
Maximum inside diameter: 23.09 mm (0.9091 in.)

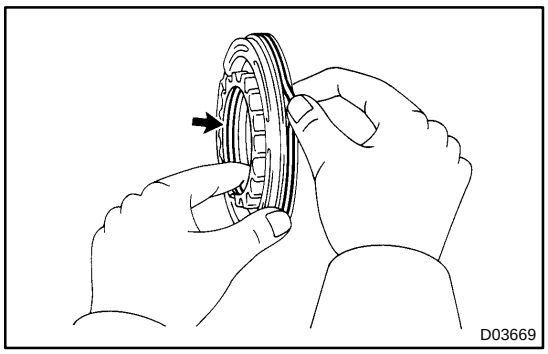
NOTICE:

- **When the diameter is over the maximum, replace the multiple disc clutch hub with new one.**
- **Check the contact surface of the bush in the direct clutch shaft. If any scratch or discolor is identified, replace the direct clutch sub-assembly with new one.**

If the inside diameter is greater than the maximum, replace the forward clutch hub.

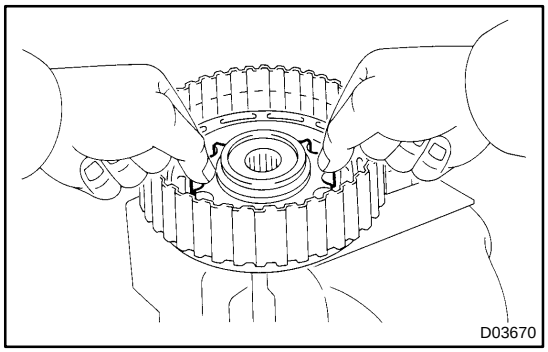
AX0AV-01

REASSEMBLY

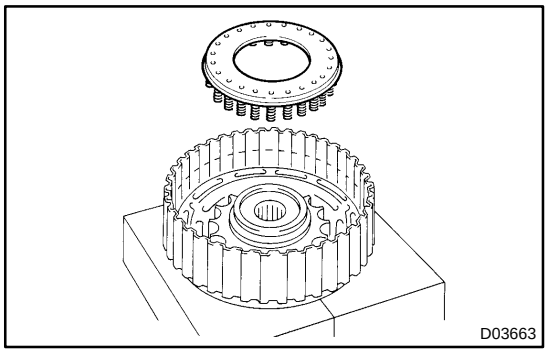


1. INSTALL FORWARD CLUTCH PISTON

(a) Coat 2 new O-rings with ATF, and install them to the forward clutch piston.

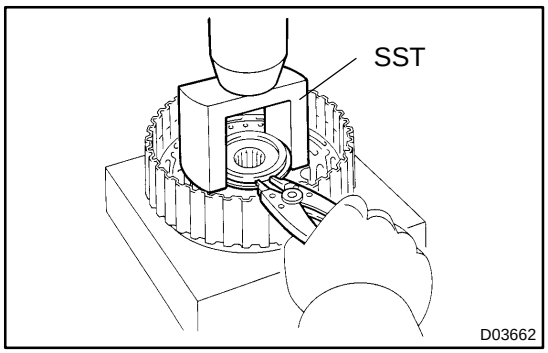


(b) Install the forward clutch piston to the forward clutch drum.



2. INSTALL PISTON RETURN SPRING

(a) Place the return spring onto the piston.

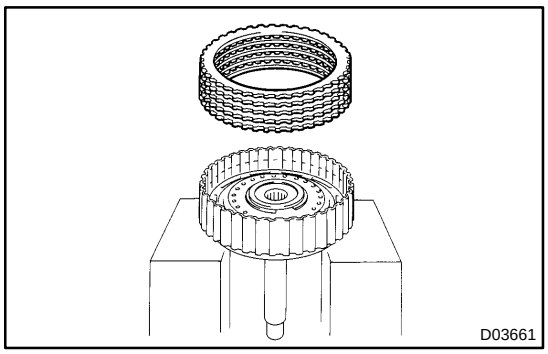


(b) Place SST on the return spring, and compress the return spring with a press.
SST 09350-32014 (09351-32070)

(c) Install the snap ring with a snap ring expander. Be sure the end gap of the snap ring is not aligned with the spring retainer claw.

NOTICE:

- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from the deforming.**
- **Do not expand the snap ring excessively.**

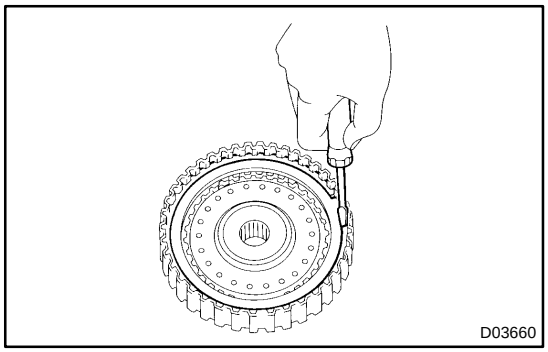


3. INSTALL PLATE, DISC AND FLANGE

Install the 6 plates and 6 discs in order.

Install in order: P=Plate, D=Disc, F=Flange

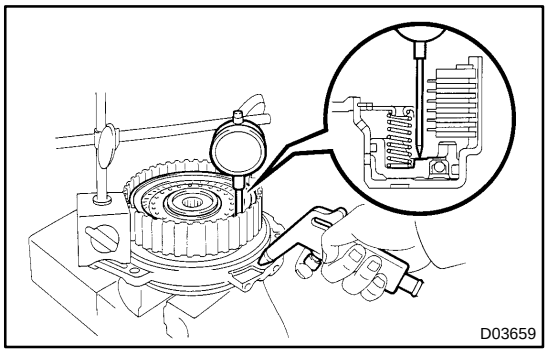
P - D - P - D - P - D - P - D - P - D - P - D - F



4. INSTALL SNAP RING

(a) Using a screwdriver, install the snap ring.

(b) Check that the end gap of the snap ring is not aligned with one of the cutouts.



5. CHECK PISTON STROKE OF FORWARD CLUTCH

(a) Using a dial indicator, measure the forward clutch piston stroke while applying and releasing compressed air (392 kgf/cm^2, 4.0 kPa, 57 psi).

Piston stroke: 2.09 - 2.23 mm (0.0823 - 0.0878 in.)

If the piston stroke is less than the limit, parts may have been assembled incorrectly, check and reassemble again.

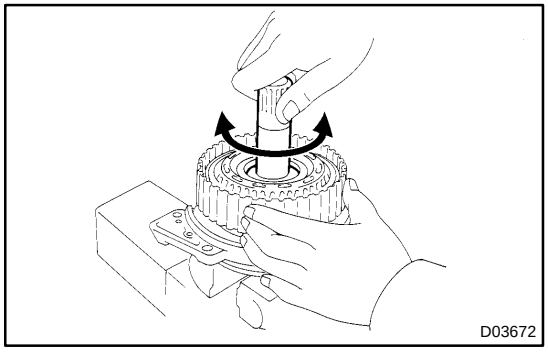
If the clearance is non-standard, select another flange.

HINT:

There are 5 different flanges in thickness.

Flange thickness: mm (in.)

No.	Thickness	No.	Thickness
1	3.00 (0.1181)	4	3.45 (0.1358)
2	3.15 (0.1240)	5	3.60 (0.1417)
3	3.30 (0.1299)	-	-



6. CHECK DISK ROTATE

Check that the disc lightly rotates when rotating the forward clutch assembly after inserting the multiple disc clutch into it.

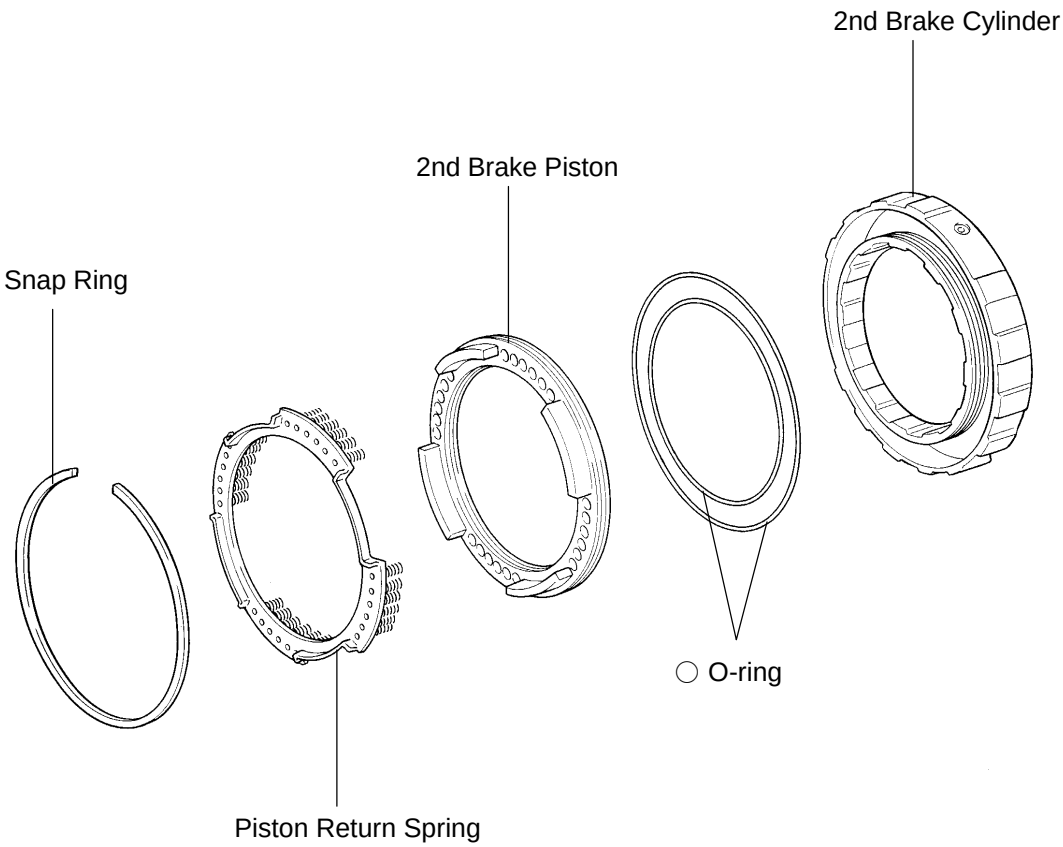
NOTICE:

Do not place the forward clutch assembly in a vise.

SECOND BRAKE

COMPONENTS

AX0AW-01

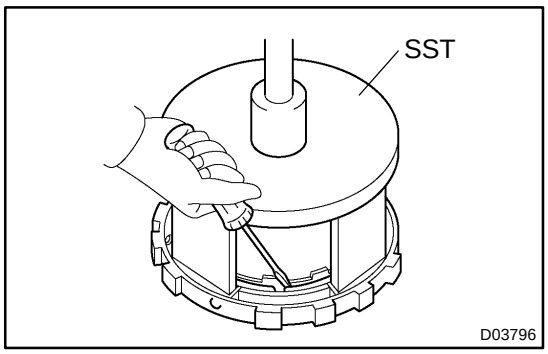


○ Non-reusable part

D03842

AX0AX-01

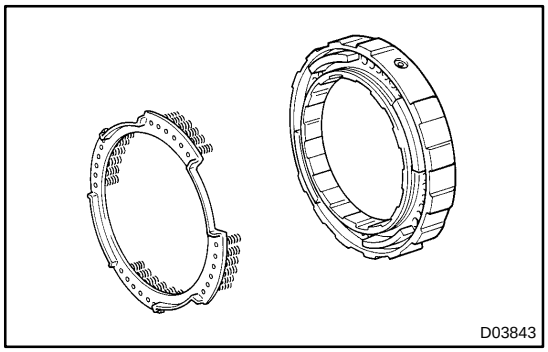
DISASSEMBLY



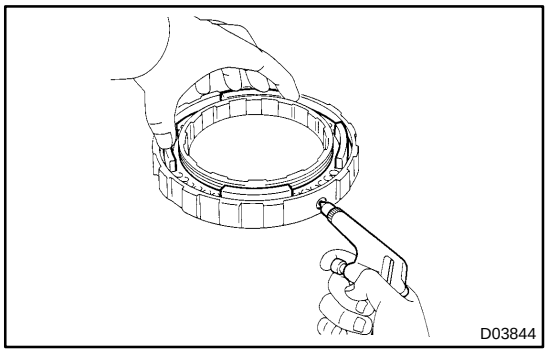
1. REMOVE PISTON RETURN SPRING

(a) Place SST on the piston return spring and compress.
SST 09387-00060

(b) Using a screwdriver, remove the snap ring.

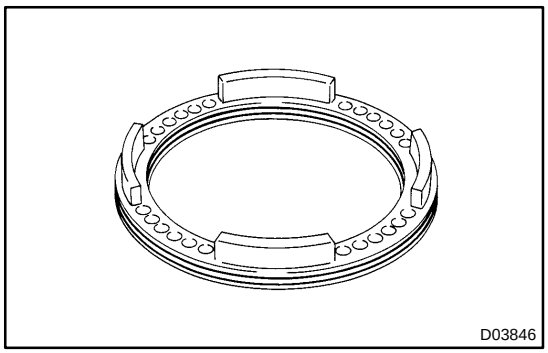


(c) Remove the piston return spring.



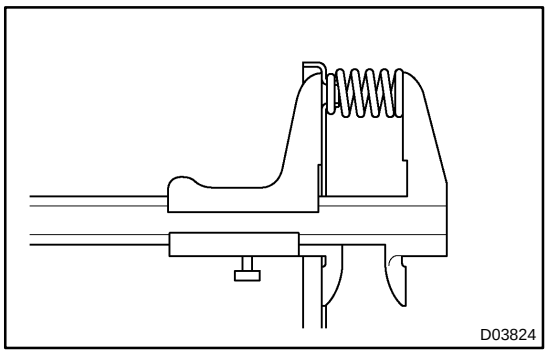
2. REMOVE 2ND BRAKE PISTON

(a) Hold the 2nd brake piston and apply compressed air (392 kPa, 4.0 kgf/cm^{2,} 57 psi) to the 2nd brake cylinder to remove the 2nd brake piston.



(b) Remove the 2 O-rings from the 2nd brake piston.

AX0AY-01



INSPECTION

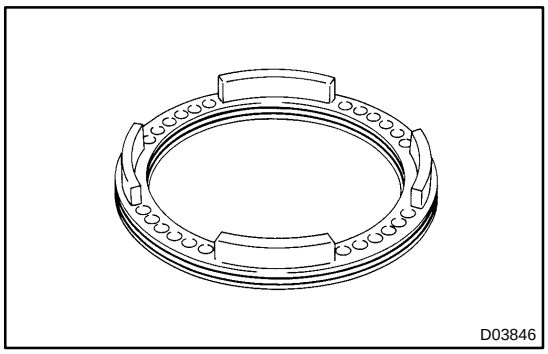
1. CHECK 2ND BRAKE PISTON RETURN SPRING

Using vernier calipers, measure the free length of the spring together with the spring seat.

Standard free length: 16.61 mm (0.6539 in.)

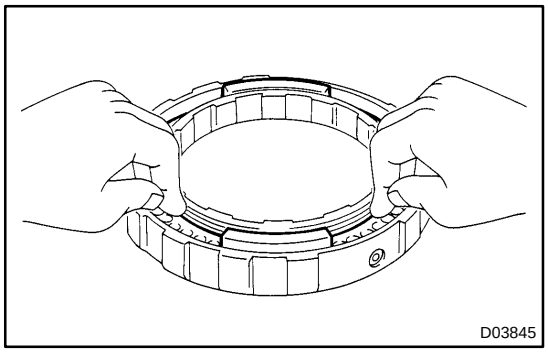
AX0AZ-01

REASSEMBLY

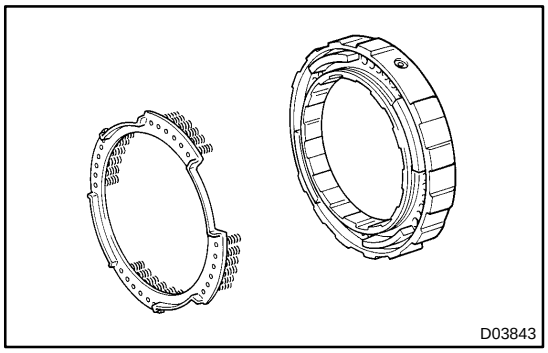


1. INSTALL 2ND BRAKE PISTON

(a) Coat 2 new O-rings with ATF and install them in the 2nd brake piston.

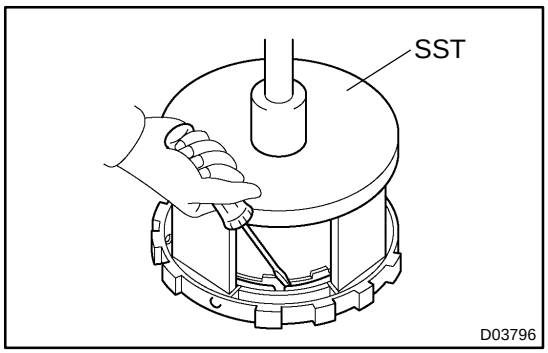


(b) Be careful not to damage the O-rings and press in the 2nd brake piston into the 2nd brake cylinder with a your hands.



2. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring.



(b) Place SST on the piston return spring, and compress the piston return spring with a press.
SST 09387-00060

(c) Using a screwdriver, install the snap ring.

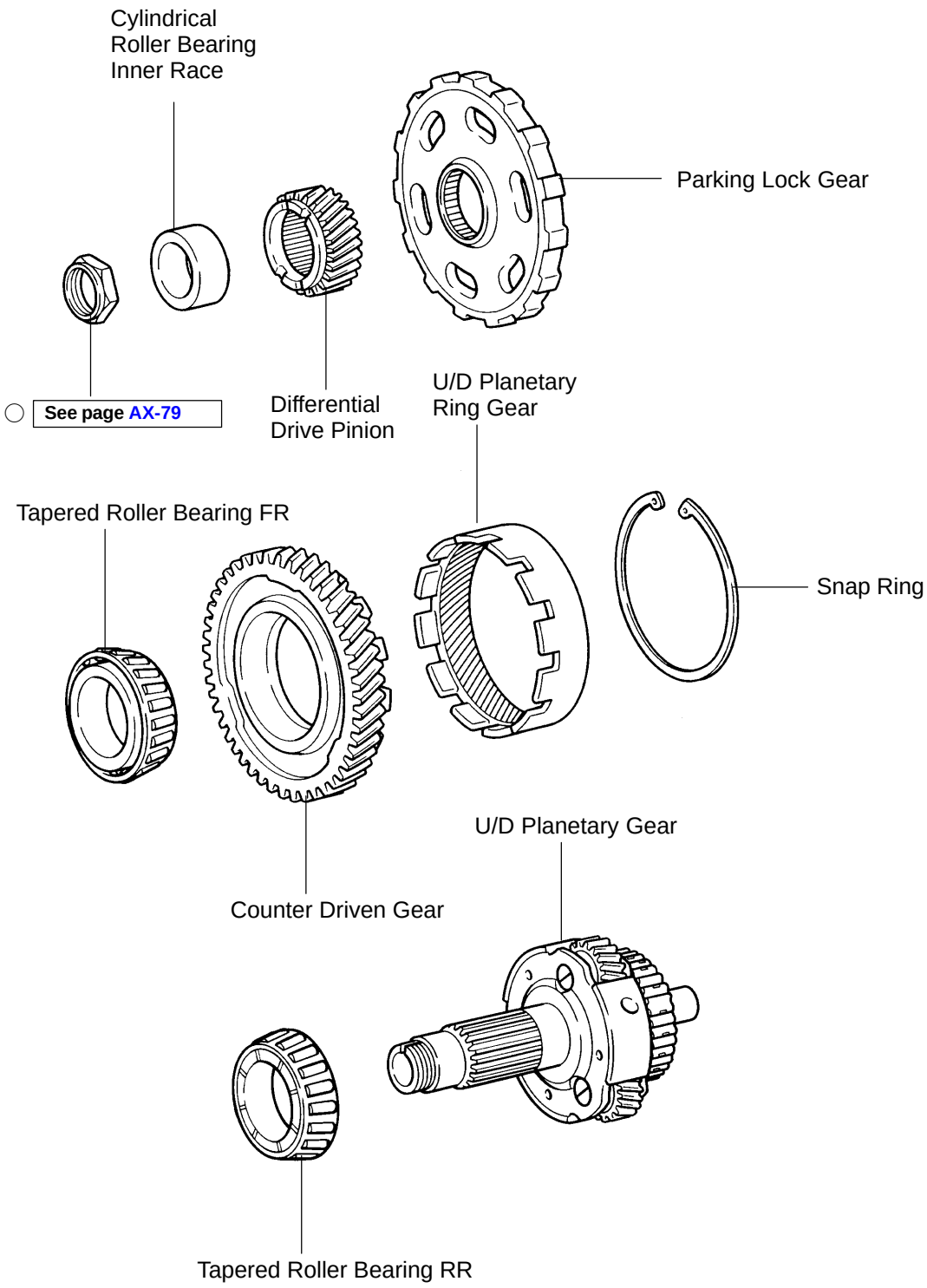
NOTICE:

Be sure the end gap of the snap ring is not aligned with the piston return spring claw.

UNDERDRIVE PLANETARY GEAR

AX0B4-01

COMPONENTS



○ Non-reusable part

D03683

AX0B5-01

DISASSEMBLY

1. MEASURE STARTING TORQUE OF U/D INPUT SHAFT

Using SST and a torque wrench, measure the staring torque of the U/D input shaft.

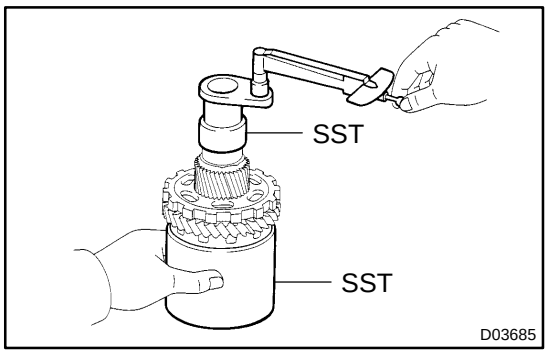
SST 09387-00050, 09564-16020

Starting torque:

0.5 - 3.3 N·m (5 - 33 kgf·cm, 4.3 - 28.6 in.·lbf)

HINT:

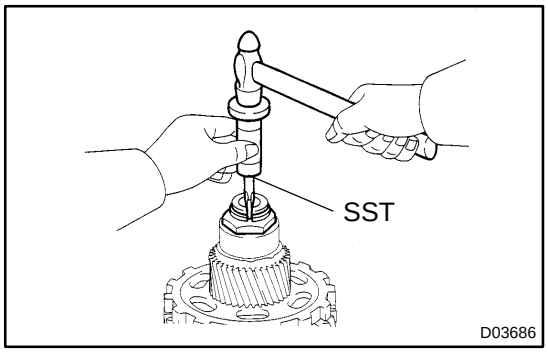
Use a torque wrench with a fulcrum length of 160 mm (6.3 in.).



2. REMOVE CYLINDRICAL ROLLER BEARING INNER RACE

(a) Using SST, loosen the staked part of the nut.

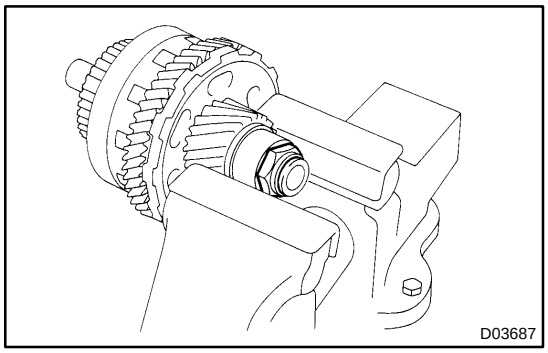
SST 09930-00010 (09931-00010, 09930-00020)



(b) Clamp the U/D planetary gear in soft jaw vise.

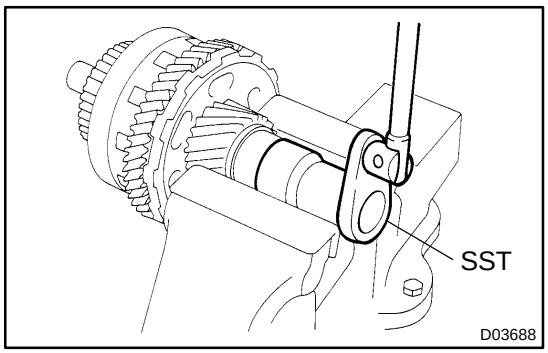
NOTICE:

Be careful not to damage the differential drive pinion.



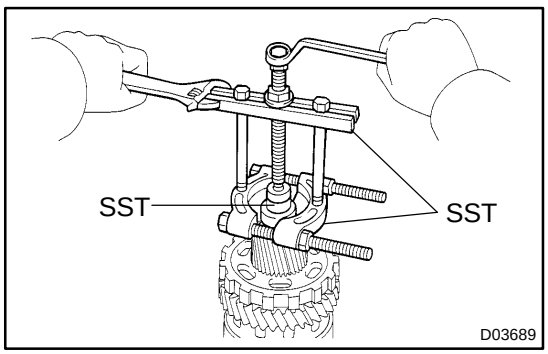
(c) Using SST, remove lock nut.

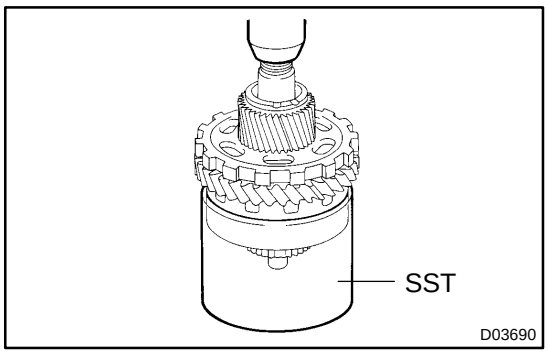
SST 09564-16020



(d) Using SST, remove cylindrical roller bearing inner race.

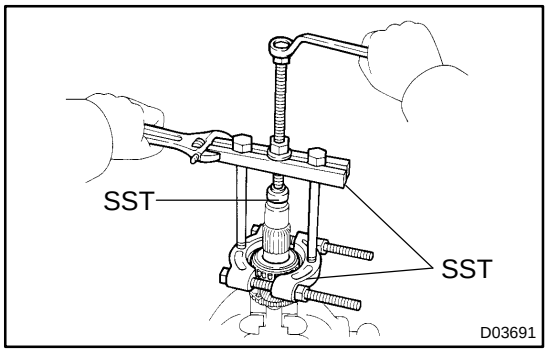
SST 09950-00020, 09950-00030, 09950-60010 (09951-00340)





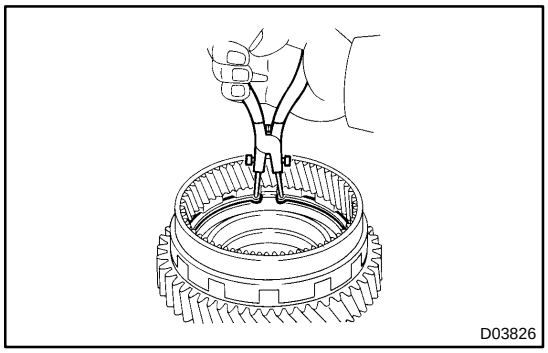
3. REMOVE U/D PLANETARY GEAR

(a) Using SST and a press, remove the differential drive pinion, parking lock gear, counter driven gear with U/D planetary ring gear and tapered roller bearing FR.
SST 09387-00050



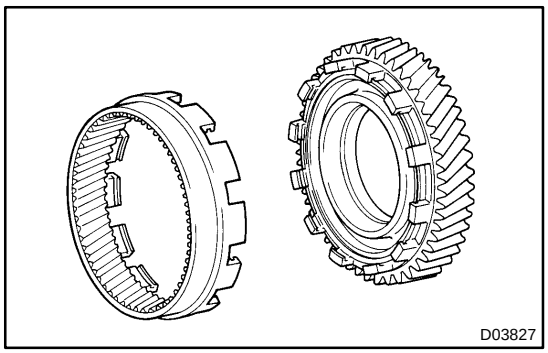
(b) Clamp the U/D planetary gear in soft jaw vise.

(c) Using SST, remove the tapered roller bearing RR from the U/D planetary gear.
SST 09950-00020, 09950-00030, 09950-60010 (09951-00320)



4. REMOVE U/D PLANETARY RING GEAR

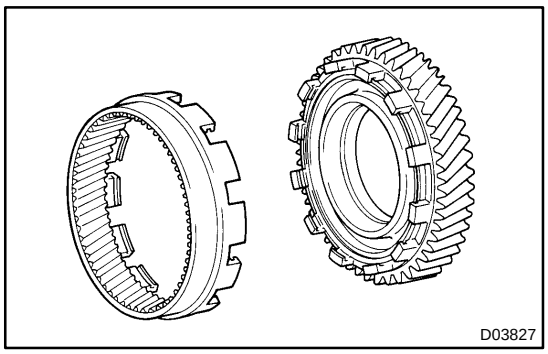
(a) Using snap ring pliers, remove snap ring.



(b) Remove the U/D planetary ring gear from the counter driven gear.

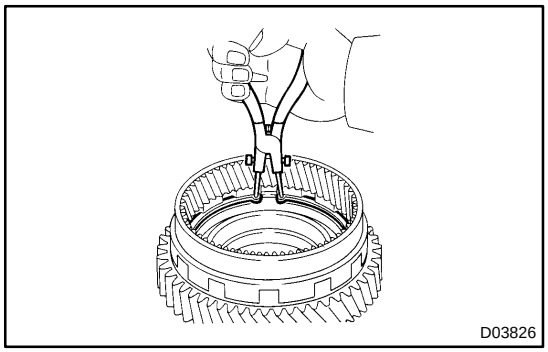
AX0B6-01

REASSEMBLY

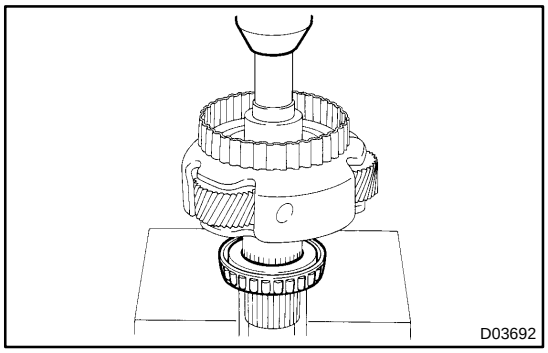


1. INSTALL U/D PLANETARY RING GEAR

(a) Install the U/D planetary ring gear to the counter driven gear.



(b) Using snap ring pliers, install snap ring.

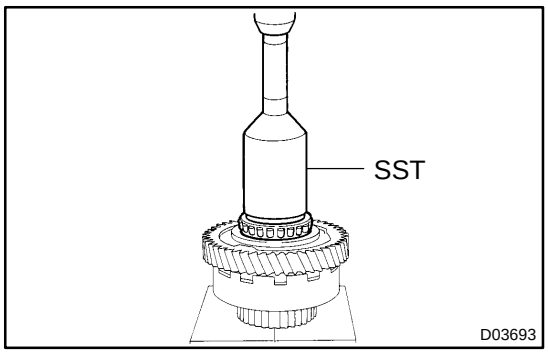


2. INSTALL U/D PLANETARY GEAR

(a) Using a press, install the tapered roller bearing RR to the U/D planetary gear.

NOTICE:

Press in the bearing until it becomes flat at the bottom.



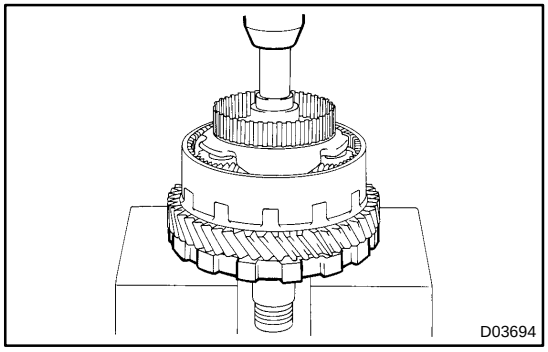
(b) Install the counter driven gear with the U/D planetary ring gear.

(c) Using SST and a press, install the tapered roller bearing FR.

SST 09214-7601 1

NOTICE:

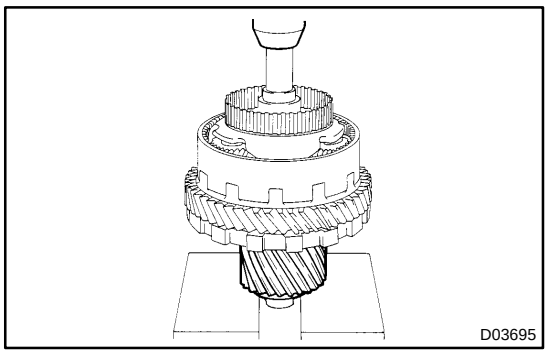
Press in the counter driven gear while rotating it.



(d) Using a press, install the parking lock gear.

NOTICE:

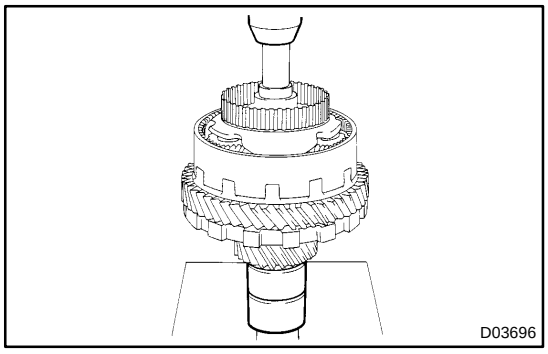
Press in the counter driven gear while rotating it.



(e) Using a press, install the differential drive pinion.

NOTICE:

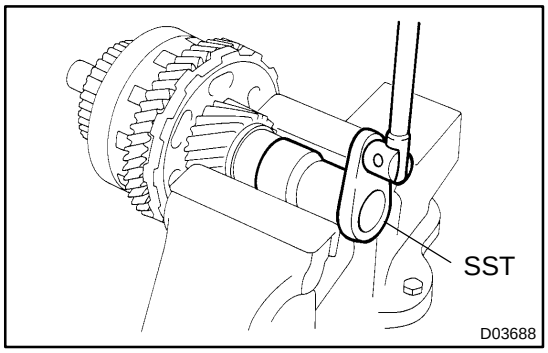
Press in the counter driven gear while rotating it.



(f) Using a press, install the cylindrical roller bearing inner race.

NOTICE:

Press in the counter driven gear while rotating it.



(g) Clamp the U/D planetary gear in soft jaw vise.

NOTICE:

Be careful not to damage the differential drive pinion.

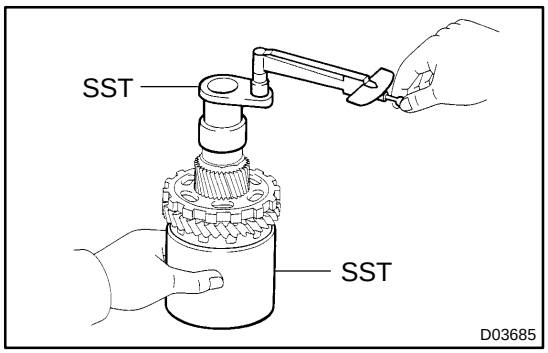
(h) Using SST, install a new lock nut.

Torque: 262 N·m (2672 kgf·cm, 194 ft·lbf)

SST 09564-16020

HINT:

Use a torque wrench with a fulcrum length of 750 mm (29.53 in.).



3. MEASURE STARTING TORQUE OF U/D INPUT SHAFT

Using SST and a torque wrench, measure the starting torque of U/D input shaft.

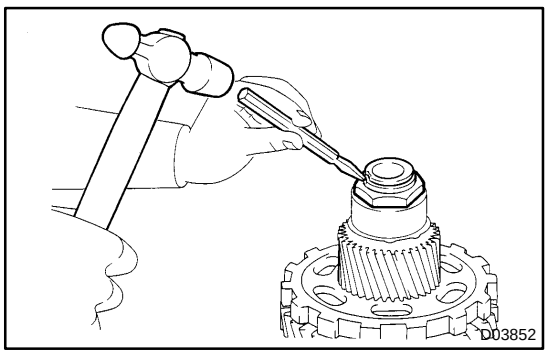
SST 09387-00050, 09564-16020

Starting torque:

0.5 - 3.3 N·m (5 - 33 kgf·cm, 4.3 - 28.6 in.·lbf)

HINT:

Use a torque wrench with a fulcrum length 160 mm (6.3 in.).



4. STAKE LOCK NUT

Using a pin punch and hammer, stake the lock nut.

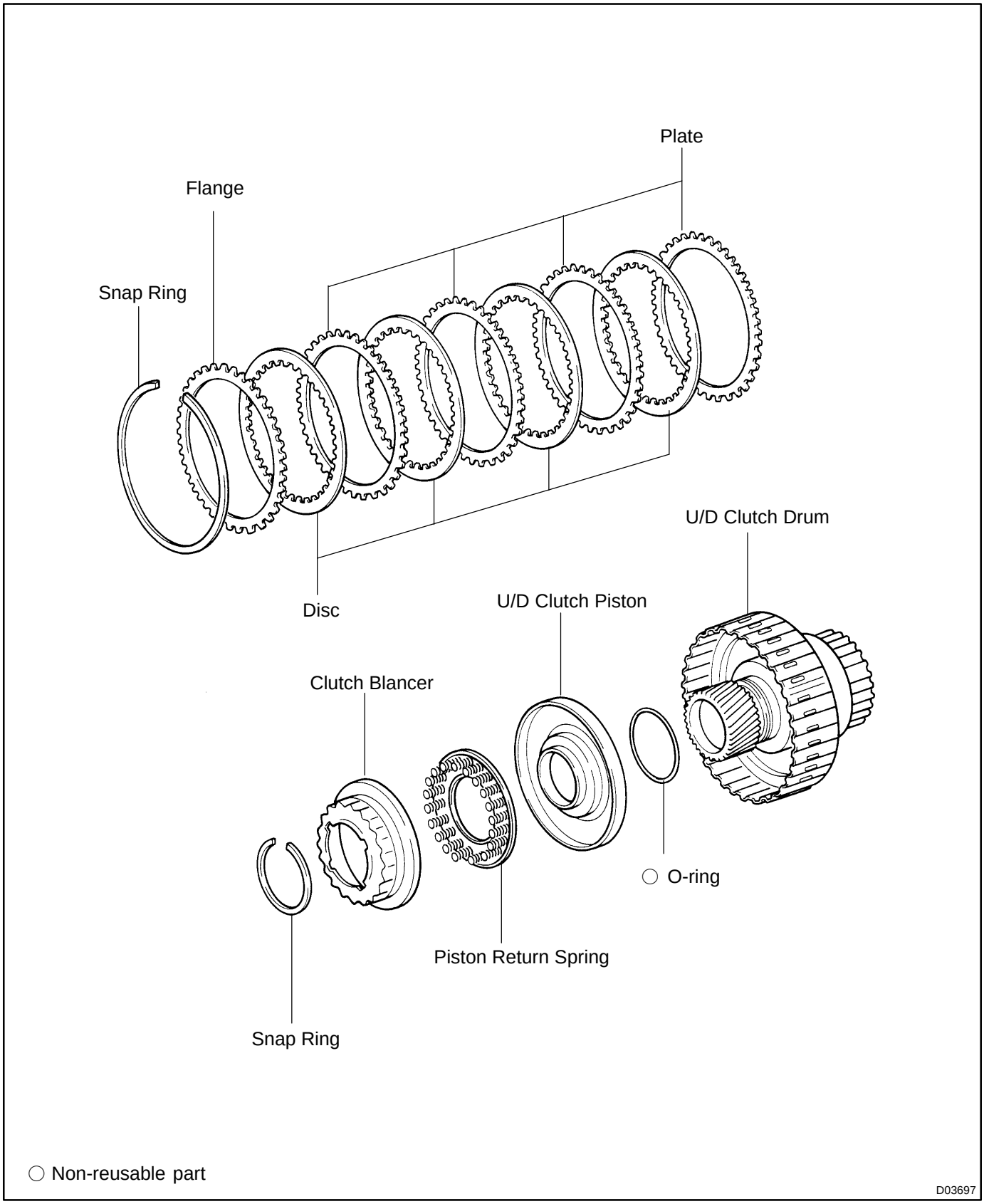
NOTICE:

Also, make sure that there are no cracks on the nut.

UNDERDRIVE CLUTCH

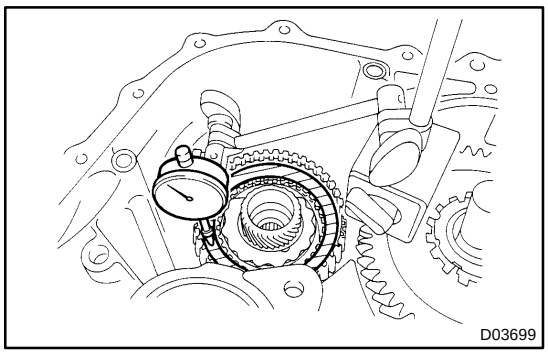
COMPONENTS

AX0B0-01



AX0B1-01

DISASSEMBLY


D03699

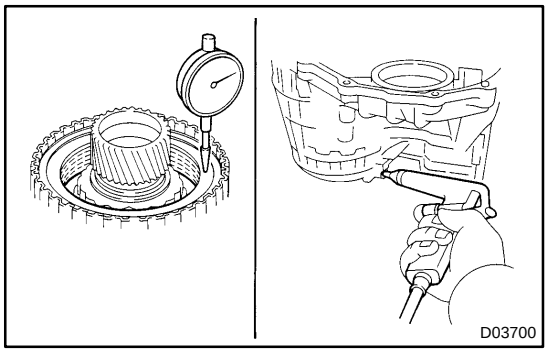
1. CHECK PISTON STROKE OF U/D CLUTCH

(a) Install the U/D clutch to the transaxle case.

NOTICE:

Be careful not to damage the oil seal rings.

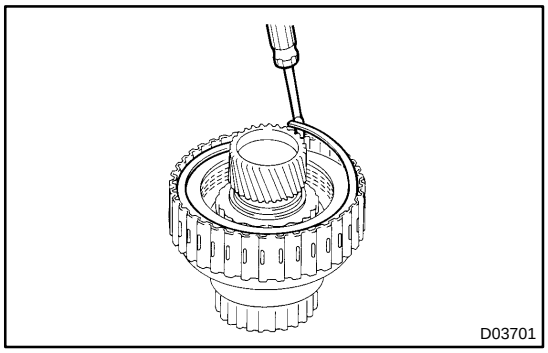
(b) Install the dial indicator, as shown in the illustration.


D03700

(c) Measure the U/D clutch piston stroke while applying and releasing compressed air (392 kgf/cm^2, 4.0 kPa, 57 psi).

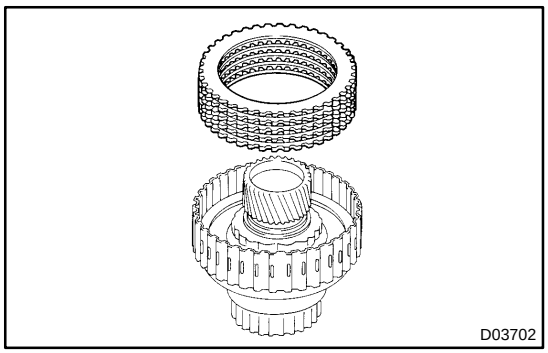
Piston stroke: 1.51 - 1.77 mm (0.0594 - 0.0697 in.)

If the piston stroke is non-standard inspect the discs, plates and flange.

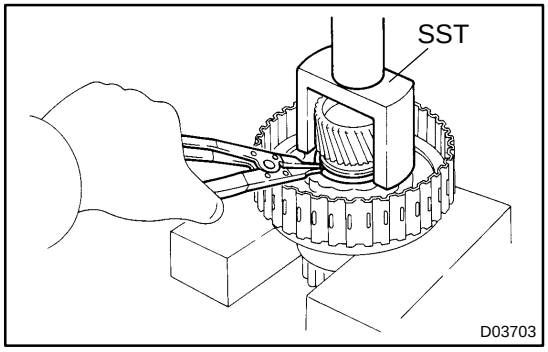

D03701

2. REMOVE FLANGE, DISC AND PLATE

(a) Using a screwdriver, remove the snap ring.


D03702

(b) Remove the flange, 4 discs and 4 plates from the U/D clutch drum.



D03703

3. REMOVE PISTON RETURN SPRING

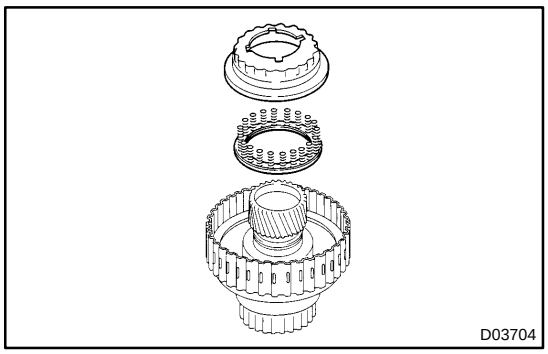
(a) Place SST on the clutch balancer and compress the spring with a press.

SST 09350-32014 (09351-32070)

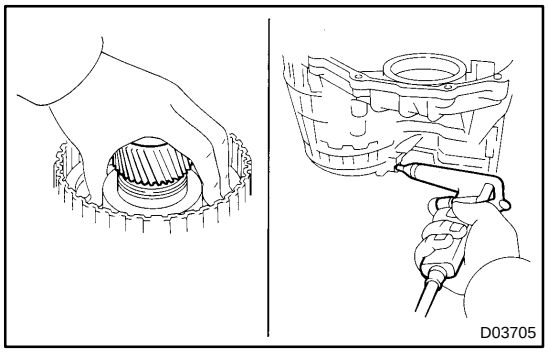
(b) Using a snap ring expander, remove the snap ring.

NOTICE:

- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from deforming.**
- **Do not expand the snap ring excessively.**



(c) Remove the clutch balancer and piston return spring from the U/D clutch drum.



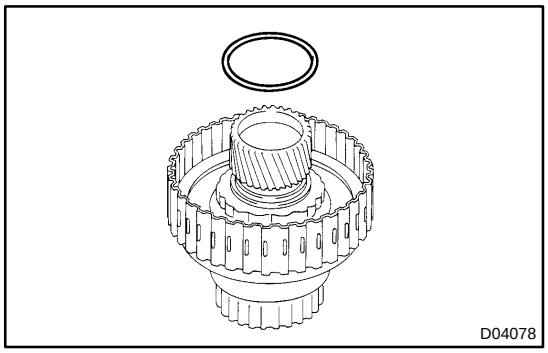
4. REMOVE U/D CLUTCH PISTON

(a) Install the U/D clutch to the transfer case.

NOTICE:

Be careful not to damage the oil seal rings.

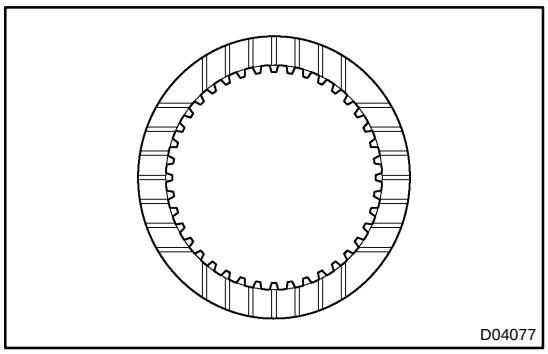
(b) Holding the U/D clutch piston with your hand, apply compressed air (392 kPa, 4.0 kgf/cm^2, 57 psi) to the transaxle case to remove the U/D clutch piston.



5. REMOVE O-RING

AX0B2-01

INSPECTION

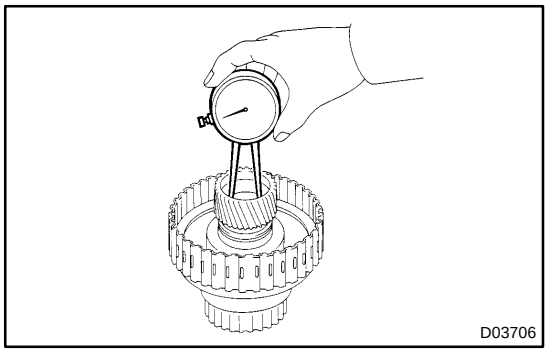


1. INSPECT DISC, PLATE AND FLANGE

Check to see if the sliding surface of the disc, plate and flange are worn or burnt. If necessary, replace them.

HINT:

- ○ If the lining of the disc is peeling off or discolored, or even if a part of the printed mark is defaced, replace all discs.
- ○ Before assembling new discs, soak them in ATF for at least 15 minutes.

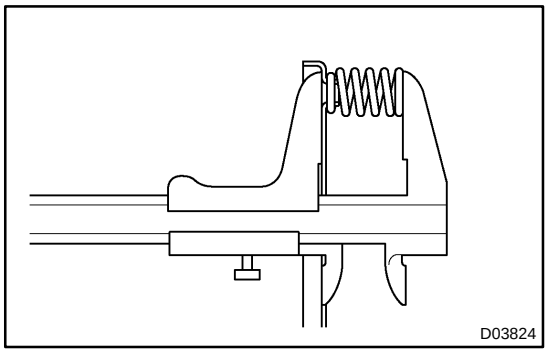


2. CHECK U/D CLUTCH DRUM BUSHING

Using a dial indicator, measure the inside diameter of the U/D clutch drum bushing.

Standard drum bushing:
37.06 - 37.08 mm (1.4591 - 1.4598 in.)
Maximum drum bushing: 37.13 mm (1.4618 in.)

If the inside diameter is greater than the maximum, replace the U/D clutch drum.



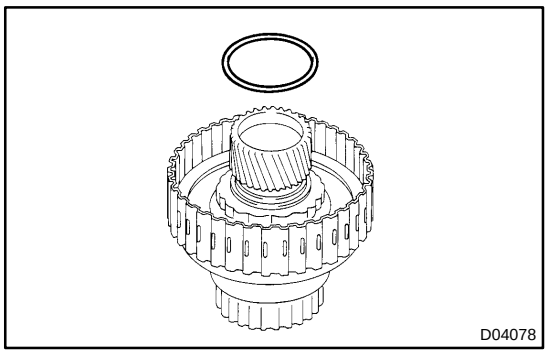
3. CHECK U/D CLUTCH PISTON RETURN SPRING

Using vernier calipers, measure the free length of the spring together with spring seat.

Standard free length: 17.14 mm (0.6748 in.)

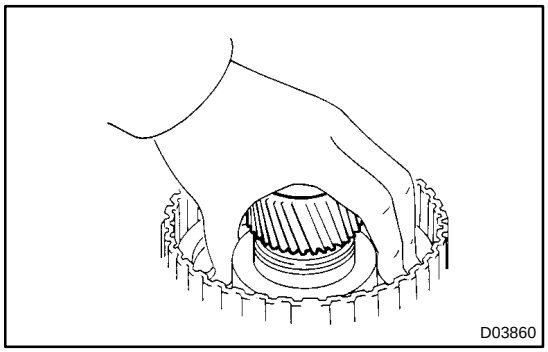
AX0B3-01

REASSEMBLY



1. INSTALL O-RING

Coat new O-ring with ATF, install it to the U/D clutch drum.

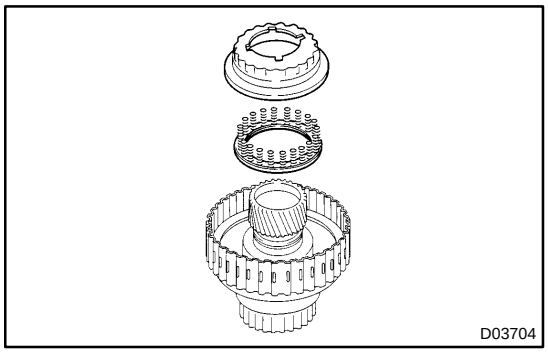


2. INSTALL U/D CLUTCH PISTON

Coat the U/D clutch piston with ATF, install it to the U/D clutch piston drum.

NOTICE:

Be careful not to damage the O-ring.

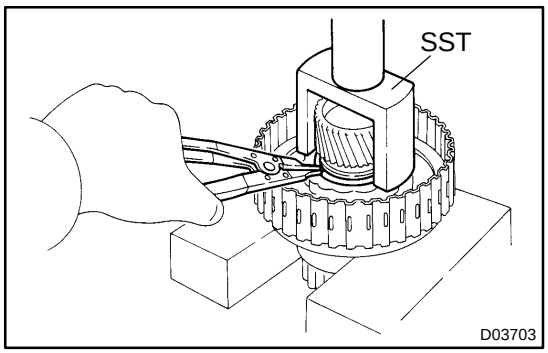


3. INSTALL PISTON RETURN SPRING

(a) Install the piston return spring and clutch balancer to the U/D clutch drum.

NOTICE:

Be careful not to damage the lip seal of clutch balancer.

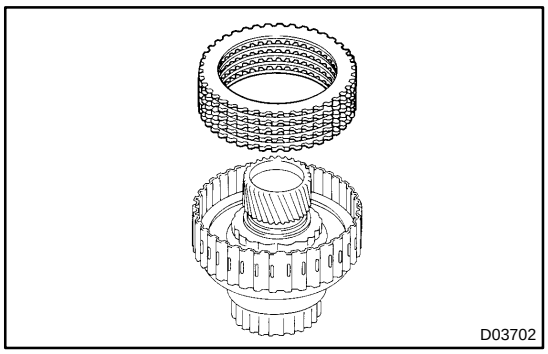


(b) Place SST on the clutch balancer and compress the piston return spring with a press.
SST 09350-32014 (09351-32070)

(c) Using a snap ring expander, install the snap ring to U/D clutch drum.

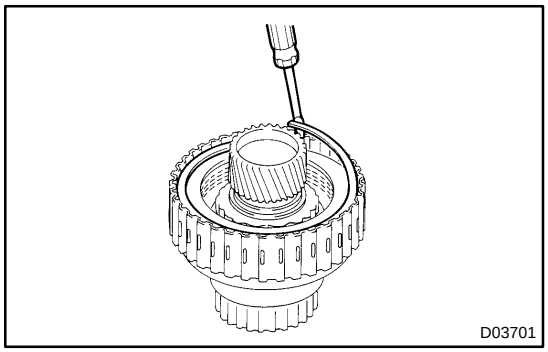
NOTICE:

- **Be sure the end gap of the snap ring is not aligned with the clutch balancer claw.**
- **Stop the press when the spring sheet is lowered to the place 1 - 2 mm (0.039 - 0.078 in.) from the snap ring groove, preventing the spring sheet from deforming.**
- **Do not expand the snap ring excessively.**

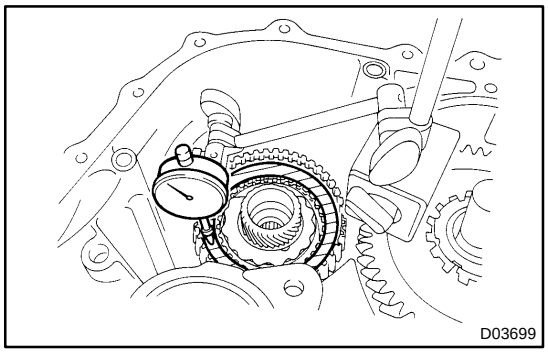


4. INSTALL PLATE, DISC AND FLANGE

(a) Install the 4 plates, 4 discs and flange.
Install in order: P = Plate, D = Disc, F = Flange
P - D - P - D - P - D - P - D - F



(b) Using a screwdriver, install the snap ring.
(c) Check that the end gap of snap ring is not aligned with one of the cutouts.



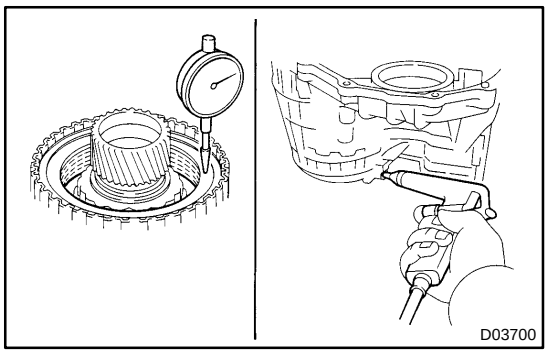
5. CHECK PISTON STROKE OF U/D CLUTCH

(a) Install the U/D clutch to the transaxle case.

NOTICE:

Be careful not to damage the oil seal rings.

(b) Install the dial indicator, as shown in the illustration.



(c) Measure the U/D clutch piston stroke while applying and releasing compressed air (392 kgf/cm^2, 4.0 kPa, 57 psi).
Piston stroke: 1.51 - 1.77 mm (0.059 - 0.070 in.)

If the piston stroke is less than the limit of piston stroke, parts may have been assembled incorrectly, so check and reassemble again.

If the stroke is non-standard, select another flange.

HINT:

There are 3 flanges in different thickness.

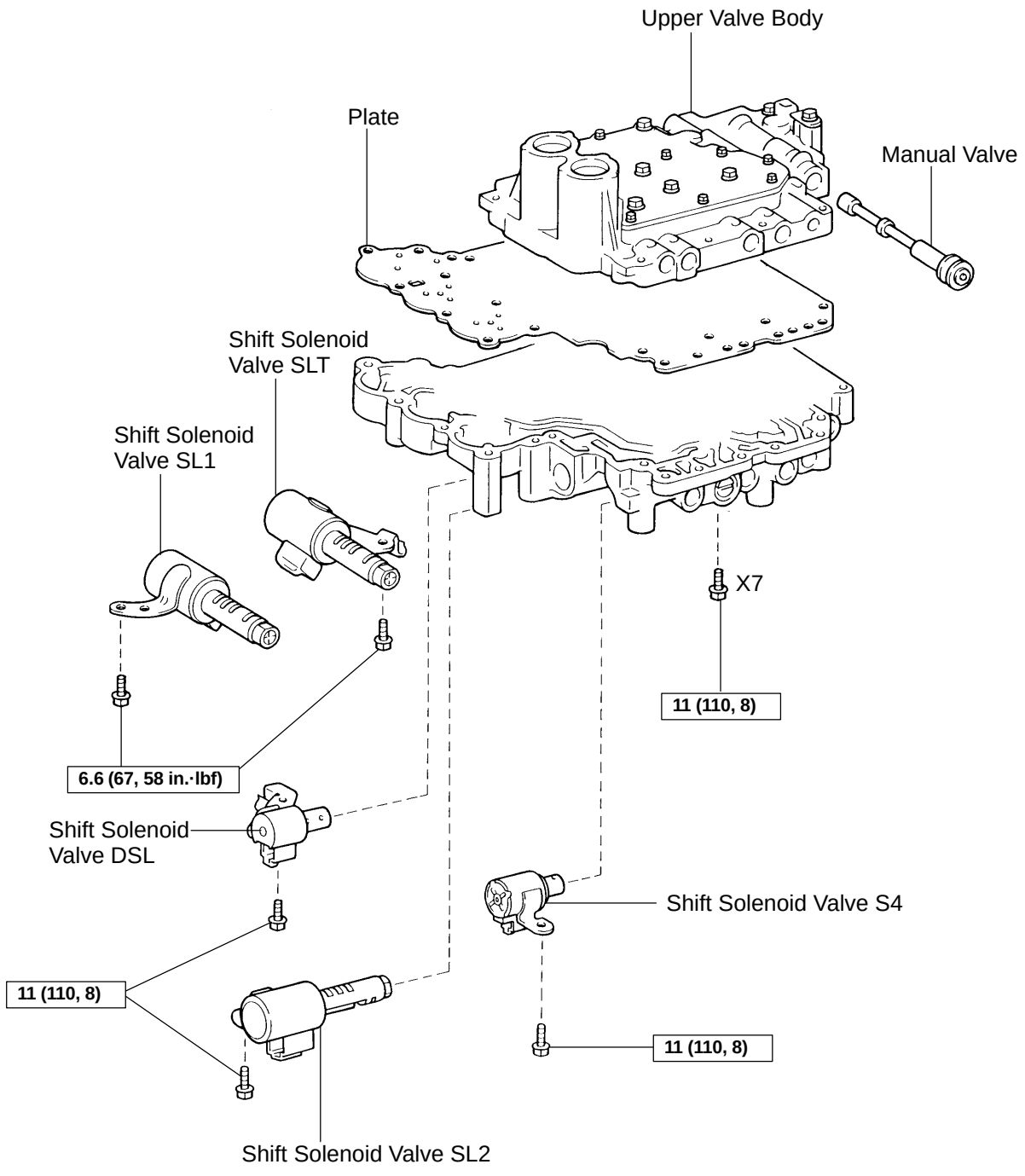
Flange Thickness: mm (in.)

No.	Thickness	No.	Thickness
1	3.0 (0.118)	3	3.4 (0.134)
2	3.2 (0.126)		

VALVE BODY

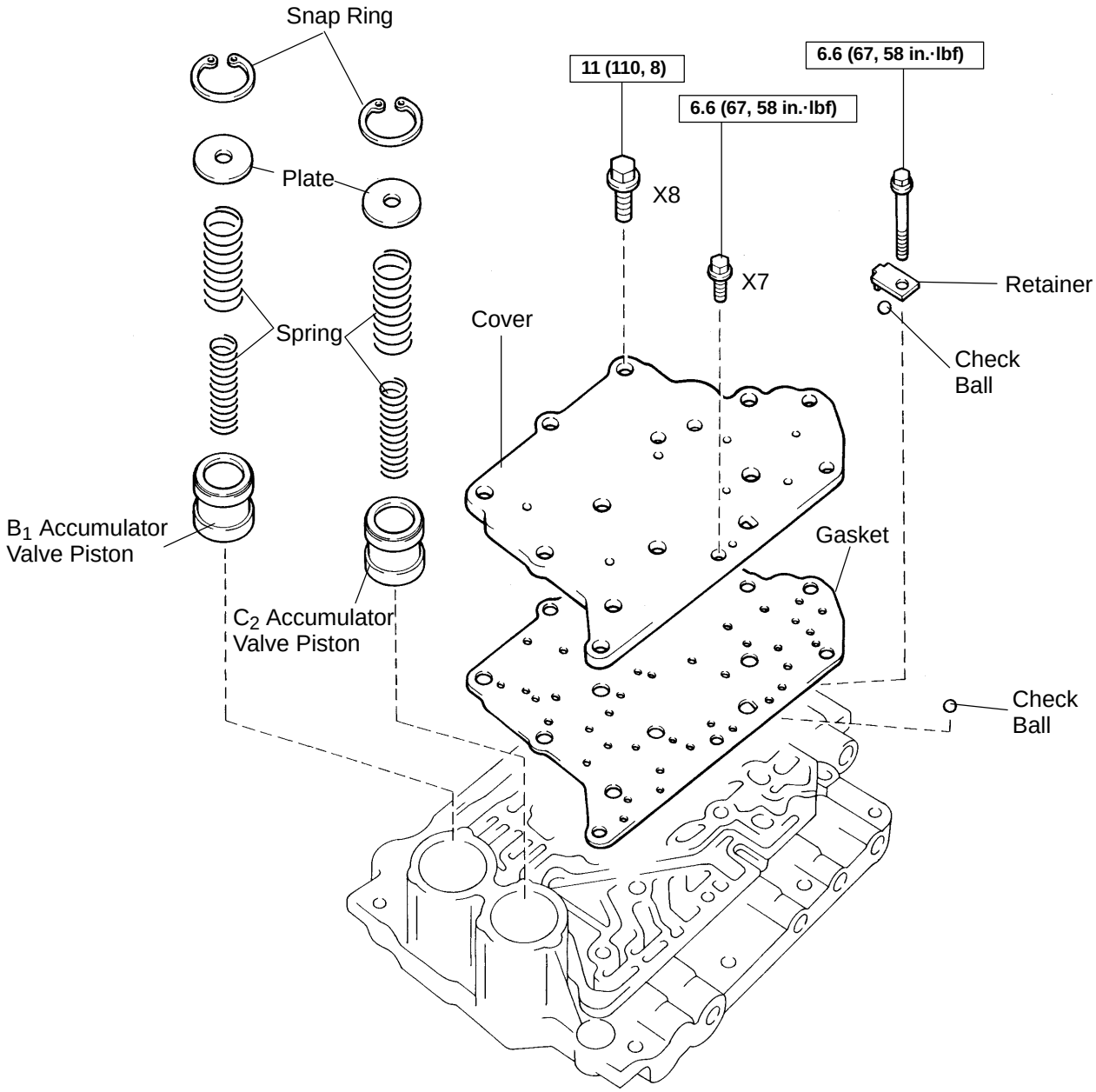
AX0B7-01

COMPONENTS



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

D03780



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

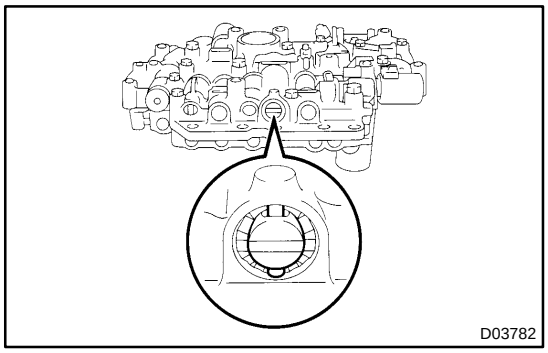
D03781

AX0B8-01

DISASSEMBLY

NOTICE:

- **Disassembling and reassembling should be conducted on a clean vinyl sheet or mat, or aluminum tray.**
- **Make the valve slide through the valve hole by its own weight. Do not forcibly pull out the valve using needle nose pliers. When having difficulty in removing it, slant and shake the valve body or use a magnet hand.**
- **Do not place the disassembled parts directly on metal work bench or waste cloth.**
- **Do not use dropped parts.**
- **Make sure that no burr is identified before assembling.**

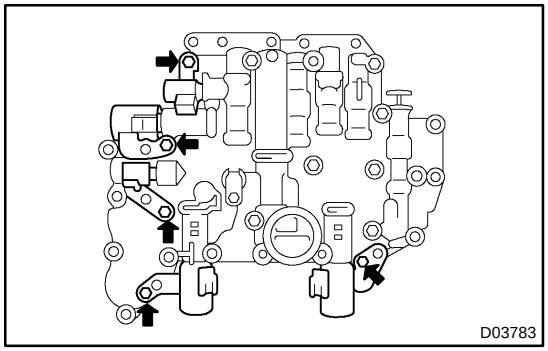


1. CHECK PRIMARY REGULATOR VALVE POSITION

Write down the relative position of the primary regulator valve sleeve, the plug and the pin.

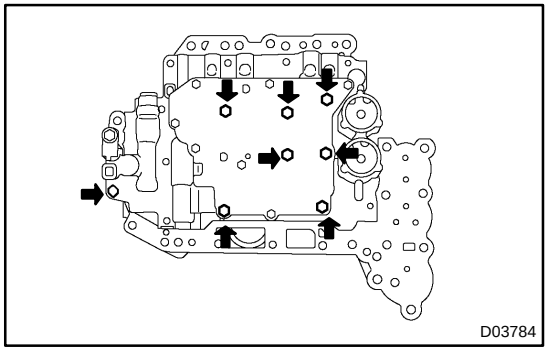
NOTICE:

Because the line pressure is changed by the position of the pin and the groove in the sleeve end, make sure to check the position.



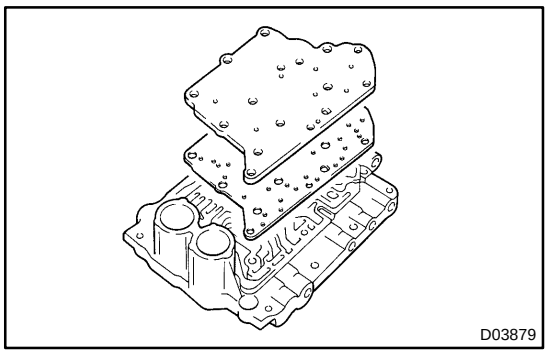
2. REMOVE SHIFT SOLENOID VALVE

(a) Remove the 5 bolts and 5 shift solenoid valves.

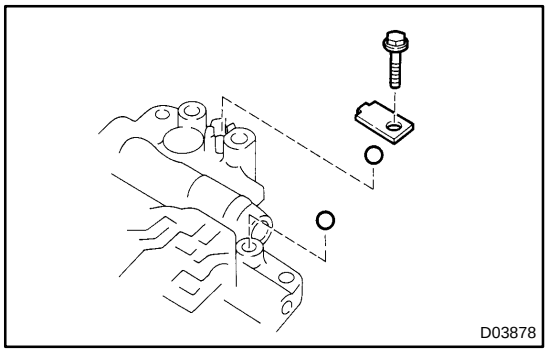


3. REMOVE LOWER VALVE BODY

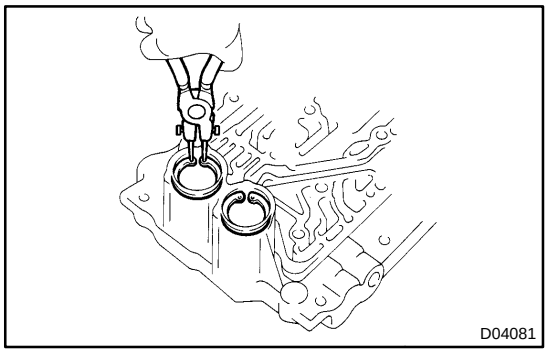
(a) Remove the 8 bolts.



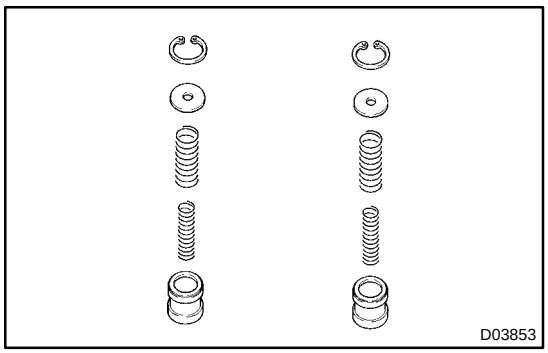
(b) Remove the 7 bolts, cover and gasket.



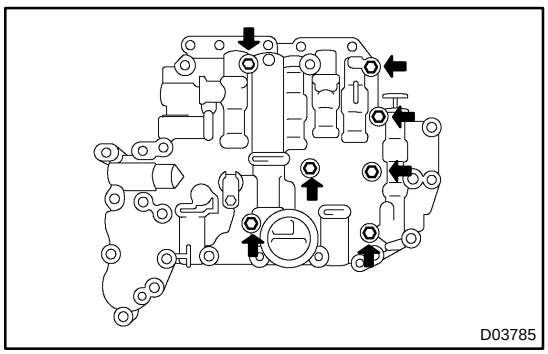
(c) Remove the bolt, cover and 2 pressure relief balls.



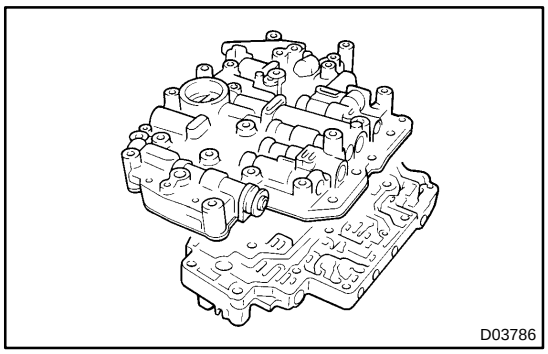
(d) Using snap ring pliers, remove the 2 snap rings.



(e) Remove 4 springs from the valve body.
(f) Remove 2 pistons from the valve body.



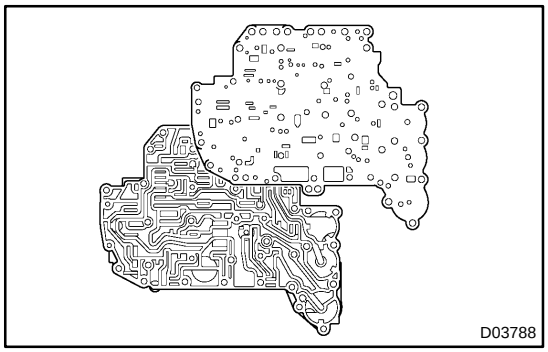
(g) Remove the 7 bolts from lower value body.



(h) Remove lower value body with plate from the upper value body.

NOTICE:

Be careful that the check balls do not fall out.



(i) Turn over the lower valve body with plate.

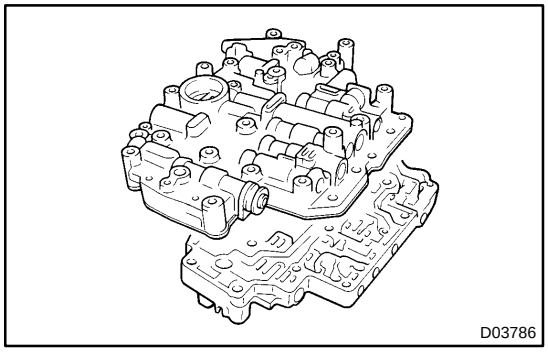
(j) Remove the plate from lower valve body.

NOTICE:

Be careful that the check balls do not fall out.

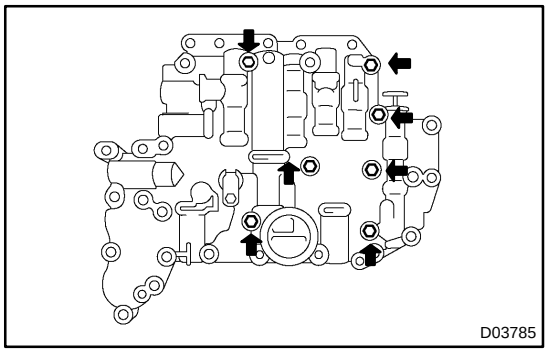
AX0B9-01

REASSEMBLY

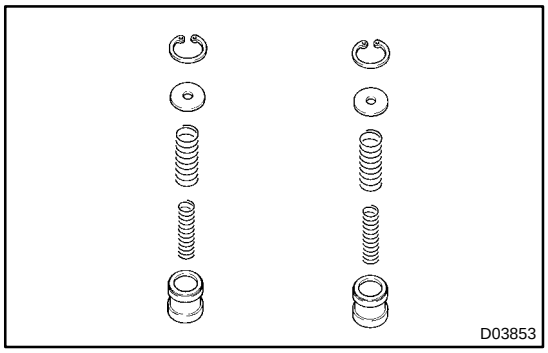

D03786

1. ASSEMBLE VALVE BODY

(a) Install the check balls to the upper and lower valve body.
(b) Install the plate to the lower valve body.
(c) Install the lower valve body with plate to the upper valve body.


D03785

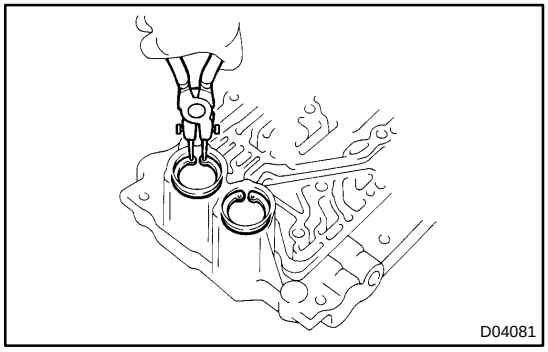
(d) Install the 7 bolts to the lower valve body.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt length: 41 mm (1.614 in.)


D03853

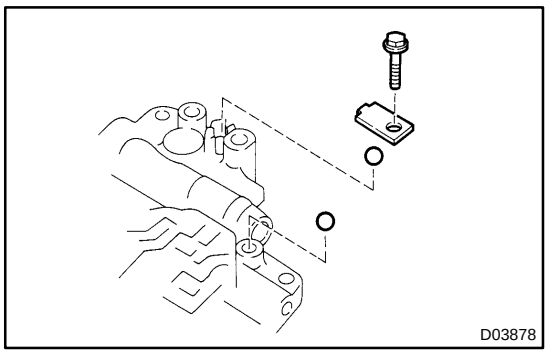
2. INSTALL ACCUMULATOR

(a) Install 2 accumulator valves to the valve body.
(b) Install 4 springs to the valve body.
Spring length: mm (in.)

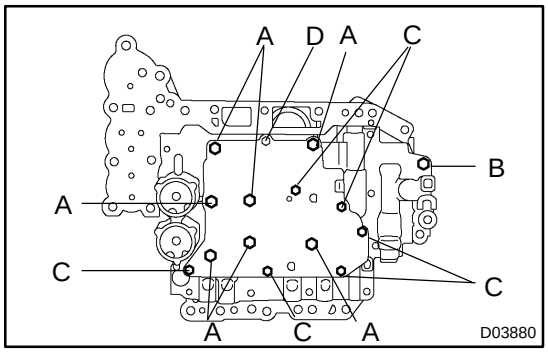
Spring		Free length / Outer diameter mm (in.)	Color
C_2	Inner:	47.58 (1.8732) / 11.2 (0.441)	Brown
	Outer:	47.61 (1.8744) / 12.0 (0.472)	Brown
B_1	Inner:	43.88 (1.7276) / 11.0 (0.433)	Parpl
	Outer:	45.12 (1.7764) / 11.8 (0.465)	White


D04081

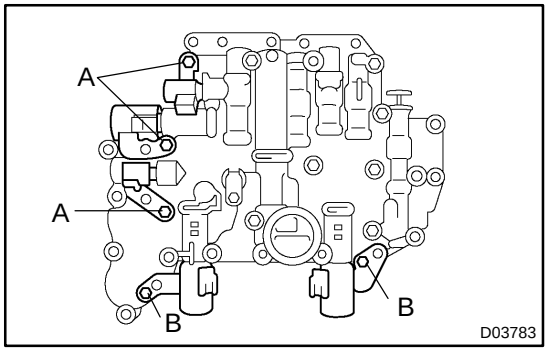
(c) Using snap ring pliers, install the snap ring.



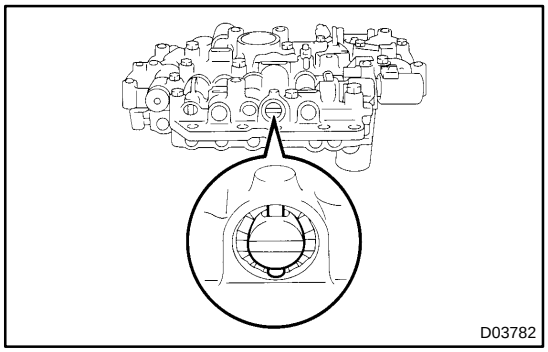
(d) Install a check ball, a retainer and a bolt to the upper valve body.
Torque: 11 N·m (110 kgf·cm, 8 ft·lbf)



(e) Turn over the valve body.
(f) Install the 14 bolts, gasket and upper body cover.
Torque:
Bolt A: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt B: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt C: 6.6 N·m (67 kgf·cm, 58 in.·lbf)
Bolt D: 6.6 N·m (67 kgf·cm, 58 in.·lbf)
HINT:
Each bolts length is indicated below.
Bolt A: 41 mm (1.614 in.)
Bolt B: 30 mm (1.181 in.)
Bolt C: 15 mm (0.591 in.)
Bolt D: 10 mm (0.394 in.)



3. INSTALL SHIFT SOLENOID VALVE
Install the 5 shift solenoid valves with 5 bolts.
Torque:
Bolt A: 11 N·m (110 kgf·cm, 8 ft·lbf)
Bolt B: 6.6 N·m (67 kgf·cm, 58 in.·lbf)
Bolt length:
Bolt A: 45 mm (1.77 in.)
Bolt B: 12 mm (0.45 in.)



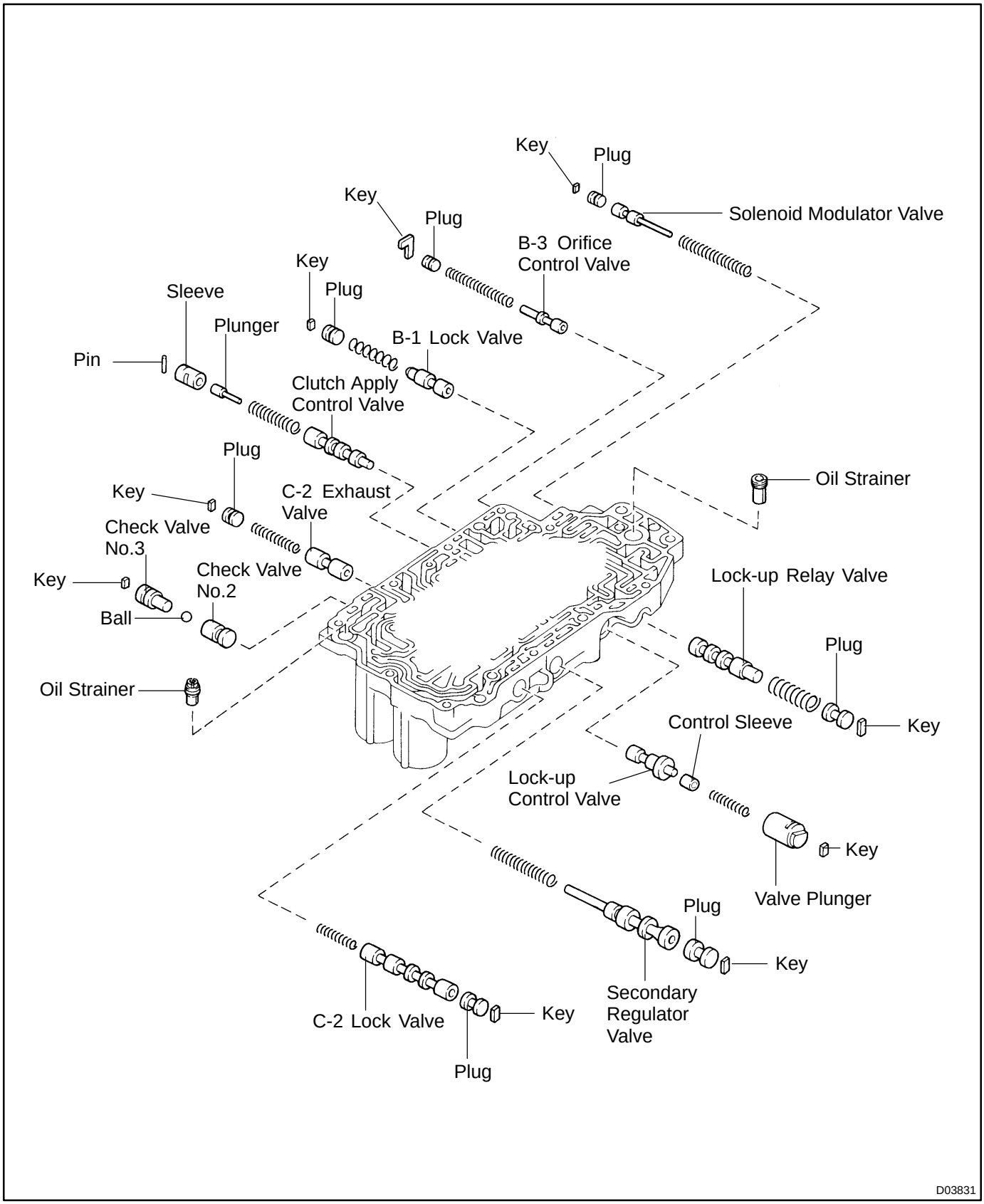
4. CHECK PRIMARY REGULATOR VALVE POSITION
Make sure that the primary regulator valve is positioned in the same place where it was removed.

UPPER VALVE BODY

AX0BA-01

LOCATION

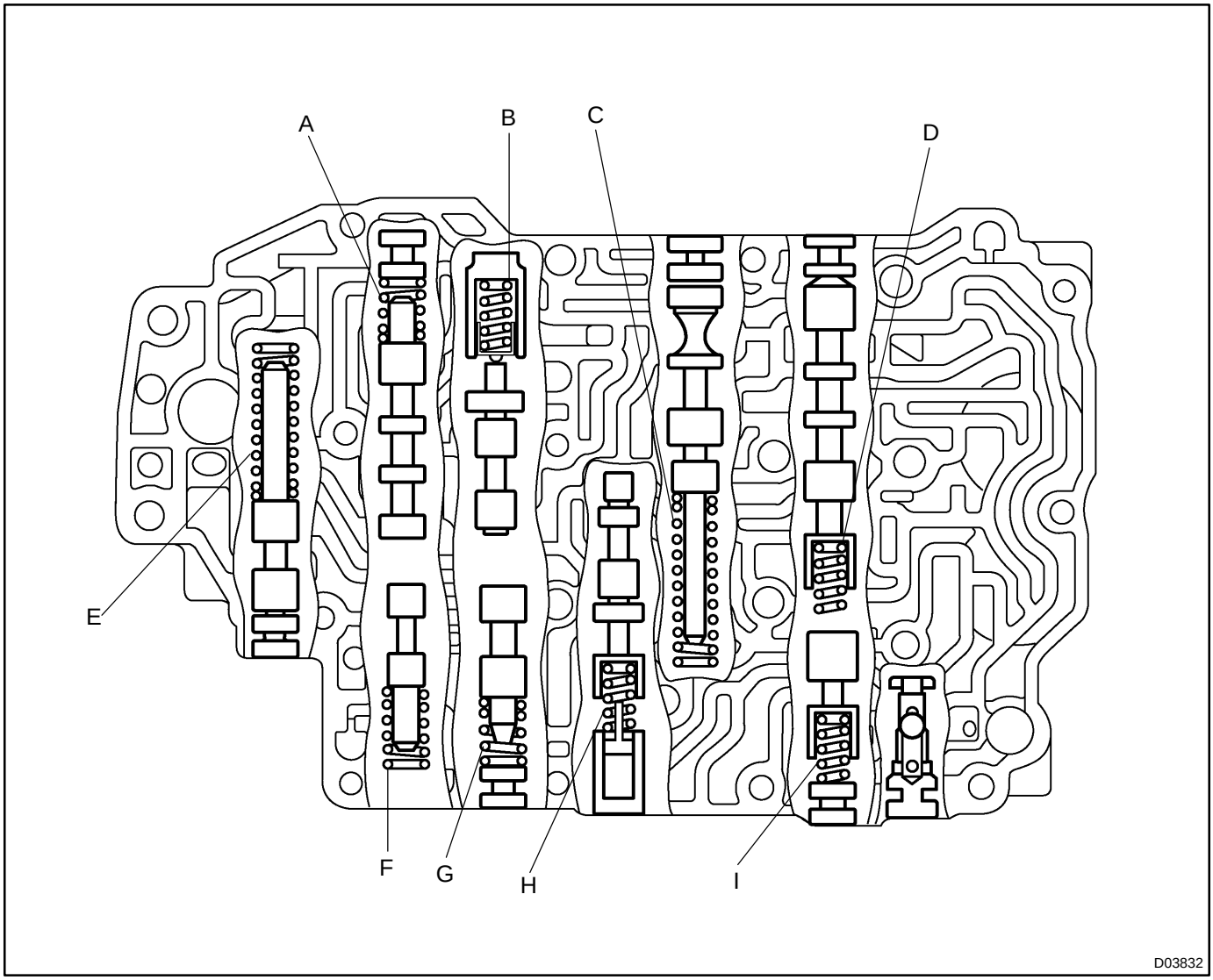
1. COMPONENTS



2. SPRING

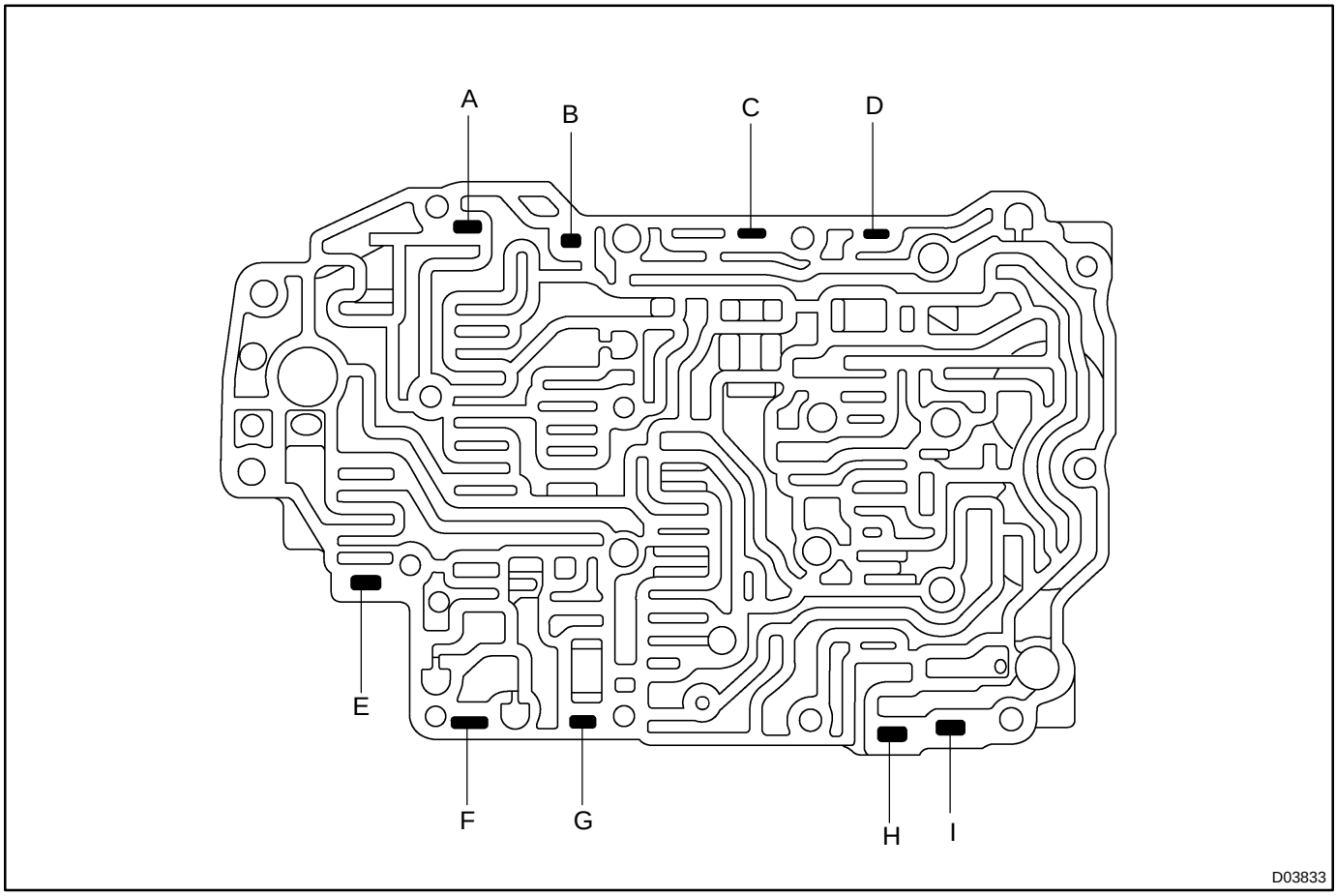
HINT:

During reassembly please refer to the spring specifications below to help you to discriminate between the different springs.



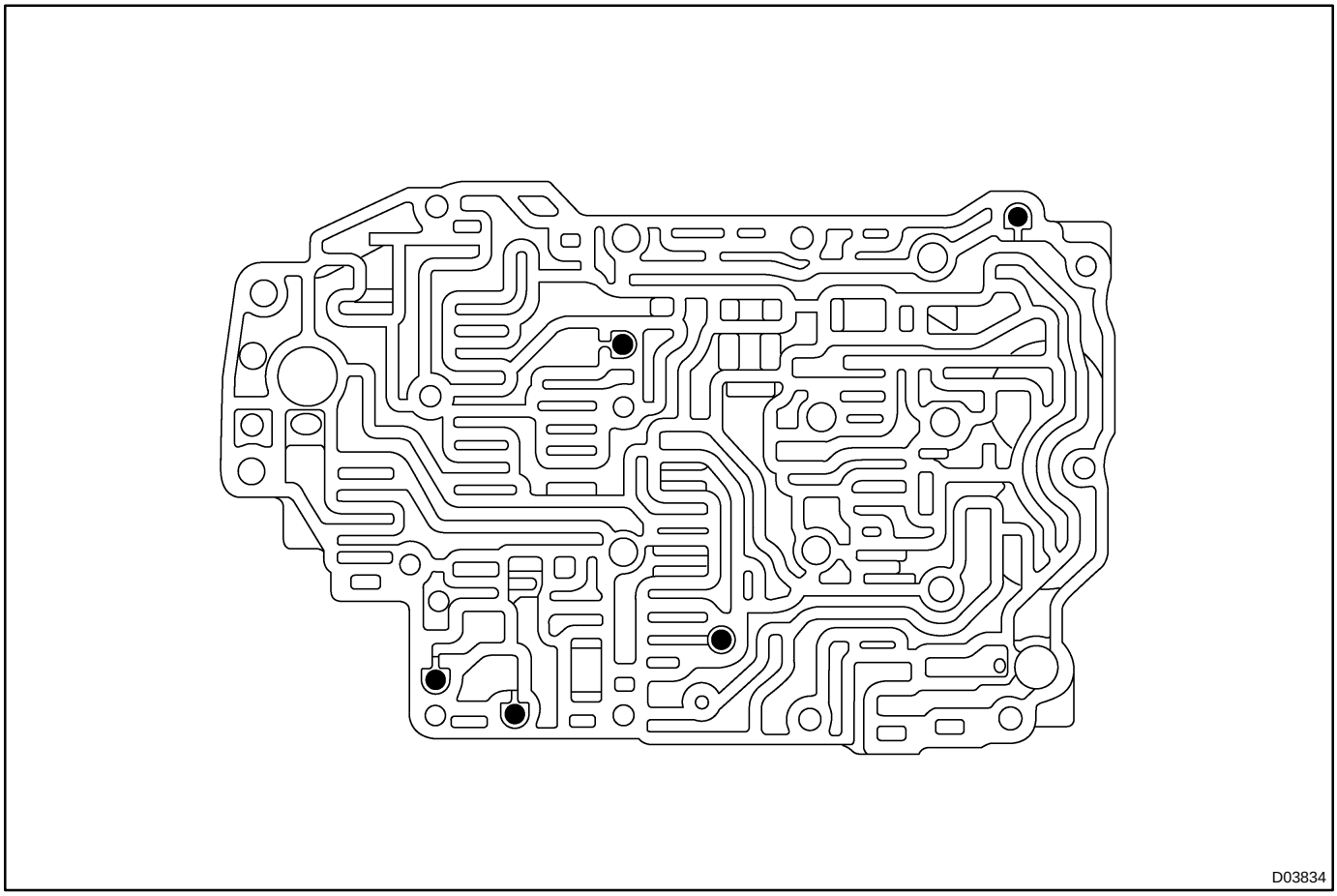
Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total number of coils
A	Rock-up relay valve (None)	29.25 (1.1516) / 9.7 0.382)	10.50
B	Rock-up control valve (Green)	23.95 (0.9429) / 5.4 (0.213)	14.94
C	Secondary regulator valve (Blue)	58.35 (2.2972) / 8.7 (0.343)	20.58
D	C-2 lock valve (Yellow)	33.65 (1.3247) / 7.4 (0.291)	11.82
E	Solenoid modulator valve (Red)	62.40 (2.4567) / 9.8 (0.386)	22.31
F	B-3 orifice control valve (Grey)	62.65 (2.4665) / 7.8 (0.307)	19.60
G	B-1 lock valve (White)	37.40 (1.4724) / 9.8 (0.386)	8.84
H	Clutch apply control valve (Purple)	40.25 (1.5816) / 9.0 (0.354)	13.00
I	C-2 exhaust check valve (Orange)	40.25 (1.5816) / 7.4 (0.291)	17.10

3. KEY



Mark	Retainer	Height / Width / Thickness mm (in.)
A	Lock-up relay valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
B	Lock-up control valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
C	Secondary regulator valve	8.0 (0.315) / 5.0 (0.197) / 3.2 (0.126)
D	C-2 lock valve	10.0 (0.394) / 5.0 (0.197) / 3.2 (0.126)
E	Solenoid modulator valve	8.0 (0.315) / 5.0 (0.197) / 3.2 (0.126)
F	B-3 orifice control valve	18.5 (0.728) / - / 2.3 (0.091)
G	B-1 lock valve	8.0 (0.315) / 5.0 (0.197) / 3.2 (0.126)
H	C-2 exhaust check valve	8.0 (0.315) / 5.0 (0.197) / 3.2 (0.126)
I	3-way check valve	8.0 (0.315) / 5.0 (0.197) / 3.2 (0.126)

4. CHECK BALL



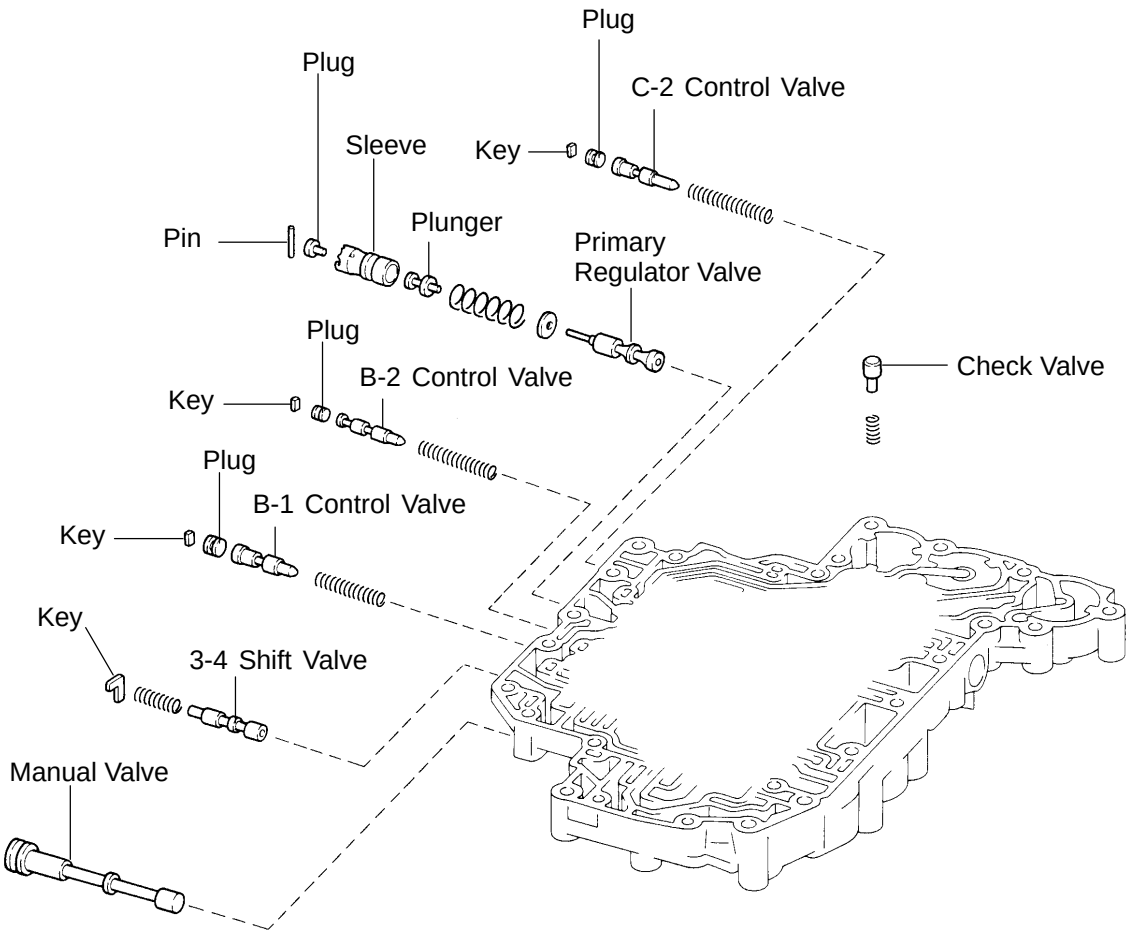
Check ball	mm (in.)	5.5 (0.217)

LOWER VALVE BODY

AX0BB-01

LOCATION

1. COMPONENTS

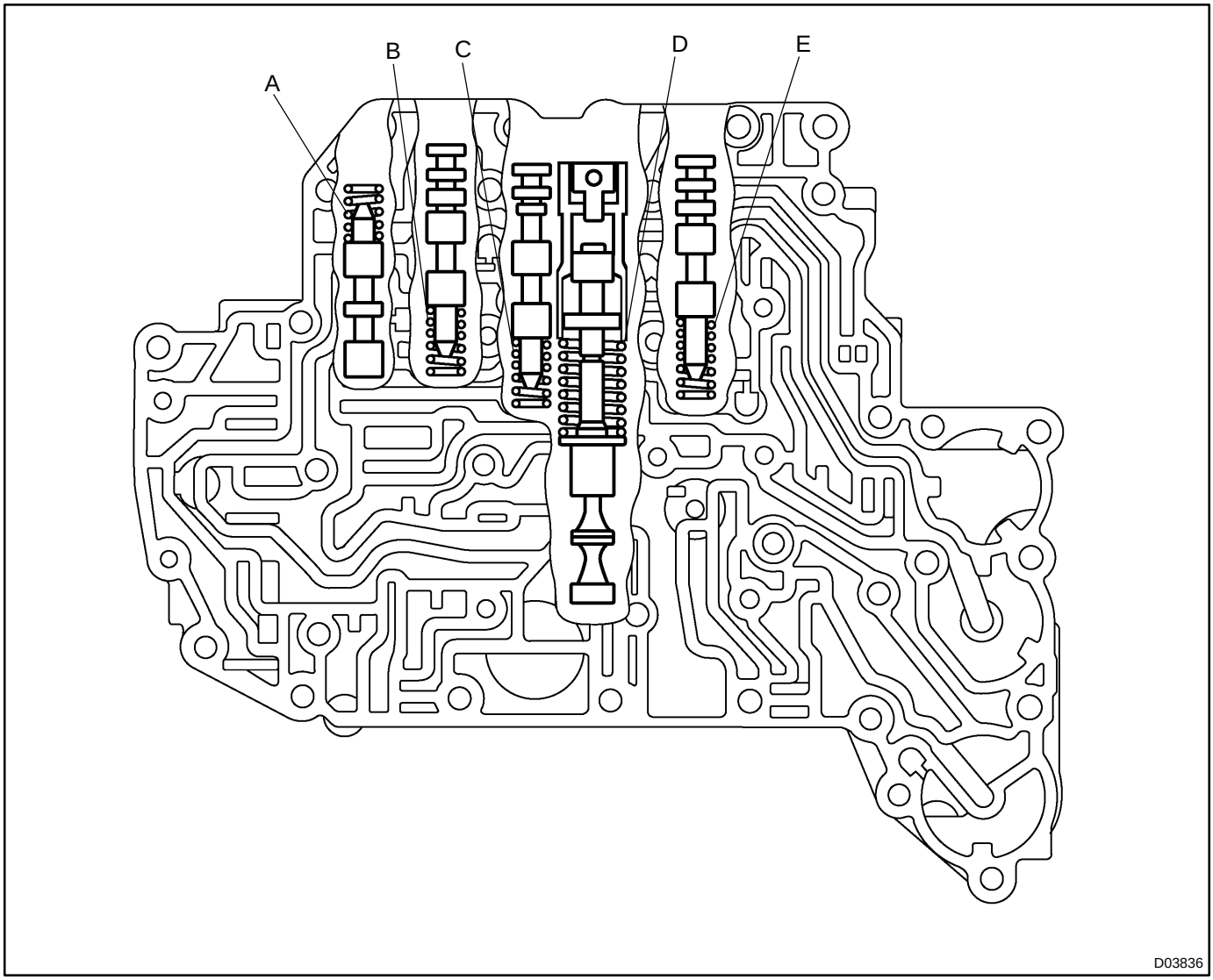


D03835

2. SPRING

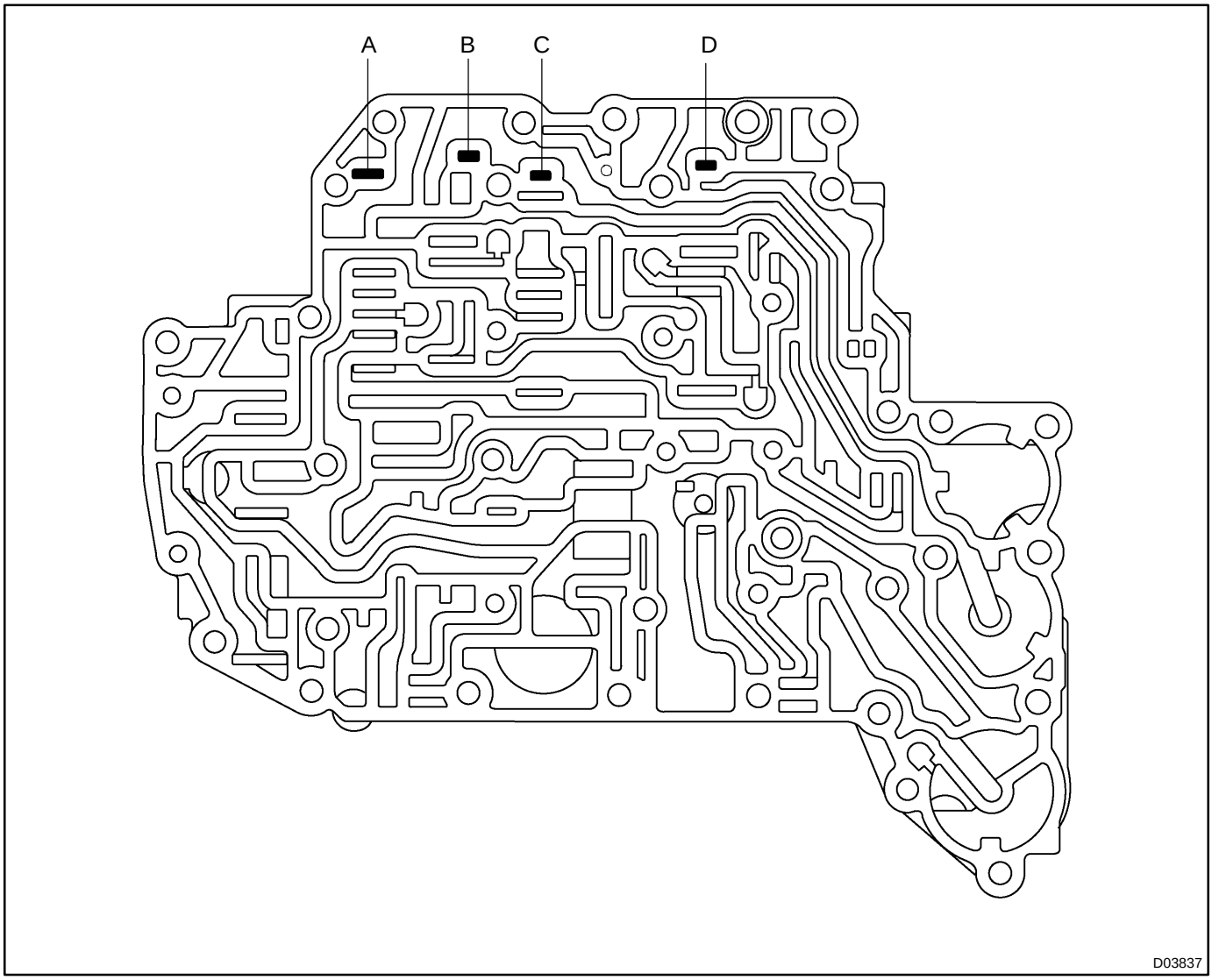
HINT:

During re-assembly please refer to the spring specifications below to help you to discriminate between the different springs:



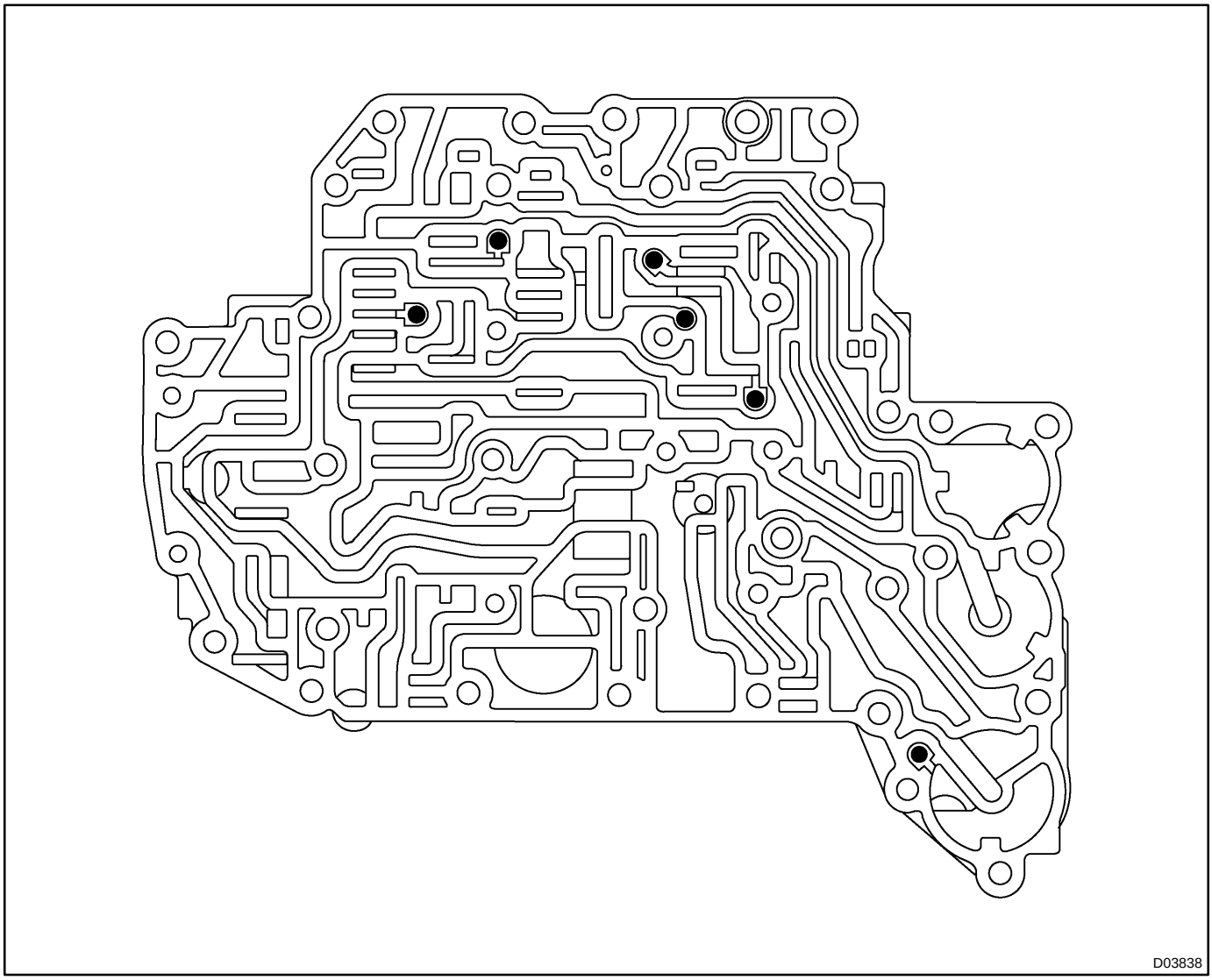
Mark	Name (Color)	Free length / Outer diameter mm (in.)	Total number of coils
A	3-4 shift valve (None)	29.25 (1.1516) / 9.7 (0.382)	10.5
B	B-1 control valve (Green)	48.55 (1.9114) / 9.8 (0.386)	13.43
C	B-2 control valve (Pink)	57.05 (2.2461) / 9.8 (0.386)	15.34
D	Primary regulator valve (Orange)	57.55 (2.2657) / 19.9 (0.783)	7.87
E	C-2 control valve (Brown)	34.20 (1.3465) / 9.9 (0.390)	8.79

3. KEY



Mark	Retainer	Height / Width / Thickness mm (in.)
A	3-4 shift valve	25.5 (1.004) / - / 2.3 (0.091)
B	B-1 control valve	14.5 (0.571) / 5.0 (0.197) / 3.2 (0.126)
C	B-2 control valve	14.5 (0.571) / 5.0 (0.197) / 3.2 (0.126)
E	C-2 control valve	14.5 (0.571) / 5.0 (0.197) / 3.2 (0.126)

4. Check ball

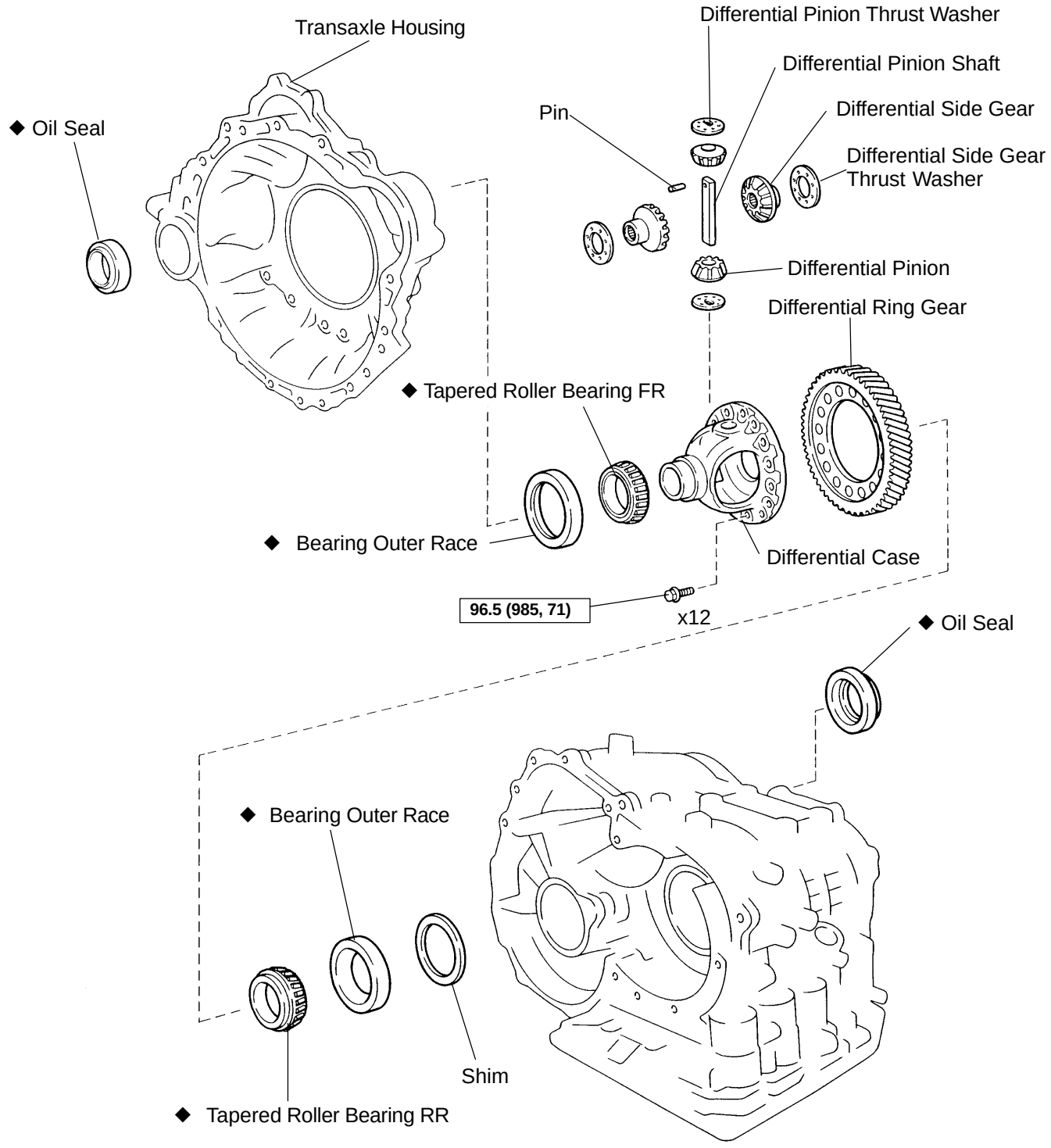


Check ball	mm (in.)	5.5 (0.217)

DIFFERENTIAL CASE

AX0BJ-01

COMPONENTS



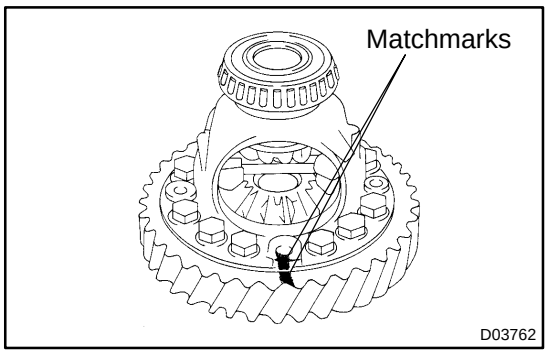
N·m (kgf·cm, ft·lbf) : Specified torque

◆ Non-reusable part

D03761

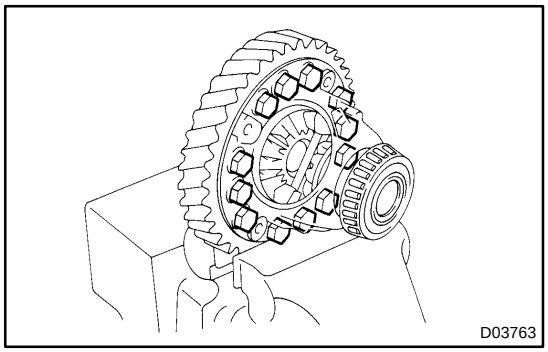
AX0BK-01

DISASSEMBLY

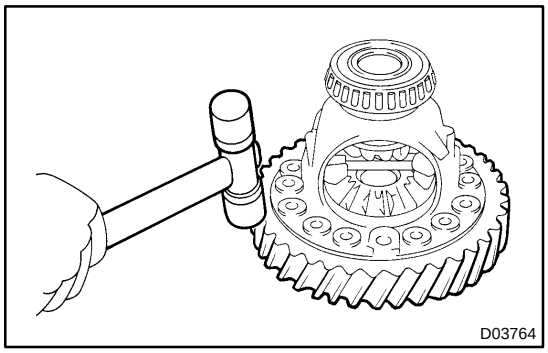


1. REMOVE RING GEAR

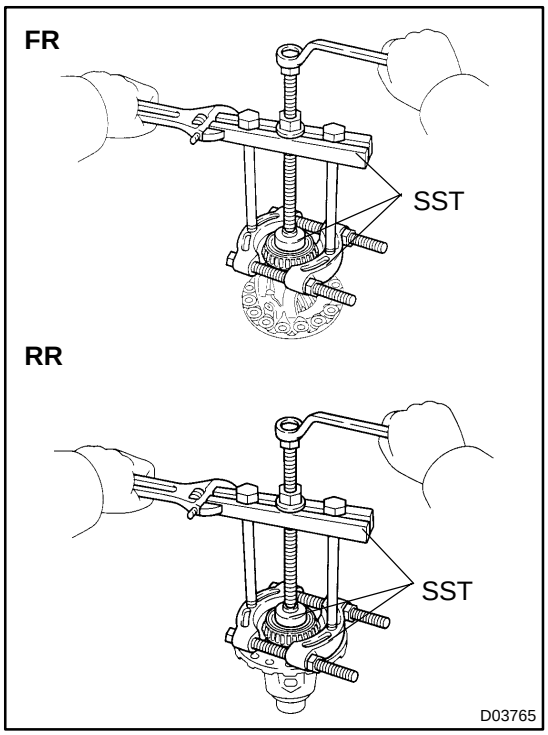
(a) Place the matchmarks on the ring gear and differential case.



(b) Remove the 12 bolts.



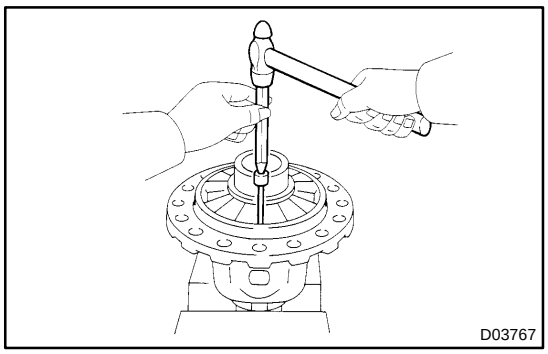
(c) Using a plastic hammer, tap on the ring gear to remove it from the case.



2. REMOVE TAPERED ROLLER BEARING

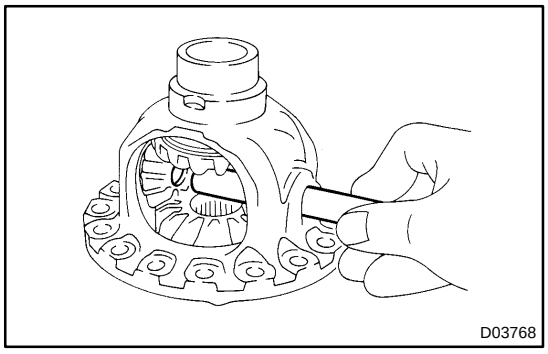
Using SST and a press, remove the tapered roller bearing FR and RR.

SST 09950-00020, 09950-00030, 09950-60011 (09951-00480, 09951-00500)

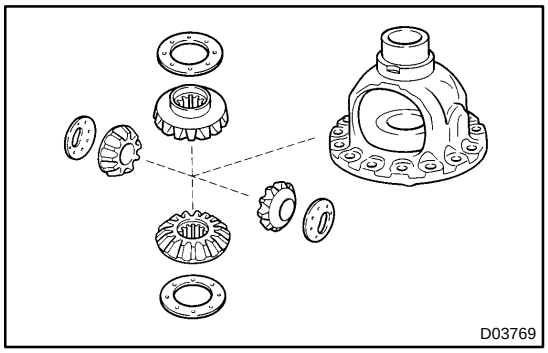


3. DISASSEMBLY DIFFERENTIAL CASE

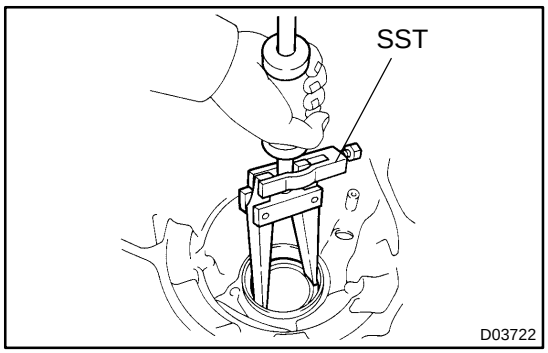
(a) Using a pin punch and hammer, drive out the pin from the ring gear side.



(b) Remove the differential pinion shaft from the case.



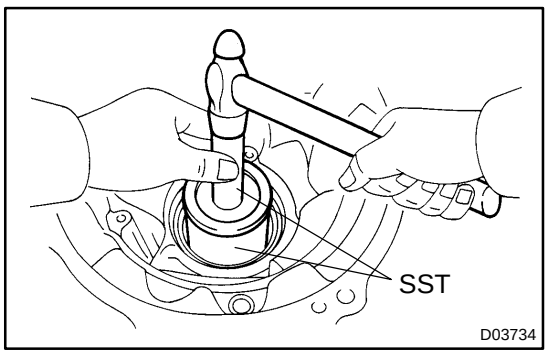
(c) Remove the 2 differential pinions, 2 differential side gears, 2 differential pinion thrust washers and 2 differential side gear thrust washers.



4. REMOVE SIDE BEARING OUTER RACE OF TRANSAXLE HOUSING

Using SST, remove outer race and adjust shim.

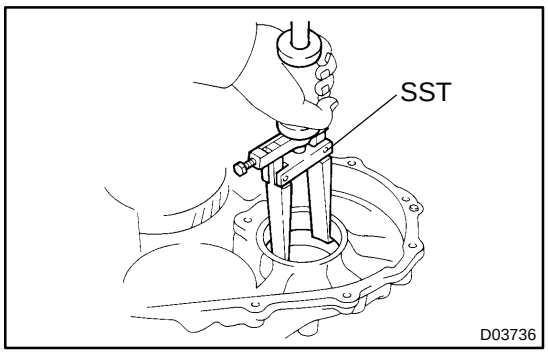
SST 09308-00010



5. REMOVE OIL SEAL OF TRANSAXLE HOUSING

Using SST and a hammer, drive out the oil seal.

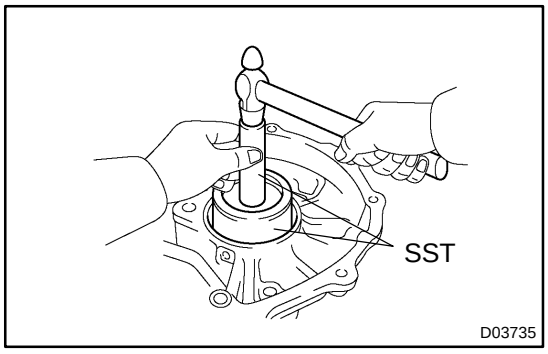
SST 09649-17010, 09950-70010 (09951-07100)



6. REMOVE SIDE BEARING OUTER RACE OF TRANSAXLE CASE

Using SST, remove the outer race and shim.

SST 09308-00010



7. REMOVE OIL SEAL OF TRANSAXLE CASE

Using SST and a hammer, drive out the oil seal.

SST 09649-17010, 09950-70010 (09951-07100)

BODY ELECTRICAL SYSTEM

BE04P–04

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 bulb)

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. HEADLIGHT SYSTEM (HID bulb)

- HID bulbs have pressurized gas inside and require special handling.
  They can burst or scatter 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.
- When high voltage socket of discharge headlight is touched with the light control switch HEAD, high voltage of 20,000 V is momentarily generated. This might lead to a serious accident.
- Never connect the tester to the high voltage socket of discharge headlight for measurement, as this leads to a serious because of high voltage.
- When performing operation related to the discharge headlight, make sure to do it in the place with no water of rain to prevent electric shock, with light control switch OFF, battery terminal removed, connector of light control ECU disconnected.
- When performing operation related to the discharge headlight, make sure to do it after assembling has been completely over and never light up without a bulb installed.

3. SRS (SUPPLEMENTAL RESTRAINT SYSTEM)

The LEXUS ES300 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.

4. 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 make 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.

5. MOBILE COMMUNICATION SYSTEM

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

- Do not light up the discharge headlight using another power source except vehicle's.
- When there is a defect on the discharge headlight or any shock has been applied to it, replace the light with a new one.
  Even if the light operates normally, there is a possibility that the fail–safe function not works.

TROUBLESHOOTING

BE1BH–01

PROBLEM SYMPTOMS TABLE

POWER OUTLET

Symptom	Suspect Area	See page
Electric power source cannot be taken out of the power outlet.	1. Battery 2. POWER OUTLET Fuse 3. Wire Harness	– – –

HEADLIGHT AND TAILLIGHT SYSTEM:

Symptom	Suspect Area	See page
Only one headlight comes on.	1. Daytime Running Light No.2, 3, 4 Relay 2. Daytime Running Light Main Relay 3. Bulb 4. *Headlight (Light Control ECU) 5. Wire Harness	BE–28 BE–28 – – –
”LO–Beam” does not light (All).	1. Headlight Control Relay 2. *Headlight (Light Control ECU) 3. Wire Harness	BE–28 – –
”LO–Beam” does not light (One side).	1. Bulb 2. HEAD LH(LWR) Fuse 3. HEAD RH(LWR) Fuse 4. *Headlight (Light Control ECU) 5. Wire Harness	– BE–12 BE–12 – –
”HI–Beam” does not light (All).	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness	BE–28 BE–28 –
”HI–Beam” does not light (One side).	1. Bulb 2. HEAD LH(UPR) Fuse 3. HEAD RH(UPR) Fuse 4. Daytime Running Light No.3 Relay 5. Wire Harness	– BE–12 BE–12 BE–28 –
”Flash” does not light.	1. Headlight Dimmer Switch 2. Daytime Running Light Main Relay 3. Wire Harness	BE–28 BE–28 –
Headlight does not come on.	1. Headlight Control Relay 2. Daytime Running Light Main Relay 3. Daytime Running Light No.2, 3, 4 Relay 4. Headlight Dimmer Switch 5. Light Control Switch 6. Wire Harness 7. *Headlight (Light Control ECU) 8. Bulb	BE–28 BE–28 BE–28 BE–28 BE–28 – – –
Headlight does not come on with light control switch in HEAD.	1. Light Control Switch 2. *Headlight (Light Control ECU) 3. Wire Harness	BE–28 – –
Headlight does not go out with light control switch in OFF.	1. Headlight Control Relay 2. *Headlight (Light Control ECU) 3. Wire Harness	BE–28 – –
Headlight flickers.	1. Bulb 2. *Headlight (Light Control ECU) 3. Wire Harness	– BE–28 –
Headlight is dark.	1. Bulb 2. *Headlight (Light Control ECU) 3. Wire Harness	– – –

Taillight does not come on with light control switch in TAIL.	1. Taillight Control Relay (Instrument Panel J/B) 2. Light Control Switch 3. Wire Harness	BE–28 – –
Taillight does not go out with light control switch in OFF.	1. Taillight Control Relay 2. Light Control Switch 3. Wire Harness	BE–28 BE–28 –
Headlight does not come on with engine running and light control switch in OFF.	1. ECU–B Fuse 2. GAUGE Fuse 3. Daytime Running Light Main Relay 4. Daytime Running Light No.2, 3, 4 Relay 5. Generator L Terminal 6. Parking Brake Switch 7. Wire Harness	BE–12 BE–12 BE–28 BE–28 CH–1 BE–99 –

*: HID Type

HEADLIGHT BEAM LEVEL CONTROL SYSTEM

HINT:

This system fails, the warning light in the instrument cluster comes on.

Symptom	Suspect Area	See page
Beam axis is not controlled. (It is not initialized.) Headlight Beam Level Control System does not operate.	1. PWR–IG Fuse 2. Headlight Beam Level Control Actuator 3. Headlight Beam Level Control ECU 4. Wire Harness Side	– BE–39 BE–39 –
Beam axis is not controlled. (It is initialized.) Headlight Beam Level Control System does not operate.	1. Headlight Beam Level Control ECU 2. Power Source Circuit 3. Height Control Sensor 4. Suspension ECU 5. Headlight Beam Level Control ECU 6. Wire Harness Side	BE–39 BE–39 BE–39 IN–31 BE–39 –
Controlled angle of head light is nnusual. (The angle is controlled.)	1. Height Control Sensor 2. Suspension ECU 3. Headlights 4. Wire Harness Side	BE–39 IN–31 – –
Beam axis position is not stable during driving.	1. ABS System 2. Headlights 3. Wire Harness Side	– – –

FOG LIGHT SYSTEM

Symptom	Suspect Area	See page
Fog light does not light with light control SW HEAD. (Headlight is normal)	1. FOG Fuse (Instrument Panel J/B) 2. Fog Light Relay 3. Fog Light Switch 4. Wire Harness	– BE–43 BE–43 –
Fog light does not light with light control SW HEAD. (Headlight does not light)	1. Other Parts*1 2. Wire Harness	– –
Only one light does not light.	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. Hazard Warning Switch 2. Turn Signal Flasher 3. Wire Harness	 BE–47 –
The flashing frequency is abnormal.	1. Bulb 2. Turn Signal Switch 3. Wire Harness	– BE–47 –
Hazard warning light does not light up. (Turn signal is normal)	1. HAZARD Fuse (E/G Room J/B) 2. Wire Harness	– –
Either of hazard warning lights does not light up .	1. Hazard Warning Switch 2. Wire Harness	BE–47 –
*1 Turn signal does not light up.	1. Ignition Switch 2. Turn Signal Switch 3. Wire Harness	BE–21 BE–47 –
*2 Turn signal does not light up.	1. TURN Fuse (Instrument Panel J/B) 2. Turn Signal Switch 3. Wire Harness	– BE–47 –
Turn signal does not light up in one direction.	1. Turn Signal Switch 2. Wire Harness	BE–47 –
Only one bulb does not light up.	1. Bulb 2. Wire Harness	– –

*1: Combination Meter, Wiper and Washer do not operate.
*2: Combination Meter, Wiper and Washer are normal.

ILLUMINATION LIGHT SYSTEM

Symptom	Suspect Area	See page
Illumination lights do not light up. (Taillight is normal)	1. PANEL Fuse (Instrument Panel J/B) 2. Wire Harness	– –
Illumination lights do not light up. (Taillight does not light)	1. Taillight Control Relay (Instrument Panel J/B) 2. Other parts* 3. Wire Harness	BE–28 – –
Illumination light with adjustable brightness do not light up.	1. Rheostat Light Control Volume 2. Wire Harness	BE–50 –
Only one light does not light up.	1. Bulb 2. Wire Harness	– –
Brightness does not chang when rheostat volume is trutned. (ALL)	1. Rheostat Light Control Volume 2. Wire Harness	BE–50 –
Brightness does not chang when rheostat volume is trutned. (Only Combination Meter)	1. Combination Meter Assembly 2. Wire Harness	BE–65 –
Glove box does not light up.	1. Glove Box Light Switch 2. Bulb 3. Wire Harness	BE–50 – –

*: Inspect Taillight System.

INTERIOR LIGHT SYSTEM

Symptom	Suspect Area	See page
Only one interior light does not light up.	1. Bulb 2. Wire Harness	– –
Interior lights do not light up (ALL).	1. DOME Fuse (E/G Room J/B) 2. Wire Harness	– –

”Illuminated Entry System” does not operate.	1. Integration Relay (Instrument Panel J/B) 2. Door Courtesy Switch 3. Wire Harness	– BE–53 –
Interior light does not light up.	1. Bulb 2. Interior Light Switch 3. Wire Harness	– BE–53 –
Front personal light does not light up.	1. Bulb 2. Personal Light Switch 3. Wire Harness	– BE–53 –
Vanity light does not light up.	1. Bulb 2. Vanity Light 3. Wire Harness	– BE–53 –
Luggage compartment light does not light up.	1. Bulb 2. Luggage Compartment Door Courtesy Switch 3. Wire Harness	– BE–53 –
Courtesy light does not light up.	1. Bulb 2. Door Courtesy Switch 3. Wire Harness	– BE–53 –

STOP LIGHT SYSTEM

Symptom	Suspect Area	See page
Stop light does not light up.	1. STOP Fuse (Instrument Panel J/B) 2. Stop Light Switch 3. Light Failure Sensor 4. Wire Harness	– BE–58 BE–58 –
Stop light always lights up.	1. Stop Light Switch 2. Wire Harness	BE–58 –
Only one light always lights up.	1. Wire Harness	–
Only one light does not light.	1. Bulb 2. Wire Harness	– –

WIPER AND WASHER SYSTEM

Symptom	Suspect Area	See page
Wiper and washers do not operate.	1. WIPER Fuse (Instrument Panel J/B) 2. Wiper Switch 3. Wire Harness	– BE–61 –
Wipers do not operate in LO or HI.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE–61 BE–61 –
Wipers do not operate in INT.	1. Wiper Switch 2. Wiper Motor 3. Wire Harness	BE–61 BE–61 –
Washer motor does not operate.	1. Washer Switch 2. Washer Motor 3. Wire Harness	BE–61 BE–61 –
Wiper do not operate when washer switch is ON.	1. Washer Motor 2. Wire Harness	BE–61 –
Washer fluid does not operate.	1. Washer Hose and Nozzle	–
●At wiper switch HI position, the wiper blade is in contact with the body. ●When the wiper switch is OFF, the wiper blade does not retract or the retract position is wrong.	1. Wiper Switch* 2. Wire Harness	BE–61 – – – –

*: Inspect wiper arm and blade set position.

DEFOGGER SYSTEM

Symptom	Suspect Area	See page
All defogger systems do not operate.	1. DEFOG Fuse (Instrument Panel J/B) 2. HEATER Fuse (Instrument Panel J/B) 3. Defogger Relay (Instrument Panel J/B) 4. Defogger Switch 5. Wire Harness	– – BE–113 BE–113 –
Rear window defogger does not operate.	1. Defogger Wire 2. Choke Coil 3. Wire Harness	– – –
Mirror defogger does not operate.	1. MIRROR–HEATER Fuse (Instrument Panel J/B) 2. Mirror Defogger 3. Wire Harness	– BE–113 –

POWER WINDOW CONTROL SYSTEM

Symptom	Suspect Area	See page
Power window system abnormal operation.	TROUBLE SHOOTING	BE–21 –

POWER DOOR LOCK CONTROL SYSTEM

Symptom	Suspect Area	See page
”Door lock system” does not operate at all.	1. ECU–IG Fuse (Instrument Panel J/B) 2. DOOR Fuse (Instrument Panel J/B) 3. Integration Relay (Instrument Panel J/B) 4. Wire Harness	– – BE–21 –
Door lock system does not operate by manual switch.	1. Power Window Master Switch 2. Door Lock Control Switch 3. Integration Relay (Instrument Panel J/B) 4. Wire Harness	BE–129 BE–136 BE–21 –
Door lock system does not operate by door key.	1. Door Key Lock and Unlock Switch 2. Integration Relay (Instrument Panel J/B) 3. Wire Harness 4. Door Lock Link Disconnected	BE–136 BE–21 – –
Fault in 2–Operation unlock function of Driver’s side door key lock and unlock switch.	1. Door Key Lock and Unlock Switch 2. Integration Relay (Instrument Panel J/B) 3. Wire Harness	BE–136 BE–21 –
Fault in key confine prevention operate.	1. Integration Relay (Instrument Panel J/B) 2. Key Unlock Warning Switch 3. Door Courtesy Switch 4. Wire Harness	BE–21 BE–21 BE–53 –
Only one door lock does not operation.	1. Door Lock Motor 2. Wire Harness	BE–136 –

SLIDING ROOF SYSTEM

Symptom	Suspect Area	See page
Sliding roof jam protection system does not operate.	1. Sliding Roof Gear Assembly	
*1 Sliding roof system does not operate.	1. Power Main Relay (Instrument Panel J/B) 2. Integration Relay (Instrument Panel J/B) 3. Wire Harness	BE–129 BE–21 –
*2 Sliding roof system does not operate.	1. POWER Fuse (Instrument Panel J/B) 2. Integration Relay (Instrument Panel J/B) 3. Sliding Roof Switch 4. Sliding Roof Control Relay 5. Sliding Roof Gear Assembly 6. Wire Harness	– BE–21 BE–158 BE–158 BE–158 –

Sliding roof system operates abnormally.	1. Sliding Roof Control Relay 2. Limit Switch 3. Sliding Roof Switch	BE–158 BE–158 BE–158
Sliding roof system stops operation half way.	1. Sliding Roof Control Relay 2. Limit Switch 3. Sliding Roof Switch 4. Sliding Roof Gear Assembly (Stones or foreign material trapped in motor assembly)	BE–158 BE–158 BE–158 BE–158 –

*1: Door Lock does not operate.
*2: Door Lock is normal.

POWER SEAT CONTROL SYSTEM

Symptom	Suspect Area	See page
Power seat does not operate. (Power door lock system does not operate)	1. Wire Harness 2. POWER Fuse (Instrument Panel J/B)	– –
Power seat does not operate. (Power door lock system is normal)	1. Wire Harness 2. Power Seat Switch (D,P)	– BE–160
Driver's seat does not operate.	1. Power seat Switch (D) 2. Wire Harness	BE–160 –
Passenger's seat does not operate.	1. Power Seat Switch (P) 2. Wire Harness	BE–160 –
"Slide operation" does not operate.	1. Power Seat Switch (D,P) 2. Wire Harness 3. Slide Motor (D,P)	BE–160 – BE–160
"Front vertical operation" does not operate.	1. Power Seat Switch (D,P) 2. Wire Harness 3. Front Vertical Motor (D,P)	BE–160 – BE–160
"Rear Vertical operation" does not operate.	1. Power Seat Switch (D,P) 2. Wire Harness 3. Rear Vertical Motor (D,P)	BE–160 – BE–160
"Reclining operation" does not operate.	1. Power Seat Switch (D,P) 2. Wire Harness 3. Reclining Motor (D,P)	BE–160 – BE–160

(D): Driver's Seat
(P): Passenger's Seat

POWER MIRROR CONTROL SYSTEM (w/o Driving position memory)

Symptom	Suspect Area	See page
Mirror does not operate.	1. CIG Fuse (Instrument Panel J/B) 2. Mirror Switch 3. Mirror Motor 4. Wire Harness	– BE–165 BE–165 –
Mirror operates abnormally.	1. Mirror Switch 2. Mirror Motor 3. Wire Harness	BE–165 BE–165 –

POWER MIRROR CONTROL SYSTEM (w/ Driving position memory)

Symptom	Suspect Area	See page
Both right and left mirrors do not operate.	1. RAD–NO.2 Fuse 2. Mirror Switch 3. Remote control mirror ECU 4. ECU–B Fuse 5. Wire Harness	BE–12 BE–165 BE–165 BE–12 –
Only one side of mirror does not operate.	1. Mirror Motor 2. Wire Harness 3. Remote control mirror ECU	BE–165 – BE–165
The mirror does not return to the memorized position.	1. Mirror Position Sensor (Position is not set) 2. Wire Harness 3. Remote control mirror ECU	BE–165 – BE–165
The memorized position is moved.	1. Mirror Position Sensor (Position is not set) 2. Wire Harness	BE–165 –

ELECTRO CHROMIC MIRROR SYSTEM

Symptom	Suspect Area	See page
Electro Chromic Inner Mirror does not operate.	1. ECU–IG Fuse 2. Electro Chromic Inner Mirror 3. Wire Harness	BE–12 BE–172 –
Electro Chromic Outer Mirror does not operate.	1. ECU–IG Fuse 2. Electro Chromic Outer Mirror 3. Electro Chromic Inner Mirror 4. Wire Harness	BE–12 BE–172 BE–172 –

SEAT HEATER SYSTEM

Symptom	Suspect Area	See page
Seat heaters do not operate. (Driver's and Passenger's)	1. SEAT–HEATER Fuse (Instrument Panel J/B) 2. Wire Harness	– –
Driver's seat heater does not operate.	1. Seat Heater Switch (Driver's) 2. Seat Heater (Driver's) 3. Wire Harness	BE–175 BE–175 –
Passenger's seat heater does not operate.	1. Seat Heater Switch (Passenger's) 2. Seat Heater (Passenger's) 3. Wire Harness	BE–175 BE–175 –
Seat heater temperature is too high.	1. Seat Heater	BE–175

FUEL LID OPENER SYSTEM

Symptom	Suspect Area	See page
Fuel lid opener system does not operate.	1. DOOR Fuse (Instrument Panel J/B) 2. Fuel Lid Opener Switch 3. Fuel Lid Opener Solenoid 4. Wire Harness	– BE–178 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–219 – –
LED does not light up. (Even though either switch is pressed.)	1. Garage Door Opener Switch 2. Wire Harness	BE–219 –
LED does not light up. (Only one switch is pressed.)	1. Garage Door Opener Switch	BE–219

* 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.

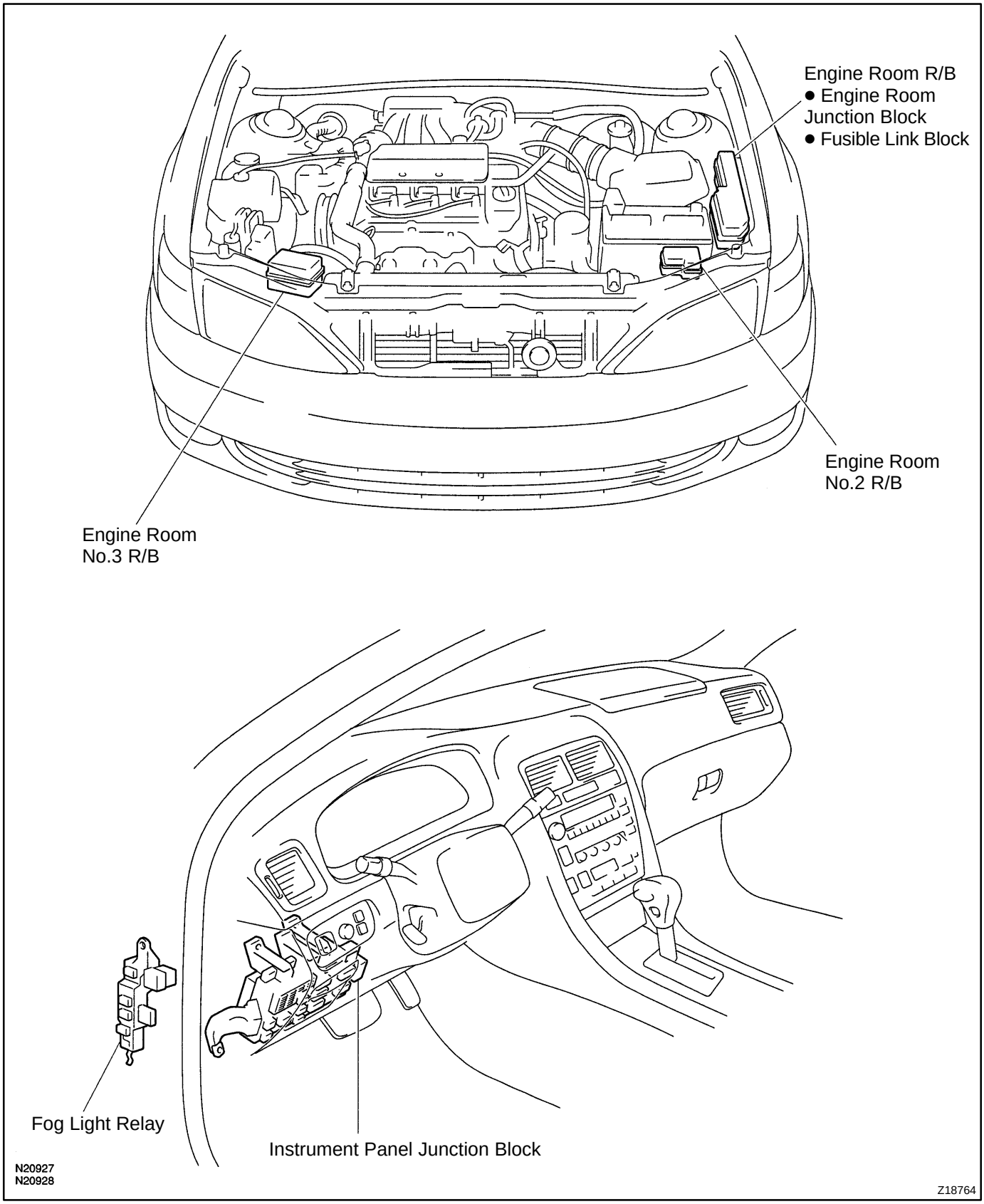
HORN SYSTEM

Symptom	Suspect Area	See page
Horn system does not operate.	1. HORN Fuse (E/G Room J/B) 2. Horn Relay (E/G Room J/B) 3. Horn Switch 4. Horn 5. Wire Harness	– BE–233 BE–233 BE–233 –
Horn blows all the time.	1. Horn Relay (E/G Room J/B) 2. Horn Switch 3. Wire Harness	BE–233 BE–233 –
One horn operates but the other horn does not operate.	1. Horn 2. Wire Harness	BE–233 –
Horns operate abnormally.	1. Horn Relay (E/G Room J/B) 2. Horn 3. Wire Harness	BE–233 BE–233 –

POWER SOURCE

LOCATION

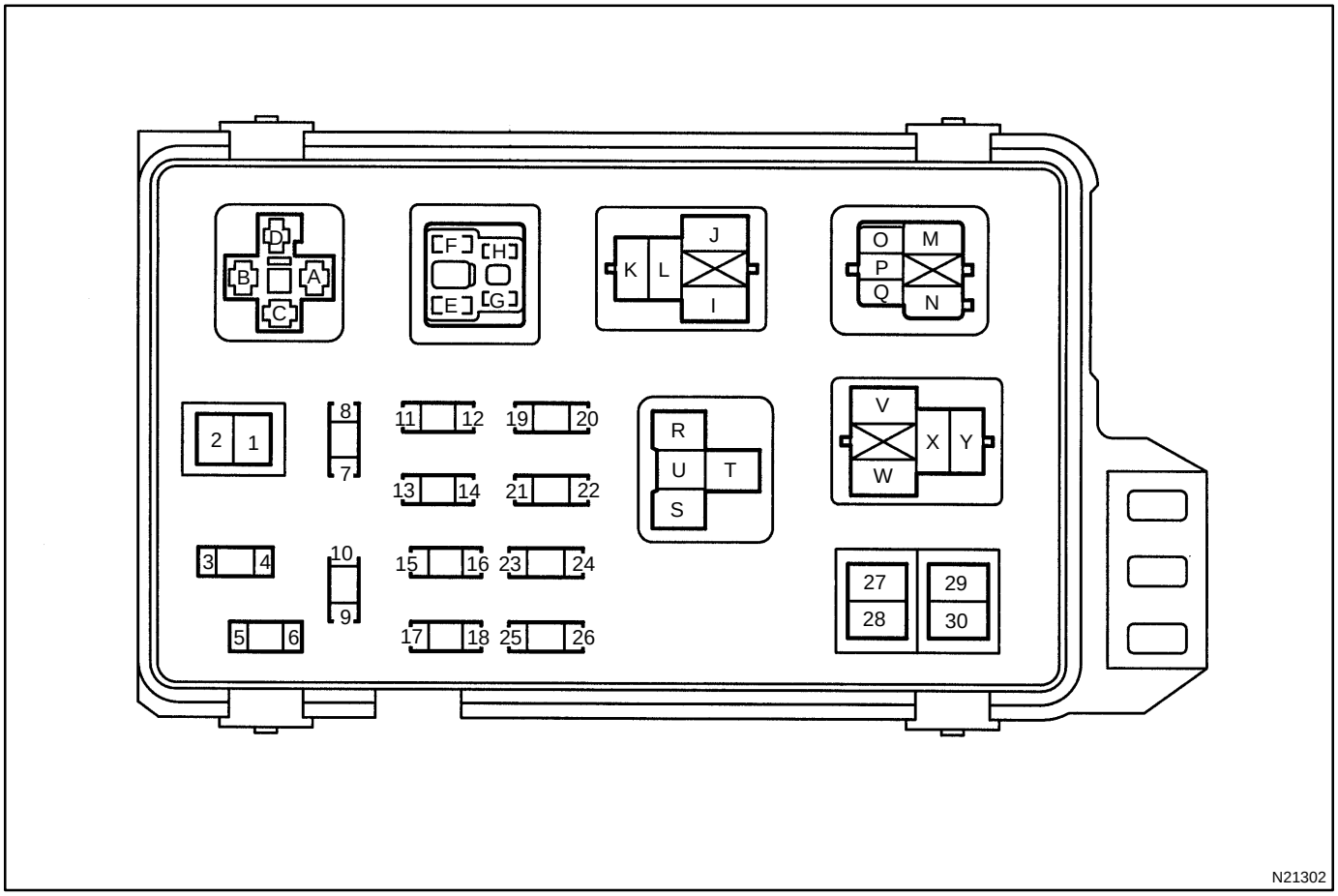
BE04R–02



BE04S–03

INSPECTION

1. INSPECT ENGINE ROOM JUNCTION BLOCK CIRCUIT



(a) Remove the fuse from the junction block and inspect the connector on junction block side.

Fuse	Tester connection	Condition	Specified condition
MAIN	1 – Ground	Constant	Battery positive voltage
DOME	4 – Ground	Constant	Battery positive voltage
ECU–B	6 – Ground	Constant	Battery positive voltage
RADIO No.1	7 – Ground	Ignition switch turned to ACC or ON	Battery positive voltage
SHORT PIN	9 – Ground	Constant	Battery positive voltage
HAZARD	11 – Ground	Constant	Battery positive voltage
AM2	13 – Ground	Constant	Battery positive voltage
TEL	15 – Ground	Constant	Battery positive voltage
HEAD (LH)	17 – Ground	Constant	Battery positive voltage
ALT–S	19 – Ground	Constant	Battery positive voltage
HEAD (RH)	21 – Ground	Constant	Battery positive voltage
EFI	23 – Ground	Constant	Battery positive voltage
HORN	25 – Ground	Constant	Battery positive voltage
RDI	28 – Ground	Constant	Battery positive voltage
CDS	30 – Ground	Constant	Battery positive voltage

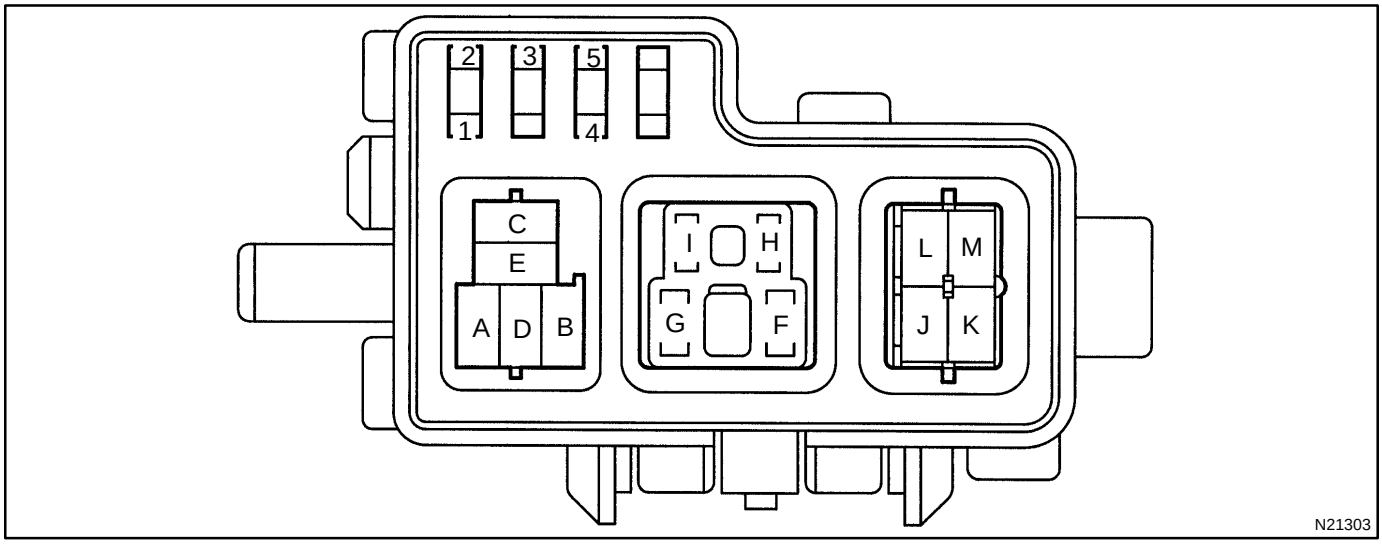
If the circuit is not as specified, inspect the circuits connected to other parts.

(b) Remove the relay from the junction block and inspect the connector on junction block side.

Relay	Tester connection	Condition	Specified condition
ST	C – Ground	Constant	Battery positive voltage
HEAD	E – Ground	Constant	Battery positive voltage
HEAD	H – Ground	Constant	Battery positive voltage
EFI	J – Ground	Constant	Continuity
ENGINE MAIN	M – Ground	Constant	Battery positive voltage
ENGINE MAIN	Q – Ground	Ignition switch turned to ON	Battery positive voltage
FAN No.1	U – Ground	Constant	Battery positive voltage
HORN	V – Ground	Constant	Battery positive voltage
HORN	Y – Ground	Constant	Battery positive voltage

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

2. INSPECT ENGINE ROOM No.2 RELAY BLOCK CIRCUIT



(a) Remove the fuse from the relay block and inspect the connector on relay block side.

Fuse	Tester connection	Condition	Specified condition
H – LP RH (LO)	2 – Ground	Constant	Battery positive voltage
H – LP LH (LO)	3 – Ground	Constant	Battery positive voltage
DRL No.2	5 – Ground	Constant	Battery positive voltage

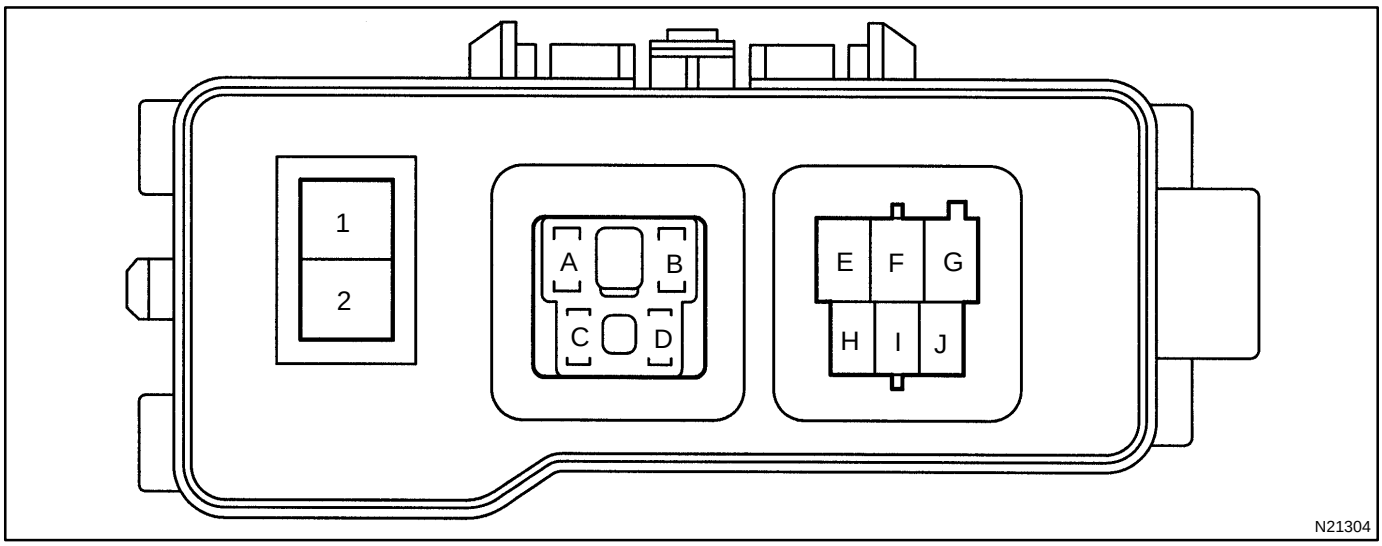
If the circuit is not as specified, inspect the circuits connected to other parts.

(b) Remove the relay from the relay block and inspect the connector on relay block side.

Relay	Tester connection	Condition	Specified condition
DRL No.3	D – Ground	Constant	Continuity
DRL No.3	A – Ground	Constant	Battery positive voltage
DRL No.3	E – Ground	Constant	Battery positive voltage
DRL No.4	H – Ground	Constant	Battery positive voltage
DRL No.4	I – Ground	Constant	Battery positive voltage
DIM	J – Ground	Constant	Battery positive voltage

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

3. INSPECT ENGINE ROOM No.3 RELAY BLOCK CIRCUIT



(a) Remove the fuse from the relay block and inspect the connector on relay block side.

Fuse	Tester connection	Condition	Specified condition
ABS	2 – Ground	Constant	Battery positive voltage

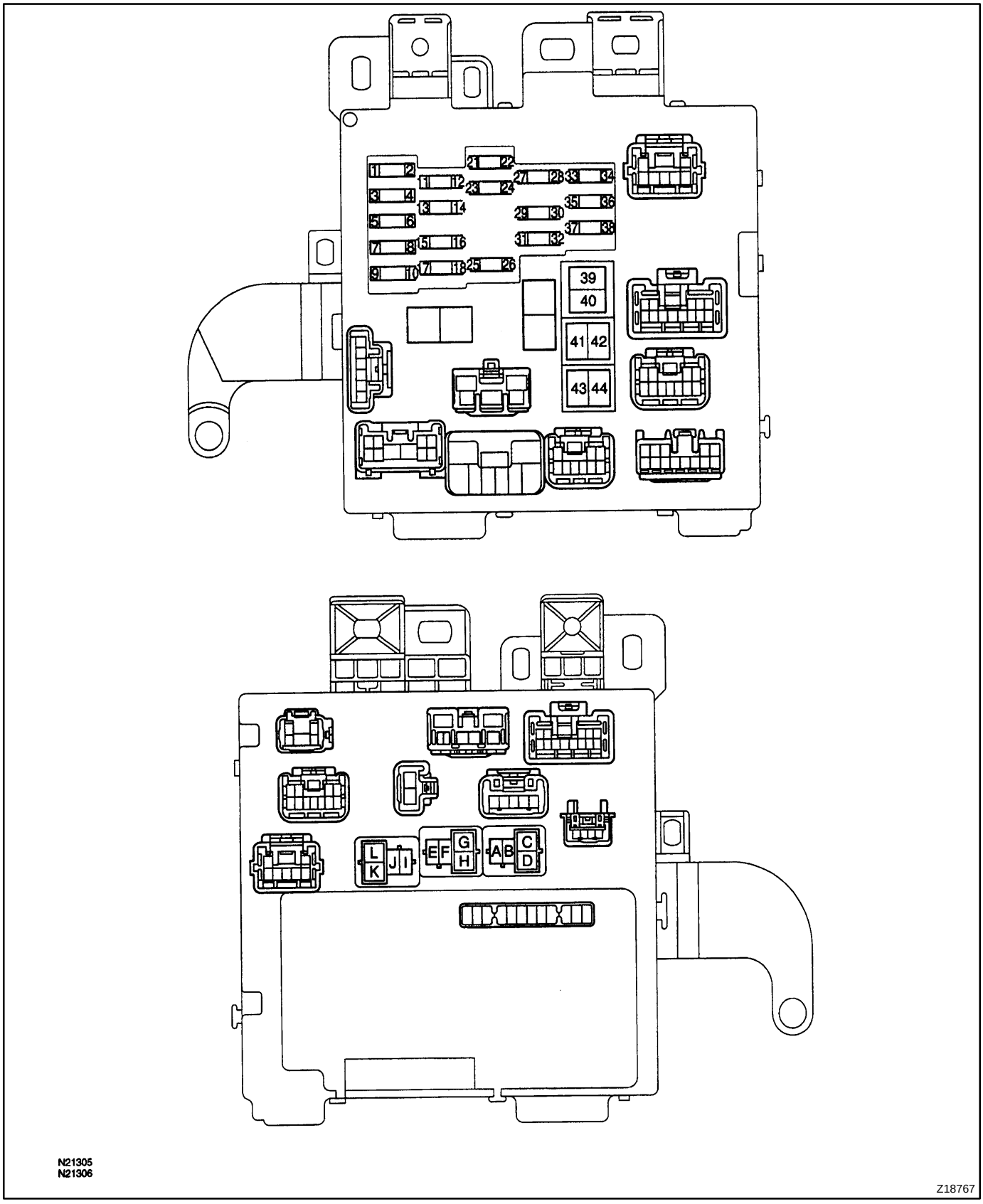
If the circuit is not as specified, inspect the circuits connected to other parts.

(b) Remove the relay from the relay block and inspect the connector on relay block side.

Relay	Tester connection	Condition	Specified condition
ABS SOL	F – Ground	Constant	Continuity
ABS SOL	E – Ground	Constant	Battery positive voltage
ABS MTR	G – Ground	Constant	Battery positive voltage

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

4. INSPECT INSTRUMENT PANEL JUNCTION BLOCK CIRCUIT



(a) Remove the fuse from the instrument panel junction block and inspect the connector on instrument panel junction block side.

Fuse	Tester connection	Condition	Specified condition
S – HTR	2 – Ground	Ignition switch turned to ON	Battery positive voltage
HEATER	3 – Ground	Ignition switch turned to ON	Battery positive voltage
GAUGE	6 – Ground	Ignition switch turned to ON	Battery positive voltage
WIPER	7 – Ground	Ignition switch turned to ON	Battery positive voltage
M – HTR	10 – Ground	Ignition switch turned to ON	Battery positive voltage
ECU – IG	11 – Ground	Ignition switch turned to ON	Battery positive voltage
IGN	14 – Ground	Ignition switch turned to ON	Battery positive voltage
STOP	16 – Ground	Constant	Battery positive voltage
TAIL	18 – Ground	Light control switch turned to TAIL or HEAD and Engine running	Battery positive voltage
PWR	22 – Ground	Ignition switch turned to ON	Battery positive voltage
OBD – 2	24 – Ground	Constant	Battery positive voltage
FOG	26 – Ground	Constant	Battery positive voltage
ST	28 – Ground	Constant	Battery positive voltage
DOOR	29 – Ground	Constant	Battery positive voltage
PANEL	31 – Ground	Constant	Battery positive voltage
TURN	33 – Ground	Ignition switch turned to ON	Battery positive voltage
RAD/2	35 – Ground	Ignition switch turned to ACC or ON	Battery positive voltage
CIG	38 – Ground	Ignition switch turned to ACC or ON	Battery positive voltage
DEF	39 – Ground	Constant	Battery positive voltage
POWER	41 – Ground	Constant	Battery positive voltage
AM1	44 – Ground	Constant	Battery positive voltage

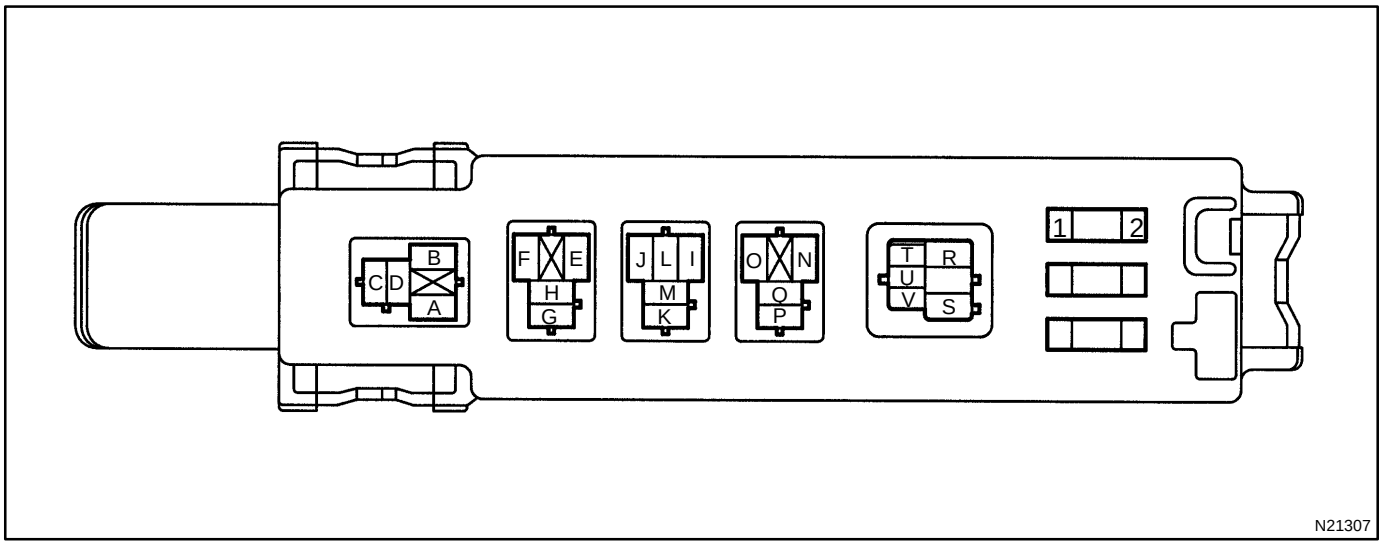
If the circuit is not as specified, inspect the circuits connected to other parts.

(b) Remove the relay from the junction block and inspect inspect the connector on junction block side.

Relay	Tester connection	Condition	Specified condition
Taillight	B – Ground	Constant	Battery positive voltage
Taillight	D – Ground	Constant	Battery positive voltage
Defogger	F – Ground	Constant	Battery positive voltage
Defogger	G – Ground	Defogger switch ON	Battery positive voltage
Power Main	J – Ground	Constant	Battery positive voltage
Power Main	K – Ground	Constant	Continuity

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

5. INSPECT INSIDE ENGINE ROOM JUNCTION BLOCK CIRCUIT



(a) Remove the fuse from the instrument panel junction block and inspect the connector on instrument panel junction block side.

Fuse	Tester connection	Condition	Specified condition
A/F–HTR	2–Ground	Ignition switch turned to ON	Battery positive voltage

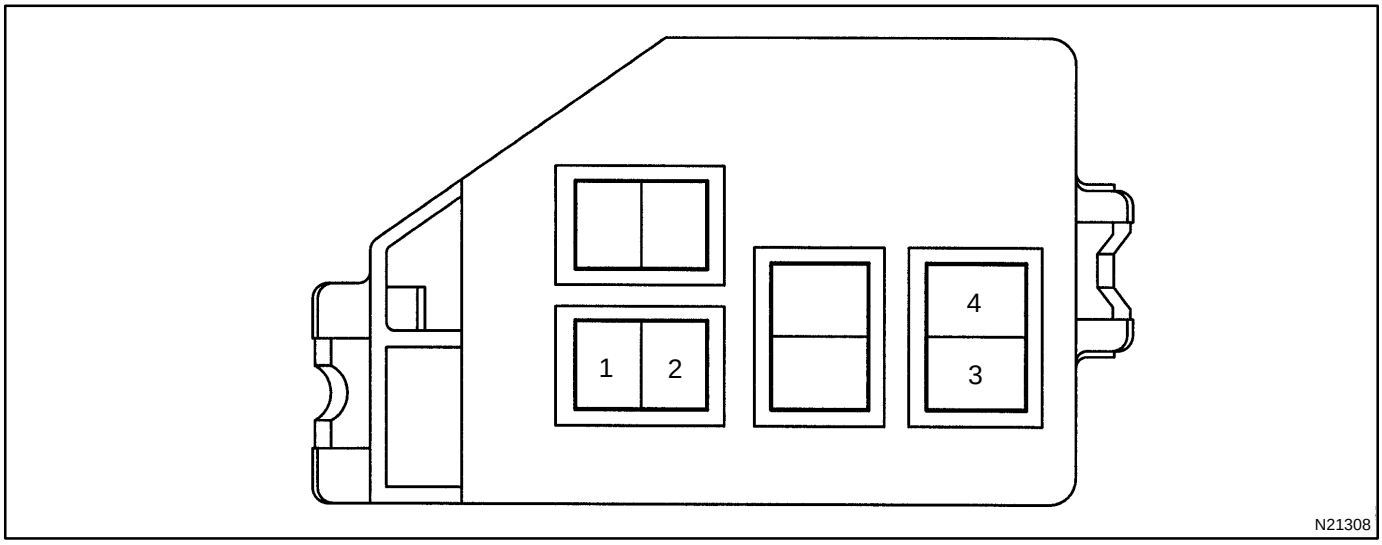
If the circuit is not specified, inspect the circuits connected to other parts.

(b) Remove the relay from the relay block and inspect the connector on relay block side.

Relay	Tester connection	Condition	Specified condition
MG/CLT	C – Ground	Constant	Continuity
MG/CLT	D – Ground	Ignition switch turned to ON	Battery positive voltage
C/OPN	G – Ground	Constant	Continuity
FAN No.2	L – Ground	Constant	Continuity
FAN No.2	J – Ground	Ignition switch turned to ON	Battery positive voltage
FAN No.2	K – Ground	Constant	Battery positive voltage
FAN No.3	P – Ground	Constant	Battery positive voltage
HEATER	U – Ground	Constant	Continuity
HEATER	R – Ground	Ignition switch turned to ON	Battery positive voltage
HEATER	V – Ground	Constant	Battery positive voltage

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

6. INSPECT FUSIBLE LINK BLOCK CIRCUIT



Remove the fuse from the junction block and inspect the connector on junction block side.

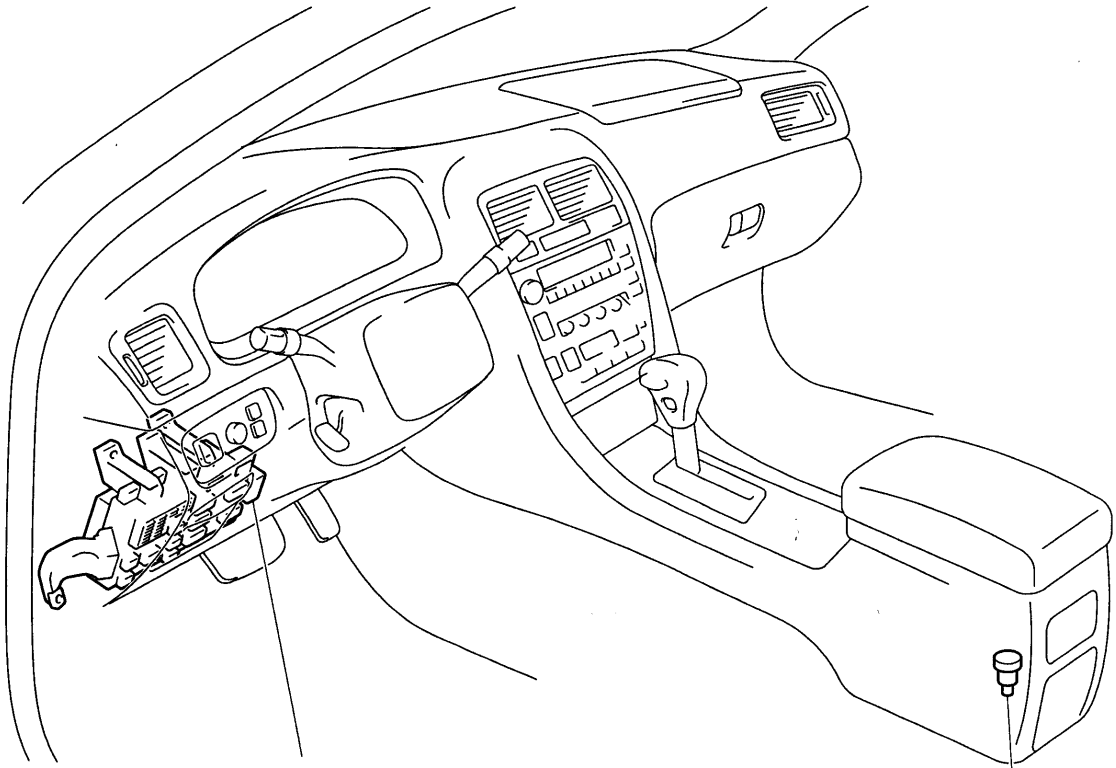
Fuse	Tester connection	Condition	Specified condition
HTR	1 – Ground	Ignition switch turned to ON	Battery positive voltage
ALT	4 – Ground	Constant	Battery positive voltage

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

POWER OUTLET

LOCATION

BE04T–02



Instrument Panel Junction Block
● POWER OUTLET Fuse

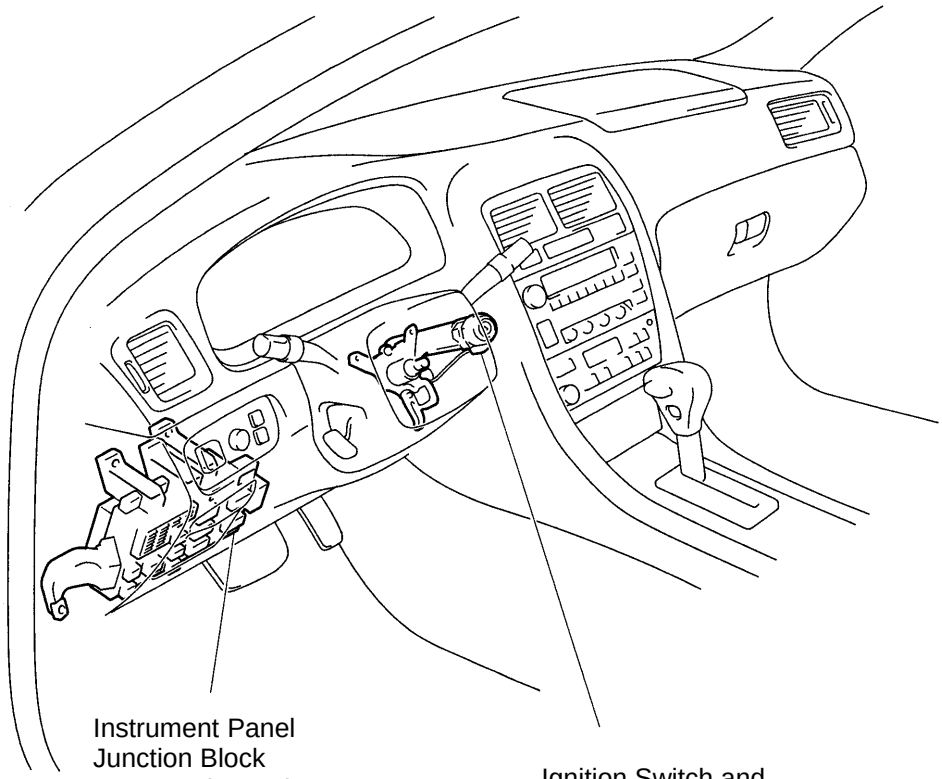
Power Outlet

N21557

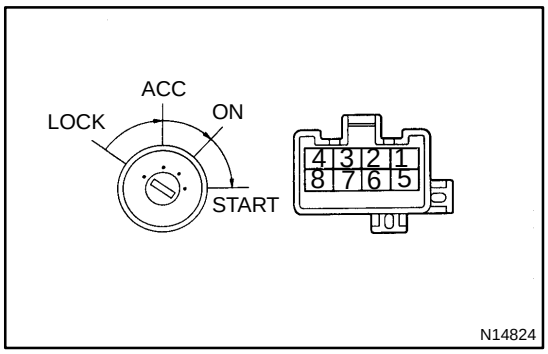
IGNITION SWITCH AND KEY UNLOCK WARNING SWITCH

BE04U–02

LOCATION



BE04V–02

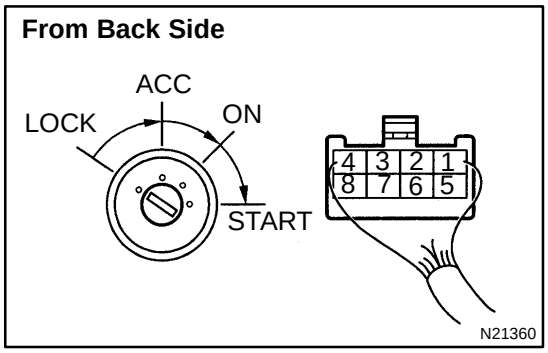


INSPECTION

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.

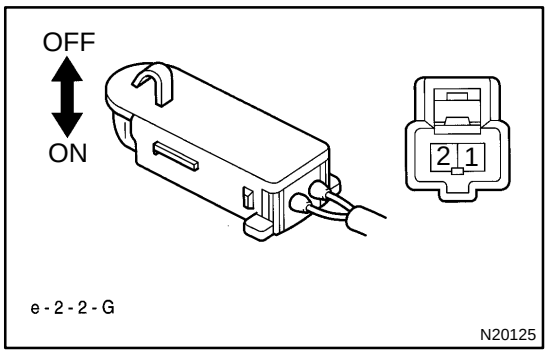


2. INSPECT IGNITION SWITCH CIRCUIT

Connect the switch connector and inspect the connector on the wire harness side from the back side.

Tester connection	Condition	Specified condition
1– Ground	Ignition switch START	Battery positive voltage
2 – Ground	Constant	Battery positive voltage
3 – Ground	Ignition switch ACC or ON	Battery positive voltage
4 – Ground	Ignition switch ON	Battery positive voltage
6 – Ground	Ignition switch ON	Battery positive voltage
7 – Ground	Constant	Battery positive voltage
8– Ground	Ignition switch START	Battery positive voltage

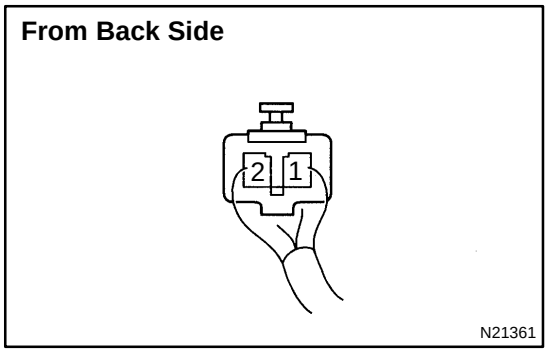
If circuit is not as specified, inspect the switch and circuits connected to other parts.



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.

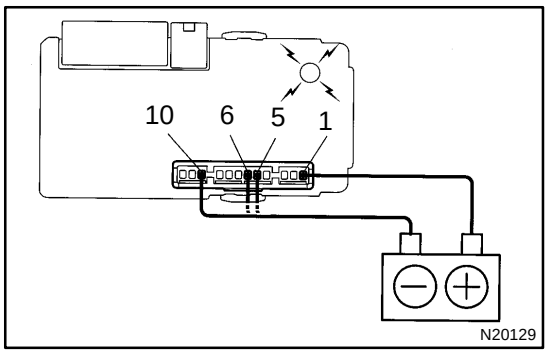


4. INSPECT KEY UNLOCK WARNING SWITCH CIRCUIT

Connect the switch connector and inspect the connector on the wire harness side from the back side.

Tester connection	Condition	Specified condition
2– Ground	Ignition key removed	No continuity
2– Ground	Ignition key set	Continuity
1– Ground	Constant	Continuity

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

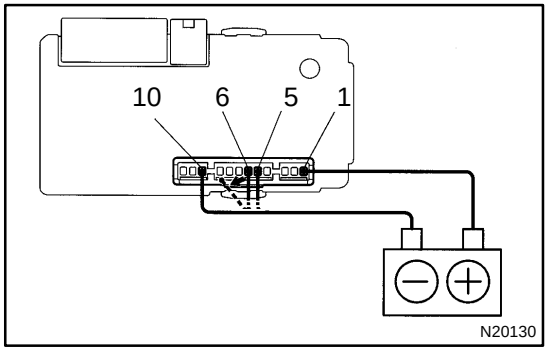


5. Key Unlock Warning System: INSPECT INTEGRATION RELAY OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1.

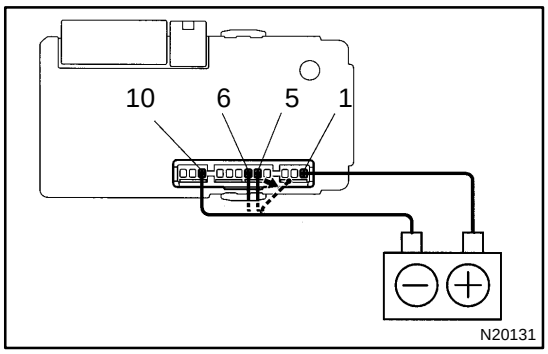
(b) Connect the negative (–) lead from the battery to terminals 5, 6 and 10.

(c) Check the buzzer sounds.



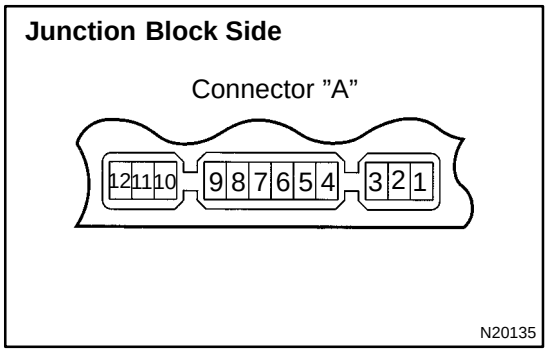
(d) Disconnect the negative (–) lead from the battery to terminal 6.

(e) Check that the buzzer stops sounding.



(f) Connect the negative (–) lead from the battery to terminal 6.
(g) Disconnect the negative (–) lead from the battery to terminal 5.
(h) Check that the buzzer stops sounding.

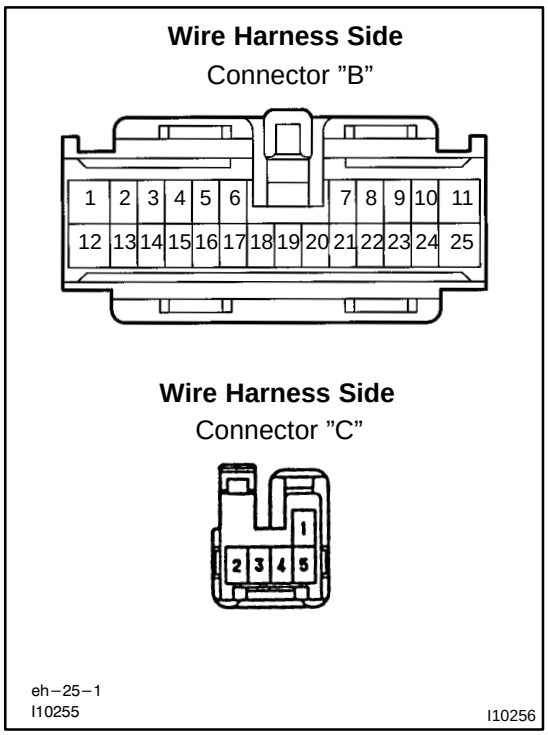
If operation is not as specified, replace the relay.



6. INSPECT INTEGRATION RELAY CIRCUIT

(a) Remove the relay from the junction block No.1 and inspect the connector on the junction block side.

Tester connection	Condition	Specified condition
A4 – Ground	Door courtesy switches except that of the driver's door OFF (Door closed)	No continuity
A4 – Ground	One of the door courtesy switches except that of the driver's door ON (Door opened)	Continuity
A5 – Ground	Key unlock warning switch OFF	No continuity
A5 – Ground	Key unlock warning switch ON	Continuity
A6 – Ground	Driver's door courtesy switch OFF (Door closed)	No continuity
A6 – Ground	Driver's door courtesy switch ON (Door opened)	Continuity
A8 – Ground	Buckle switch OFF (Seat belt unfastened)	No continuity
A8 – Ground	Buckle switch ON (Seat belt fastened)	Continuity
A10 – Ground	Constant	Continuity
A1 – Ground	Constant	Battery positive voltage
A2 – Ground	Constant	Battery positive voltage
A7 – Ground A9 – Ground	Ignition switch LOCK or ACC	No voltage
A7 – Ground A9 – Ground	Ignition switch ON	Battery positive voltage
A11 – Ground	Ignition switch LOCK	No voltage
A11 – Ground	Ignition switch ACC or ON	Battery positive voltage



(b) Disconnect the connector from the integration relay and inspect the connectors on the wire harness side.

Tester connection	Condition	Specified condition
C1, C3, C4 – Ground	Constant	Continuity
B3 – Ground	Constant	Continuity
B5 – Ground	Driver's door unlock detection switch OFF (Door closed)	No continuity
B5 – Ground	Driver's door unlock detection switch ON (Door opened)	Continuity
B6 – Ground	Passenger's door courtesy switch OFF (Door closed)	No continuity
B6 – Ground	Passenger's door courtesy switch ON (Door opened)	Continuity
B7 – Ground	Passenger's door unlock detection switch OFF (Door closed)	No continuity
B7 – Ground	Passenger's door unlock detection switch ON (Door opened)	Continuity
B9 – Ground	Rear door unlock detection switch OFF (Door closed)	No continuity
B9 – Ground	Rear door unlock detection switch ON (Door opened)	Continuity
B11 – B12 B12 – B25	Constant	Continuity
B13 – Ground	Light control switch AUTO	No Continuity
B13 – Ground	Light control switch OFF or TAIL or HEAD	Continuity
B14 – Ground	Light control switch OFF	No continuity
	Light control switch HI or Flash	Continuity
B15 – Ground	Luggage compartment door courtesy switch OFF (Door close)	No continuity
	Luggage compartment door courtesy switch ON (Door opened)	Continuity

B16 – Ground	Door lock manual switch OFF or UNLOCK	No continuity
B16 – Ground	Door lock manual switch LOCK	Continuity
B17 – Ground	Door lock manual switch OFF or LOCK	No continuity
B17 – Ground	Door lock manual switch UNLOCK	Continuity
B18 – Ground	Driver's and passenger's door key lock and unlock switch OFF or UNLOCK	No continuity
B18 – Ground	Driver's or passenger's door key lock and unlock switch LOCK	Continuity
B19 – Ground	Driver's door key lock and unlock switch OFF or LOCK	No continuity
B19 – Ground	Driver's door key lock and unlock switch UNLOCK	Continuity
B20 – Ground	Passenger's door key lock and unlock switch OFF or LOCK	No continuity
B20 – Ground	Passenger's door key lock and unlock switch UNLOCK	Continuity
B22 – Ground	Parking brake switch OFF	No continuity
	Parking brake switch ON	Continuity
B24 – Ground	Brake fluid level warning switch OFF (float up)	No continuity
	Brake fluid level warning switch ON (float down)	Continuity
B1 – Ground	Constant	Battery positive voltage
C2 – Ground	Light control switch OFF	No continuity
C2 – Ground	Light control switch TAIL or HEAD	Continuity
C5 – Ground	Light control switch OFF or TAIL	Continuity
C5 – Ground	Light control switch HEAD	Continuity
B8 – Ground	Engine running	Battery positive voltage

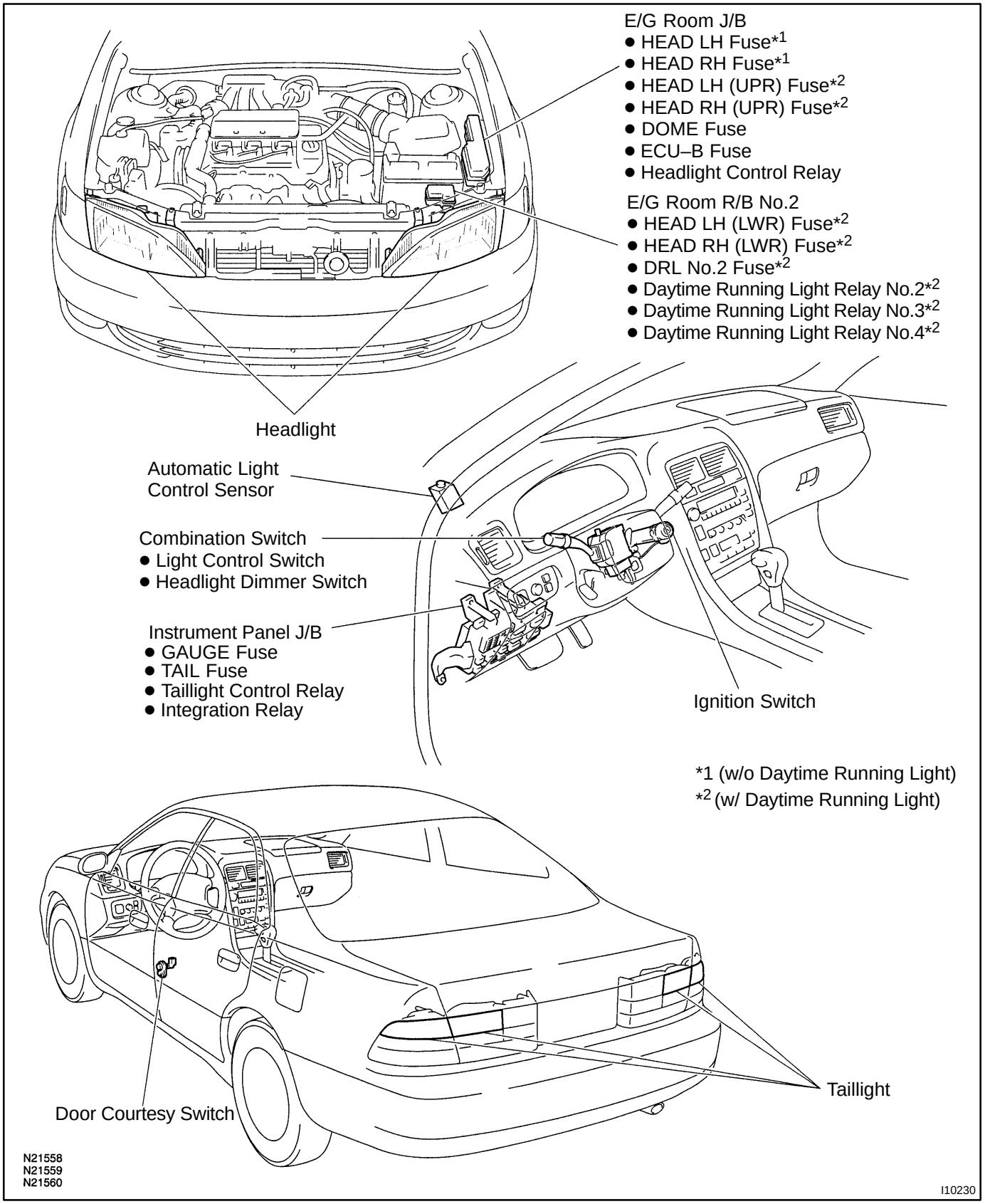
If the circuit is as specified, try replacing the relay with a new one.

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

HEADLIGHT AND TAILLIGHT SYSTEM

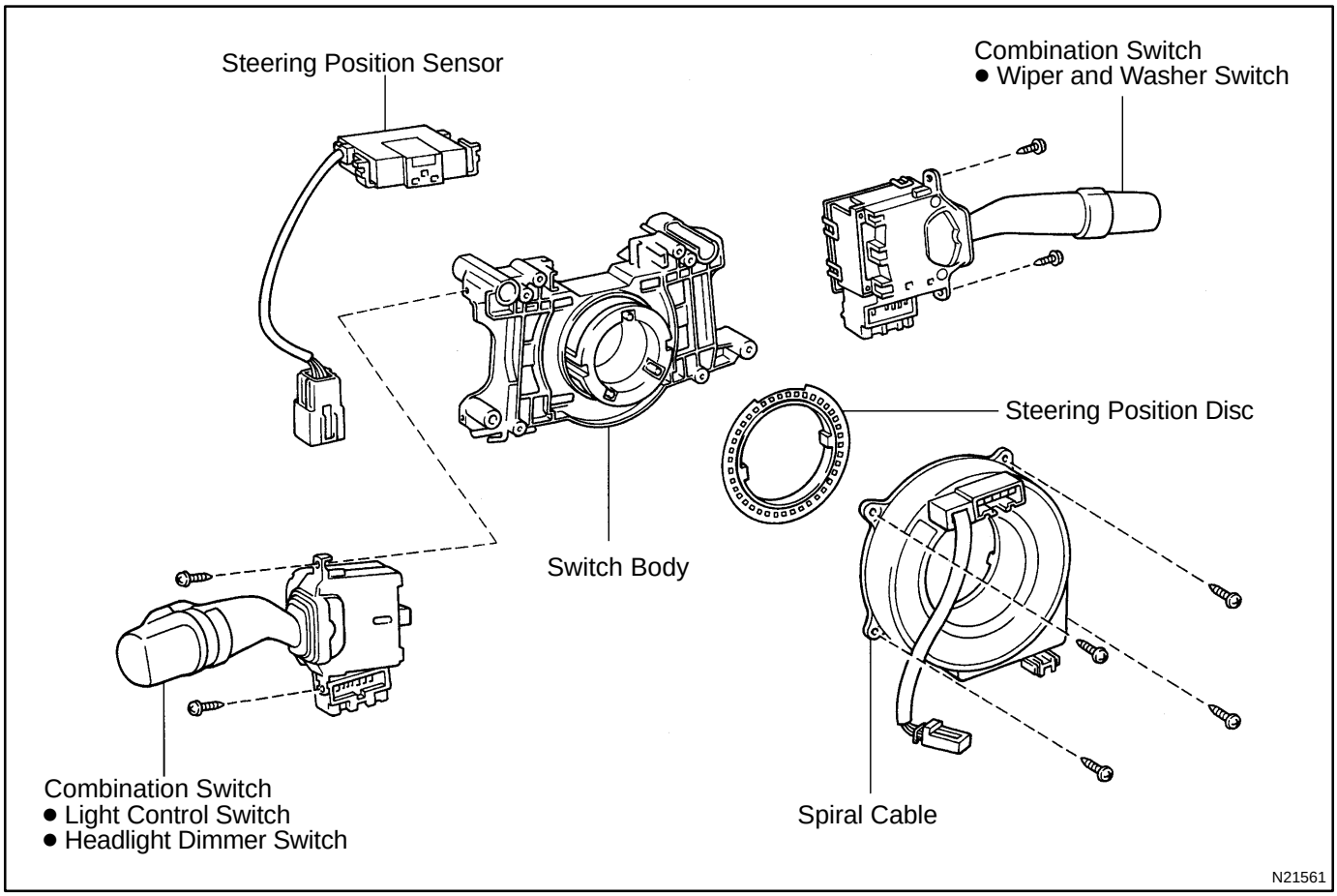
BE04W–10

LOCATION



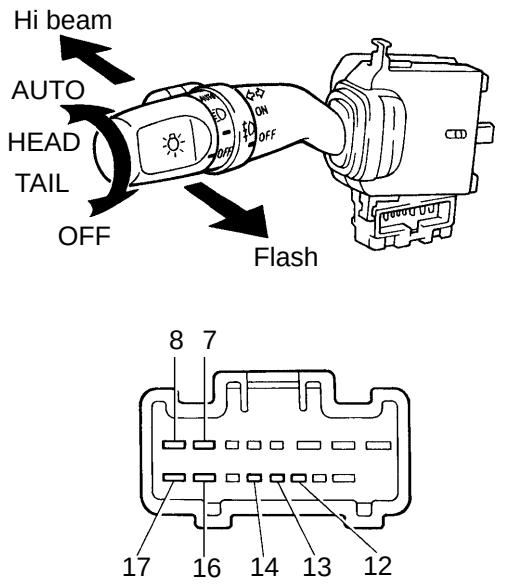
BE04X–05

COMPONENTS



BE10G–03

INSPECTION



1. INSPECT LIGHT CONTROL SWITCH CONTINUITY

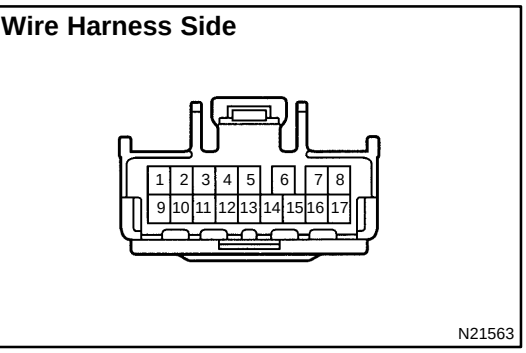
Switch position	Tester connection	Specified condition
OFF	–	No continuity
TAIL	14 – 16	Continuity
HEAD	13 – 14 – 16	Continuity
AUTO	12 – 16	Continuity

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 COMBINATION SWITCH CIRCUIT

Connect the wire harness side connector to the combination switch and inspect wire harness side connector from the back side.

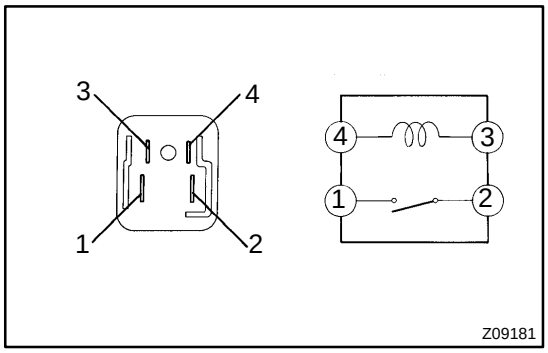
Light Control Switch:

Tester connection	Condition	Specified condition
16 – Ground	Constant	Continuity
12 – Ground	Light control switch OFF, TAIL or HEAD	No voltage
12 – Ground	Light control switch AUTO	Battery positive voltage
13 – Ground	Light control switch OFF or TAIL	No voltage
13 – Ground	Light control switch HEAD	Battery positive voltage
14 – Ground	Light control switch OFF	No voltage
14 – Ground	Light control switch TAIL or HEAD	Battery positive voltage

Headlight Dimmer Switch:

Tester connection	Condition	Specified condition
7 – Ground	Headlight dimmer switch Low Beam	No voltage
7 – Ground	Headlight dimmer switch High Beam or Flash	Battery positive voltage
8 – Ground	Headlight dimmer switch Low Beam or High Beam	No voltage
8 – Ground	Headlight dimmer switch Flash	Battery positive voltage
17– Ground	Headlight dimmer switch High Beam or Flash	No voltage
17– Ground	Headlight dimmer switch Low Beam	Battery positive voltage

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

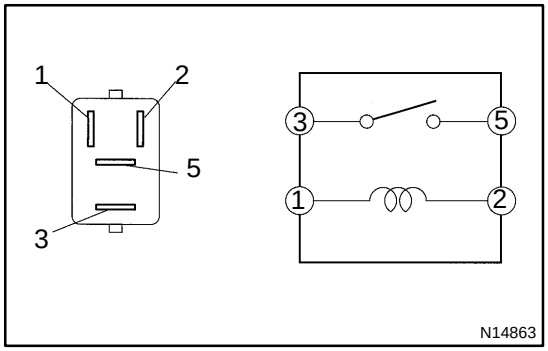


4. INSPECT HEADLIGHT CONTROL RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

5. INSPECT HEADLIGHT CONTROL RELAY CIRCUIT (See page BE–12)



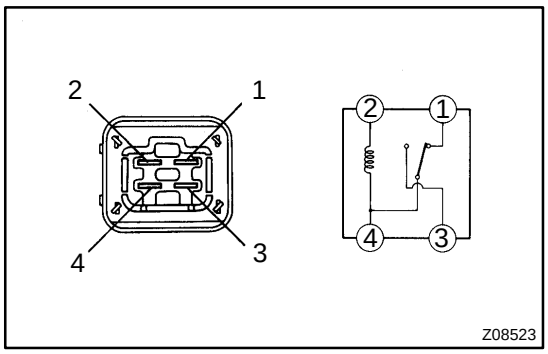
6. INSPECT TAILLIGHT CONTROL RELAY CONTINUITY

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.

7. INSPECT TAILLIGHT CONTROL RELAY CIRCUIT (See page BE–28)

8. INSPECT DAYTIME RUNNING LIGHT RELAY CIRCUIT (See Integration relay circuit on page BE–21)

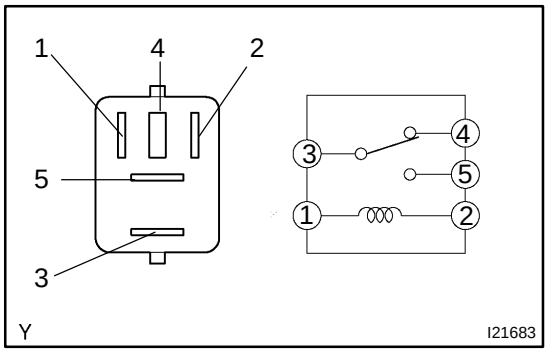


9. INSPECT DAYTIME RUNNING LIGHT NO.2 CONTINUITY

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

If continuity is not as specified, replace the relay.

10. INSPECT DAYTIME RUNNING LIGHT NO.2 CIRCUIT (See page BE–12)

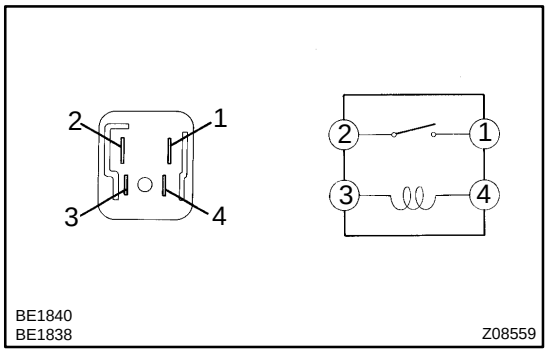


11. INSPECT DAYTIME RUNNING LIGHT NO.3 CONTINUITY

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.

12. INSPECT DAYTIME RUNNING LIGHT NO.3 RELAY CIRCUIT (See page BE–12)



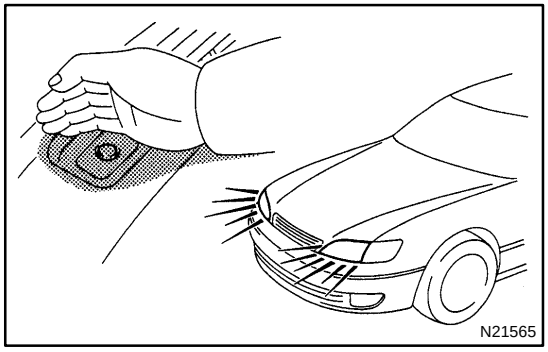
13. INSPECT DAYTIME RUNNING LIGHT NO.4 RELAY CONTINUITY

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

If continuity is not as specified, replace the relay.

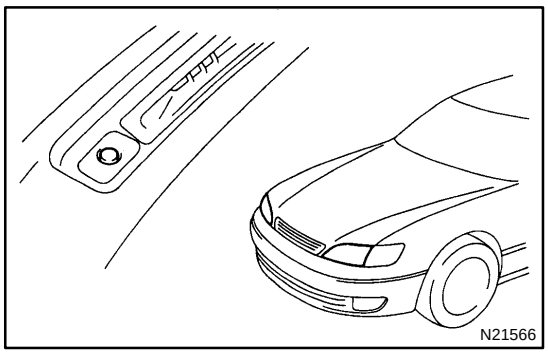
14. INSPECT DAYTIME RUNNING LIGHT NO.4 RELAY CIRCUIT (See page BE–12)

15. INSPECT LIGHT AUTO TURN OFF SYSTEM (See Integration relay circuit on page BE–21)



16. Auto ON:
INSPECT AUTOMATIC LIGHT CONTROL

(a) Turn the ignition switch ON.
(b) Turn the light control switch to AUTO.
(c) Gradually cover the top of the sensor.
(d) Verify that the accessory lights and the headlights turn ON.



17. Auto OFF:
INSPECT AUTOMATIC LIGHT CONTROL

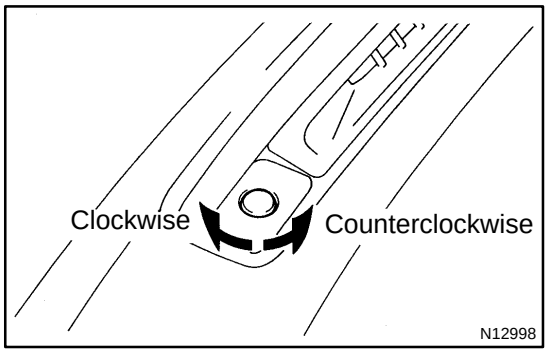
(a) Gradually expose the sensor.
(b) Verify that the headlights and the accessory lights turn OFF.

18. INSPECT LIGHT–OFF CONDITION

(a) Turn the ignition switch ON.
(b) Lights auto ON:
Gradually cover the top of the sensor.
(c) Verify that the lights will go out when light control switch position is OFF or the area surrounding the sensor gets bright or open the driver's door while the ignition switch is OFF.

19. INSPECT LIGHTS–ON CONDITION

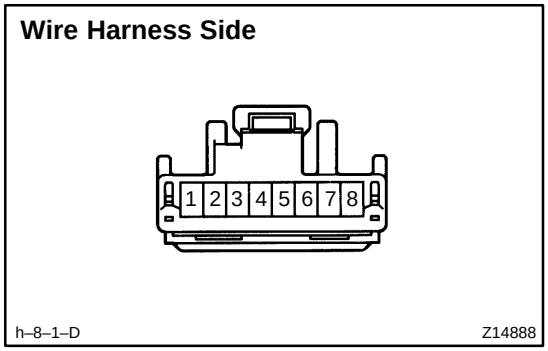
(a) Open the driver's door while the ignition switch is OFF.
(b) Turn the light control switch to AUTO leaving the door open and cover the top of the sensor, and verify that the lights go on when the ignition switch is turned ON.



20. ADJUST AUTOMATIC LIGHT CONTROL SENSOR

(a) Adjustment of the light control is performed by turning the sensitivity knob on the sensor.
(b) This will determine at what light condition the automatic control will take place.

If response is too quick, turn the knob counterclockwise.
If response is too slow, turn the knob clockwise.



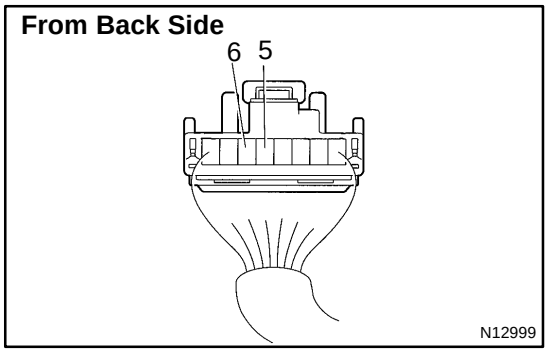
21. Connector disconnected:
INSPECT SENSOR CIRCUIT

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

Tester connection	Condition	Specified condition
6 – Ground	Constant	Continuity
5 – Ground	Ignition switch LOCK or ACC	No voltage
5 – Ground	Ignition switch ON	Battery positive voltage
4 – Ground	Ignition switch LOCK or ACC	No voltage
4 – Ground	Ignition switch ON	5.2 – 9.0 V
6 – Ground	Light control switch AUTO	Continuity

If circuit is as specified, perform the inspection on the following page.

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



22. Connector connected:
INSPECT SENSOR CIRCUIT

Connect the wire harness side connector to the sensor and inspect wire harness side connector from the back side.
HINT:

- Ignition switch ON.
- Light control switch AUTO.
- Vehicle's surroundings are bright.

Tester connection	Condition	Specified condition
6 – Ground	Constant	Continuity
5 – Ground	Ignition switch LOCK or ACC	No voltage
5 – Ground	Ignition switch ON	9.5 V or more
Vehicle is under the direct sun light. (Sensor is not covered)		Taillight and Headlight are ON.

If circuit is as specified, try replacing the sensor with a new one.
If the circuit is not as specified, inspect the circuit connected to other parts.

BE1BF–02

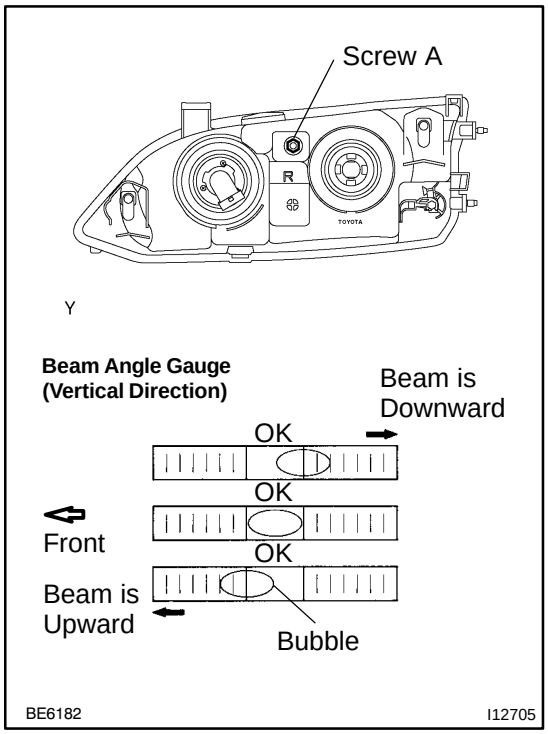
ADJUSTMENT

1. Halogen type:

ADJUST HEADLIGHT AIM

(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) Adjust the headlight aim in vertical direction.

If the bubble is outside the acceptable range of the beam angle gauge, adjust it using adjusting screw A.

2. Halogen type:

ADJUST HEADLIGHT AIM (Reference)

HINT:

Adjusting method for the headlight aiming by not using beam angle gauges is shown below.

(a) Inspect the headlight aim.

(1) 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.

(2) Prepare a thick white paper.

(3) Stand the paper perpendicular to the ground at the position 9.84 ft away from the headlights.

(4) Ensure that the center line of the vehicle and the paper face forms a 90–degree angle as shown in the illustration.

(5) Draw a horizontal line (H line) on the paper, showing where the headlights should strike.

(6) Draw a vertical line (V line) to where the center line of the vehicle is to be.

(7) Draw 2 vertical lines to where the both headlights should strike (V RH and V LH lines).

(8) 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.

(9) Take appropriate measures to prevent influence of other lights.

NOTICE:

Disconnect connectors of the other lights so that the aiming adjustment will not be affected.

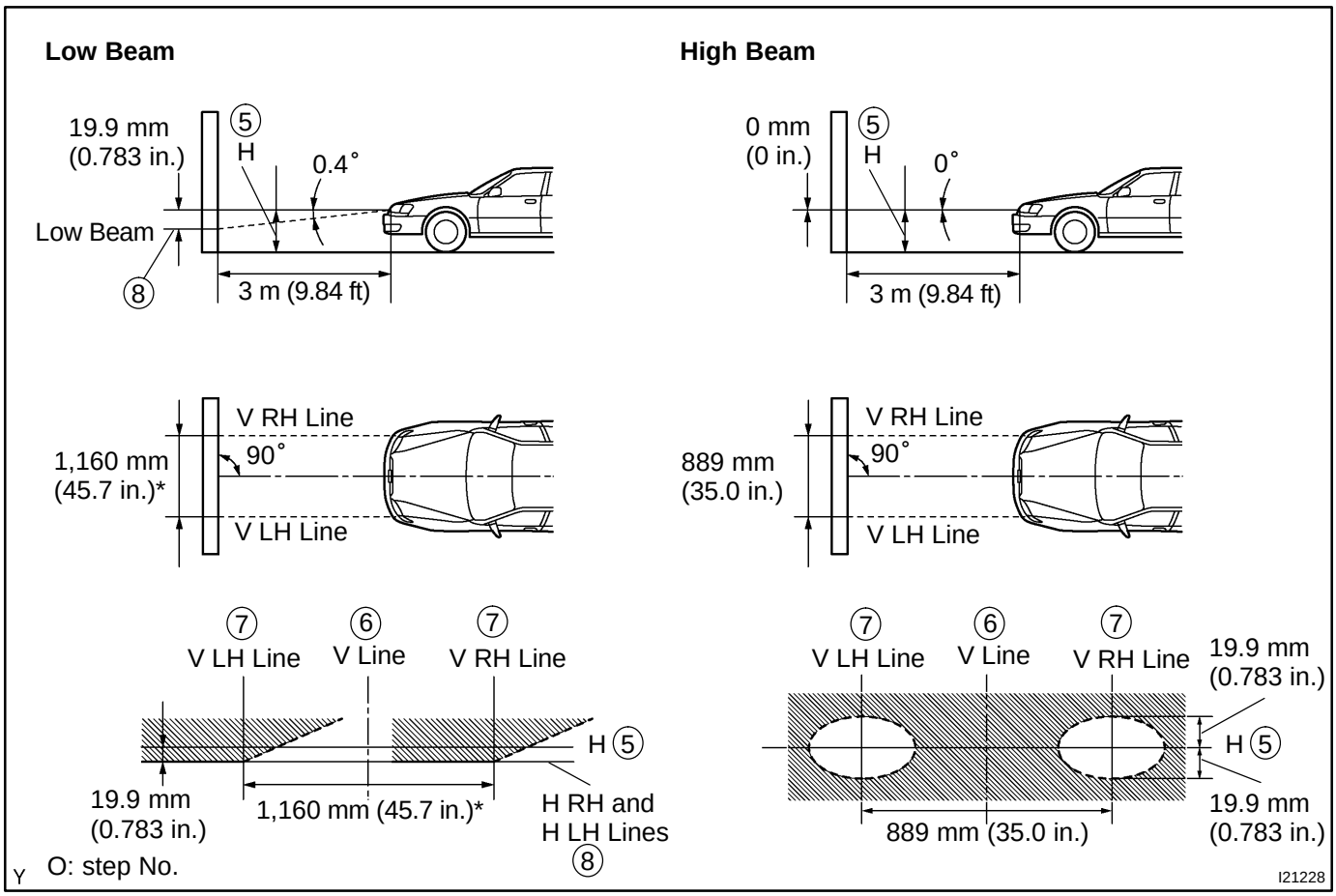
When connecting the connectors again, take care not to make the aiming out of adjustment.

(10) Start the engine.

(11) Turn the headlights ON.

(12) Check that the headlights properly strike the position shown in the illustration.

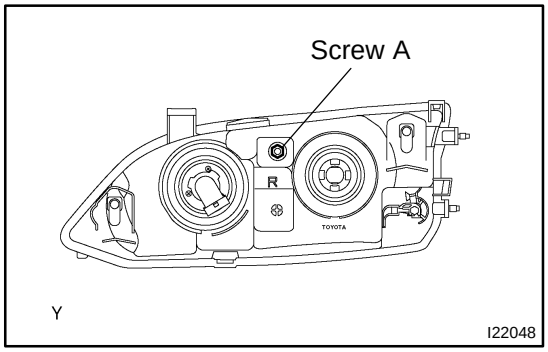
(13) If not, adjust the lights in the vertical direction.



HINT:

- As shown in the illustration, adjust each aim of the RH and LH lights.
- The "High Beam" values in the illustration are reference values. The "*" marked values in the illustration are reference values.

(b) When adjusting it in the vertical direction:
Using adjusting screw A, adjust the headlight aim to within the specified range.



3. HID type:

ADJUST HEADLIGHT AIM

(a) Inspect the headlight aim.

(1) 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.

(2) Prepare a thick white paper.

(3) Stand the paper perpendicular to the ground at the position 9.84 ft away from the headlights.

(4) Ensure that the center line of the vehicle and the paper face forms a 90–degree angle as shown in the illustration.

(5) Draw a horizontal line (H line) on the paper, showing where the headlights should strike.

(6) Draw a vertical line (V line) to where the center line of the vehicle is to be.

(7) Draw 2 vertical lines to where the both headlights should strike (V RH and V LH lines).

(8) 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.

(9) Take appropriate measures to prevent influence of other lights.

NOTICE:

Disconnect connectors of the other lights so that the aiming adjustment will not be affected.

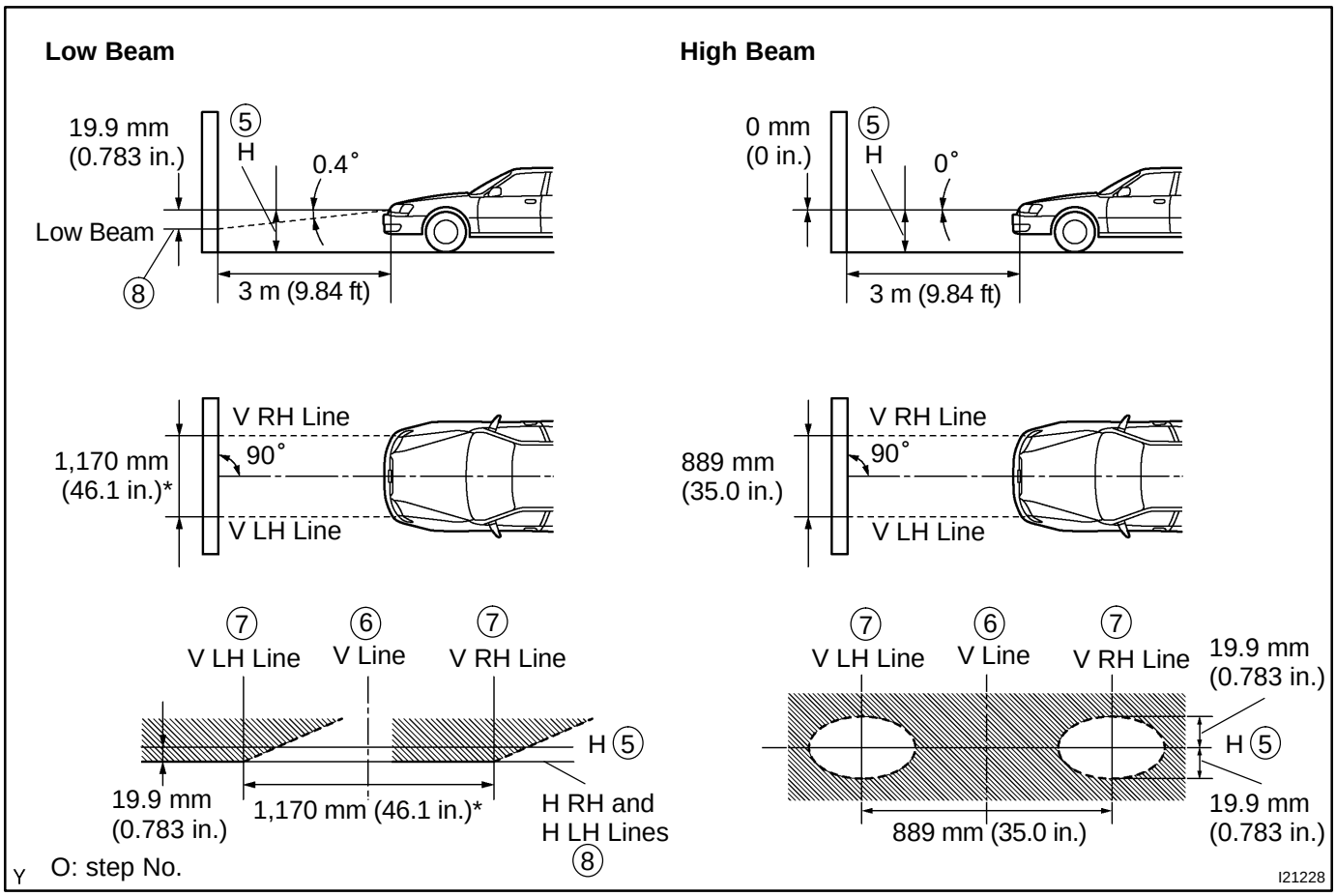
When connecting the connectors again, take care not to make the aiming out of adjustment.

(10) Start the engine.

(11) Turn the headlights ON.

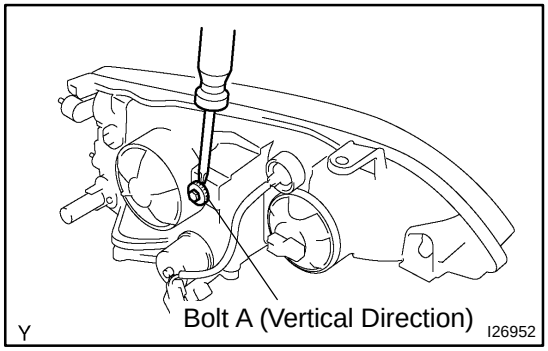
(12) Check that the headlights properly strike the position shown in the illustration.

(13) If not, adjust the lights in the vertical direction.



HINT:

- As shown in the illustration, adjust each aim of the RH and LH lights.
- The "High Beam" values in the illustration are reference values. The "*" marked values in the illustration are reference values.

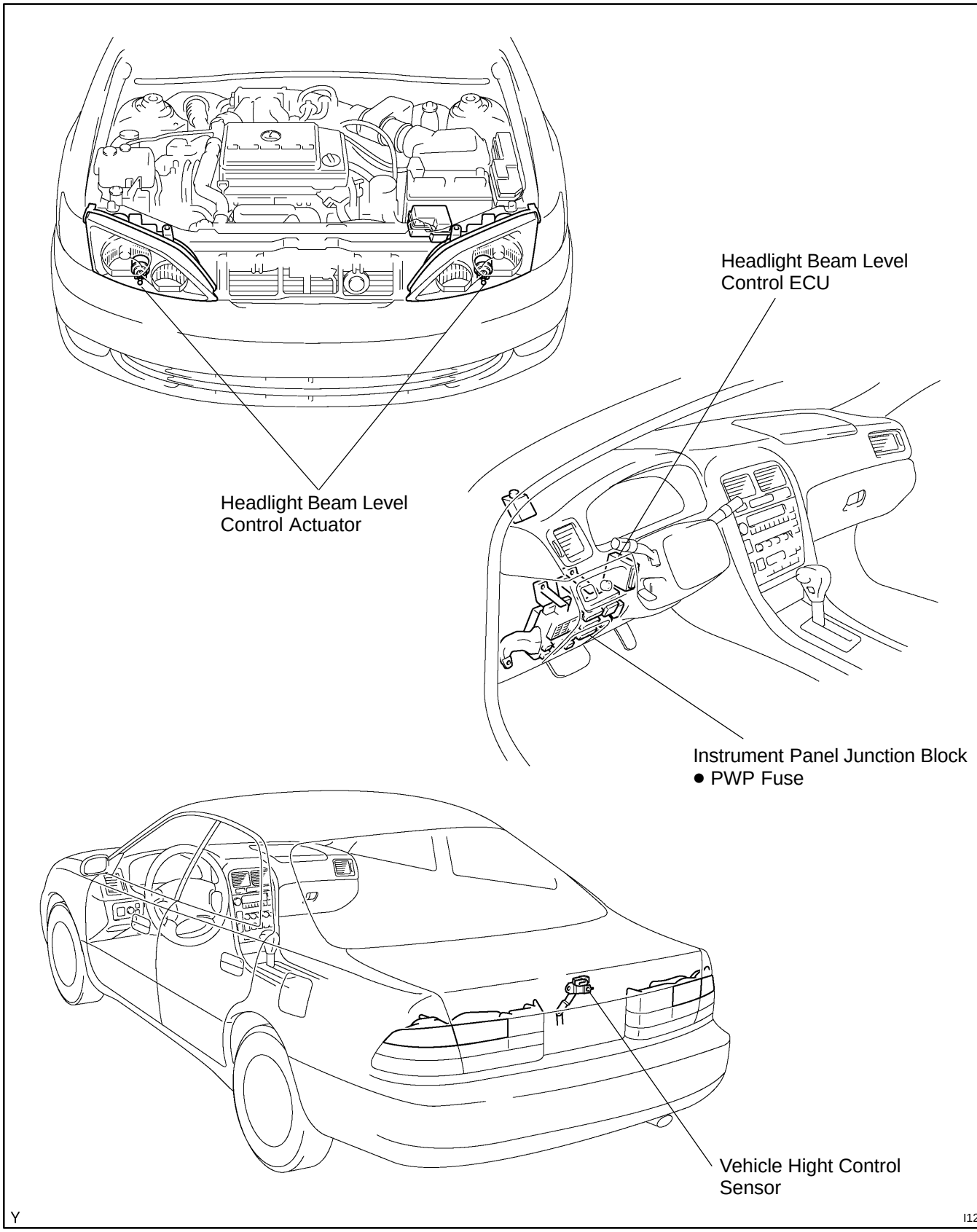


(b) When adjusting it in the vertical direction:
Using adjusting bolt A, adjust the headlight aim to within the specified range.

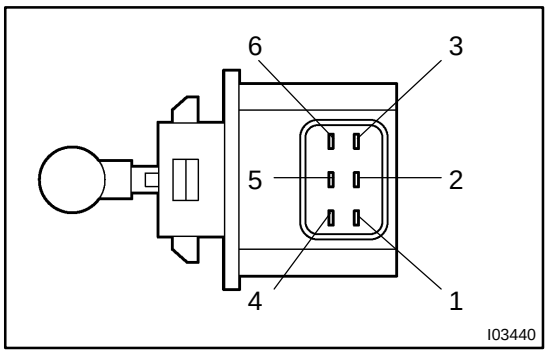
HEADLIGHT BEAM LEVEL CONTROL SYSTEM (HID Type)

BE1BI–01

LOCATION



BE1BJ–01



INSPECTION

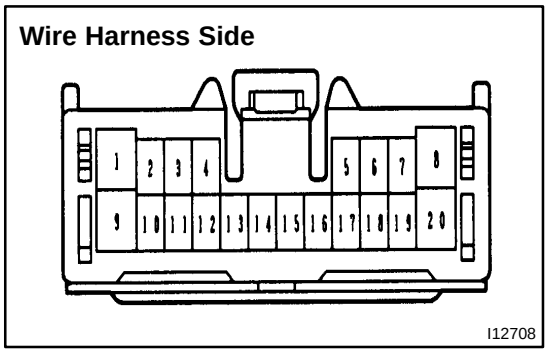
1. INSPECT HEADLIGHT BEAM LEVEL CONTROL ACTUATOR RESISTANCE

(a) Check that continuity exists between terminals 2 and 5.

(b) Check that resistance exists between terminals, as shown in the chart.

Terminal	Resistance (Ω)
2 – 1	26 – 30
2 – 3	26 – 30
2 – 4	26 – 30
2 – 6	26 – 30
5 – 1	26 – 30
5 – 3	26 – 30
5 – 4	26 – 30
5 – 6	26 – 30

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

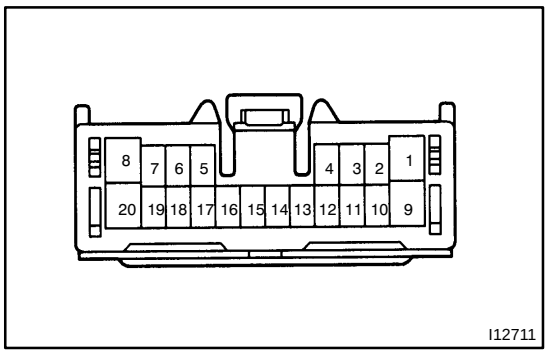


2. INSPECT HEADLIGHT BEAM LEVEL CONTROL ECU CIRCUIT

(a) Disconnect the connector from the ECU and inspect the connector on the wire harness side, as shown.

Tester connection	Condition	Specified condition
IG(1) – RH4(2)	Ignition switch OFF	26 – 30 Ω
IG(1) – LH4(3)	Ignition switch OFF	26 – 30 Ω
IG(1) – RH2(4)	Ignition switch OFF	26 – 30 Ω
IG(1) – LH3(5)	Ignition switch OFF	26 – 30 Ω
IG(1) – LH2(13)	Ignition switch OFF	26 – 30 Ω
IG(1) – RH1(14)	Ignition switch OFF	26 – 30 Ω
IG(1) – LH1(15)	Ignition switch OFF	26 – 30 Ω
IG(1) – RH3(16)	Ignition switch OFF	26 – 30 Ω
HDLP(9) – E1(20)	Ignition switch ON and light control switch HEAD	Below 1.5 V
SHR(6) – SGR(8)	Ignition switch OFF	3.5 – 6.5 kΩ
SBR(7) – SGR(8)	Ignition switch OFF	3.5 – 6.5 kΩ
E1(20) – Body ground	Constant	Continuity

If circuit is not as specified, perform the inspection on the following pages.



(b) Connect the connector from the ECU and inspect the connector, as shown in the table.

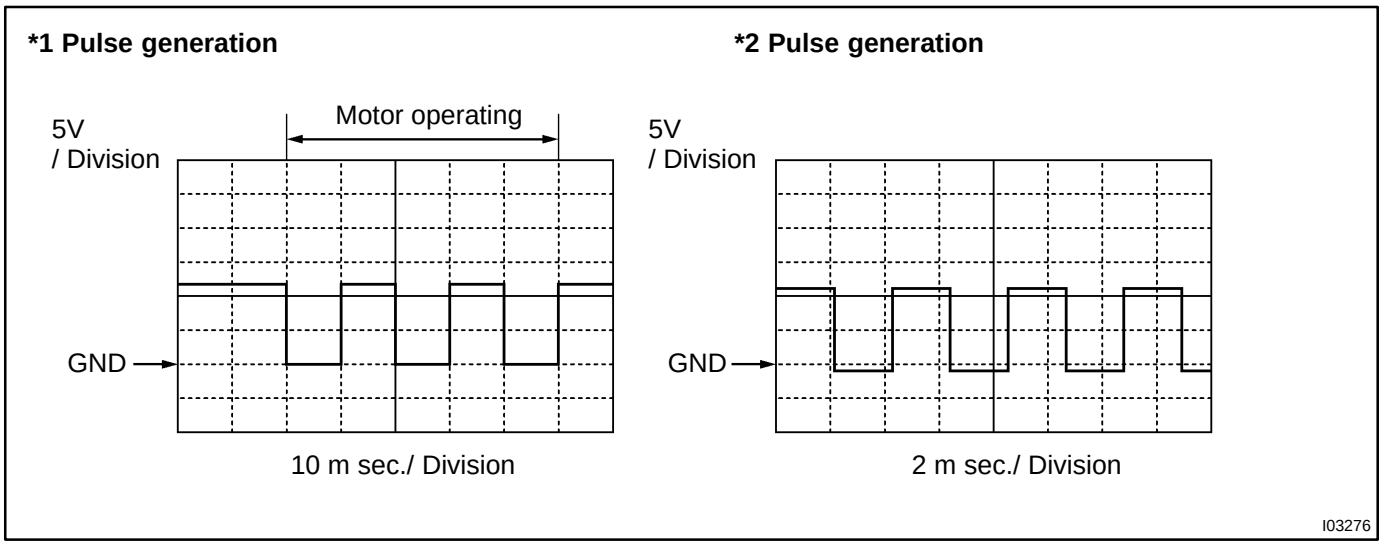
Tester connection	Condition	Specified condition
IG(1) – E1(20)	Ignition switch ON	Battery positive voltage
RH4(2) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
LH4(3) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
RH2(4) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
LH3(5) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
SHR(6) – E1(20)	Ignition switch ON	Approx. 2.5 V
SBR(7) – SGR(8)	Ignition switch ON	5 V
SGR(8) – E1(20)	Ignition switch OFF	Continuity
HDLP(9) – E1(20)	Ignition switch ON and light control switch HEAD	Below 1.5 V
LH2(13) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
RH1(14) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
LH1(15) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
RH3(16) – E1(20)	Ignition switch ON, when keep and bounce the vehicle	*1 Pulse generation
WNG(18) – E1(20)	Ignition switch ON	No continuity
SPDR(19) – E1(20)	Vehicle driving at about 30 km (18 mph)	*2 Pulse generation
E1(20) – Body ground	Ignition switch OFF	Continuity

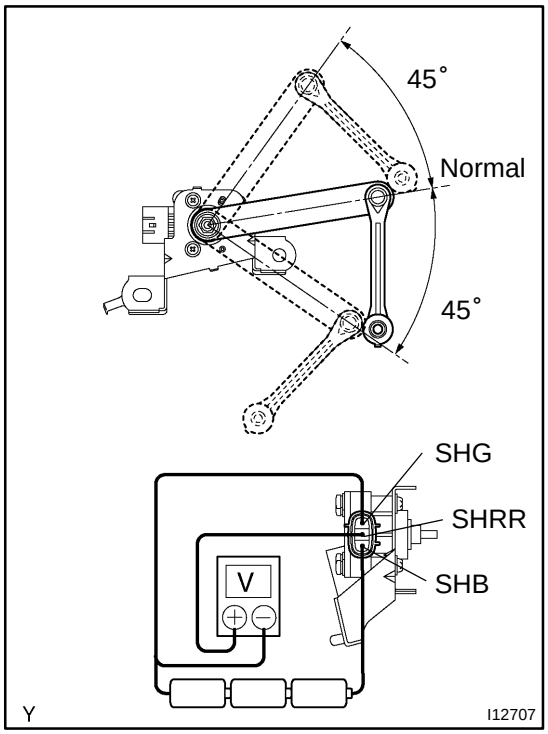
If the circuit is not as specified, replace the ECU.

Reference INSPECTION USING OSCILLOSCOPE

HINT:

The correct waveform is as shown in the illustration.





3. INSPECT VEHICLE HIGHT CONTROL SENSOR

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect SHB terminal to the batteries' positive (+) terminal, and SHG terminal to the batteries' negative (–) terminal, apply about 4.5 V between SHB – SHG terminals.

NOTICE:

Do not apply voltage of 6 V or more to terminals VGS and GGND.

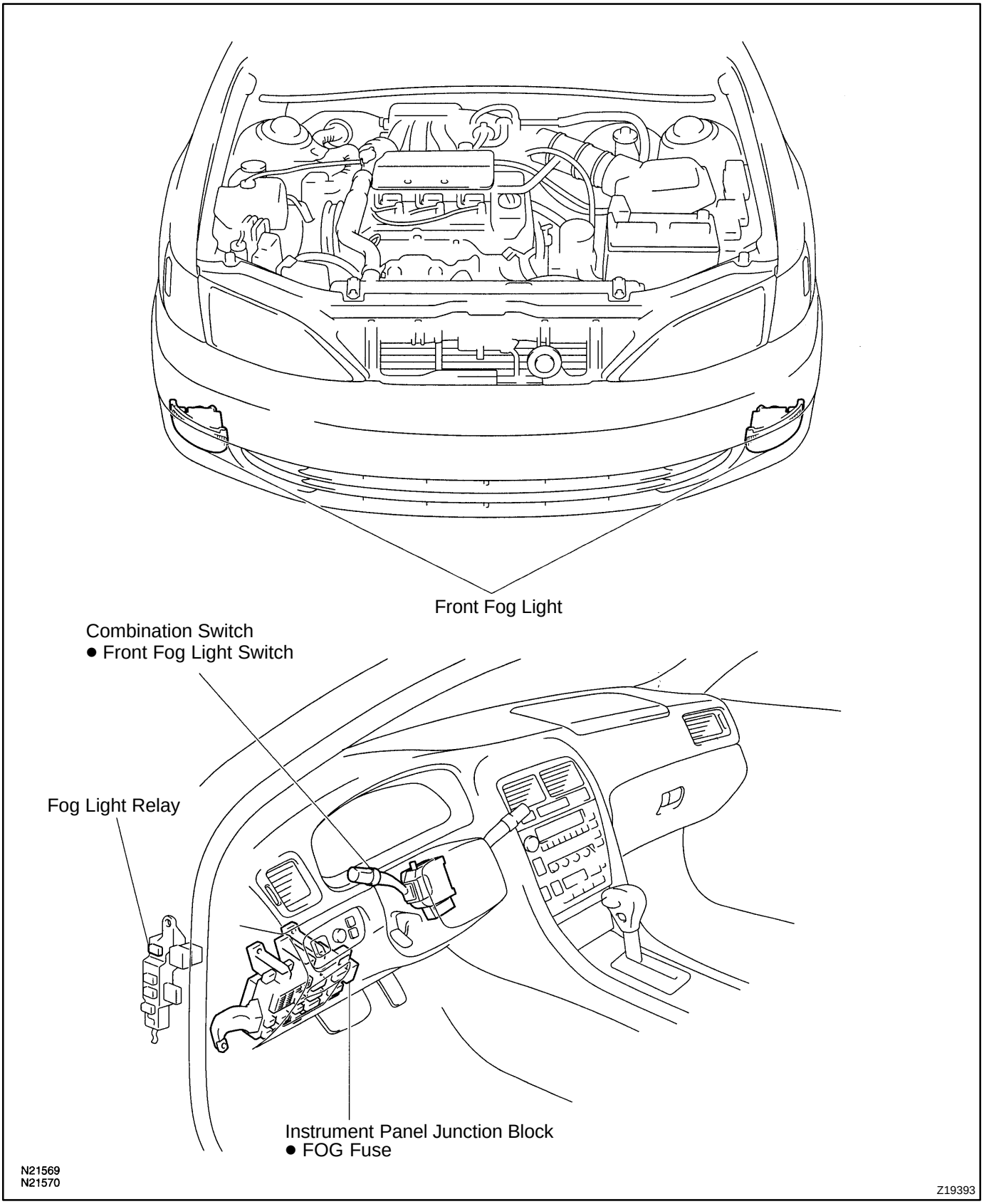
(c) Check the output voltage of SHRR and SHG terminals.

Symbols	Condition	Standard Value
SHRR – SHG	+ 45˚	4.1 V
	Normal position	2.25 V
	– 45˚	0.5 V

FOG LIGHT SYSTEM

LOCATION

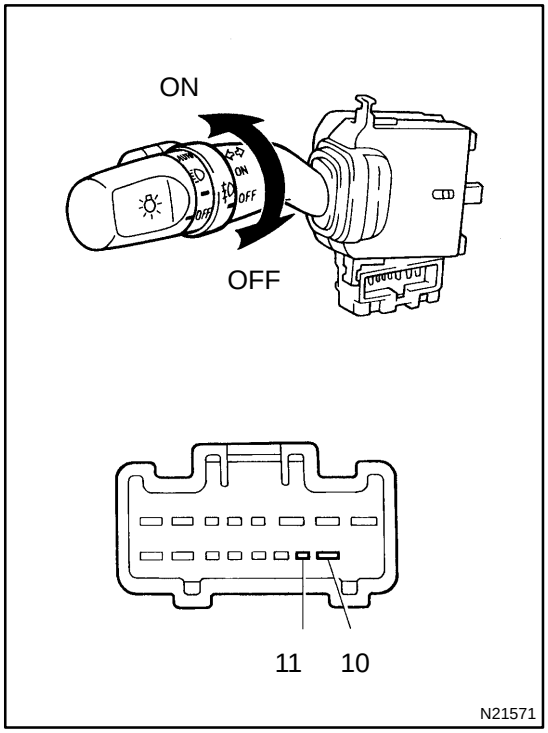
BE050–06



BE051–03

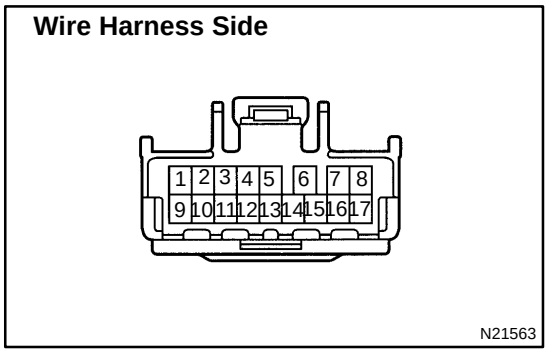
INSPECTION

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.

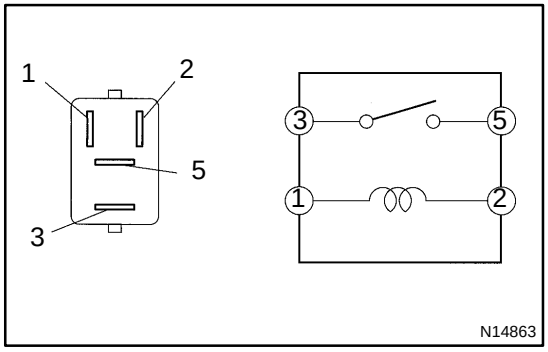


2. INSPECT COMBINATION SWITCH CIRCUIT

Connect the wire harness side connector to the combination switch and inspect wire harness side connector from the back side.

Tester connection	Condition	Specified condition
10– Ground	Headlight dimmer switch High Beam or Flash	No continuity
10– Ground	Headlight dimmer switch Low Beam	Continuity
11 – Ground	Light control switch OFF or TAIL	No voltage
11 – Ground	Light control switch HEAD	Battery positive voltage

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



3. INSPECT FOG LIGHT 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.

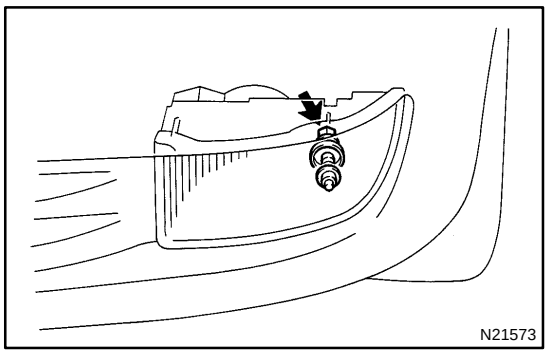
4. INSPECT FOG LIGHT RELAY CIRCUIT

Remove the relay from the driver's side relay block and inspect the connector on relay block side.

Tester connection	Condition	Specified condition
3 – Ground	Constant	Continuity
1 – Ground	Light control switch HEAD	Battery positive voltage
5 – Ground	Constant	Battery positive voltage

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

BE052–06



ADJUSTMENT

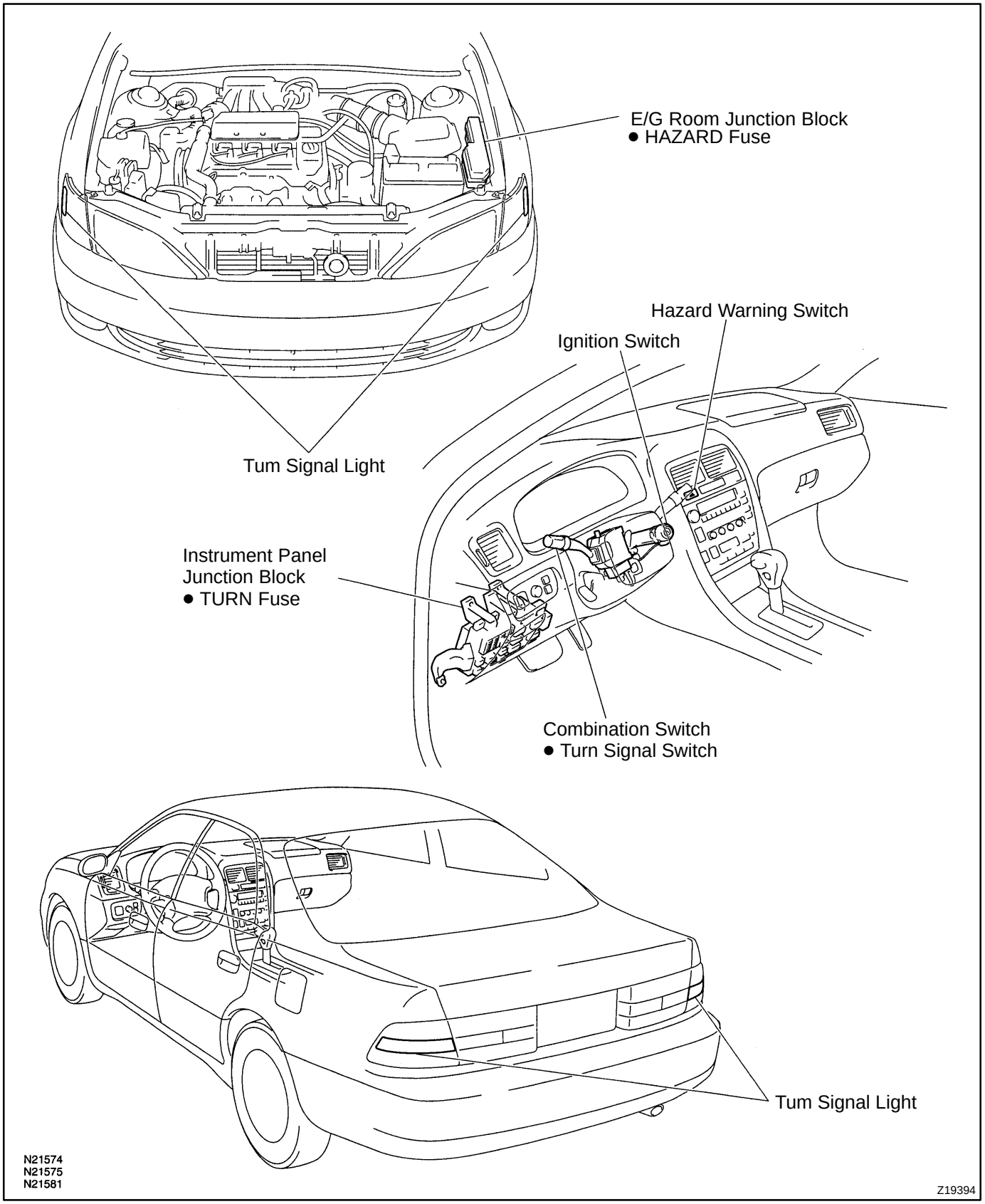
ADJUST FOG LIGHT AIM

A–bolt: Vertical Direction

TURN SIGNAL AND HAZARD WARNING SYSTEM

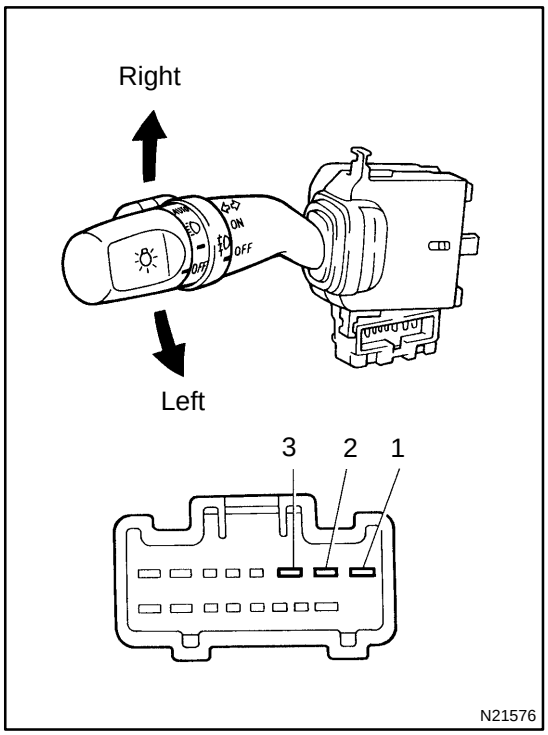
LOCATION

BE053–03



BE054–02

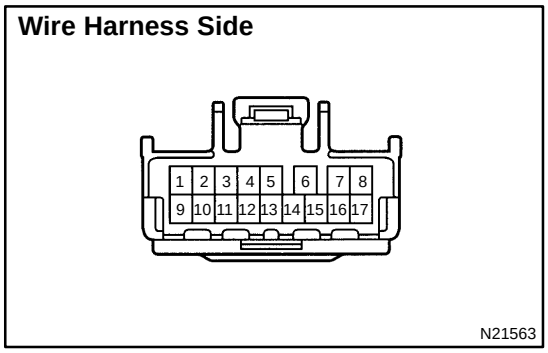
INSPECTION



1. INSPECT TURN SIGNAL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Left turn	1 – 2	Continuity
Neutral	–	No continuity
Right turn	2 – 3	Continuity

If continuity is not as specified, replace the switch.



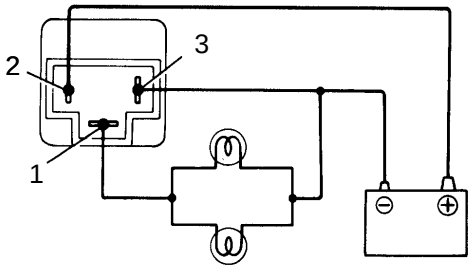
2. INSPECT COMBINATION SWITCH CIRCUIT

Connect the wire harness side connector to the combination switch and inspect wire harness side connector from the back side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	*Continuity
3 – Ground	Constant	*Continuity
2 – Ground	Ignition switch ON and turn signal switch position Neutral	No voltage
2 – Ground	Hazard warning switch ON	Battery positive voltage
2 – Ground	Ignition switch ON and turn signal switch position Left or Right	Battery positive voltage

*There is resistance because this circuit is grounded through the bulb.

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



Turn Signal Light Bulbs(21W)
BE1843

3. INSPECT TURN SIGNAL FLASHER OPERATION

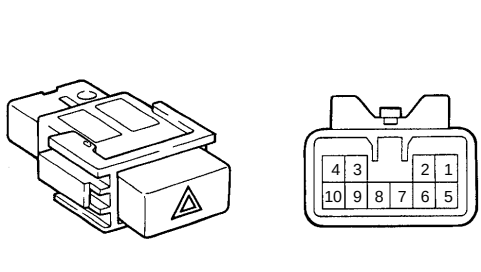
(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 3.

(b) Connect the 2 turn signal light bulbs in parallel to each other to terminals 1 and 3, check that the bulbs flash.

HINT:

The turn signal lights should flash 60 to 120 times per minute. If one of the front or rear turn signal lights has an open circuit, the number of flashes will be more than 140 per minute.

If operation is not as specified, replace the flasher.

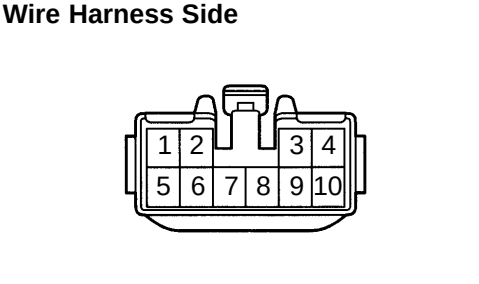


e–10–2
N21578

4. INSPECT HAZARD WARNING SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch OFF	5 – 7	Continuity
Switch ON	1 – 2 – 3 – 4 5 – 6	Continuity
Illumination circuit	8 – 9	Continuity

If continuity is not as specified, replace the switch.



e–10–1
N21579

5. INSPECT HAZARD WARNING SWITCH CIRCUIT

Disconnect the switch connector and inspect the connection on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	*2Continuity
2 – Ground	Constant	*2Continuity
*19 – Ground	Constant	Continuity
6 – Ground	Constant	Battery positive voltage
7 – Ground	Ignition switch position LOCK or ACC	No voltage
7 – Ground	Ignition switch position ON	Battery positive voltage
*18 – Ground	Light control switch position OFF	No voltage
*18 – Ground	Light control switch position TAIL or HEAD	Battery positive voltage

*1: Illumination

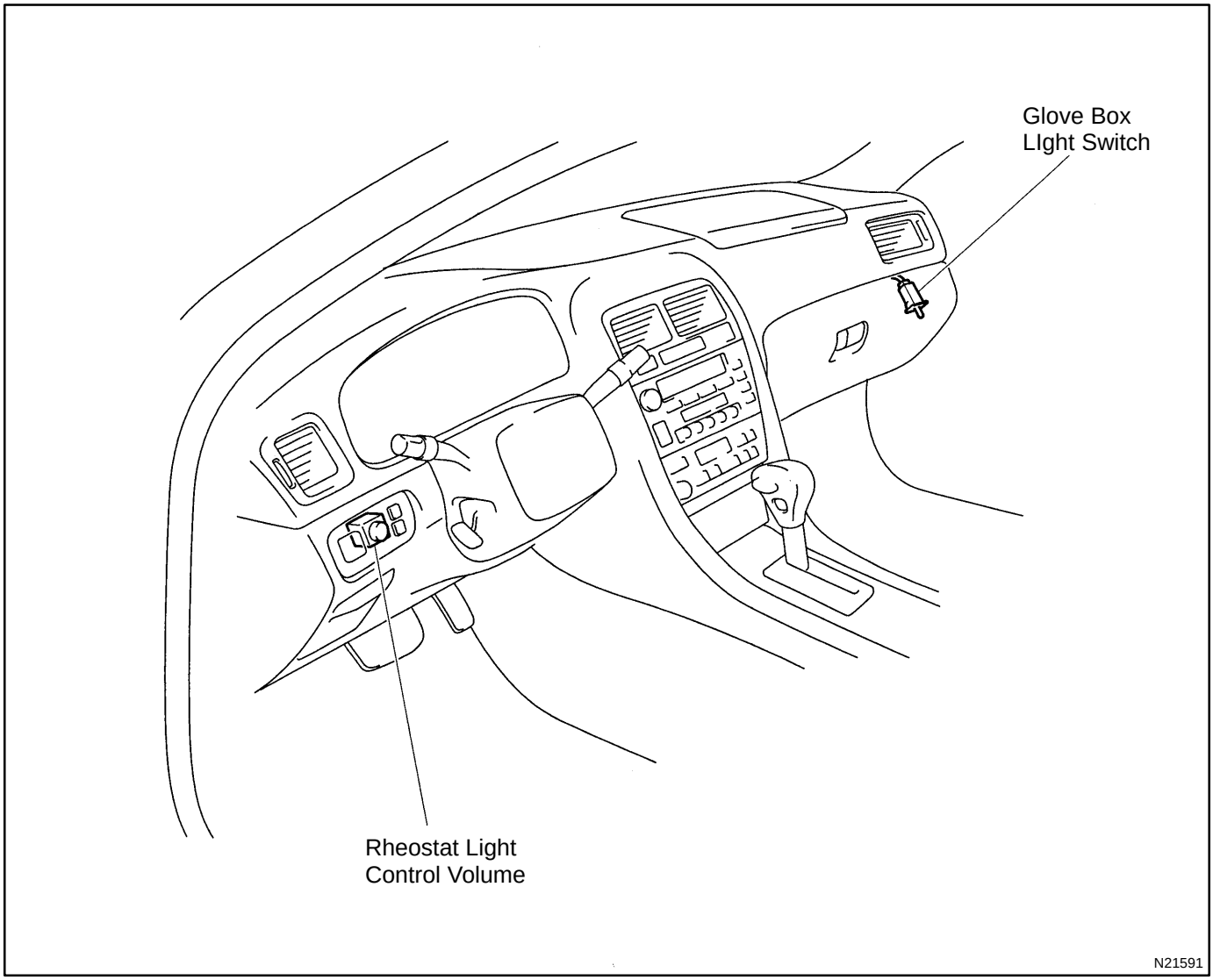
*2: There is resistance because this circuit is grounded through the bulb.

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

ILLUMINATION LIGHT SYSTEM

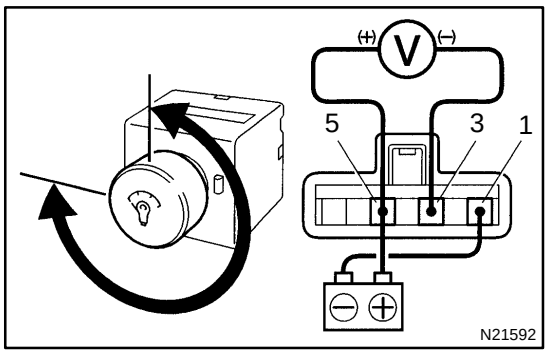
LOCATION

BE055–02



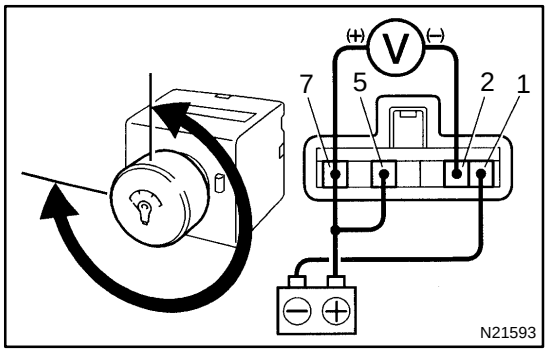
BE056–02

INSPECTION



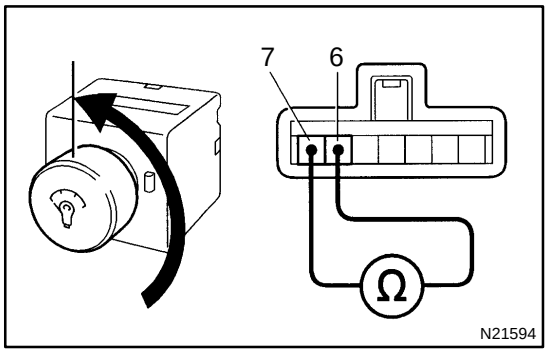
1. Combination Meter Adjustment:
INSPECT RHEOSTAT LIGHT CONTROL VOLUME

(a) Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead to terminal 1.
(b) Connect the positive (+) lead from the voltmeter to terminal 5 and negative (–) lead to terminal 3.
(c) Turn the rheostat knob and check that the voltage changes.



2. Illumination Adjustment:
INSPECT RHEOSTAT LIGHT CONTROL VOLUME

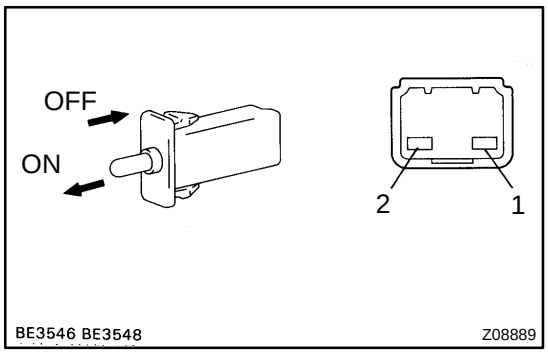
(a) Connect the positive (+) lead from the battery to terminal 5 and 7 and negative (–) lead to terminal 1.
(b) Connect the positive (+) lead from the voltmeter to terminal 7 and negative (–) lead to terminal 2.
(c) Turn the rheostat knob and check that the voltage changes.



3. Tail Cancel:
INSPECT RHEOSTAT LIGHT CONTROL VOLUME

(a) Connect the ohmmeter to terminals 6 and 7.
(b) Turn the rheostat knob fully clockwise and check that current flow stops.

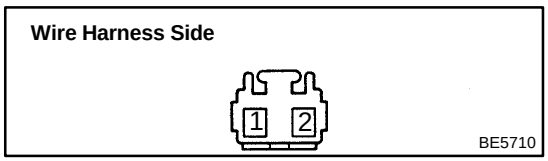
If switch is not as specified, replace the volume.



4. INSPECT GLOVE BOX LIGHT 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 relay.



5. INSPECT GLOVE BOX LIGHT SWITCH CIRCUIT

Disconnect the connector fromt the switch and inspect the connector on the wire harness side.

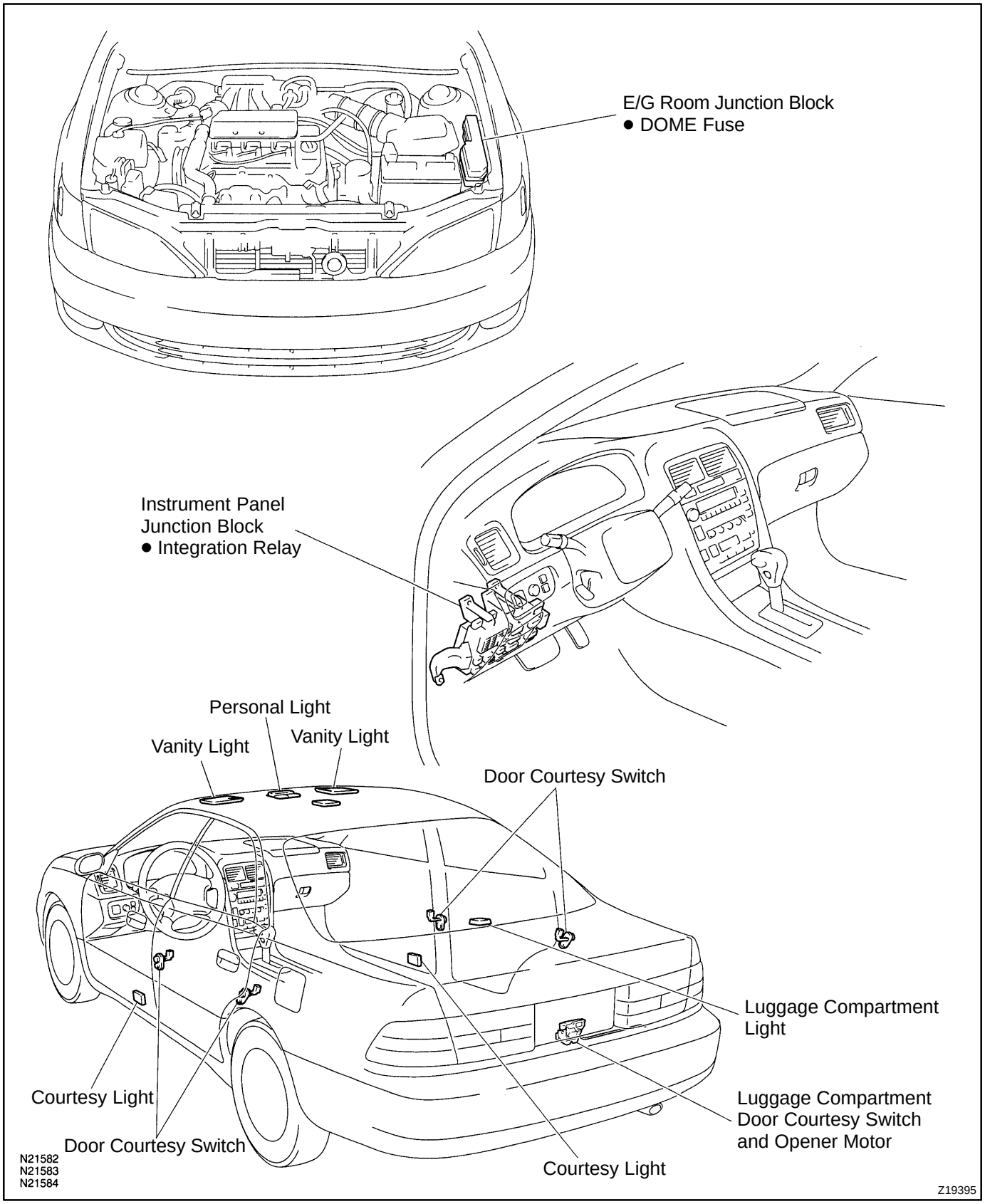
Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Light control switch position OFF	No voltage
1 – Ground	Light control switch position TAIL or HEAD	Battery positive voltage

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

INTERIOR LIGHT SYSTEM

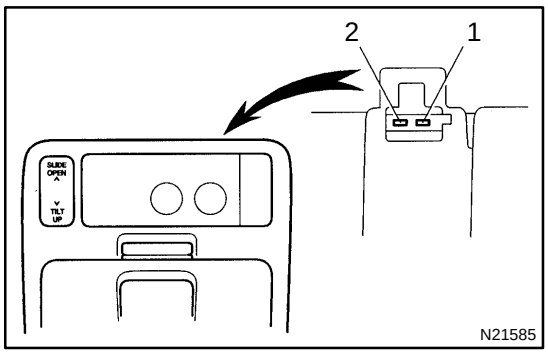
LOCATION

BE057–03



BE058–02

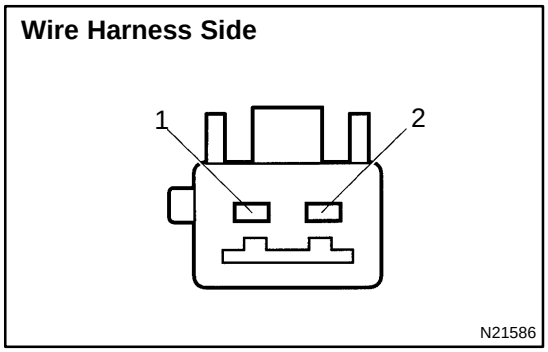
INSPECTION



1. INSPECT 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.

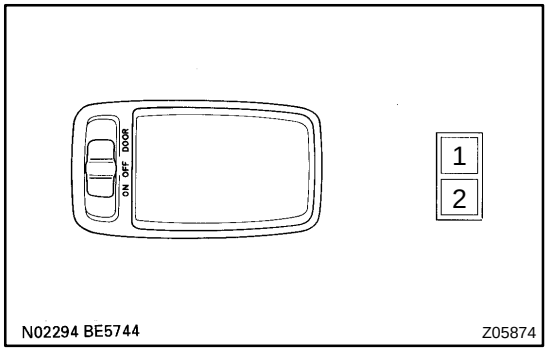


2. INSPECT PERSONAL LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Constant	Battery positive voltage

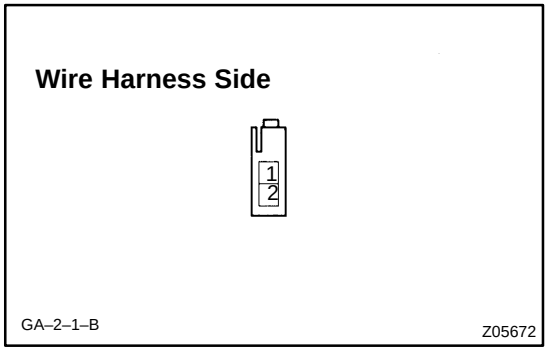
If the circuit is as specified, inspect power source or wire harness.



3. INSPECT INTERIOR LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
DOOR	2 – Switch body	Continuity
OFF	–	No continuity
ON	1 – 2	Continuity

If continuity is not as specified, replace the light assembly or bulb.

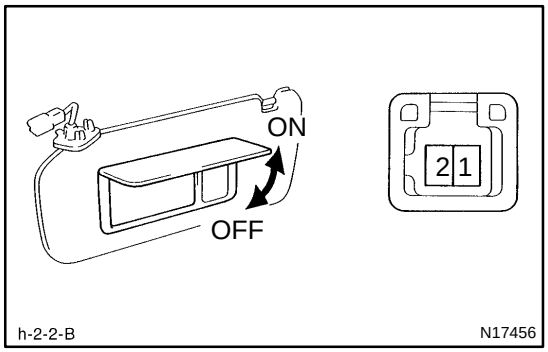


4. INSPECT INTERIOR LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Battery positive voltage

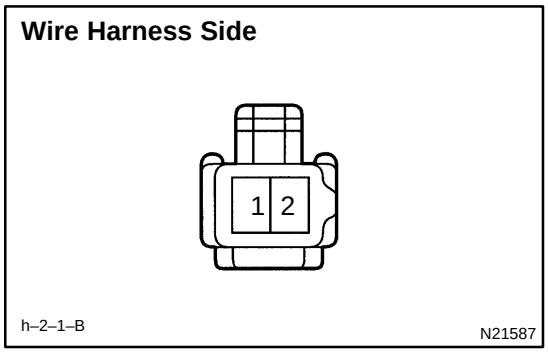
If the circuit is not as specified, inspect power source or wire harness.



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 bulb or vanity light.

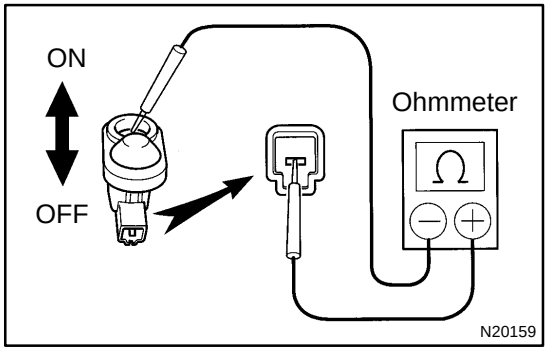


6. INSPECT VANITY LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Constant	Battery positive voltage

If the circuit is not as specified, inspect power source or wire harness.

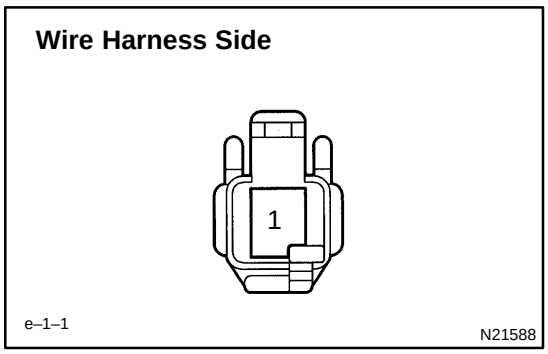


7. INSPECT DOOR COURTESY SWITCH CONTINUITY

(a) Check that continuity exists between terminals and the switch body with the switch ON (switch pin released: opened door).

(b) Check that no continuity exists between terminals and the switch body with the switch OFF (switch pin pushed in: closed doors).

If operation is not as specified, replace the switch.

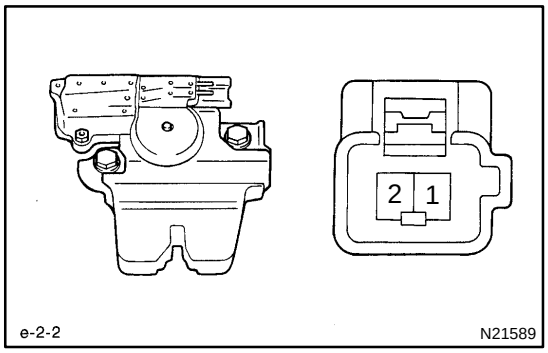


8. INSPECT DOOR COURTESY SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Battery positive voltage

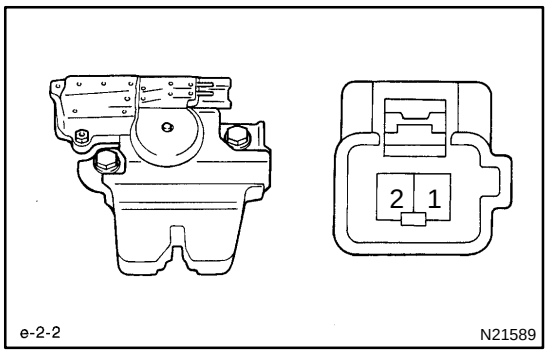
If the circuit is not as specified, inspect power source or wire harness.



9. INSPECT LUGGAGE COMPARTMENT DOOR COURTESY SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch OFF	–	No continuity
Switch ON	2 – Body Ground	Continuity

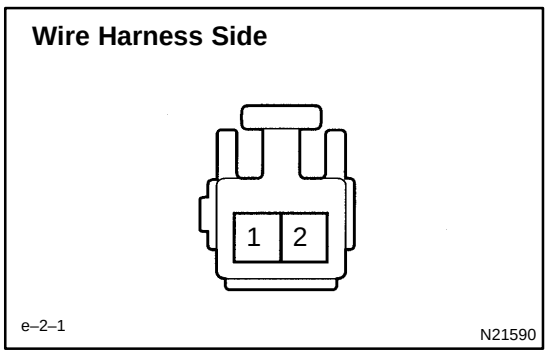
If continuity is not as specified, replace the switch and motor.



10. INSPECT LUGGAGE COMPARTMENT DOOR OPENER MOTOR OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to body ground, check that the motor operates.

If operation is not as specified, replace the switch and motor.



11. INSPECT LUGGAGE COMPARTMENT DOOR COURTESY SWITCH AND OPENER MOTOR CIRCUIT

Disconnect the connector from the switch and opener motor, and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Luggage compartment door opener switch OFF	No voltage
1 – Ground	Luggage compartment door opener switch ON	Battery positive voltage
2 – Ground	Constant	Battery positive voltage

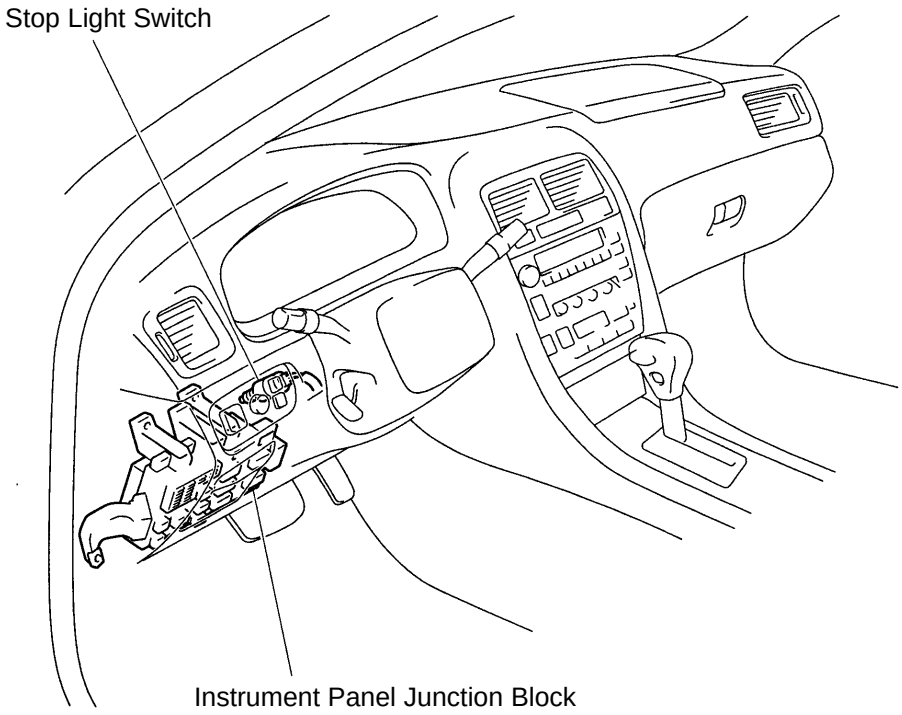
If the circuit is not as specified, inspect power source or wire harness.

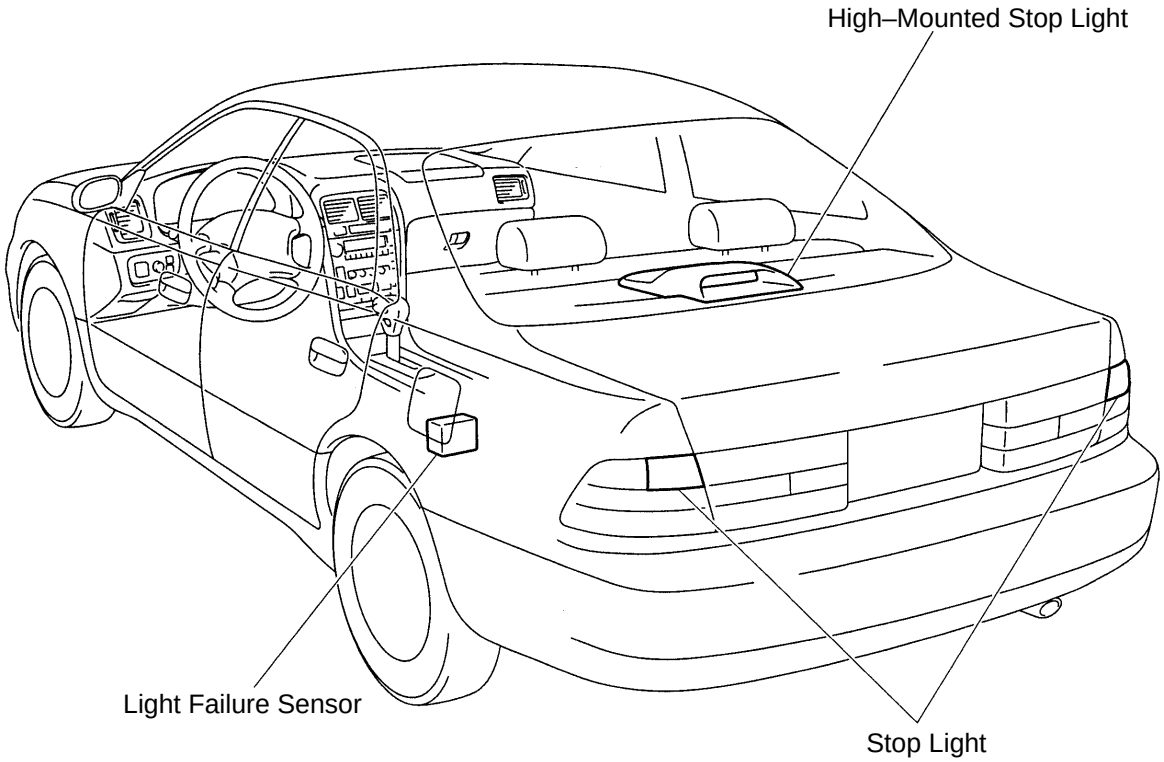
12. INSPECT ILLUMINATED ENTRY SYSTEM
(See integration relay circuit on page BE–21)

STOP LIGHT SYSTEM

LOCATION

BE059–03

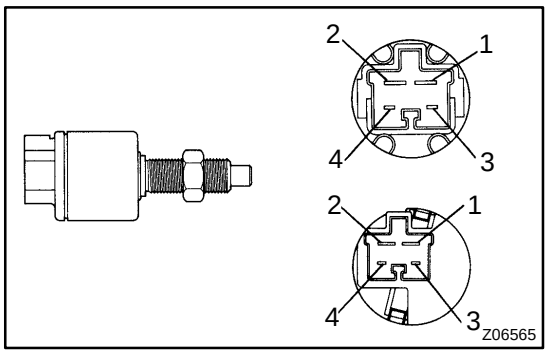




N21595
N21596

Z19396

BE05A–03

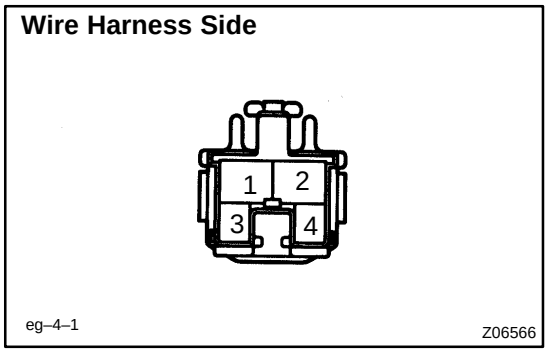


INSPECTION

1. INSPECT STOP LIGHT SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
Switch pin free	1 – 2	Continuity
Switch pin pushed in	3 – 4	Continuity

If continuity is not as specified, replace the switch.

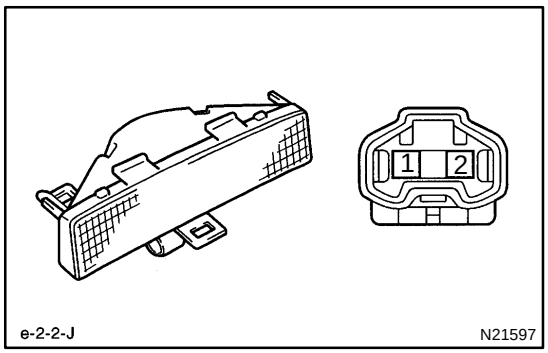


2. INSPECT STOP LIGHT SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Battery positive voltage

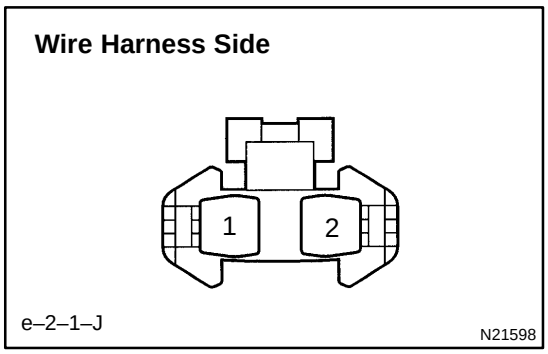
If circuit is not as specified, inspect the power source or wire harness.



3. INSPECT HIGH–MOUNTED STOP LIGHT ASSEMBLY CONTINUITY

Using the ohmmeter, check that continuity exists between terminals.

If continuity is not as specified, replace the bulb or light assembly.

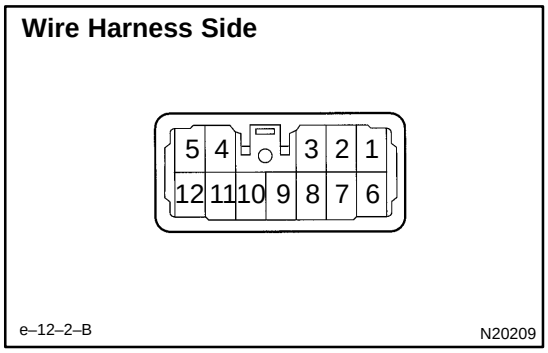


4. INSPECT HIGH–MOUNTED STOP LIGHT ASSEMBLY CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Battery positive voltage

If circuit is not as specified, inspect the power source or wire harness.



5. INSPECT LIGHT FAILURE SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity*
2 – Ground	Constant	Continuity*
9 – Ground	Constant	Continuity*
11 – Ground	Constant	Continuity
3 – Ground	Light control switch OFF	No voltage
3 – Ground	Light control switch TAIL or HEAD	Battery positive voltage
4 – Ground	Ignition switch LOCK or ACC	No voltage
4 – Ground	Ignition switch ON	Battery positive voltage
7 – Ground	Stop light switch OFF	No voltage
7 – Ground	Stop light switch ON	Battery positive voltage
8 – Ground	Ignition switch LOCK or ACC	No voltage
8 – Ground	Ignition switch ON	Battery positive voltage

*: There is resistance because this circuit is grounded through the bulb.

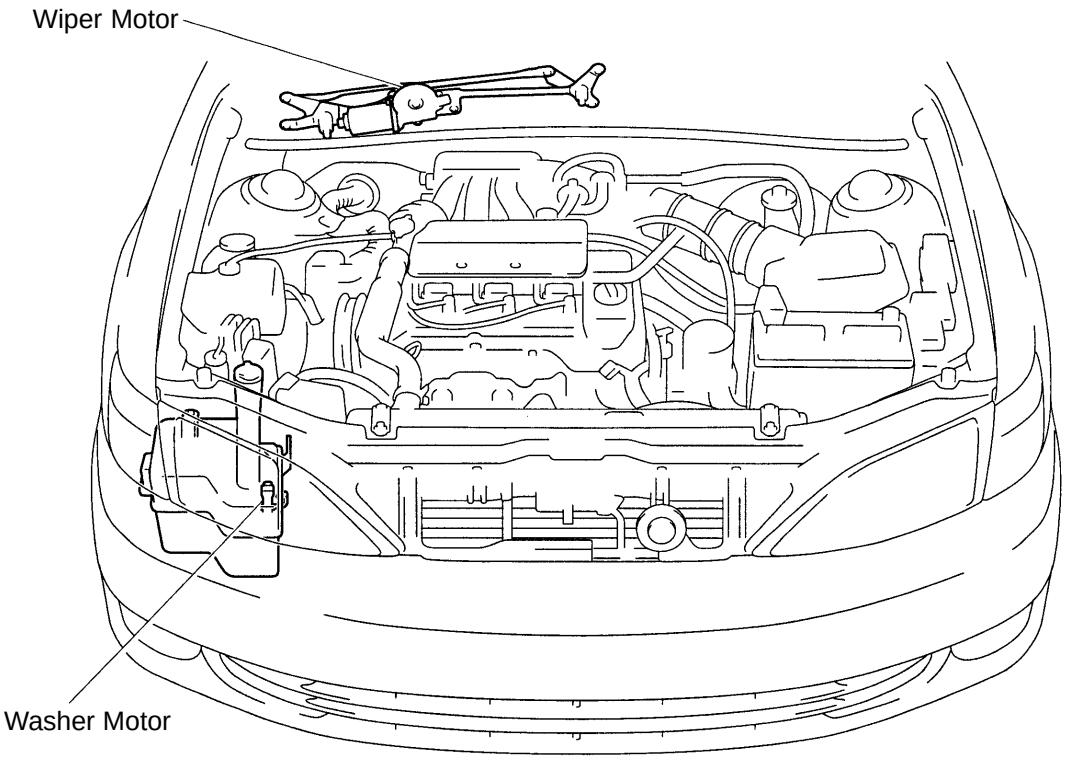
If the circuit is as specified, replace the sensor.

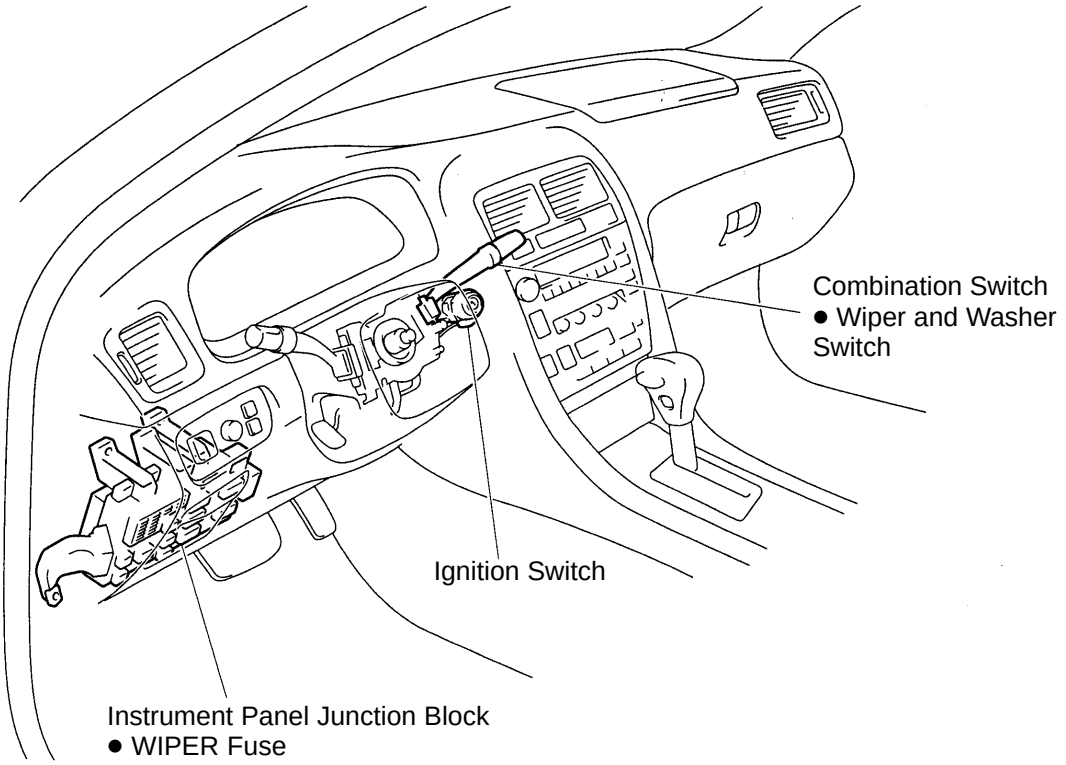
If the circuit is not as specified, inspect the circuits connected to other parts.

WIPER AND WASHER SYSTEM

LOCATION

BE05B–03





N21500
N21501

Z19354

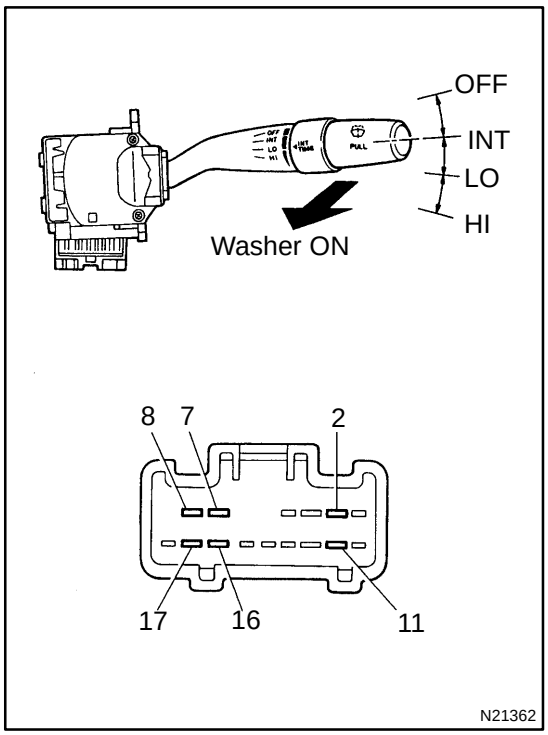
BE05C–02

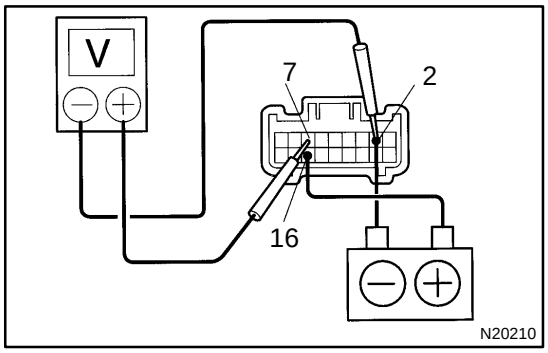
INSPECTION

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 ON	2 – 11	Continuity

If continuity is not as specified, replace the switch.





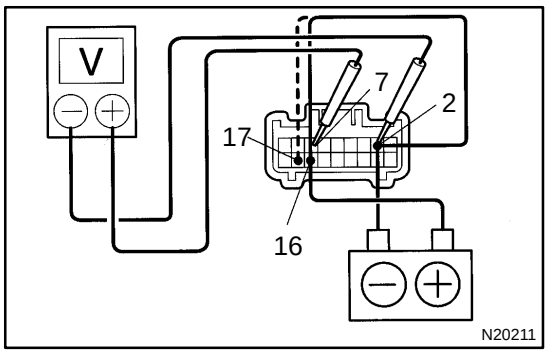
2. INSPECT INTERMITTENT OPERATION

(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.

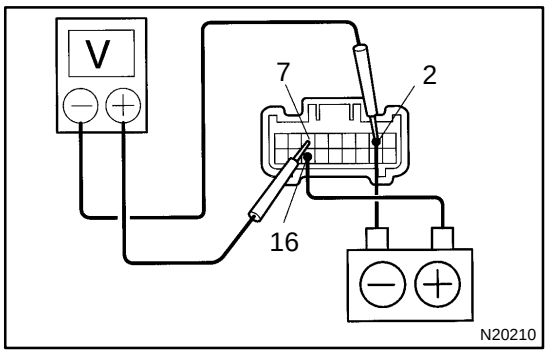
(d) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (–) lead to terminal 2, check that the meter needle indicates battery positive voltage.



(e) After connecting terminal 16 to terminal 17, connect it to terminal 2, check the voltage rises from 0 volt to battery positive voltage within the time, as shown in the table.

INT time control switch position	Voltage
FAST	Approx. 2 sec. → Battery positive voltage / 0 V
SLOW	10.7 ± 5 sec. → Battery positive voltage / 0 V
Non variable type	3.3 ± 1 sec. → Battery positive voltage / 0 V

If operation is not as specified, replace the wiper and washer switch.

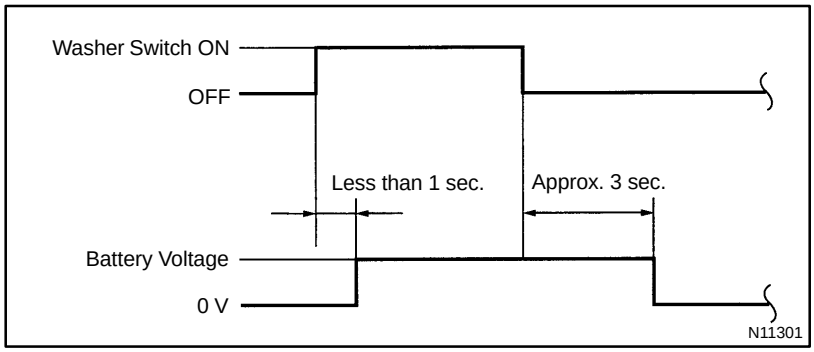


3. INSPECT WASHER LINKED OPERATION

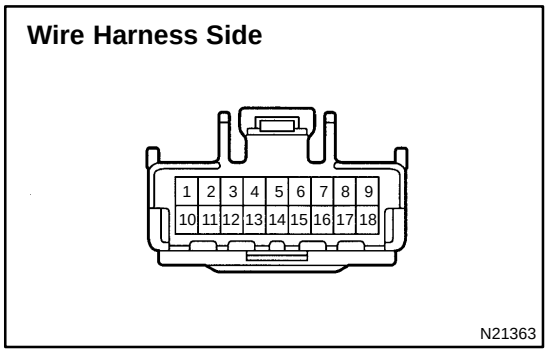
(a) Connect the positive (+) lead from the battery to terminal 16 and the negative (–) lead to terminal 2.

(b) Connect the positive (+) lead from the voltmeter to terminal 7 and the negative (–) lead to terminal 2.

(c) Push in the washer switch, and check that the voltage changes as shown in the table below.



If operation is not as specified, replace the wiper and washer switch.

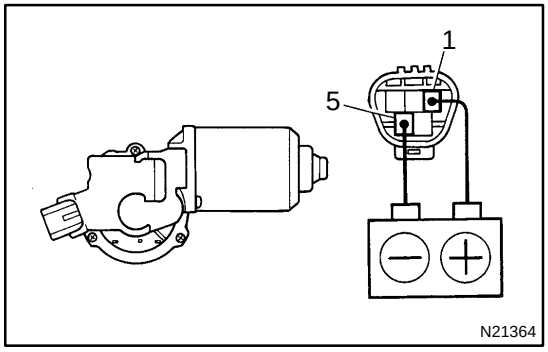


4. INSPECT WIPER SWITCH CIRCUIT

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

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
11 – Ground	Ignition switch LOCK or ACC	No voltage
11 – Ground	Ignition switch ON	Battery positive voltage

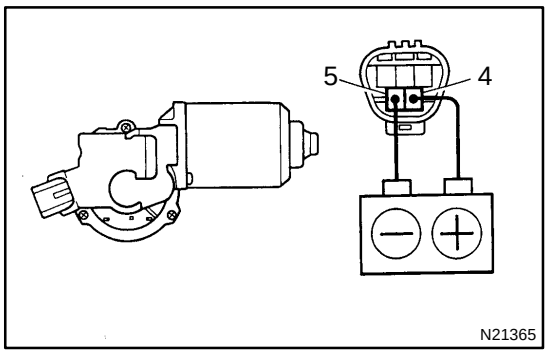
If circuit is not as specified, inspect the circuits connected to other parts.



5. 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.

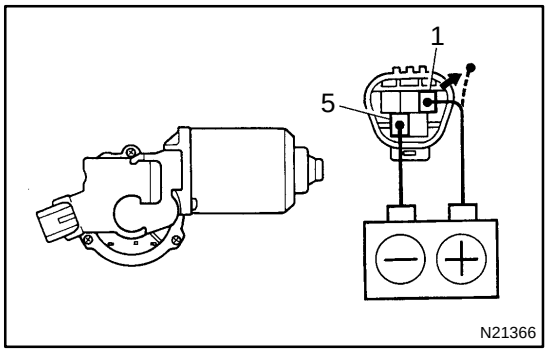
If operation is not as specified, replace the motor.



6. High speed:
INSPECT FRONT WIPER MOTOR OPERATION

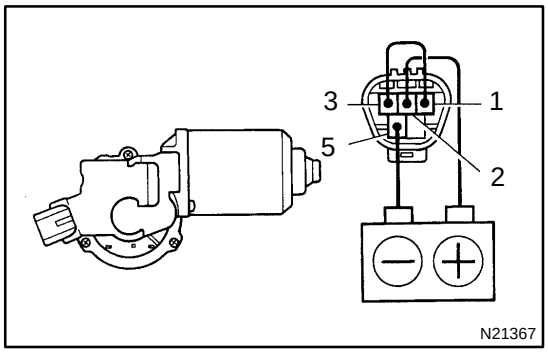
Connect the positive (+) lead from the battery to terminal 4 and the negative (–) lead to terminal 5, check that the motor operates at high speed.

If operation is not as specified, replace the motor.



7. Stopping at stop position:
INSPECT FRONT WIPER MOTOR OPERATION

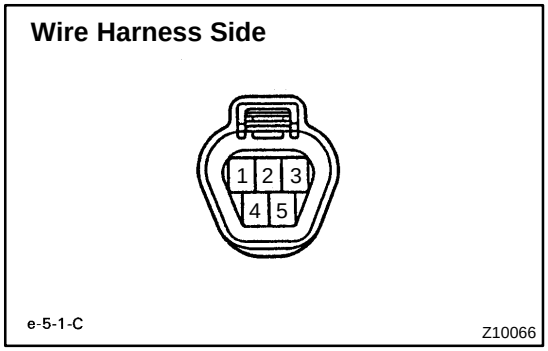
(a) Operate the motor at low speed and stop the motor operation anywhere except at the stop position by disconnecting positive (+) lead from terminal 1.



(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.

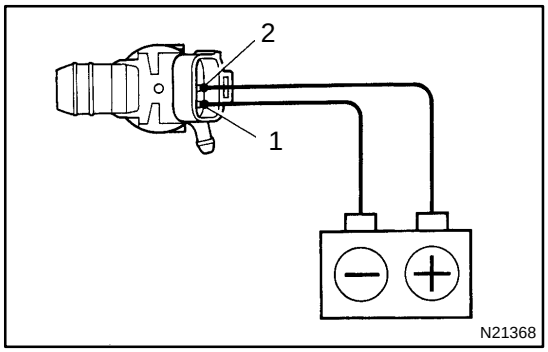


8. INSPECT WIPER MOTOR CIRCUIT

Disconnect the connector from the motor and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
5 – Ground	Constant	Continuity
1 – Ground	* Wiper switch OFF or INT, HIGH	No voltage
1 – Ground	* Wiper switch LOW	Battery positive voltage
2 – Ground	Ignition switch LOCK or ACC	No voltage
2 – Ground	Ignition switch ON	Battery positive voltage
4 – Ground	* Wiper switch OFF or INT, LOW	No voltage
4 – Ground	* Wiper switch HIGH	Battery positive voltage

*: Turn ignition switch ON
If circuit is not as specified, inspect the circuits connected to other parts.



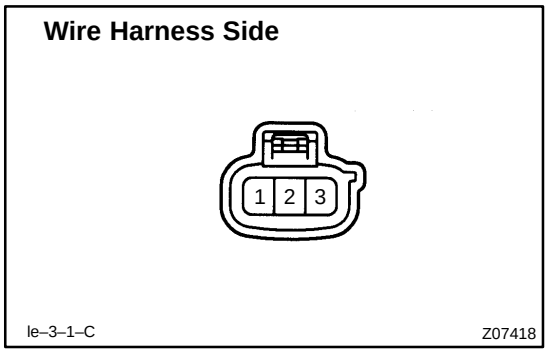
9. INSPECT WASHER MOTOR OPERATION

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.



10. INSPECT WASHER MOTOR CIRCUIT

Disconnect the connector from the washer motor and inspect the connector on harness side.

Tester connection	Condition	Specified condition
1 – Ground	Washer switch OFF (released)	No continuity
1 – Ground	Washer switch ON (pushed in)	Continuity
2 – Ground	Ignition switch LOCK or ACC	No voltage
2 – Ground	Ignition switch ON	Battery positive voltage

If circuit is not as specified, inspect wire harness, power source or wiper switch.

COMBINATION METER

BE05D–02

TROUBLESHOOTING

PRECAUTIONS

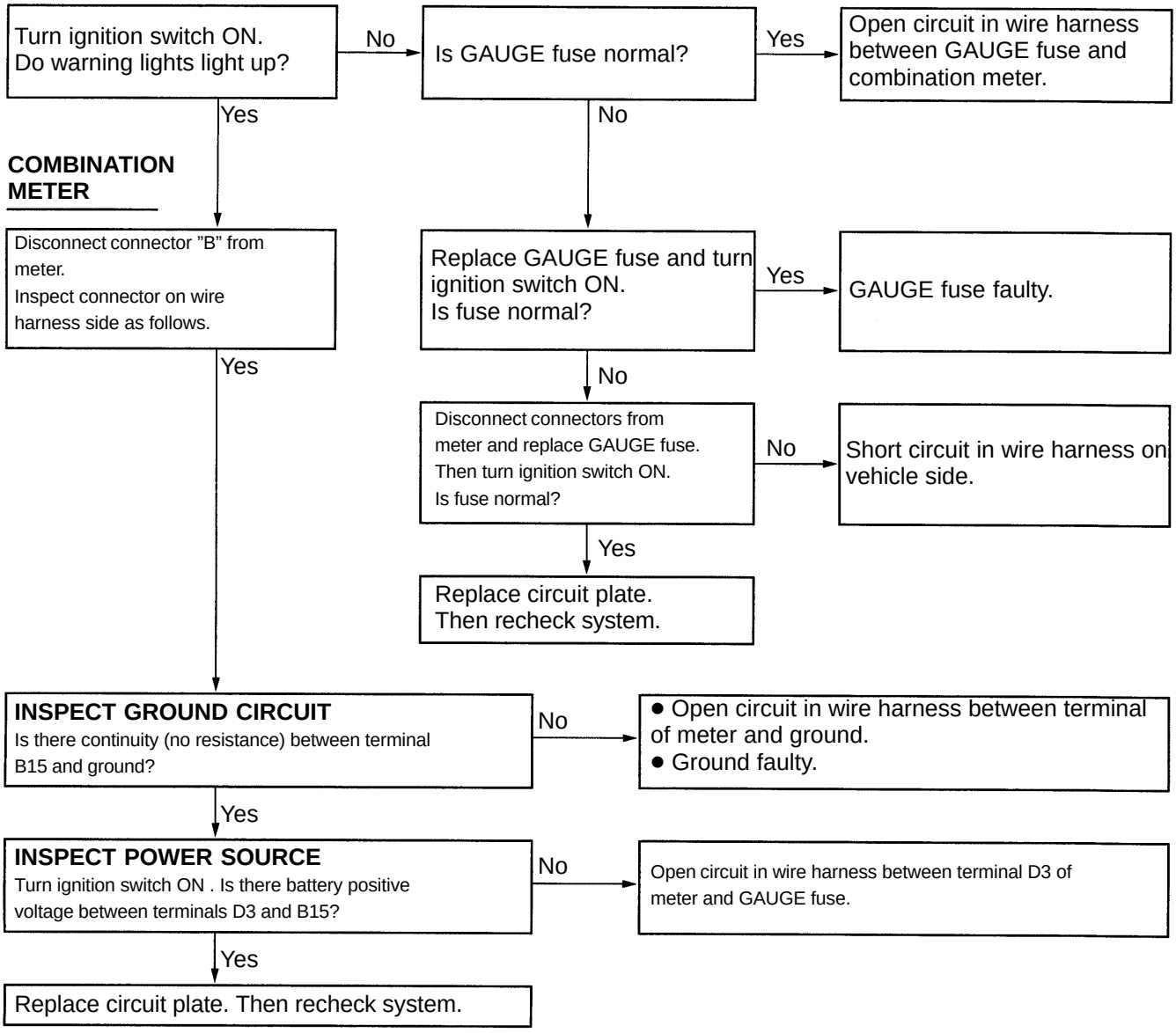
(a) When checking voltage, resistance, etc., use a high impedance type tester (It is impossible to use a simple tester).
(b) When the ignition switch is turned to START, all meters will go out but this is normal.
(c) When replacing the internal mechanism (computer parts) of the meter, be careful that no part of your body or clothing comes in contact with the terminals of the leads from the IC, etc. of the replacement parts (spare parts).
(d) Do not disconnect the battery while the engine is running as this would cause an instant reverse charge, resulting in damage to the components.
(e) Always disconnect the battery terminals before pulling apart connectors or terminals.
(f) To prevent damage, handle meters with care.

Trouble		Refer to
All Meters, Gauges, and Illuminations	No display at all.	1
	The four indicator needles do not light up.	Replace combination meter computer.
	One indicator needle does not light up.	2
	The character plate is not illuminated at one or two locations.	3
	Brightness does not change even when light control switch is operated (OFF↔TAIL).	4
	Brightness does not change even when rheostat volume is turned.	5
	Remains dimmed when the light control switch is turned OFF.	Replace combination meter computer.
	Does not go out while starter running.	6
Speedometer	Speedometer does not operate while driving.	7
	Vehicle speed signal (4P) faulty.	8
Tachometer	Tachometer does not operate while engine running.	9
Fuel Gauge	Does not operate or operation is abnormal.	10
Fuel Level Warning	Warning light does not light up or always lights up.	11
Engine Coolant Temperature Gauge	Does not operate or operation is abnormal.	12
Low Oil Pressure warning	Abnormal operation or warning light does not light up.	13
Brake Warning	Abnormal operation or warning light does not light up.	14
Rear Lights Warning	Abnormal operation or warning light does not light up.	15
Open Door Warning	Abnormal operation or warning light does not light up.	16
Engine Oil Level Warning	Abnormal operation or warning light does not light up.	17
Seat Belt Warning Chime	Abnormal operation or chime does not operate.	BE–99
Seat Belt Warning	Abnormal operation or warning light does not light up.	18

Trouble		Refer to
Turn Signal Indicator	Abnormal operation or Indicator does not light up.	19
O/D OFF Indicator	Abnormal operation or Indicator does not light up.	20
Shift Position Indicator	Abnormal operation or Indicator does not light up.	21
Malfunction Indicator	Abnormal operation or warning light does not light up	22
ABS Warning	Abnormal operation or warning light does not light up.	23
CRUISE Indicator	Abnormal operation or Indicator does not light up.	24
SRS Warning	Abnormal operation or warning light does not light up.	25
Discharge Warning	Abnormal operation or warning light does not light up.	26
High Beam Indicator	Abnormal operation or Indicator does not light up.	27
Window Washer Warning	Abnormal operation or warning light does not light up.	28
Taillight Indicator	Abnormal operation or Indicator does not light up.	29
Headlight Indicator	Abnormal operation or Indicator does not light up.	30

1	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**No display at all.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08429

2	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**One indicator needle does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Is LED OK?
- No → Replace the LED. Then recheck system.
- Yes ↓

Disconnect connector "B" from meter.
Inspect connector on wire harness side as follows

INSPECT GROUND CIRCUIT
Is there continuity (no resistance) between terminal B15 and ground?
- No → ● Open circuit in wire harness between terminal of meter and ground. ● Ground faulty.
- Yes ↓

INSPECT POWER SOURCE
Turn ignition switch ON . Is there battery positive voltage between terminals D3 and B15?
- No → Open circuit in wire harness between terminal D3 of meter and GAUGE fuse.
- Yes ↓

Replace circuit plate. Then recheck system.

3	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**The character plate is illuminated on one side.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Is bulb OK?
- No → Replace the LED. Then recheck system.
- Yes ↓

Disconnect connector "B" from meter.
Inspect connector on wire harness side as follows.

INSPECT GROUND CIRCUIT
Is there continuity (no resistance) between terminal B15 and ground?
- No → ● Open circuit in wire harness between terminal D3 of meter and ground. ● Ground faulty.
- Yes ↓

INSPECT POWER SOURCE
Turn ignition switch ON . Is there battery positive voltage between terminals D3 and B15?
- No → Open circuit in wire harness between terminal D3 of meter and GAUGE fuse.
- Yes ↓

Replace circuit plate. Then recheck system.

V08430

4	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**Brightness does not change even when light control switch is operated. (OFF↔TAIL)**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

COMBINATION METER

Disconnect connector "B" from meter.
Inspect connector on wire harness side as follows.

↓

INSPECT TAILLIGHT SIGNAL CIRCUIT
Does voltage change between terminal B8 and ground as follows?

Condition		Voltage
Light control switch position	OFF	No voltage
	TAIL or HEAD	Battery positive voltage

No → Taillight signal circuit faulty on vehicle side. Inspect illumination light system.

Yes ↓

Replace circuit plate. Then recheck system.

5	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**Brightness does not change even when rheostat volume is turned.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

RHEOSTAT LIGHT CONTROL VOLUME

INSPECT RHEOSTAT LIGHT CONTROL VOLUME
(See page BE–50)
Is operation normal?

No → Replace rheostat light control volume. Then recheck system.

Yes ↓

COMBINATION METER

Connect connector to rheostat volume.
Disconnect connector "D" from meter.
Inspect connector on wire harness side as follows.

↓

Turn ignition switch ON. Does voltage change evenly between terminal D1 and D2 when rheostat knob is turned?

No → Wire harness faulty between terminal D1 of meter and terminal D2 of rheostat volume and rheostat light control.

Yes ↓

Replace circuit plate. Then recheck system.

V08431

6	**ALL METERS, GAUGES, AND ILLUMINATIONS**	**Does not go out while starter running.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Disconnect connector ”B” from meter.
Inspect connector on wire harness side as follows.

↓

Turn ignition switch START.
Is there battery positive voltage between terminal and ground or B16?

No → Wire harness faulty between terminal B16 of Meter and ST fuse.

↓ Yes

Replace circuit plate. Then recheck system.

7	**SPEEDOMETER**	**Speedometer does not operate while driving**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

INSPECT ODOMETER OPERATION
Does odometer operate while driving?

Yes → **INSPECT TRIP METER OPERATION**
Does trip meter operate while driving?

Yes → Replace speedometer. Then recheck system.

No → Go to step 7–A

↓ No

COMBINATION METER

Disconnect connector ”C” from meter.
Inspect connector on wire harness side as follows.

↓

Jack up the vehicle.
Turn ignition switch ON. Rotate propeller shaft.
Does the voltage between terminals C9 and C10 change (approx. 0V to 11V or more) per revolution of propeller shaft?

Yes → Replace circuit plate. Then recheck system.

↓ No

CONTINUED ON NEXT PAGE

V08432

8	**SPEEDOMETER**	**Vehicle speed signal (4P) faulty**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

INSPECT ODOMETER OPERATION
Does odometer operate while driving?
No → See chart 18.
Yes ↓

COMBINATION METER

Remove meter with connector connected.
Inspect connector "C" from back side as follows. ↓

Jack up the vehicle. Turn ignition switch ON.
Rotate propeller shaft. Does the voltage between terminals C10 and ground change (approx. 0V to 5V or more) per revolution of propeller shaft?
No → Replace circuit plate. Then recheck system.
Yes ↓

Wire harness between terminal C10 of meter and*ECU faulty.

- ECM
- Suspension ECU
- Power Steering ECU
- ABS and TRAC ECU
- Cruise Control ECU

9	**TACHOMETER**	**Tachometer dose not operate while engine running.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Disconnect connectors "A" and "C" from meter.
Inspect connector on wire harness side as follows. ↓

*** INSPECT TACHOMETER CIRCUIT**
With engine running, does voltage between terminals A13 and C10 fluctuate?
No → Wire harness faulty between terminal A13 of meter and igniter.
Yes ↓

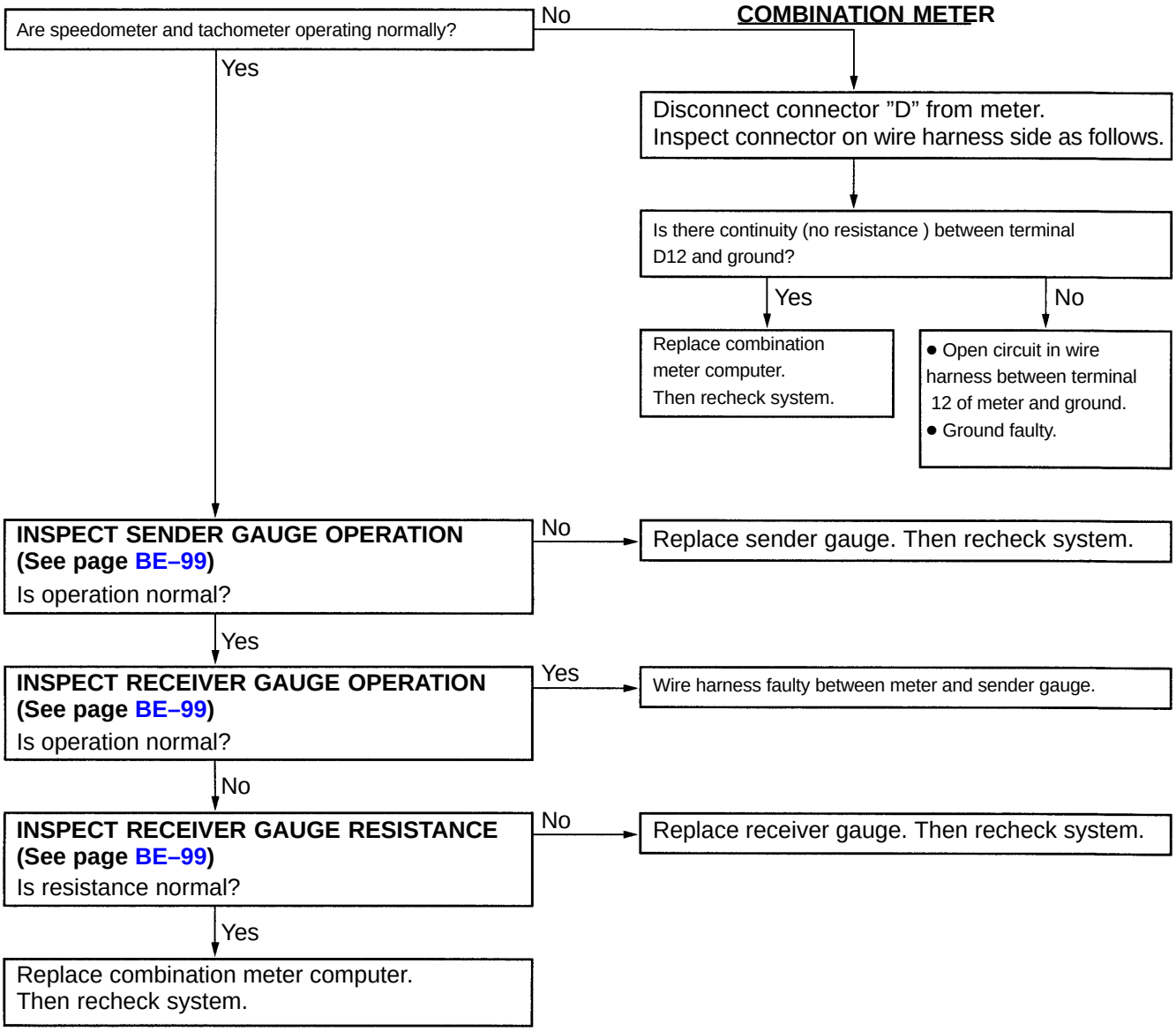
Replace circuit plate. Then recheck system.

* : An electrical tester availble to measure frrequency is necessary for this inspection.
REFERENCE : TOYOTA ELECTRICAL TESTER (09082–00050)

V08433

10	FUEL GAUGE	**Does not operate or operation is abnormal.**

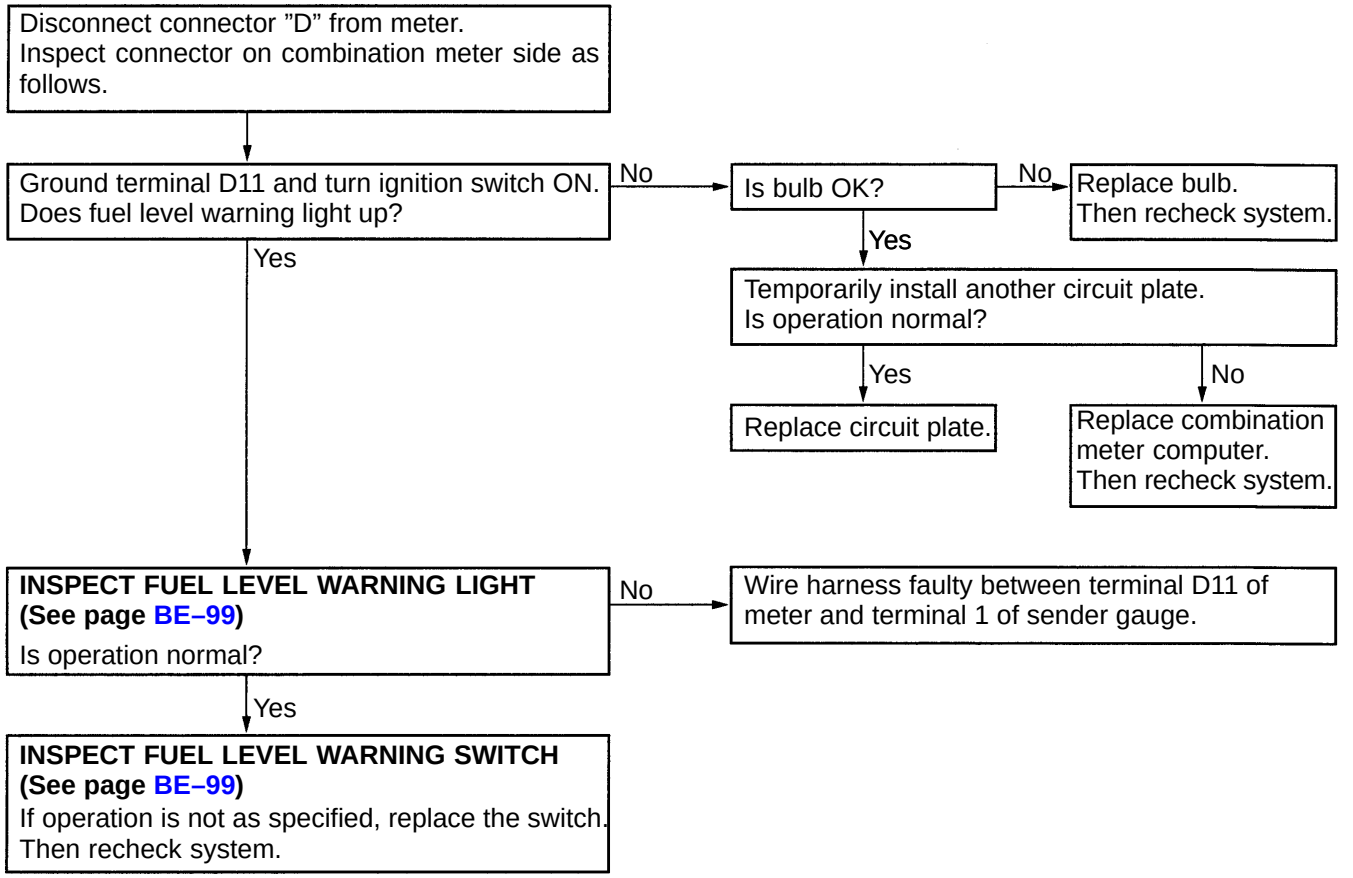
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08434

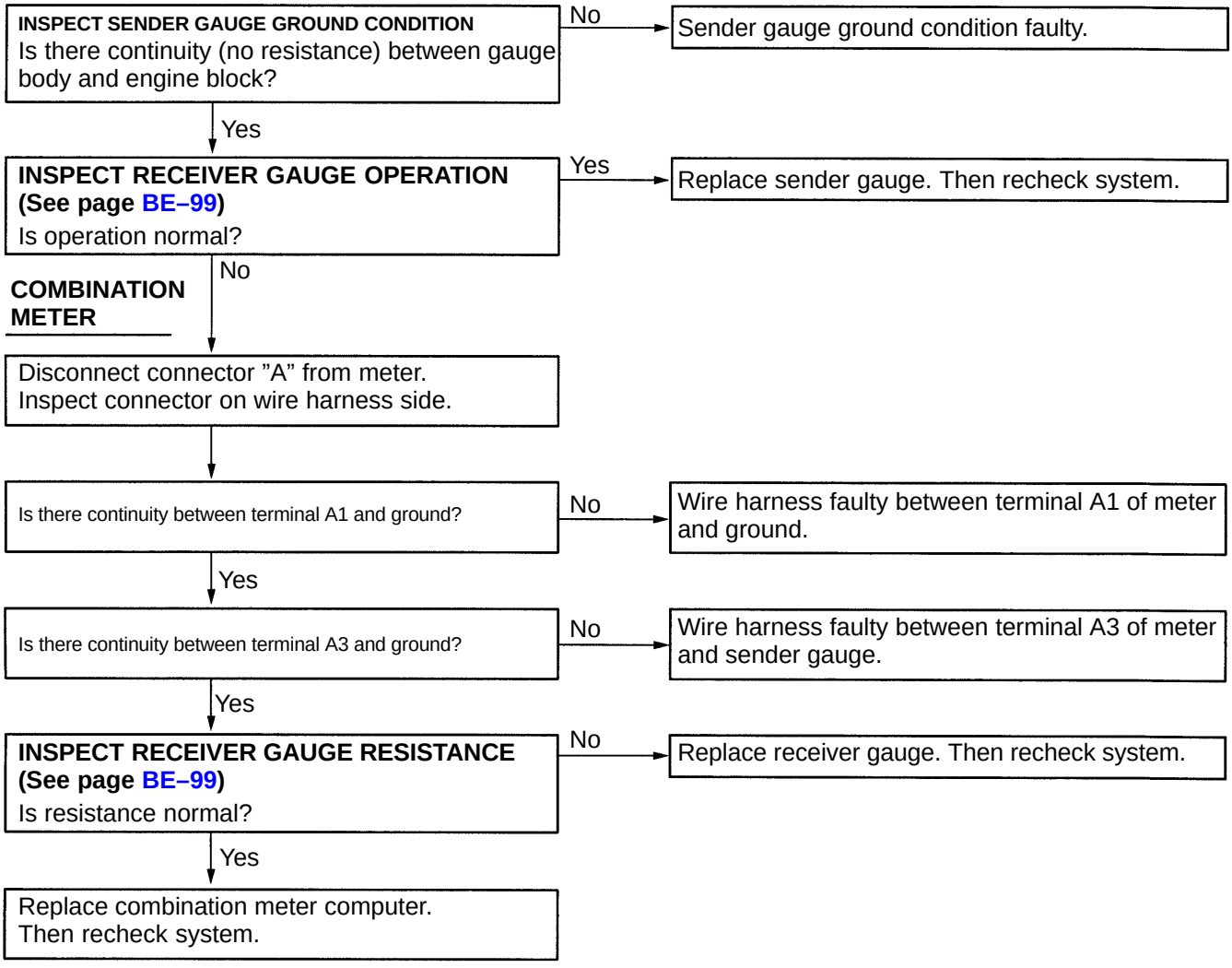
11	FUEL LEVEL WARNING	**Warning light does not light up or always lights up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



12	**ENGINE COOLANT TEMPERATURE GAUGE**	**Does not operate or operation is abnormal.**

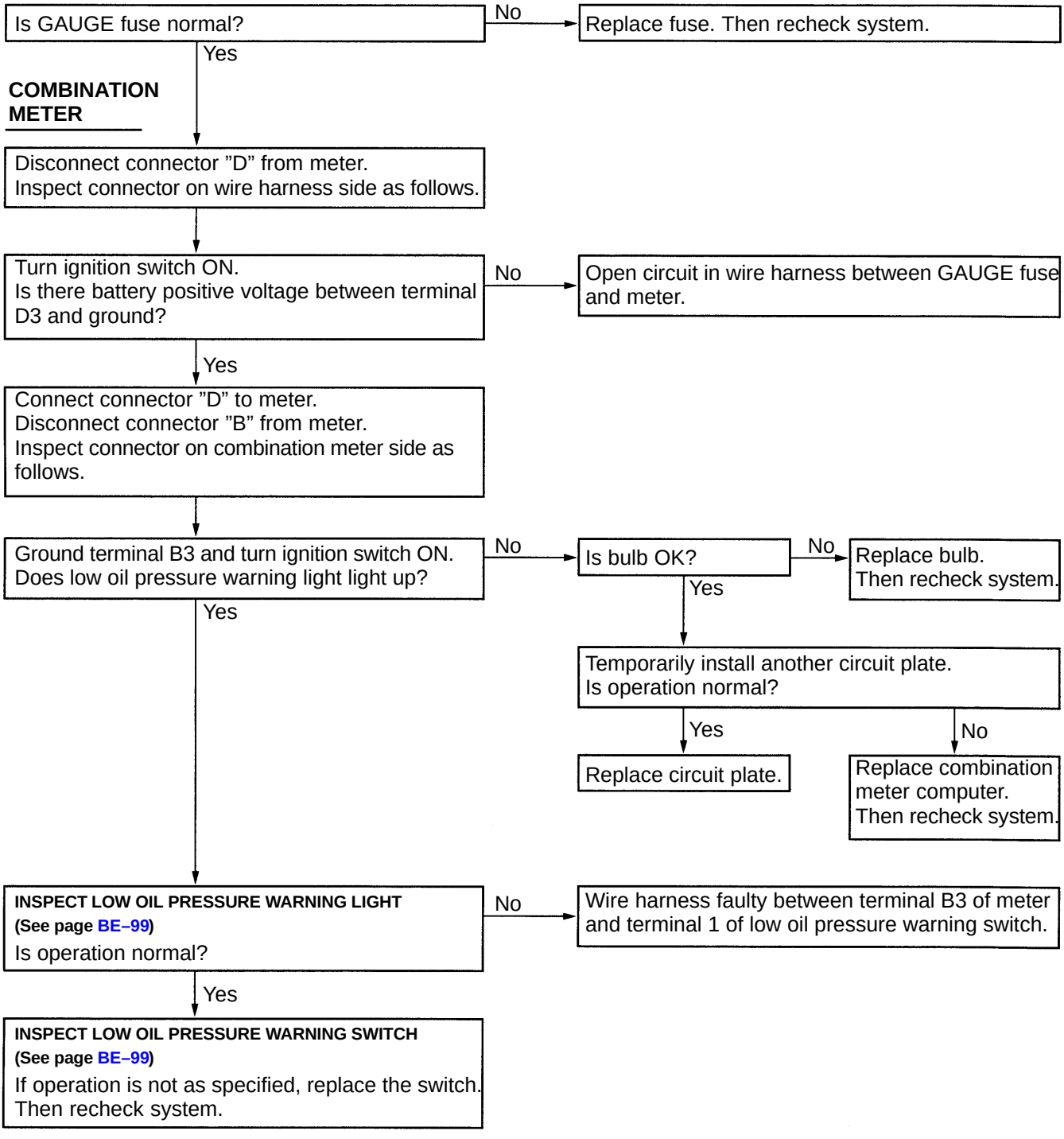
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08436

13	LOW OIL PRESSURE WARNING	Abnormal operation or warning light does not light up.

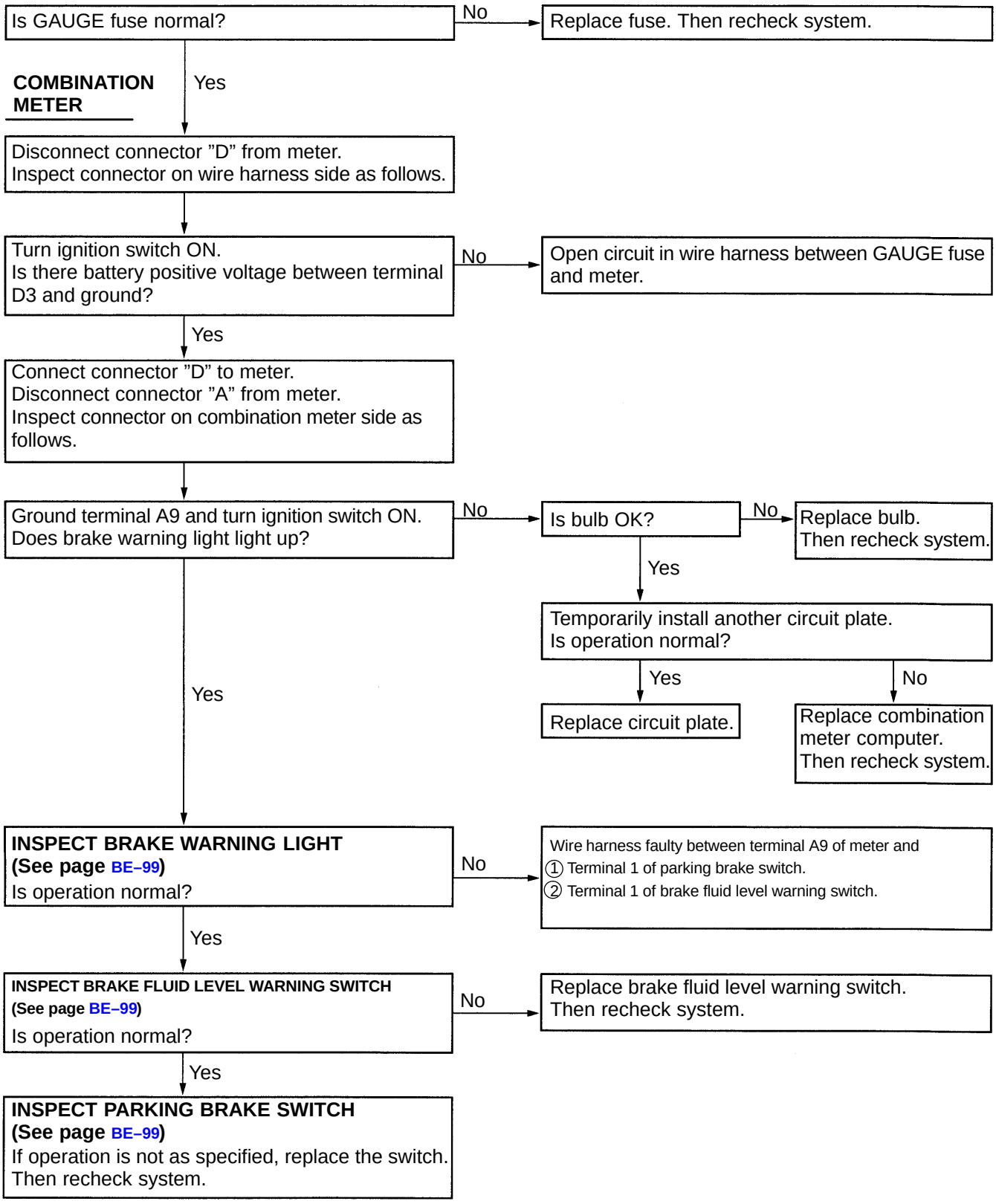
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08437

14	**BRAKE WARNING**	**Abnormal operation or warning light does not light up.**

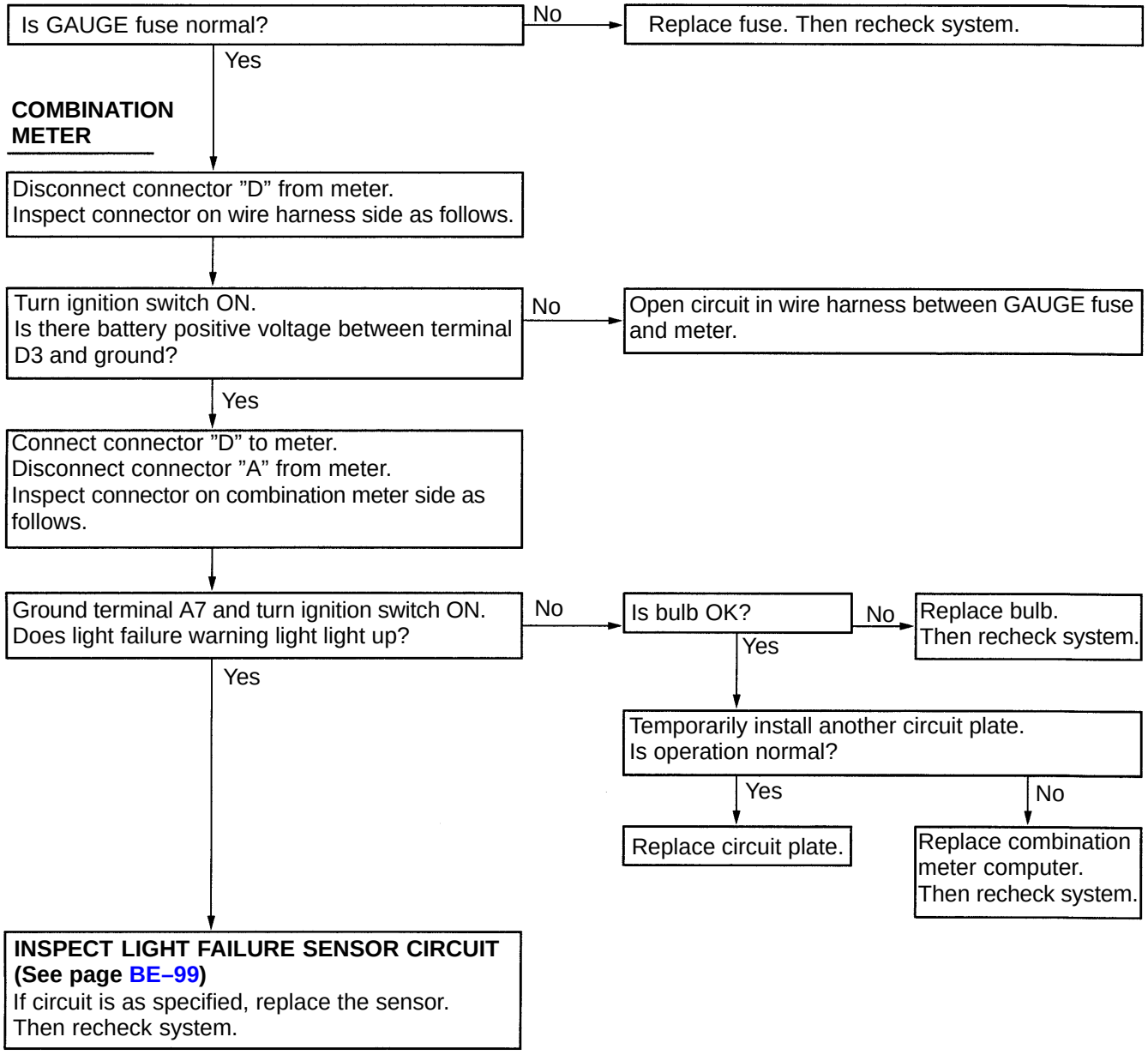
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08438

15	**REAR LIGHTS WARNING**	**Abnormal operation or warning light does not light up.**

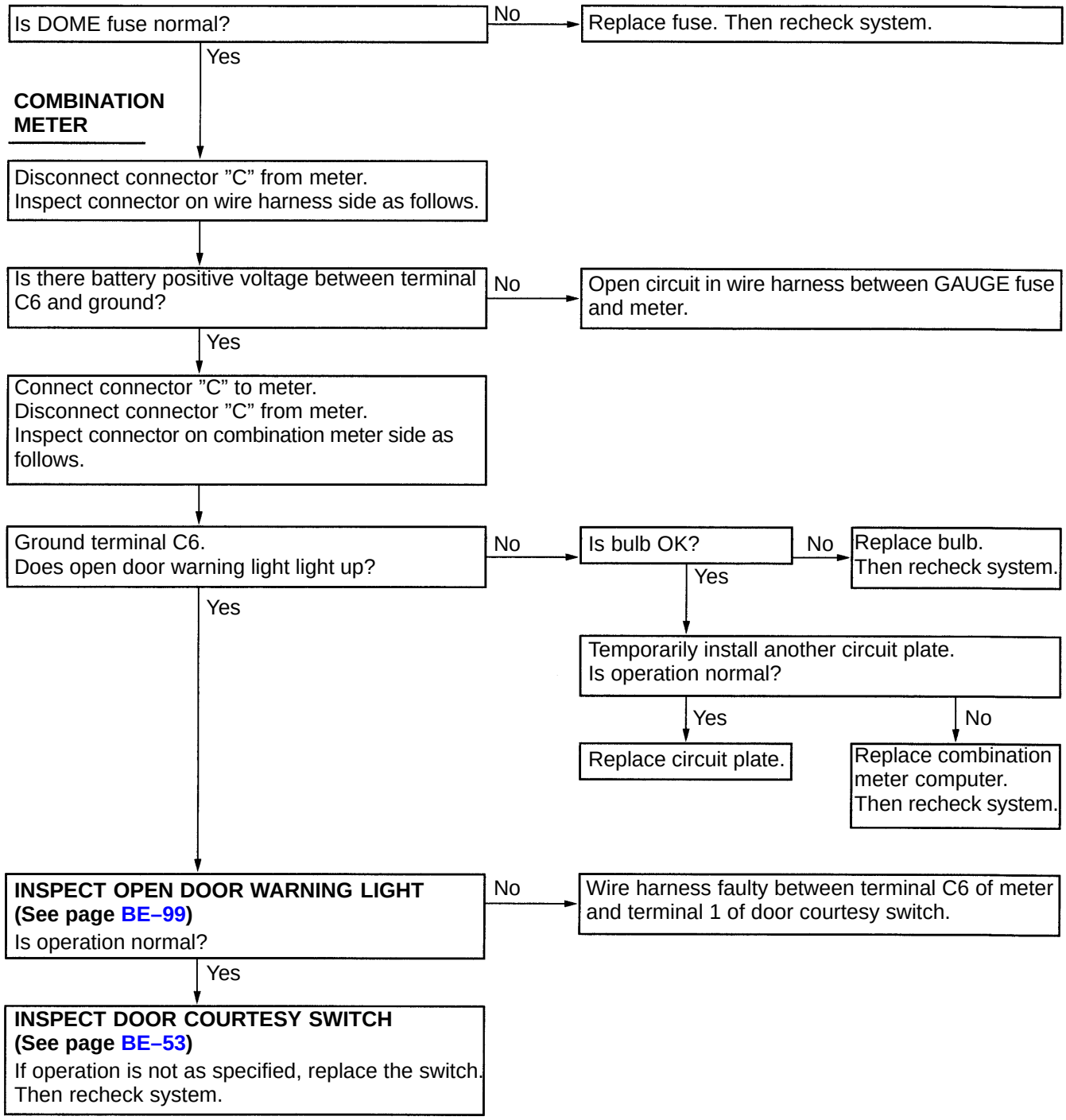
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08439

16	OPEN DOOR WARNING	**Abnormal operation or warning light does not light up.**

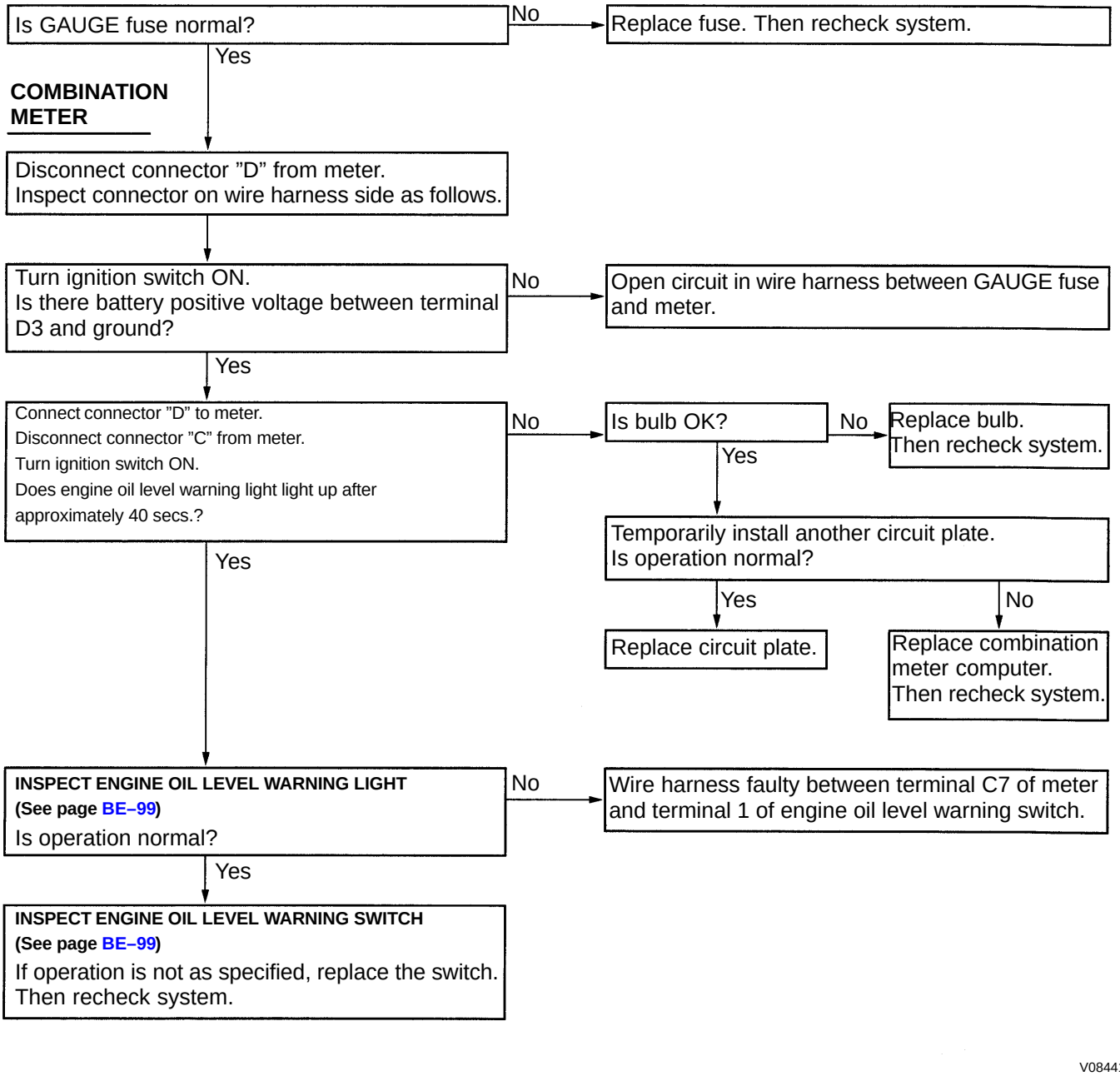
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08440

17	ENGINE OIL LEVEL WARNING	Abnormal operation or warning light does not light up.

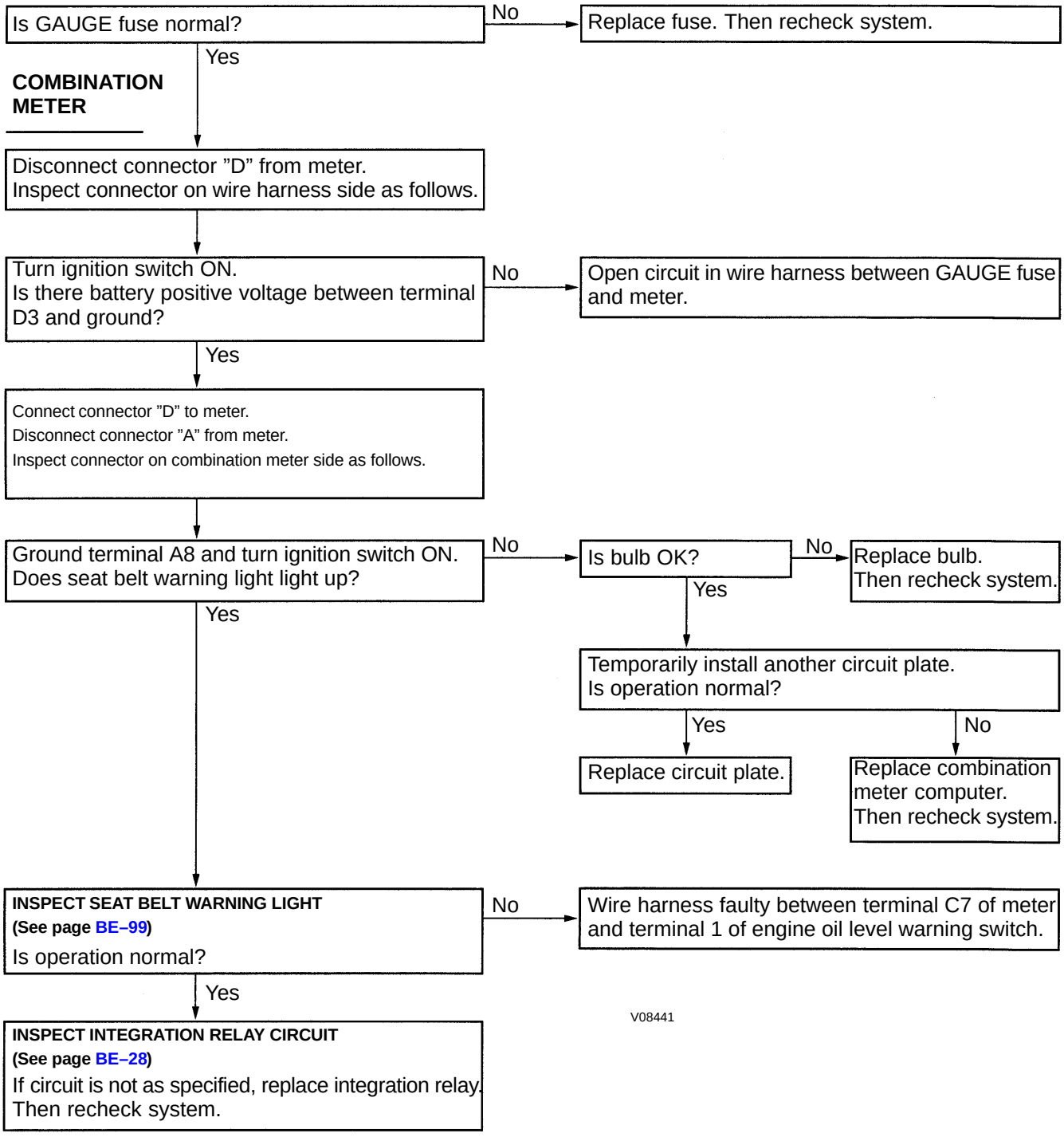
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08441

18	SEAT BELT WARNING	Abnormal operation or warning light does not light up.

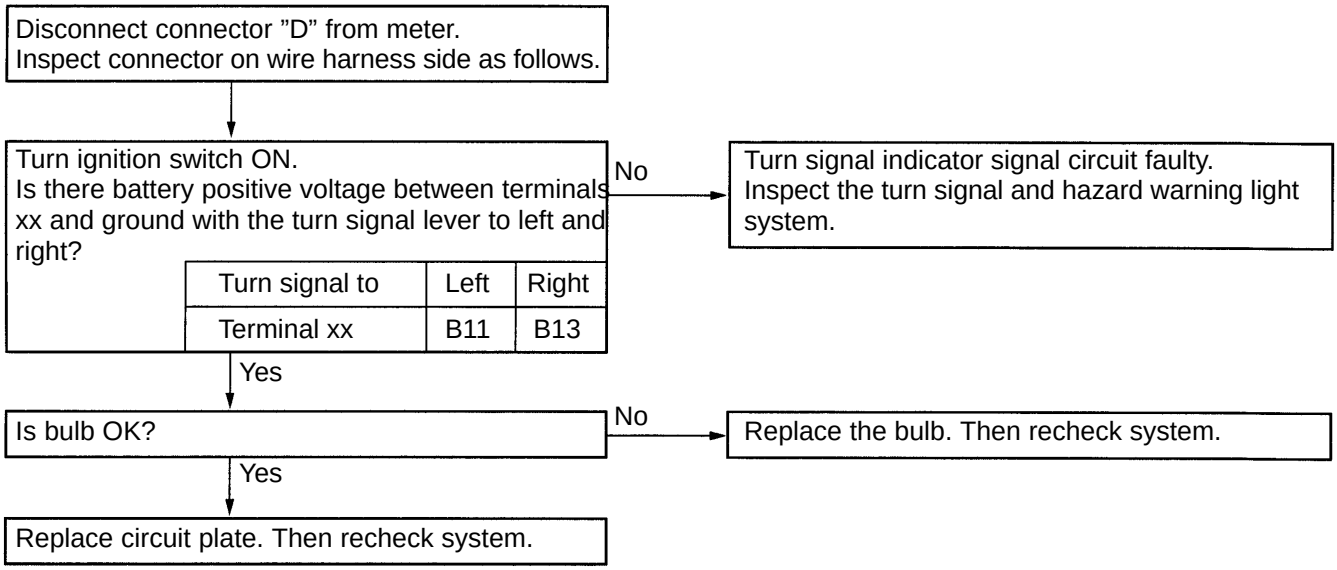
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08442

19	**TURN SIGNAL INDICATOR**	**Abnormal operation or warning light does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08443

20	**O/D OFF INDICATOR**	**Abnormal operation or indicator does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Disconnect connector "B" from meter.
Inspect connector on combination meter side as follows.

↓

Ground terminal B5 and turn ignition switch ON.
Does O/D OFF indicator light up?

Yes → O/D OFF indicator signal circuit faulty.

↓ No

Is bulb OK?

No → Replace the bulb.

↓ Yes

Replace circuit plate. Then recheck system.

21	**SHIFT POSITION INDICATOR**	**Abnormal operation or indicator does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Disconnect connector "D" from meter.
Inspect connector on wire harness side as follows.

↓

Turn ignition switch ON.
Is there battery positive voltage between terminals XX and ground with turn shift lever to P through L

Shift to	P	R	N	D	2	L
Terminal XX	B12	B14	C1	C2	B10	B9

No → Shift position indicator signal circuit faulty.

↓ Yes

Is bulb OK?

No → Replace the bulb. Then recheck system.

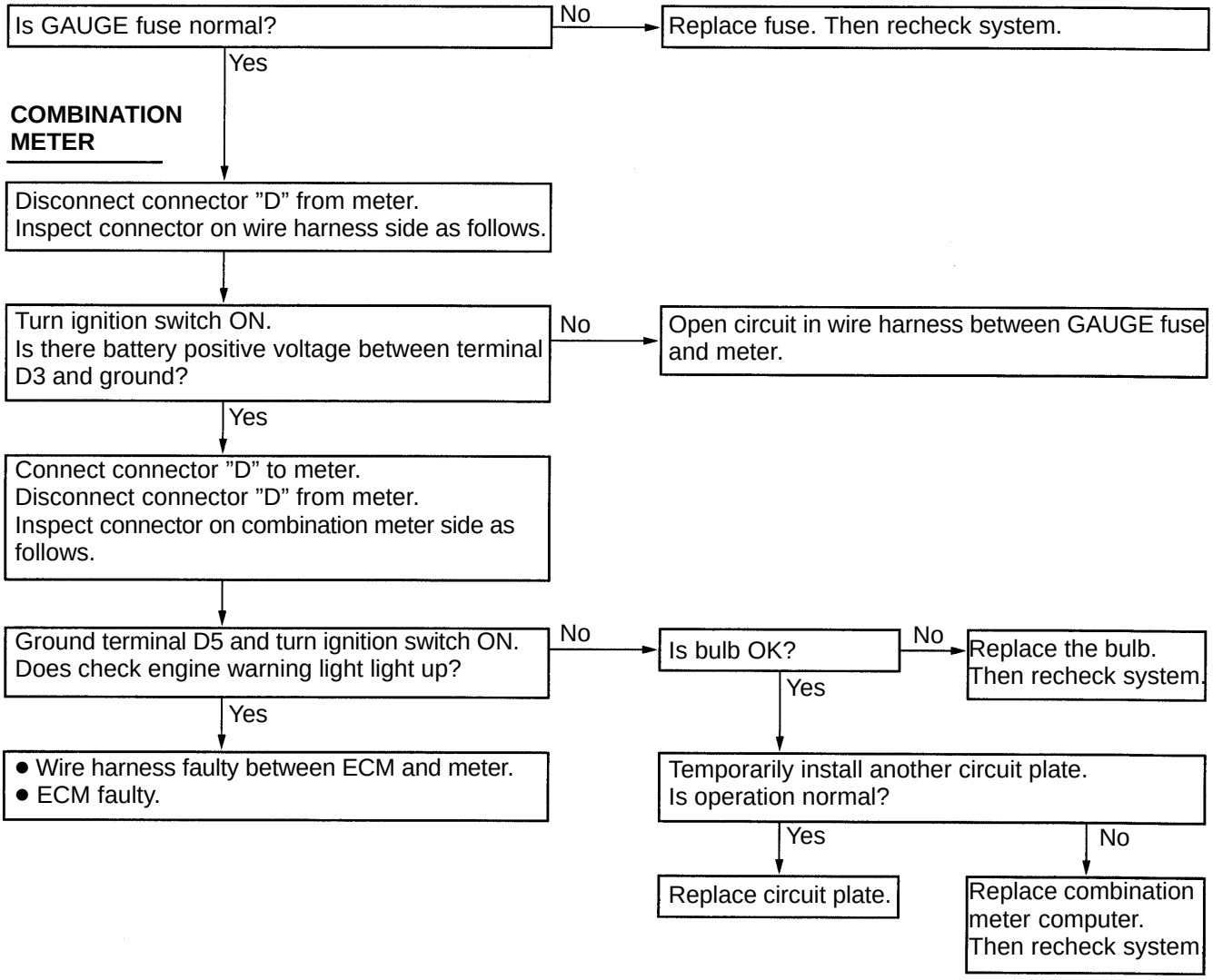
↓ Yes

Replace circuit plate. Then recheck system.

V08444

22	MALFUNCTION WARNING	Abnormal operation or warning light does not light up.

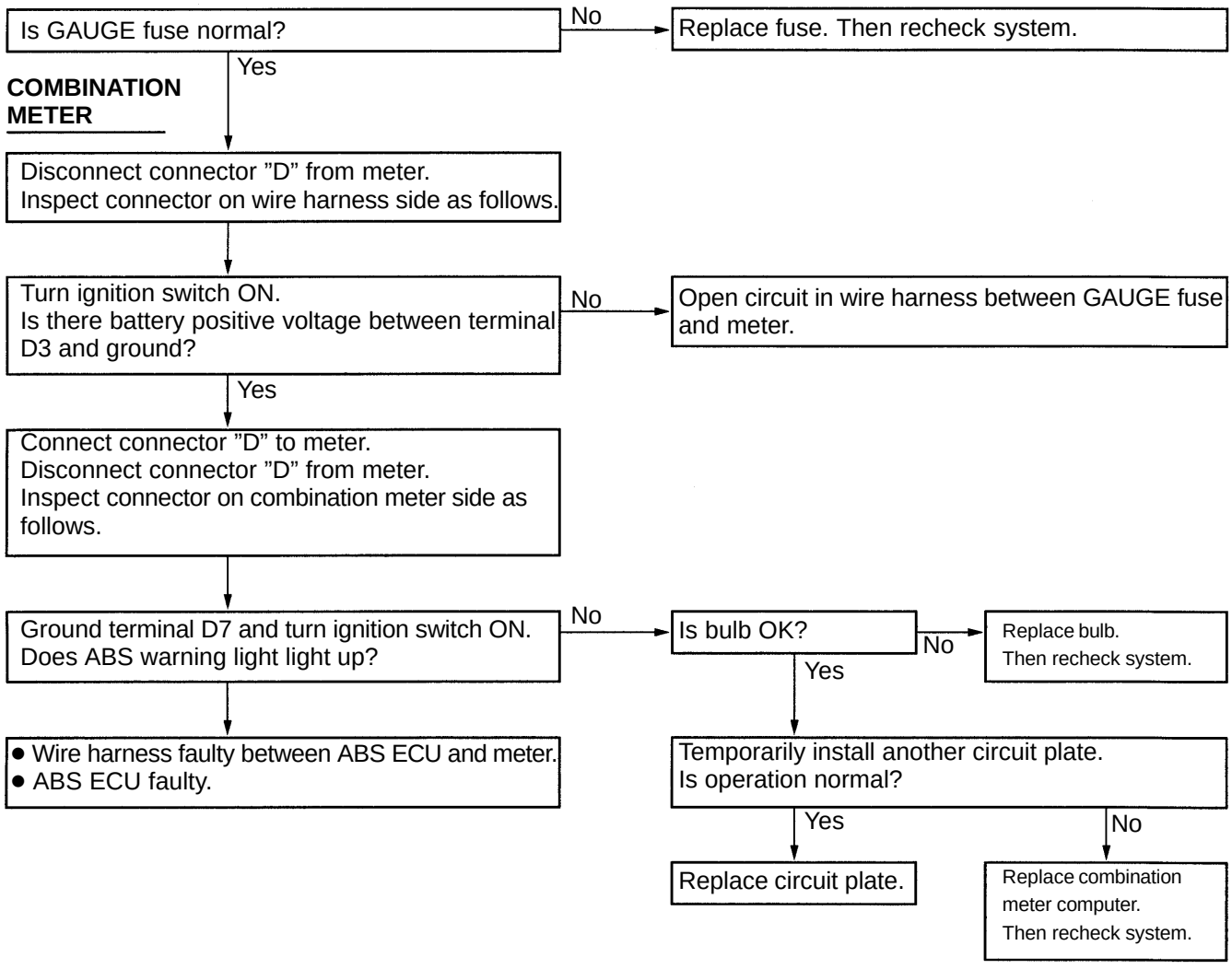
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08445

23	ABS WARNING	**Abnormal operation or warning light does not light up.**

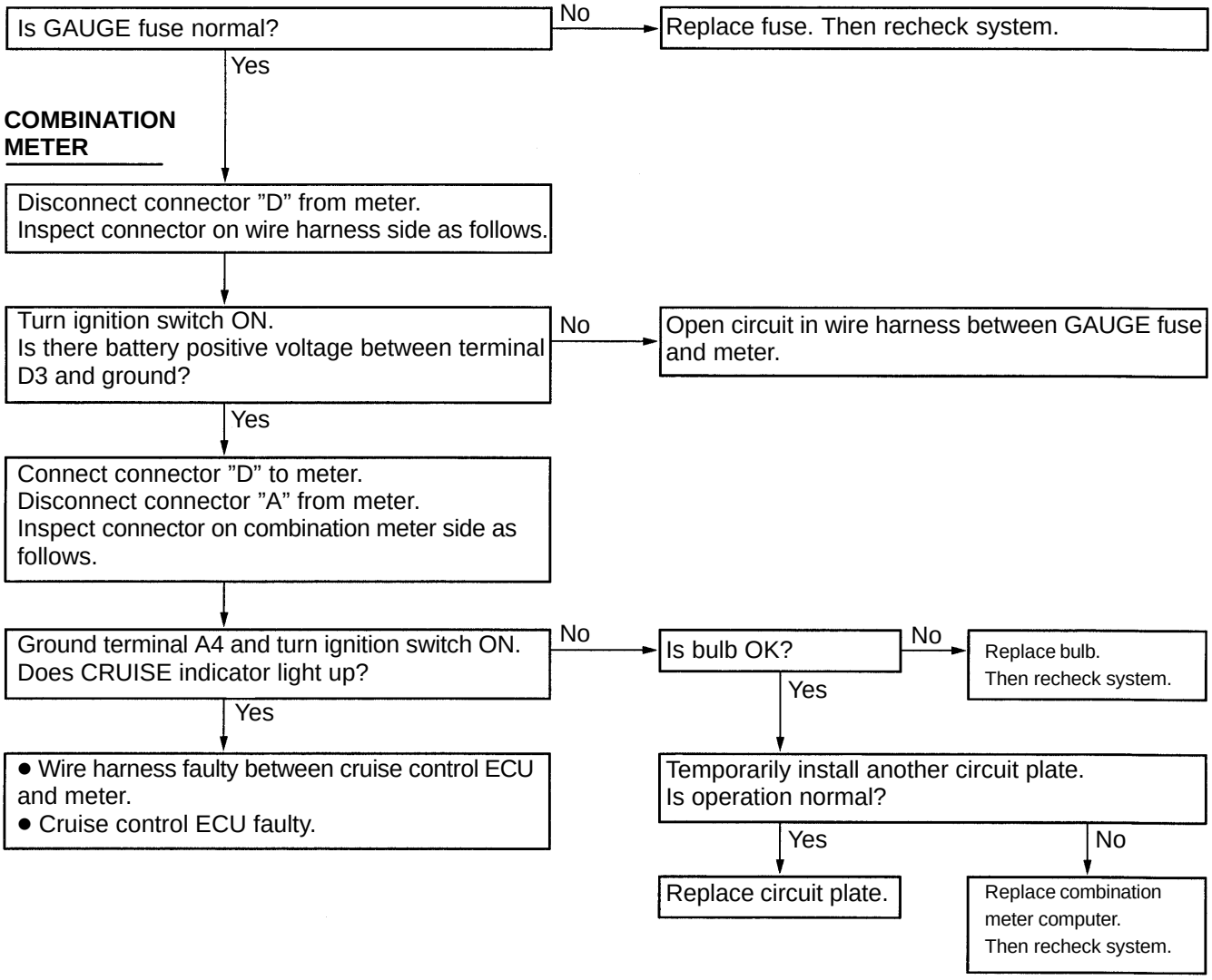
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08446

24	**CRUISE INDICATOR**	**Abnormal operation or indicator does not light up.**

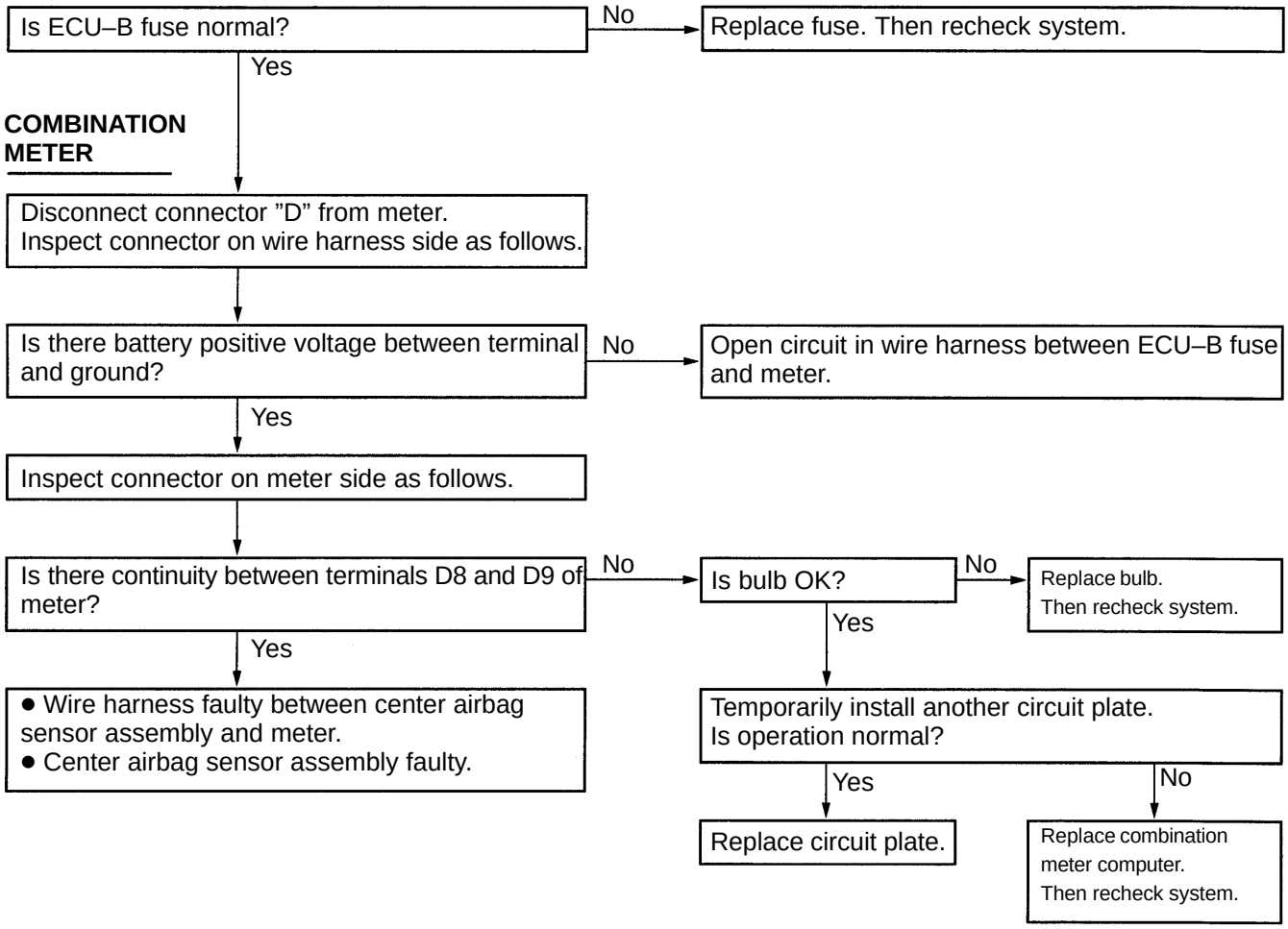
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08447

25	SRS WARNING	**Abnormal operation or warning light does not light up.**

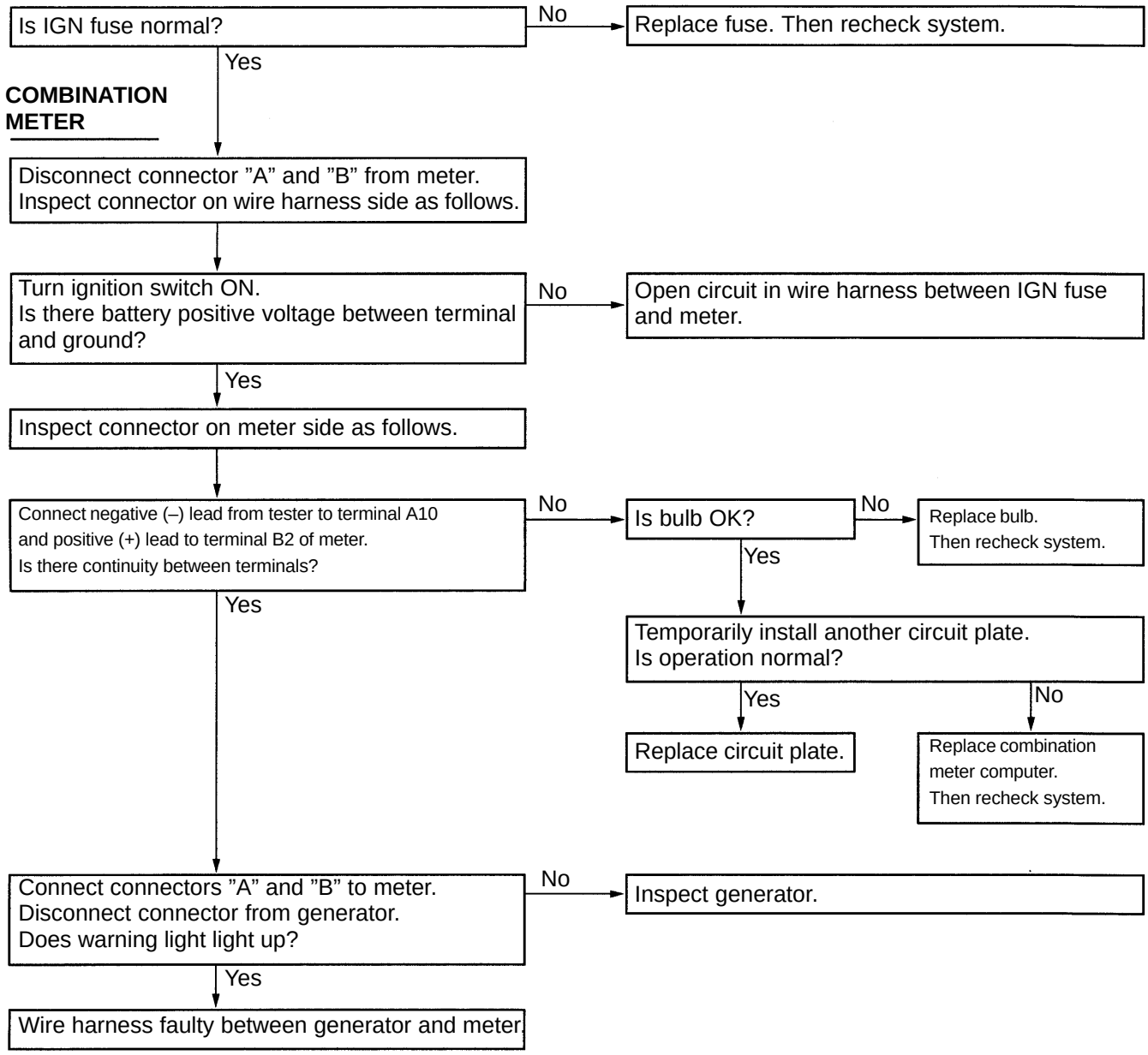
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08448

26	DISCHARGE WARNING	**Abnormal operation or warning light does not light up.**

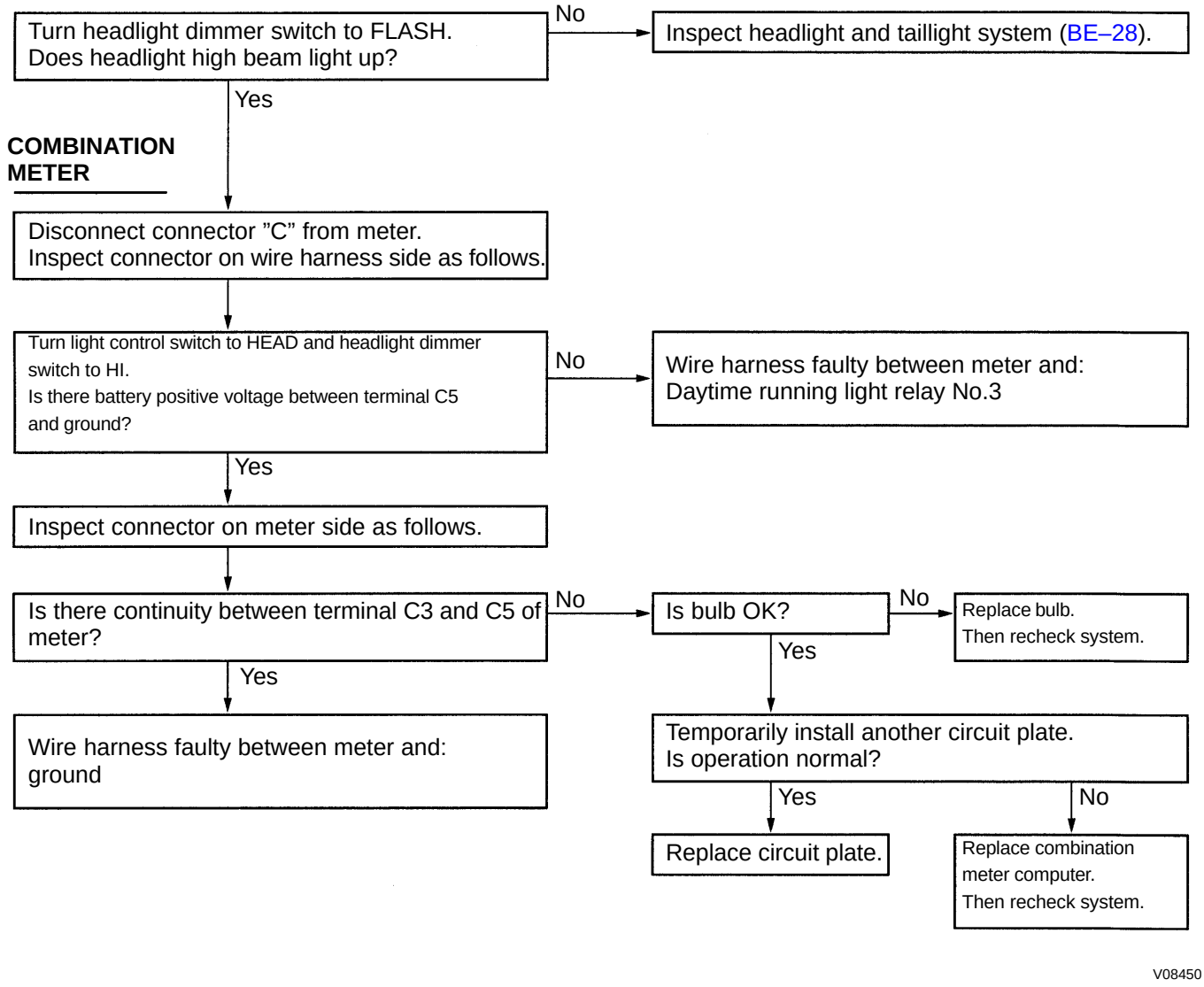
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08449

27	**HIGH BEAM INDICATOR**	**Abnormal operation or indicator does not light up.**

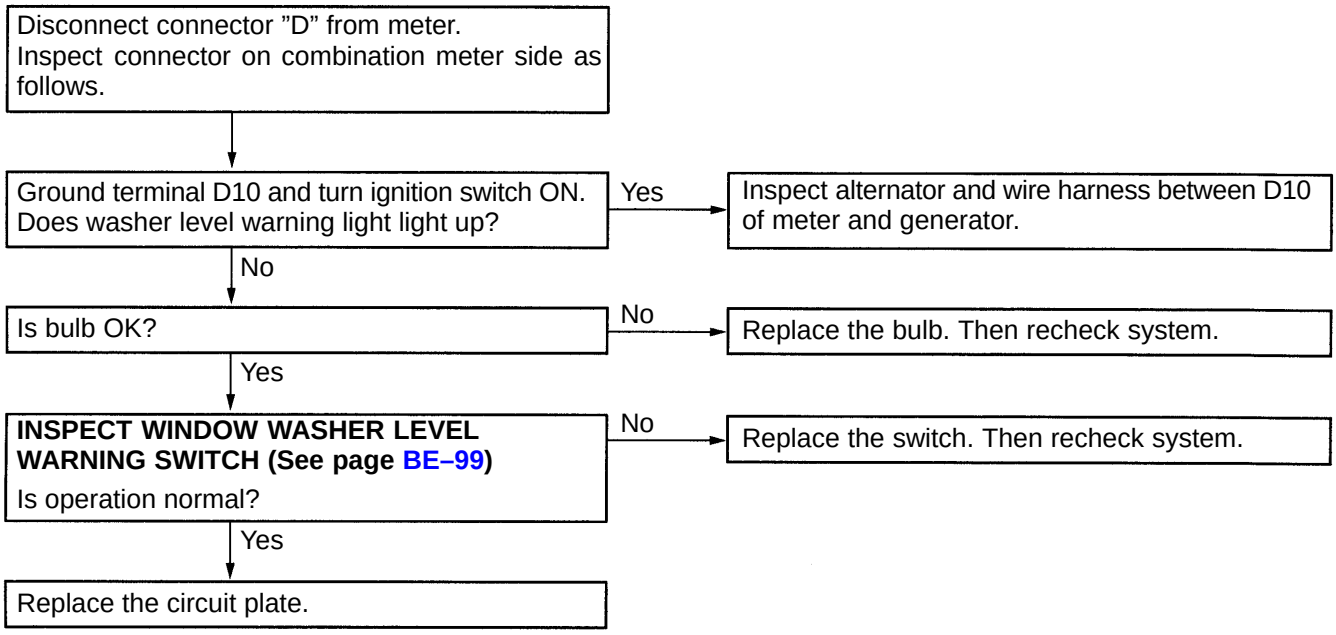
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08450

28	**WINDOW WASHER LEVEL WARNING SWITCH**	**Abnormal operation or indicator does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.



V08451

29	TAILLIGHT INDICATOR	**Abnormal operation or indicator does not light up.**

HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

Turn the light control switch to TAIL.
Does taillight light up?

No → Inspect headlight and taillight system.
(See page BE–28).

Yes

COMBINATION METER

Disconnect connectors "C" from meter.
Inspect connector on wire harness side as follows.

Is there battery positive voltage (0 V ↔ battery positive voltage) between following terminals with light control switch TAIL?
- C5 and ground.

No → Wire harness faulty between meter and:
- Light control switch.
- Taillight Relay.

Yes

Connect connectors "B" to meter.
Disconnect connector "B" from meter.
Inspect connector on combination meter side as follows.

Ground terminal B7 and turn the light control switch to TAIL. Does taillight indicator light up?

No → Is bulb OK?

No → Replace bulb.
Then recheck system.

Yes → Temporarily install another circuit plate.
Is operation normal?

Yes → Replace circuit plate.

No → Replace combination meter computer.
Then recheck system.

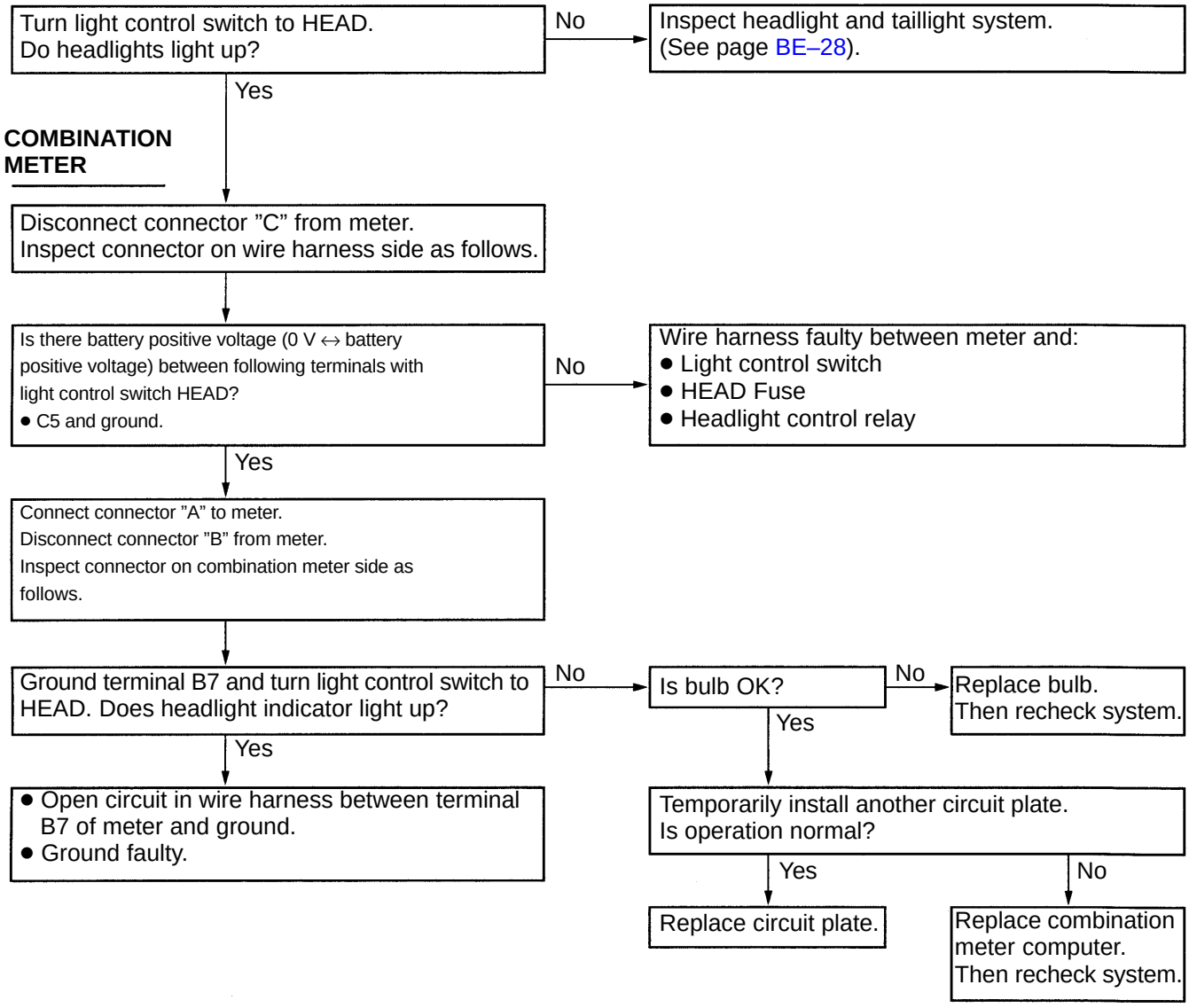
Yes

- Open circuit in wire harness between terminal B7 of meter and ground.
- Ground faulty.

V08452

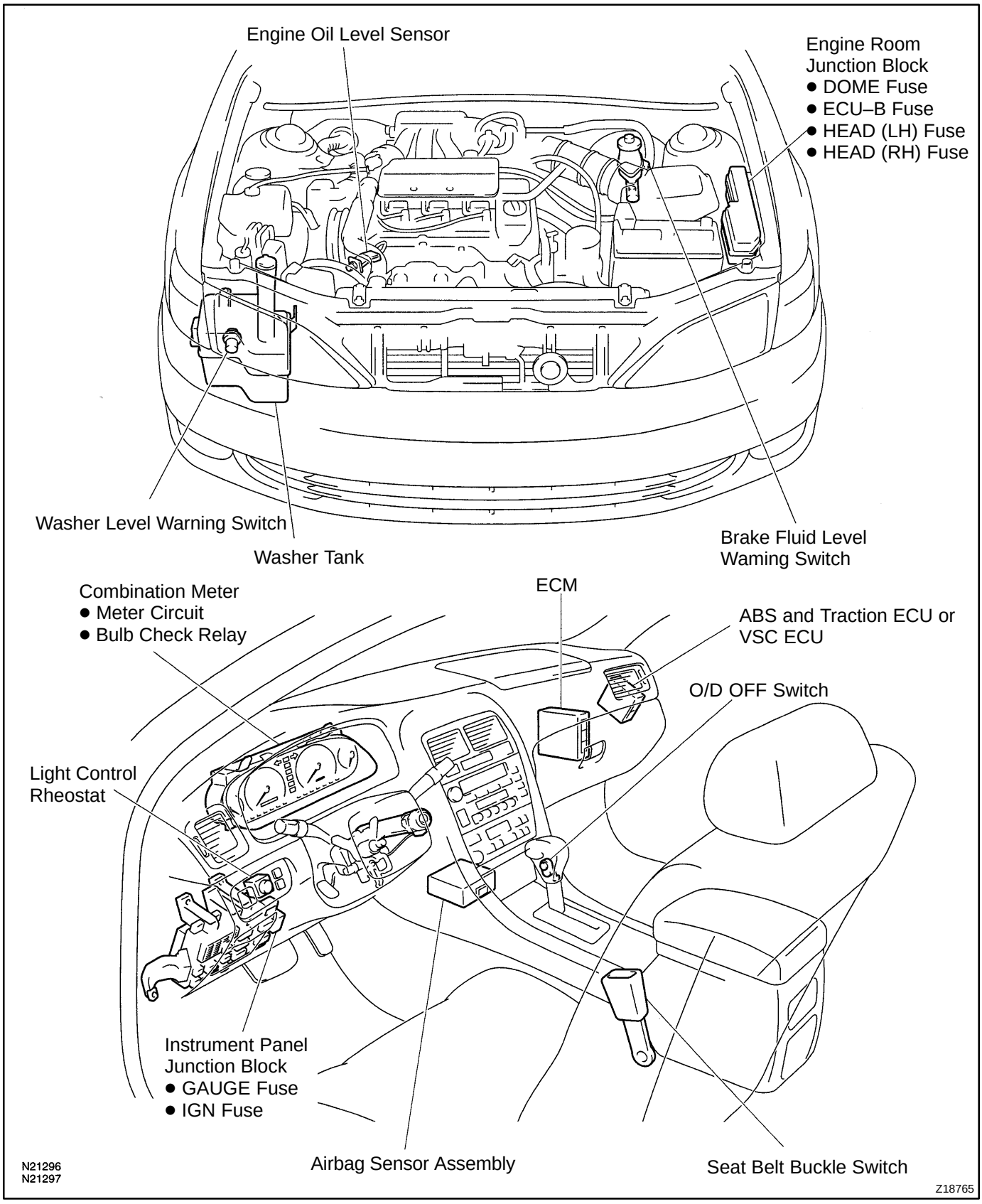
30	**HEADLIGHT INDICATOR**	**Abnormal operation or indicator does not light up.**

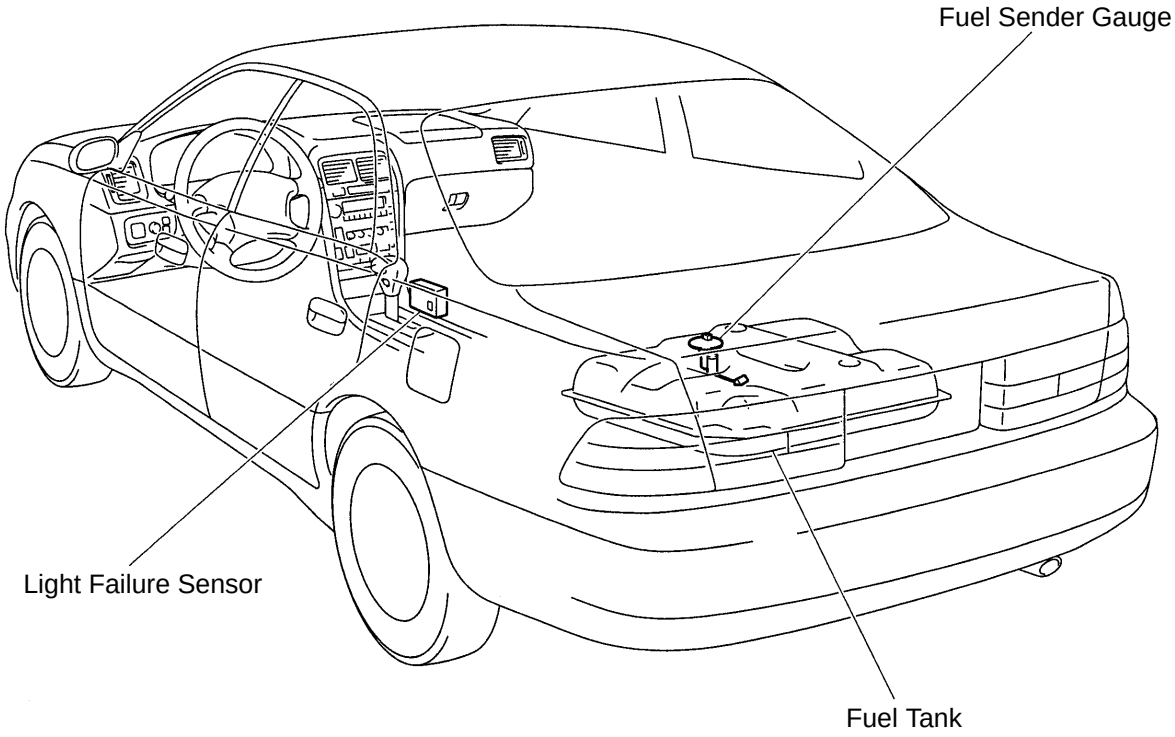
HINT : While carrying out the following inspection, make certain that the connectors and terminals are properly connected.

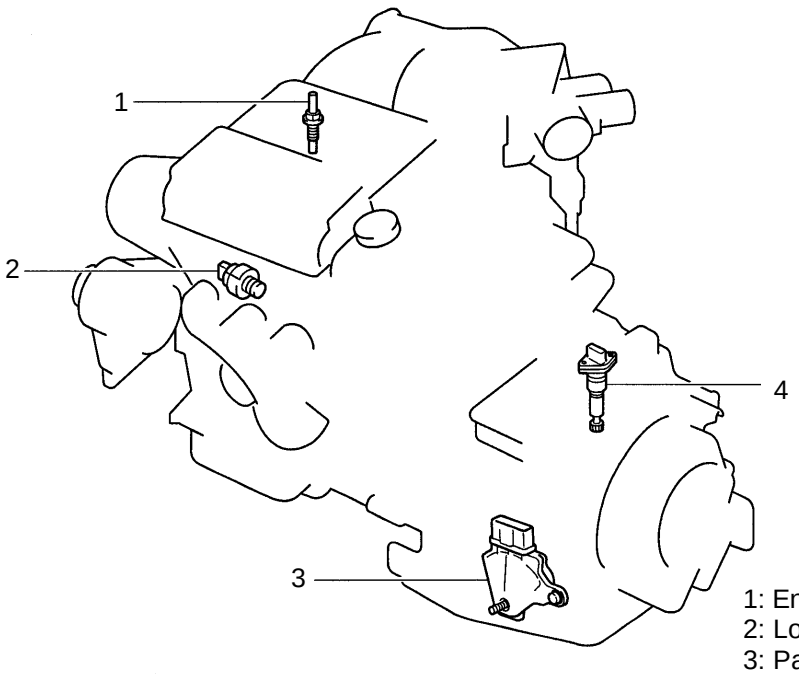


V08453

LOCATION


Engine Oil Level Sensor
Engine Room Junction Block
● DOME Fuse
● ECU–B Fuse
● HEAD (LH) Fuse
● HEAD (RH) Fuse
Washer Level Warning Switch
Washer Tank
Brake Fluid Level Waming Switch
Combination Meter
● Meter Circuit
● Bulb Check Relay
ECM
ABS and Traction ECU or VSC ECU
O/D OFF Switch
Light Control Rheostat
Instrument Panel Junction Block
● GAUGE Fuse
● IGN Fuse
Airbag Sensor Assembly
Seat Belt Buckle Switch
N21296
N21297
Z18765





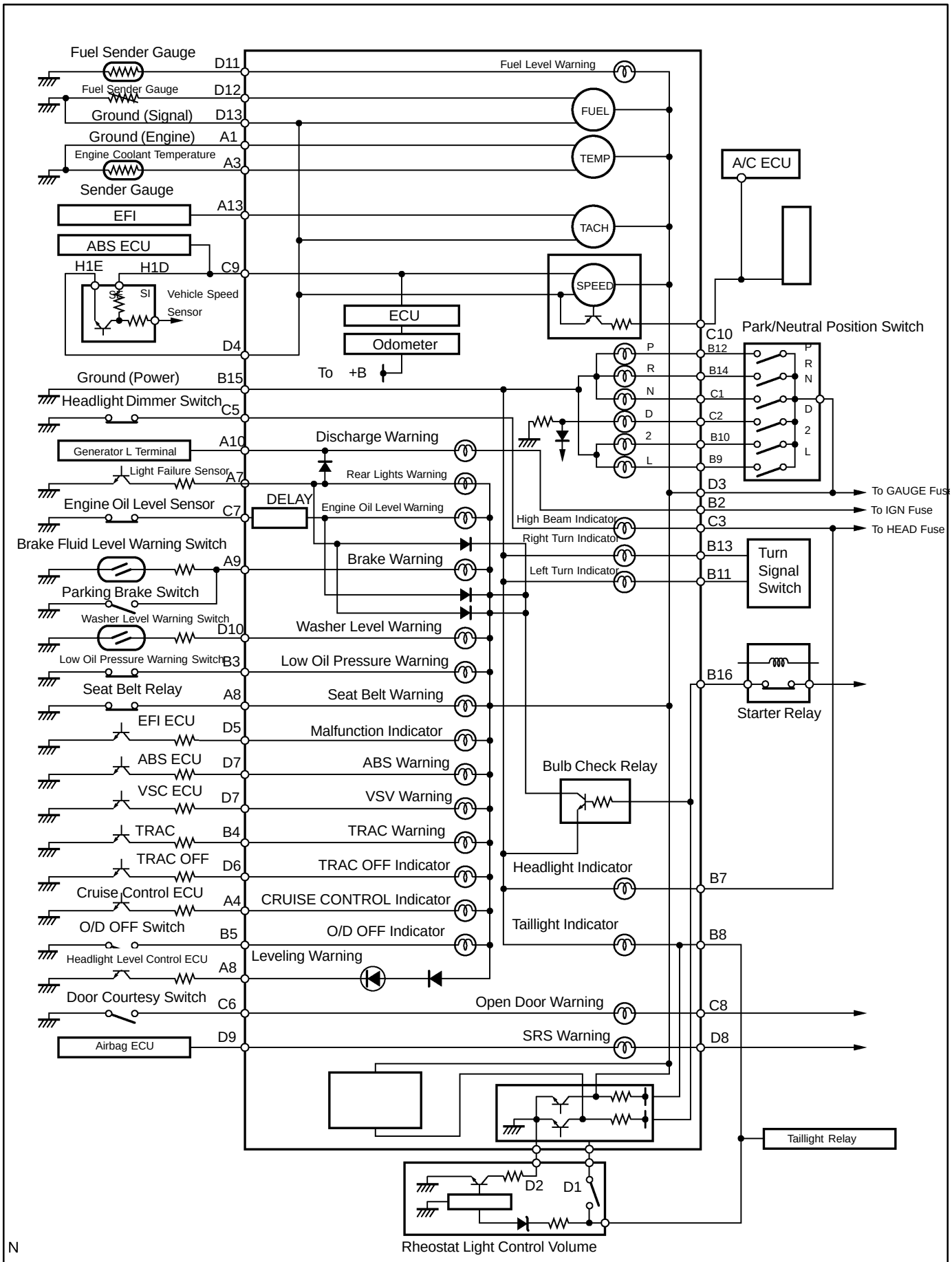
1: Engine Coolant Temperature Sender Gauge
2: Low Oil Pressure Switch
3: Park/Neutral Position Switch
4: Vehicle Speed Sensor

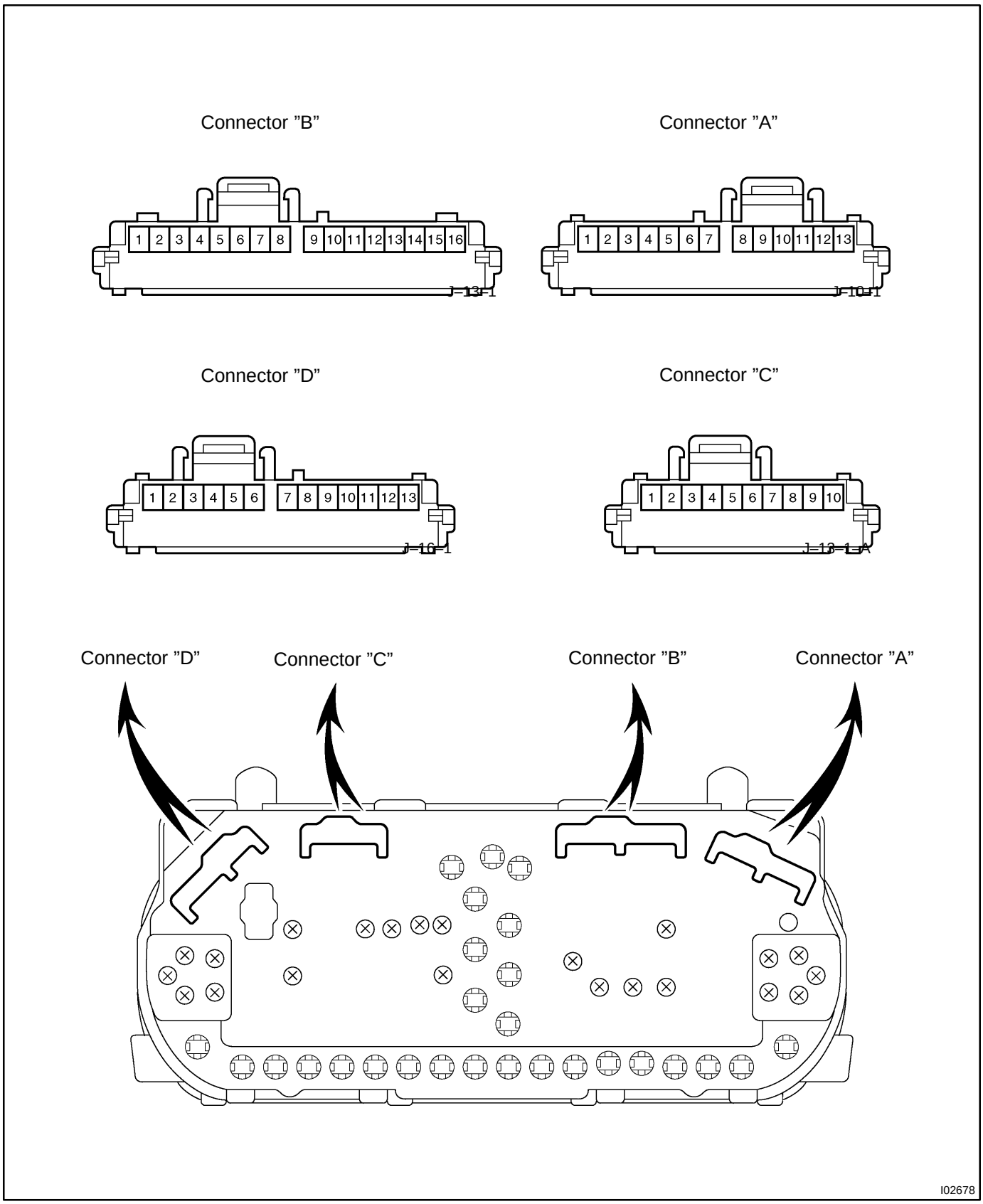
N21298
N21299

Z18766

BE05F–03

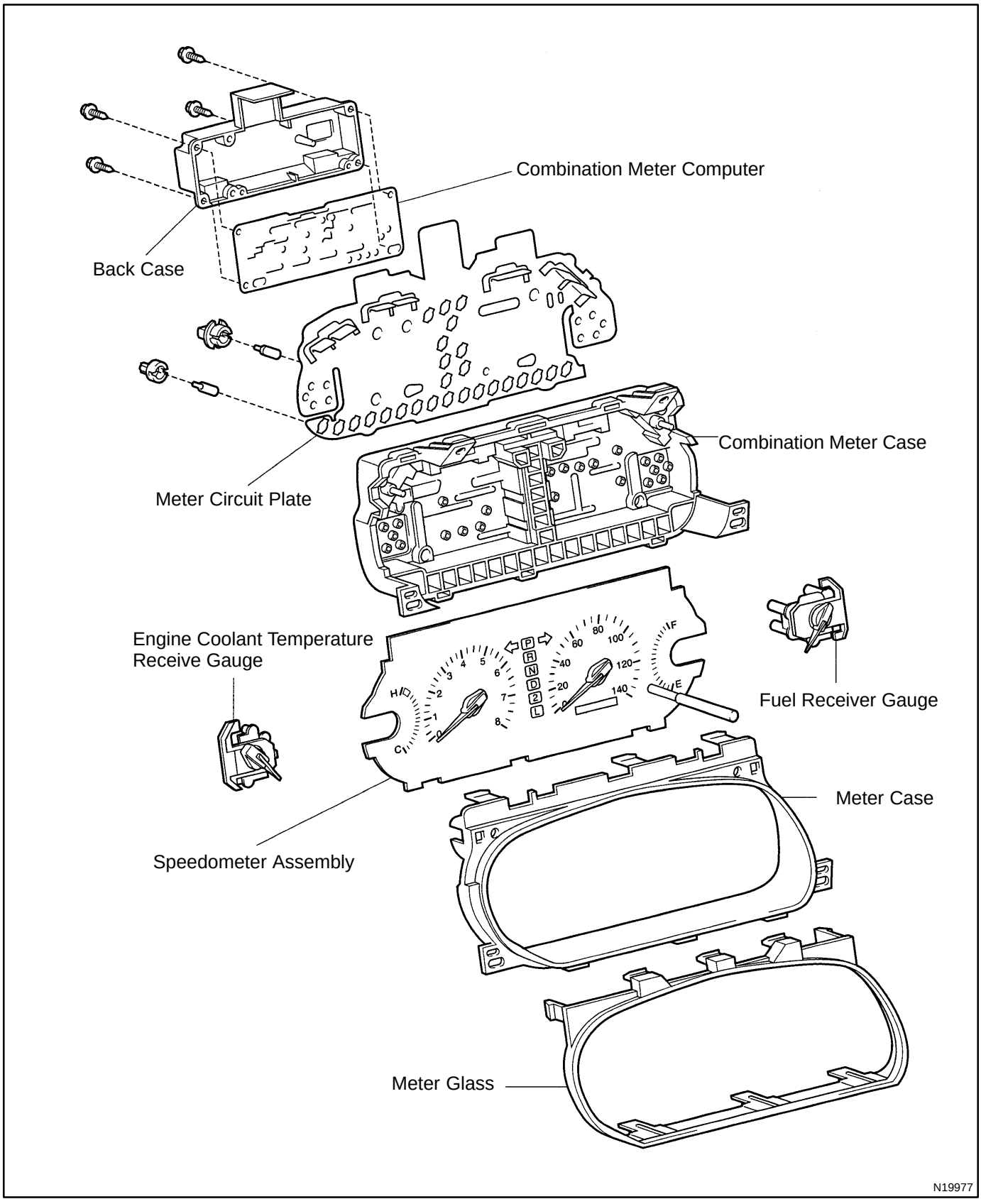
CIRCUIT




Connector ”B”
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
J–13–1
Connector ”A”
1 2 3 4 5 6 7 8 9 10 11 12 13
J–10–1
Connector ”D”
1 2 3 4 5 6 7 8 9 10 11 12 13
J–16–1
Connector ”C”
1 2 3 4 5 6 7 8 9 10
J–13–1–A
Connector ”D”
Connector ”C”
Connector ”B”
Connector ”A”
I02678

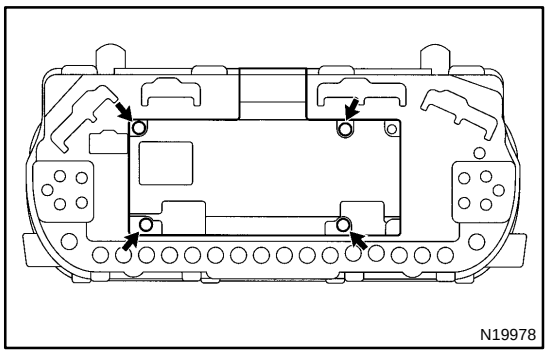
BE05G–02

COMPONENTS



BE05H–02

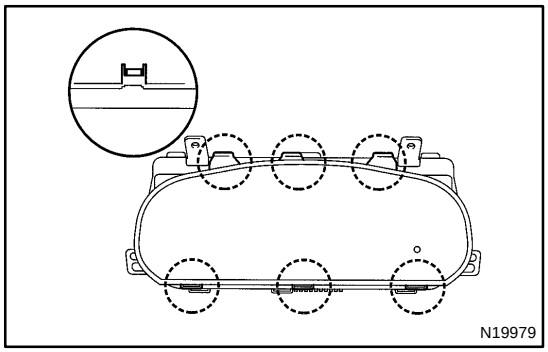
DISASSEMBLY



1. REMOVE BACK COVER

(a) Remove the 4 screws.

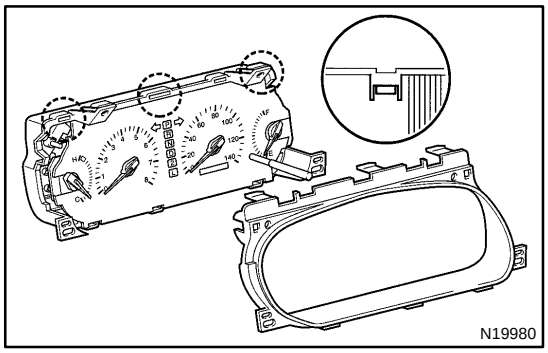
(b) Remove the back cover from the meter case.



2. REMOVE METER GLASS

(a) Remove the 8 claws.

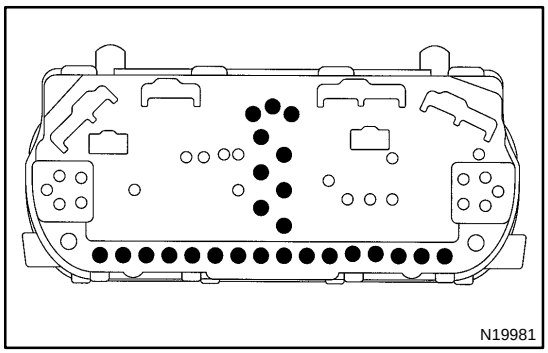
(b) Remove the meter glass from the meter case.



3. REMOVE METER PLATE

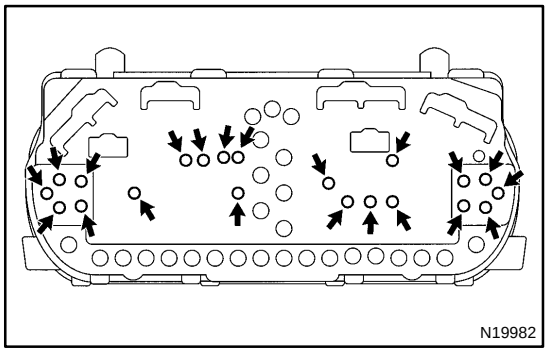
(a) Remove the 8 claws.

(b) Remove the meter plate from the meter case.



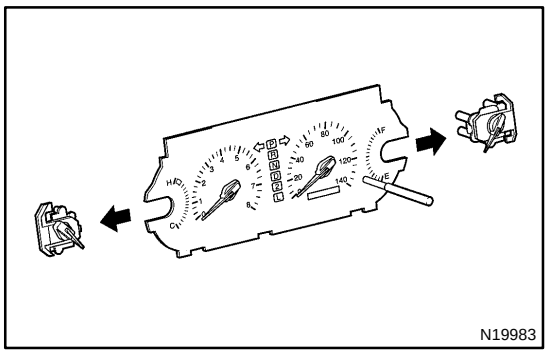
4. REMOVE METER CIRCUIT PLATE

(a) Remove the 27 bulbs.



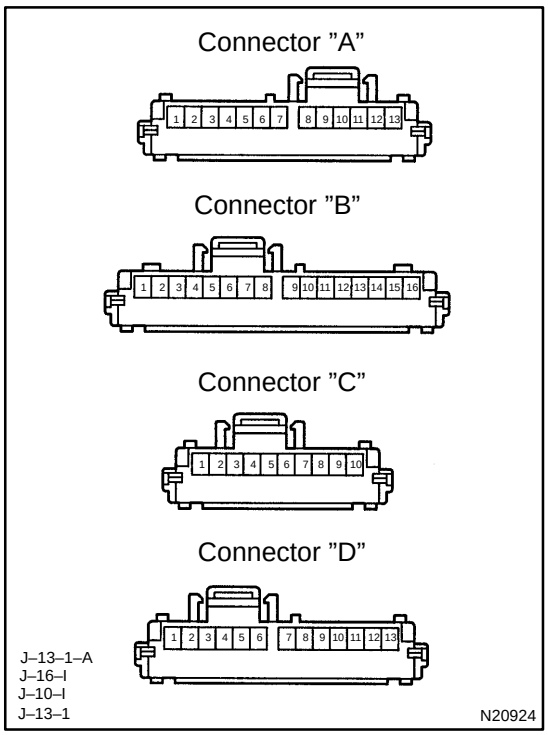
(b) Remove the 22 screws.

(c) Remove the meter circuit plate from the meter case.



5. **REMOVE SPEEDOMETER ASSEMBLY**
6. **REMOVE FUEL GAUGE**
7. **REMOVE ENGINE COOLANT TEMPERATURE GAUGE**

BE05I–02



INSPECTION

1. INSPECT COMBINATION METER WIRING CIRCUIT

Disconnect the connector ”A”, connector ”B”, connector ”C” and connector ”D” from the combination meter and inspect the connectors on the wire harness side.

Park/Neutral Position Switch:

Tester connection	Condition	Specified condition
B12 – Ground	Ignition switch ON and shift lever position ”P”	Battery positive voltage
B14 – Ground	Ignition switch ON and shift lever position ”R”	Battery positive voltage
C1 – Ground	Ignition switch ON and shift lever position ”N”	Battery positive voltage
C2 – Ground	Ignition switch ON and shift lever position ”D”	Battery positive voltage
B10 – Ground	Ignition switch ON and shift lever position ”2”	Battery positive voltage
B9 – Ground	Ignition switch ON and shift lever position ”L”	Battery positive voltage

Turn Signal Switch and Hazard Warning Switch:

Tester connection	Condition	Specified condition
B13 – Ground	Hazard warning switch ON	Battery positive voltage ↔ 0V
B13 – Ground	Ignition switch ON and turn signal switch to ”Right”	Battery positive voltage ↔ 0V
B11 – Ground	Hazard warning switch ON	Battery positive voltage ↔ 0V
B11 – Ground	Ignition switch ON and turn signal switch to ”Left”	Battery positive voltage ↔ 0V

Headlight:

Tester connection	Condition	Specified condition
C3 – C5	Light control switch ”HEAD” (Dimmer switch ”LO”)	No voltage
C3 – C5	Light control switch ”HEAD” (Dimmer switch ”HI” or ”Flash”)	Battery positive voltage

GAUGE Fuse:

Tester connection	Condition	Specified condition
D3 – Ground	Ignition switch position ACC, START	No voltage
D3 – Ground	Ignition switch position ON	Battery positive voltage

IGN Fuse:

Tester connection	Condition	Specified condition
D3 – Ground	*2 Ignition switch position LOCK, ACC, START	No voltage
D3 – Ground	*2 Ignition switch position ON	Battery positive voltage

Fuel Sender Gauge:

Tester connection	Condition	Specified condition
D12 – D13	Float position Full, Approx. 91.1 mm (3.587 in.)	Approx. 4.6V
D12 – D13	Float position 1/2, Approx. 34.2 mm (1.346 in.)	Approx. 2.4V
D12 – D13	Float position Empty, Approx. 30.8 mm (1.213 in.)	Approx. 0.3V
D11 – D12	Ignition switch ON	Approx. 5V

Ground (Signal):

Tester connection	Condition	Specified condition
D13 – Ground	Constant	Continuity

Ground (Engine):

Tester connection	Condition	Specified condition
A1 – Ground	Constant	Continuity

Ground (Power):

Tester connection	Condition	Specified condition
B15 – Ground	Constant	Continuity

Generator ”L” Terminal:

Tester connection	Condition	Specified condition
A10 – Ground	Engine stop	Continuity
A10 – Ground	Engine running	Battery positive voltage

Engine Oil Level Warning Switch:

Tester connection	Condition	Specified condition
C7 – Ground	Oil temperature above approx. 55 ˚C (131 ˚F) and switch position OFF (float down)	No continuity
C7 – Ground	Oil temperature below approx. 55 ˚C (131 ˚F)	Continuity
C7 – Ground	Oil temperature above approx. 55 ˚C (131 ˚F) and switch position ON (float up)	Continuity

DOME fuse:

Tester connection	Condition	Specified condition
C8 – Ground	Constant	Battery positive voltage

Rheostat Light Control:

Tester connection	Condition	Specified condition
D1 – Ground	Light control switch TAIL or HEAD and turn rheostat volume knob.	Voltage changes no voltage or voltage fluctuates

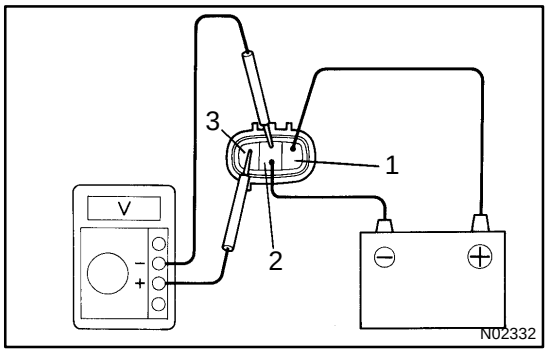
*2 Shift lever position is ”N” or ”P” position.

If circuit is not as specified, refer to BE–60 wiring diagram and inspect the circuit connected to other parts.

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.
If error is excessive, replace the speedometer.

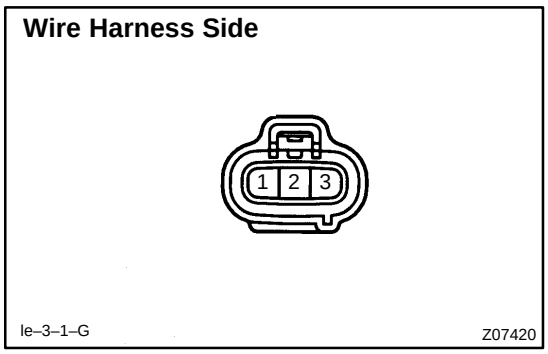
USA (mph)		CANADA (km/h)	
Standard indication	Allowable range	Standard indication	Allowable range
20	18 – 24	20	17 – 24
40	38 – 44	40	38 – 46
60	56 – 66	60	57.5 – 67
80	78 – 88	80	77 – 88
100	98 – 110	100	96 – 109
120	118 – 132	120	115 – 130
		140	134 – 151.5
		160	153 – 173



3. 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. 0 V to 11 V or more between terminals 2 and 3.

HINT:
The voltage change should be performed 4 times for every revolution of the speed sensor shaft.
If operation is not as specified, replace the sensor.



4. INSPECT VEHICLE SPEED SENSOR CIRCUIT

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

Tester connection	Condition	Specified condition
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	Battery positive voltage

If circuit is not as specified, inspect power source or wire harness.

5. INSPECT TACHOMETER ON–VEHICLE

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

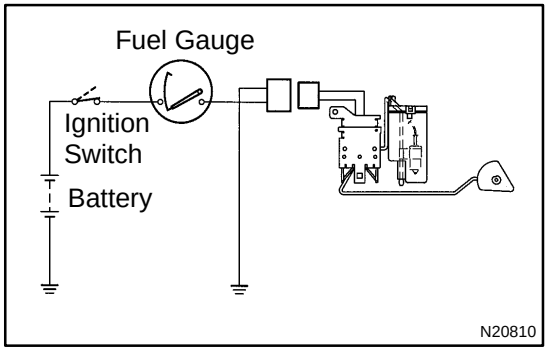
NOTICE:

- **Reversing the connection of the tachometer will damage the transistors and diodes inside.**
- **When removing or installing the tachometer, be careful not to drop or subject it to heavy shocks.**

(b) Compare the tester and tachometer readings.

DC 13.5 V 25 ˚C at (77˚F)

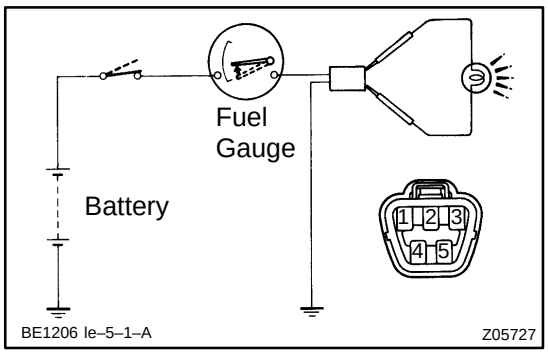
Standard indication	Allowable range
700	630 – 770
1,000	900 – 1,100
2,000	1,850 – 2,150
3,000	2,800 – 3,200
4,000	3,800 – 4,200
5,000	4,800 – 5,200
6,000	5,750 – 6,250
7,000	6,700 – 7,300



6. INSPECT FUEL RECEIVER GAUGE OPERATION

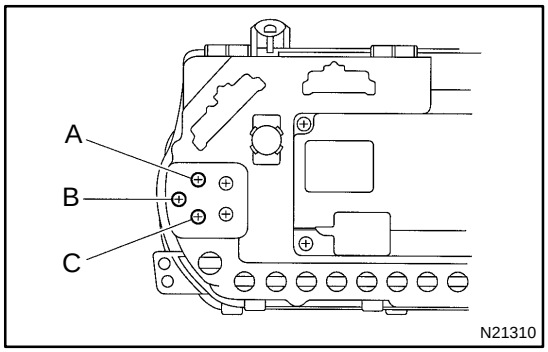
(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON, check that the receiver gauge needle indicates EMPTY.



(c) Connect terminals 2 and 3 on the wire harness side connector through a 3.4–W test bulb.
(d) Turn the ignition switch ON, check that the bulb lights up and the receiver gauge needle moves toward ”E” side.

HINT:
Because of the silicon oil in the gauge, it will take a short time for needle to stabilize.
If operation is not as specified, inspect the receiver gauge resistance.

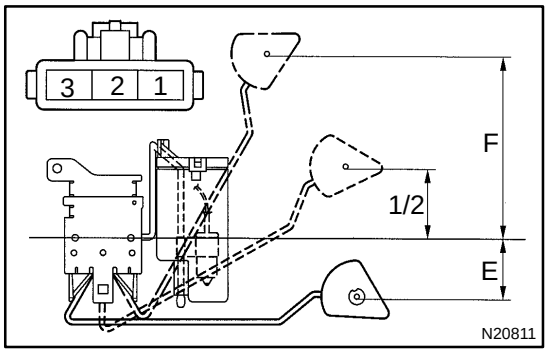


7. INSPECT FUEL RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals.

Tester connection	Resistance (Ω)
A – B	Approx. 270.8
A – C	Approx. 91.3
B – C	Approx. 179.5

If resistance value is not as specified, replace the receiver gauge.

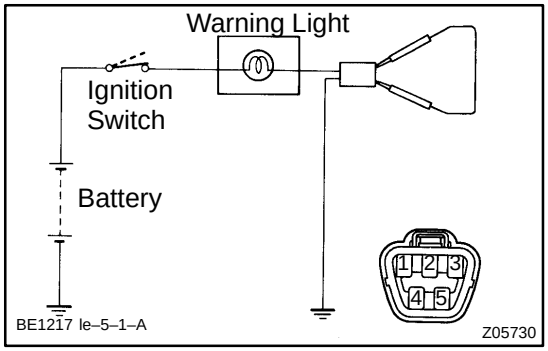


8. INSPECT FUEL SENDER GAUGE RESISTANCE

Measure the resistance between terminals 2 and 3 for each float position.

Float position mm (in.)	Resistance (Ω)
F: Approx. 91.1 (3.587)	Approx. 3.0
1/2: Approx. 34.2 (1.346)	Approx. 31.7
E: Approx. 30.8 (1.213)	Approx. 110.0

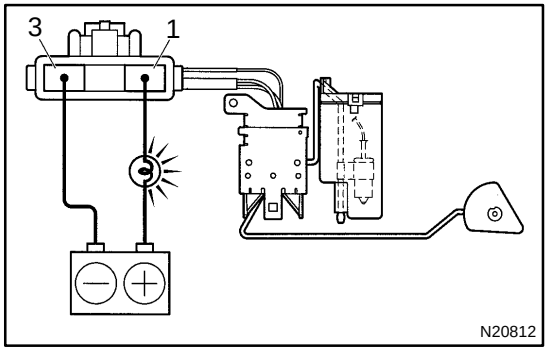
If resistance value is not as specified, replace the sender gauge.



9. INSPECT FUEL LEVEL WARNING LIGHT

(a) Disconnect the connector from the sender gauge.
(b) Connect terminals 1 and 3 on the wire harness side connector.
(c) Turn the ignition switch ON, check that the warning light lights up.

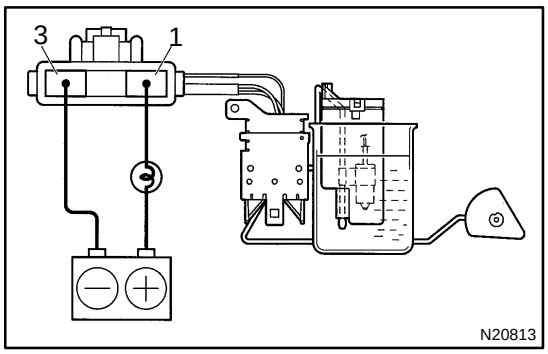
If the warning light does not light up, test the bulb or inspect wire harness.



10. INSPECT FUEL LEVEL WARNING SWITCH

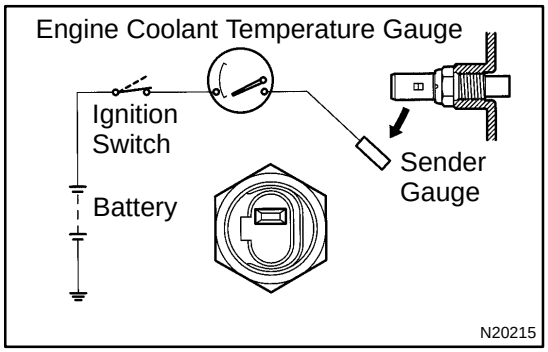
(a) Apply battery positive voltage between terminals 1 and 3 through a 3.4–W test bulb, check that the bulb lights up.

HINT:
It takes a short time for the bulb to light up.



(b) Submerge the switch in fuel, check that the bulb goes out.

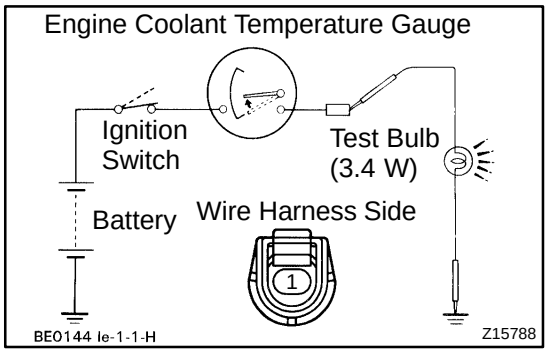
If operation is not as specified, replace the sender gauge.



11. INSPECT ENGINE COOLANT TEMPERATURE RECEIVER GAUGE OPERATION

(a) Disconnect the connector from the sender gauge.

(b) Turn the ignition switch ON and check that the receiver gauge needle indicates COOL.



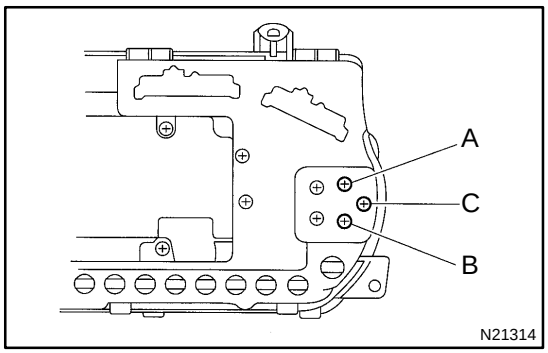
(c) Ground terminal on the wire harness side connector through a 3.4–W test bulb.

(d) Turn the ignition switch ON, and check that the bulb lights up and the receiver gauge needle moves to the hot side.

If operation is as specified, replace the sender gauge.

Then recheck the system.

If operation is not as specified, measure the receiver gauge resistance.



12. INSPECT ENGINE COOLANT TEMPERATURE RECEIVER GAUGE RESISTANCE

Measure the resistance between terminals.

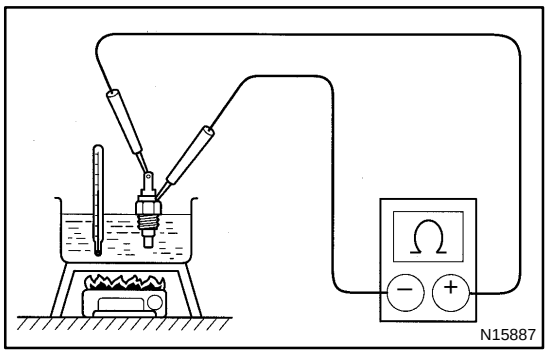
Tester connection	Resistance (Ω)
A – B	Approx. 54.0
A – C	Approx. 175.7
B – C	Approx. 229.7

HINT:

Connect the test leads so that the current from the ohmmeter can flow according to the above order.

This circuit includes the diode.

If resistance value is not as specified, replace the receiver gauge.

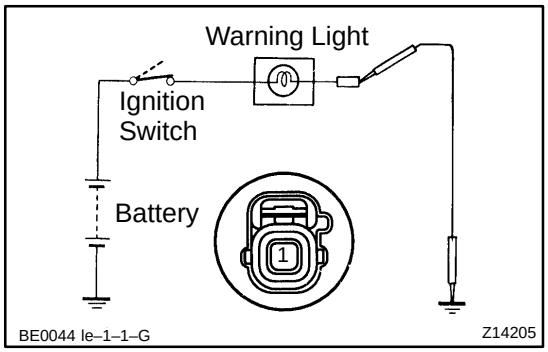


13. INSPECT ENGINE COOLANT TEMPERATURE SENDER GAUGE RESISTANCE

Measure the resistance between the terminal and gauge body.

Temperature ˚C(˚F)	Resistance (Ω)
50 (122.0)	160 – 240
120 (248.0)	17.1 – 21.2

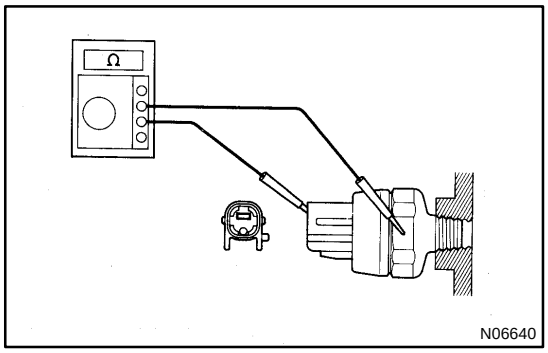
If resistance value is not as specified, replace the engine coolant temperature sender gauge.



14. INSPECT LOW OIL PRESSURE WARNING LIGHT

(a) Disconnect the connector from the 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.

If the warning light does not light up, test the bulb.

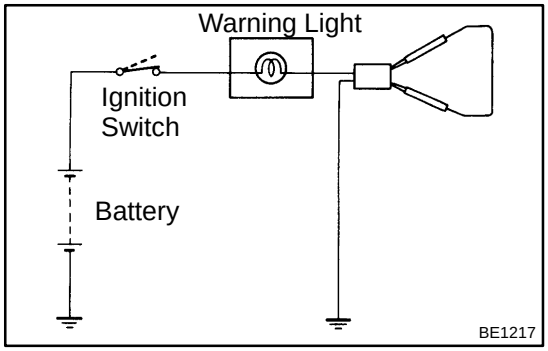


15. INSPECT LOW OIL PRESSURE SWITCH

(a) Disconnect the connector from the switch.
(b) Check that continuity exists between terminal and ground with the engine stopped.
(c) Check that no continuity exists between terminal and ground with the engine running.

HINT:

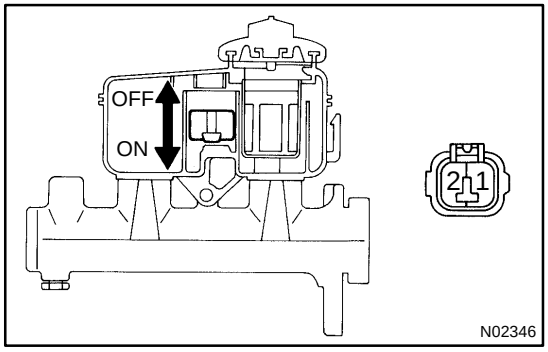
Oil pressure should be over 24.5 kPa (0.25 kgf/cm^2, 3.55 psi).
If operation is not as specified, replace the switch.



16. INSPECT BRAKE SYSTEM WARNING LIGHT

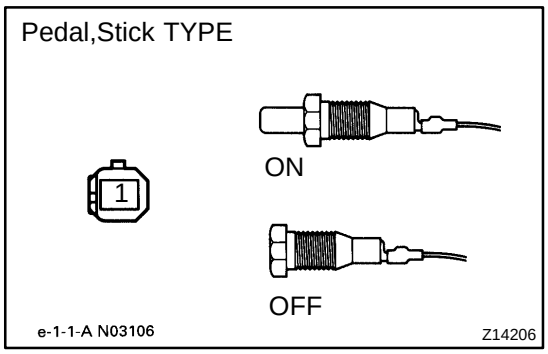
(a) Disconnect the connector from the brake fluid warning switch.
(b) Release the parking brake pedal.
(c) Connect the terminals on the wire harness side of the level warning switch connector.
(d) Start the engine, check that the warning light lights up.

If the warning light does not light up, test the bulb or wire harness.



17. INSPECT BRAKE FLUID LEVEL WARNING SWITCH

(a) Remove the reservoir tank cap and strainer.
(b) Disconnect the connector.
(c) Check that no continuity exists between the terminals with the switch OFF (float up).
(d) Use syphon, etc. to take fluid out of the reservoir tank.
(e) Check that continuity exists between the terminals with the switch ON (float down)



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

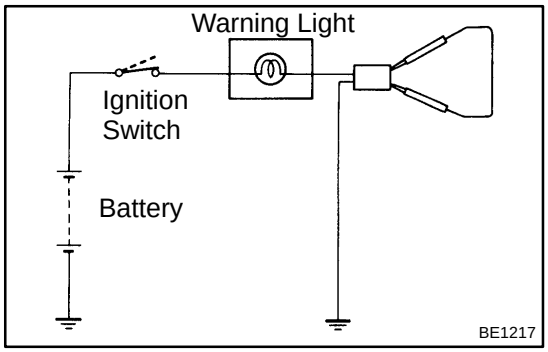
If operation is not as specified, replace the switch.

18. INSPECT PARKING BRAKE SWITCH

(a) Check that continuity exists between the terminal and switch body with the switch ON (switch pin released).

(b) Check that no continuity exists between the terminal and switch body with the switch OFF (switch pin pushed in).

If operation is not as specified, replace the switch or inspect ground point.



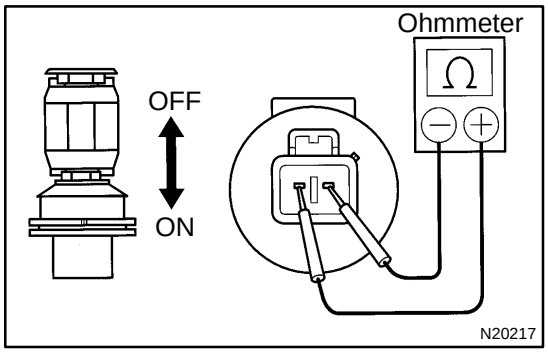
19. INSPECT WASHER LEVEL WARNING LIGHT

(a) Disconnect the connectors from the level warning switch and parking brake switch.

(b) Connect terminals on the wire harness side connector of the level warning switch connector.

(c) Remove the GAUGE fuse and turn the ignition switch ON, and check that the warning light comes on.

If the warning light does not light up, test the bulb.

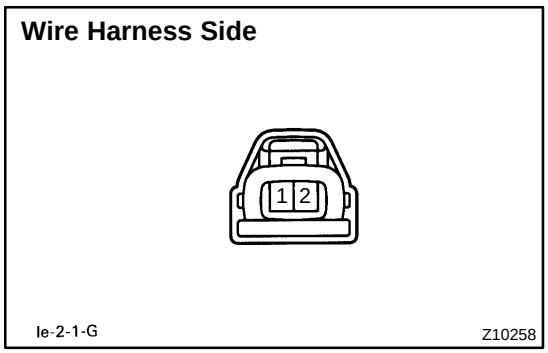


20. INSPECT WASHER LEVEL WARNING SWITCH

(a) Check that no continuity exists between terminals with the switch OFF (float up).

(b) Check that continuity exists between terminals with the switch ON (float down).

If operation is not as specified, replace the switch.

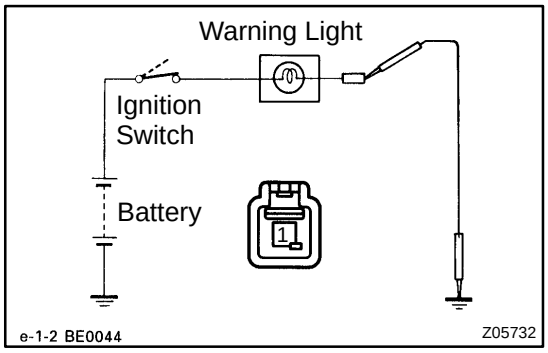


21. INSPECT WINDOW WASHER LEVEL WARNING SWITCH CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity

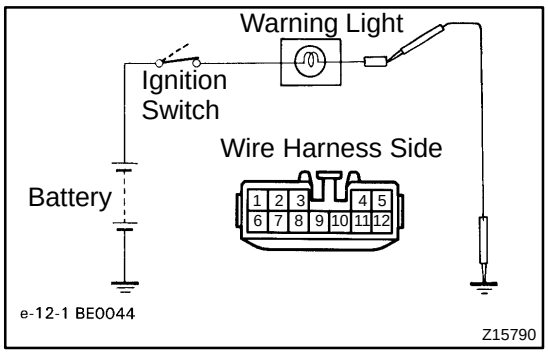
If continuity is not as specified, inspect the wire harness or ground point.



22. INSPECT OPEN DOOR WARNING LIGHT

Disconnect the connector from the door courtesy switch and ground terminal 1 on the wire harness side, and check that the warning light lights up.

If the warning light does not light up, inspect the bulb or wire harness.

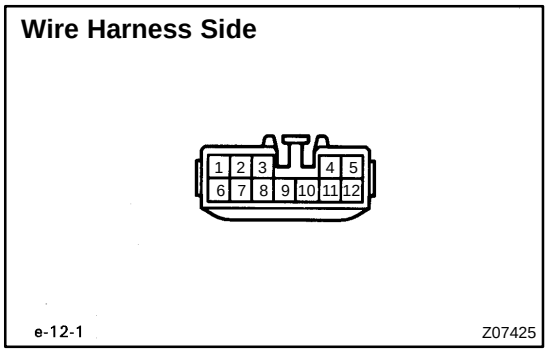


23. INSPECT WARNING LIGHT

(a) Disconnect the connector from the light failure sensor and ground terminal 4 on the wire harness side connector.

(b) Start the engine, check that the warning light lights up.

If the warning light does not light up, test the bulb or inspect wire harness.



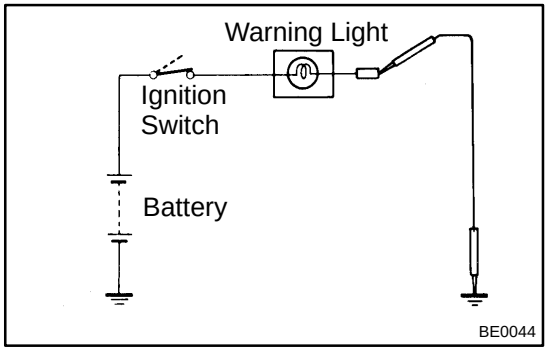
24. INSPECT LIGHT FAILURE SENSOR CIRCUIT

Disconnect the connector from the sensor and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity*
2 – Ground	Constant	Continuity*
9 – Ground	Constant	Continuity*
10 – Ground	Constant	Continuity*
11 – Ground	Constant	Continuity*
12 – Ground	Constant	Continuity*
3 – Ground	Light control switch OFF	No voltage
3 – Ground	Light control switch TAIL or HEAD	Battery positive voltage
4.8 – Ground	Ignition switch LOCK or ACC	No voltage
4.8 – Ground	Ignition switch ON	Battery positive voltage
7 – Ground	Stop light switch OFF	No voltage
7 – Ground	Stop light switch ON	Battery positive voltage

*: There is resistance because this circuit is grounded through the bulb.

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



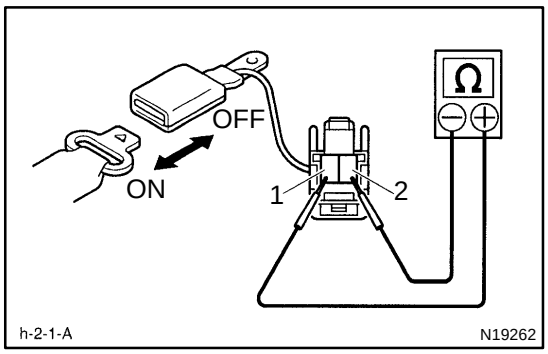
25. INSPECT SEAT BELT WARNING LIGHT

(a) Disconnect the connector from the buckle switch.

(b) Ground terminal 1 on the buckle switch with the connectors still connected.

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

If the warning light does not light up, inspect the bulb or wire harness.

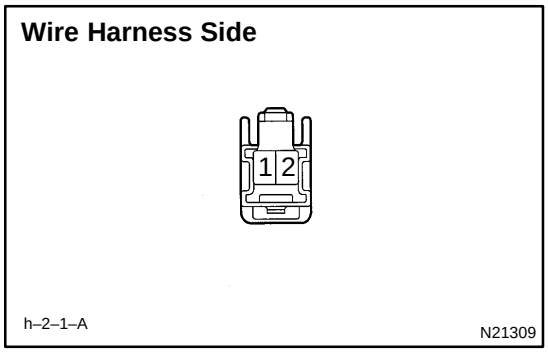


26. INSPECT BUCKLE SWITCH CONTINUITY

(a) Check that continuity exists between terminals 1 and 2 on the switch side connector with the switch ON (belt unfastened).

(b) Check that no continuity exists between terminals 1 and 2 on the switch side connector with the switch OFF (belt fastened).

If operation is not as specified, replace the front seat inner belt.

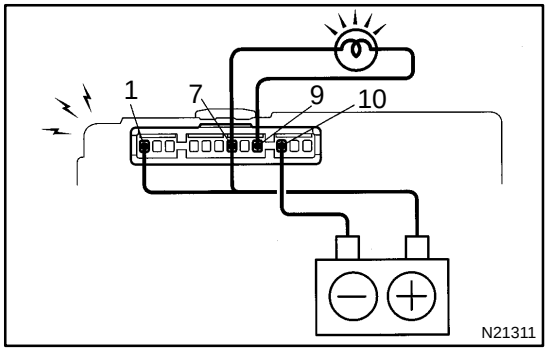


27. INSPECT BUCKLE SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
–	Turn the ignition switch ON	Chime sounds for 4 – 8 sec.
–	Ground terminal 1 and turn the ignition switch ON	No chime sound

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



28. INSPECT INTEGRATION RELAY SEAT BELT WARNING SYSTEM OPERATION

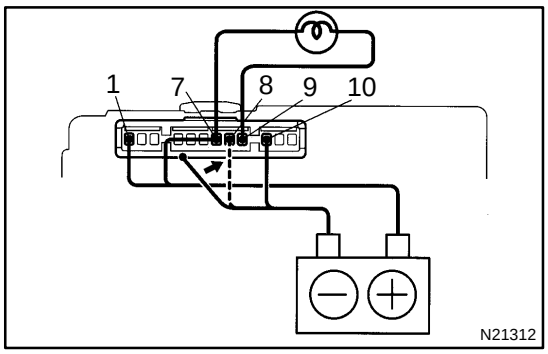
(a) Connect the positive (+) lead from the battery to terminals 1 and 7.

(b) Connect the terminal 7 to terminal 9 through the 3.4 W test bulb.

(c) Connect the negative (–) lead from the battery to terminal 10.

(d) Check that the bulb lights and the buzzer sounds for 4 to 8 seconds.

(e) Return to step (a) and operate the chime again.



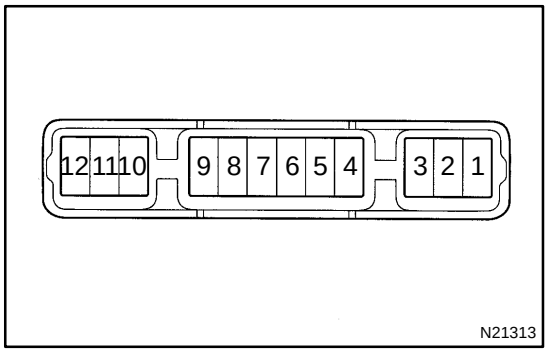
(f) Connect the negative (–) lead from the battery to terminal 8.

(g) Check that the buzzer stops sounding.

HINT:

Check the buzzer within a period of 4 to 8 seconds.

If operation is not as specified, replace the relay.



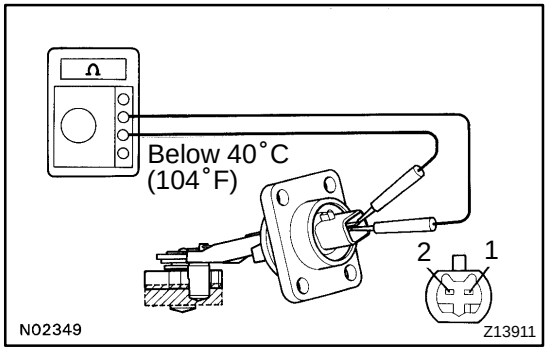
29. Seat belt warning : INSPECT INTEGRATION RELAY CIRCUIT

Remove the relay from the junction block No.1 and inspect the connectors on the junction block side.

Tester connection	Condition	Specified condition
8 – Ground	Driver's buckle switch OFF (Seat best unfastened)	No continuity
8 – Ground	Driver's buckle switch ON (Seat best fastened)	Continuity
10 – Ground	Constant	Continuity
1 – Ground	Constant	Battery positive voltage
7 – Ground 9 – Ground	Ignition switch position OFF or ACC	No voltage
7 – Ground 9 – Ground	Ignition switch position ON	Battery positive voltage

If the circuit is as specified, try to replace the relay with a new one.

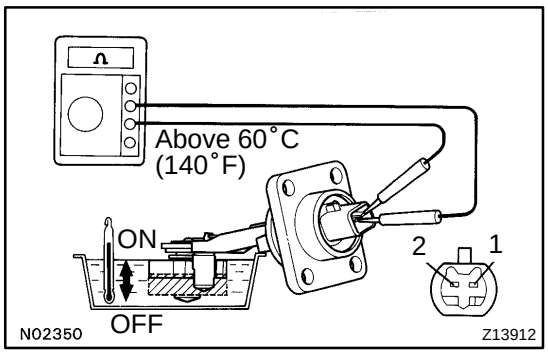
If the circuit is not as specified, inspect the circuits connected to other parts.



30. INSPECT ENGINE OIL LEVEL WARNING SWITCH CONTINUITY

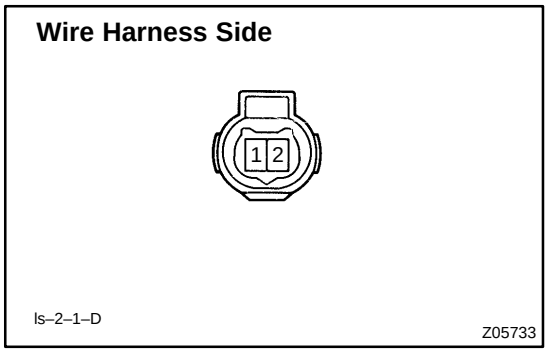
(a) Check that continuity exists between terminal with the switch in each position.

(b) Heat the switch to above 60˚C (140˚F) in an oil bath.



(c) Check that continuity exists between terminals with the switch ON (float up).
(d) Check that no continuity exists between terminals with the switch OFF (float down).

If operation is not as specified, replace the switch.

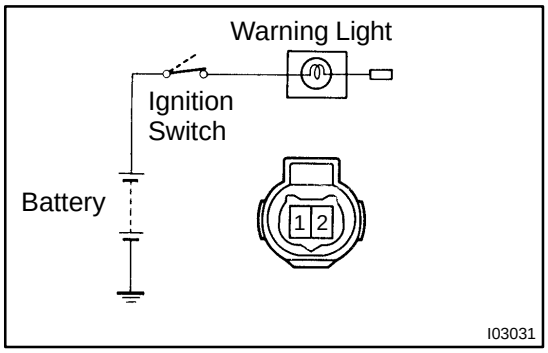


31. INSPECT ENGINE OIL LEVEL WARNING SWITCH CIRCUIT

Disconnect the switch connector and inspect the connector on wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity

If continuity is not as specified, inspect the wire harness or ground point.

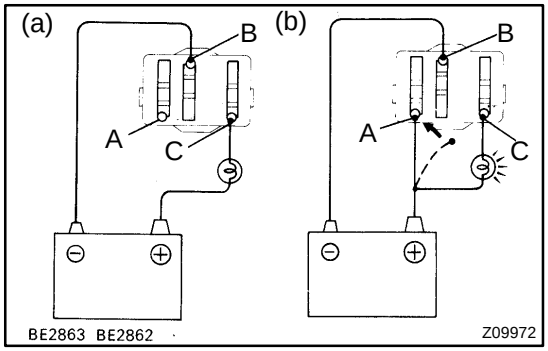


32. INSPECT ENGINE OIL LEVEL WARNING LIGHT

(a) Disconnect the connector from the switch.
(b) Turn the IG switch ON, the warning light lights up.
(c) The warning light lights up after 40 sec. from the engine has started.

If the warning light does not light up, inspect bulb or wire harness.

33. INSPECT LIGHT CONTROL RHEOSTAT
(See page BE–50)



34. INSPECT BULB CHECK RELAY OPERATION

(a) Connect the positive (+) lead from the battery to terminal C through a 1.4–W test bulb and the negative (–) lead to terminal B, check that the test bulb does not light up.
(b) Connect the positive (+) lead from the battery to terminal A and check that the test bulb lights up.

If operation is not as specified, replace the relay.

BE05J–02

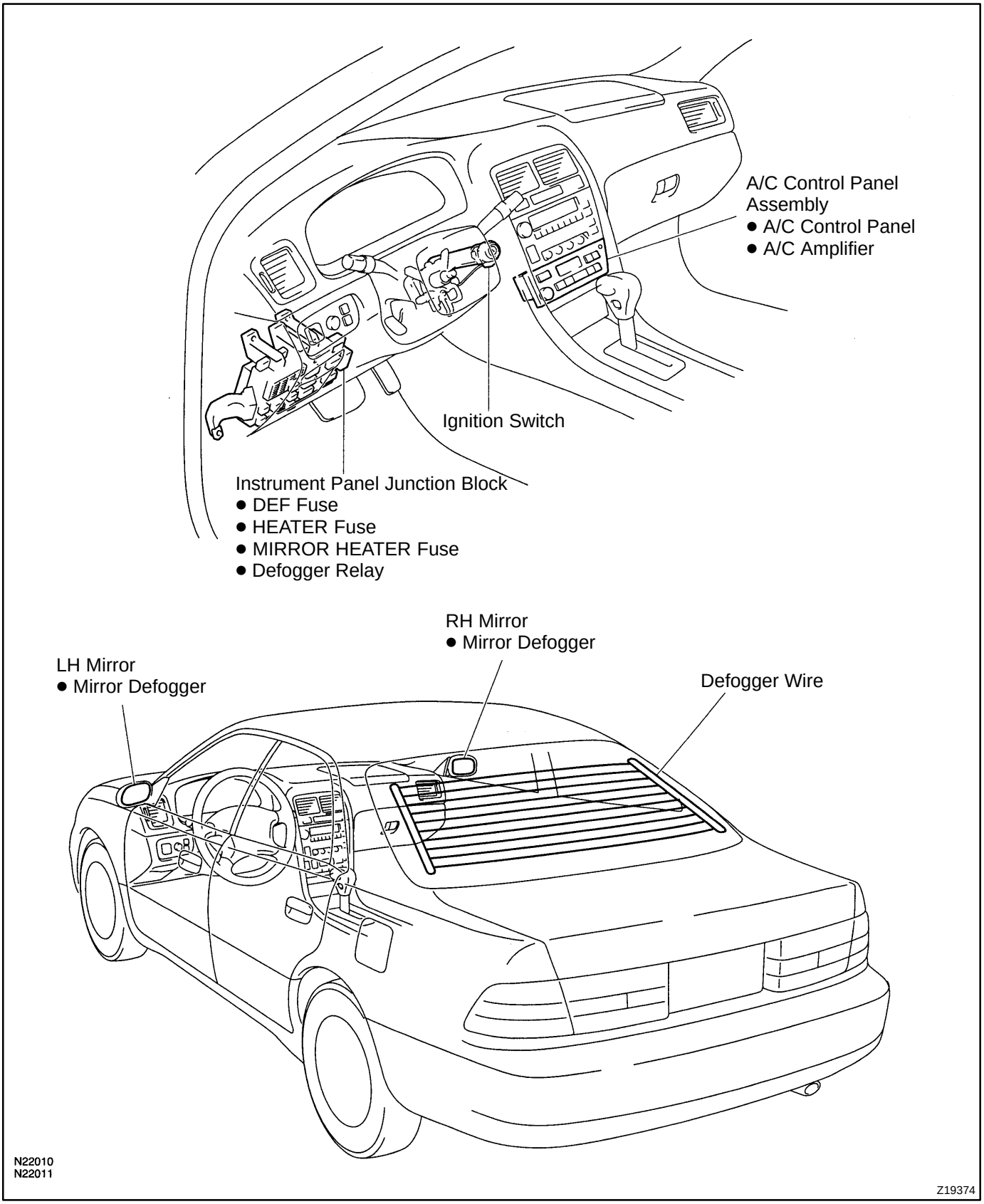
REASSEMBLY

Reassembly is in the reverse of the disassembly(See page BE–97).

DEFOGGER SYSTEM

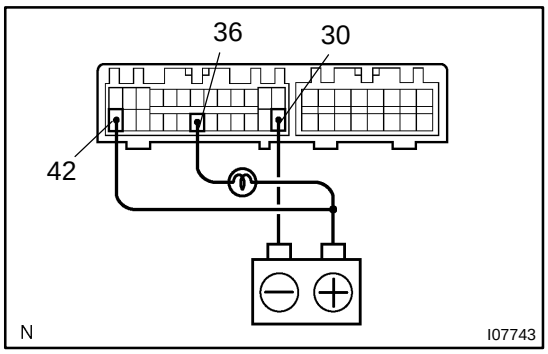
LOCATION

BE05K–03



BE1JP–01

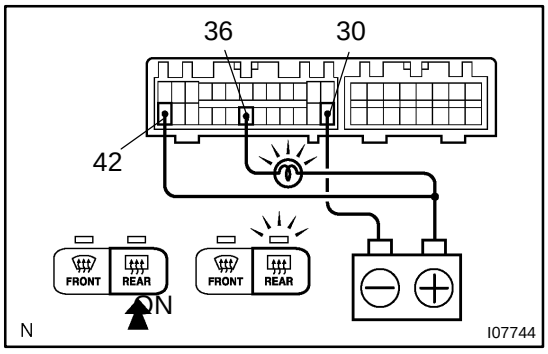
INSPECTION



1. A/C control panel assembly:
INSPECT DEFOGGER SWITCH OPERATION

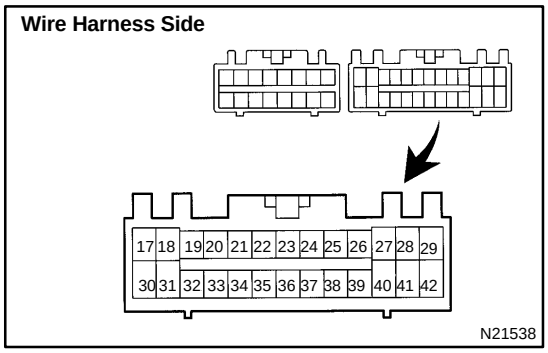
(a) Connect the positive (+) lead from the battery to terminal 42 and negative (–) lead to terminal 30.

(b) Connect the positive (+) lead from the battery to terminal 36 through a 1.4 W test bulb.



(c) Turn the defogger switch ON and check that the test bulb and indicator light turn ON, then turn OFF after approx. 15 minutes.

If operation is not as specified, proceed to inspect the A/C control assembly.
(See page AC–106)

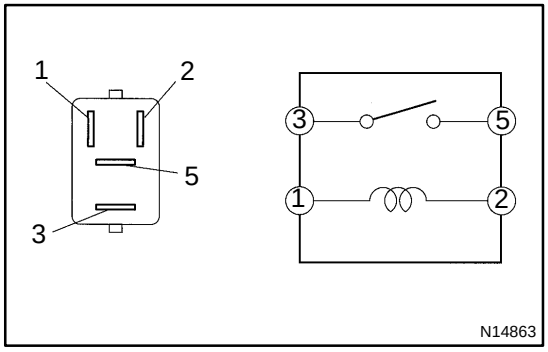


2. INSPECT DEFOGGER SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on wire harness side.

Tester connection	Condition	Specified condition
30 – Ground	Constant	Continuity
42 – Ground	Ignition switch position ACC or LOCK	No voltage
42 – Ground	Ignition switch position ON	Battery positive voltage

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

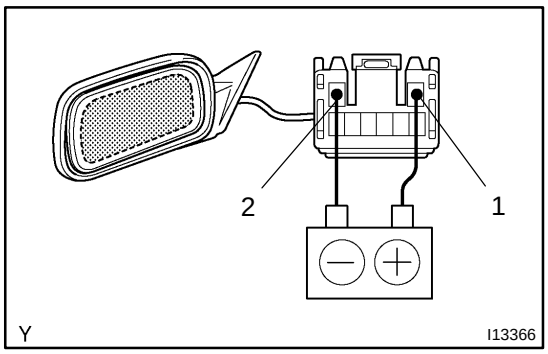


3. INSPECT DEFOGGER RELAY CONTINUITY

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.

4. INSPECT DEFOGGER RELAY CIRCUIT
(See page BE–12)



5. w/o Driving Position Memory (Driver's door): INSPECT MIRROR DEFOGGER OPERATION

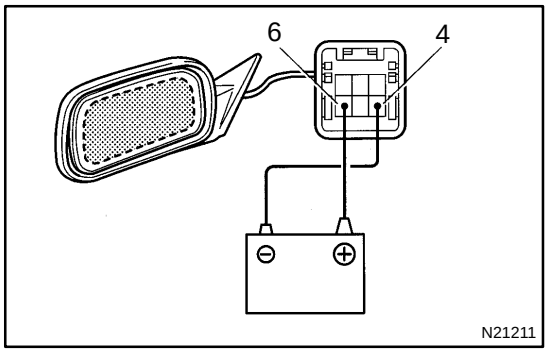
(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2.

(b) Check that the mirror becomes warm.

HINT:

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

If the mirror does not become warm, replace the mirror assembly.



6. w/o Driving Position Memory (Passenger's door): INSPECT MIRROR DEFOGGER OPERATION

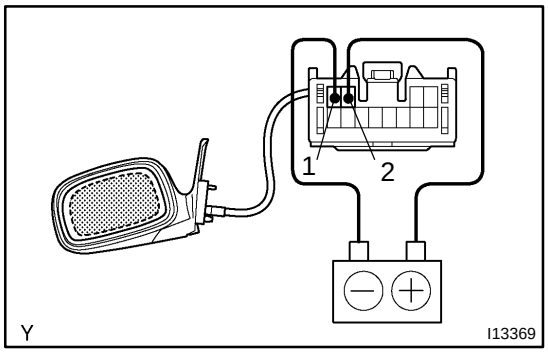
(a) Connect the positive (+) lead from the battery to terminal 6 and the negative (–) lead to terminal 4.

(b) Check that the mirror becomes warm.

HINT:

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

If the mirror does not become warm, replace the mirror assembly.



7. w/ Driving Position Memory: INSPECT MIRROR DEFOGGER OPERATION

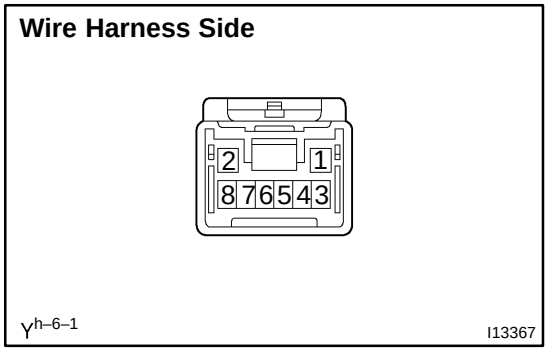
(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1.

(b) Check that the mirror becomes warm.

HINT:

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

If the mirror does not become warm, replace the mirror assembly.



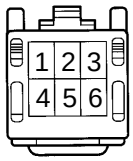
8. w/o Driving Position Memory (Driver's door): INSPECT MIRROR DEFOGGER CIRCUIT

Disconnect the connector from the outside mirror and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Ignition switch ON and Defogger switch OFF	No voltage
1 – Ground	Ignition switch ON and Defogger switch ON	Battery voltage

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

Wire Harness Side



h–6–1 N21539

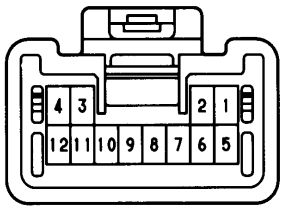
9. w/o Driving Position Memory (Passenger's door): INSPECT MIRROR DEFOGGER CIRCUIT

Disconnect the connector from the outside mirror and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity
6 – Ground	Ignition switch position ON (Defogger switch OFF)	No voltage
6 – Ground	Ignition switch position ON (Defogger switch ON)	Battery positive voltage

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

Wire Harness Side



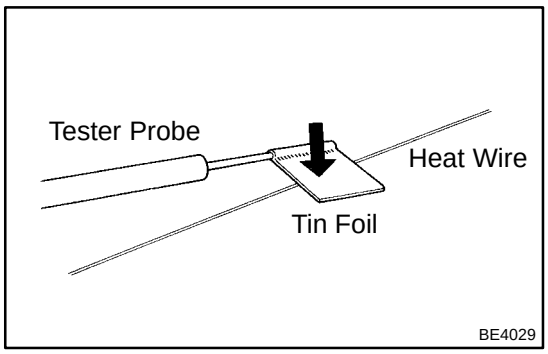
I13370

10. w/ Driving Position Memory: INSPECT MIRROR DEFOGGER CIRCUIT

Disconnect the connector from the outside mirror and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity
6 – Ground	Ignition switch position ON (Defogger switch OFF)	No voltage
6 – Ground	Ignition switch position ON (Defogger switch ON)	Battery positive voltage

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



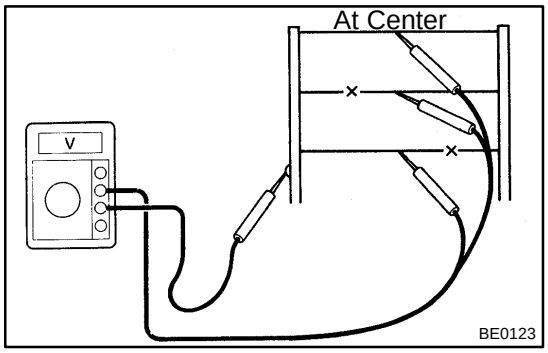
11. INSPECT DEFOGGER WIRE

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, wind a piece of tin foil around the top 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.

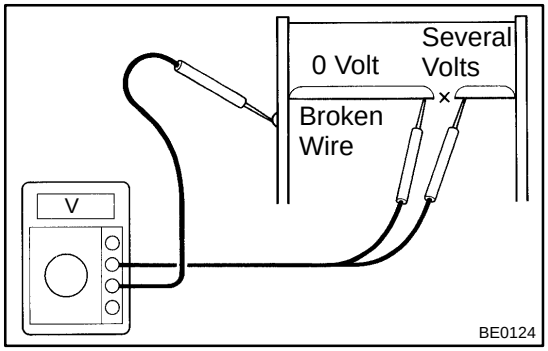


(c) Inspect the voltage at the center of each heat wire.

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.



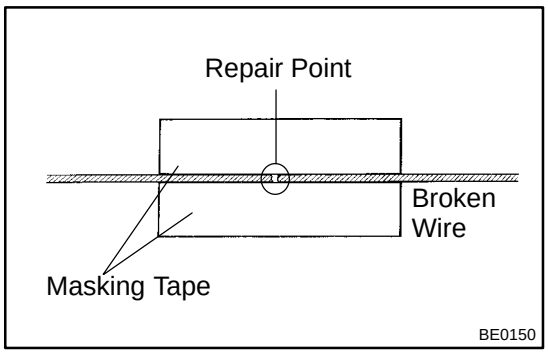
(d) Place the voltmeter positive (+) lead against the defogger positive (+) terminal.

(e) Place the voltmeter negative (–) lead with the foil strip against the heat wire at the positive (+) terminal end and slide it toward the negative (–) terminal end.

(f) The point where the voltmeter deflects from zero to several V is the place where the heat 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 gradually voltage increases to approx. 12 V as the meter probe moves to the other end.

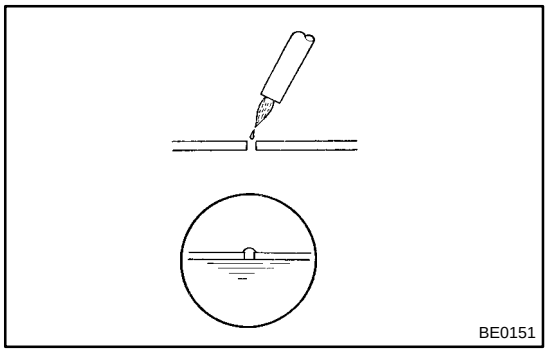


12. IF NECESSARY, REPAIR DEFOGGER WIRE

(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.

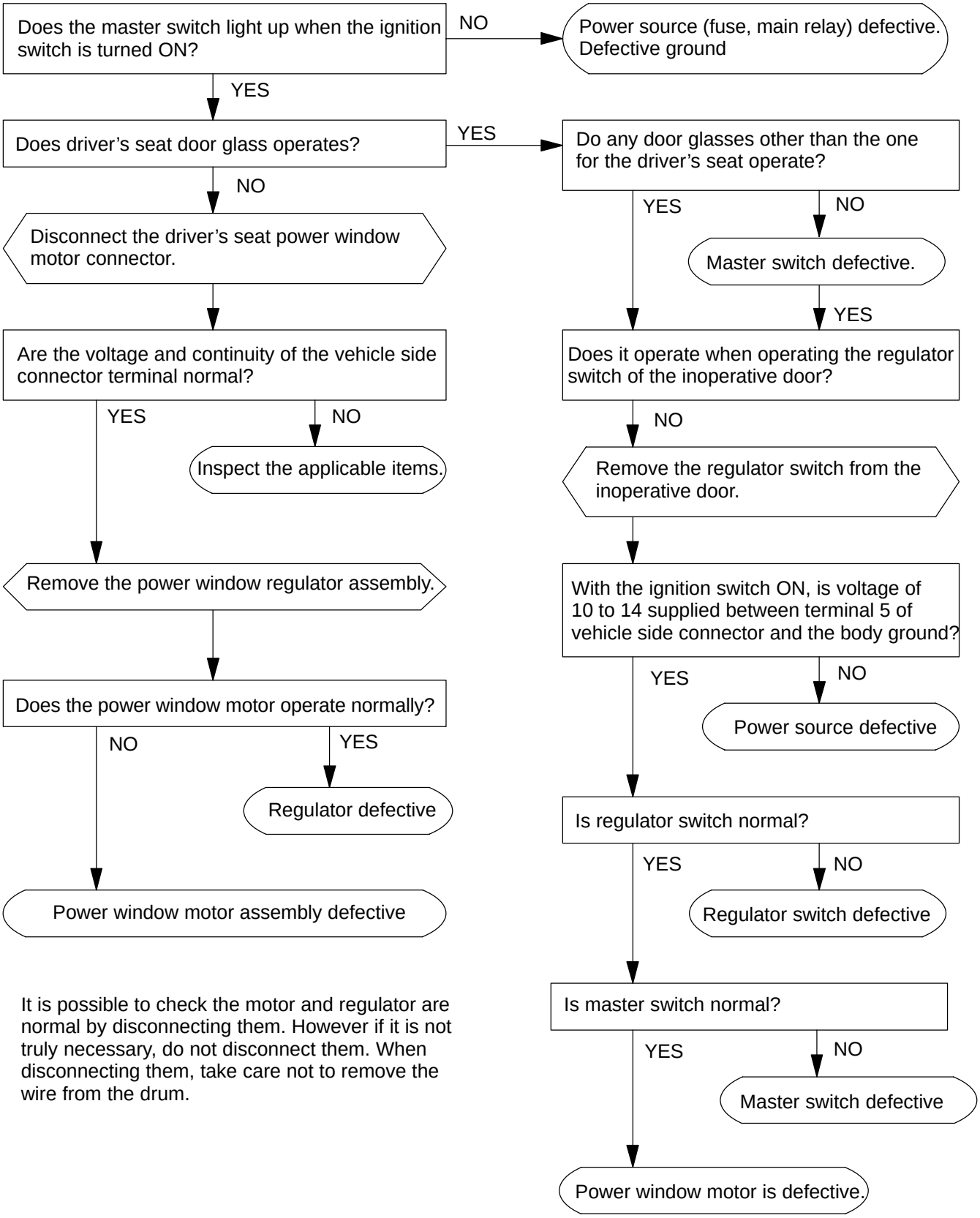
POWER WINDOW CONTROL SYSTEM

BE10L–02

TROUBLESHOOTING

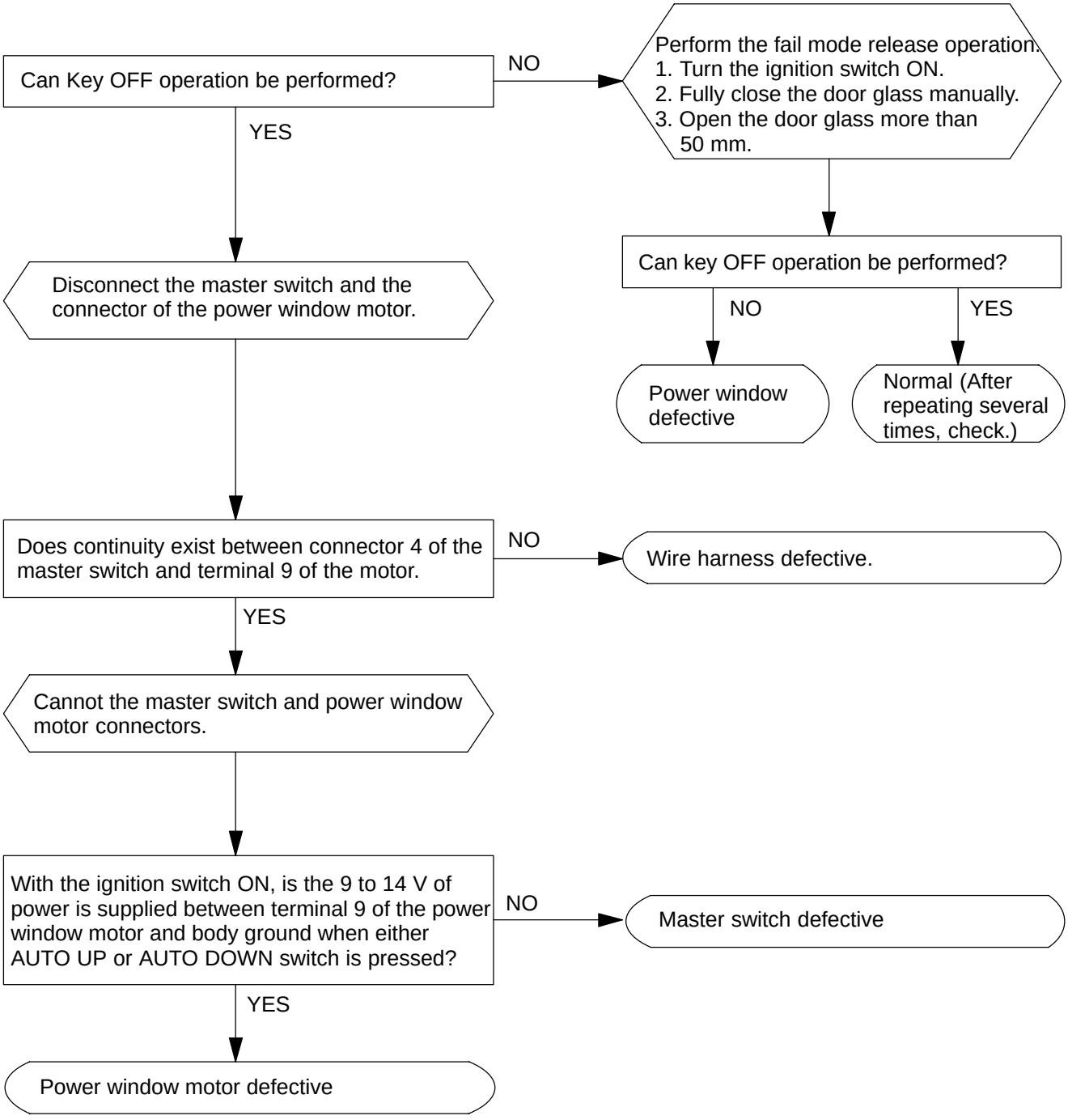
Malfunction		Chart
The power window will not move.	Operation can not be performed with the power window master switch.	1
	AUTO operation for driver's seat door can not be performed.	2
	The driver's seat door can be operated using the switch.	3
	The driver's seat door can be operated using the wireless function.	4
	Key OFF function can be operated.	5
Moves DOWN during UP operation.	During UP operation, DOWN operation starts near fully closed position.	6
	During UP operation, DOWN operation starts anywhere except near fully closed position.	7
Down operation does not start, Even though a foreign object is inserted.		8

1	Operation with the power window master switch can not be performed.

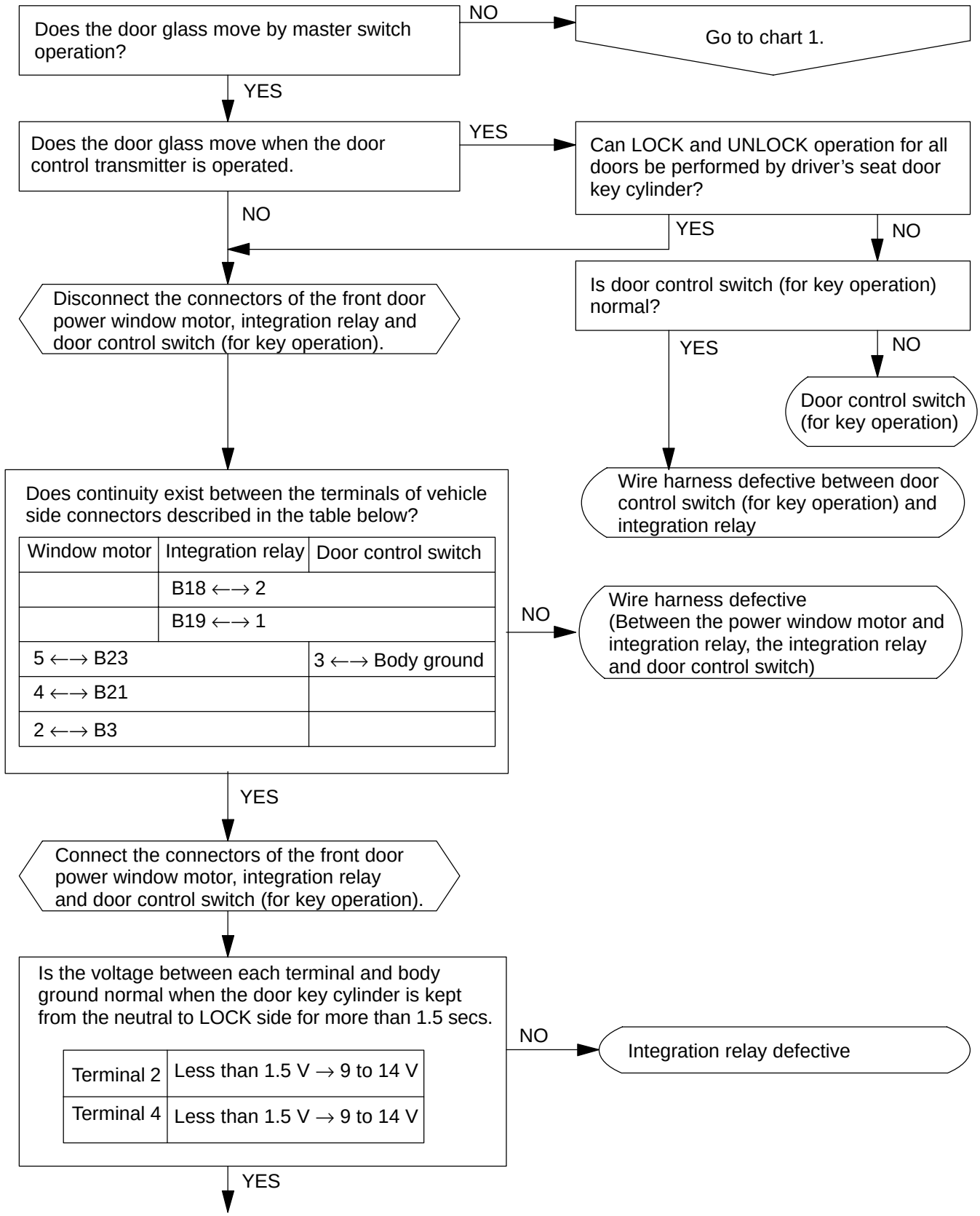


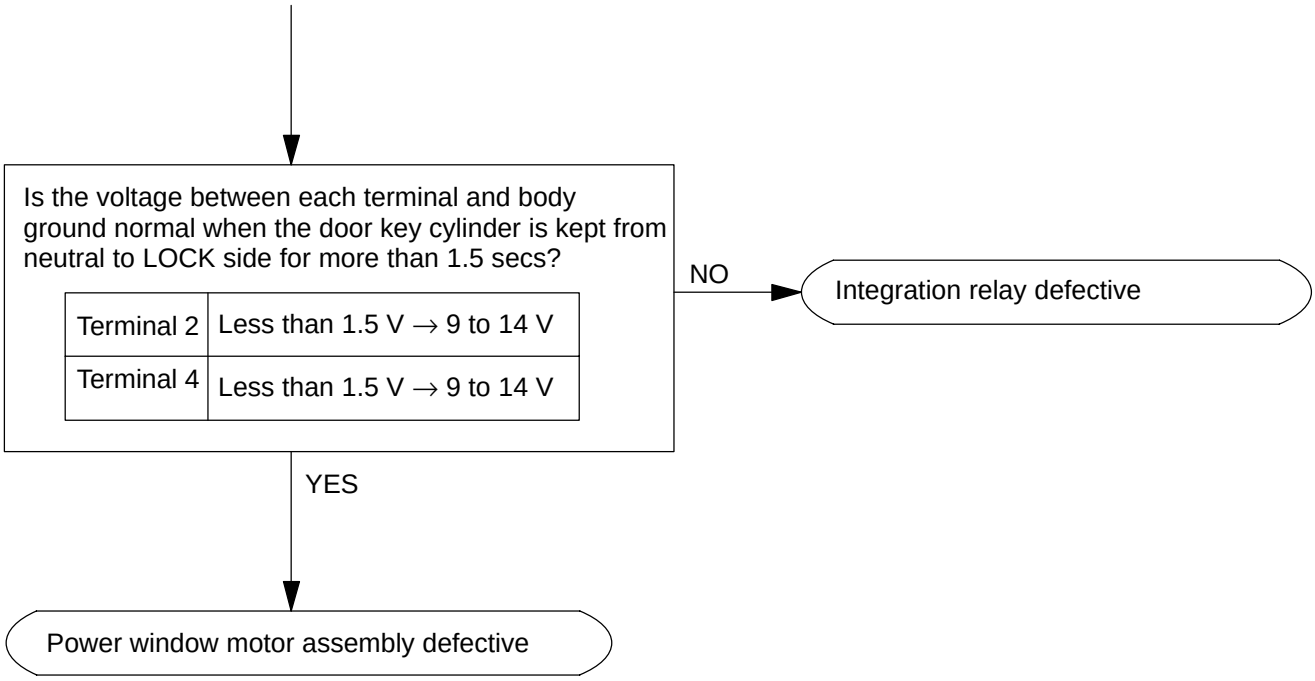
It is possible to check the motor and regulator are normal by disconnecting them. However if it is not truly necessary, do not disconnect them. When disconnecting them, take care not to remove the wire from the drum.

2	AUTO operation for driver's seat door cannot be performed.

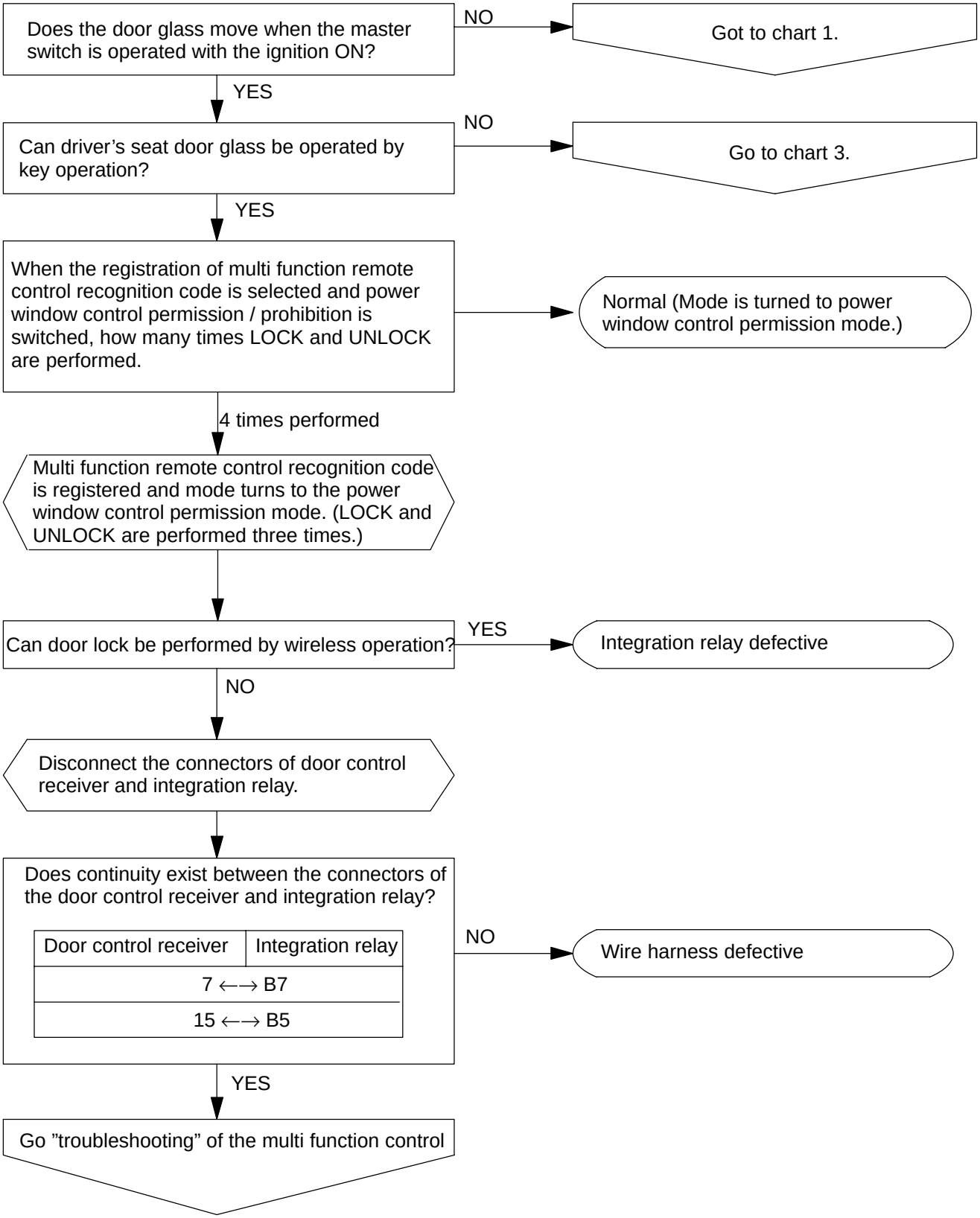


3	Driver's seat door cannot be operated by key operation.

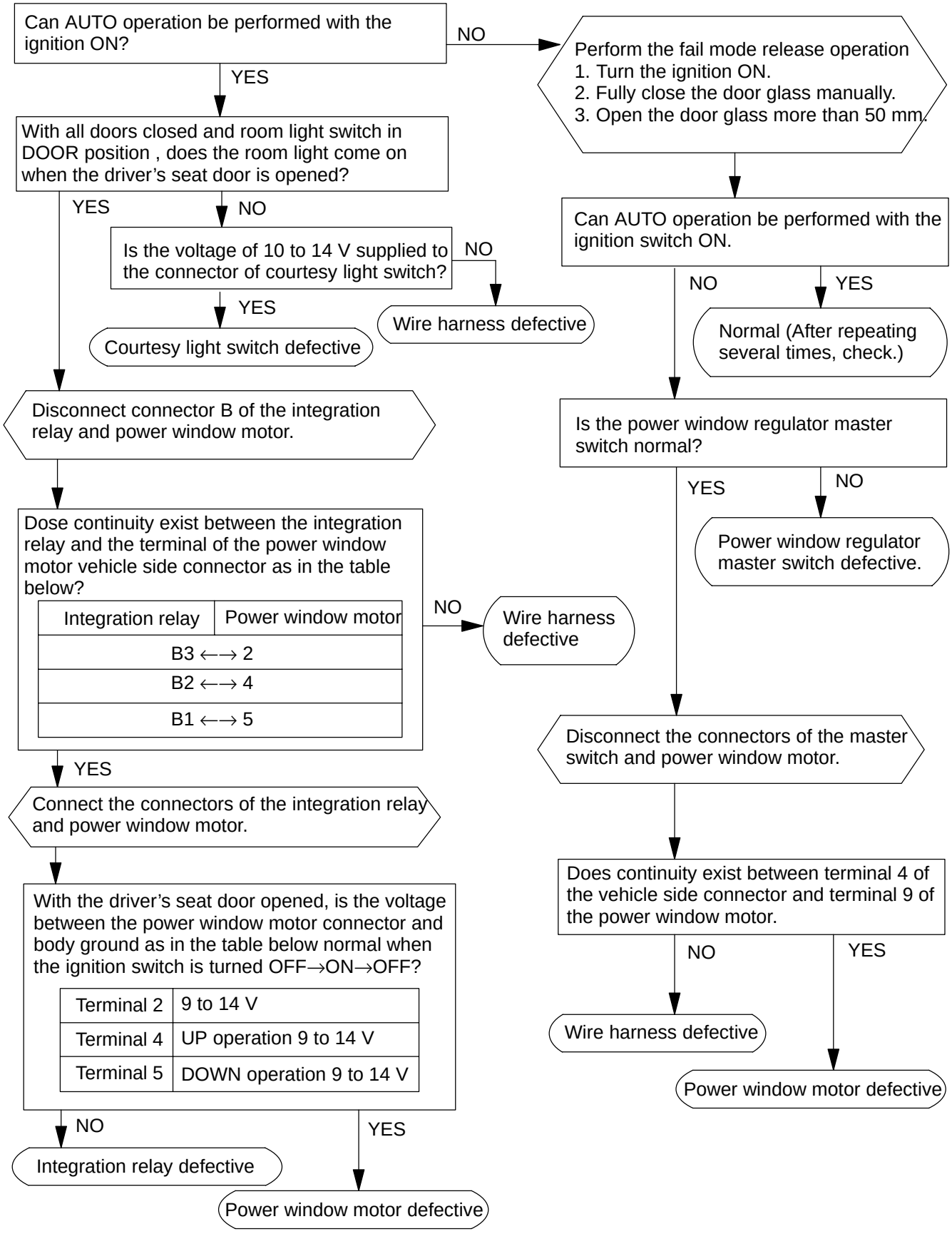



Is the voltage between each terminal and body ground normal when the door key cylinder is kept from neutral to LOCK side for more than 1.5 secs?
Terminal 2
Less than 1.5 V → 9 to 14 V
Terminal 4
Less than 1.5 V → 9 to 14 V
NO
Integration relay defective
YES
Power window motor assembly defective

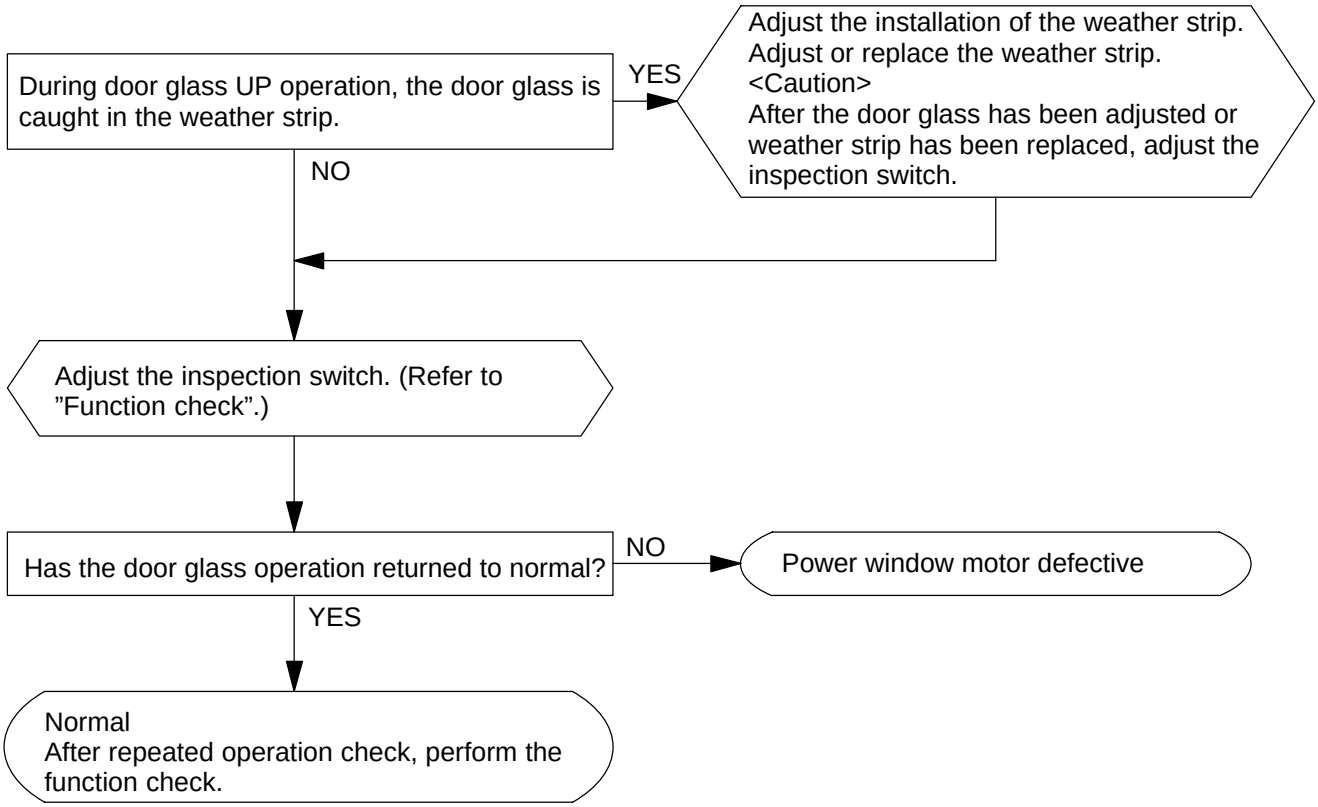
4	Driver's seat door can not be operated by wireless operation



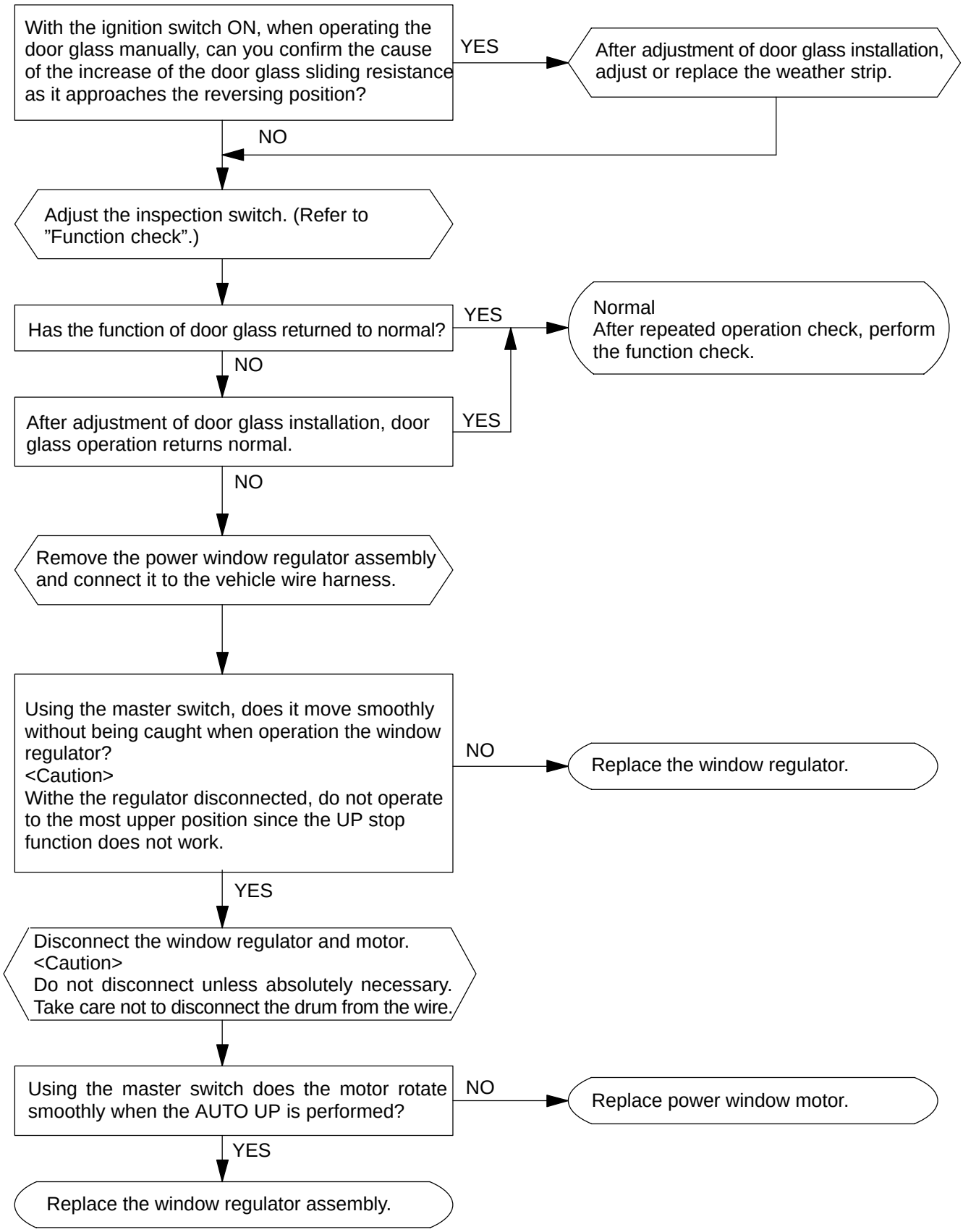
5	Key OFF operation can not be performed.



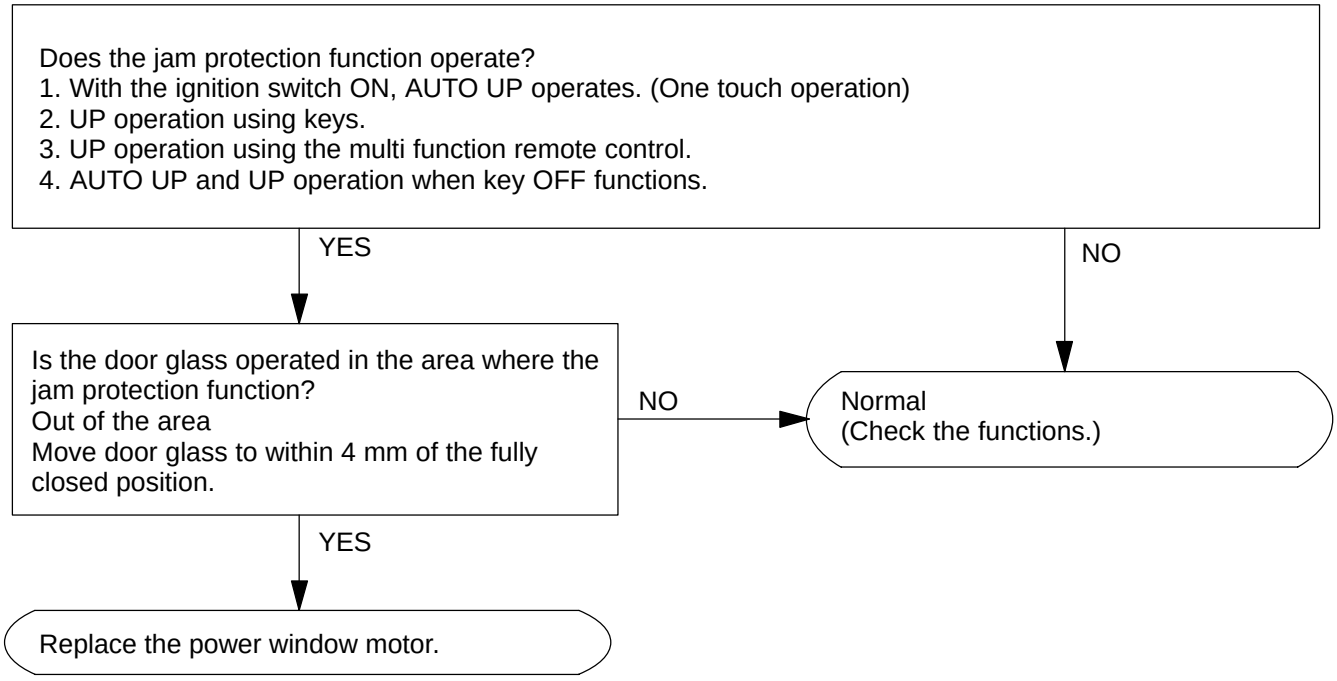
6	During driver’s seat door glass UP operation, the glass moves down.



7	During the driver's seat door UP operation, the door glass moves DOWN near the fully closed position.

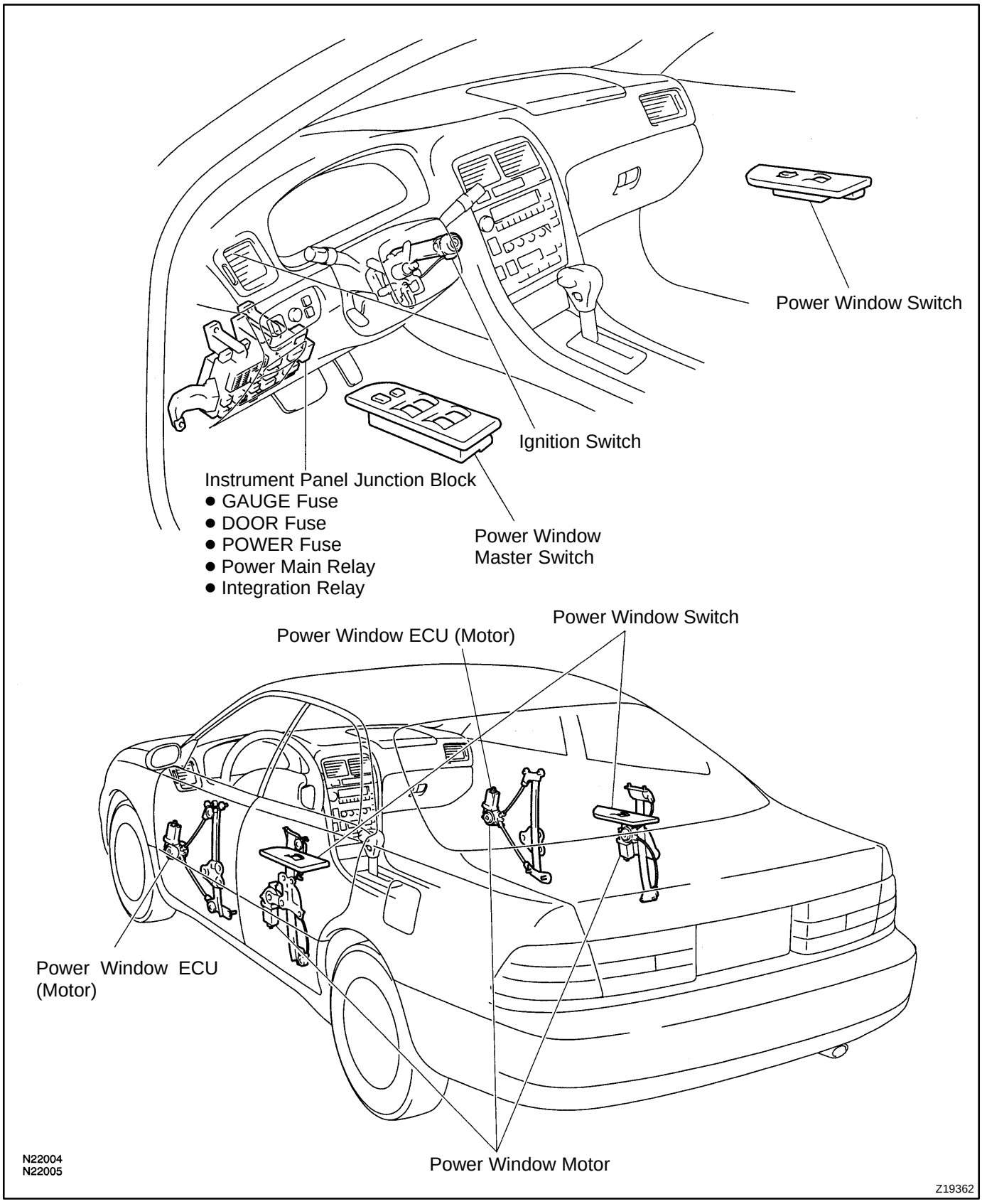


8	DOWN operation does not start even though a foreign object is inserted.

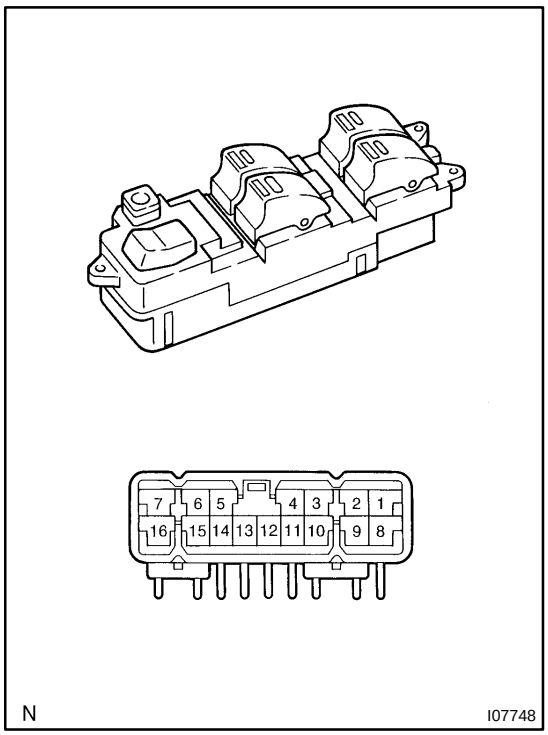


BE05M–04

LOCATION



BE10M–01



INSPECTION

1. INSPECT POWER WINDOW MASTER SWITCH CONTINUITY

(a) Inspect the front driver's switch.

Window unlock:

Switch position	Tester connection	Specified condition
UP AUTO	4 – 9 – 11	Continuity
UP MANUAL	4 – 9	Continuity
OFF	–	No Continuity
DOWN MANUAL	2 – 4	Continuity
DOWN AUTO	2 – 4 – 11	Continuity

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

(b) Inspect the front passenger's switch.

Window unlock:

Switch position	Tester connection	Specified condition
UP AUTO	4 – 13 – 15	Continuity
UP MANUAL	4 – 13	Continuity
OFF	–	No Continuity
DOWN MANUAL	4 – 5	Continuity
DOWN AUTO	4 – 5 – 15	Continuity

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

(c) Inspect the rear left switch.

Window unlock:

Switch position	Tester connection	Specified condition
UP	8 – 12 7 – 10	Continuity
OFF	7 – 8 – 10	Continuity
DOWN	10 –12 7 – 8	Continuity

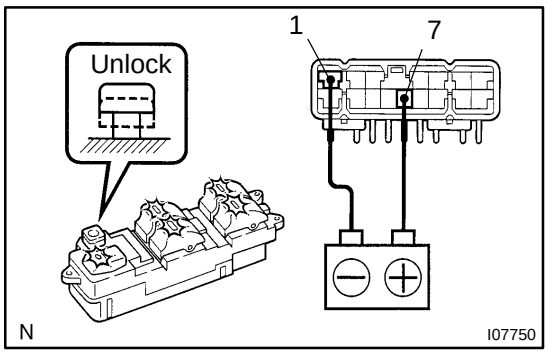
If continuity is not as specified, replace the master switch.

(d) Inspect the rear right switch.

Window unlock:

Switch position	Tester connection	Specified condition
UP	12 – 14 7 – 16	Continuity
OFF	7 – 14 – 16	Continuity
DOWN	12 – 16 7 – 14	Continuity

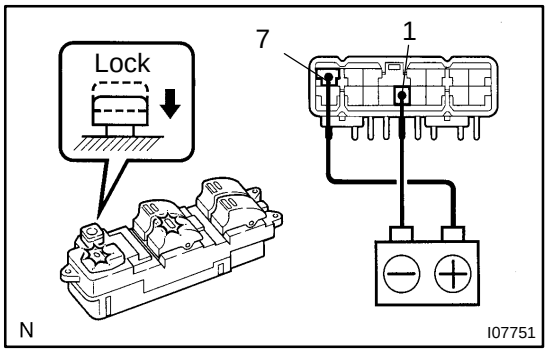
If continuity is not as specified, replace the master switch.



2. INSPECT POWER WINDOW MASTER SWITCH ILLUMINATION

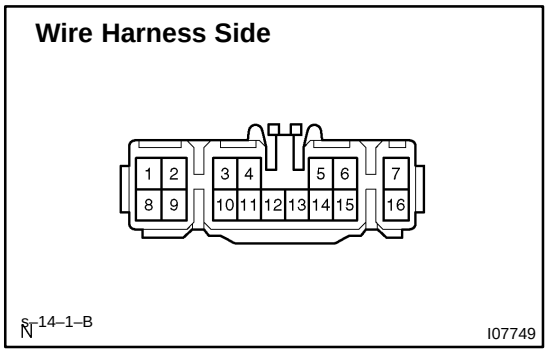
(a) Set the window lock switch to the unlock position.

(b) Connect the positive (+) lead from the battery to terminal 12 and the negative (–) lead to terminal 7, and check that all the illuminations light up.



(c) Set the window lock switch to the lock position, check that all the passenger's power window switch illuminations go out.

If operation is not as specified, replace the master switch.



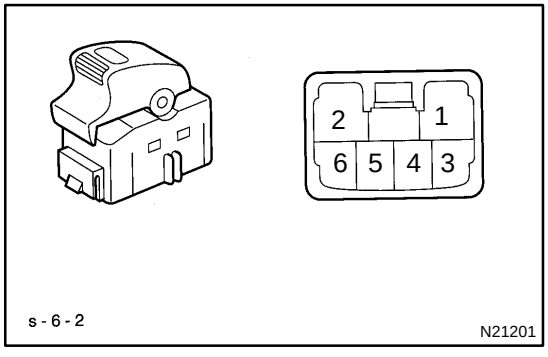
3. INSPECT POWER WINDOW MASTER SWITCH CIRCUIT

Disconnect the connector from the master switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity
7 – Ground	Ignition switch position LOCK or ACC	*No voltage
7 – Ground	Ignition switch position ON	Battery positive voltage

* Exceptions: During 60 seconds after the ignition switch is turned ON → OFF (ACC) or until driver or a passenger's door is opened after the ignition switch is turned ON → OFF (ACC).

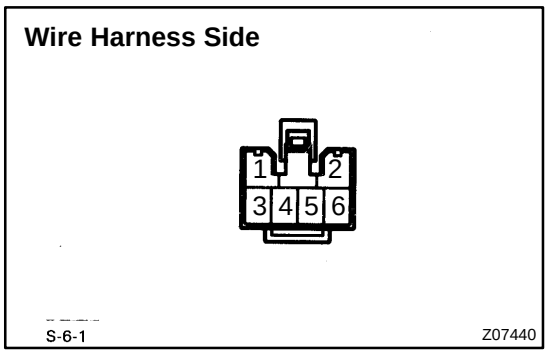
If the circuit is not as specified, inspect the circuits connected to other parts.



4. Passenger's side: INSPECT POWER WINDOW SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP MANUAL	3 – 6	Continuity
UP AUTO	3 – 6 3 – 5	Continuity
OFF	–	No Continuity
DOWN AUTO	3 – 4 3 – 5	Continuity
DOWN MANUAL	3 – 4	Continuity

If continuity is not as specified, replace the switch.



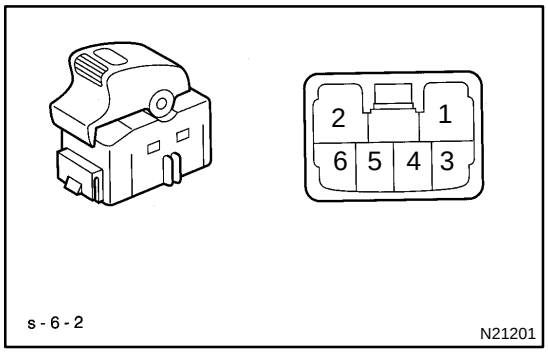
5. INSPECT POWER WINDOW SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity

*Exceptions: During 60 seconds period after the ignition switch is turned ON → OFF (ACC) or until driver or a passenger's door is opened after the ignition switch is turned ON → OFF (ACC).

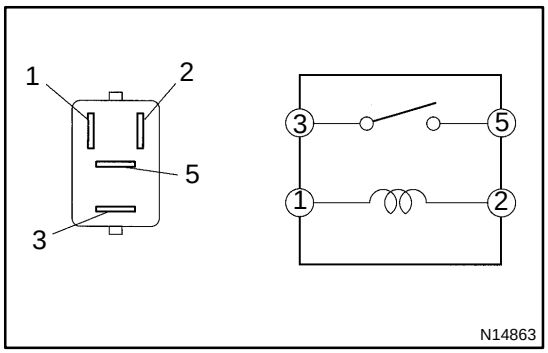
If the circuit is not as specified, inspect the circuits connected to other parts.



6. Rear door side:
INSPECT POWER WINDOW SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
UP	1 – 3 2 – 5	Continuity
OFF	1 – 3 2 – 4	Continuity
DOWN	2 – 4 3 – 5	Continuity

If continuity is not as specified, replace the switch.

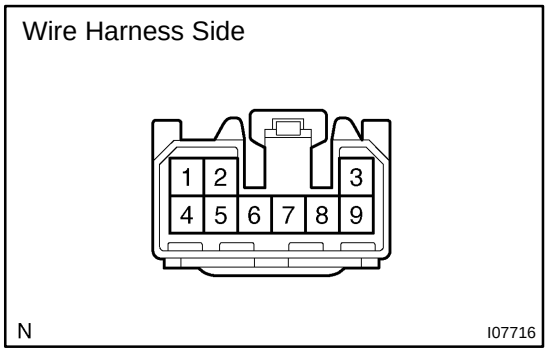


7. INSPECT POWER MAIN RELAY CONTINUITY

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.

8. INSPECT POWER MAIN RELAY CIRCUIT
(See page BE–12)



9. INSPECT POWER WINDOW ECU (MOTOR) CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side.

HINT:

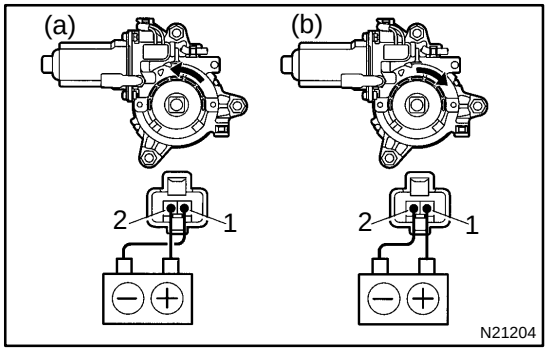
The power window ECU does not operate even if battery voltage is applied to the connector of the driver's door power window ECU directly.

Do not apply the battery voltage directly because this will cause the condroller broken.

Each regulator does not have stop function. Operate manually and never operate to the highest position.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity
2 – Ground	Ignition switch ON	Battery positive voltage
2 – Ground	Ignition switch OFF Door courtesy switch OFF	Below 1.5 V
3 – Ground	Constant	Battery positive voltage
4 – Ground	Using a key, door key cylinder OFF	No voltage
4 – Ground	Using a key, door key cylinder LOCK	Battery positive voltage
5 – Ground	Using a key, door key cylinder OFF	No voltage
5 – Ground	Using a key, door key cylinder UNLOCK	Battery positive voltage
6 – Ground	Ignition switch ON Master switch OFF	No voltage
6 – Ground	Ignition switch ON Master switch UP	Battery positive voltage
7 – Ground	Ignition switch ON Master switch OFF	No voltage
7 – Ground	Ignition switch ON Master switch DOWN	Battery positive voltage
8 – Ground	Ignition switch LOCK or ACC	No voltage
8 – Ground	Ignition switch ON	Battery positive voltage
9 – Ground	Ignition switch ON Master switch DOWN or UP	No voltage
9 – Ground	Ignition switch ON Master switch AUTO DOWN or AUTO UP	Battery positive voltage

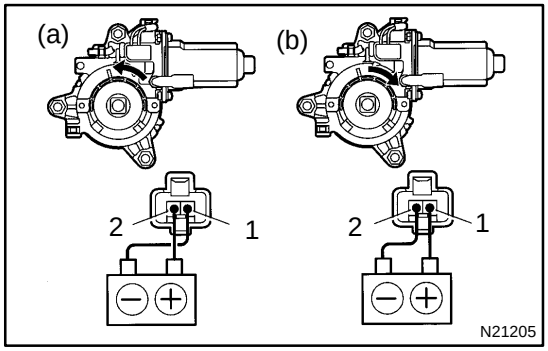
If the circuit is as specified, replace the ECU.
If the circuit is not as specified, inspect the circuits connected to other parts.



10. Rear left side door:
INSPECT POWER 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 motor turns counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

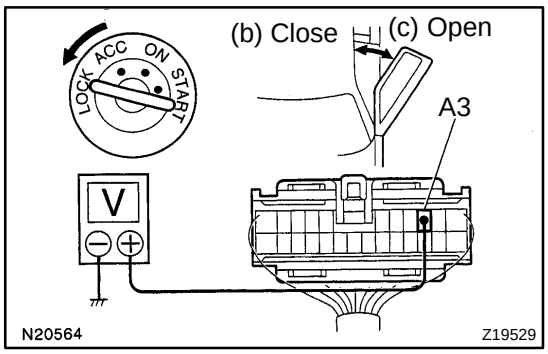
If operation is not as specified, replace the motor.



11. Rear right side door:
INSPECT POWER 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 motor turns counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the motor.



12. Key–off power window signal:
INSPECT INTEGRATION RELAY OPERATION

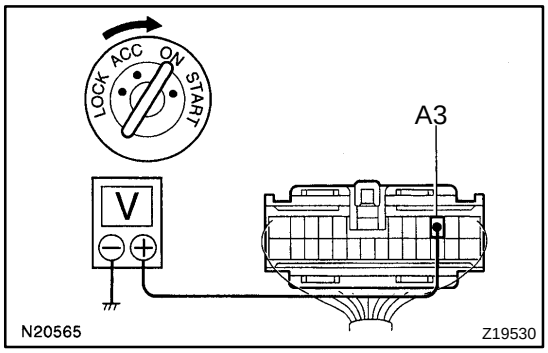
HINT:

When the relay circuit is as specified, inspect the key–off power window signal.

(a) Connect the positive (+) lead from the voltmeter to terminal A3 and the negative (–) lead to body ground.

(b) Close the door with ignition switch turned to LOCK or ACC, and check that the meter needle indicates battery positive voltage.

(c) Open the door and check that the meter needle indicates 0 V.



(d) Turn the ignition switch ON and check that the meter needle indicates battery positive voltage again.

If operation is not as specified, replace the relay.

13. INSPECT INTEGRATION RELAY CIRCUIT (See page BE–21)

Inspect the switch adjustment procedures.

(1) Connect the power window master switch to the wire harness and turn the ignition switch ON.

(2) Fully open the door glass manually.

(3) Using a round bar that is 2 mm^2, press the reset switch.

CAUTION:

When using an iron wire, take care not to use a wire with a sharp edge.

(4) With the reset switch pressed, fully open the door glass with the master switch.

CAUTION:

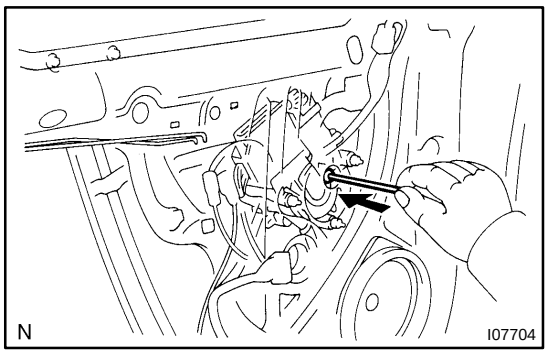
- **Operate manually.**
- **While opening the door glass, if any vibration is felt on the pressed reset switch, pressing force is weak, so repeat step (2).**

(5) Remove the bar and fully open the door glass.

(6) Check that the door glass can be opened and closed fully by AUTO operation.

(7) Checklist for power window malfunction.

BE10N–01



ADJUSTMENT

ADJUST POWER WINDOW MOTOR LIMIT SWITCH

(a) Connect the master switch assembly to the wire harness and turn the ignition switch ON.

(b) Close the window glass fully.

HINT:

Close by manual operation.

(c) Using a 2 mm round bar in diameter, press the reset switch to the force of 30 to 50 N (3 to 5 kgf), open the glass fully with a master switch.

HINT:

- When using a wire or equivalent, make sure that tip of it should be flat.
- Open by manual operation.
- Do not damage the rubber on the reset switch.

(d) Remove the round bar from the reset switch and fully close the window glass.

HINT:

Close by manual operation.

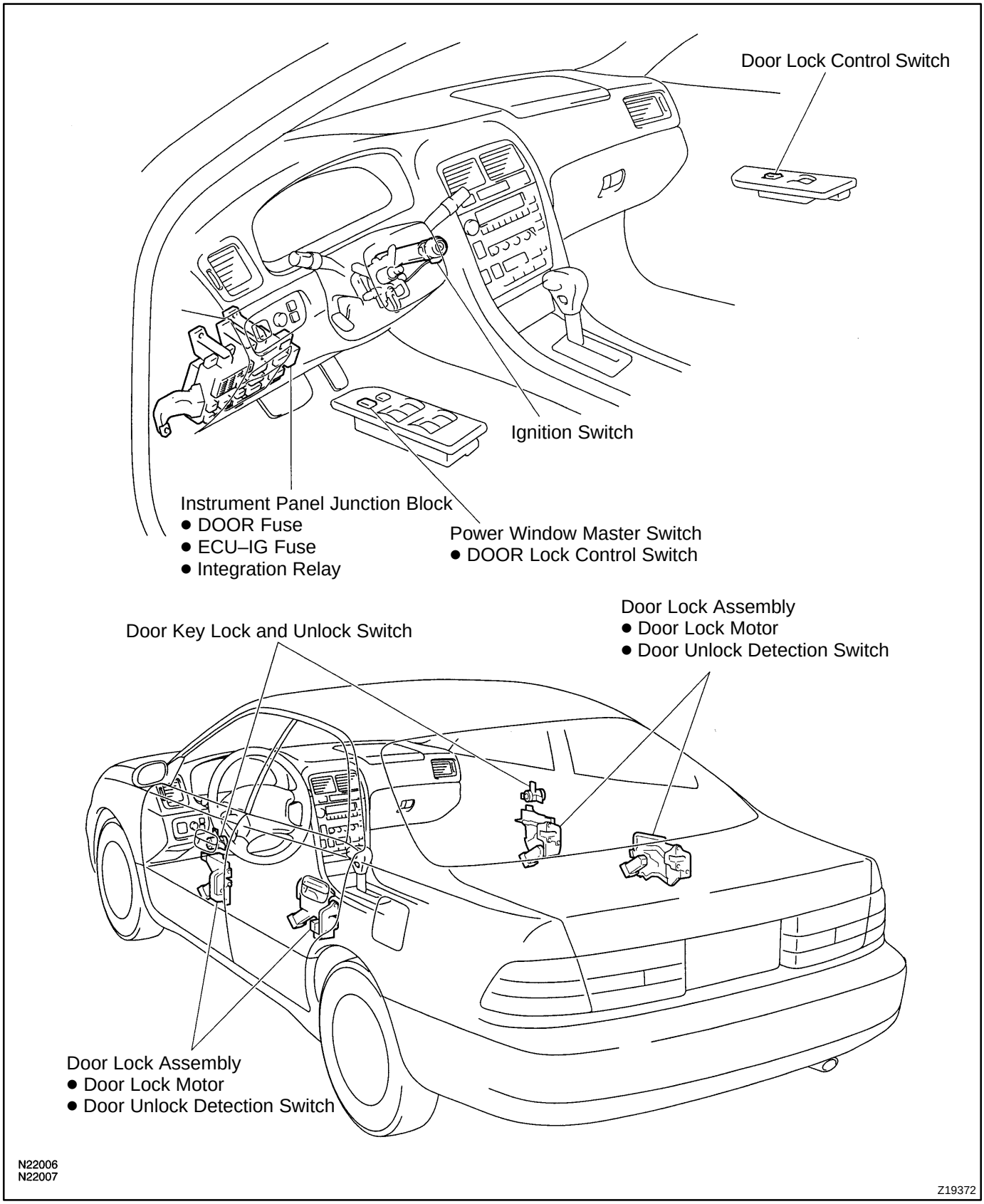
(e) Check that window glass can be fully opened and closed by automatic operation.

(f) Check functioning of power window.

POWER DOOR LOCK CONTROL SYSTEM

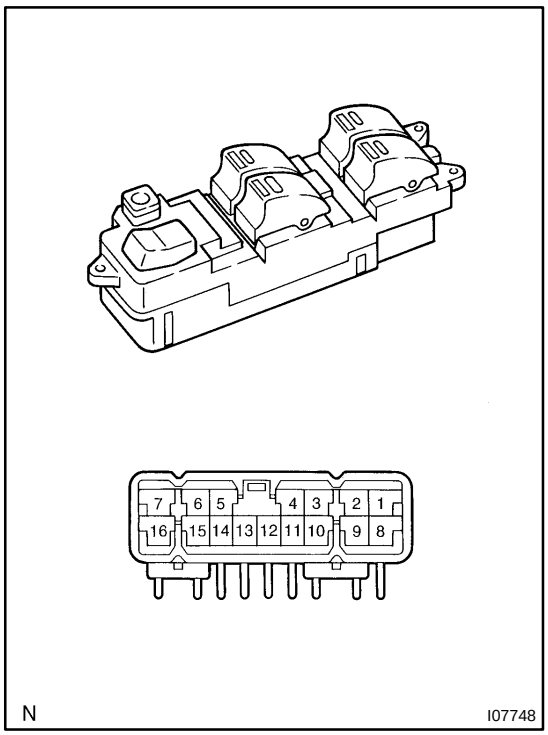
LOCATION

BE05O–02



BE05P–02

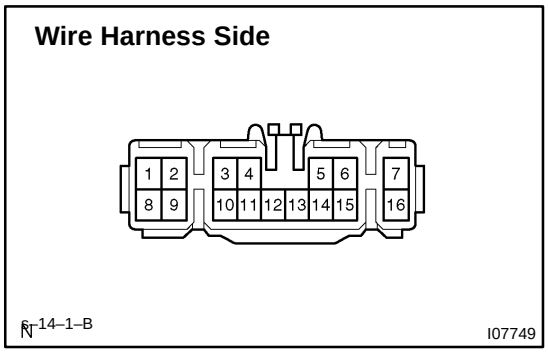
INSPECTION



1. Master switch:
INSPECT DRIVER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	3 – 7	Continuity
OFF	–	No continuity
UNLOCK	1 – 7	Continuity

If continuity is not as specified, replace the switch.

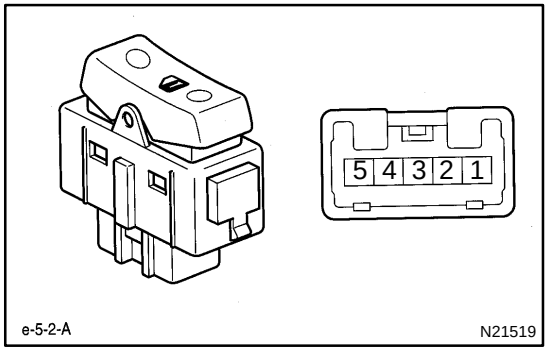


2. Master switch:
INSPECT DRIVER'S DOOR LOCK CONTROL SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
7 – Ground	Constant	Continuity
4 – Ground	Constant	Battery positive voltage
12 – Ground	Constant	Battery positive voltage

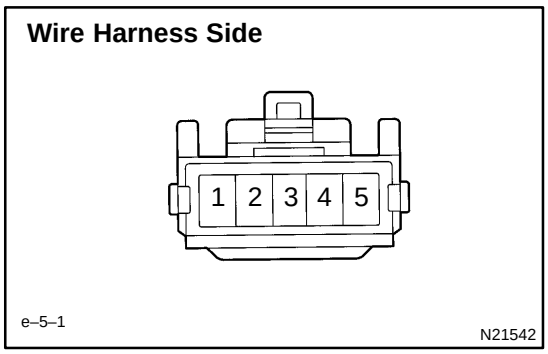
If the circuit is not as specified, inspect the circuits connected to other parts.



3. INSPECT PASSENGER'S DOOR LOCK CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	2 – 3	Continuity
OFF	–	No continuity
UNLOCK	1 – 2	Continuity

If continuity is not as specified, replace the switch.

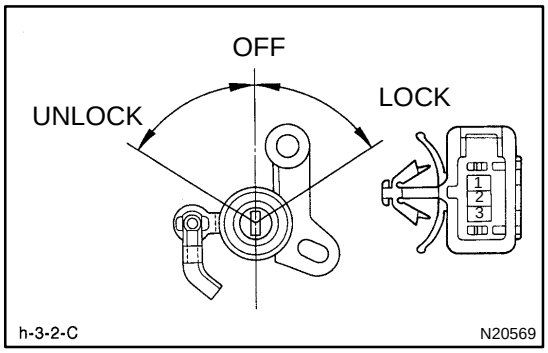


4. INSPECT PASSENGER'S DOOR LOCK CONTROL SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Constant	Battery positive voltage
3 – Ground	Constant	Battery positive voltage
4 – Ground	Ignition switch position LOCK or ACC	No voltage
4 – Ground	Ignition switch position ON	Battery positive voltage

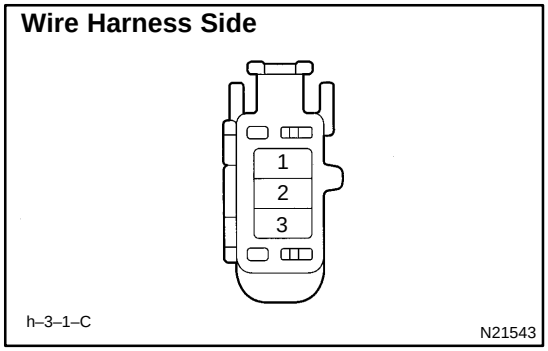
If the circuit is not as specified, inspect the circuits connected to other parts.



5. INSPECT DOOR KEY LOCK AND UNLOCK SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
LOCK	1 – 2	Continuity
OFF	–	No continuity
UNLOCK	1 – 3	Continuity

If continuity is not as specified, replace the switch.

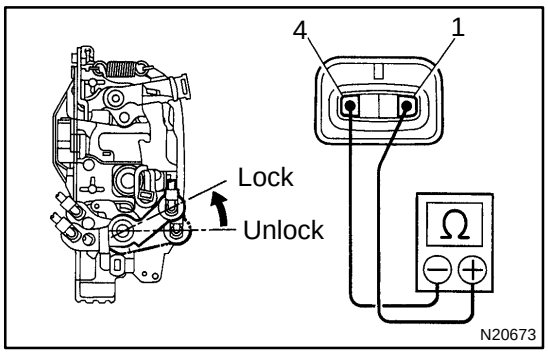


6. INSPECT DOOR KEY LOCK AND UNLOCK SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity
2 – Ground	Constant	Battery positive voltage
3 – Ground	Constant	Battery positive voltage

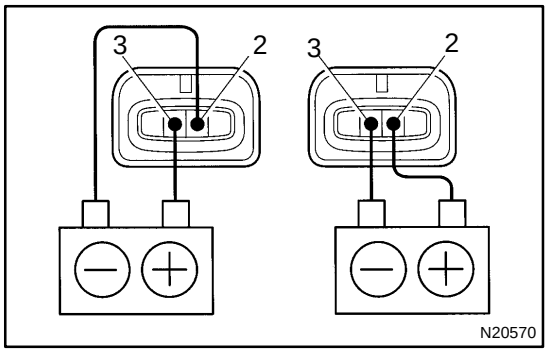
If the circuit is not as specified, inspect the circuits connected to other parts.



7. 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.

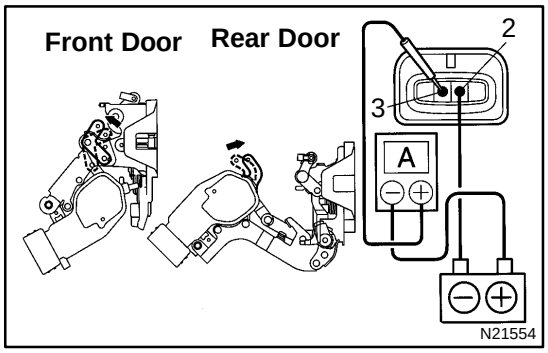


8. INSPECT MOTOR OPERATION

(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.

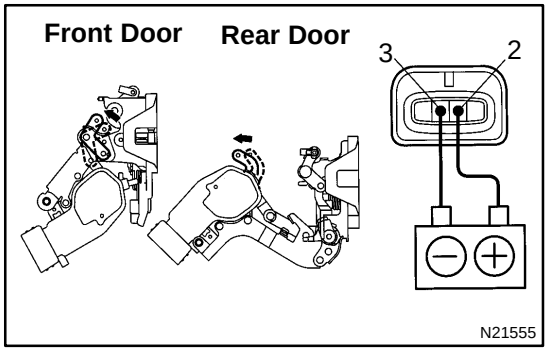
If operation is not as specified, replace the door lock assembly.



9. INSPECT PTC THERMISTOR OPERATION (Using an ammeter)

(a) Connect the positive (+) lead from the battery to terminal 3.

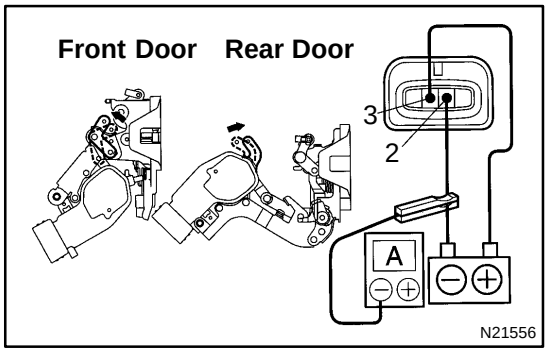
(b) Connect the positive (+) lead from the ammeter to terminal 2 and the negative (–) lead to battery negative (–) terminal, and check that the current changes from approximately 3.2 A to less than 0.5 A within 20 to 70 seconds.



(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.

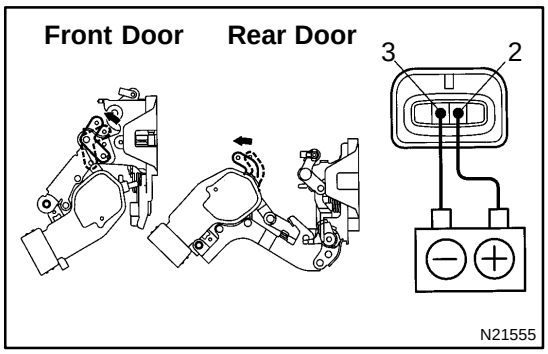
If operation is not as specified, replace the door lock assembly.



10. INSPECT PTC THERMISTOR OPERATION (Using an ammeter with a current–measuring probe)

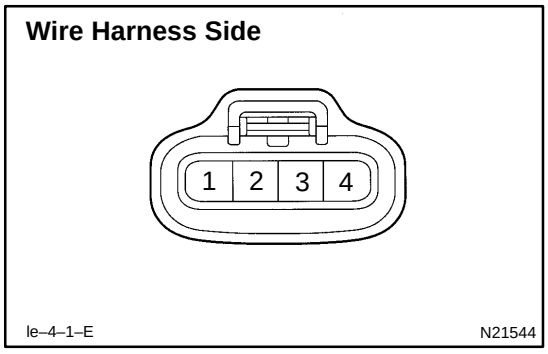
(a) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2.

(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.

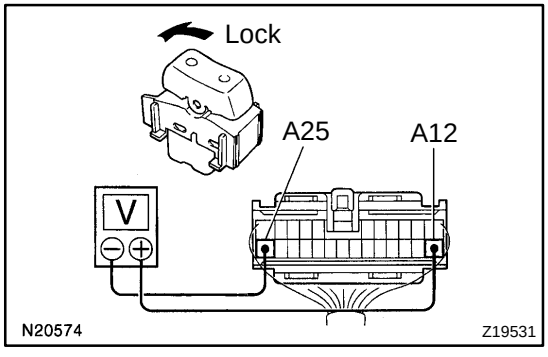


11. INSPECT DOOR LOCK ASSEMBLY CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity
1 – Ground 3 – Ground	Door lock manual switch OFF or LOCK	No voltage
1 – Ground 3 – Ground	Door lock manual switch UNLOCK	Battery positive voltage
2 – Ground	Door lock manual switch OFF or UNLOCK	No voltage
2 – Ground	Door lock manual switch LOCK	Battery positive voltage

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

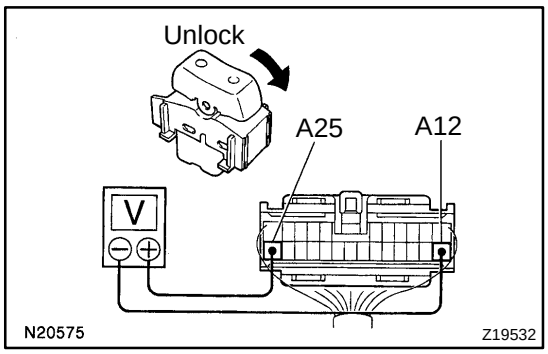


12. Door lock signal: INSPECT INTEGRATION RELAY OPERATION

HINT:

When the relay circuit is as specified, inspect the door lock signal.

(a) Connect the positive (+) lead from the voltmeter to terminal A12 and the negative (–) lead to terminal A25.
(b) Set the door lock control switch to UNLOCK and check that the voltage rises from 0 V to battery positive voltage for approximately 0.2 seconds.



(c) Reverse the polarity of the voltmeter leads.
(d) Set the door lock control switch to LOCK and check that the voltage rises from 0 V to battery positive voltage for approximately 0.2 seconds.

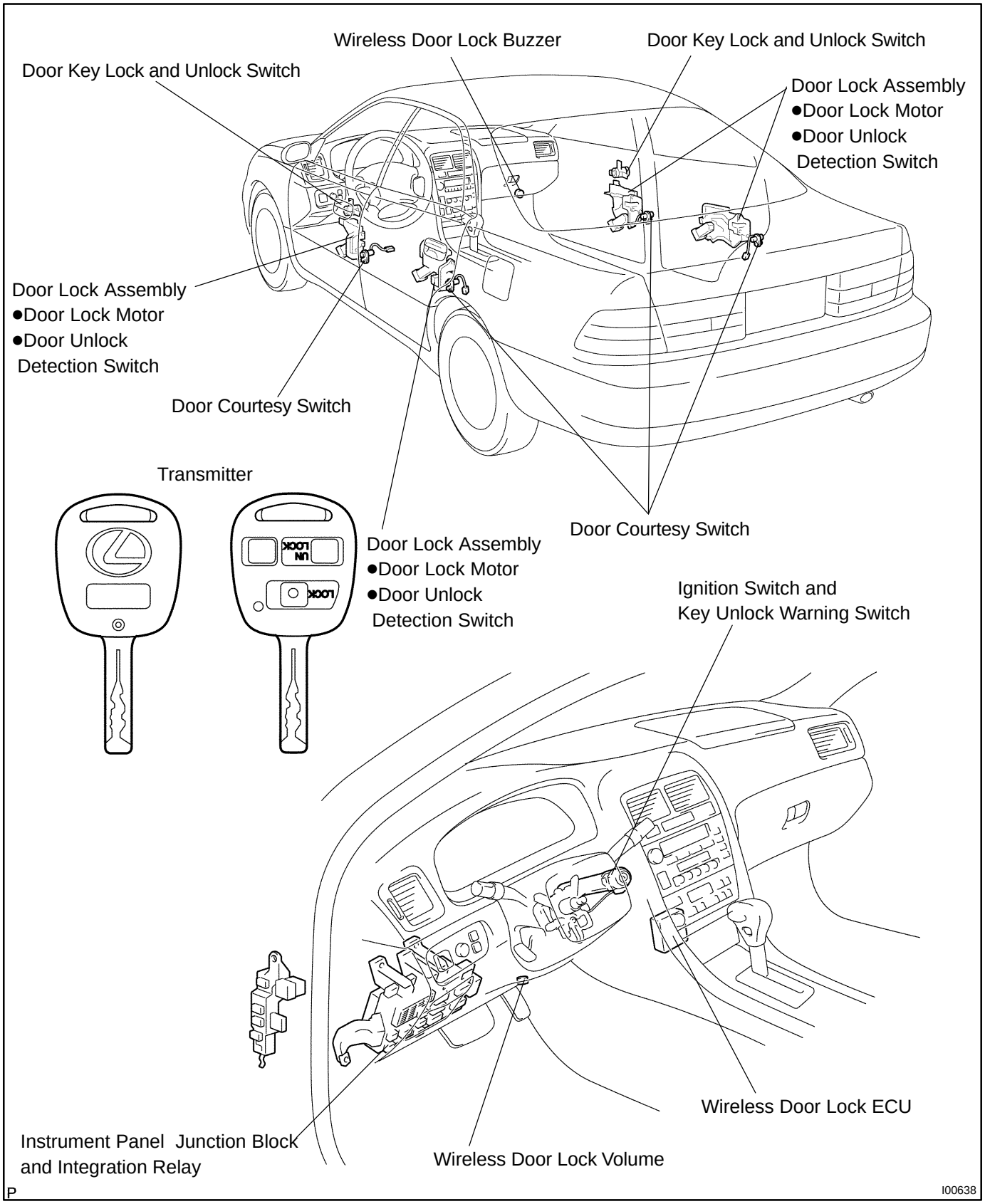
If operation is not as specified, replace the relay.

13. INSPECT INTEGRATION RELAY CIRCUIT
(See page BE–21)

WIRELESS DOOR LOCK CONTROL SYSTEM

LOCATION

BE0IL–08



BE0IM–16

PRE–CHECK

Only wireless function (Remote control) will not operate.
(If a new transmitter or a transmitter of the same type that works properly with the vehicle is not available.)

Put the vehicle in the following conditions (Pre requisite).
(1) Key plate has not been inserted in the ignition key cylinder.
(2) All the doors are closed. (Door warning light is off.)
(3) All the doors are locked.

Basic function check:

Under the standard operation, when repeating the operation of UNLOCK and LOCK switch 3 times or more alternately, check the UNLOCK–LOCK operation from 3rd time onward.
Following procedures are standard operation.
(1) Keep about 1 M away in the right direction from the outside handle of a driver's seat.
(2) Face the transmitter to the vehicle and press one of transmitter switches for about 1 second

No

Yes

Normal
<Reference>
Operative distance may differ according to an operator, the way of holding the transmitter or position.
As weak electric wave is used, when there is strong wave or noise in the used frequency, operation distance might be shortened.

Transmitter battery check:

Replace the transmitter battery with a new or normal one and check UNLOCK–LOCK function works under the standard operation.
<Reference>
The battery should be replaced by only the shops with sufficient skill.
Battery quality can be judged by checking the remaining battery capacity.

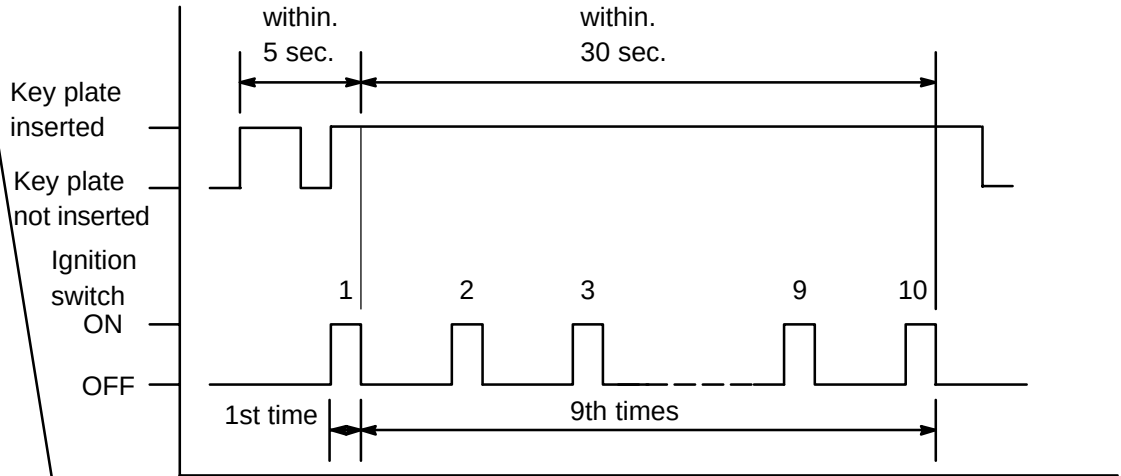
Yes → Battery faulty.

No

Put the vehicle in the same conditions as shown in the previous page. (Pre requisite)

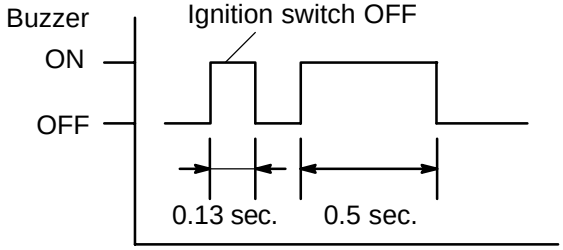
Inspection starts by using self diagnostic mode:

Enter into the self diagnostic mode.
When operating door control receiver in the order of 1 through 2, the mode turns to diagnostic mode.
(1) Insert the key plate in the ignition key cylinder and pull it out, then insert it again and turn the ignition switch
OFF → ON → OFF once within 5 seconds after pulling it out.
(2) After completing the above step within 30 seconds, turn the ignition switch OFF → ON → OFF 9 times.
HINT:
In case that either of (1) and (2) conditions is not satisfied, change to normal mode.
<Reference>
When completing self diagnostic mode, turn the ignition switch ON.
LOCK and UNLOCK operation is not performed under the self diagnostic mode.



Self diagnostic mode operation check:

After the self diagnostic mode input operation has been performed, check that the buzzer chirps.



No
(Not entered in self diagnostic mode)

Is the method to enter into the diagnostic mode correct?

No

Yes

Is the chirping function of operation confirmation buzzer normal?

No

Check door control buzzer.

Yes

Is the function of operation confirmation buzzer normal?

No

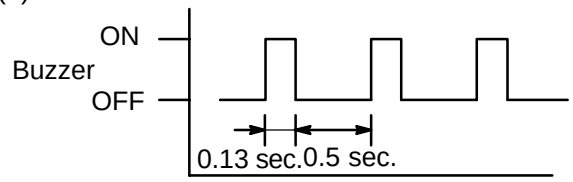
Yes

Yes
(Entered in self diagnostic mode)

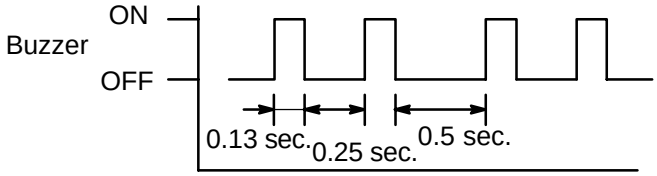
Self diagnostic mode check:

Check that how the buzzer chirps when pressing each transmitter switch.

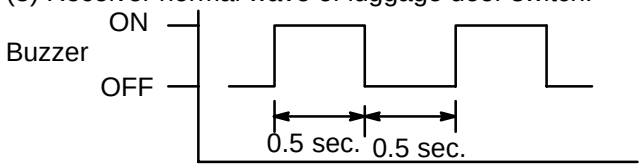
(1) Receiver normal wave of LOCK switch.



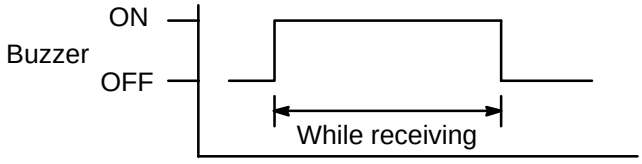
(2) Receiver normal wave of UNLOCK switch.



(3) Receiver normal wave of luggage door switch.



(4) Incompatibility of the recognition code or out from synchronization of rolling code.



<Reference>:
While turning the ignition switch ON in the self diagnostic mode, the mode returns to normal mode.

No response

No response from buzzer.

Transmitter faulty or wireless door lock ECU faulty.
<Reference>
Use another (normal) transmitter and check with the diagnostic mode and in the case that the check result shows the transmitter faulty, it can be judged that wireless door lock ECU is normal.

(1), (2) or (3) are output.

(4) is output.

Check of the recognition code registration function:
Check if it can set to rewrite mode or add mode of the recognition code registration.

Yes → After registering the code, check the operation and operation is normal.
(The rolling code has not been synchronized.)

No

Check the terminal voltage of wireless door lock ECU:
Check each following terminal.
L UL3 IG
CTY LSWD

OK → Vehicle wiring faulty.

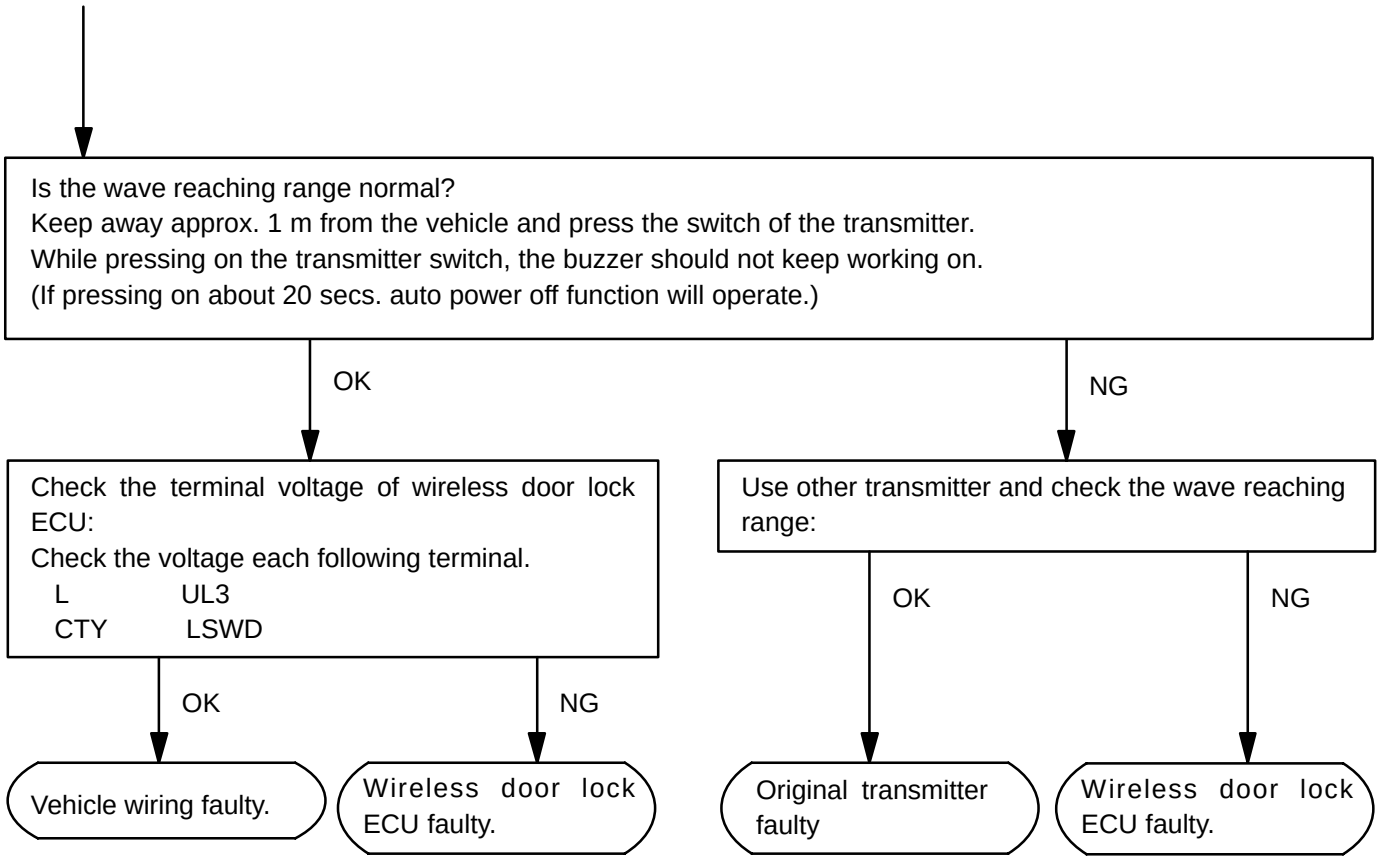
NG → Wireless door lock ECU faulty.

Check the wireless door lock ECU:
Are the continuity and voltage between each terminal of the connector connected to the wireless door lock ECU and body ground normal?

Terminal No.	Item	Checking condition	Standard
10	Voltage	Insert the key plate into the ignition key cylinder →Pull out.	0 V → 10 ~ 14 V
13	Voltage	Ignition switch OFF ↔ ON	0 V → 10 ~ 14 V

Yes → Wireless door lock ECU faulty.

No → Vehicle wiring faulty.



HINT:
The rolling code is the code changing at each time when the wave is transmitted from the transmitter and changing when the wave is synchronized between transmitter side and ECU side.
When the rolling code is not synchronized between the transmitter and ECU, a symptom of ”Only LOCK operation is available.”appears.
In this case, it goes back to normal by synchronizing the rolling code (The method to synchronize it is the same as of the registration of the recognition code.).

BE0OJ–13

INSPECTION

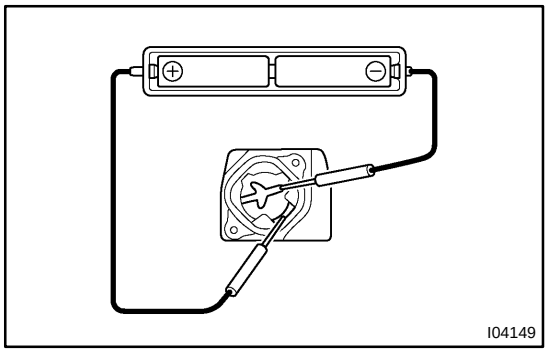
1. INSPECT WIRELESS DOOR LOCK TRANSMITTER OPERATION

HINT:

Refer to ”Wireless door lock control receiver and transmitter replacement”.

(a) Using a screwdriver, remove the 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, and check the transmitter operation when pressing transmission switch on the side of the transmitter body.

Standard:

Remote control of vehicle door lock can be operated.

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.

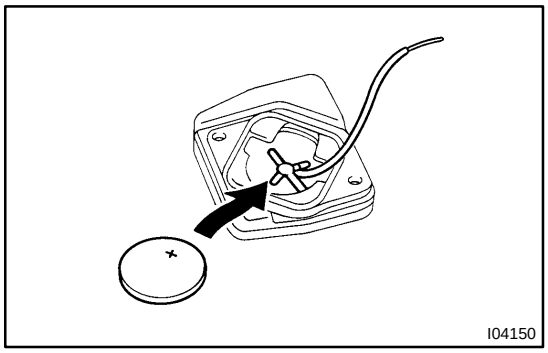
(e) Install the battery (lithium battery).

(f) Install a cover so that rubber is not distorted or slipped off.

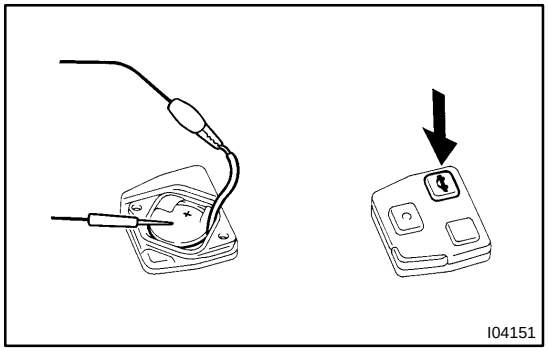
2. CHECK BATTERY CAPACITY

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) Using a screwdriver, remove the screw and cover.
(b) Remove the battery (lithium battery) from the transmitter.
(c) Connect the lead to the (–) terminal of the transmitter and install the battery.



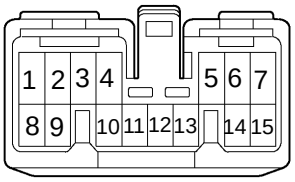
(d) Connect the (+) tester to the (+) battery (lithium battery), and (–) tester to the lead respectively.
(e) Press one of the transmitting switches on the transmitter for approx. 1 second.
(f) Press the transmitting switch on the transmitter again to check the voltage.
Standard:
2.1 V or more

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 after 20 seconds from 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 rubber cover is not distorted or slipped off.

Wire Harness Side:



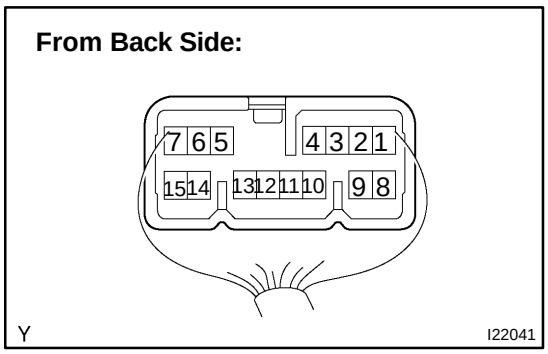
Y I22040

3. INSPECT WIRELESS DOOR LOCK CONTROL RECEIVER CIRCUIT

(a) Disconnect the connector from the receiver and inspect the connector on the wire harness side, as shown below.

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity
8 – Ground	Constant	10 – 14 V
10 – Ground	Key unlock warning switch ”ON” (Key inserted into ignition key cylinder)	0 V
	Key unlock warning switch ”OFF” (Key removed from ignition key cylinder)	10 – 14 V
11 – Ground	Driver’s door unlock detection switch ”ON” (Driver’s door lock knob ”LOCK”)	4 – 6 V
	Driver’s door unlock detection switch ”OFF” (Driver’s door lock knob ”UNLOCK”)	0 V
13 – Ground	Ignition switch ”OFF”	0 V
	Ignition switch ”ON”	10 – 14 V
14 – Ground	All door courtesy switches ”OFF” (All doors closed)	10 V or more
	Any of door courtesy switches ”ON” (Any of doors opened)	0 V

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



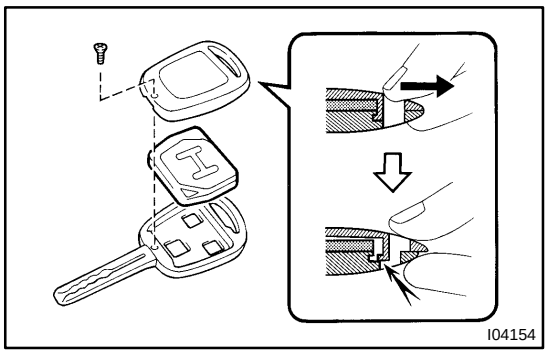
(b) Connect the wire harness side connector to the receiver and inspect the wire harness side connector from the back side, as shown below.

Tester connection Tester ⊕ ↔ Tester ⊖	Condition	Specified condition
3 – 2	All doors closed → All doors locked with transmitter lock switch "ON"	0 V → 10 V or more (Output once)
	All doors closed → All doors unlocked with transmitter unlock switch "ON"	0 V → 10 V or more (Output twice)
	Luggage door unlock switch in transmitter "OFF" → "ON"	0 V → 10 V or more (Output once)
	Any of doors opened → Transmitter lock switch "ON"	0 V → 10 V or more (Output for 10 seconds)
5 – Ground	Luggage door unlock switch in transmitter "OFF" → "ON" (Keeps 0.8 seconds or more)	10 V or more → 0 V → 10 V or more
7 – Ground	All doors closed → Transmitter unlock switch "ON"	0 V → 10 V or more → 0 V
15 – Ground	All doors closed → Transmitter lock switch "ON"	0 V → 10 V or more → 0 V

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

BE1BG–02

REPLACEMENT



1. 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.

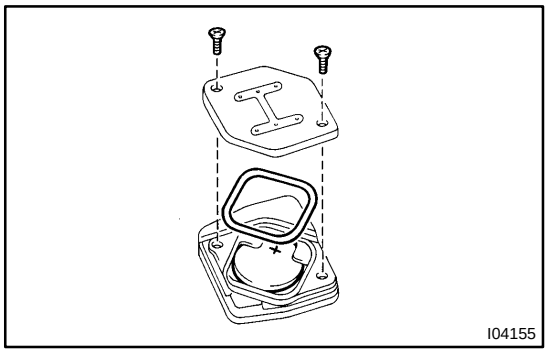
NOTICE:

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.



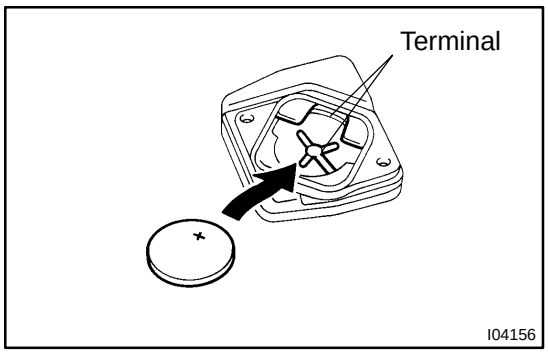
(c) Using a screwdriver, remove the 2 screws and cover.

(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.

2. REPLACE DOOR CONTROL RECEIVER AND TRANSMITTER

NOTICE:

When replacing the door control receiver and transmitter, registration of recognition code is necessary because they are provided as single components.

(a) Select which operation mode should be performed from the following modes.

Add mode
Rewrite mode
Prohibition mode
Confirmation mode

HINT:

The add mode is used to retain codes already registered while you register new recognition codes. This mode is used when adding a transmitter. However, if the number of registered codes exceeds 4 codes, previously registered codes are correspondingly erased in order, starting from the first registered code.

The rewrite mode is used to erase all previously registered codes and register only new recognition codes.

The prohibition mode is used to erase all registered codes and cancels the wireless door lock function. Use this mode when the transmitter is lost.

The confirmation mode is for confirming how many recognition codes are already registered before you register additional recognition codes.

(b) Follow the chart on the following pages to register the transmitter recognition code at the wireless door lock control receiver.

HINT:

When procedure is out of the specified, the operation returns to normal operation.

Maximum 4 recognition codes can be registered.

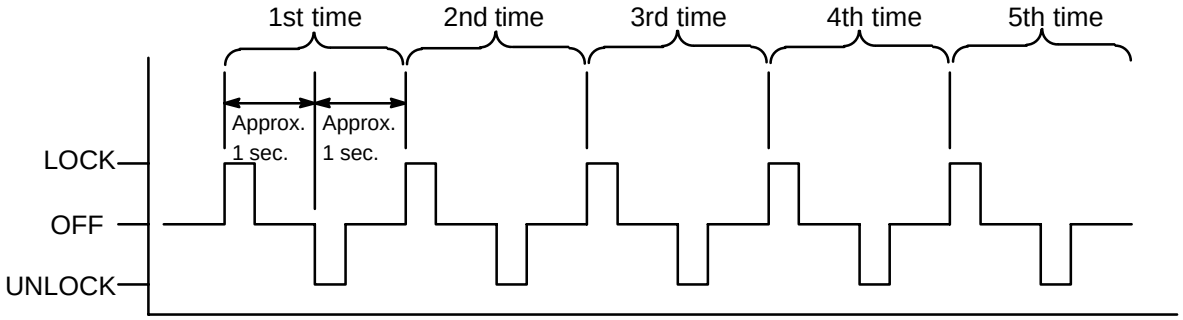
Start registration of recognition code

The vehicle should be in the following conditions.
- The key is not inserted in the ignition key cylinder.
- Driver's door is OPEN. (Other doors are CLOSED)
- Driver's door is UNLOCKED.

Insert the key into the ignition key cylinder, then pull it out.

Within 40 secs.

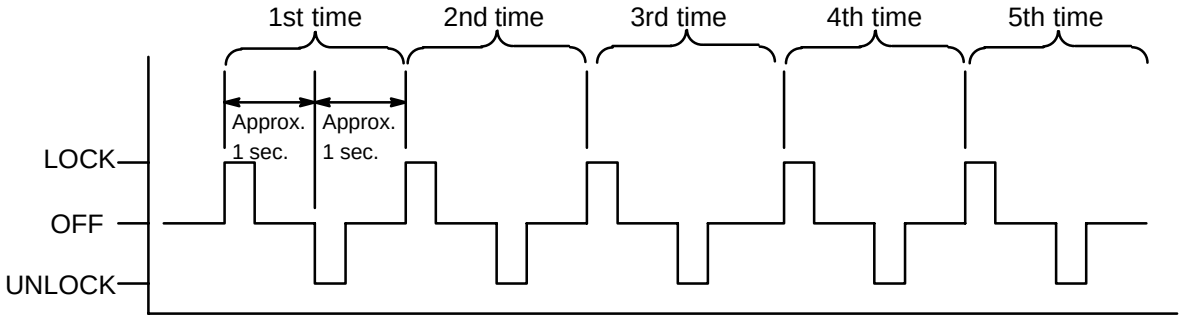
Press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.



Close the driver's door, then open it.

Within 40 secs.

Again press the door lock control switch (for manual operation) 5 times to LOCK/UNLOCK at approx. 1 sec. interval.

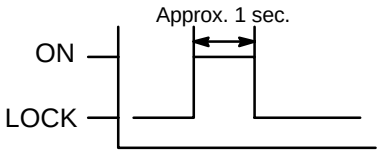


Insert the key into the ignition key cylinder.

Turn the ignition switch from ON to LOCK at approx. 1 sec. interval 1 to 5 times to select the mode.

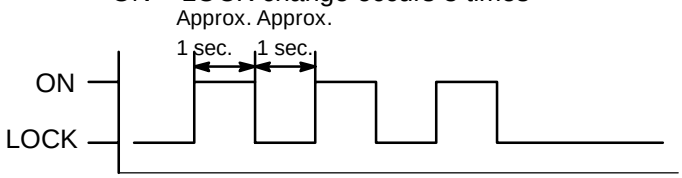
Add mode

ON – LOCK change occurs 1 time



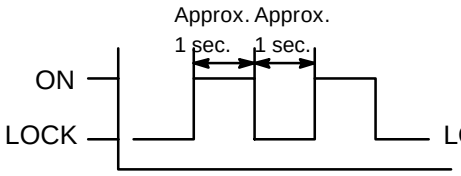
Confirmation mode

ON – LOCK change occurs 3 times



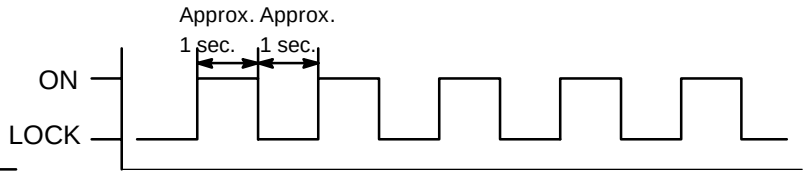
Rewrite mode

ON – LOCK change occurs 2 times



Prohibition mode

ON – LOCK change occurs 5 times



Remove the key from the ignition key cylinder.

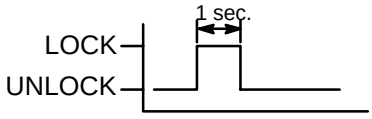
Within 20 secs.

When add mode, rewrite mode or erase mode has been selected.

The receiver automatically performs the LOCK–UNLOCK operation once, twice or 5 times at 1 sec. intervals to inform the technician whether the add mode, rewrite mode or erase mode has been selected.

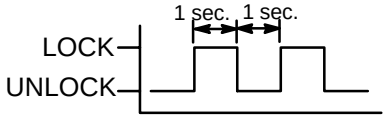
LOCK–UNLOCK occurs once

Indicates that add mode has been selected.



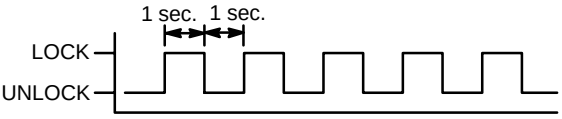
LOCK–UNLOCK occurs twice

Indicates that rewrite mode has been selected.



LOCK–UNLOCK occurs 5 times

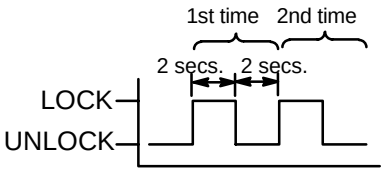
Indicates that erase mode has been selected.



When confirmation mode is selected.

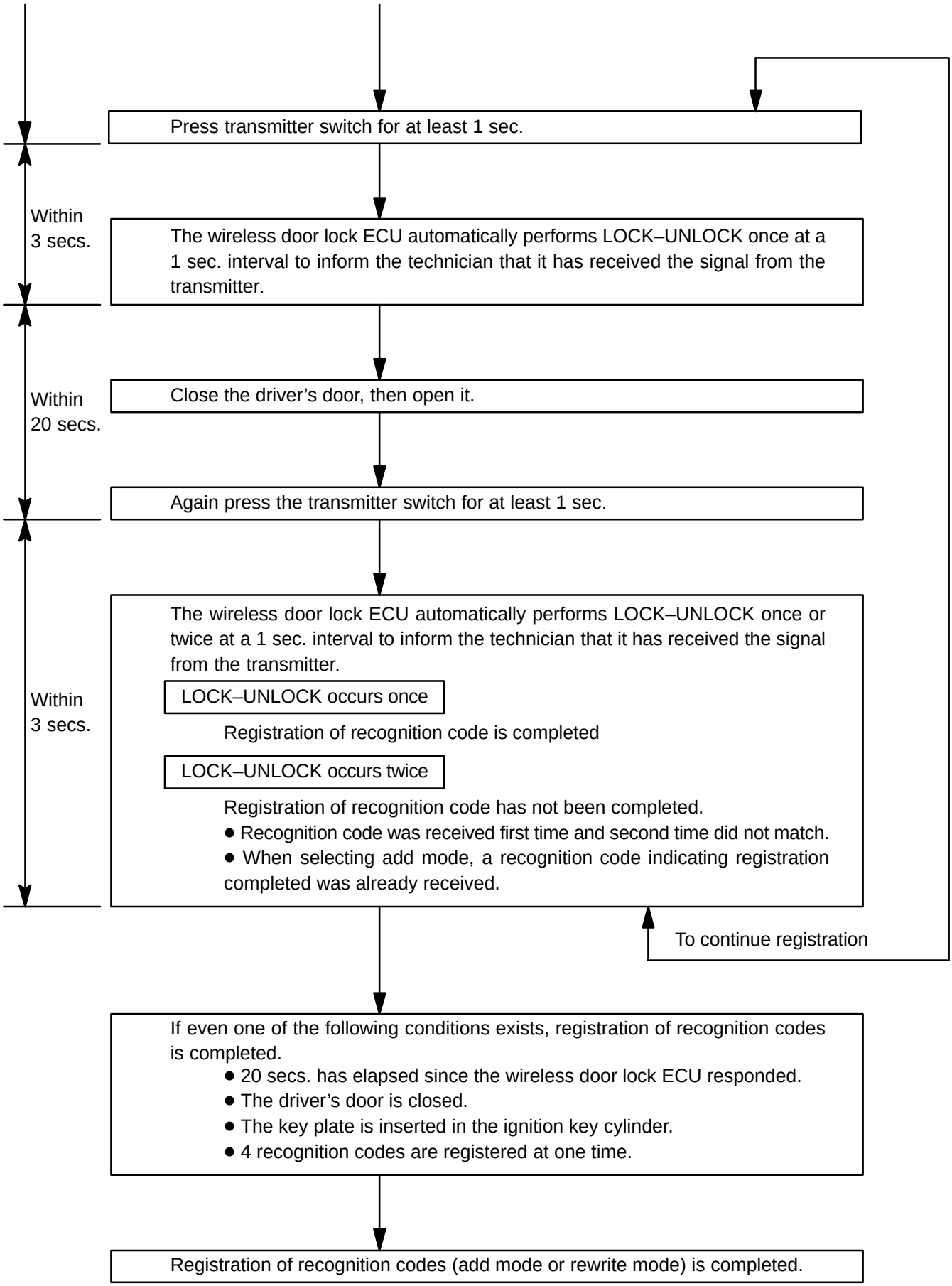
The receiver automatically performs the LOCK–UNLOCK operation 0 to 4 times at 2 sec. intervals to inform the technician of the number of registered codes.

Example:
LOCK–UNLOCK occurs twice:
2 recognition codes are registered.



Registration of recognition code (Confirmation mode) and erase mode completed.

Erase Mode

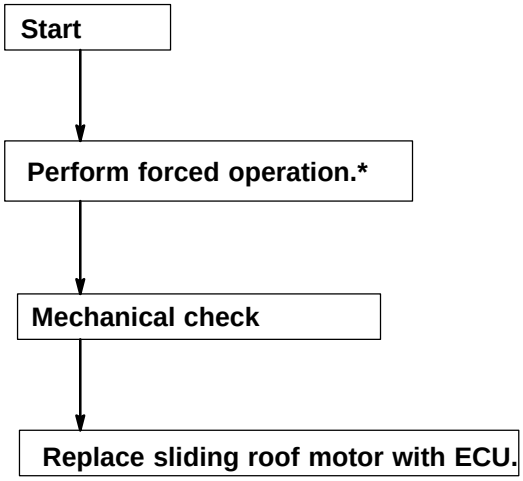

Press transmitter switch for at least 1 sec.
Within 3 secs.
The wireless door lock ECU automatically performs LOCK–UNLOCK once at a 1 sec. interval to inform the technician that it has received the signal from the transmitter.
Within 20 secs.
Close the driver's door, then open it.
Again press the transmitter switch for at least 1 sec.
Within 3 secs.
The wireless door lock ECU automatically performs LOCK–UNLOCK once or twice at a 1 sec. interval to inform the technician that it has received the signal from the transmitter.
LOCK–UNLOCK occurs once
Registration of recognition code is completed
LOCK–UNLOCK occurs twice
Registration of recognition code has not been completed.
● Recognition code was received first time and second time did not match.
● When selecting add mode, a recognition code indicating registration completed was already received.
To continue registration
If even one of the following conditions exists, registration of recognition codes is completed.
● 20 secs. has elapsed since the wireless door lock ECU responded.
● The driver's door is closed.
● The key plate is inserted in the ignition key cylinder.
● 4 recognition codes are registered at one time.
Registration of recognition codes (add mode or rewrite mode) is completed.

SLIDING ROOF SYSTEM

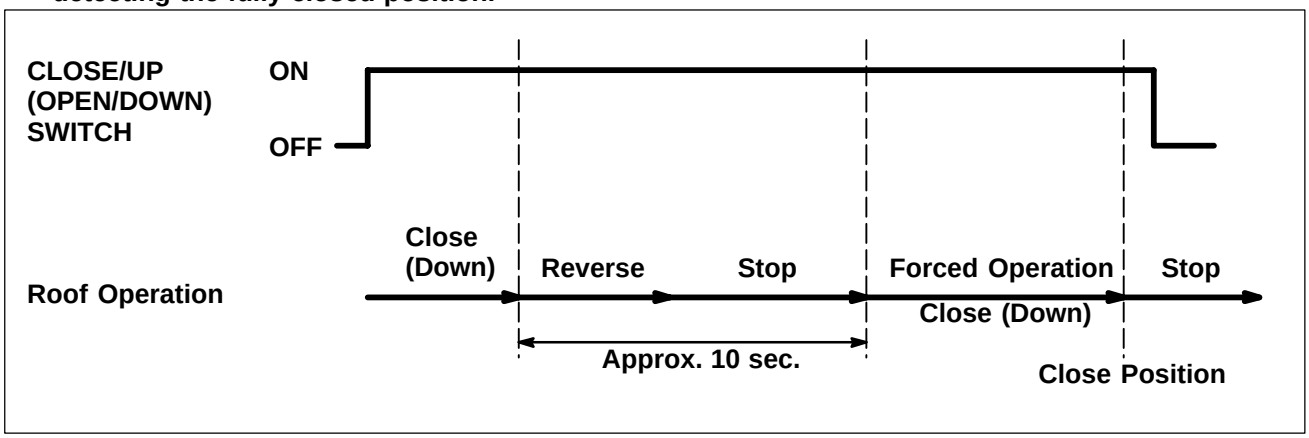
TROUBLESHOOTING

BE0O9–07

Sliding Roof reverses during close (down) operation.



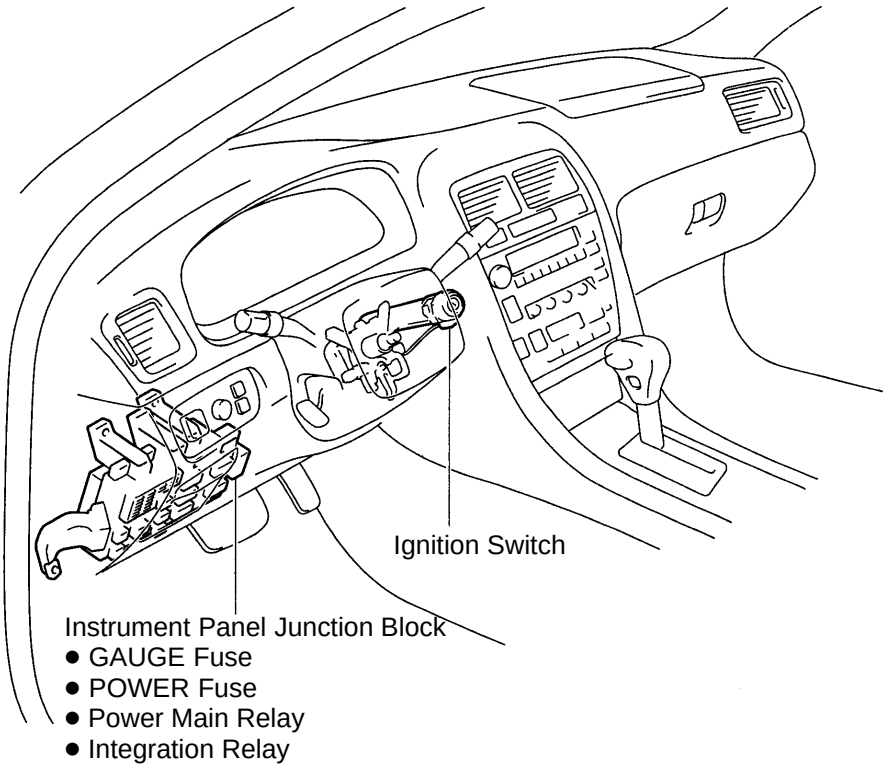
***: Holding the CLOSE/UP (OPEN/DOWN) switch pressed inhibits the jam protection function at approx. 10 sec. after starting the reverse operation.**
If the switch remains pressed any longer, the sliding door starts close operation and it stops when detecting the fully closed position.

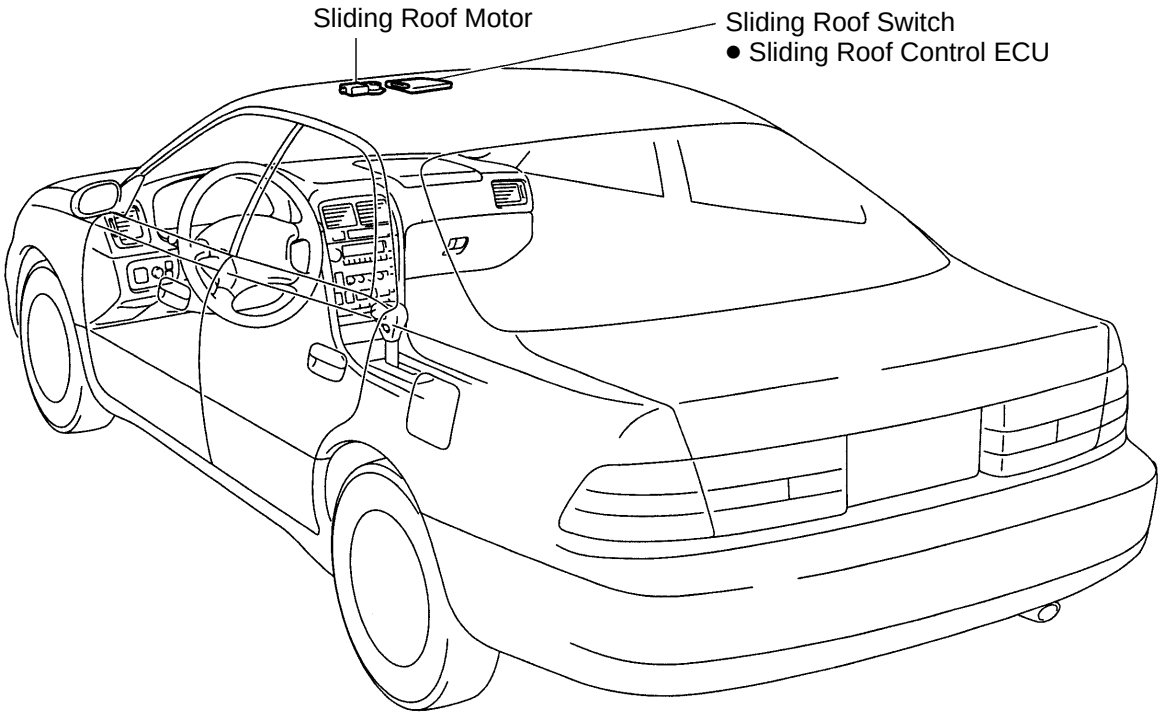


HINT:
At approx. 10 sec. after starting the reverse operation, it is switched to the forced close (down) operation.

BE05Q–02

LOCATION



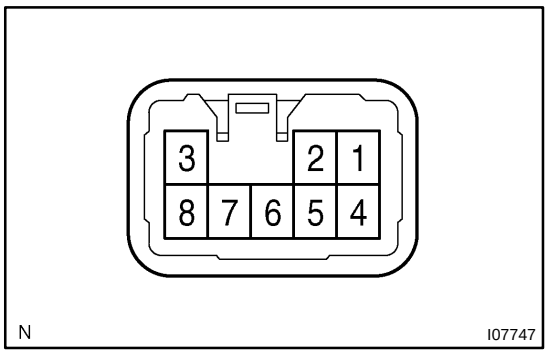


N22012
N22013

I10233

BE10K–04

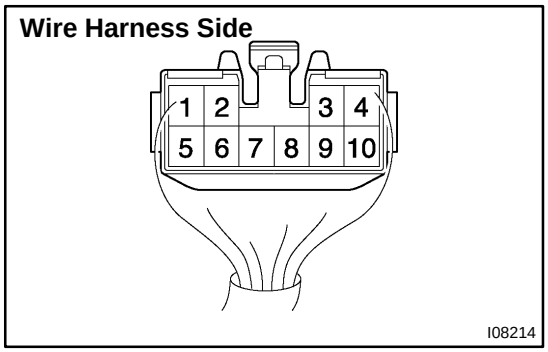
INSPECTION



1. INSPECT SLIDING ROOF CONTROL SWITCH CONTINUITY

Switch position	Tester connection	Specified condition
SLIDE OPEN	4 – 8	Continuity
TILT UP	4 – 6	Continuity

If continuity is not as specified, replace the switch.



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
2 – Ground	Sliding roof control switch (TILT) OFF or UP	No continuity
2 – Ground	Sliding roof control switch (TILT) DOWN	Continuity
2 – Ground	Sliding roof control switch (SLIDE) OFF or CLOSE	No continuity
2 – Ground	Sliding roof control switch (SLIDE) OPEN	Continuity
5 – Ground	Sliding roof control switch (TILT) OFF or CLOSE	No continuity
5 – Ground	Sliding roof control switch (TILT) UP	Continuity
5 – Ground	Sliding roof control switch (SLIDE) OFF or OPEN	No continuity
5 – Ground	Sliding roof control switch (SLIDE) CLOSE	Continuity
8, 7 – Ground	Constant	Continuity
10 – Ground	Constant	Continuity
3 – Ground	Ignition switch LOCK or ACC	* No voltage
3 – Ground	Ignition switch ON	Battery positive voltage
4 – Ground	Constant	Battery positive voltage

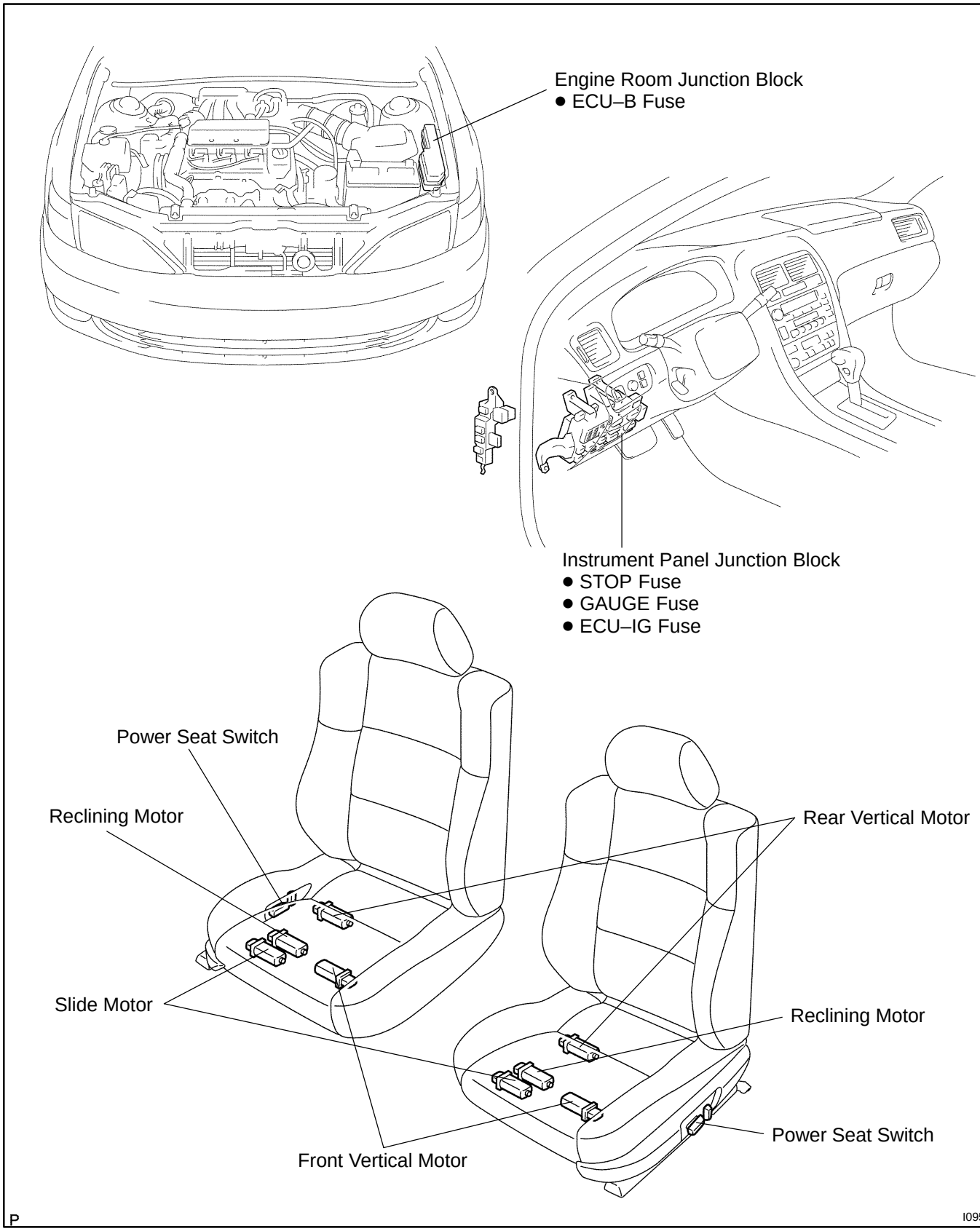
*: Exceptions: During 60 second period after ignition switch ON → OFF (ACC) or until driver of passenger door in opened after ignition switch ON → OFF (ACC).

If circuit is as specified, replace the relay.

POWER SEAT CONTROL SYSTEM

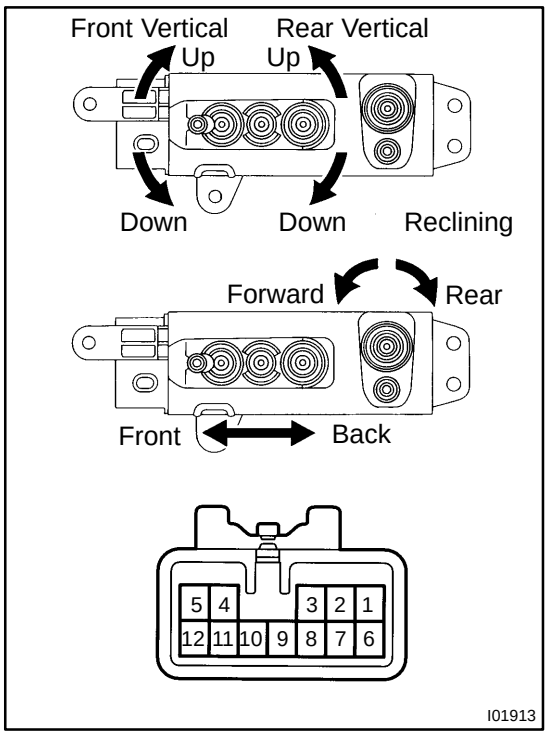
BE05S–05

LOCATION



BE05T–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

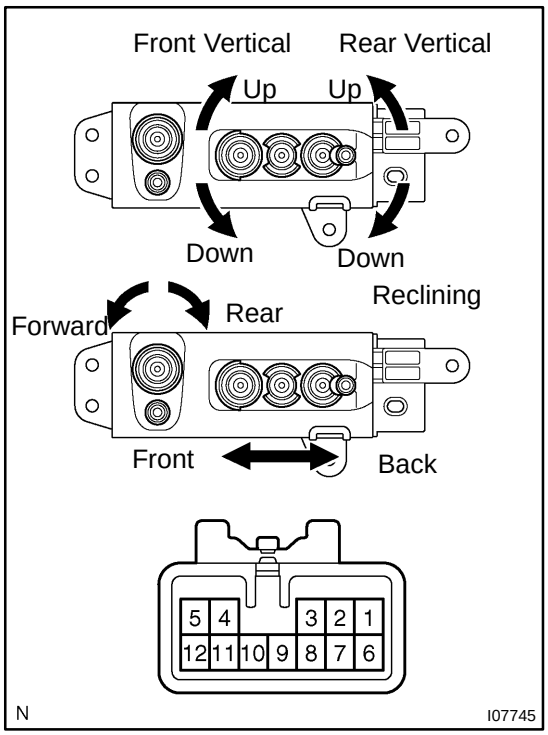
Rear vertical switch:

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 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	7 – 9 10 – 11	Continuity

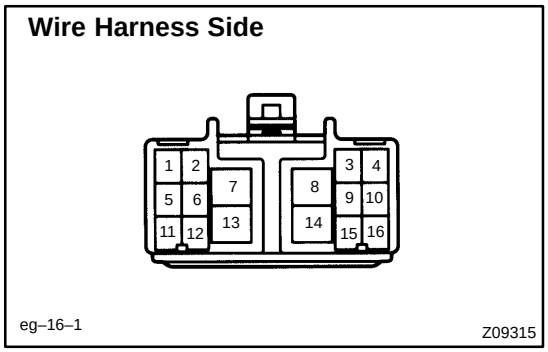
Rear vertical switch:

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.



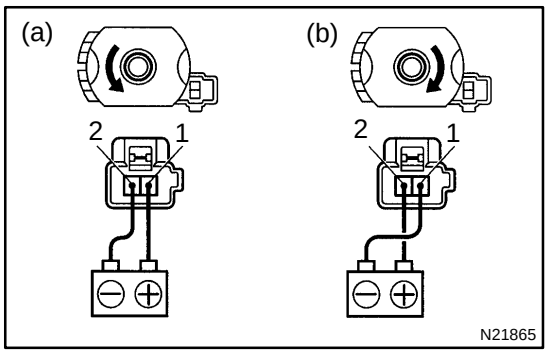
3. INSPECT POWER SEAT SWITCH CIRCUIT

(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.

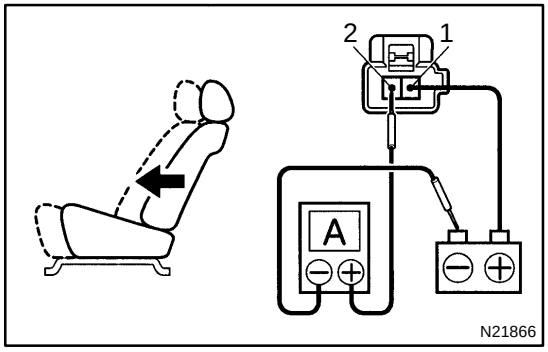


4. INSPECT SLIDE MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

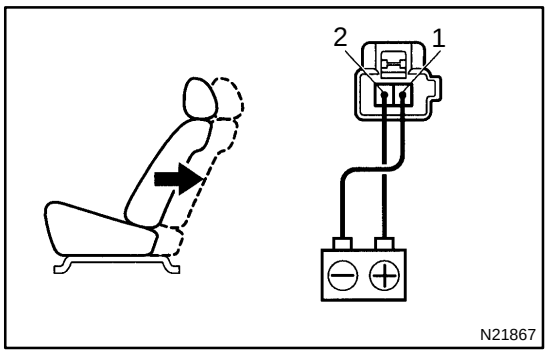
If operation is not as specified, replace the seat adjuster.



5. INSPECT SLIDE MOTOR PTC THERMISTOR OPERATION

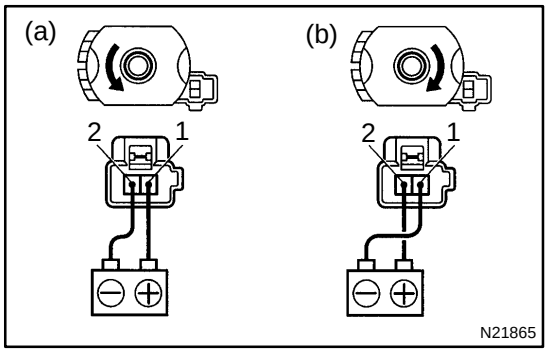
(a) Connect the positive (+) lead from the battery to terminal 1, the positive (+) lead from the ammeter to terminal 2 and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the front position.

(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 2 and the negative (–) lead to terminal 1, check that the seat cushion begins to move backwards.

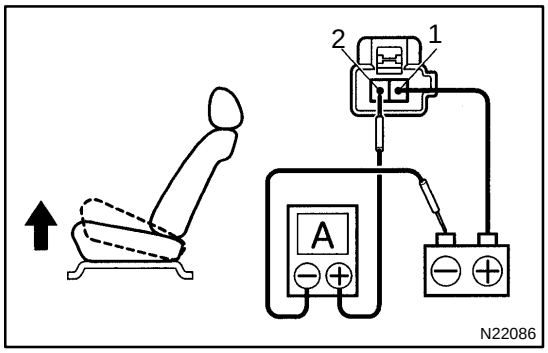
If operation is not as specified, replace the seat adjuster.



6. INSPECT FRONT VERTICAL MOTOR OPERATION

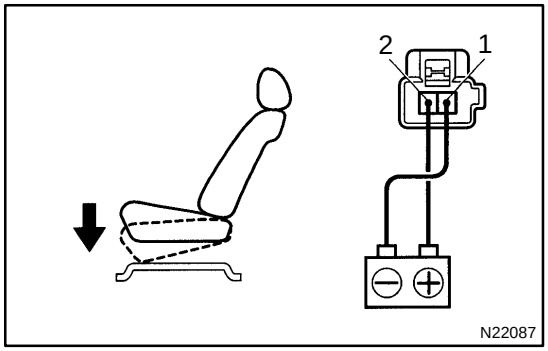
(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

If operation is not as specified, replace the seat adjuster.



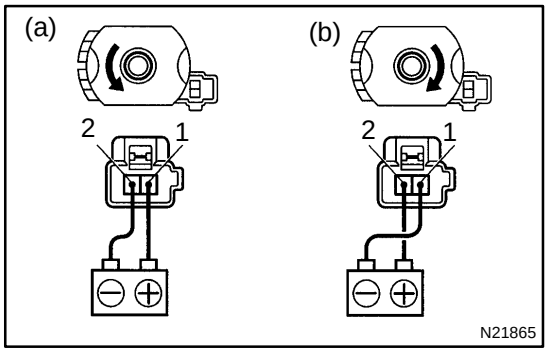
7. INSPECT FRONT VERTICAL MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1, the positive (+) lead from the ammeter to terminal 2 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 and the negative (–) lead to terminal 1, check that the seat cushion begins to descend.

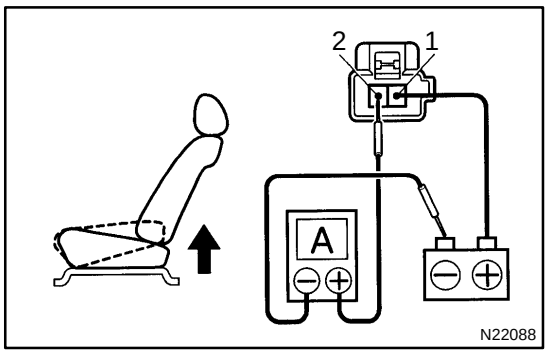
If operation is not as specified, replace the seat adjuster.



8. INSPECT REAR 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 counterclockwise.
(b) Reverse the polarity, check that the motor turns clockwise.

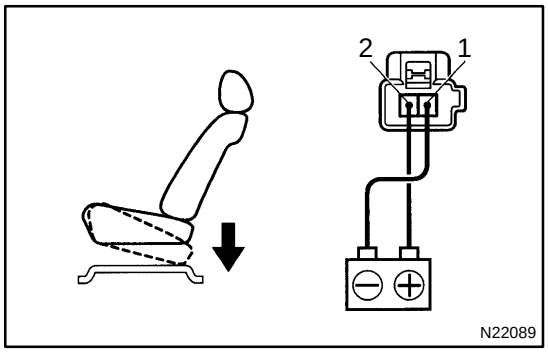
If operation is not as specified, replace the seat adjuster.



9. INSPECT REAR VERTICAL MOTOR PTC THERMISTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1, the positive (+) lead from the ammeter to terminal 2 and the negative (–) lead to the battery negative (–) terminal, then move the seat cushion to the highest position.

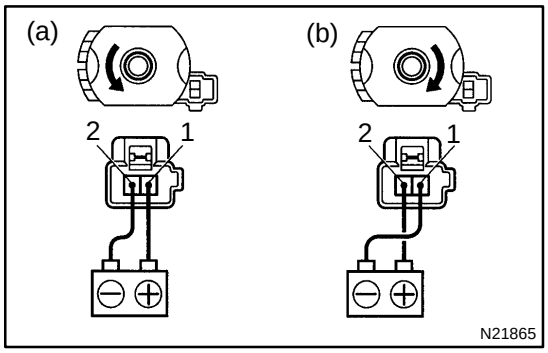
(b) Continue to apply voltage, check that the current changes to less than 1 ampere within 4 to 90 seconds.



(c) Disconnect the leads from the terminals.

(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 1, check that the seat cushion begins to descend.

If operation is not as specified, replace the seat adjuster.

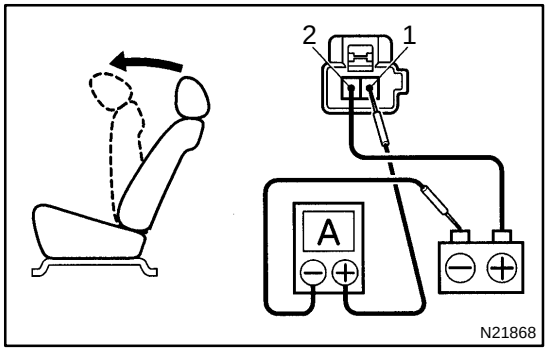


10. INSPECT RECLINING MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the motor turns counterclockwise.

(b) Reverse the polarity, check that the motor turns clockwise.

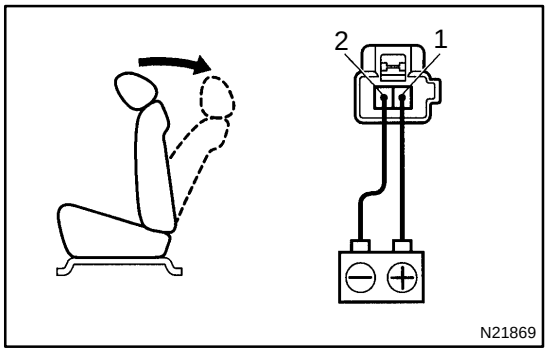
If operation is not as specified, replace the seat adjuster.



11. 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.

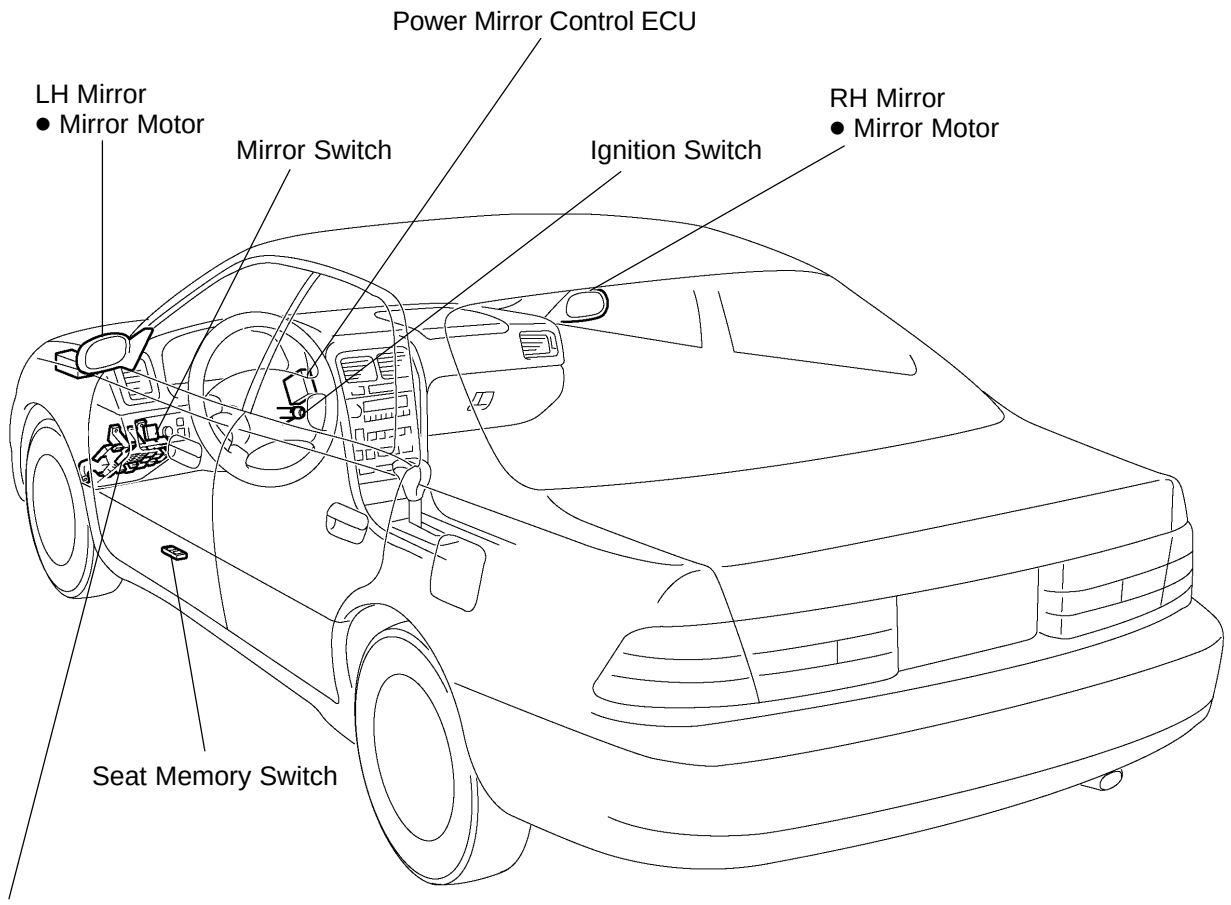
(d) Approximately 60 seconds later, connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, check that the seat back starts to fall backward.

If operation is not as specified, replace the seat adjuster.

POWER MIRROR CONTROL SYSTEM

BE05U–03

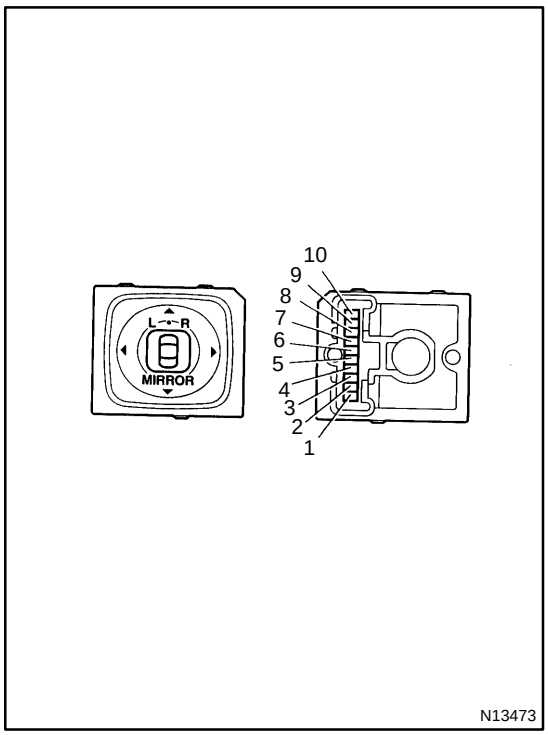
LOCATION



Y

I13376

BE1JQ–01



INSPECTION

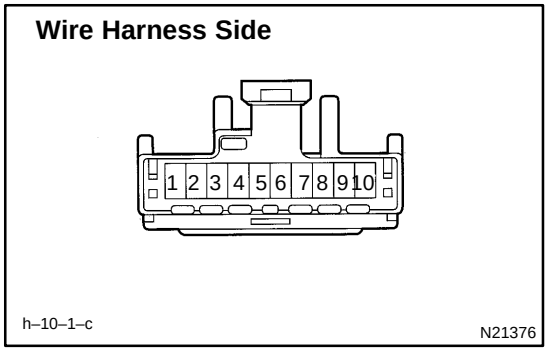
1. Master switch left side:
INSPECT MIRROR SWITCH CONTINUITY

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. Master switch right side:
INSPECT 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

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

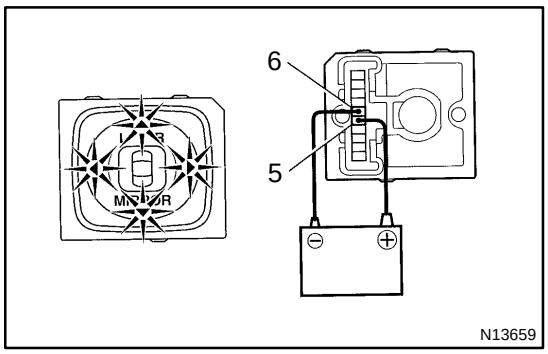


3. INSPECT MIRROR SWITCH CIRCUIT

Disconnect the connector from the switch and inspect the connector on the wire harness side.

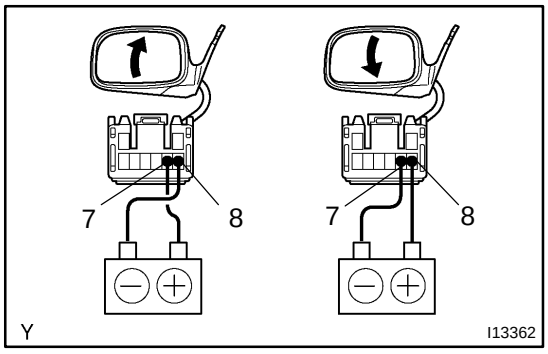
Tester connection	Condition	Specified condition
8 – Ground	Constant	Continuity
4 – Ground	Ignition switch position LOCK	No voltage
4 – Ground	Ignition switch position ACC or ON	Battery positive voltage

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



4. INSPECT INDICATOR LIGHT OPERATION

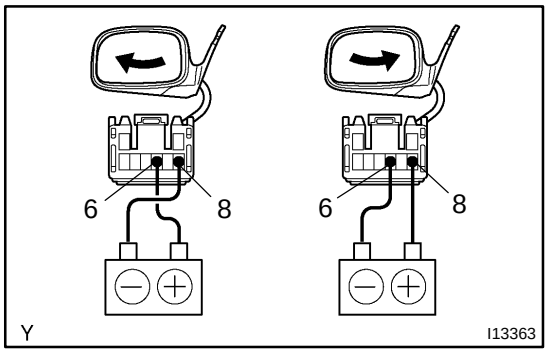
Connect the positive (+) lead from the battery to terminal 5 and the negative (–) lead to terminal 6, and check that the indicator light does not light up, replace the switch.



5. w/o Driving Position Memory (Driver's door): INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 7 and the negative (–) lead to terminal 8, and check that the mirror turns upward.

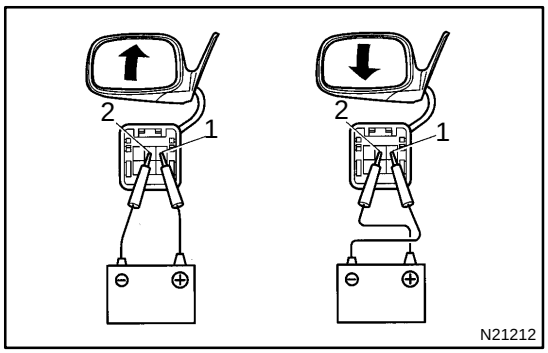
(b) Reverse the polarity, and check that the mirror turns downward.



(c) Connect the positive (+) lead from the battery to terminal 8 and the negative (–) lead to terminal 6, and check that the mirror turns to the left side.

(d) Reverse the polarity, and check that the mirror turns to the right side.

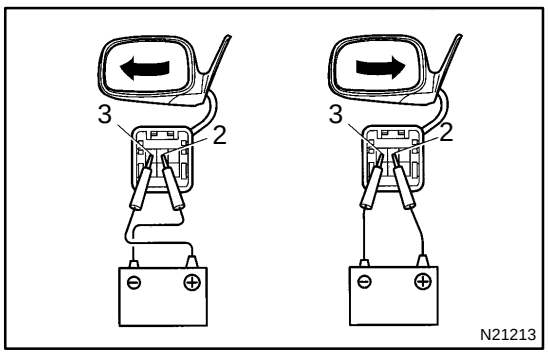
If operation is not as specified, replace the mirror.



6. w/o Driving Position Memory (Passenger's door): INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the mirror turns upward.

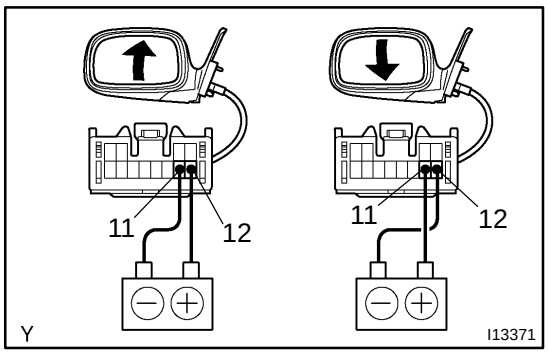
(b) Reverse the polarity, and check that the mirror turns downward.



(c) Connect the positive (+) lead from the battery to terminal 3 and the negative (–) lead to terminal 2, and check that the mirror turns to the left side.

(d) Reverse the polarity, and check that the mirror turns to the right side.

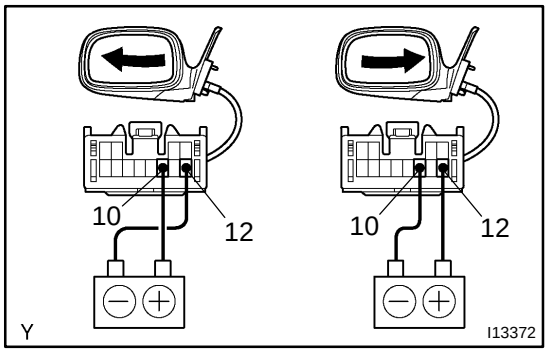
If operation is not as specified, replace the mirror.



7. w/ Driving Position Memory:
INSPECT MIRROR MOTOR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 12 and the negative (–) lead to terminal 11, and check that the mirror turns upward.

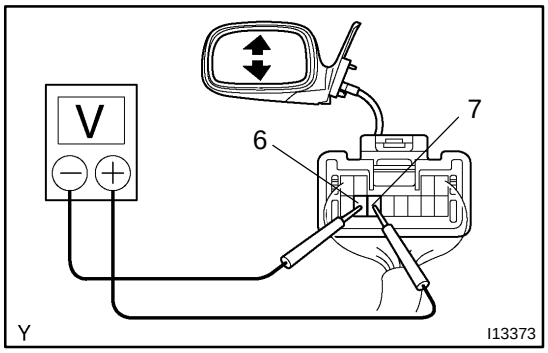
(b) Reverse the polarity, and check that the mirror turns downward.



(c) Connect the positive (+) lead from the battery to terminal 12 and the negative (–) lead to terminal 10, and check that the mirror turns to the left side.

(d) Reverse the polarity, and check that the mirror turns to the right side.

If operation is not as specified, replace the mirror.



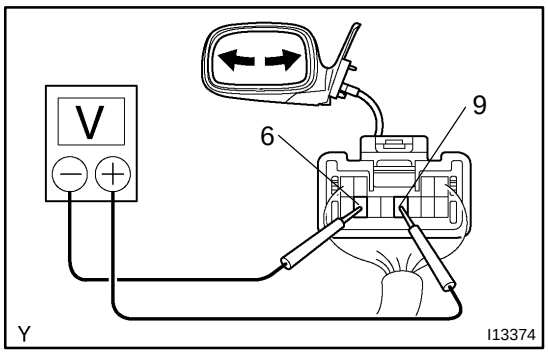
8. w/ Driving Position Memory only:
INSPECT MIRROR POSITION SENSORS OPERATION

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

(b) Check that the voltage gradually changes according to the table below while the mirror moves between the uppermost position and lowermost position.

Mirror position	Lowermost	→	Uppermost
Voltage	0 – 1.0	Changes gradually	3.0 – 4.0

If voltage value is not as specified, replace the mirror assembly.



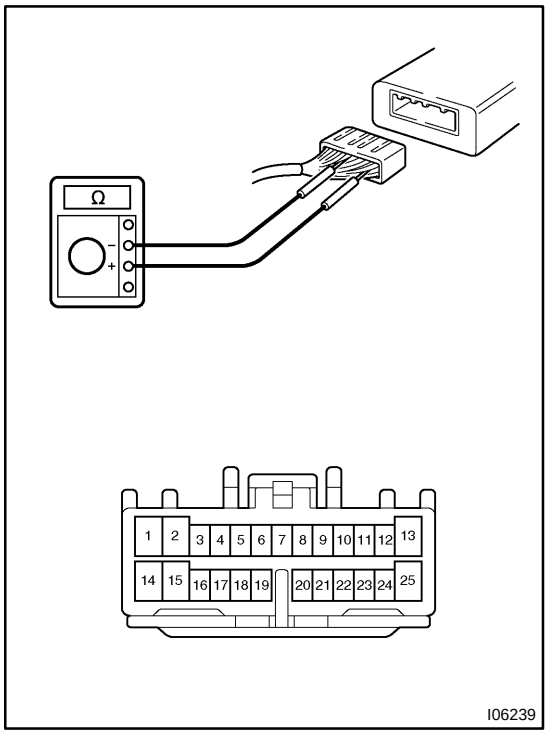
(c) Connect the positive (+) lead from the voltmeter to terminal 9 and negative (–) lead to terminal 6.

(d) Check that the voltage gradually changes according to the table below while the mirror moves between the left–most position and right–most position.

Mirror position	Left–most	→	Right–most
LH Mirror	3.0 – 4.0	Changes gradually	0 – 1.0
RH Mirror	0 – 1.0	Changes gradually	3.0 –4.0

If voltage value is not as specified, replace the mirror assembly.

9. INSPECT DRIVING POSITION MEMORY AND RETURN SWITCH CONTINUITY AND CIRCUIT
(See page DI–587)



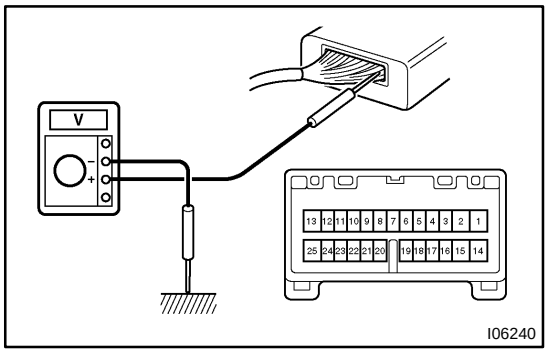
10. INSPECT MIRROR CONTROL ECU CIRCUIT

Disconnect the connector from the ECU and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
3 – 16	Right side mirror switch to RIGHT	Continuity
4 – 16	Left side mirror switch to RIGHT	Continuity
5 – 16	Right side mirror switch to DOWN	Continuity
6 – 16	Left side mirror switch to DOWN	Continuity
3 – 17	Right side mirror switch to LEFT	Continuity
4 – 17	Left side mirror switch to LEFT	Continuity
5 – 17	Right side mirror switch to UP	Continuity
6 – 17	Left side mirror switch to UP	Continuity

7 – 19	Constant	Continuity
10 – 11	Constant	Continuity
10 – 12	Constant	Continuity
14 – Ground	Constant	Continuity
22 – 23	Constant	Continuity
22 – 24	Constant	Continuity
1 – Ground	Constant	Battery positive voltage
2 – Ground	Ignition switch OFF	No voltage
2 – Ground	Ignition switch ACC or ON	Battery positive voltage

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



11. INSPECT MIRROR CONTROL ECU OPERATION

Connect the connectors and using a voltmeter with high impedance (10 kΩ/V minimum), measure the voltage at each terminal and body ground.

Tester connection	Condition	Specified condition
3 – Ground	Constant	About 12 V
4 – Ground	Constant	About 12 V
5 – Ground	Constant	About 12 V
6 – Ground	Constant	About 12 V
7 – Ground	Right or left side mirror switch to any position except OFF	About 5 V
* 8 – Ground	Left side mirror to lowermost position	0 – 1.0 V
	Left side mirror to uppermost position	3.0 – 4.0 V
* 9 – Ground	Left side mirror to leftmost position	3.0 – 4.0 V
	Left side mirror to rightmost position	0 – 1.0 V
10 – Ground	Left side mirror switch to RIGHT or DOWN	Battery positive voltage
11 – Ground	Left side mirror switch to LEFT or DOWN	Battery positive voltage
12 – Ground	Left side mirror switch to UP or RIGHT	Battery positive voltage
* 20 – Ground	Right side mirror to lowermost position	0 – 1.0 V
	Right side mirror to uppermost position	3.0 – 4.0 V
* 21 – Ground	Right side mirror to leftmost position	0 – 1.0 V
	Right side mirror to rightmost position	3.0 – 4.0 V

22 – Ground	Right side mirror switch to RIGHT or DOWN	Battery positive voltage
23 – Ground	Right side mirror switch to LEFT or DOWN	Battery positive voltage
24 – Ground	Right side mirror switch to UP or RIGHT	Battery positive voltage

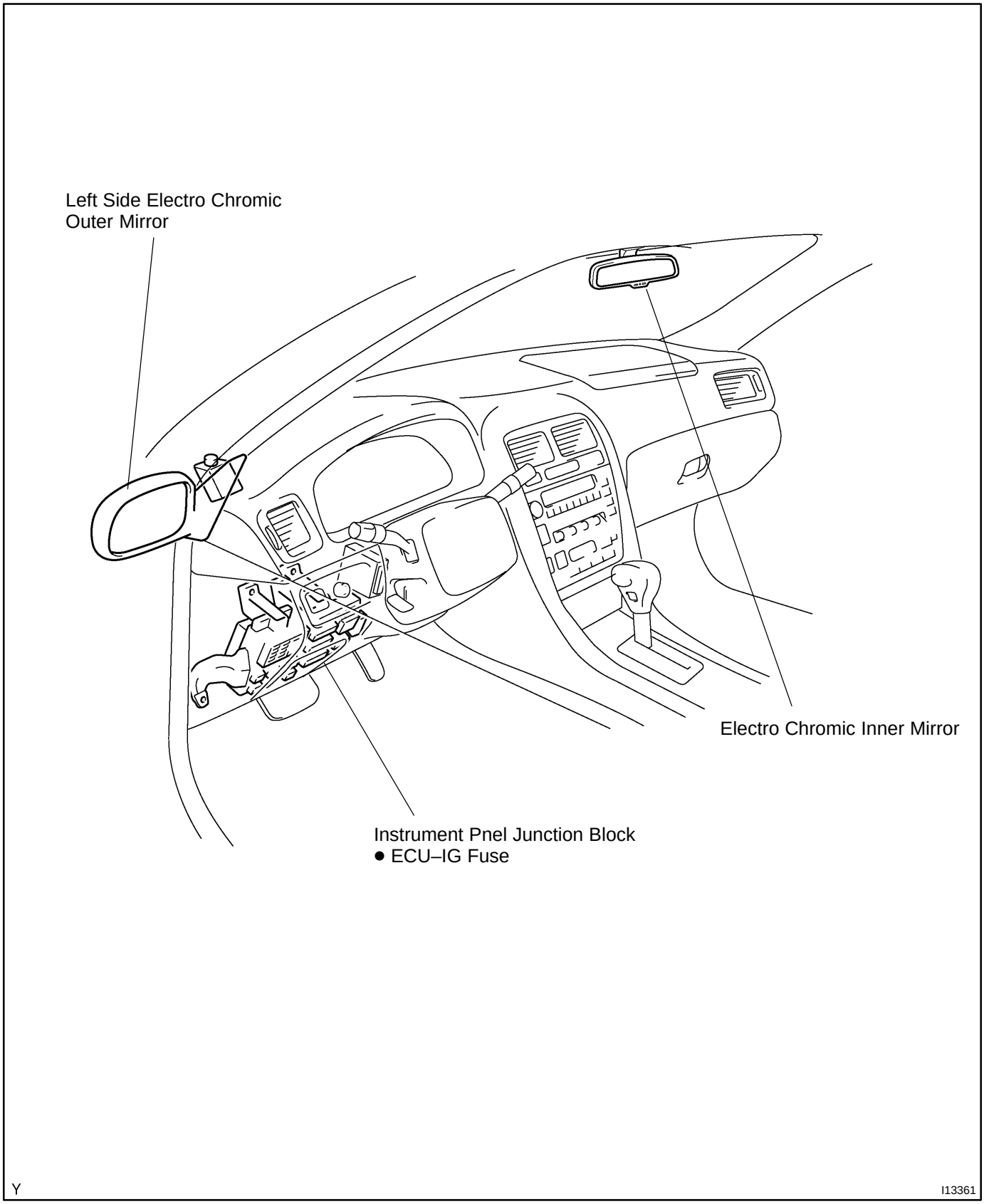
*: Confirm that the voltage changes gradually while the mirror moves.

If the operation is not as specified, inspect the wire harness and mirror switch or motor assembly. Then if these are correct, replace the ECU.

ELECTRO CHROMIC MIRROR SYSTEM

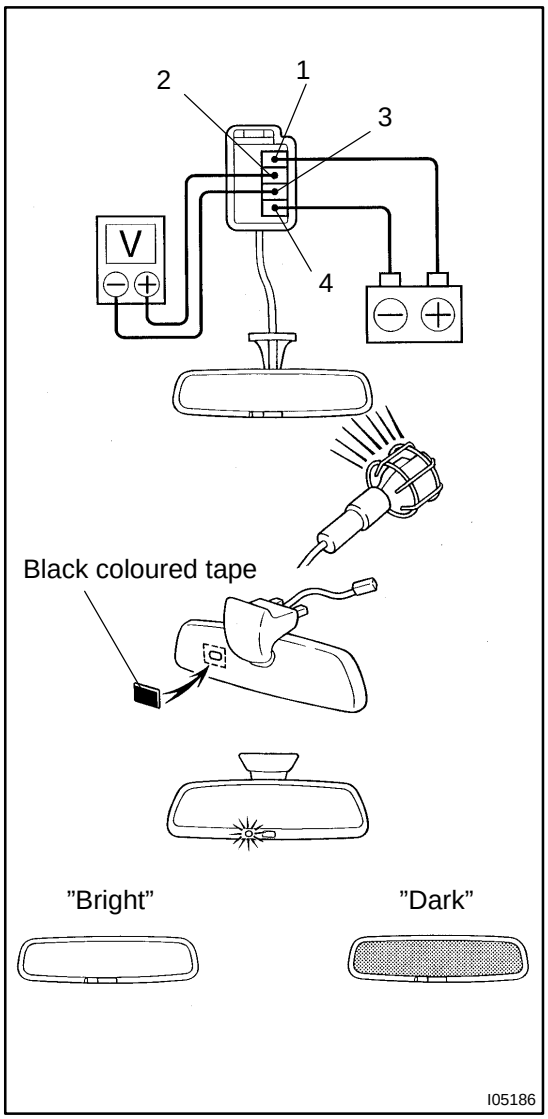
BE0TO–04

LOCATION



BE0TP–03

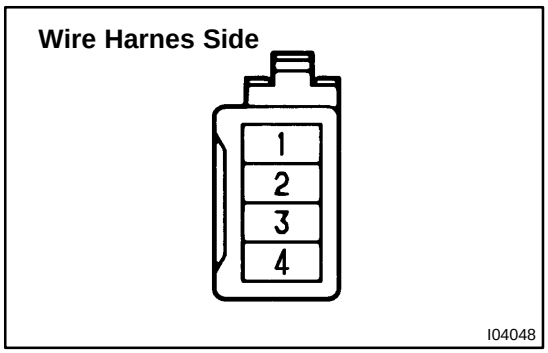
INSPECTION



1. INSPECT ELECTRO CHROMIC INNER MIRROR OPERATION

(a) Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 4.
(b) Connect the positive (+) lead from the voltmeter to terminal 2 and the negative (–) lead to terminal 3.
(c) Attach a black coloured tape to forward sensor to prevent it from sensing.
(d) When the mode is turned to AUTO, check that indicator light lights up.
(e) Light up the mirror with an electric light, and check that there is battery positive voltage and mirror surface changes ”bright” to ”dark”.

If operation is not as specified, replace the inner mirror.

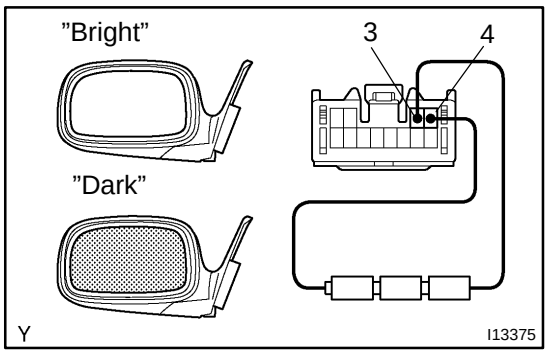


2. INSPECT ELECTRO CHROMIC INNER MIRROR CIRCUIT

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

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity
1 – Ground	Ignition switch LOCK or ACC	No voltage
1 – Ground	Ignition switch ON	Battery positive voltage

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



3. INSPECT ELECTRO CHROMIC OUTER MIRROR OPERATION

(a) Disconnect the outer mirror connector.

(b) Connect the positive (+) lead from the dry cell battery to terminal 4 and the negative (–) lead to terminal 3, then check that the mirror surface changes to ”dark”.

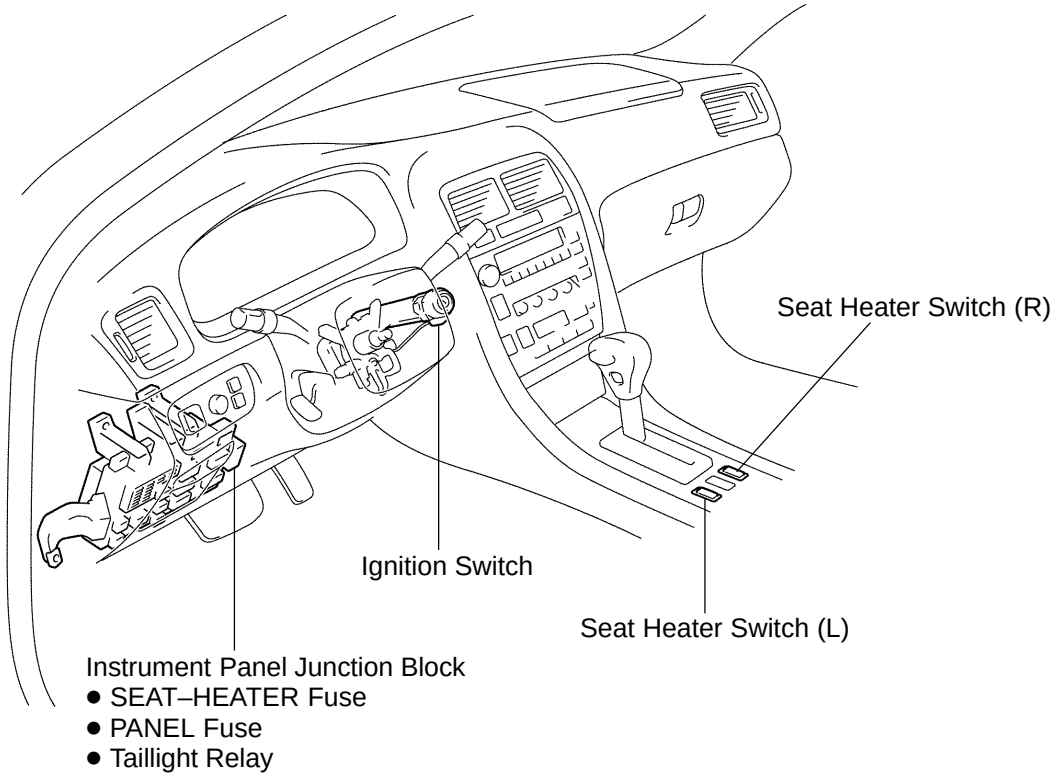
(c) Check the mirror turns to ”bright” after disconnecting the battery.

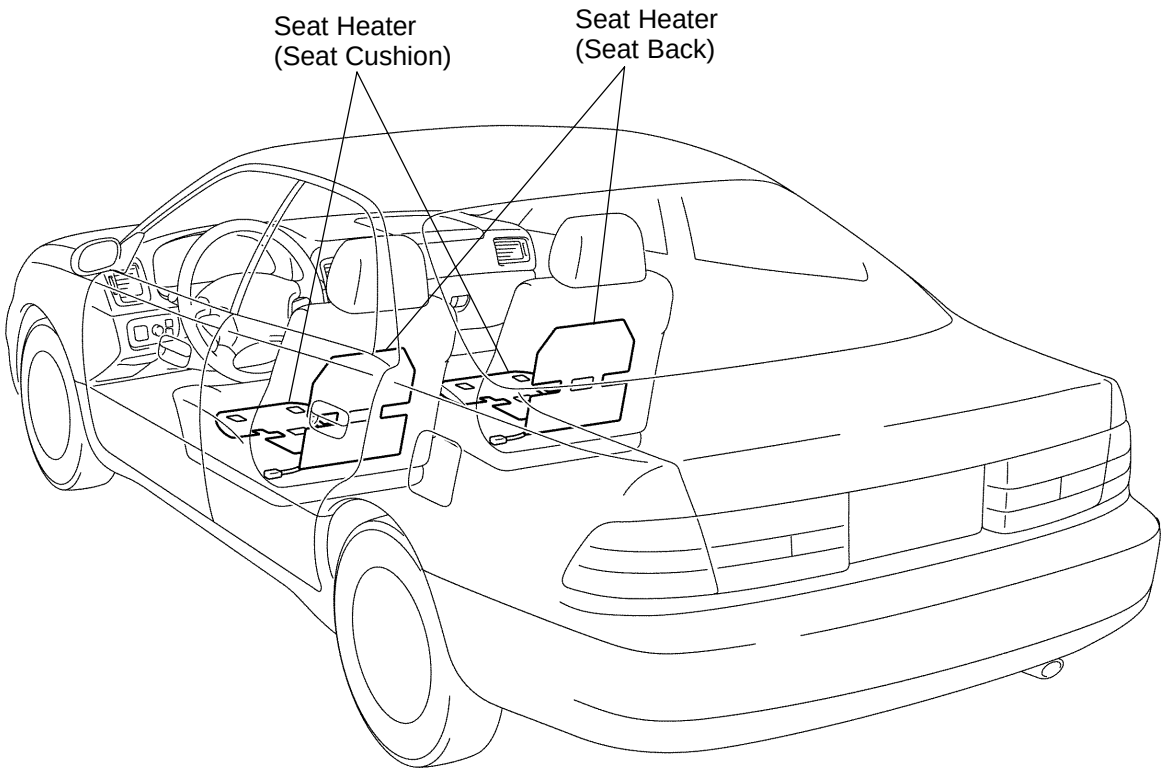
If operation is not as specified, replace the mirror assembly.

SEAT HEATER SYSTEM

BE05W–02

LOCATION



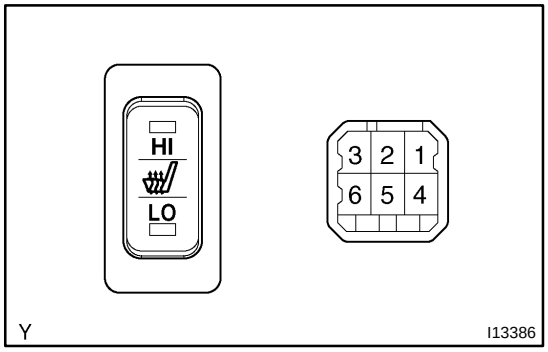


P

I09563

BE05X–04

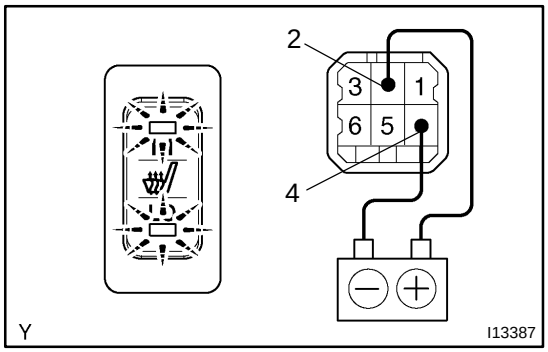
INSPECTION



1. INSPECT SEAT HEATER SWITCH CONTINUITY

Condition	Tester connection	Specified condition
OFF	–	No continuity
HI	2 – 5, 1 – 4	Continuity
LO	1 – 2	Continuity
Illumination circuit	3 – 6	Continuity

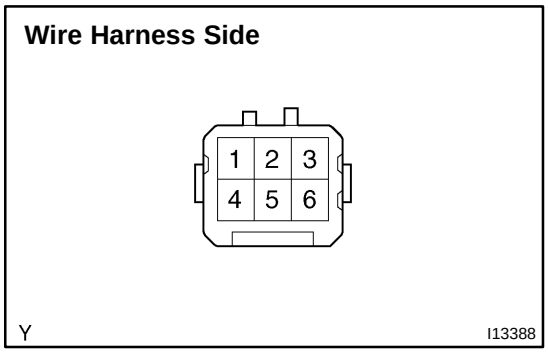
If continuity is not as specified, replace the switch or bulb.



2. INSPECT SEAT HEATER SWITCH INDICATOR

(a) Connect the positive (+) lead from the battery to terminal 2 and the negative (–) lead to terminal 4.
(b) Push the switches ”HI” position, check that the indicator of ”HI” position lights up.
(c) Push the switches ”LO” position, check that the indicator of ”LO” position lights up.

If operation is not as specified, replace the switch and inspect the circuits connected to other parts.

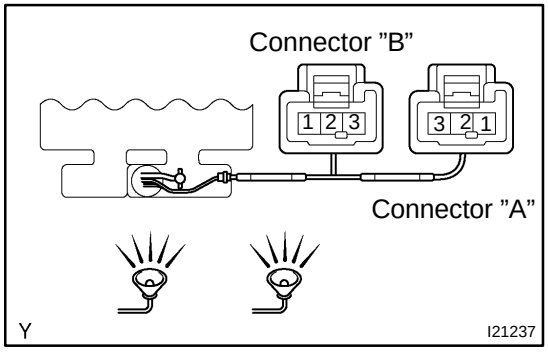


3. INSPECT SEAT HEATER SWITCH CIRCUIT

Disconnect the switch connector and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
4 – Ground	Constant	Continuity
2 – Ground	Ignition switch position LOCK or ACC	No voltage
	Ignition switch position ON	Battery positive voltage
3 – Ground	Light control switch OFF	No voltage
	Light control switch TAIL or HEAD	Battery positive voltage

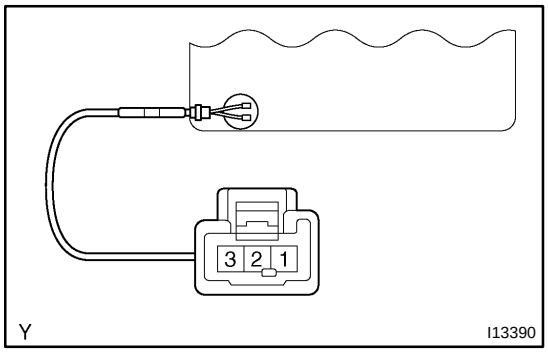
If the circuit is not as specified, inspect the circuits connected to other parts.



4. INSPECT SEAT CUSHION CONTINUITY

(a) Check that continuity exists between terminal 1 of the connector ”A” and terminal 3 of the connector ”B”.
(b) Heat the 2 thermostats with light. Check that no continuity exists above 36 – 44°C (97 – 111°F) between terminal 1 of the connector ”A” and terminal 3 of the connector ”B”.
(c) Heat the 2 thermostats with light. Check that there is no continuity above 46 – 54°C (115 – 129°F) between terminal 2 of the connector ”A” and terminal 1 of the connector ”B”.

(d) Cool the 2 thermostats below 25 – 35˚C (77 – 95˚F). Check that continuity exists between terminal 1 of the connector ”A” and terminal 3 of the connector ”B”, and terminal 2 of the connector ”A” and terminal 1 of the connector ”B”.



5. INSPECT SEAT BACK CONTINUITY

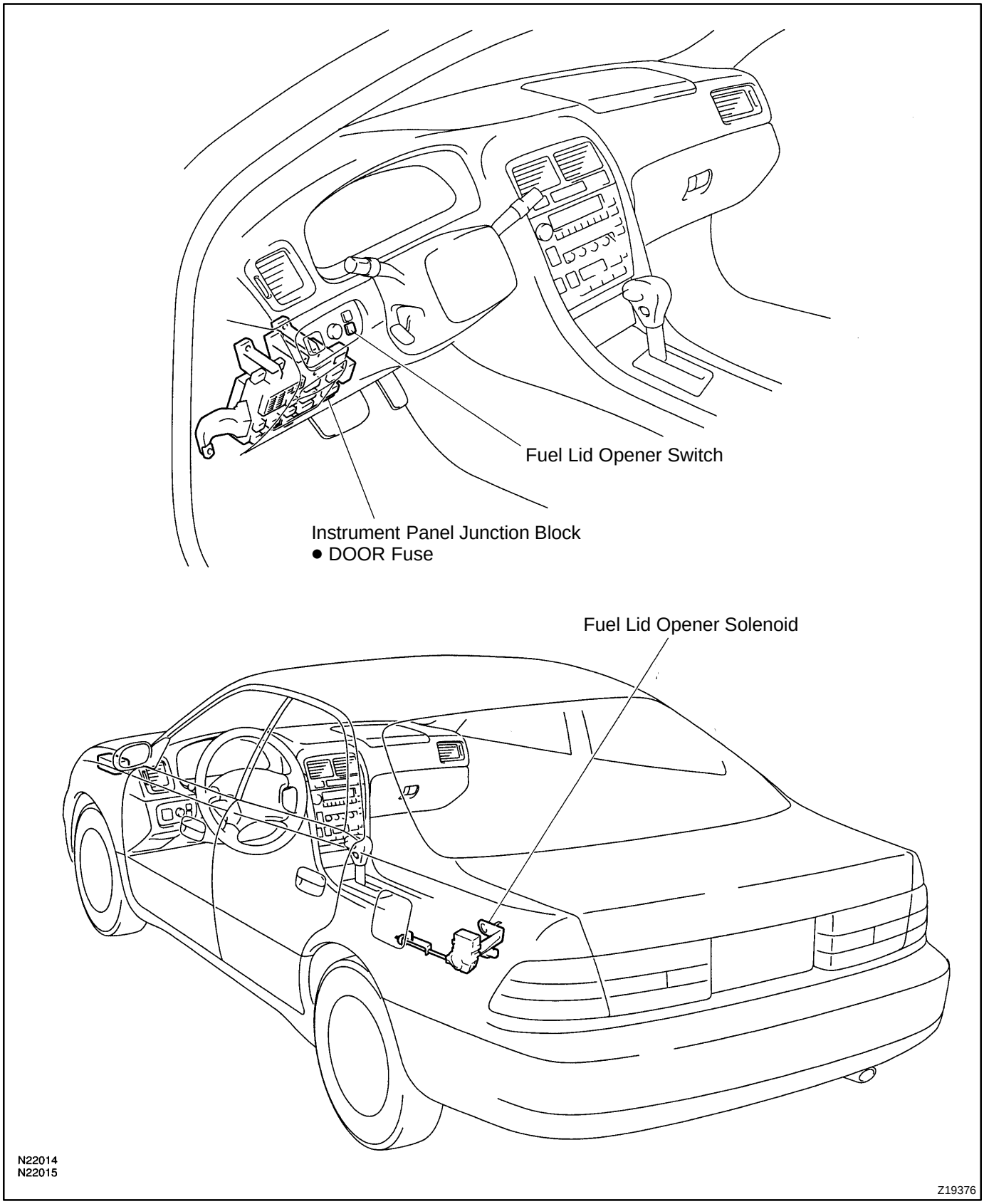
Check that continuity exists between terminals 1 and 2, 1 and 3.

If continuity is not as specified, replace the seat back pad.

FUEL LID OPENER SYSTEM

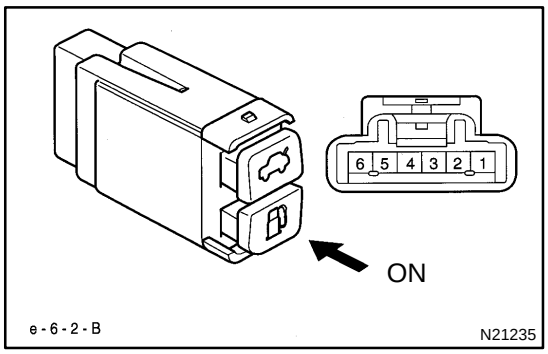
LOCATION

BE05Y–02



BE05Z–02

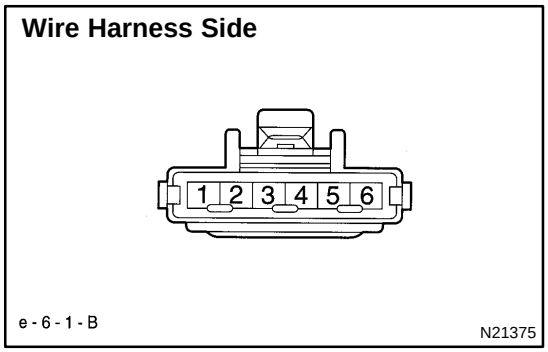
INSPECTION



1. INSPECT FUEL LID OPENER SWITCH CONTINUITY

(a) Check that continuity exists between terminals 2 and 3 with the switch ON.
(Switch button pushed)

(b) Check that no continuity exists between terminals 2 and 3 with the switch OFF.
(Switch button released)

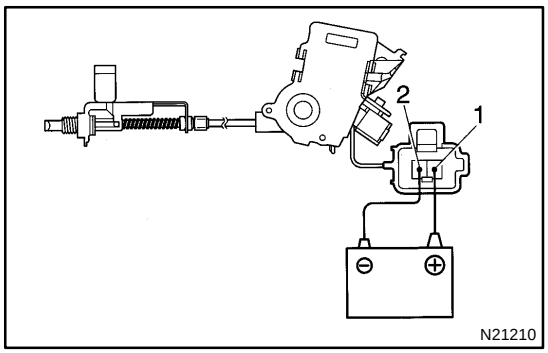


2. INSPECT FUEL LID OPENER SWITCH CIRCUIT

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

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
3 – Ground	Constant	Battery positive voltage

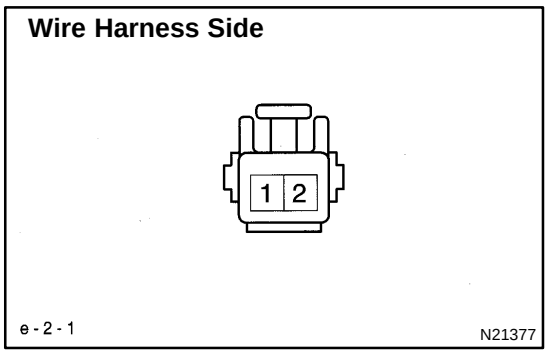
If the circuit is not specified, inspect power source or wire harness.



3. INSPECT FUEL LID OPENER SOLENOID OPERATION

Connect the positive (+) lead from the battery to terminal 1 and the negative (–) lead to terminal 2, and check that the solenoid operates in the open direction.

If operation is not as specified, replace the solenoid.



4. INSPECT FUEL LID OPENER SOLENOID CIRCUIT

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

Tester connection	Condition	Specified condition
2 – Ground	Constant	Continuity
1 – Ground	Fuel lid opener switch OFF	No voltage
1 – Ground	Fuel lid opener switch ON	Battery positive voltage

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

AUDIO SYSTEM

BE10O–02

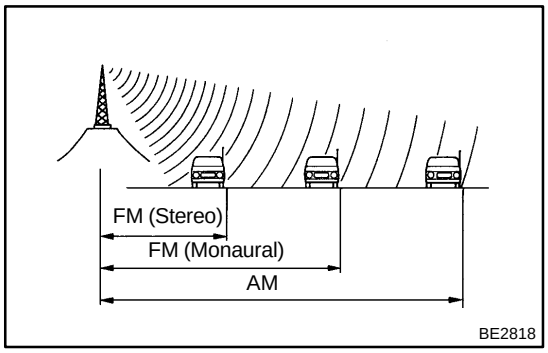
DESCRIPTION

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 method	Amplitude modulation			Frequency modulation	

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

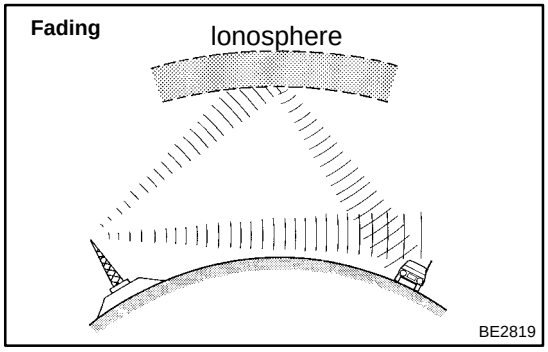


2. SERVICE AREA

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.

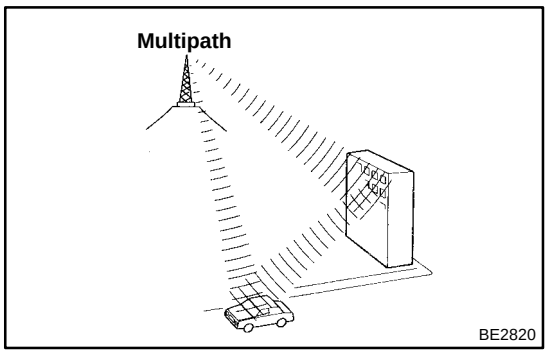
3. RECEPTION PROBLEMS

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.

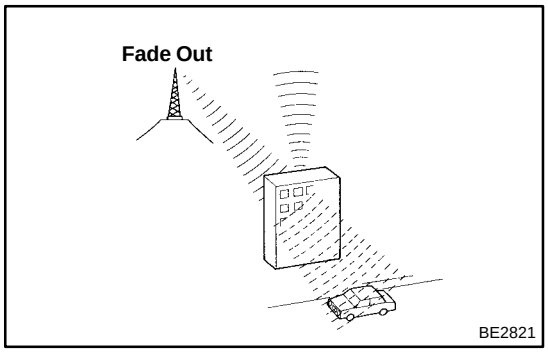


(1) Fading

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

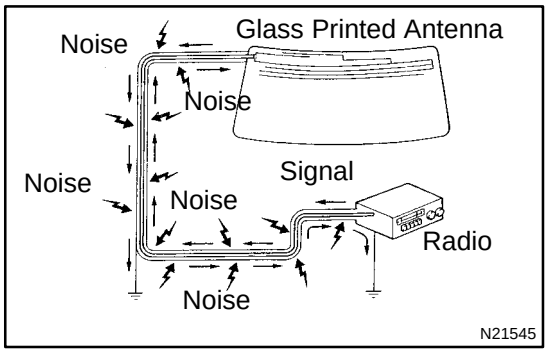
(a) Questionnaire for noise:
It is very important for noise troubleshooting to have good understanding of the claims from the customers, so that make the best use of following questionnaire and diagnose the problem accurately.

AM	Noise occurs at a specific place.	Strong possibility of foreign noise.
	Noise occurs when listening to faint broadcasting.	There is a case that the same program is broadcasted from each local station and that may be the case you are listening different station if the program is the same.
	Noise occurs only at night.	Strong possibility of the beat from a distant broadcasting.
FM	Noise occurs while driving and at a specific place.	Strong possibility of multipath noise and fading noise caused by the changes of FM waves.

HINT:
In the case that the noise occurrence condition does not meet any of the above questionnaire, check based on the ”Trouble Phenomenon”.
Refer to above descriptions for multipath and fading.

(b) Matters that require attention when checking:

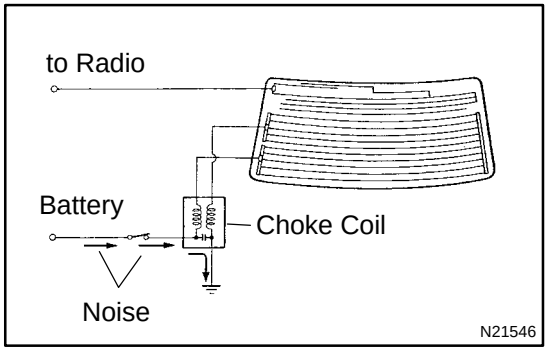
- Noise coming into the radio usually has no harm for practical use as the noise protection is taken and it is hardly thinkable for an extremely loud noise to come in. When extremely loud noise comes into the radio, check if the grounding is normal where the antenna is installed.
- Check if all the regular 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 tuning), it is easy to diagnose the phenomenon as noise occurs frequently.



(c) Antenna and noise:

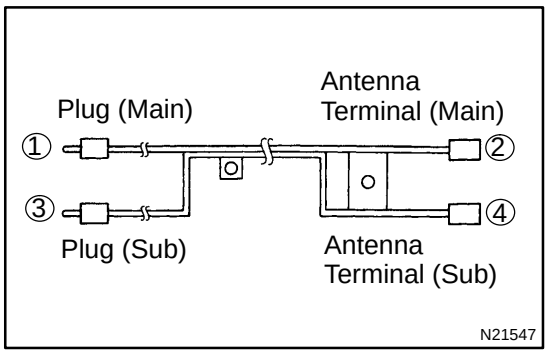
Electronic signal received by the antenna will reach to the radio transmitting through the core wire of the coaxial cable. Any noise wave other than radio wave is mixed into this core wire, that naturally causes noise in the radio and poor sound quality. In order to prevent these noises from mixing into the radio, the core wire inside the coaxial cable is covered with a mesh wire called shield wire. This shield wire shelters the noise and transmits it to the ground, thus preventing noise from mixing in.

If this shield wire has grounding failure, that causes noise.



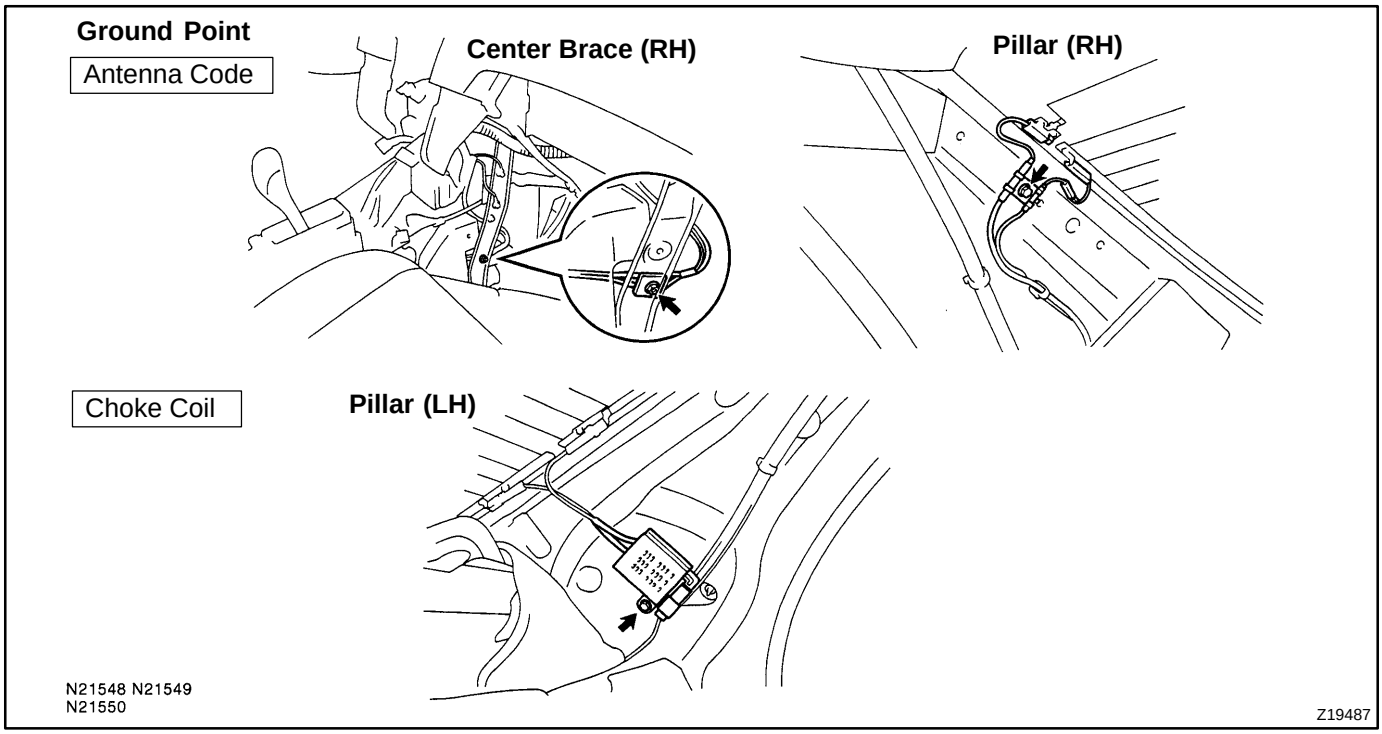
(d) Choke coil and noise:

The choke coil is connected in the rear window defogger circuit. This is connected so to prevent noise from mixing into the radio by making the noise current included in the power source of the rear window defogger flow to the ground.



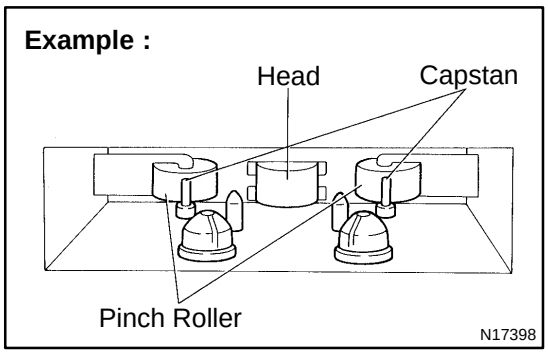
(e) Antenna code continuity check and grounding point:
HINT:
During troubleshooting, in case that the antenna code continuity check, grounding check and grounding check of the choke coil are needed, please check refering to the following illustration.

Terminal connection	Normal condition
(1) ↔ (2)	Continuity
(3) ↔ (4)	No continuity



5. COMPACT DISC PLAYER

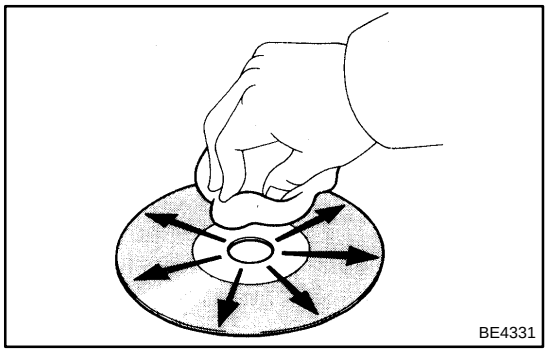
Compact Disc (hereafter called ”CD”) Players use a laser beam pick–up to read the digital signals recorded on the CD and reproduce analog signals of the music, etc. There are 4.7 in. (12 cm) and 3.2 in. (8 cm) discs in the CD player.
HINT:
Never attempt to disassemble or oil any part of the player unit. 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.



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:

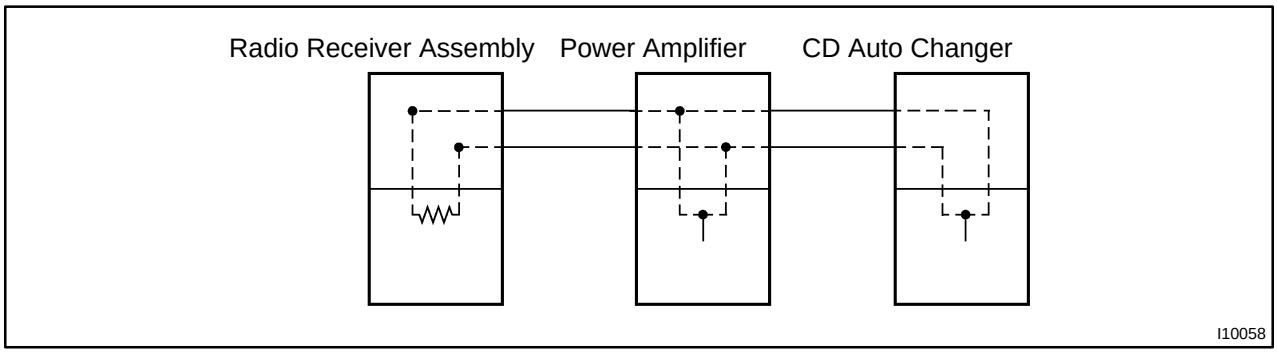
Do not use a conventional record cleaner or anti–static preservative.

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.



(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) Conventionally, a new product developed by a manufacture could not be used due to a lack of compatibility with other manufactures products. Because of this new standard, users can enjoy compatible products provided for them timely.

(c) The above descriptions are the objectives to introduce AVC–LAN. By this standardization, development of new products will no longer cause systematic errors. Thus, this is very effective standard for a product in the future.

BE218–02

TROUBLESHOOTING

1. DIAGNOSIS FUNCTION

HINT:

Error codes over tuner and connected equipment are displayed on the screen of tuner.

(a) Diagnosis start–up

For shifting to diagnosis mode, push ”CD” switch 3 times with pressing ”1” and ”6” of PRESET button at the same time while the audio power is OFF and ACC is ON.

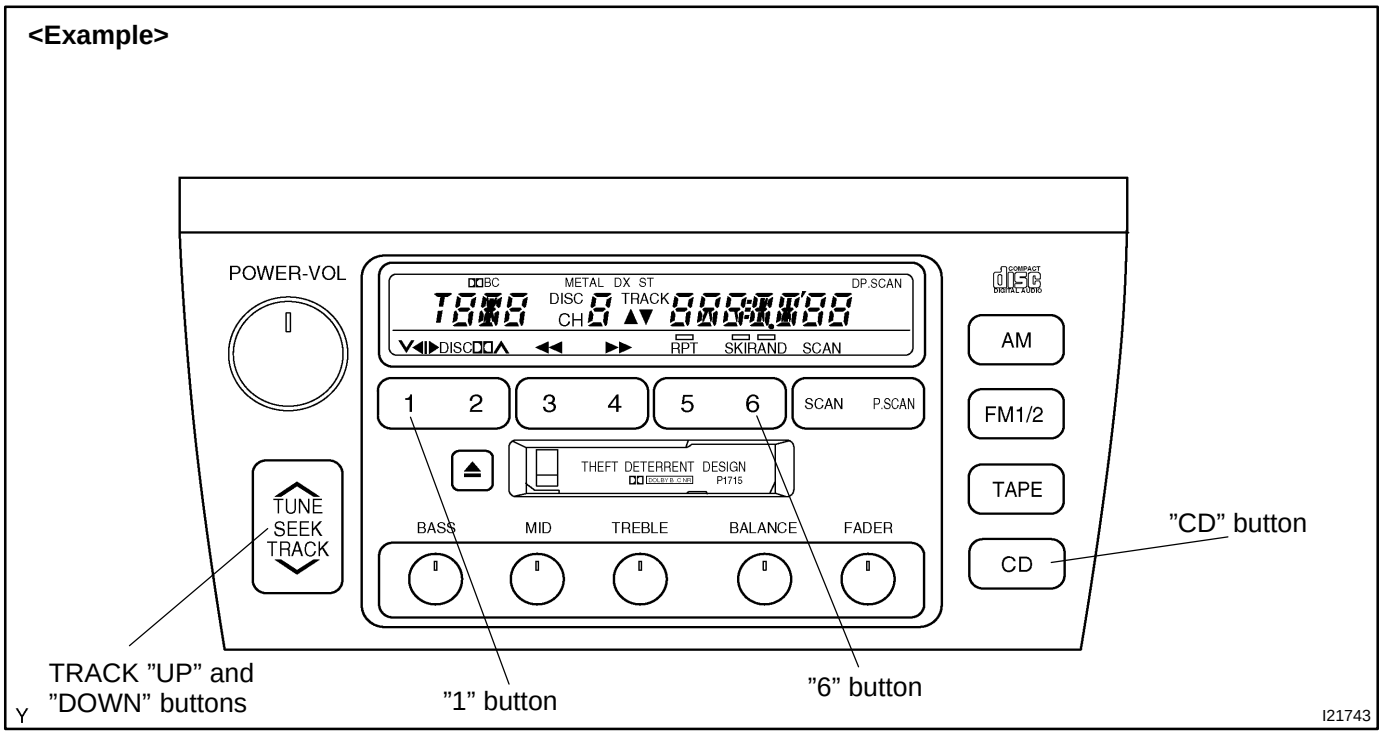
To exit from diagnosis mode, press ”CD” switch for 2 seconds or turn the ignition key OFF.

(When ”1–190” is displayed, the mode is transferred to LAN check mode.)

(b) LAN check

When starting up the diagnosis mode, the mode turns to LAN check mode, the screen displays the code numbers (physical address) of tuner and connected equipment. Smaller codes are displayed in order, displayed code numbers are switched by operating TRACK ”UP” or ”DOWN” switch. In LAN check mode, by pressing ”5” of PRESET button for more than 2 secs., diagnosis memory of each equipment can be deleted, when deletion is completed, the mode returns to LAN check mode.

<Example>



Code No. (physical address) List

Code No. (physical address)	Equipment name
190	Radio receiver assembly (Audio head unit)
240	CD changer (in Luggage room)
360	CD changer(in center console and glove compartment box)
440	Power amplifier

(c) System check

(1) When pressing ”1” of PRESET button in LAN check mode, the mode turns to the system check mode, the system performs self diagnosis of connected equipment and displays the results.(”SYS” (showing the system is under detection) is displayed.)

HINT:

It sometimes takes approx. 40 secs. till the system inspection is completed.

(2) Perform the operation shown in the chart, then read the result of the inspection.

HINT:

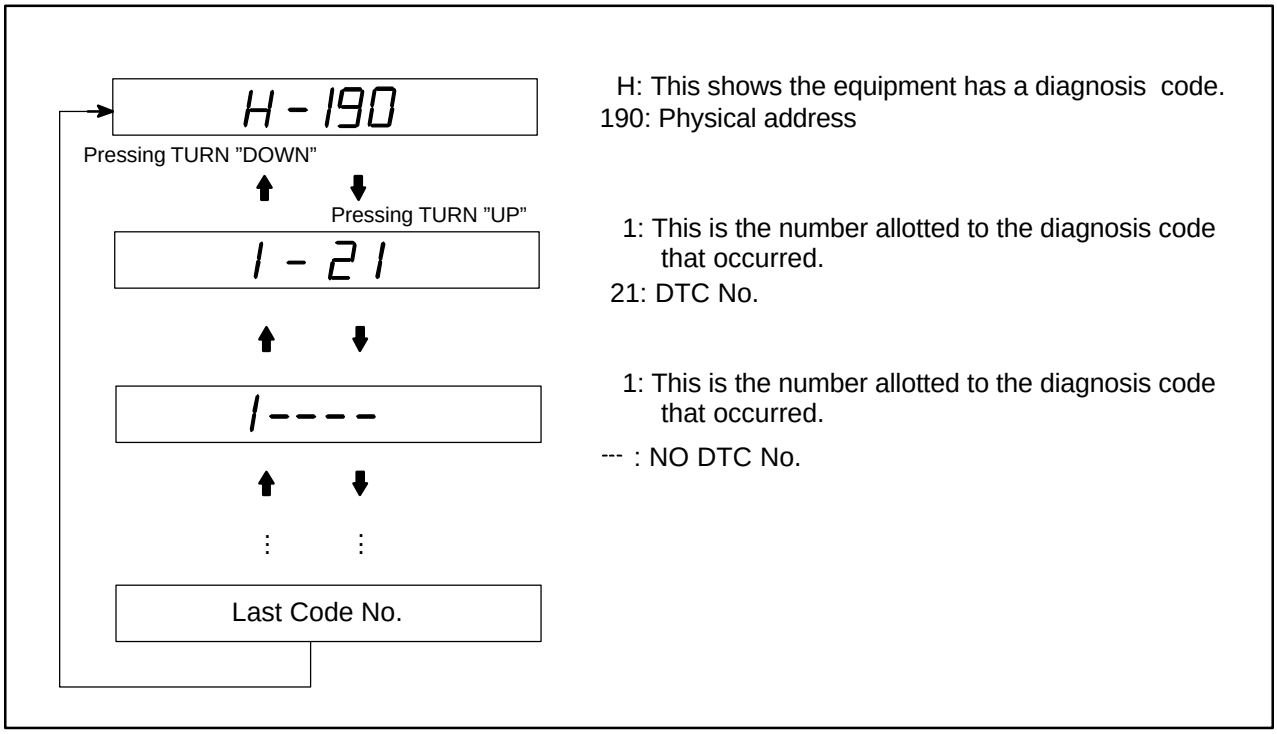
The chart below is an example of when diagnosis code ”21” appears on the physical address (190) equipment. (ROM error occurs on the radio receiver.)

The smaller code numbers (physical address) are displayed in order (code No., diagnosis code, support code of diagnosis code (object equipment)).

When no error is detected in the system, ”00” is displayed.

When an error code is detected, up to 6 codes per one system are displayed. Pressing TRACK ”UP” or ”DOWN” switches the display.

In the system check mode, when pressing ”6” of PRESET button the mode returns to LAN check mode.



(d) Diagnosis memory

(1) In LAN check mode, when pressing ”2” of PRESET button the mode turns to the diagnosis memory mode. (”CODE” is displayed.)

The results of self diagnosis performed over tuner and connected equipment are memorized and displayed.

(2) Perform the operation shown in the following illustration, then read the result of the inspection.

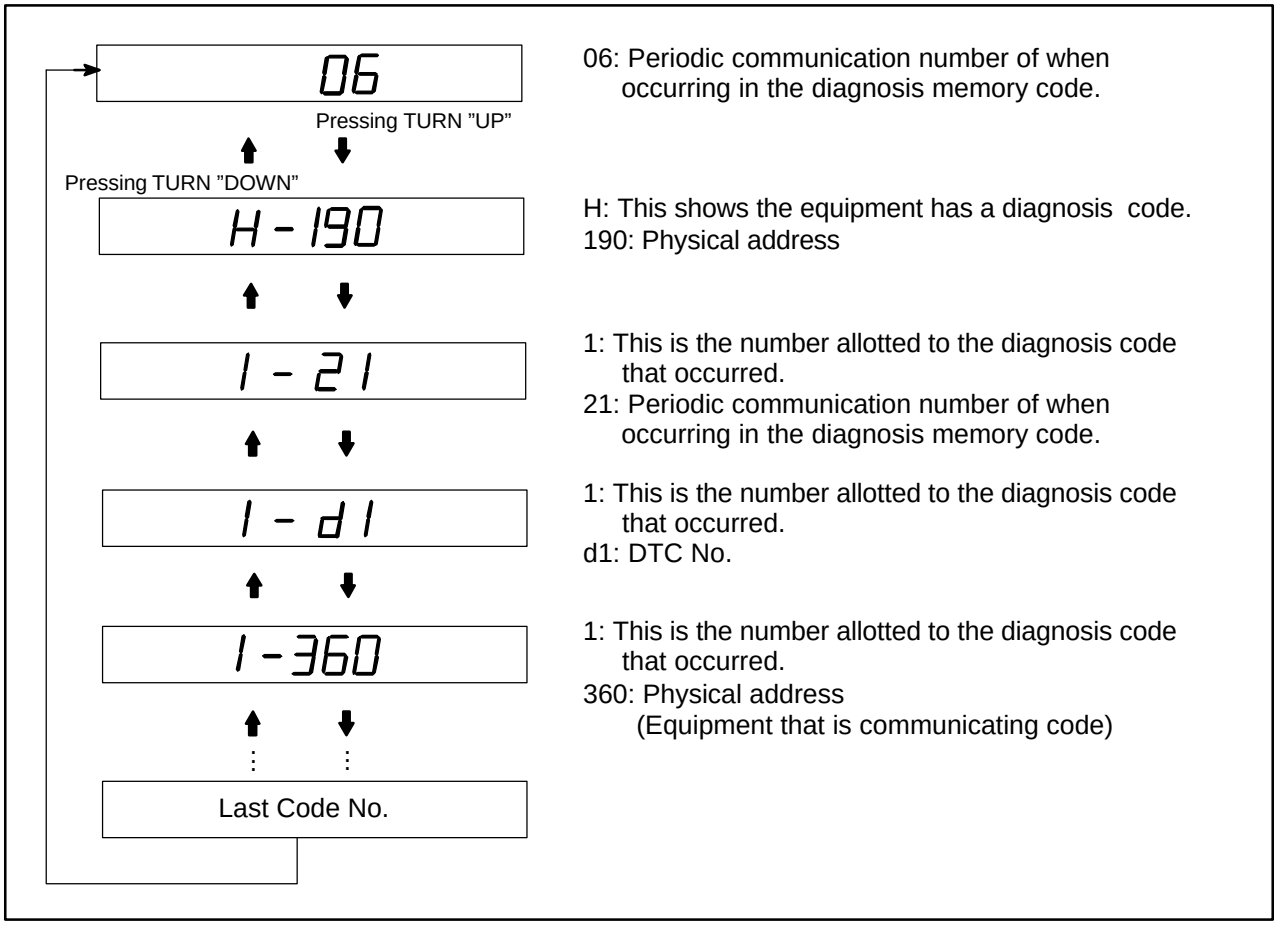
HINT:

The smaller code numbers (physical address) are displayed in order (code No. , periodic communication number when error occurs, diagnosis code, and support code of diagnosis code (object equipment)).

When no error is detected in the system, ”00” is displayed. When an error code is detected, up to 6 codes per one system are displayed. Pressing TRACK ”UP” or ”DOWN” switches the display. Each diagnosis code is same as code in the system check mode.

When pressing ”6” of PRESET button, the mode returns to LAN check mode.

The following illustration below is an example of when diagnosis code ”D1” appears on the code (190) and (240 or 360) equipment. (Communication error occurs between the radio receiver and CD changer.)



(e) Diagnosis memory clear

(1) After error is fixed, start up the diagnosis mode.

(2) Continue pressing function switch ”5” for 2 secs. (CLr is displayed.)

(3) Press the function switch ”2” and transfer to the diagnosis memory mode and check that the normal code (00) is output.

2. DIAGNOSIS CODE LIST

If there is ”O” in the column of system check, an error can be detected when the mode is switched to the system check mode.

If there is ”O” in the column of diagnosis mode each unit is monitoring whether or not it has failure. In case of detecting failure, it memorizes DTC.

Parts Name	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts	System Check	Diagnosis memory
Head Unit (190)	21	ROM error	There is an error on internal ROM.	Radio receiver check.	○	X
	22	RAM error	There is an error on internal RAM.		○	X
	41	AM tuner error	There is an error in AM tuner.		X	○
	42	FM tuner error	There is an error in FM tuner.		X	○
	50	Cassette error	There is an error in cassette deck.		X	○
	51	Cassette eject error	Cassette can not be ejected from Head Unit.		X	○
	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Radio receiver check. Wire harness and connecter check.	○	○
	D2	Periodic communication no response	Error in periodic communication.	● Wire harness and connector	X	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	Radio receiver check.	○	X
CD (240) (360)	21	ROM error	There is an error on internal ROM.	CD changer check.	○	X
	22	RAM error	There is an error on internal RAM.		○	X
	60	CD error	Error codes other than 61–69 are detected.		X	○
	61	EJECT error	CD is not ejected.	CD changer check. Magazine check.	X	○
	62	DISC inside out/flaw	CD is inserted inside out or it has a flaw.	CD check.	X	○
	63	Pickup temperature detection	High temperature of CD changer is detected.	CD changer check.	X	○
	64	Excessive current detection	Excessive current to CD changer is detected.		X	○
	67	Tray insertion/ discharging error	An error occurs in insertion and discharging operation of CD changer tray.	CD changer check. Magazine check.	X	○

Parts Name	DTC	Diagnosis Item	Diagnosis Content	Countermeasure and Inspected Parts	System Check	Diagnosis Memory
CD (240) (360)	68	Elevator error	An error occurs in elevator of CD changer elevator.	CD changer check.	X	○
	69	Clamp error	An error occurs in CD changer clamp.		X	○
	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.		○	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	CD changer check.	○	X
AMP (440)	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Stereo component amplifier check.	○	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	Stereo component amplifier check.	○	X

3. PROBLEM SYMPTOM 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.

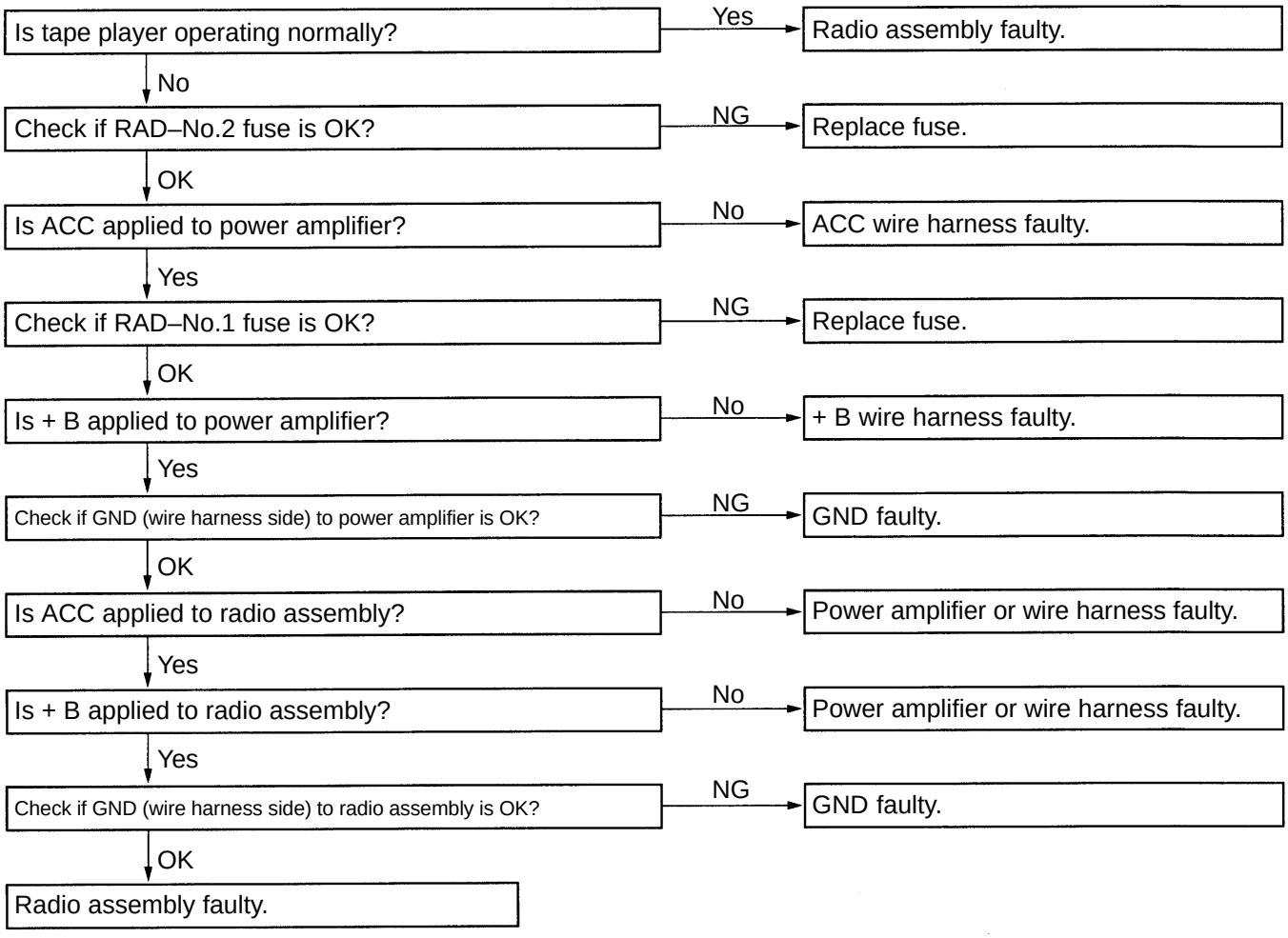
Open or short circuit of the wire harness

Connector or terminal connection fault

	Problem	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
	Either 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 inserts, 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
Noise	Noise occurs	23
	Noise produced by vibration or shock while driving.	24
	Noise produced when engine starts.	25

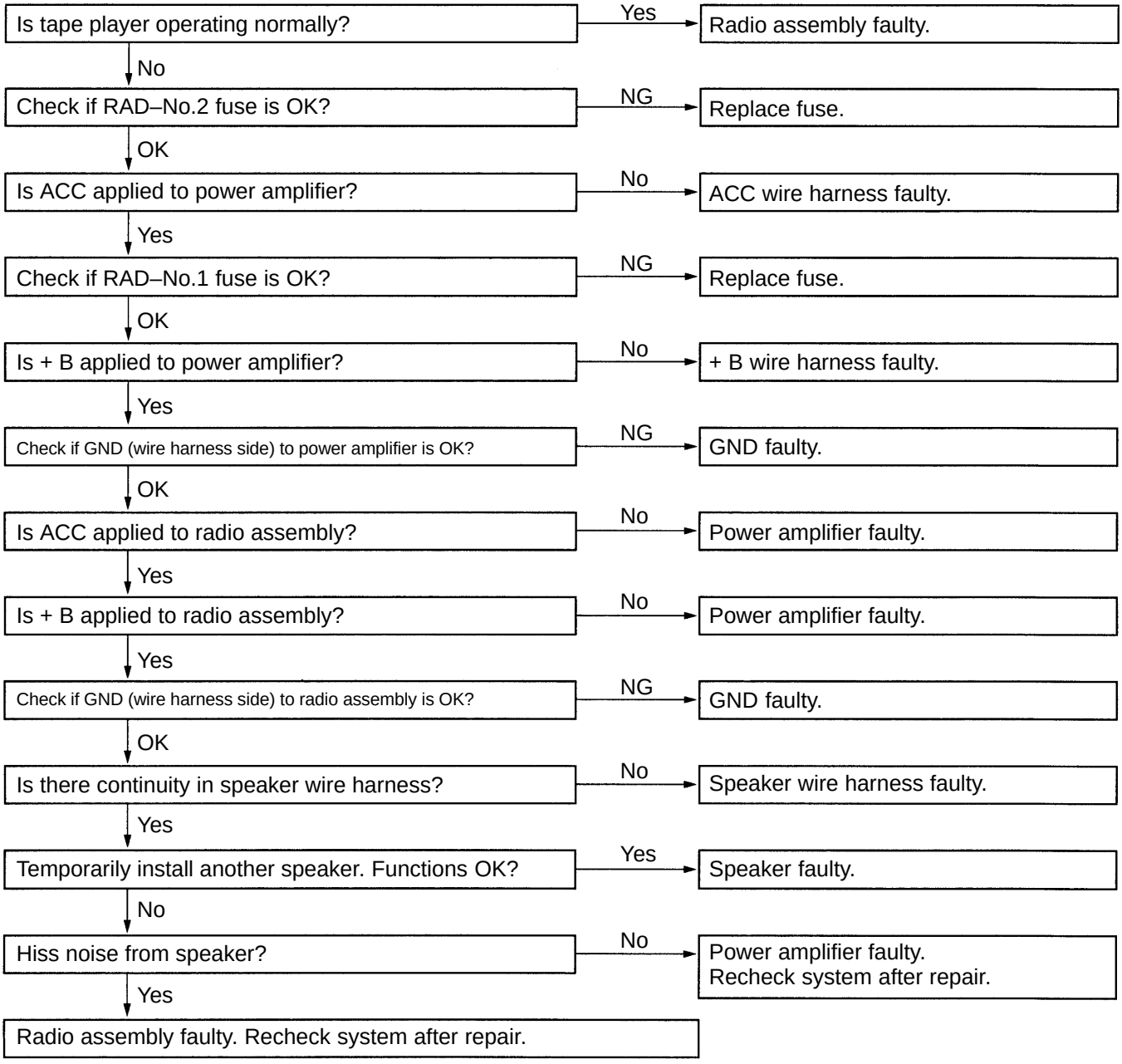
The term "AM" includes LW, MW and SW, and the term "FW" includes UKW.

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



V08480

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



V08481

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 tape player operating normally? Yes → Radio assembly faulty.

No ↓

Is hiss noise produced by non–functioning speaker? Yes → Radio assembly faulty. Recheck system after repair.

No ↓

Is there continuity 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	EITHER AM OR FM DOES NOR WORK FEW PRESET TUNING BANDS

Problem with radio wave signals or location? Yes → Poor signals, poor location.

No ↓

Are both AM and FM defective? Yes → Radio assembly faulty.

No ↓

Is power for the antenna being output from the radio assembly? No → Radio assembly faulty.

Yes ↓

Go to No. 23

Is tape player operating normally? Yes → Radio assembly faulty.

No ↓

Temporarily install another speaker. Functions OK? Yes → Speaker faulty.

No ↓

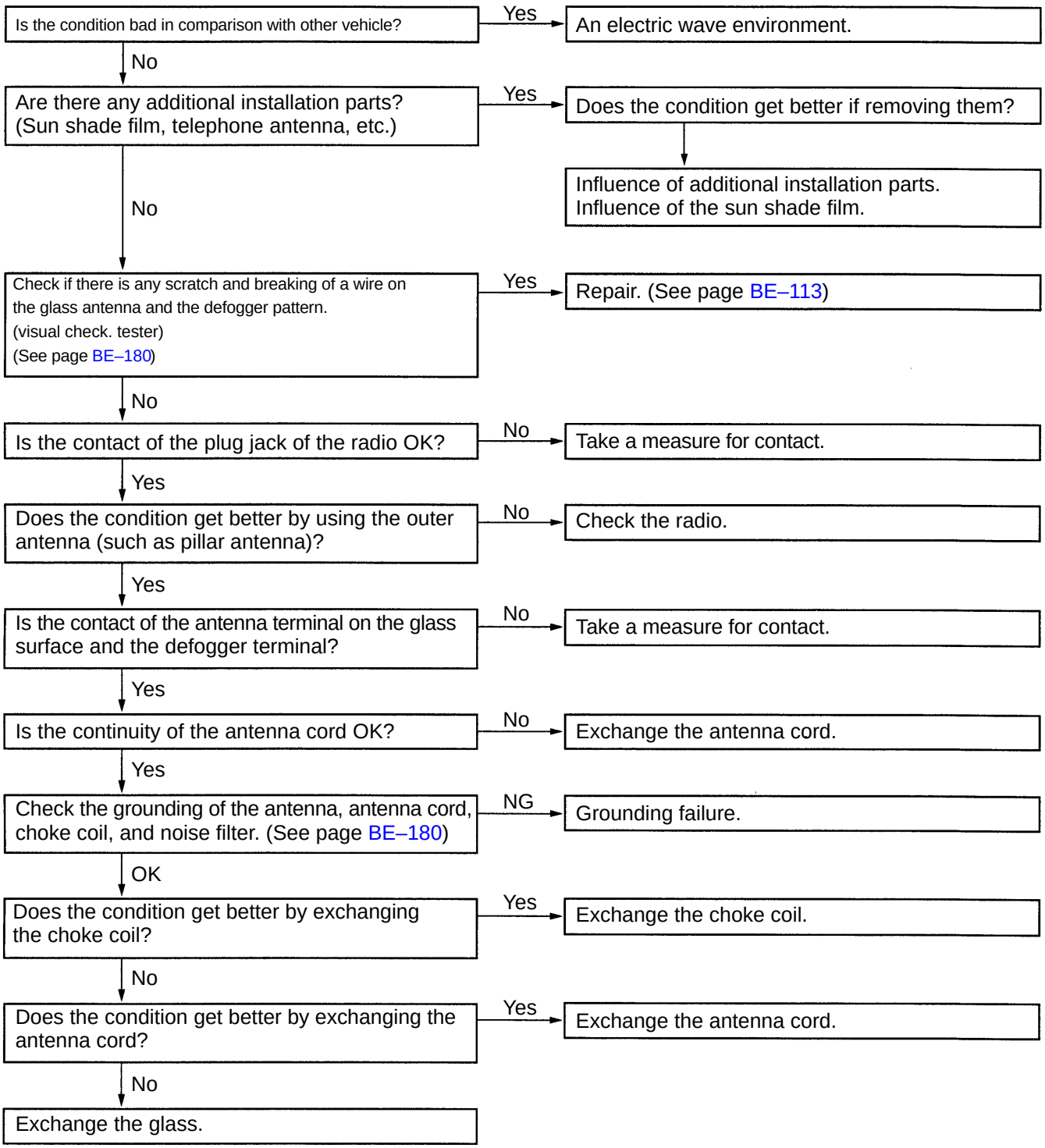
Hiss noise from speaker? No → Power amplifier faulty. Recheck system after repair.

Yes ↓

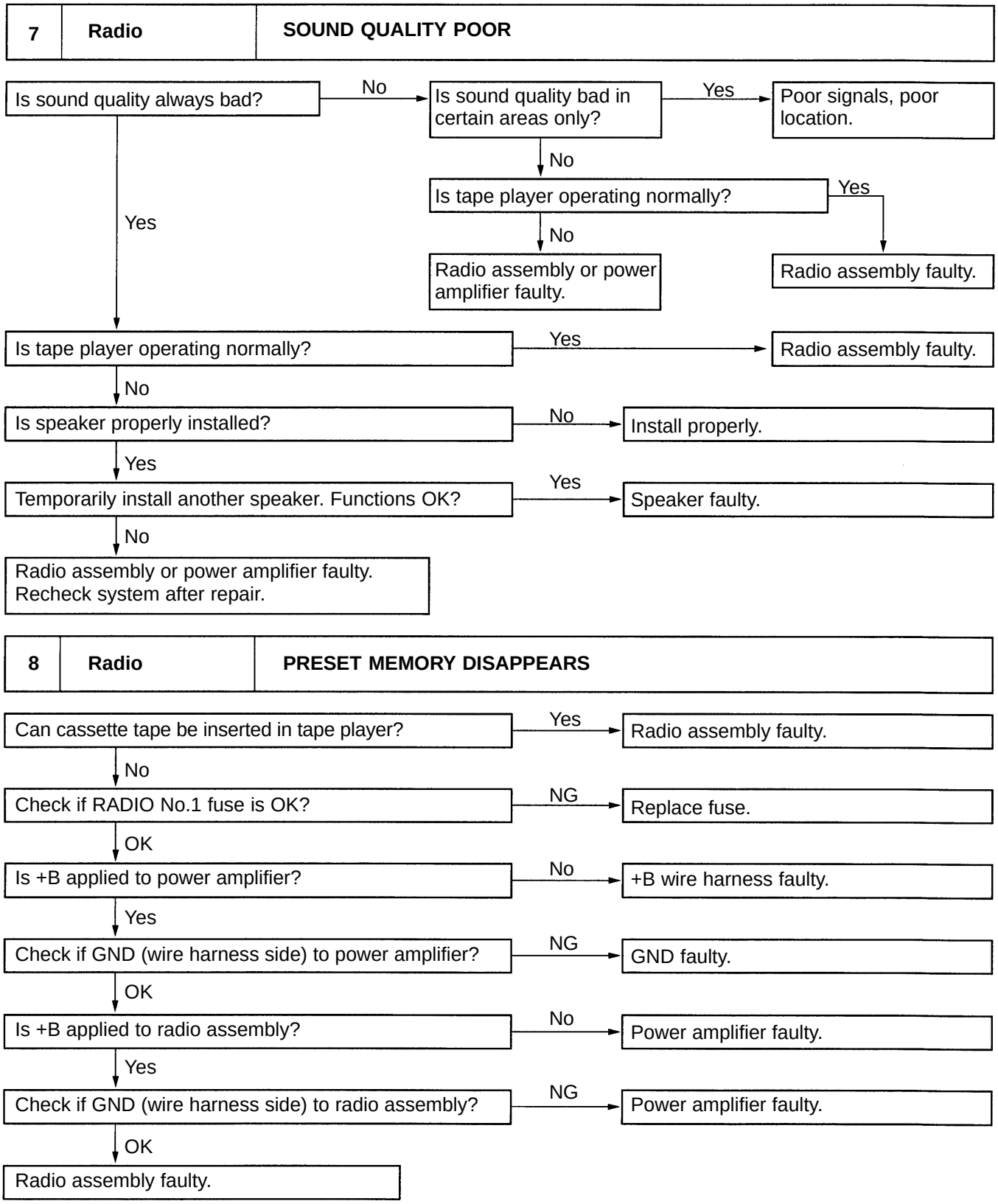
Radio assembly faulty. Recheck system after repair.

V08482

6	Radio	POOR RECEPTION

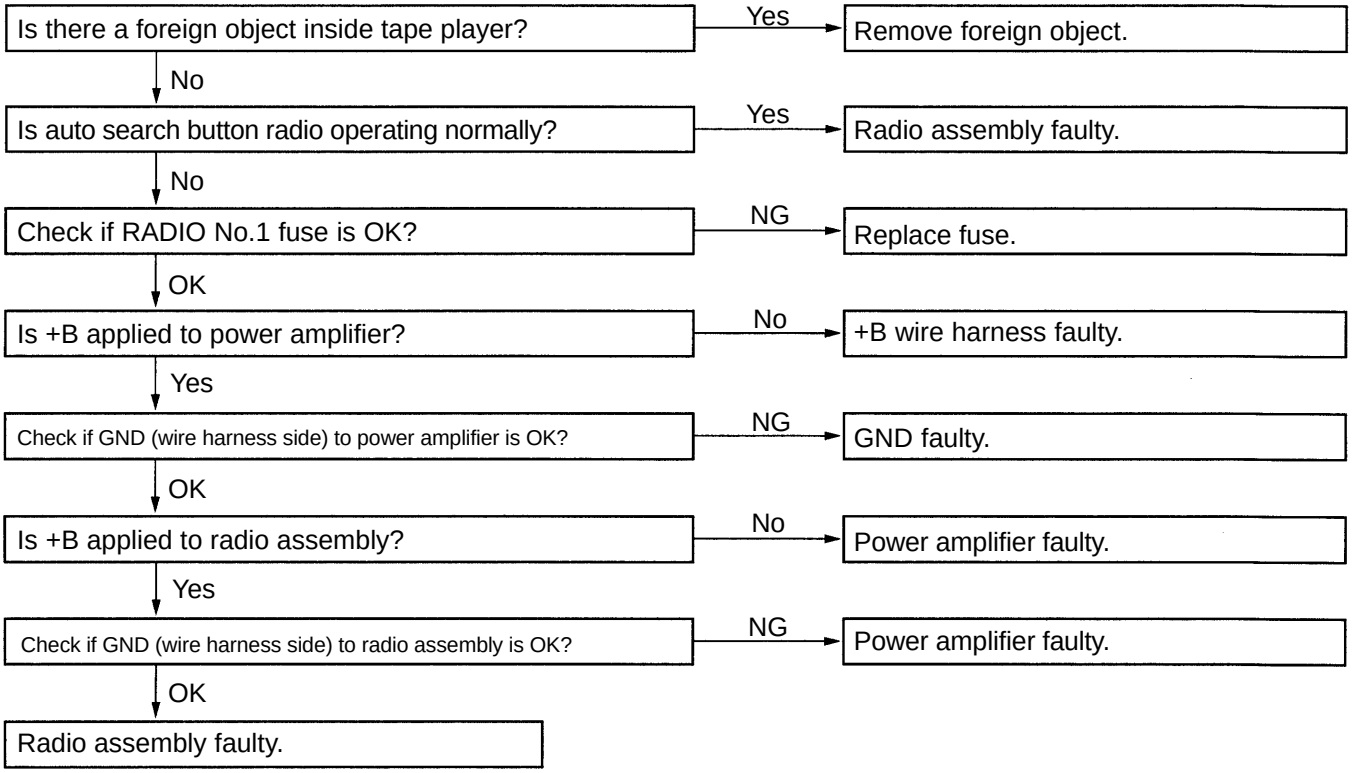


V08549

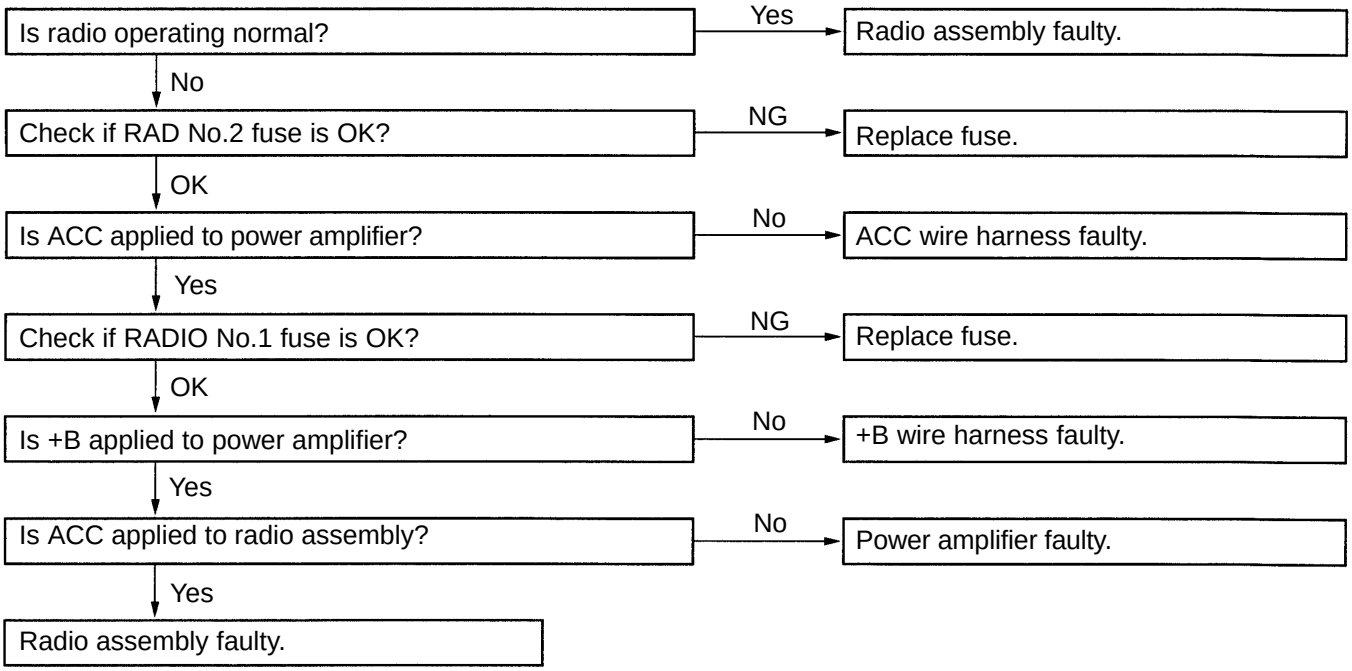

7
Radio
SOUND QUALITY POOR
Is sound quality always bad?
No
Is sound quality bad in certain areas only?
Yes
Poor signals, poor location.
No
Is tape player operating normally?
Yes
Radio assembly faulty.
No
Radio assembly or power amplifier faulty.
Yes
Is tape player operating normally?
Yes
Radio assembly faulty.
No
Is speaker properly installed?
No
Install properly.
Yes
Temporarily install another speaker. Functions OK?
Yes
Speaker faulty.
No
Radio assembly or power amplifier faulty.
Recheck system after repair.
8
Radio
PRESET MEMORY DISAPPEARS
Can cassette tape be inserted in tape player?
Yes
Radio assembly faulty.
No
Check if RADIO No.1 fuse is OK?
NG
Replace fuse.
OK
Is +B applied to power amplifier?
No
+B wire harness faulty.
Yes
Check if GND (wire harness side) to power amplifier?
NG
GND faulty.
OK
Is +B applied to radio assembly?
No
Power amplifier faulty.
Yes
Check if GND (wire harness side) to radio assembly?
NG
Power amplifier faulty.
OK
Radio assembly faulty.

V08483

9	Tape Player	CASSETTE TAPE CANNOT BE INSERTED



10	Tape Player	CASSETTE TAPE INSERTED, BUT NO POWER



V08484

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

Function OK if different cassette tape inserted?
- Yes → Cassette tape faulty.
- No ↓

Is radio operating normally?
- Yes → Radio assembly faulty.
- No ↓

Is there continuity in speaker wire harness?
- No → Speaker wire harness faulty.
- Yes ↓

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

Hiss noise from speaker?
- No → Power amplifier faulty. Recheck system after repair.
- Yes ↓

Radio assembly faulty. Recheck system after repair.

12	Tape Player	EITHER SPEAKER DOES NOT WORK

Is radio operating normally?
- Yes → Radio assembly faulty.
- No ↓

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

Is there continuity in speaker wire harness?
- No → Speaker wire harness faulty.
- Yes ↓

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

Radio assembly or power amplifier faulty.

V08485

13	Tape Player	SOUND QUALITY POOR (VOLUME FAINT)

Function OK if different cassette tape inserted?
- Yes → Cassette tape faulty.
- No → Operates normally after cleaning the heads?
  - Yes → Head dirty.
  - No → Is radio operating normally?
    - Yes → Radio assembly faulty.
    - No → Is speaker properly installed?
      - No → Install properly.
      - Yes → Temporarily install another speaker. Function OK?
        - Yes → Speaker faulty.
        - No → Radio assembly faulty.

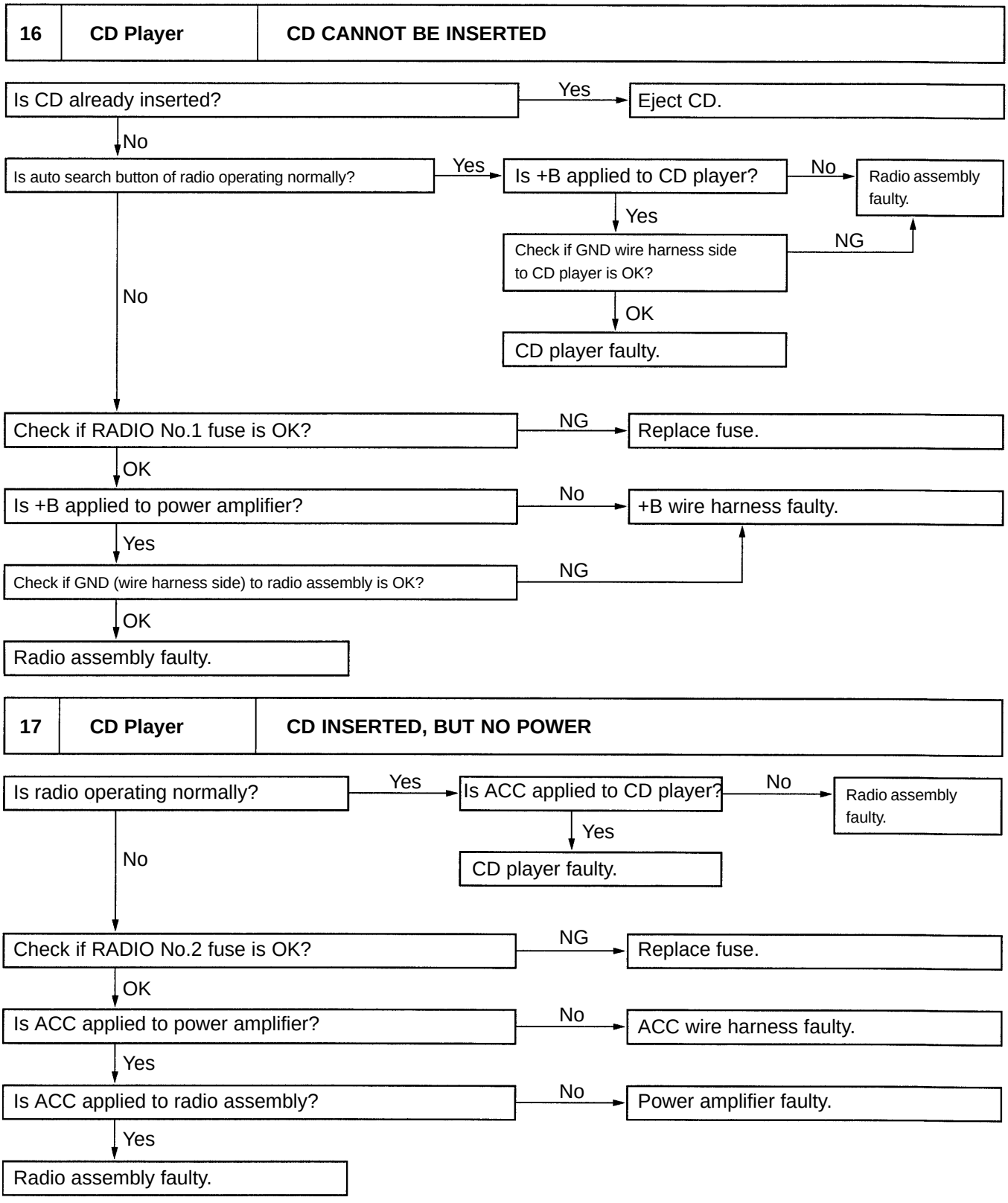
14	Tape Player	TAPE JAMMED MALFUNCTION WITH TAPE SPEED OR AUTO–REVERSE

Function OK if different tape (less than 120 mins.) is inserted?
- Yes → Cassette tape faulty.
- No → Is there a foreign object inside tape player?
  - Yes → Remove foreign object.
  - No → Operates normally after cleaning the heads?
    - Yes → Head dirty.
    - No → Radio assembly faulty.

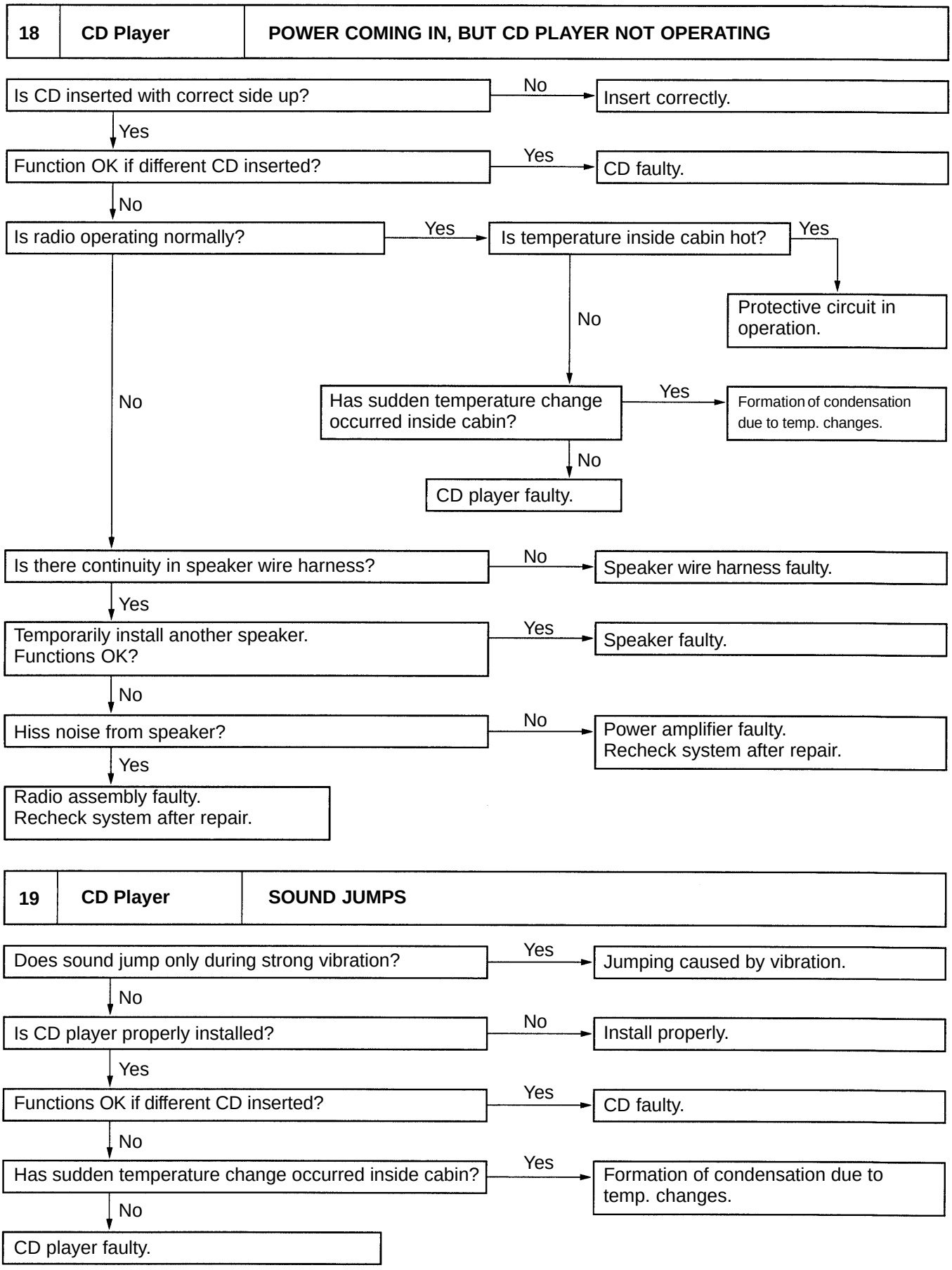
15	Tape Player	CASSETTE TAPE WILL NOT EJECTED

Is tape player operating normally?
- No → Cassette tape jammed.
- Yes → Is auto search button of radio operating normally?
  - Yes → Radio assembly faulty.
  - No → Check if RADIO No.1 fuse is OK?
    - NG → Replace fuse.
    - OK → Is –B applied to power amplifier?
      - No → +B wire harness faulty.
      - Yes → Is +B applied to radio assembly?
        - No → Power amplifier faulty.
        - Yes → Radio assembly faulty.

V08486

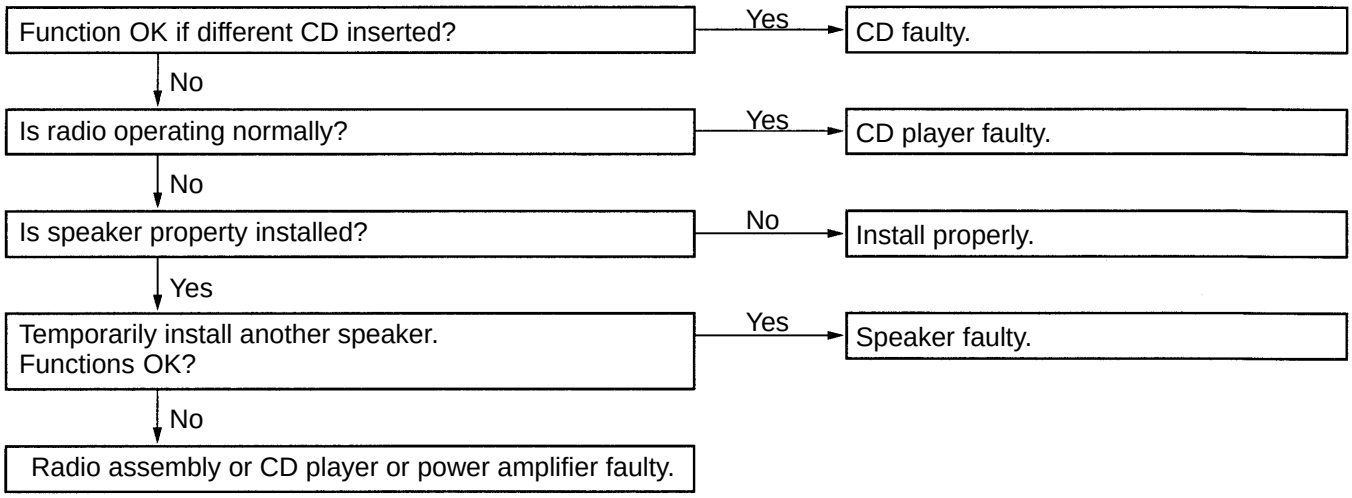

16
CD Player
CD CANNOT BE INSERTED
Is CD already inserted?
Yes
Eject CD.
No
Is auto search button of radio operating normally?
Yes
Is +B applied to CD player?
No
Radio assembly faulty.
Yes
Check if GND wire harness side to CD player is OK?
NG
OK
CD player faulty.
No
Check if RADIO No.1 fuse is OK?
NG
Replace fuse.
OK
Is +B applied to power amplifier?
No
+B wire harness faulty.
Yes
Check if GND (wire harness side) to radio assembly is OK?
NG
OK
Radio assembly faulty.
17
CD Player
CD INSERTED, BUT NO POWER
Is radio operating normally?
Yes
Is ACC applied to CD player?
No
Radio assembly faulty.
Yes
CD player faulty.
No
Check if RADIO No.2 fuse is OK?
NG
Replace fuse.
OK
Is ACC applied to power amplifier?
No
ACC wire harness faulty.
Yes
Is ACC applied to radio assembly?
No
Power amplifier faulty.
Yes
Radio assembly faulty.

V08487

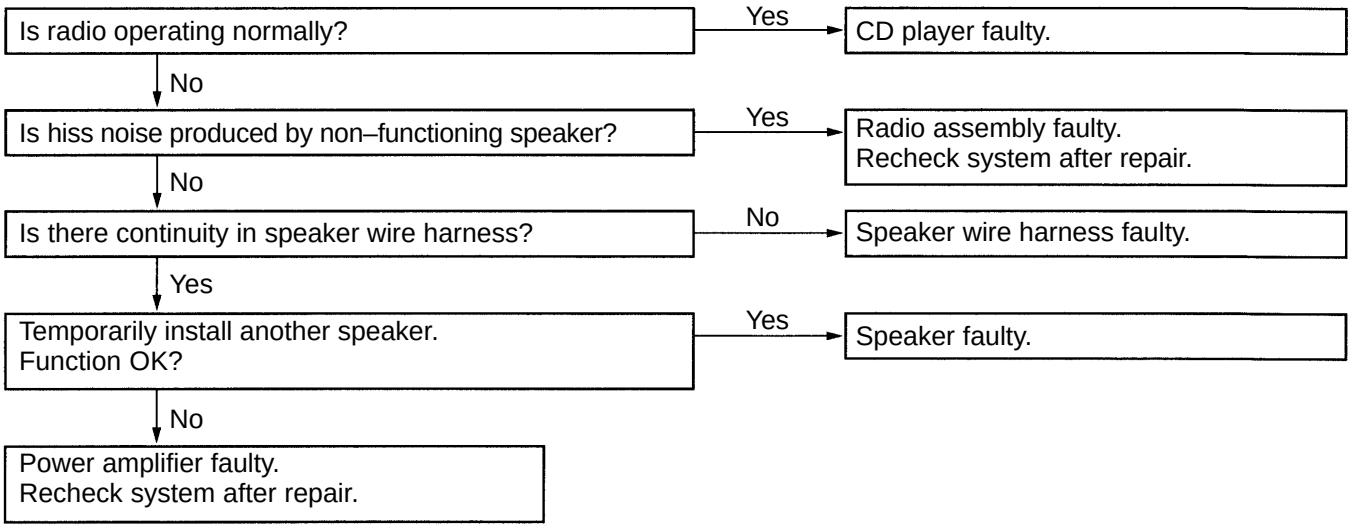

18
CD Player
POWER COMING IN, BUT CD PLAYER NOT OPERATING
Is CD inserted with correct side up?
No
Insert correctly.
Yes
Function OK if different CD inserted?
Yes
CD faulty.
No
Is radio operating normally?
Yes
Is temperature inside cabin hot?
Yes
Protective circuit in operation.
No
Has sudden temperature change occurred inside cabin?
Yes
Formation of condensation due to temp. changes.
No
CD player faulty.
No
Is there continuity in speaker wire harness?
No
Speaker wire harness faulty.
Yes
Temporarily install another speaker. Functions OK?
Yes
Speaker faulty.
No
Hiss noise from speaker?
No
Power amplifier faulty. Recheck system after repair.
Yes
Radio assembly faulty. Recheck system after repair.
19
CD Player
SOUND JUMPS
Does sound jump only during strong vibration?
Yes
Jumping caused by vibration.
No
Is CD player properly installed?
No
Install properly.
Yes
Functions OK if different CD inserted?
Yes
CD faulty.
No
Has sudden temperature change occurred inside cabin?
Yes
Formation of condensation due to temp. changes.
No
CD player faulty.

V08550

20	CD Player	SOUND QUALITY POOR (VOLUME FAINT)

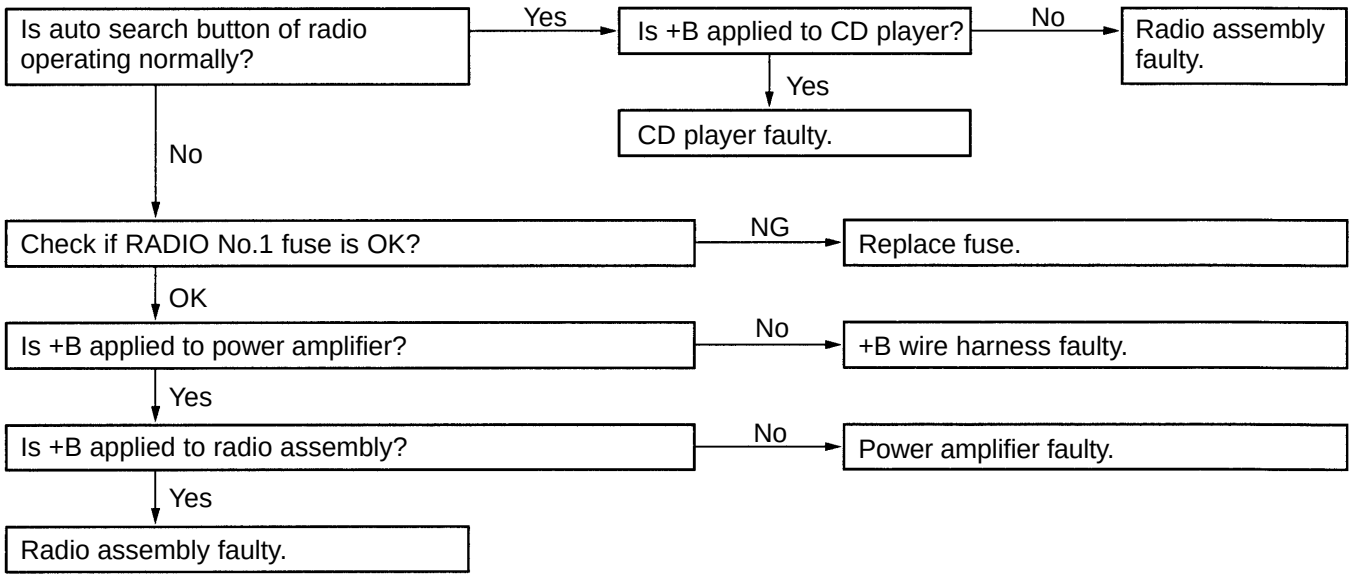


21	CD Player	EITHER SPEAKER DOES NOT WORK



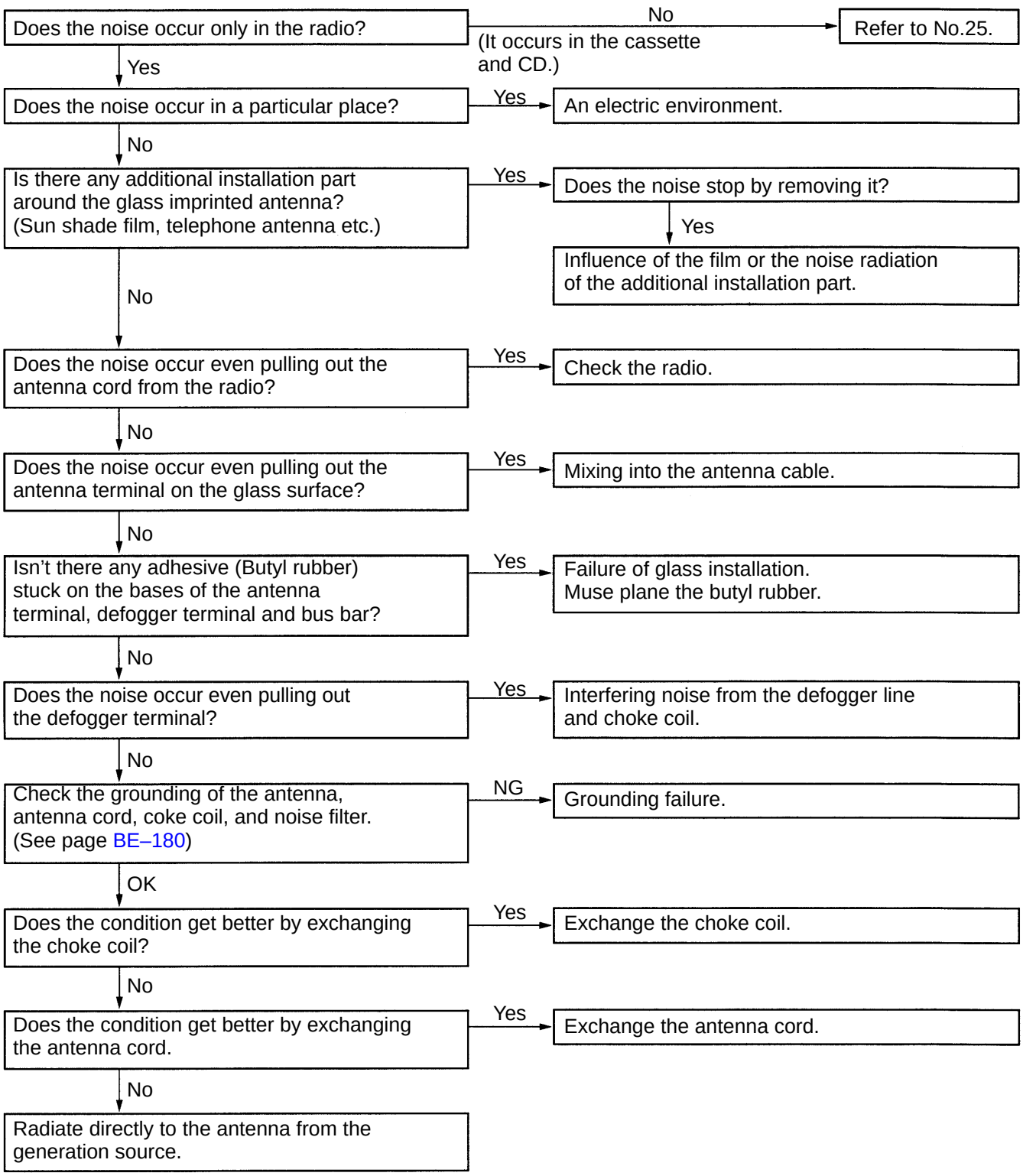
V08551

22	CD Player	CD WILL NOT BE EJECTED



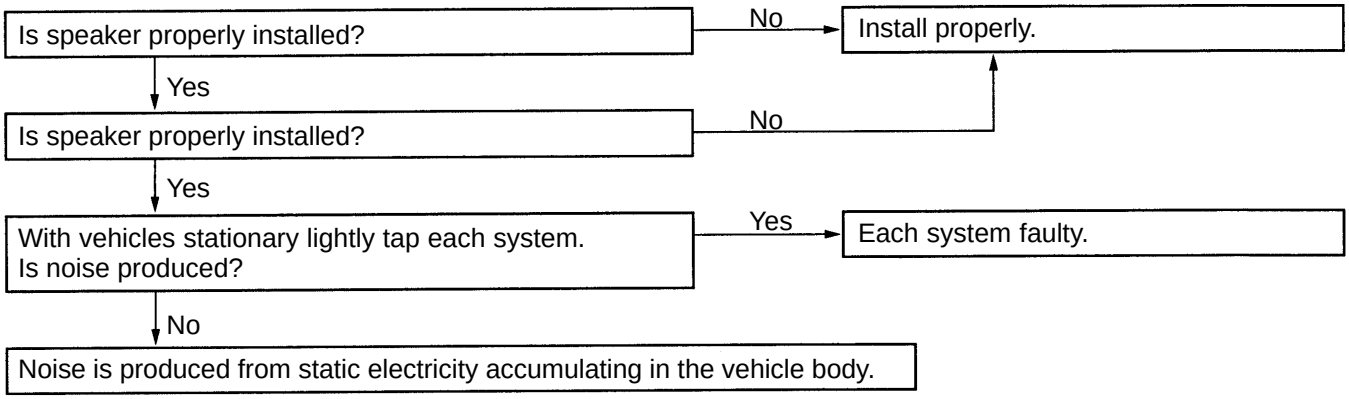
V08488

23	Noise	NOISE OCCURS



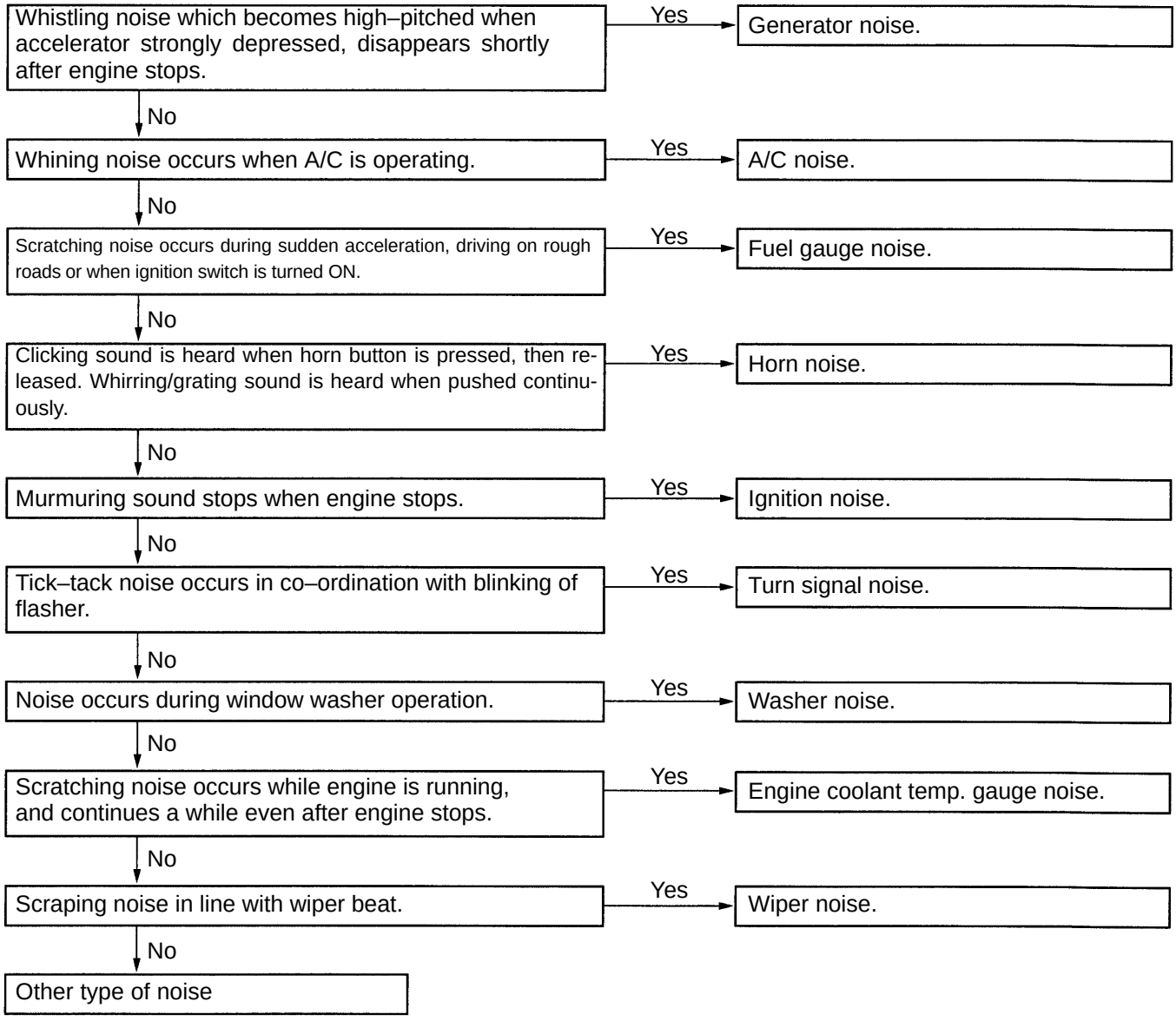
V08552

24	Noise	NOISE PRODUCED BY VIBRATION OR SHOCK WHILE DRIVING



V08553

25	Noise	NOISE PRODUCED WHEN ENGINE STARTS



V08554

BE218–02

TROUBLESHOOTING

1. DIAGNOSIS FUNCTION

HINT:

Error codes over tuner and connected equipment are displayed on the screen of tuner.

(a) Diagnosis start–up

For shifting to diagnosis mode, push ”CD” switch 3 times with pressing ”1” and ”6” of PRESET button at the same time while the audio power is OFF and ACC is ON.

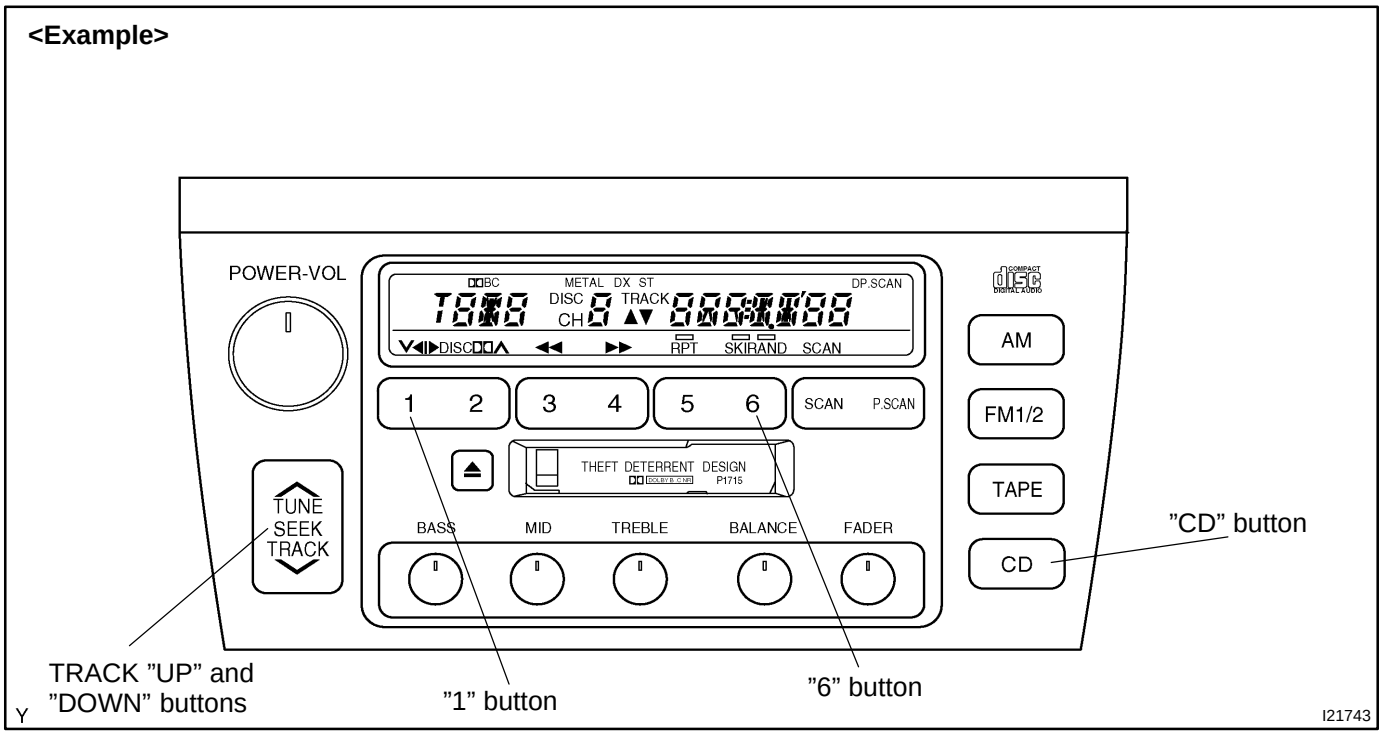
To exit from diagnosis mode, press ”CD” switch for 2 seconds or turn the ignition key OFF.

(When ”1–190” is displayed, the mode is transferred to LAN check mode.)

(b) LAN check

When starting up the diagnosis mode, the mode turns to LAN check mode, the screen displays the code numbers (physical address) of tuner and connected equipment. Smaller codes are displayed in order, displayed code numbers are switched by operating TRACK ”UP” or ”DOWN” switch. In LAN check mode, by pressing ”5” of PRESET button for more than 2 secs., diagnosis memory of each equipment can be deleted, when deletion is completed, the mode returns to LAN check mode.

<Example>



Code No. (physical address) List

Code No. (physical address)	Equipment name
190	Radio receiver assembly (Audio head unit)
240	CD changer (in Luggage room)
360	CD changer(in center console and glove compartment box)
440	Power amplifier

(c) System check

(1) When pressing ”1” of PRESET button in LAN check mode, the mode turns to the system check mode, the system performs self diagnosis of connected equipment and displays the results.(”SYS” (showing the system is under detection) is displayed.)

HINT:

It sometimes takes approx. 40 secs. till the system inspection is completed.

(2) Perform the operation shown in the chart, then read the result of the inspection.

HINT:

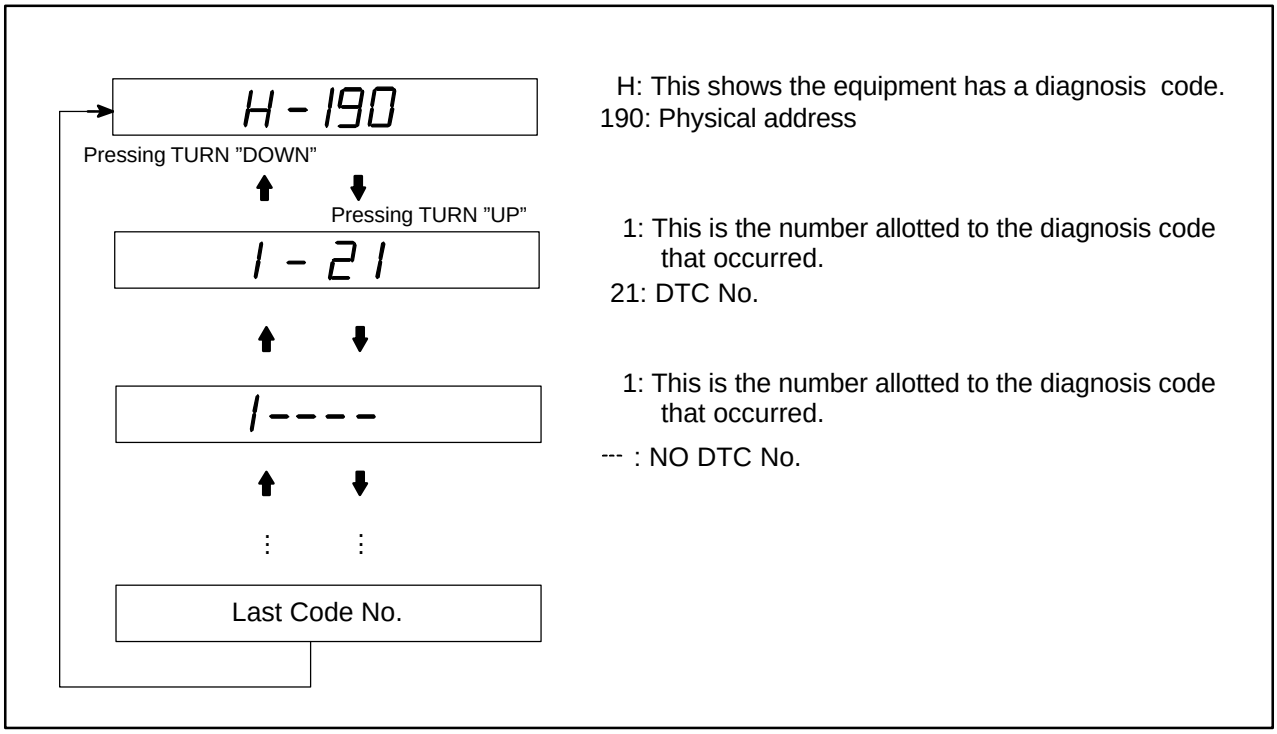
The chart below is an example of when diagnosis code ”21” appears on the physical address (190) equipment. (ROM error occurs on the radio receiver.)

The smaller code numbers (physical address) are displayed in order (code No., diagnosis code, support code of diagnosis code (object equipment)).

When no error is detected in the system, ”00” is displayed.

When an error code is detected, up to 6 codes per one system are displayed. Pressing TRACK ”UP” or ”DOWN” switches the display.

In the system check mode, when pressing ”6” of PRESET button the mode returns to LAN check mode.



(d) Diagnosis memory

(1) In LAN check mode, when pressing ”2” of PRESET button the mode turns to the diagnosis memory mode. (”CODE” is displayed.)

The results of self diagnosis performed over tuner and connected equipment are memorized and displayed.

(2) Perform the operation shown in the following illustration, then read the result of the inspection.

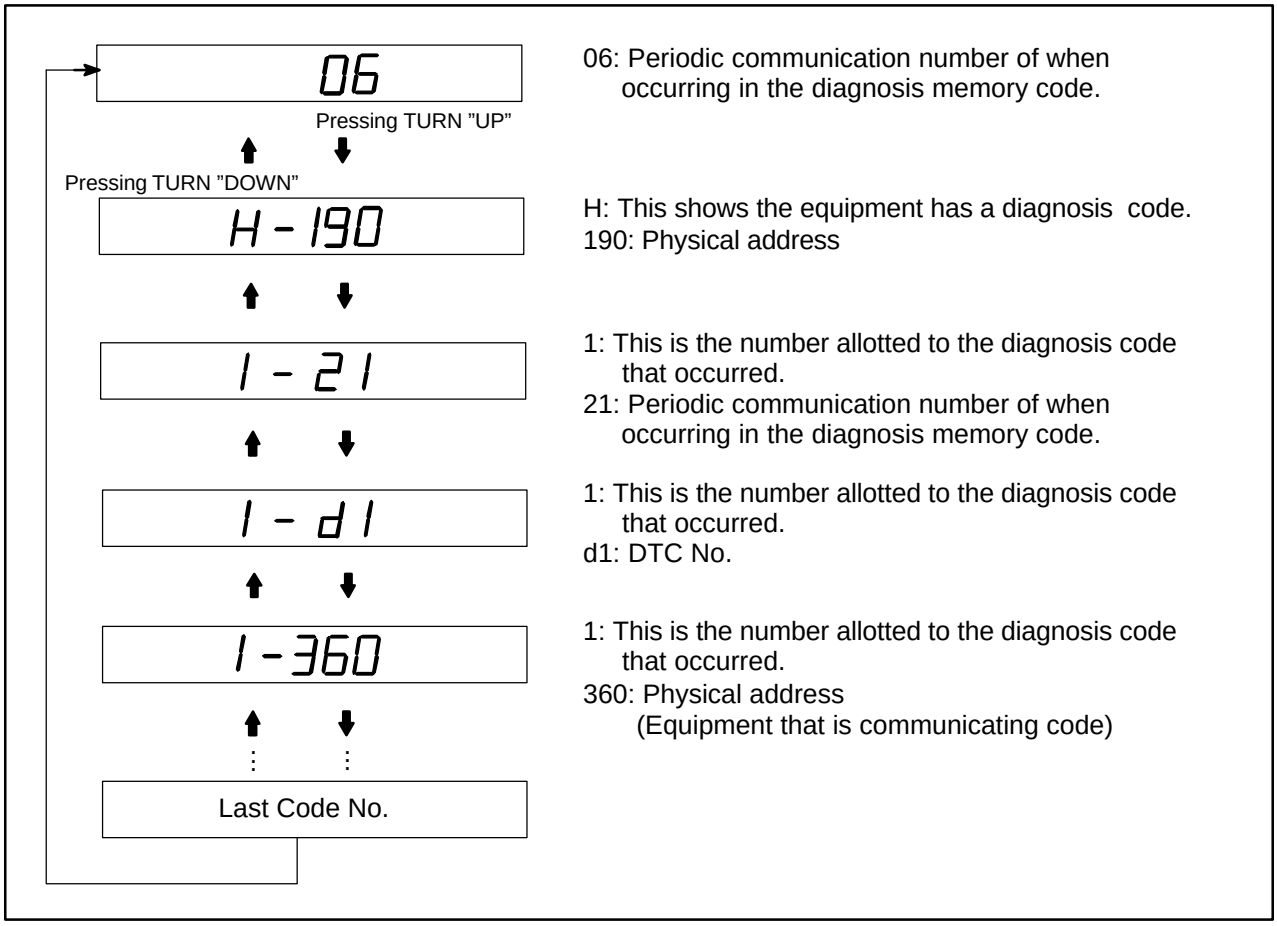
HINT:

The smaller code numbers (physical address) are displayed in order (code No. , periodic communication number when error occurs, diagnosis code, and support code of diagnosis code (object equipment)).

When no error is detected in the system, ”00” is displayed. When an error code is detected, up to 6 codes per one system are displayed. Pressing TRACK ”UP” or ”DOWN” switches the display. Each diagnosis code is same as code in the system check mode.

When pressing ”6” of PRESET button, the mode returns to LAN check mode.

The following illustration below is an example of when diagnosis code ”D1” appears on the code (190) and (240 or 360) equipment. (Communication error occurs between the radio receiver and CD changer.)



(e) Diagnosis memory clear

(1) After error is fixed, start up the diagnosis mode.

(2) Continue pressing function switch ”5” for 2 secs. (CLr is displayed.)

(3) Press the function switch ”2” and transfer to the diagnosis memory mode and check that the normal code (00) is output.

2. DIAGNOSIS CODE LIST

If there is ”O” in the column of system check, an error can be detected when the mode is switched to the system check mode.

If there is ”O” in the column of diagnosis mode each unit is monitoring whether or not it has failure. In case of detecting failure, it memorizes DTC.

Parts Name	DTC	Diagnosis item	Diagnosis content	Countermeasure and inspected parts	System Check	Diagnosis memory
Head Unit (190)	21	ROM error	There is an error on internal ROM.	Radio receiver check.	○	X
	22	RAM error	There is an error on internal RAM.		○	X
	41	AM tuner error	There is an error in AM tuner.		X	○
	42	FM tuner error	There is an error in FM tuner.		X	○
	50	Cassette error	There is an error in cassette deck.		X	○
	51	Cassette eject error	Cassette can not be ejected from Head Unit.		X	○
	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Radio receiver check. Wire harness and connecter check.	○	○
	D2	Periodic communication no response	Error in periodic communication.	● Wire harness and connector	X	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	Radio receiver check.	○	X
CD (240) (360)	21	ROM error	There is an error on internal ROM.	CD changer check.	○	X
	22	RAM error	There is an error on internal RAM.		○	X
	60	CD error	Error codes other than 61–69 are detected.		X	○
	61	EJECT error	CD is not ejected.	CD changer check. Magazine check.	X	○
	62	DISC inside out/flaw	CD is inserted inside out or it has a flaw.	CD check.	X	○
	63	Pickup temperature detection	High temperature of CD changer is detected.	CD changer check.	X	○
	64	Excessive current detection	Excessive current to CD changer is detected.		X	○
	67	Tray insertion/ discharging error	An error occurs in insertion and discharging operation of CD changer tray.	CD changer check. Magazine check.	X	○

Parts Name	DTC	Diagnosis Item	Diagnosis Content	Countermeasure and Inspected Parts	System Check	Diagnosis Memory
CD (240) (360)	68	Elevator error	An error occurs in elevator of CD changer elevator.	CD changer check.	X	○
	69	Clamp error	An error occurs in CD changer clamp.		X	○
	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.		○	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	CD changer check.	○	X
AMP (440)	D1	Transmitter error	Communication with the equipment that is communicating has failed successively.	Stereo component amplifier check.	○	○
	D4	Periodic communication error	Connection confirmation has not come from the equipment that is communicating	● Radio receiver check. ● Wire harness check.	X	○
	FF	Diagnosis no response	Result of diagnosis is not issued from start to finish.	Stereo component amplifier check.	○	X

3. PROBLEM SYMPTOM 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.

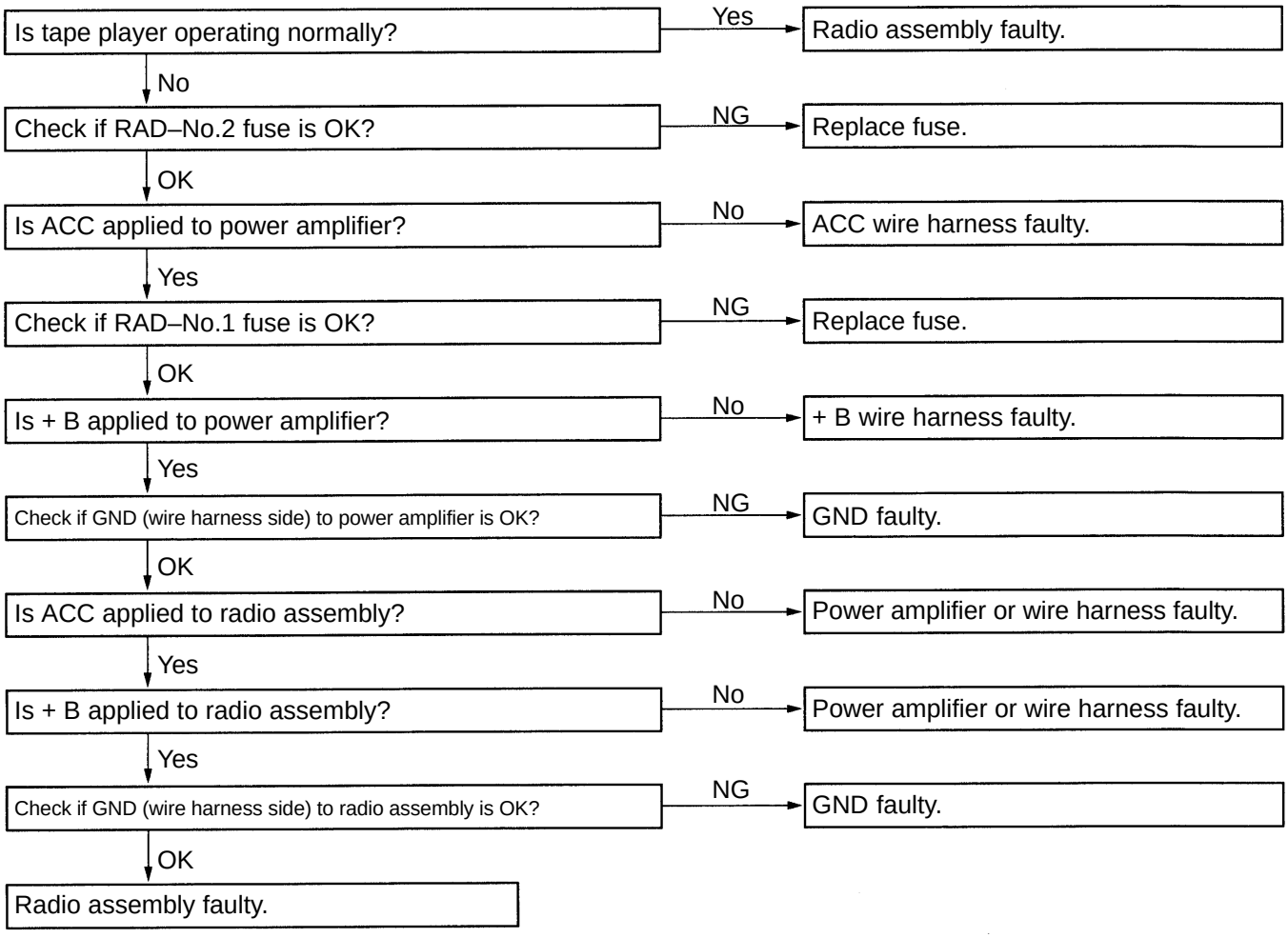
Open or short circuit of the wire harness

Connector or terminal connection fault

	Problem	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
	Either 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 inserts, 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
Noise	Noise occurs	23
	Noise produced by vibration or shock while driving.	24
	Noise produced when engine starts.	25

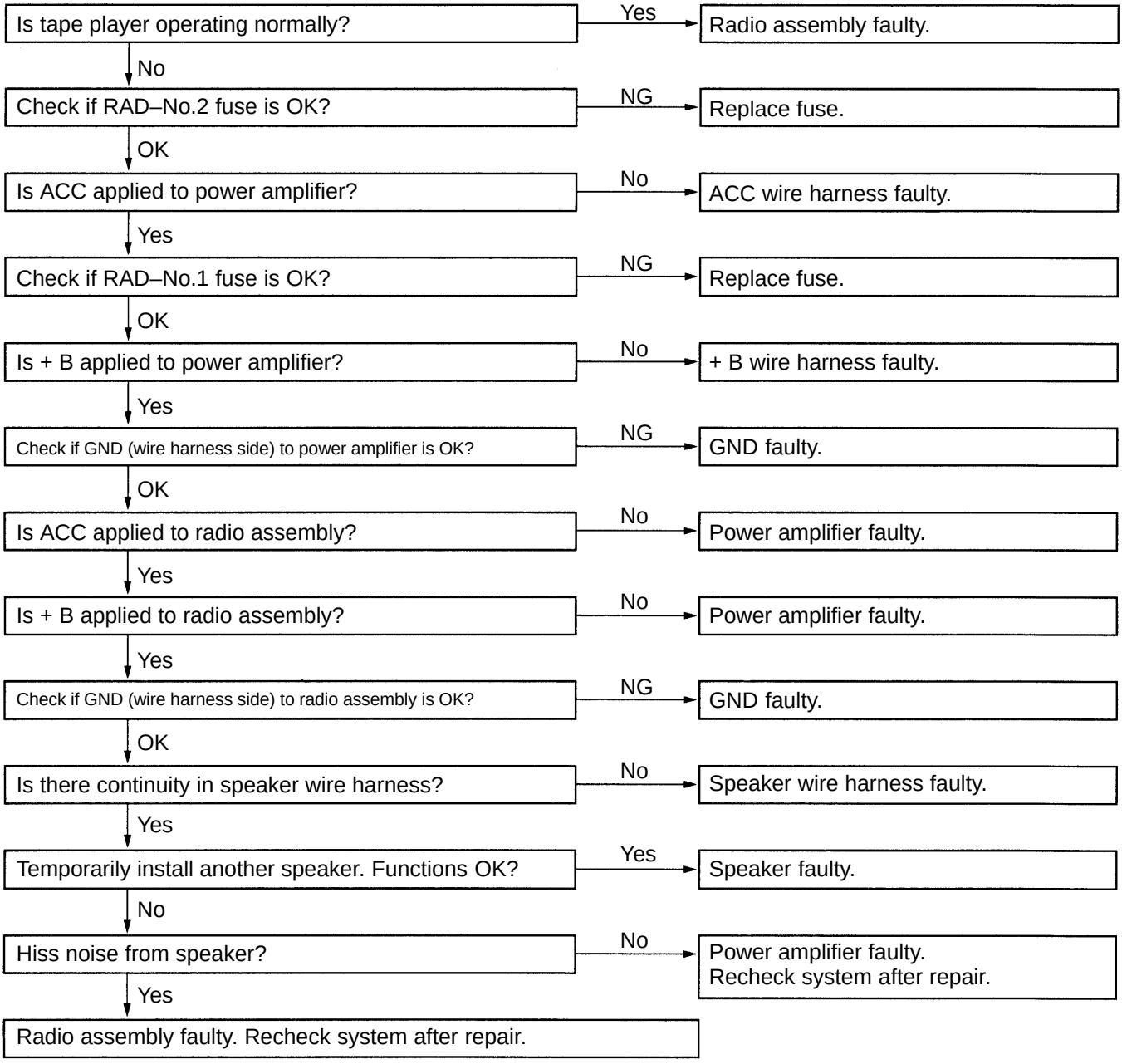
The term "AM" includes LW, MW and SW, and the term "FW" includes UKW.

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



V08480

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



V08481

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 tape player operating normally? Yes → Radio assembly faulty.

No ↓

Is hiss noise produced by non–functioning speaker? Yes → Radio assembly faulty. Recheck system after repair.

No ↓

Is there continuity 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	EITHER AM OR FM DOES NOR WORK FEW PRESET TUNING BANDS

Problem with radio wave signals or location? Yes → Poor signals, poor location.

No ↓

Are both AM and FM defective? Yes → Radio assembly faulty.

No ↓

Is power for the antenna being output from the radio assembly? No → Radio assembly faulty.

Yes ↓

Go to No. 23

Is tape player operating normally? Yes → Radio assembly faulty.

No ↓

Temporarily install another speaker. Functions OK? Yes → Speaker faulty.

No ↓

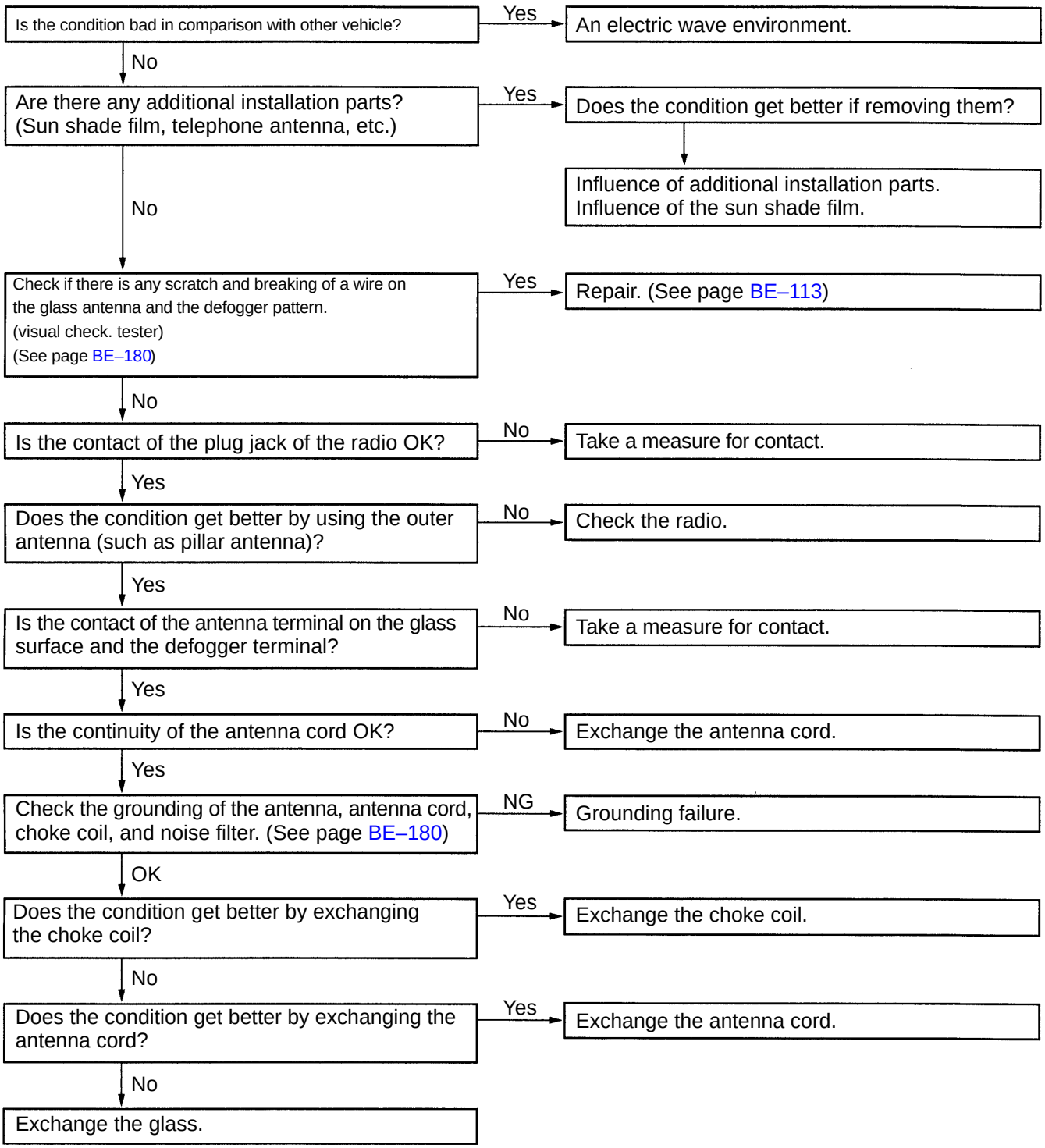
Hiss noise from speaker? No → Power amplifier faulty. Recheck system after repair.

Yes ↓

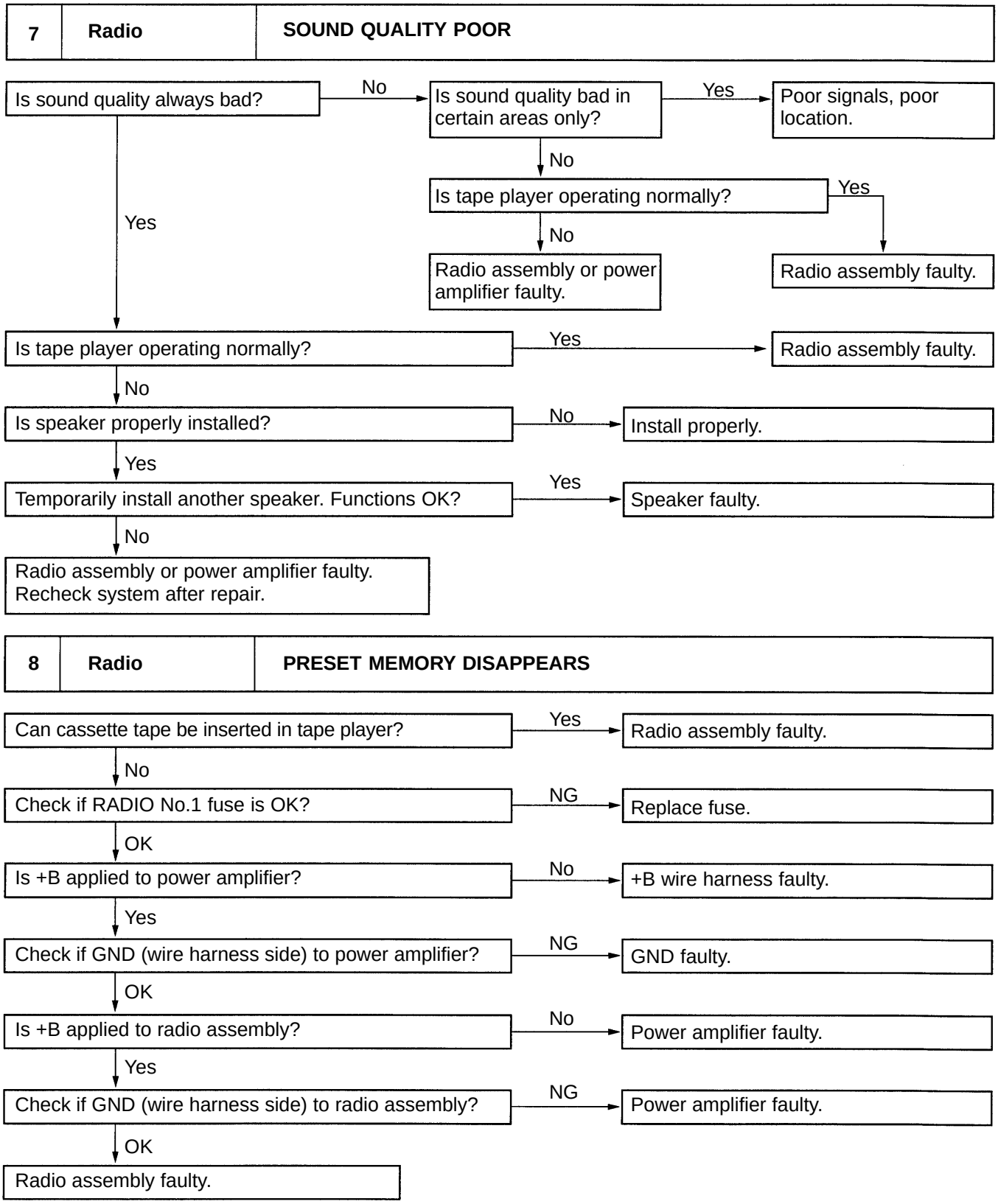
Radio assembly faulty. Recheck system after repair.

V08482

6	Radio	POOR RECEPTION

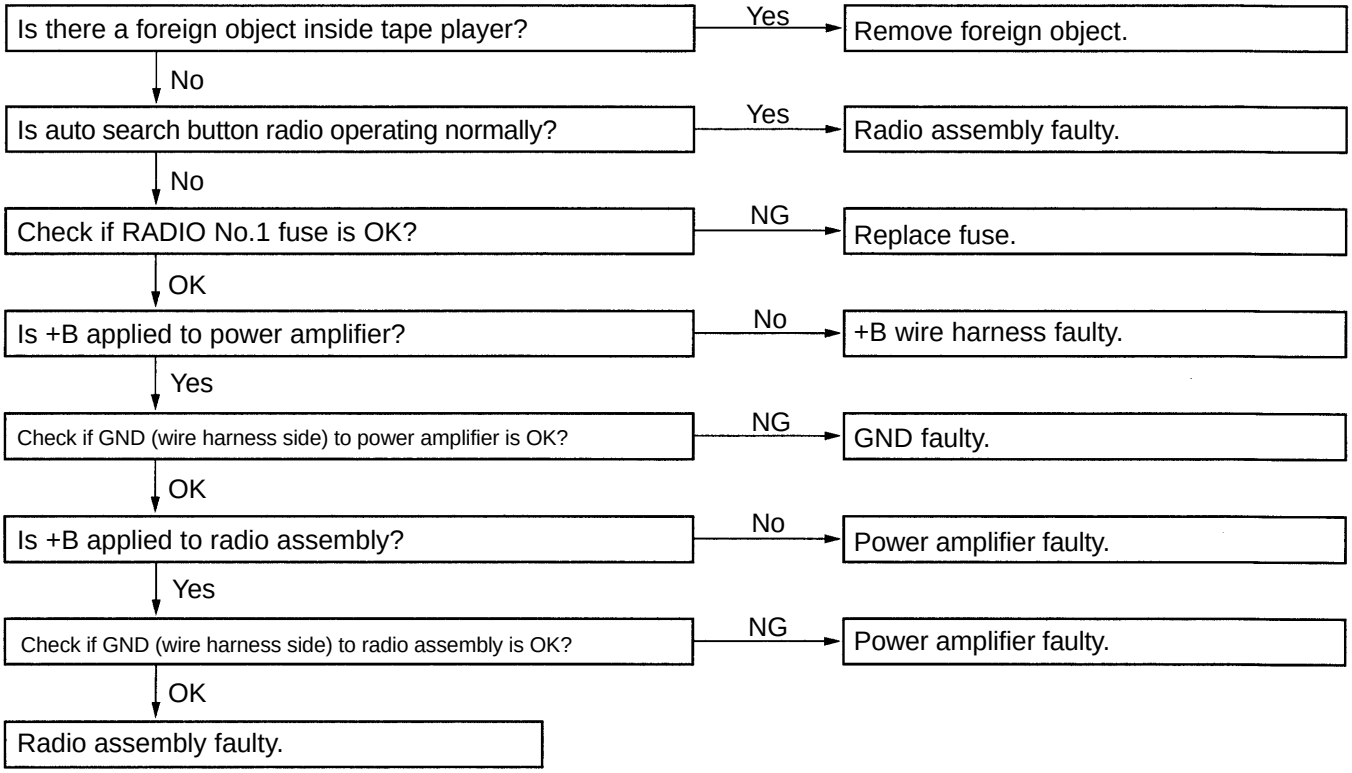


V08549

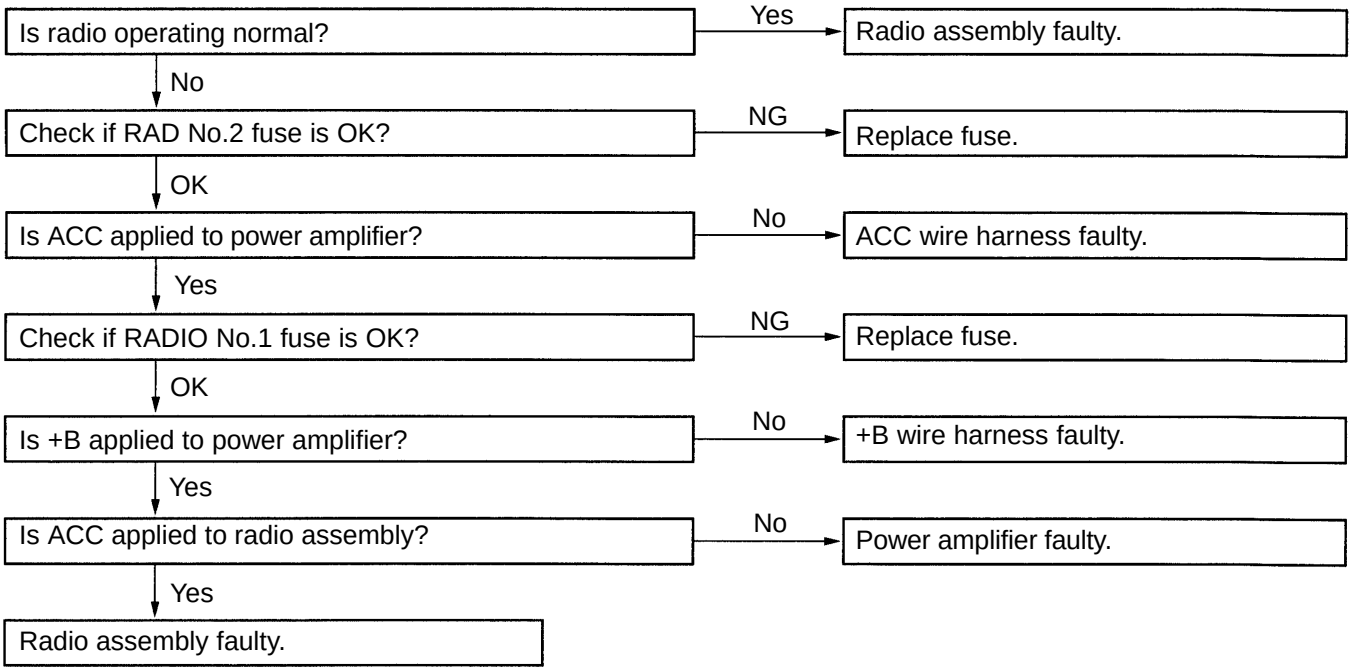

7
Radio
SOUND QUALITY POOR
Is sound quality always bad?
No
Is sound quality bad in certain areas only?
Yes
Poor signals, poor location.
No
Is tape player operating normally?
Yes
Radio assembly faulty.
No
Radio assembly or power amplifier faulty.
Yes
Is tape player operating normally?
Yes
Radio assembly faulty.
No
Is speaker properly installed?
No
Install properly.
Yes
Temporarily install another speaker. Functions OK?
Yes
Speaker faulty.
No
Radio assembly or power amplifier faulty.
Recheck system after repair.
8
Radio
PRESET MEMORY DISAPPEARS
Can cassette tape be inserted in tape player?
Yes
Radio assembly faulty.
No
Check if RADIO No.1 fuse is OK?
NG
Replace fuse.
OK
Is +B applied to power amplifier?
No
+B wire harness faulty.
Yes
Check if GND (wire harness side) to power amplifier?
NG
GND faulty.
OK
Is +B applied to radio assembly?
No
Power amplifier faulty.
Yes
Check if GND (wire harness side) to radio assembly?
NG
Power amplifier faulty.
OK
Radio assembly faulty.

V08483

9	Tape Player	CASSETTE TAPE CANNOT BE INSERTED



10	Tape Player	CASSETTE TAPE INSERTED, BUT NO POWER



V08484

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

Function OK if different cassette tape inserted?
- Yes → Cassette tape faulty.
- No ↓

Is radio operating normally?
- Yes → Radio assembly faulty.
- No ↓

Is there continuity in speaker wire harness?
- No → Speaker wire harness faulty.
- Yes ↓

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

Hiss noise from speaker?
- No → Power amplifier faulty. Recheck system after repair.
- Yes ↓

Radio assembly faulty. Recheck system after repair.

12	Tape Player	EITHER SPEAKER DOES NOT WORK

Is radio operating normally?
- Yes → Radio assembly faulty.
- No ↓

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

Is there continuity in speaker wire harness?
- No → Speaker wire harness faulty.
- Yes ↓

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

Radio assembly or power amplifier faulty.

V08485

13	Tape Player	SOUND QUALITY POOR (VOLUME FAINT)

Function OK if different cassette tape inserted?
- Yes → Cassette tape faulty.
- No → Operates normally after cleaning the heads?
  - Yes → Head dirty.
  - No → Is radio operating normally?
    - Yes → Radio assembly faulty.
    - No → Is speaker properly installed?
      - No → Install properly.
      - Yes → Temporarily install another speaker. Function OK?
        - Yes → Speaker faulty.
        - No → Radio assembly faulty.

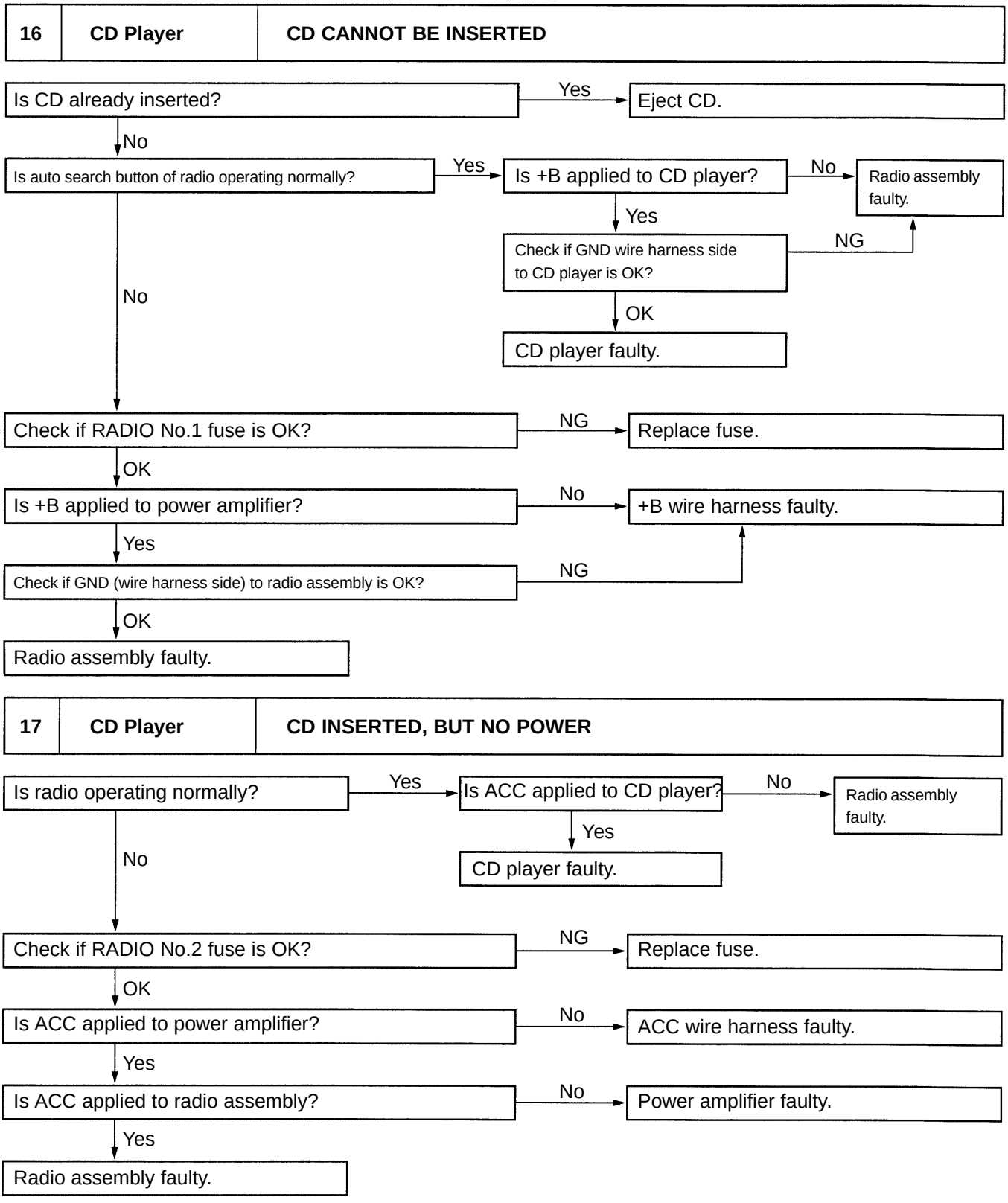
14	Tape Player	TAPE JAMMED MALFUNCTION WITH TAPE SPEED OR AUTO–REVERSE

Function OK if different tape (less than 120 mins.) is inserted?
- Yes → Cassette tape faulty.
- No → Is there a foreign object inside tape player?
  - Yes → Remove foreign object.
  - No → Operates normally after cleaning the heads?
    - Yes → Head dirty.
    - No → Radio assembly faulty.

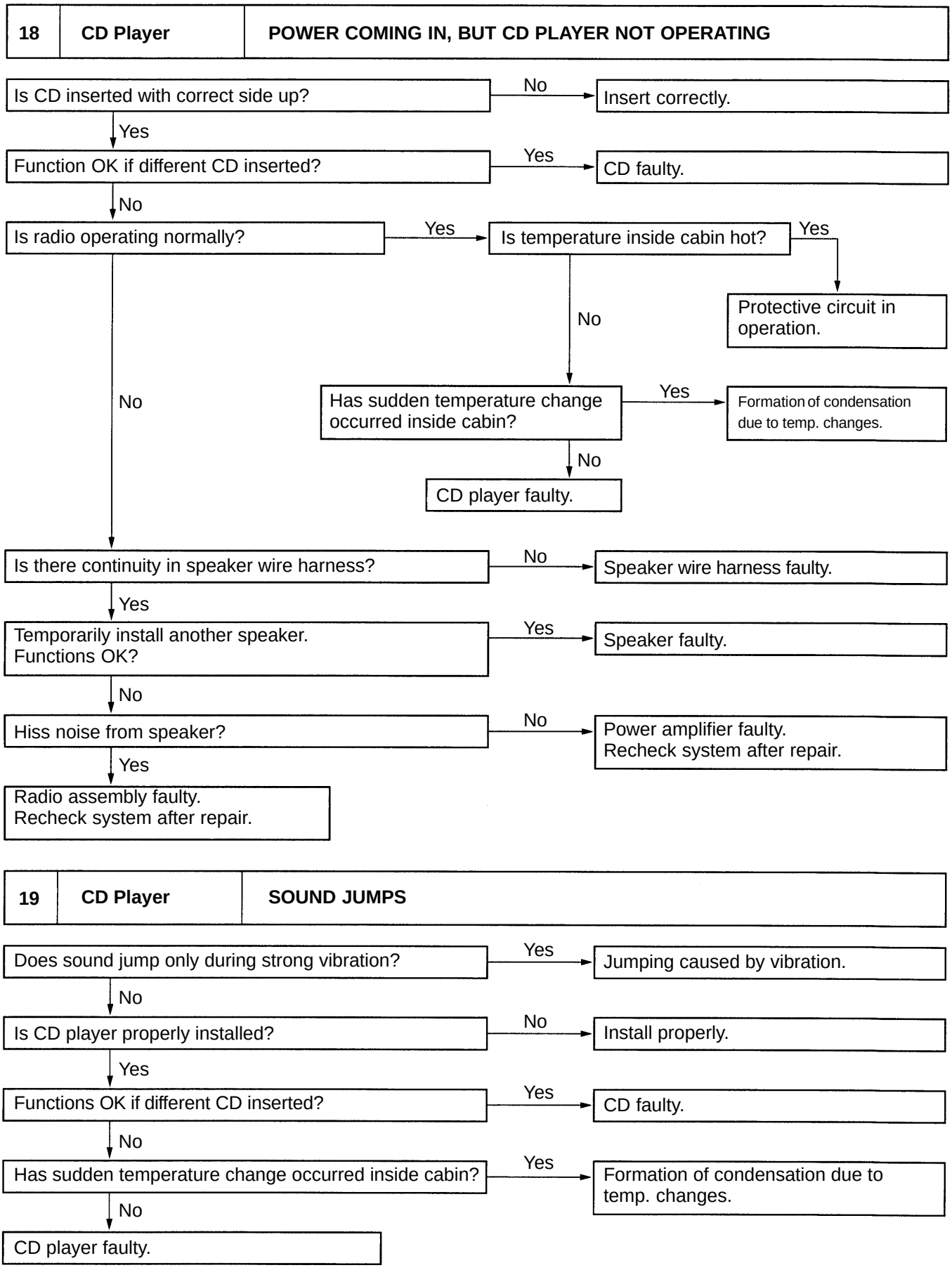
15	Tape Player	CASSETTE TAPE WILL NOT EJECTED

Is tape player operating normally?
- No → Cassette tape jammed.
- Yes → Is auto search button of radio operating normally?
  - Yes → Radio assembly faulty.
  - No → Check if RADIO No.1 fuse is OK?
    - NG → Replace fuse.
    - OK → Is –B applied to power amplifier?
      - No → +B wire harness faulty.
      - Yes → Is +B applied to radio assembly?
        - No → Power amplifier faulty.
        - Yes → Radio assembly faulty.

V08486

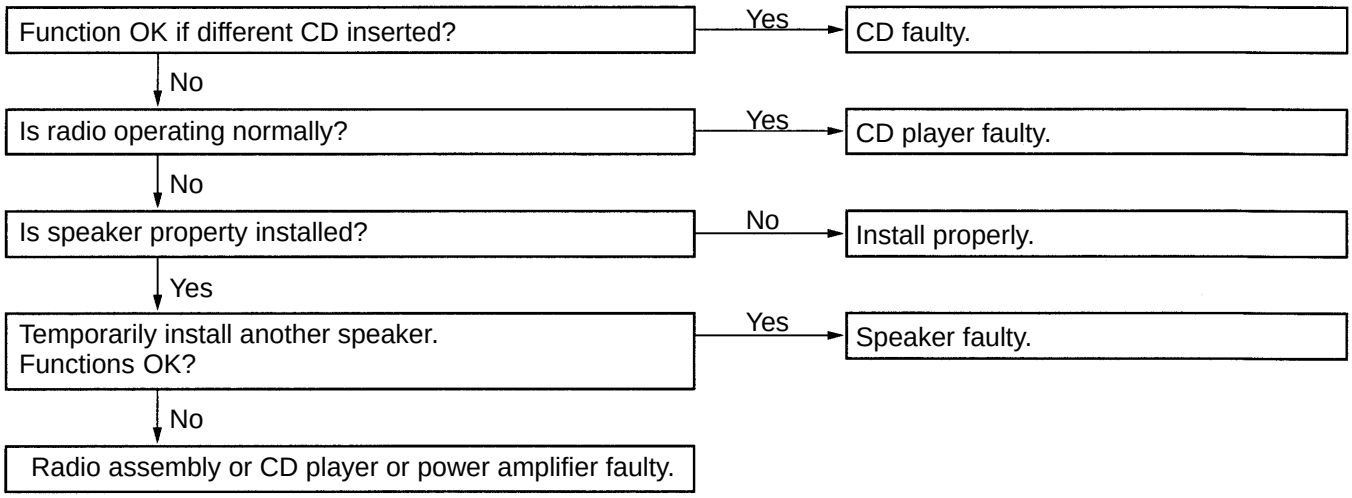

16
CD Player
CD CANNOT BE INSERTED
Is CD already inserted?
Yes
Eject CD.
No
Is auto search button of radio operating normally?
Yes
Is +B applied to CD player?
No
Radio assembly faulty.
Yes
Check if GND wire harness side to CD player is OK?
NG
OK
CD player faulty.
No
Check if RADIO No.1 fuse is OK?
NG
Replace fuse.
OK
Is +B applied to power amplifier?
No
+B wire harness faulty.
Yes
Check if GND (wire harness side) to radio assembly is OK?
NG
OK
Radio assembly faulty.
17
CD Player
CD INSERTED, BUT NO POWER
Is radio operating normally?
Yes
Is ACC applied to CD player?
No
Radio assembly faulty.
Yes
CD player faulty.
No
Check if RADIO No.2 fuse is OK?
NG
Replace fuse.
OK
Is ACC applied to power amplifier?
No
ACC wire harness faulty.
Yes
Is ACC applied to radio assembly?
No
Power amplifier faulty.
Yes
Radio assembly faulty.

V08487

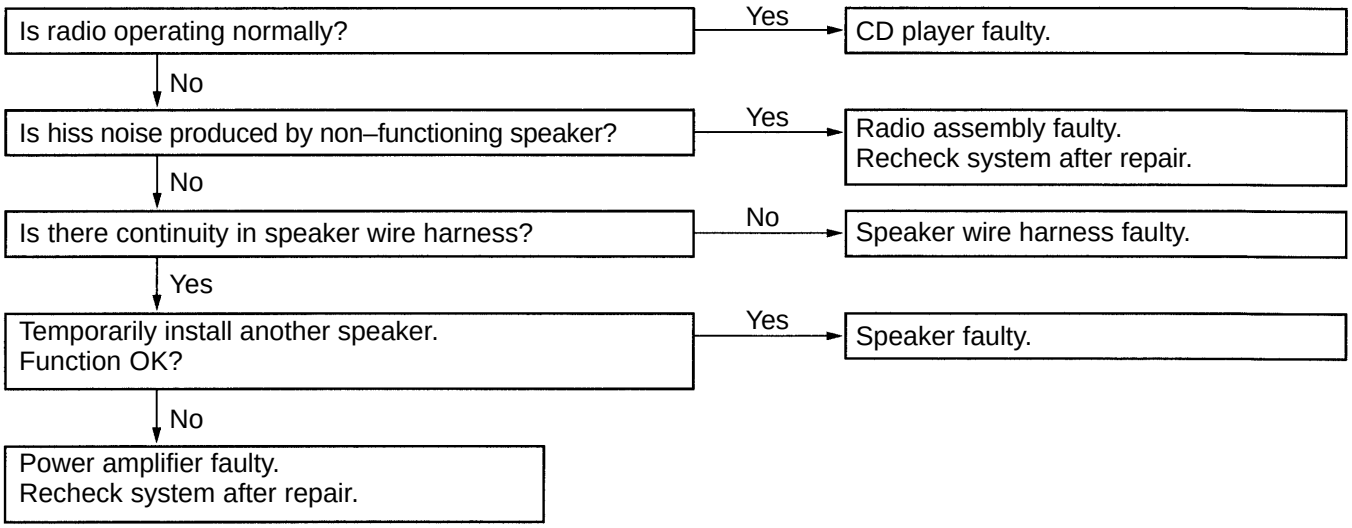

18
CD Player
POWER COMING IN, BUT CD PLAYER NOT OPERATING
Is CD inserted with correct side up?
No
Insert correctly.
Yes
Function OK if different CD inserted?
Yes
CD faulty.
No
Is radio operating normally?
Yes
Is temperature inside cabin hot?
Yes
Protective circuit in operation.
No
Has sudden temperature change occurred inside cabin?
Yes
Formation of condensation due to temp. changes.
No
CD player faulty.
No
Is there continuity in speaker wire harness?
No
Speaker wire harness faulty.
Yes
Temporarily install another speaker. Functions OK?
Yes
Speaker faulty.
No
Hiss noise from speaker?
No
Power amplifier faulty. Recheck system after repair.
Yes
Radio assembly faulty. Recheck system after repair.
19
CD Player
SOUND JUMPS
Does sound jump only during strong vibration?
Yes
Jumping caused by vibration.
No
Is CD player properly installed?
No
Install properly.
Yes
Functions OK if different CD inserted?
Yes
CD faulty.
No
Has sudden temperature change occurred inside cabin?
Yes
Formation of condensation due to temp. changes.
No
CD player faulty.

V08550

20	CD Player	SOUND QUALITY POOR (VOLUME FAINT)

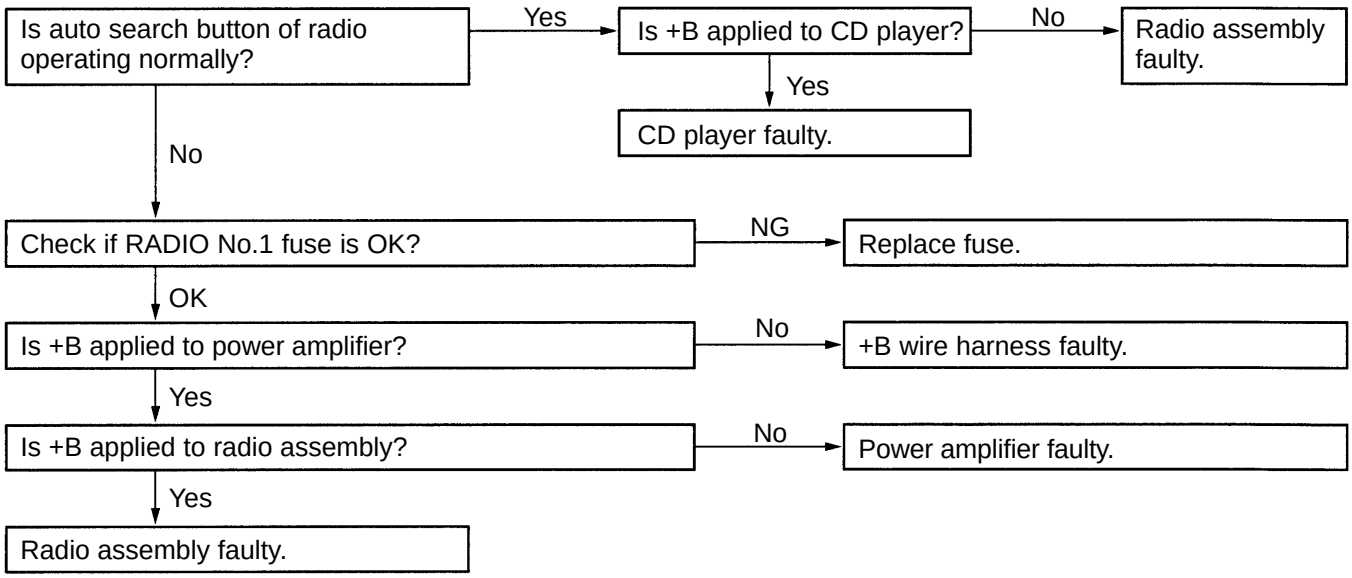


21	CD Player	EITHER SPEAKER DOES NOT WORK



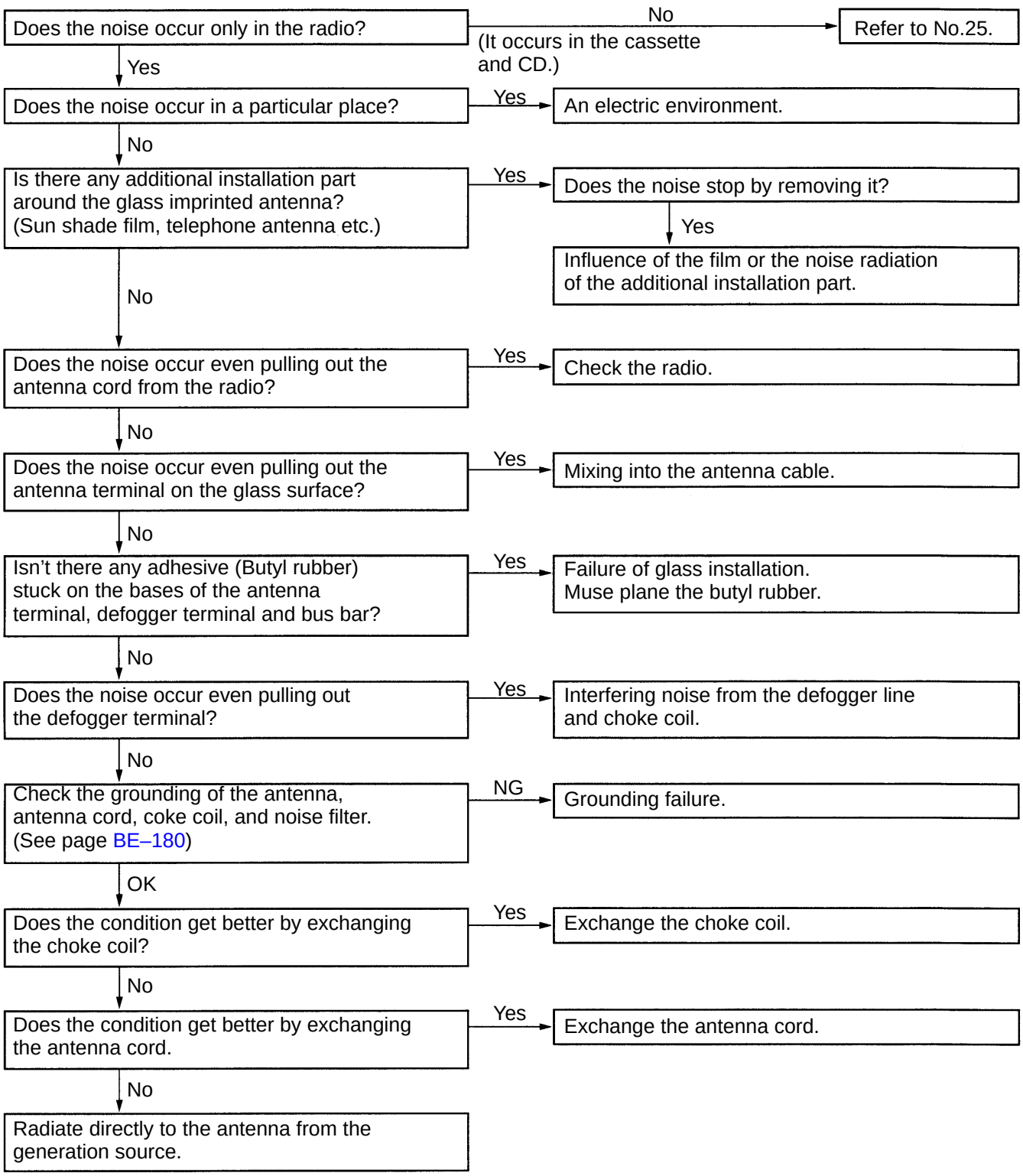
V08551

22	CD Player	CD WILL NOT BE EJECTED



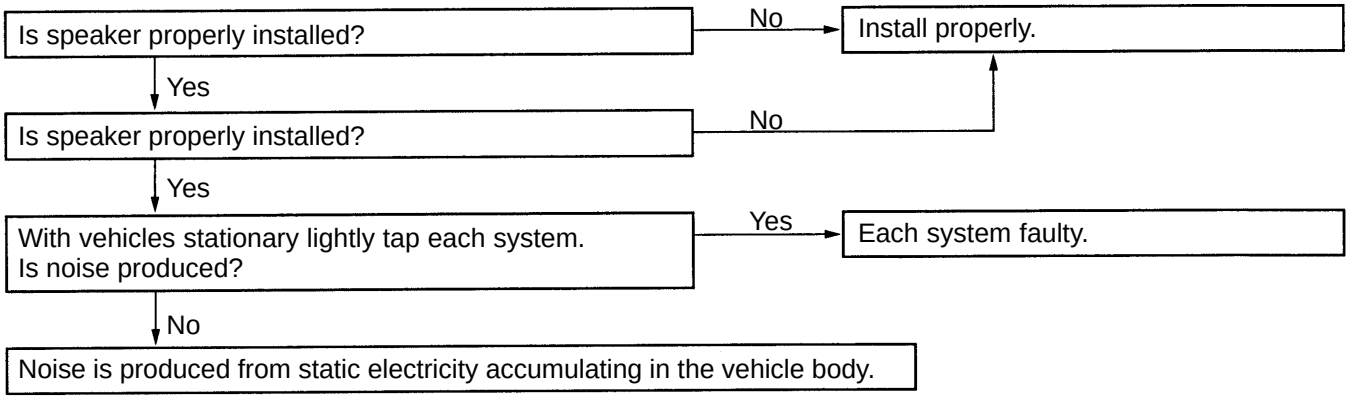
V08488

23	Noise	NOISE OCCURS



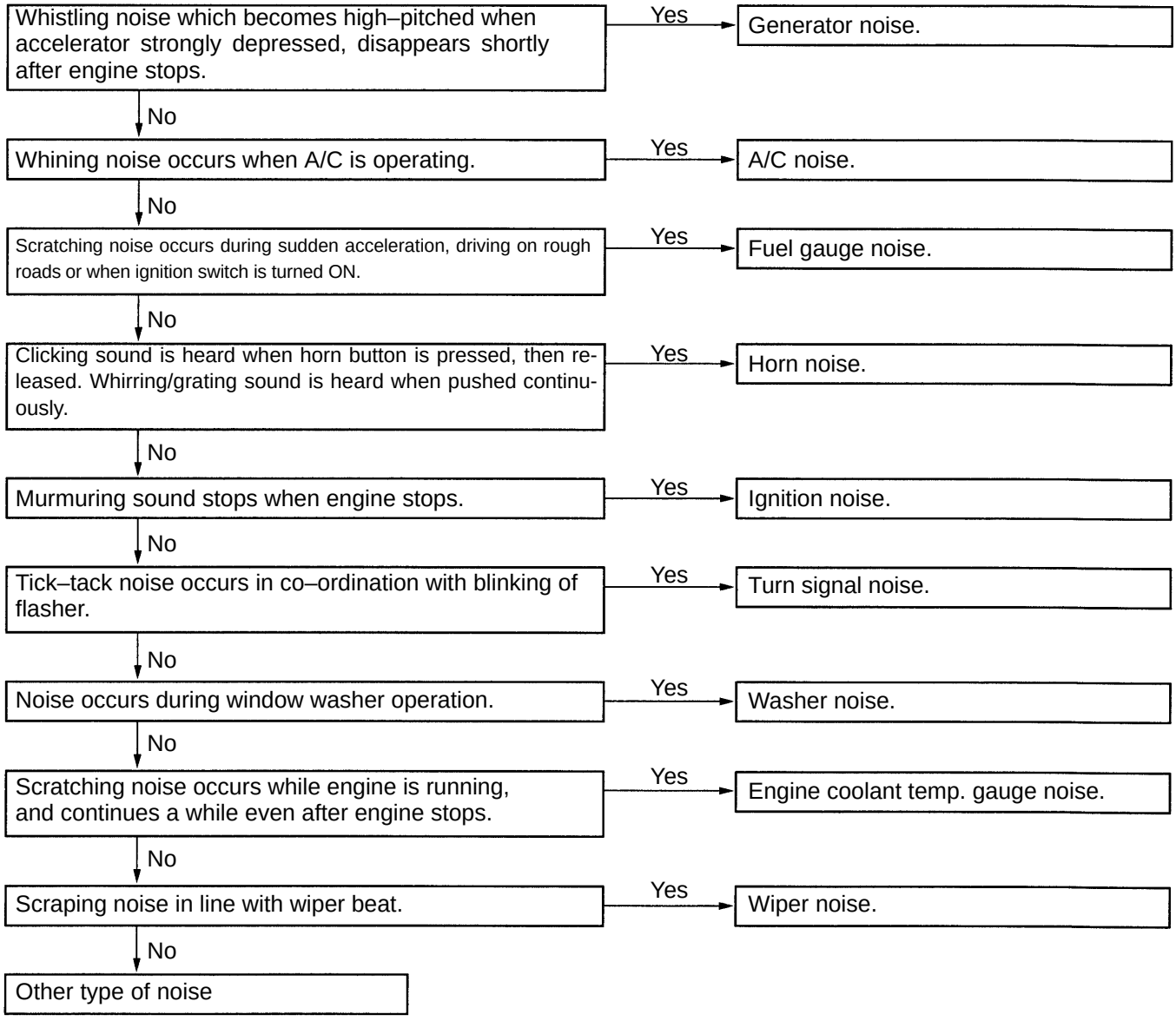
V08552

24	Noise	NOISE PRODUCED BY VIBRATION OR SHOCK WHILE DRIVING



V08553

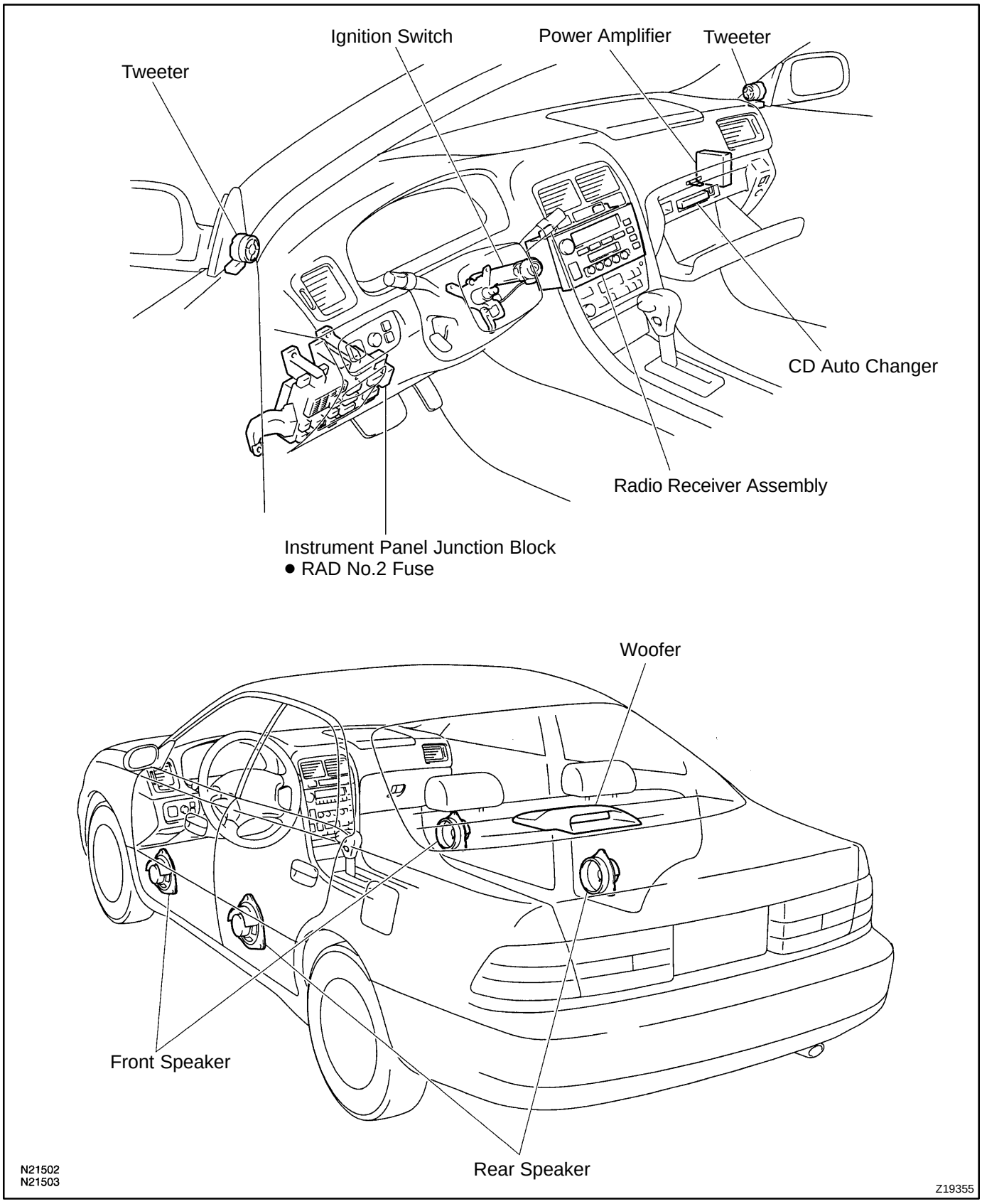
25	Noise	NOISE PRODUCED WHEN ENGINE STARTS



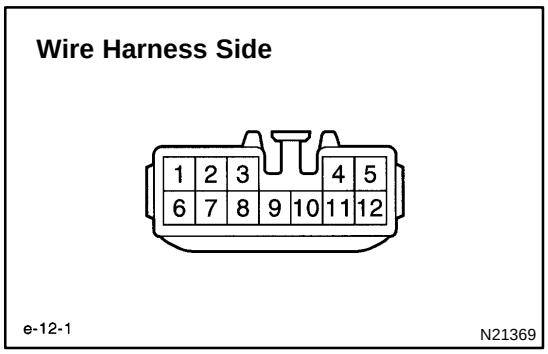
V08554

BE062–02

LOCATION



BE063–03



INSPECTION

1. INSPECT CD AUTO CHANGER CIRCUIT

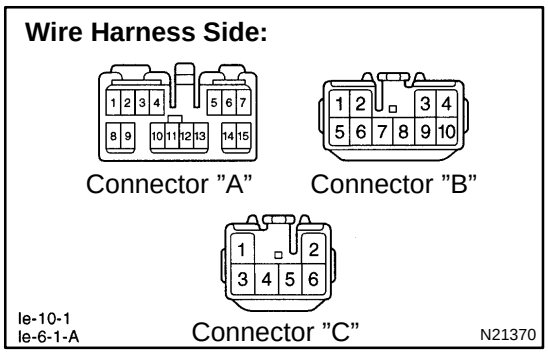
Disconnect connectors from CD auto changer and inspect the connector on the wire harness side.

Tester connection	Condition	Specified condition
8 – Ground	Constant	Continuity
5 – Ground	Constant	Battery positive voltage
12 – Ground	Ignition switch LOCK	No voltage
12 – Ground	Ignition switch ACC or ON	Battery positive voltage

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

HINT:

- Check the wire harness between the radio receiver assembly and the CD auto changer.
- Since the signals to and from the MUTE, R^-, R^+, L^-, L^+, TX^- and TX^+ terminals are serial signals, they cannot ordinarily be measured with a tester.

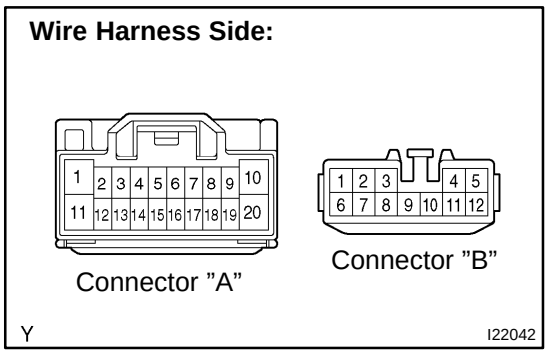


2. INSPECT POWER AMPLIFIER CIRCUIT

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

Tester connection	Condition	Specified condition
B7 – Ground	Constant	Continuity
B3 – Ground	Ignition switch LOCK	No voltage
B3 – Ground	Ignition switch ACC or ON	Battery positive voltage
B4 – Ground	Constant	Battery positive voltage

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



3. 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 positive voltage
A11 – Ground	Ignition switch LOCK	No voltage
A11 – Ground	Ignition switch ACC or ON	Battery positive 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.

4. INSPECT GLASS IN PRINTED ANTENNA (Use same procedure as for "INSPECT DEFOGGER WIRES" on page BE–113.)

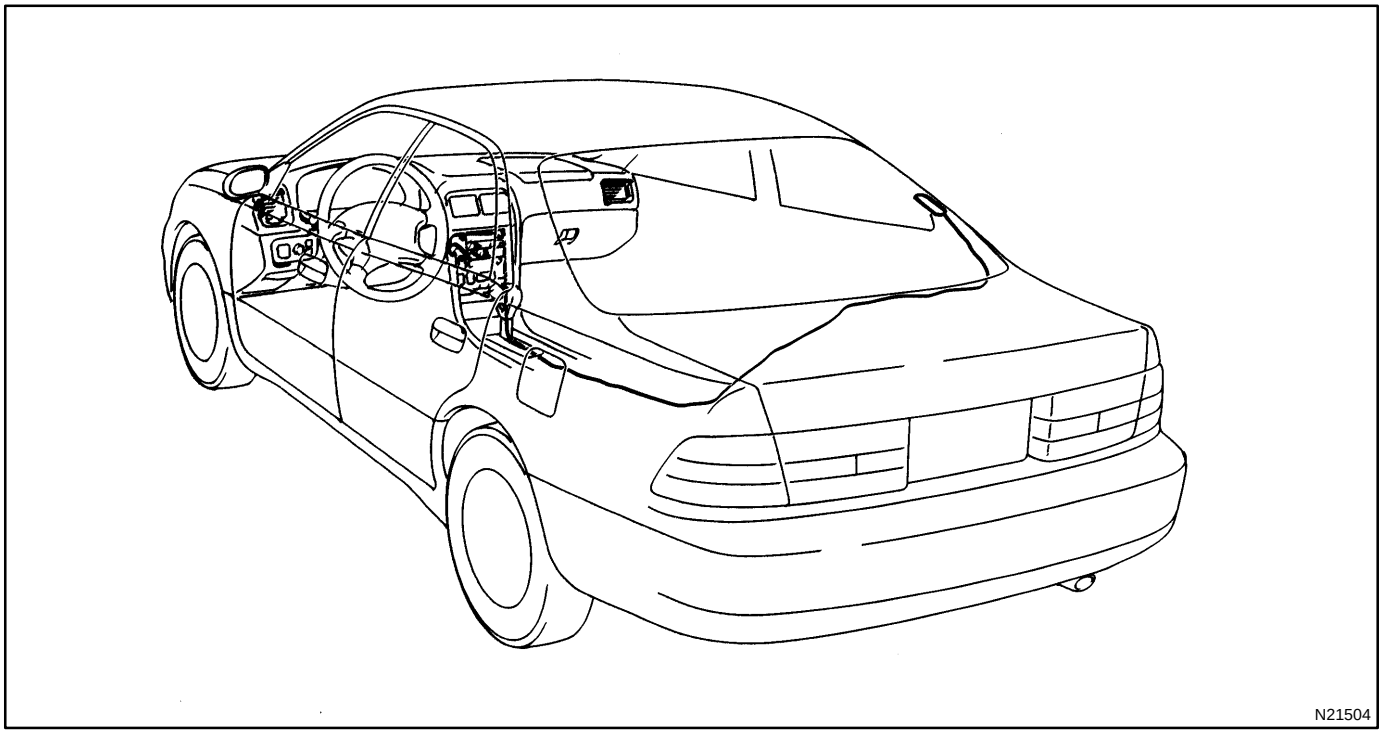
5. REPAIR GLASS PRINTED ANTENNA (Use same procedure as for "REPAIR DEFOGGER WIRES" on page BE–113.)

ANTENNA CORD

BE064–02

REMOVAL

REMOVE ANTENNA CORD



(a) Remove the following parts:
- Instrument panel assembly (See page BO–79)
- Console box (See page BO–79)
- Rear seat (See page BO–111)
- Right rear poller garnish (See page BO–33)
- Package tray trim (See page BO–33)
- Room partition trim (See page BO–33)

(b) Remove antenna cord from glass printed antenna.

(c) Disconnect the connectors shown in the illustration.

(d) Remove the clips and antenna cord assembly.

BE065–02

INSTALLATION

Installation is in the reverse order of removal (See page BE–210).

CLOCK

BE066–02

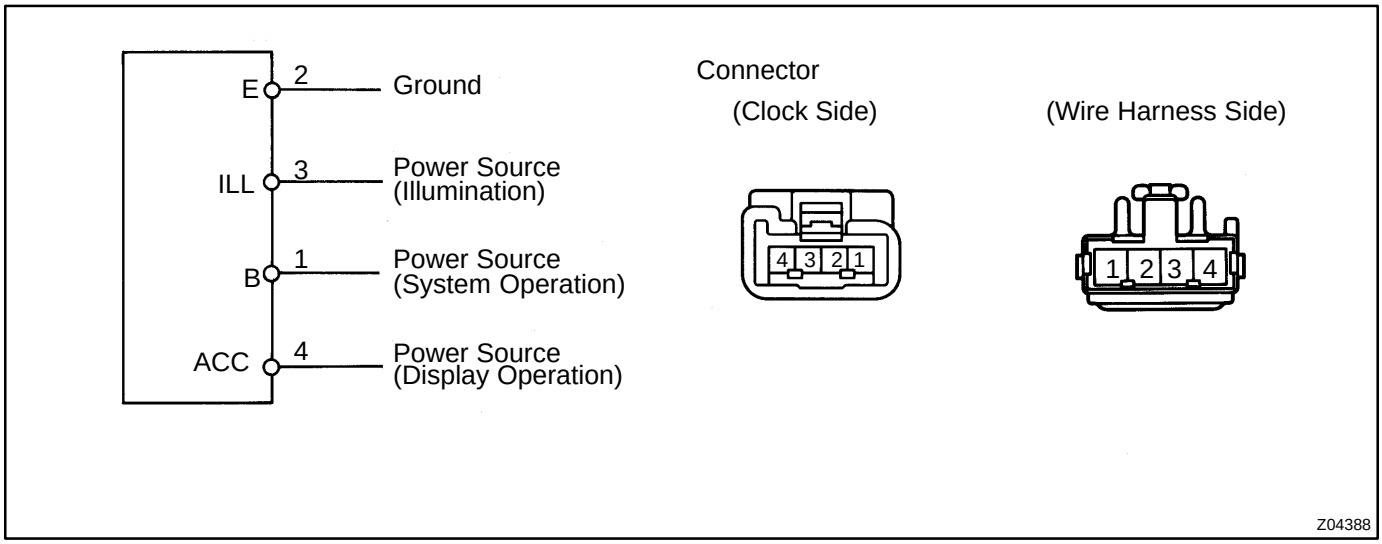
TROUBLESHOOTING

HINT:

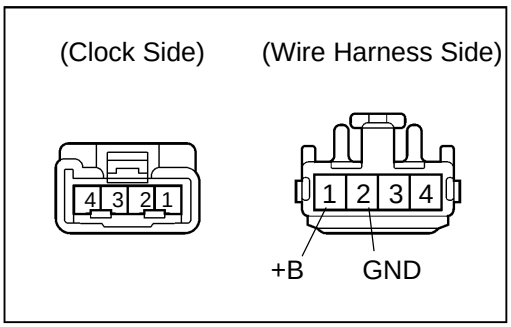
Troubleshoot the clock according to the table below.

Clock will not operate	1
Clock loses or gains time	2

± 1.5 seconds / day



1	CLOCK WILL NOT OPERATE



(a) Check that the battery positive voltage is 10 –14 V.

If voltage is not as specified, replace the battery.

(b) Check that the DOME fuse is not blown.

If the fuse is blown, replace the fuse and check for short circuit.

(c) Troubleshoot the clock as follows.

HINT:
Inspect the connector on the wire harness side.

Is there battery voltage between terminal +B and body ground?

No → Open or short circuit in wire harness between terminal +B and DOME fuse.

Yes

Does continuity exist between terminal GND and body ground?

No → Open circuit in wire harness between terminal GND and body ground.

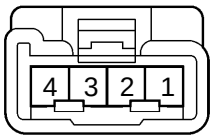
Yes

Replace clock.

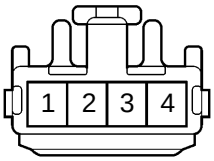
I01417

2	CLOCK LOSES OR GAINS TIME

(Clock Side)



(Wire Harness Side)



(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 sec.
If the error exceeds the allowable error, replace the clock.

(c) Check that the clock adjusting button is caught in position, and does not return.
If the button is not returned, repair or replace the clock.

(d) Troubleshoot the clock as follows.
HINT:
Inspect the connector on the wire harness side.

Is there 10 – 16 V between terminal +B and body ground?

Below 10V → Detect cause and repair, or recharge battery.

Yes ↓

Adjust or replace clock.

I01418

GARAGE DOOR OPENER SYSTEM

BE0TY–02

REGISTRATION PROCEDURE

1. NEW CODE REGISTRATION

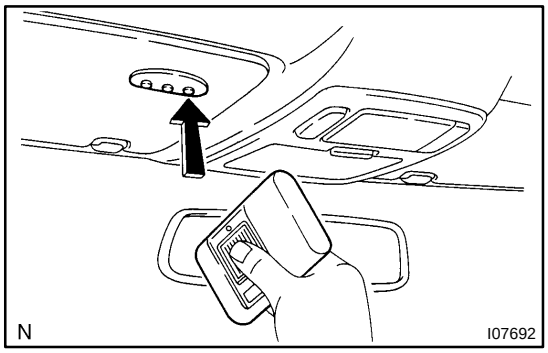
NOTICE:

- **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.

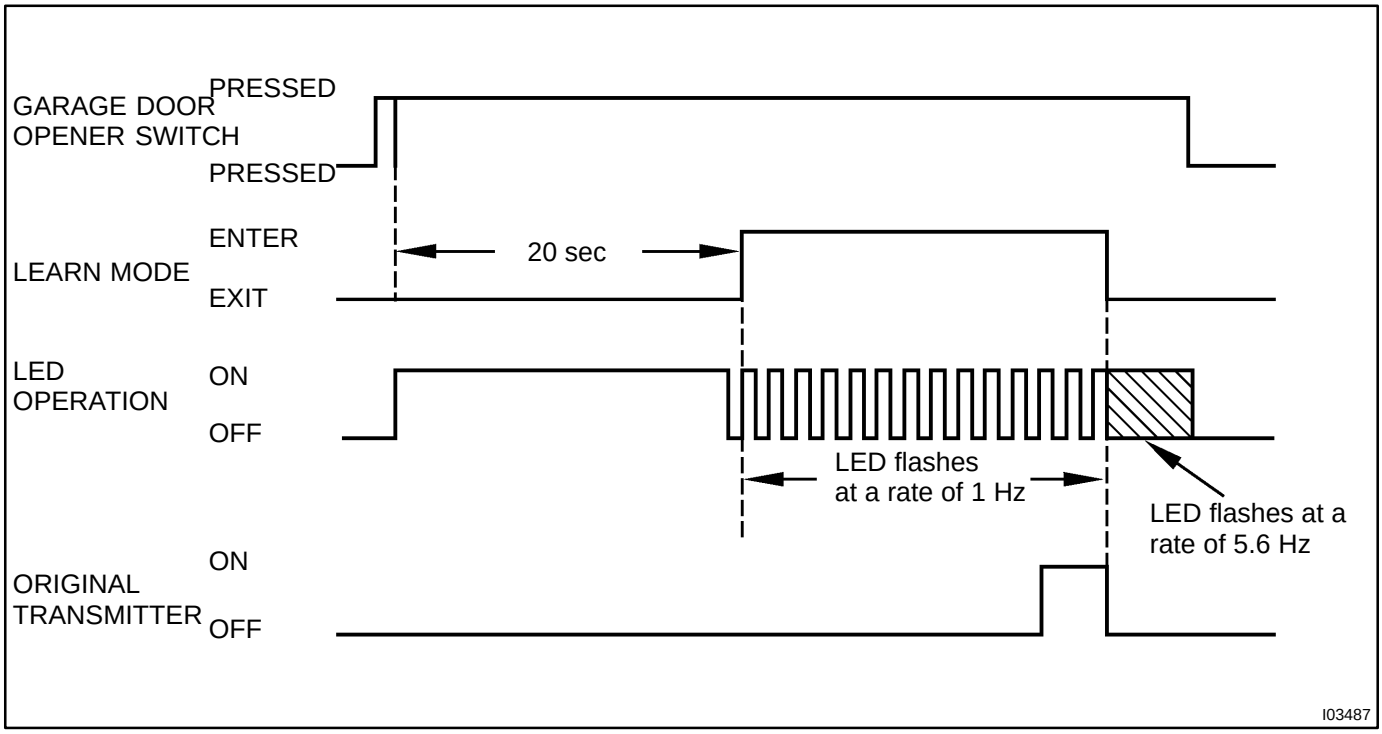


(b) In the condition of (a), bring the original transmitter to within 1–inch area around the garage door opener and press the switch. (code transmitting).

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:

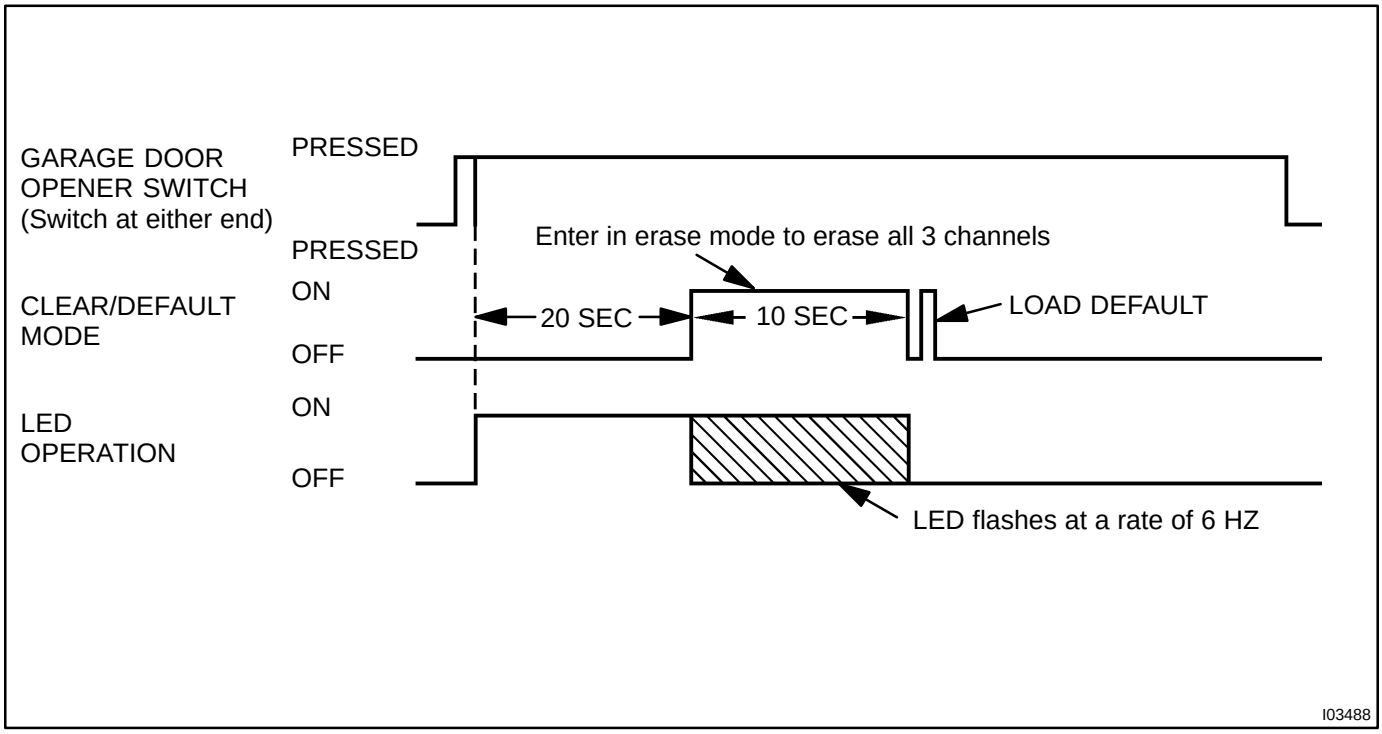
When transferring to deletion mode, LED (red) blinks in 6 Hz cycle.

(b) When releasing the switch within 10 seconds after transferring to deletion mode, all the registered codes will be erased.

HINT:

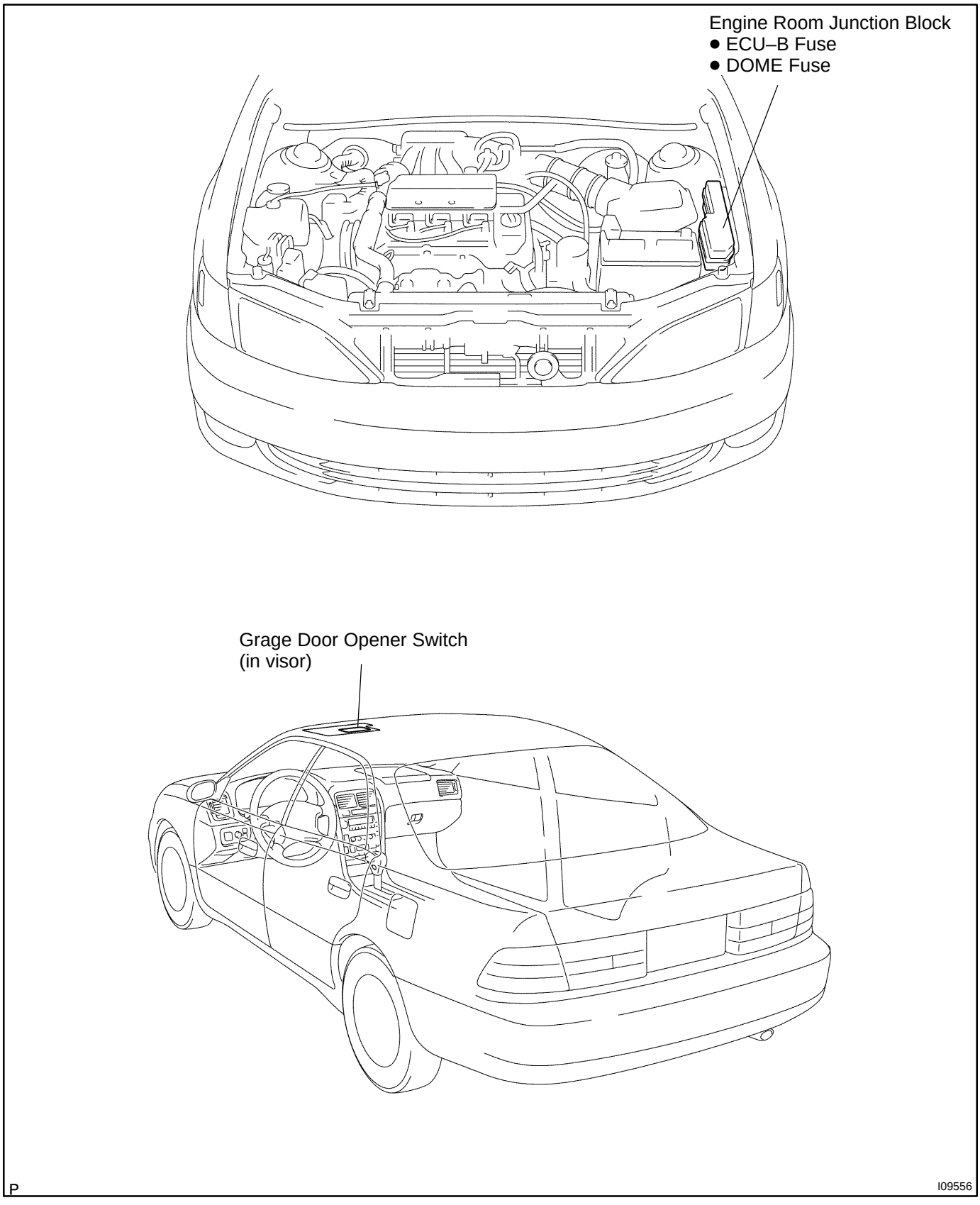
Press the switch until blinking in 6 Hz cycle stops, so that the default code for check is set.

Code deletion timing chart



BE0TZ–02

LOCATION



BE10Q–01

REMOVAL

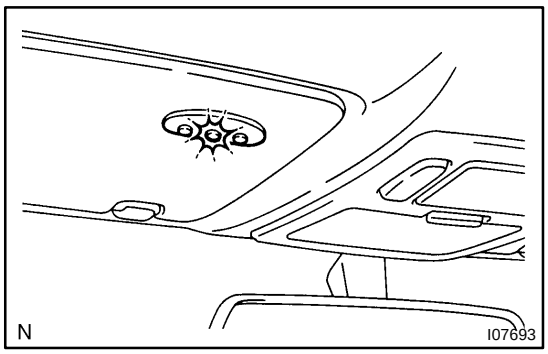
REMOVE LH SIDE SUN VISOR

(a) Remove the 2 screws.

(b) Disconnect the garage door opener switch connector.

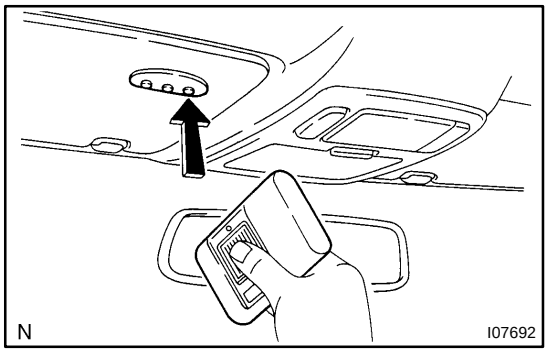
BE0U0–02

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.

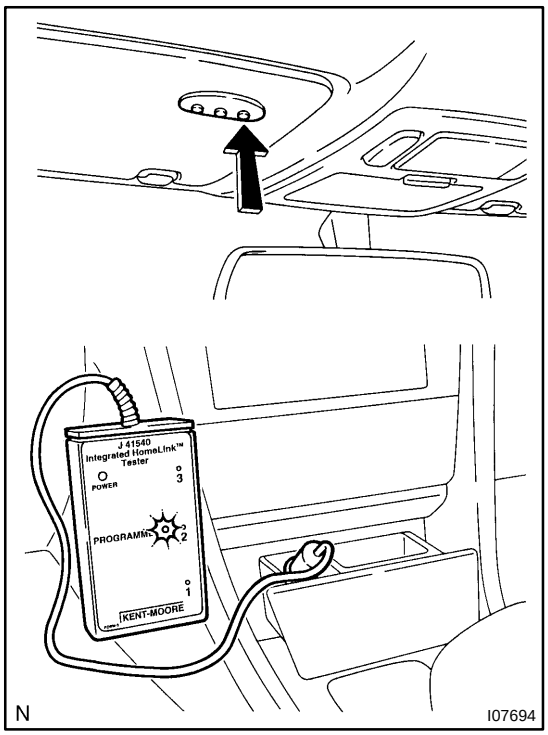


2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTING

HINT:
Use the home link tester made by KENT MOORE 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

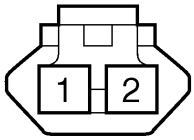
If the code can not be registered, replace garage door opener.



(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.

Wire Harness Side



I04287

3. INSPECT GARAGE DOOR OPENER SWITCH CIRCUIT

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

Tester connection	Condition	Specified condition
1 – Ground	Constant	Continuity
2 – Ground	Constant	Battery positive voltage

If the circuit is not as specified, inspect the power source or wire harness.

BE10R–01

INSTALLATION

INSTALL GARAGE DOOR OPENER SWITCH

(a) Connect the garage door opener switch connector.

(b) Install the 2 screws and the LH side sun visor.

ENGINE IMMOBILISER SYSTEM

REGISTRATION PROCEDURE

HINT:

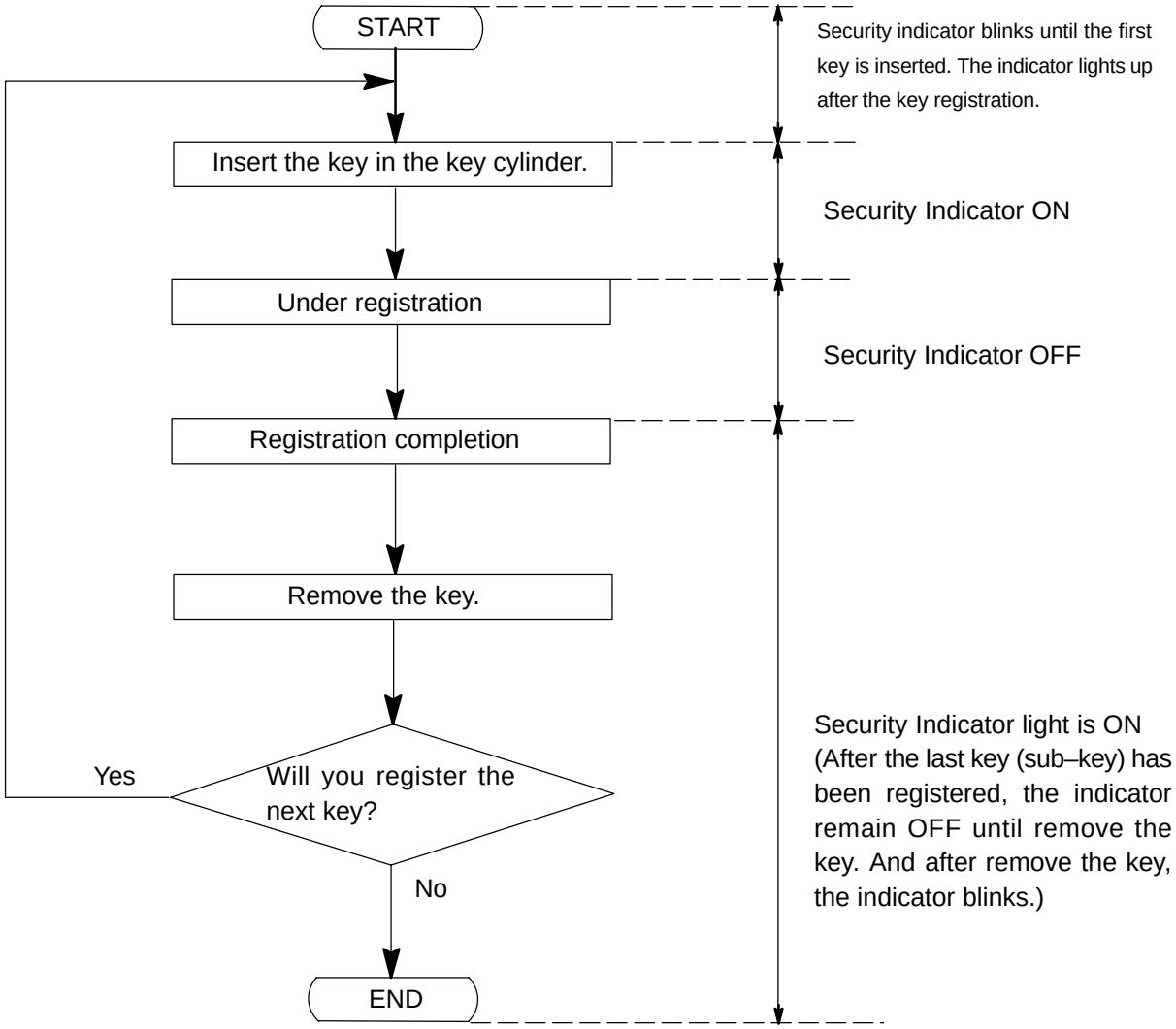
In case of having lost all the already registered master keys, you are not able to do additional registration or deletion. Change the ECM and then must register the new key codes according to the following registration procedure of the automatic registration mode.

1. KEY REGISTRATION IN AUTOMATIC REGISTRATION MODE

(a) Registration of a new transponder key.

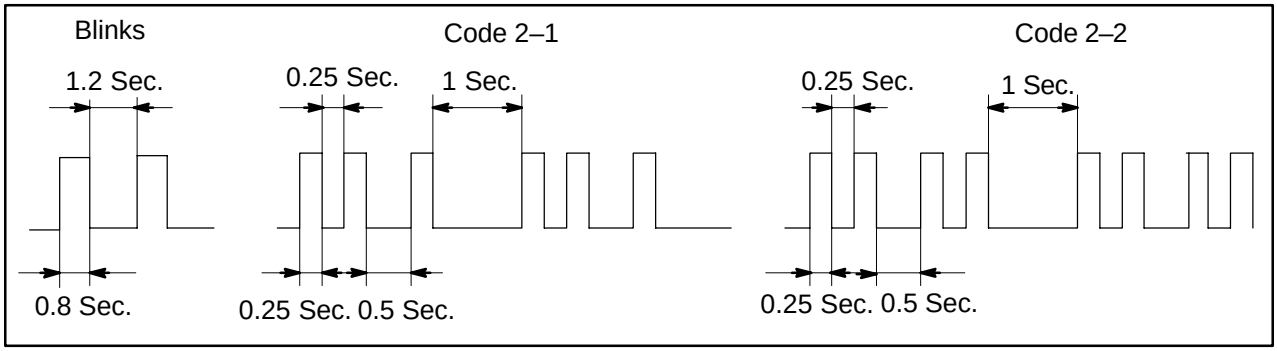
HINT:

- This must be done when you install a new ECM.
- The new ECM is on the automatic key code registration mode. The already fixed number of key codes for this ECM can be registered.
  On this type of vehicle, up to 3 key codes can be registered.
- In the automatic registration mode, the last key registered becomes sub–key.



HINT:

- When a key is not inserted in the key cylinder on the automatic registration mode, the security indicator always lights on.
- When the immobiliser system operates normally and the key is pull out, the security indicator blinks.
- When key code registration could not be performed on the automatic registration mode, code 2–1 is output from the security indicator and when inserting the already registered key, code 2–2 is output.



(b) Automatic registration mode completion

If completing the mode forcibly when more than 1 key code have been registered on the automatic registration mode, perform the following procedures.

After 1 more key code have been registered with master key, perform step (1) or (2) without pulling the key out or inserting the already registered key.

(1) Depress and release brake pedal 5 times or more within 15 sec.

(2) With the LEXUS hand–held tester, require automatic registration mode completion.

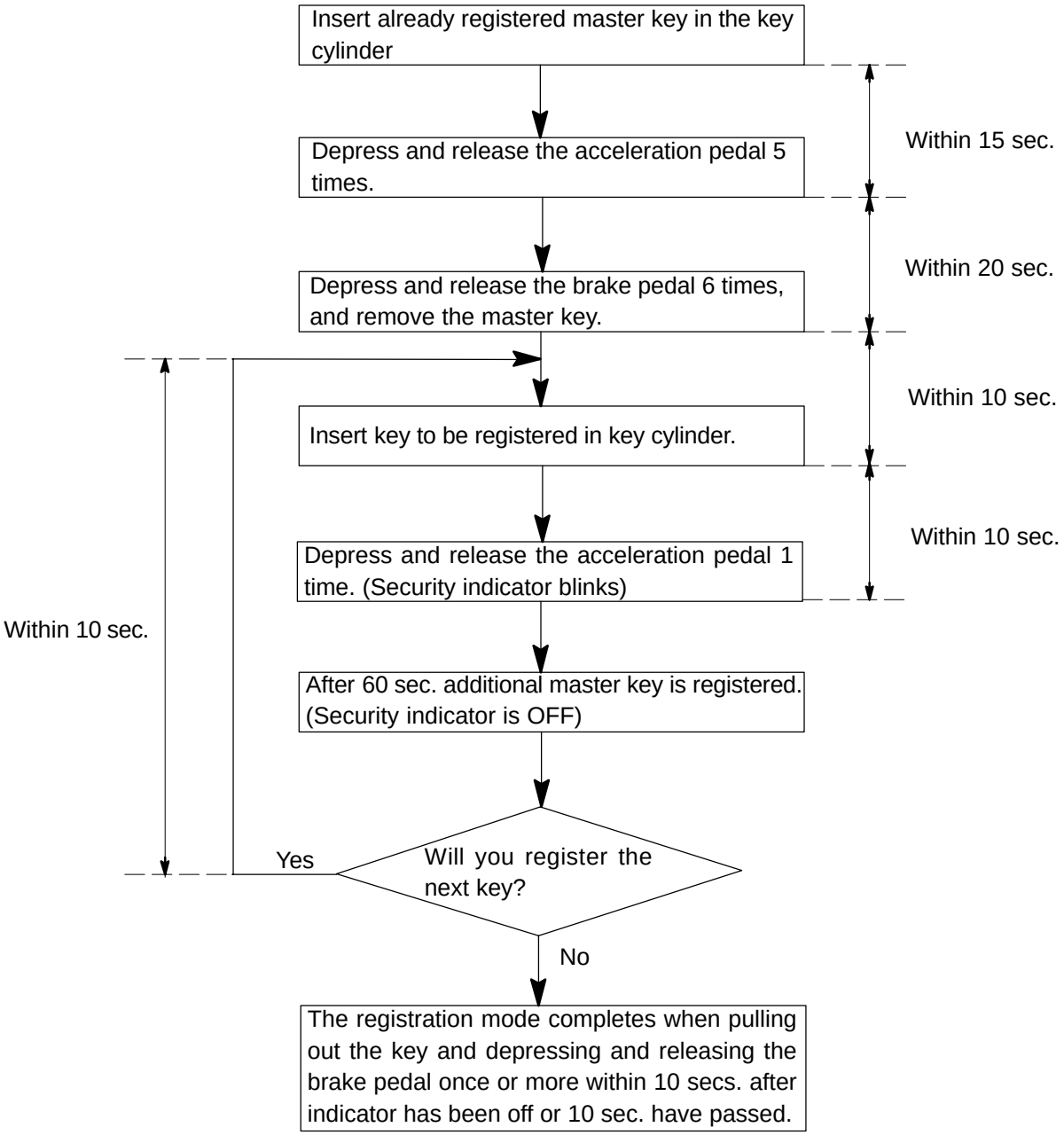
2. REGISTRATION OF ADDITIONAL MASTER KEY

There are 2 ways for registration of additional master key, one way is depressing brake pedal and acceleration pedal and the other way is using LEXUS hand–held tester.

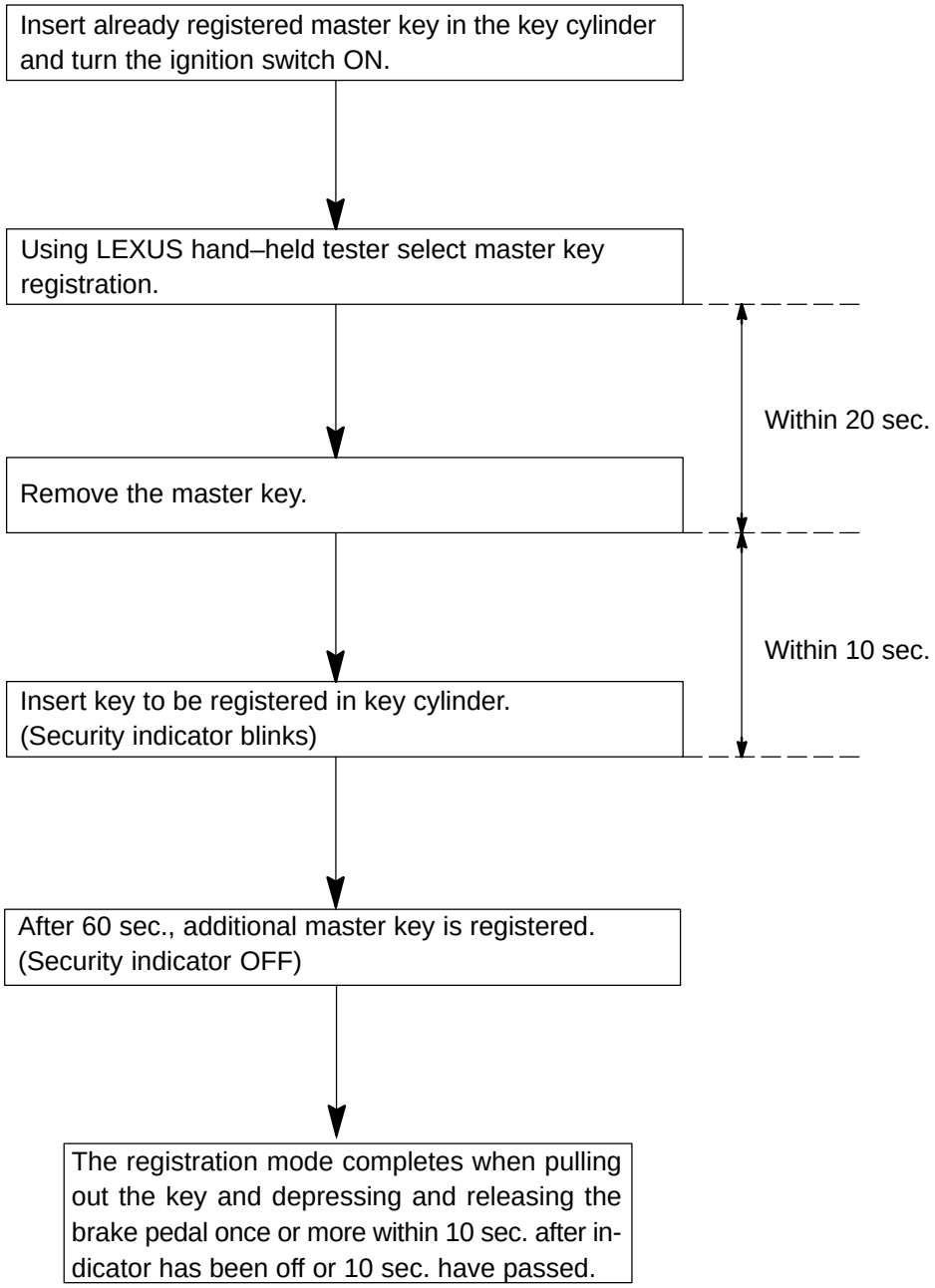
HINT:

- It is possible to register up to 7 master key codes including the already registered key code.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.
- When replacing ”Ignition Cylinder Key Set” or ”Lock Cylinder Set” and register according to the following 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, so erase registration of those key codes.

  (1) Depressing brake pedal and acceleration pedal:



(2) Using LEXUS hand–held tester:



HINT:
Please follow the screen of the LEXUS hand–held tester for more detailed procedure.

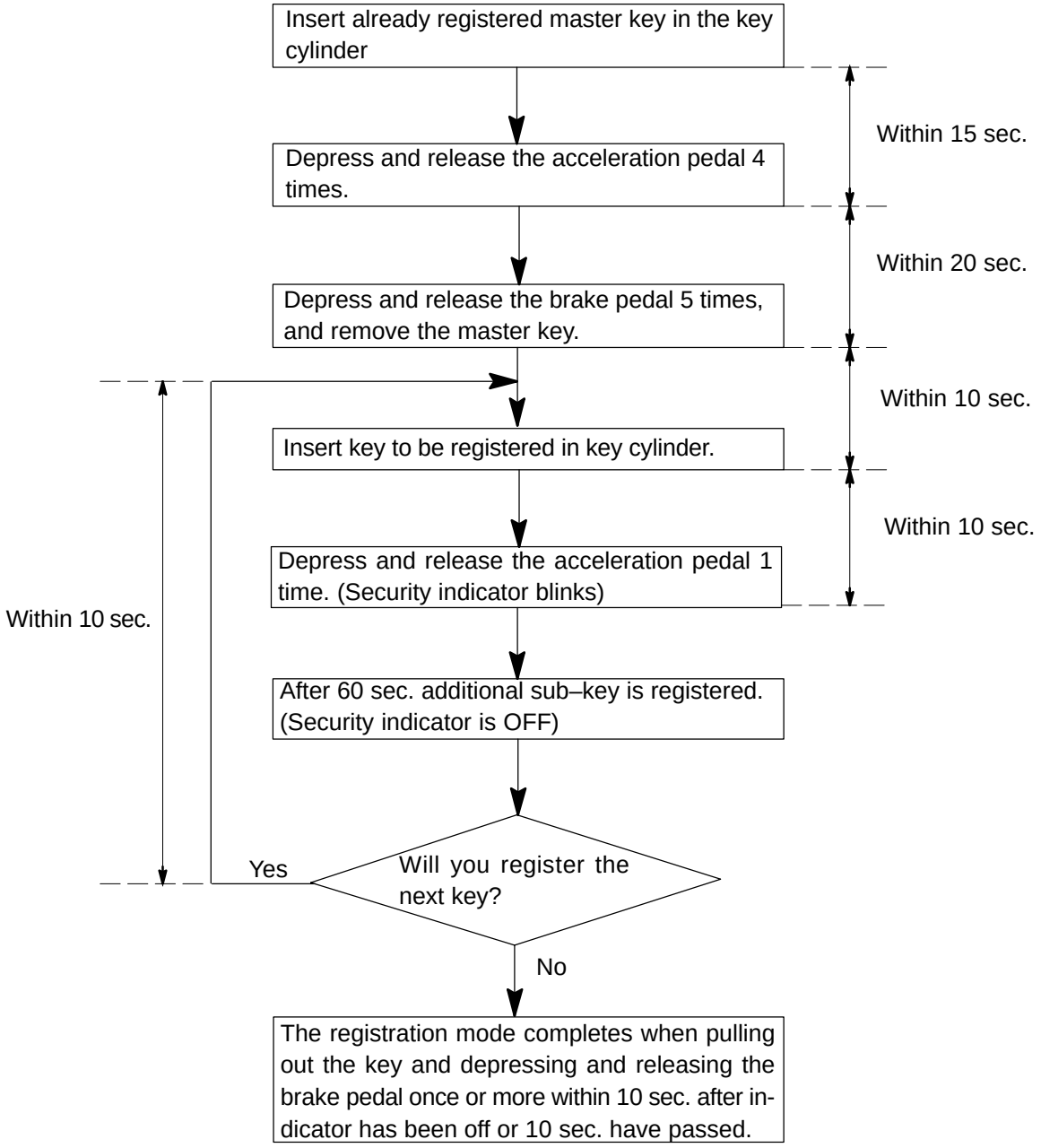
3. REGISTRATION OF ADDITIONAL SUB–KEY

There are 2 ways for registration of additional sub–key, one way is depressing brake pedal and acceleration pedal and the other way is using LEXUS hand–held tester.

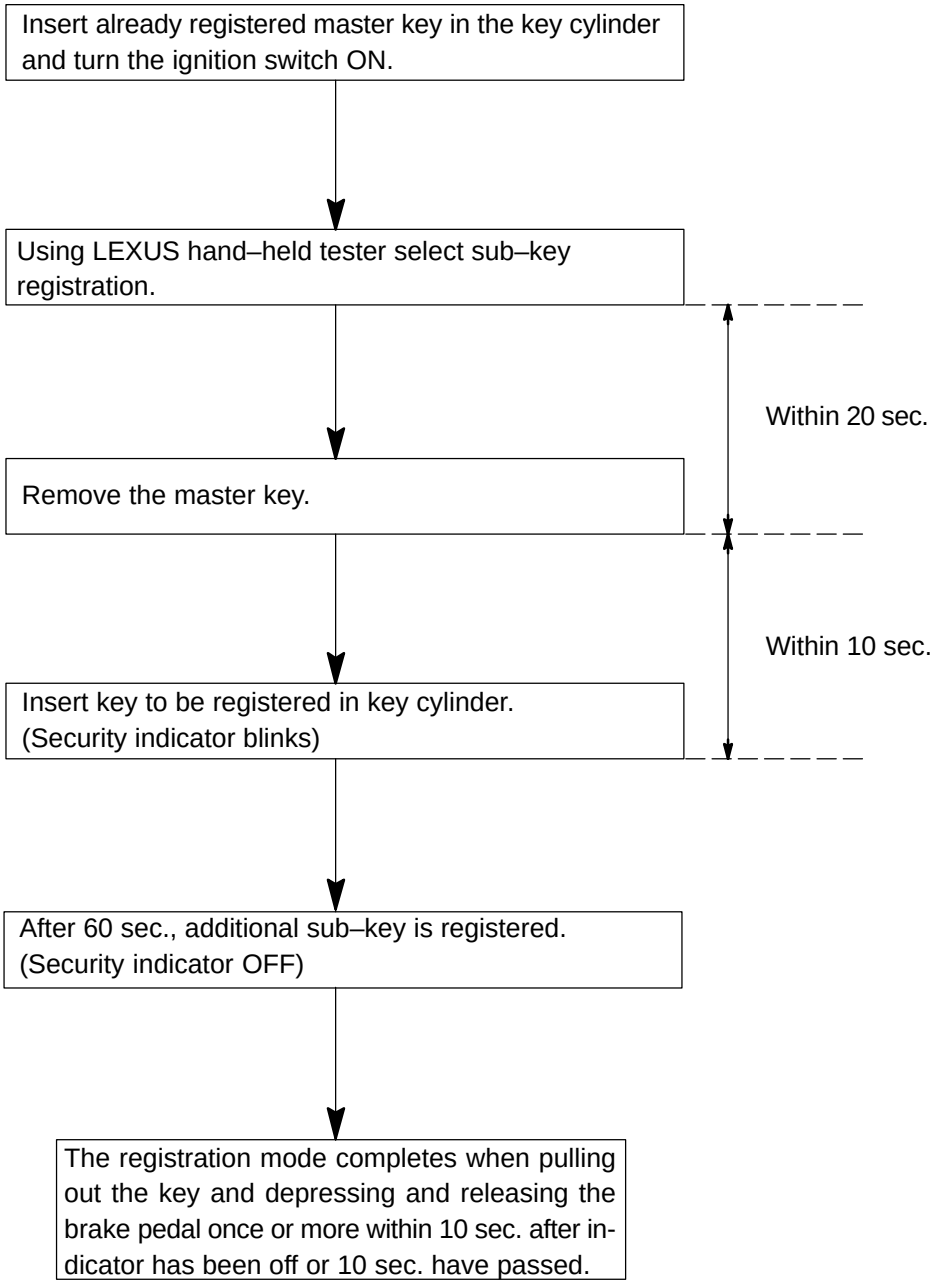
HINT:

- It is possible to register up to 3 sub–key codes including the already registered key code.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.

(1) Depressing brake pedal and acceleration pedal:



(2) Using LEXUS hand–held tester:



HINT:
Please follow the screen of the LEXUS hand–held tester for more detailed procedure.

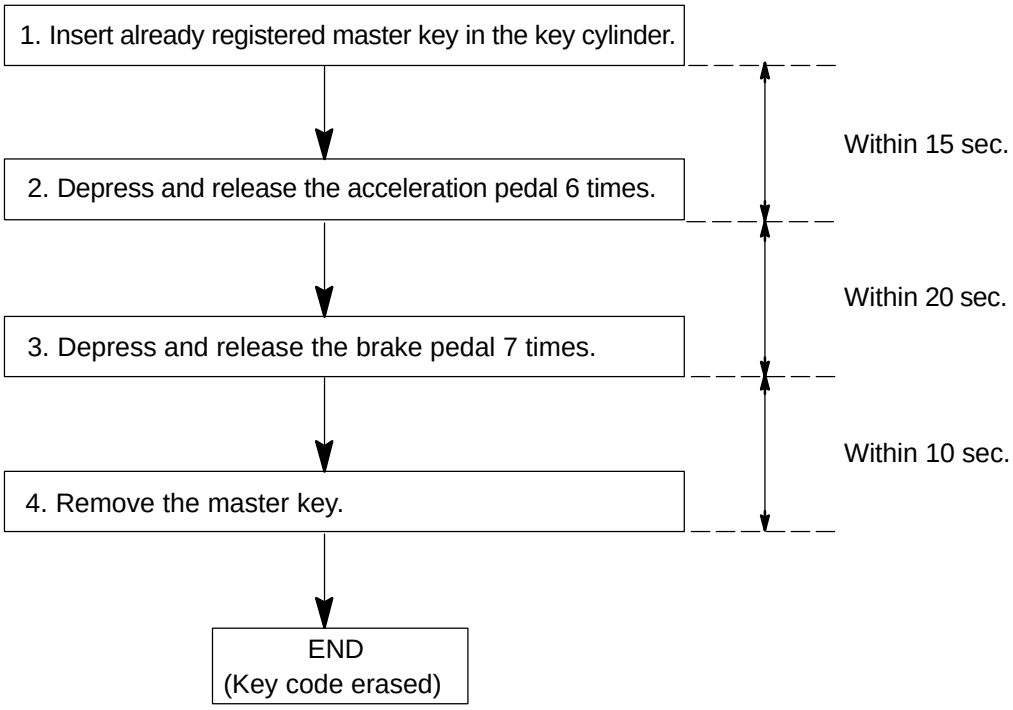
4. ERASURE OF TRANSPONDER KEY CODE

There are 2 ways for erasure of transponder key code, one way is depressing brake pedal and acceleration pedal and the other way is using LEXUS hand–held tester.

HINT:

- Delete all other master and sub–key codes leaving the master key code to use the operation. When using the key which was used before deletion, it is necessary to register the code again.
- When any operation time described below is over, registration mode completes.
- When the next procedure is performed while the timer is working, the timer completes counting time, then next timer starts.

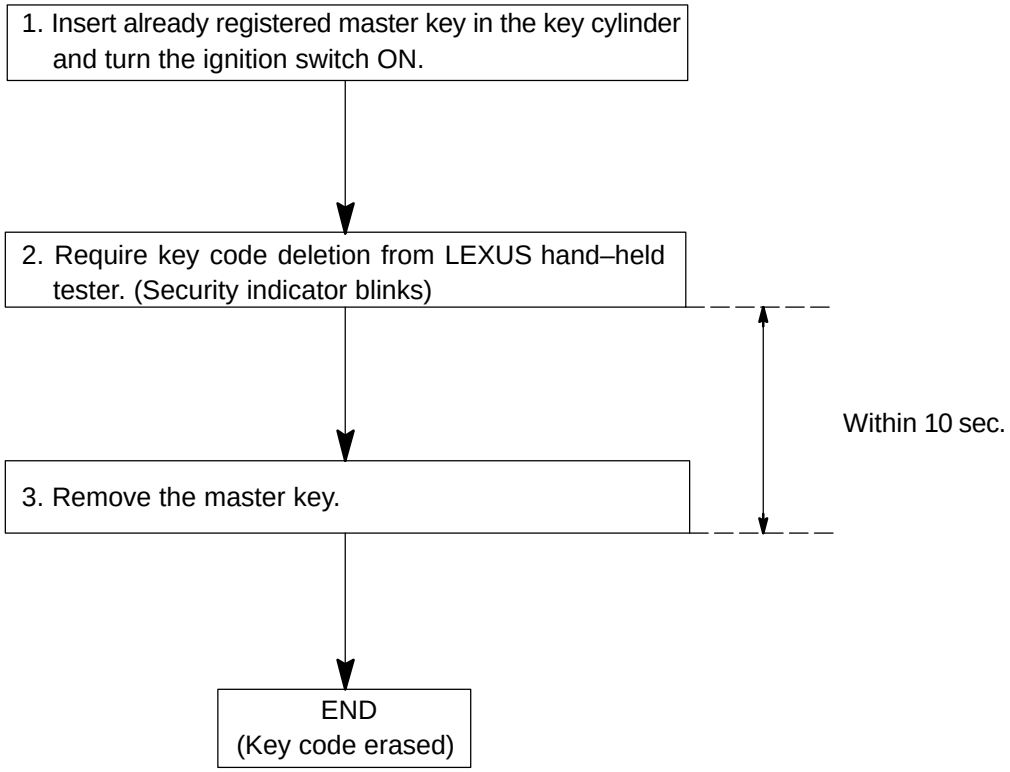
(1) Depressing brake pedal and acceleration pedal:



HINT:

When the key cannot be pulled out in the step 4, key code deletion is canceled.

(2) Using LEXUS hand–held tester:

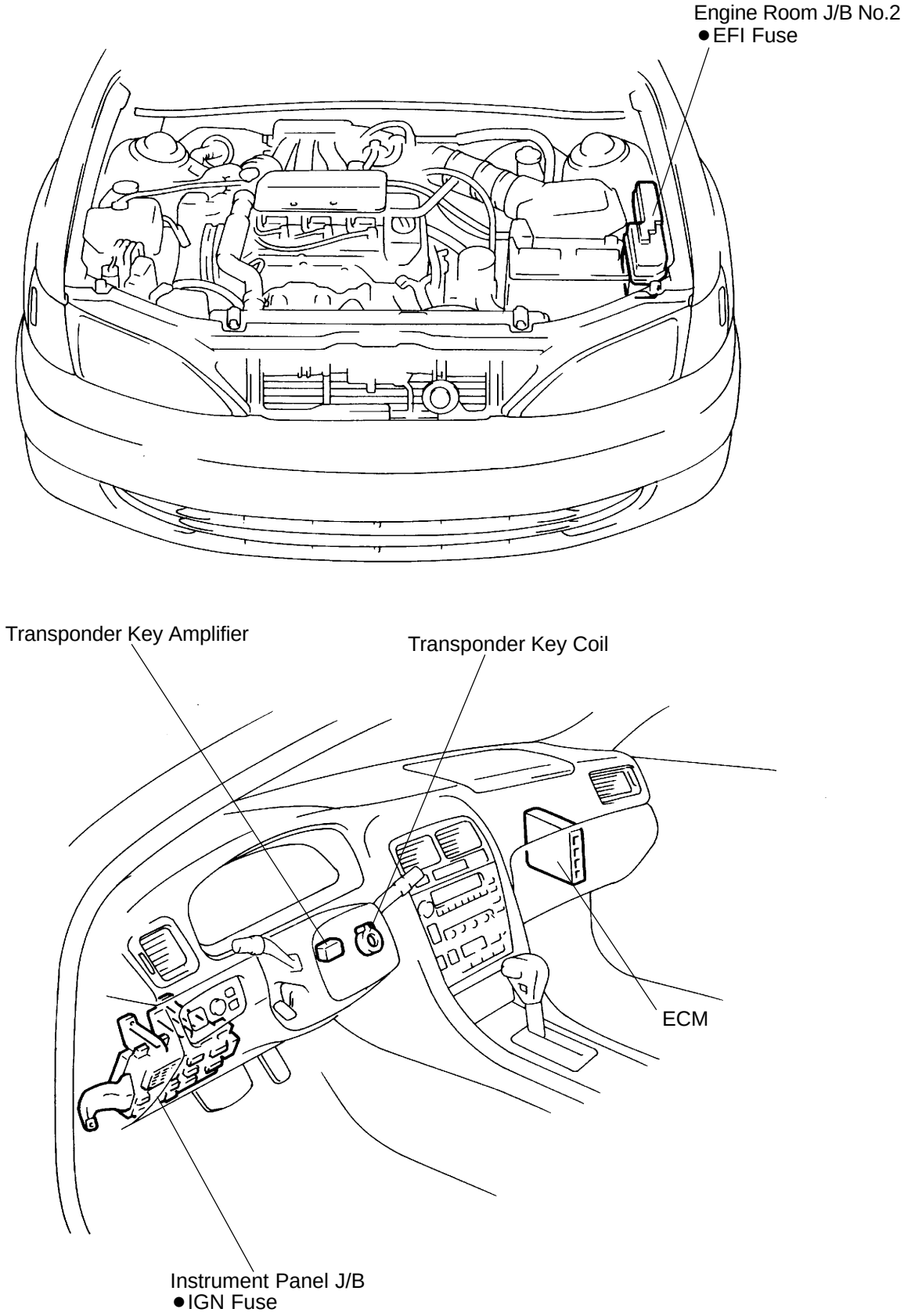


HINT:

- When the key cannot be pulled out in the step 3, key code deletion is canceled. (Security indicator is OFF.)
- Please follow the screen of the hand–held tester for more detailed procedure.

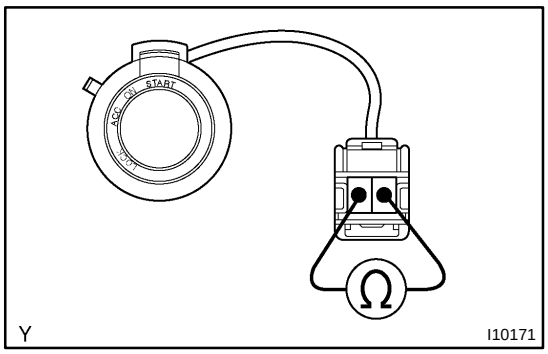
BE06A–03

LOCATION



I02683

BE06B–05



INSPECTION

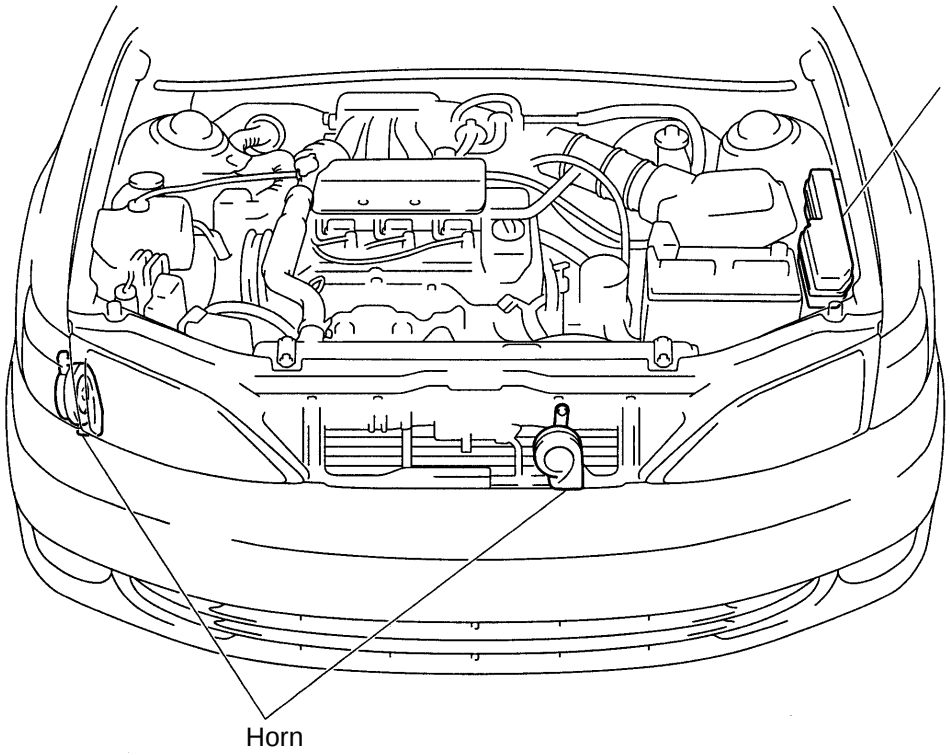
INSPECTION TRANSPONDER KEY COIL CONTINUITY

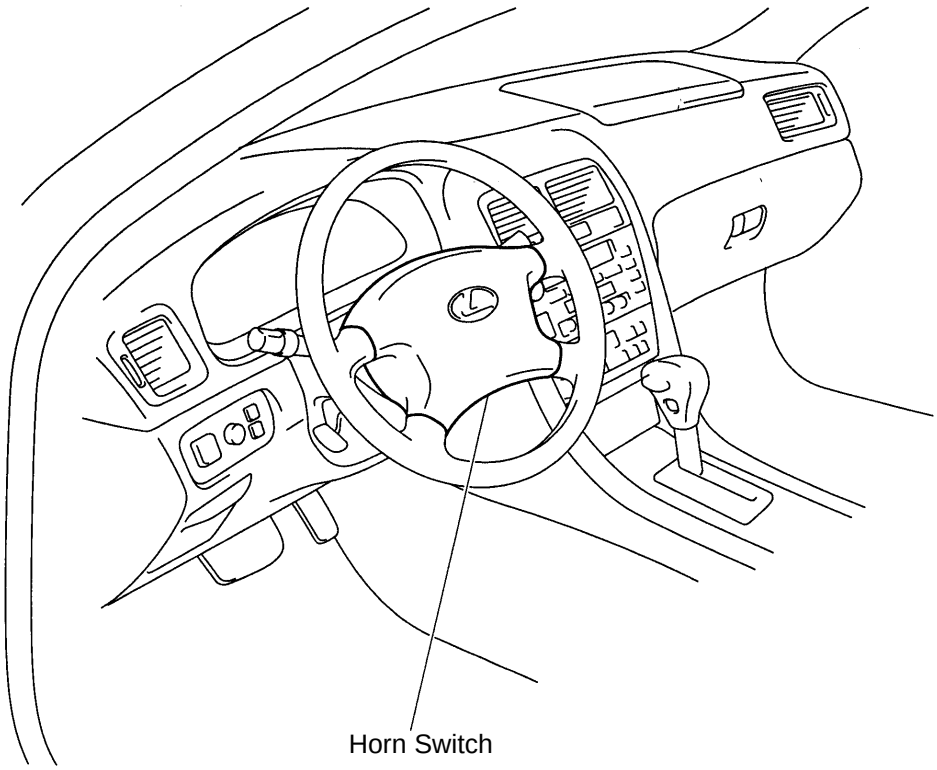
Check that there is continuity between terminal 1 and 2.
If continuity is not as specified, replace the coil.

HORN SYSTEM

LOCATION

BE067–02



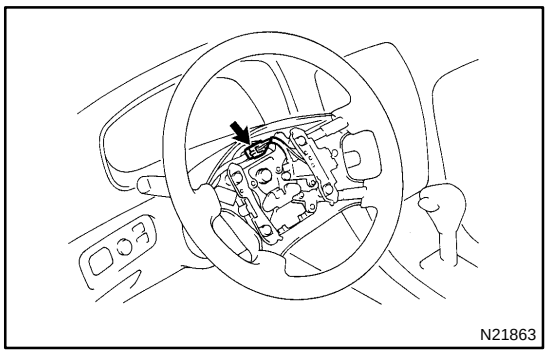


N21630
N21631

Z19485

BE10V–01

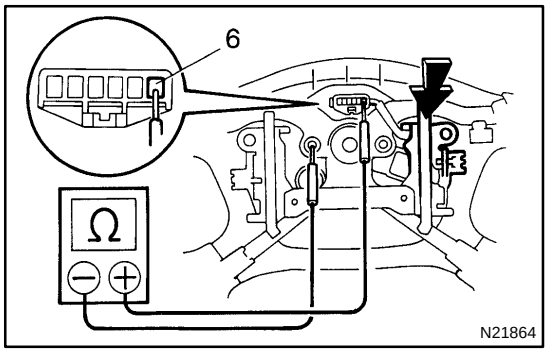
INSPECTION



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.

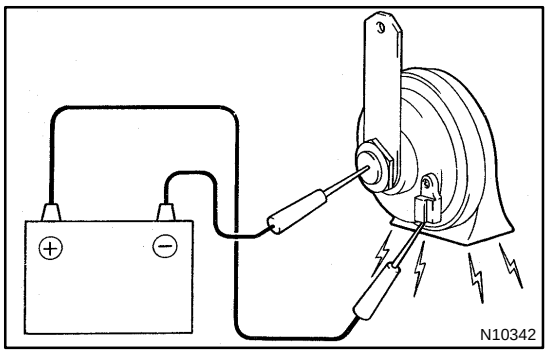
HINT:
Do not disconnect the connector from the horn pad.



(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.

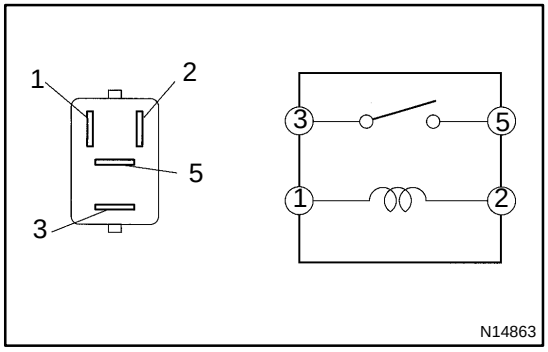
(h) Install the horn pad in place and using a torx socket wrench, torque the 2 bolts.
Torque: 7.1 N·m (72 kgf·cm, 62 in.·lbf)
(i) Install the left and right covers.
(j) Connect the negative (–) terminal to the battery.



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 HORN RELAY CONTINUITY

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

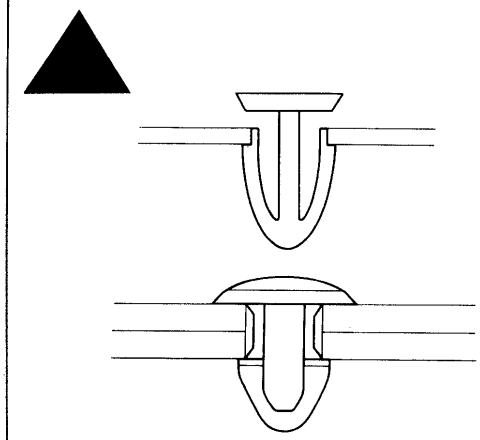
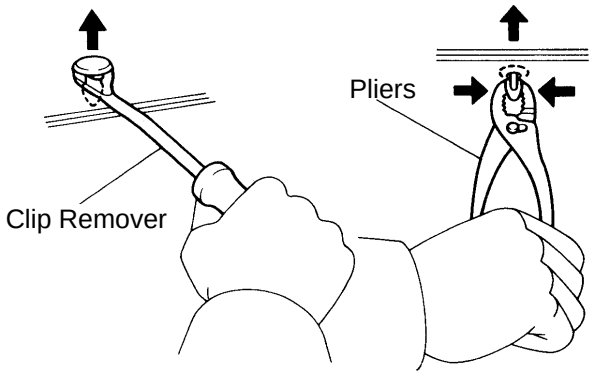
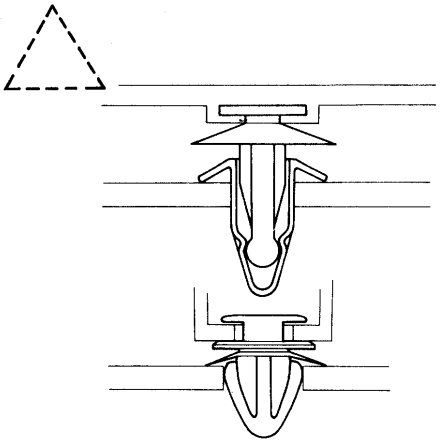
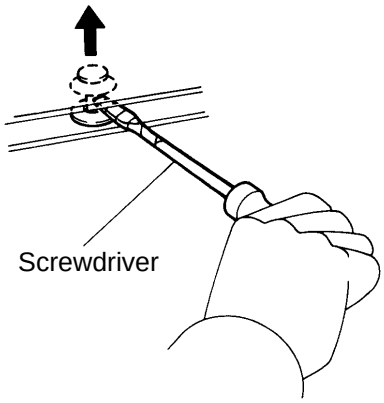
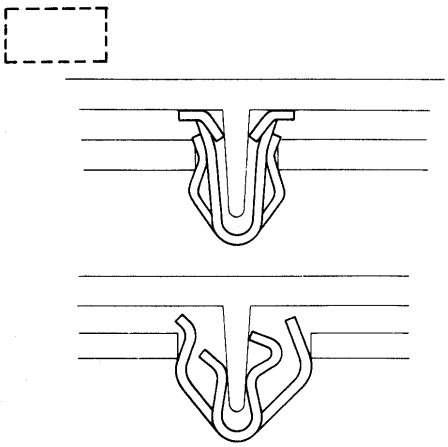
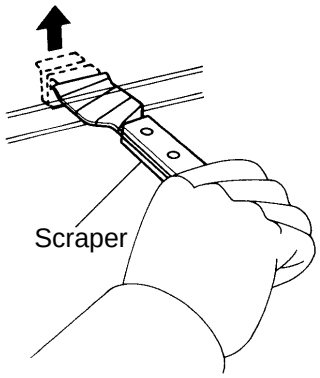
If continuity is not as specified, replace the relay.

CLIP

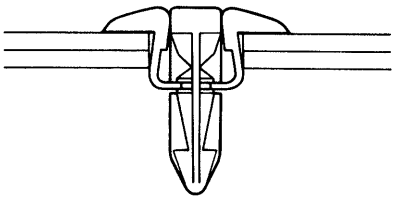
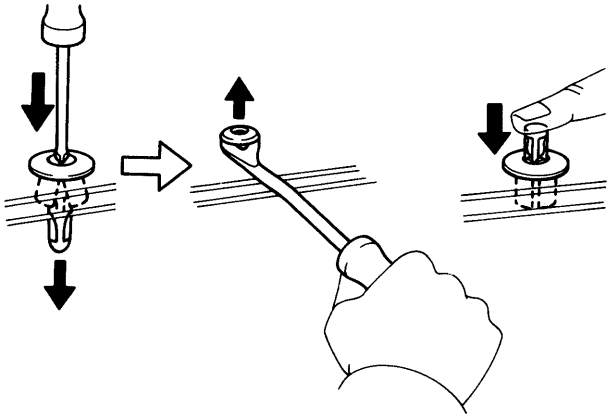
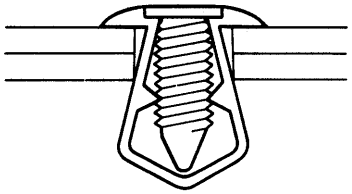
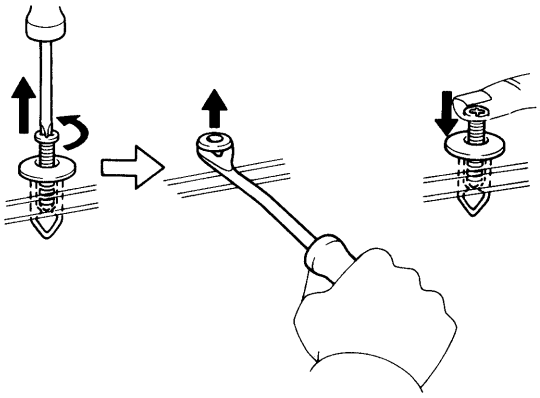
BO093–02

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

SRS AIRBAG

BO094–01

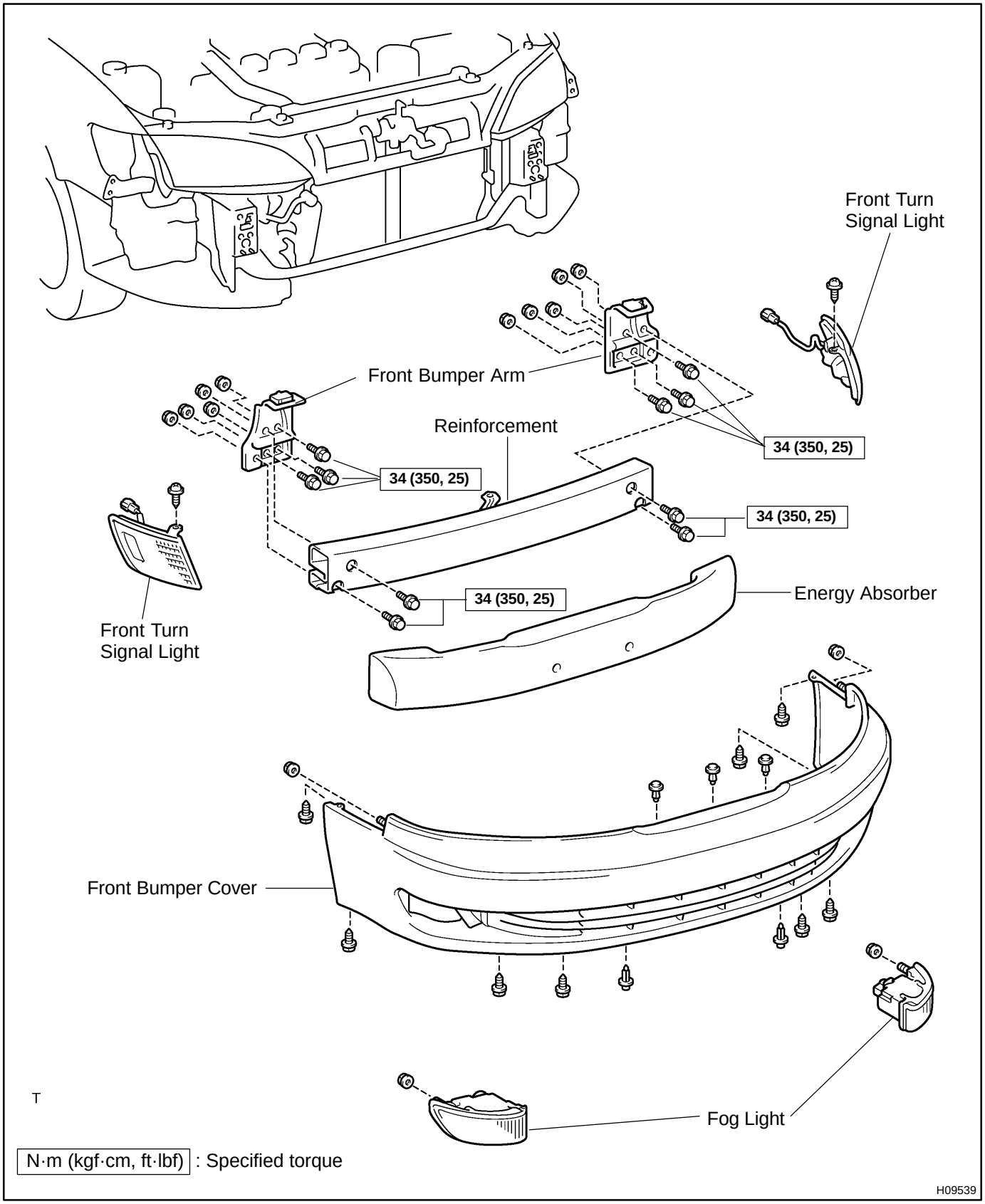
PRECAUTION

The LEXUS ES300 is equipped with an SRS (Supplemental Restraint System) such as the driver airbag, front passenger airbag, side airbag and seat belt pretensioner. 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.

FRONT BUMPER

BO095–03

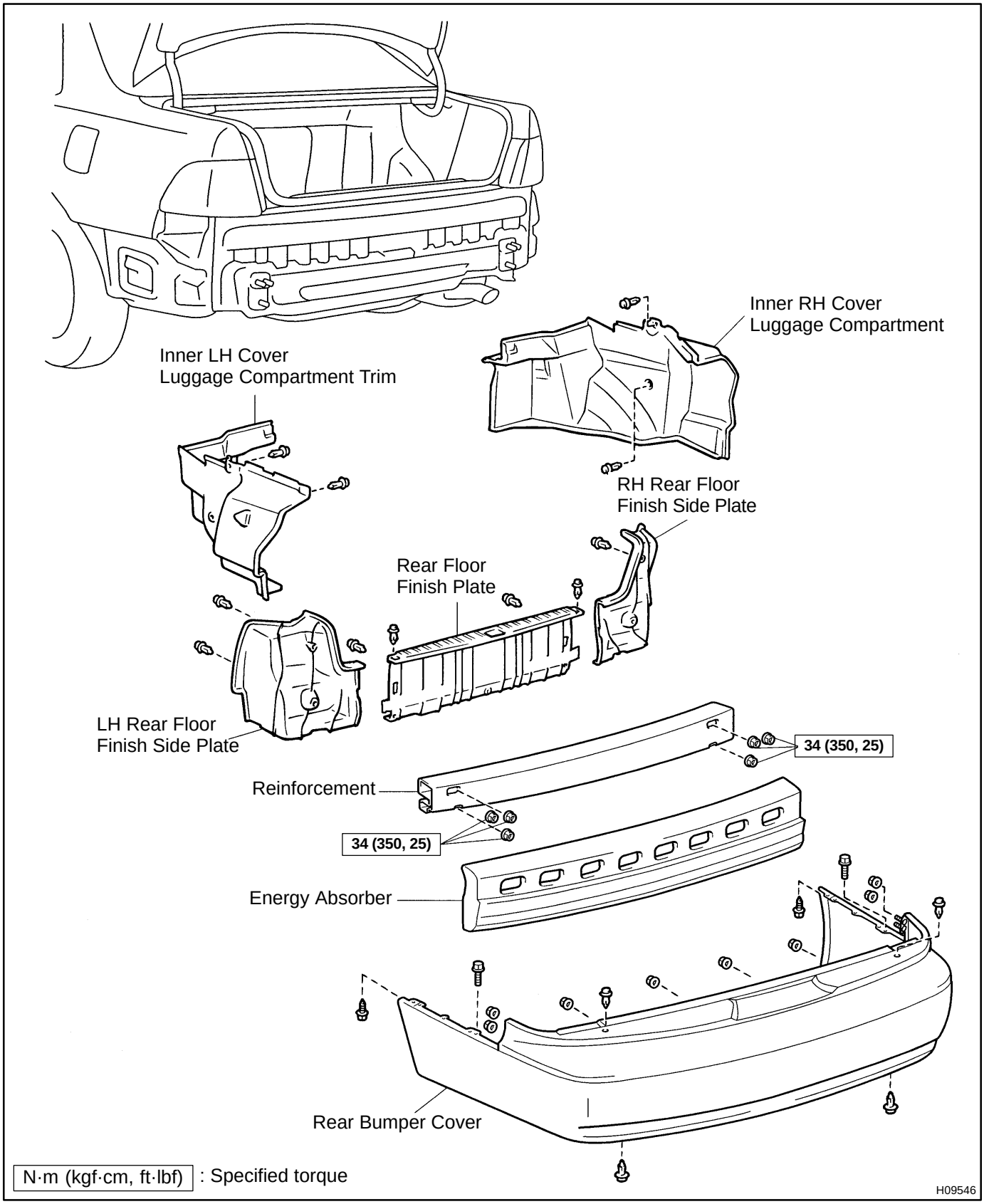
COMPONENTS



REAR BUMPER

BO096–02

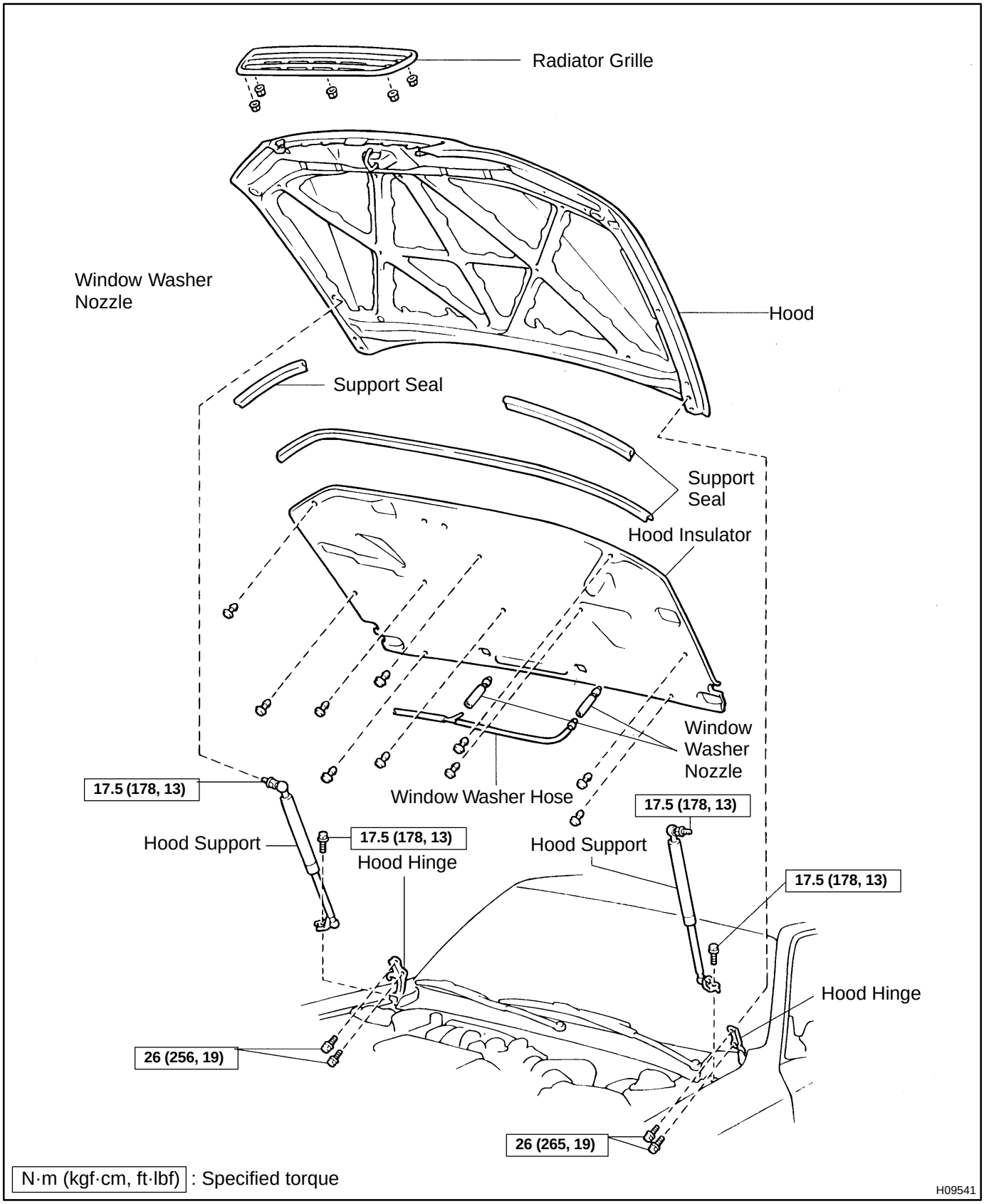
COMPONENTS



HOOD

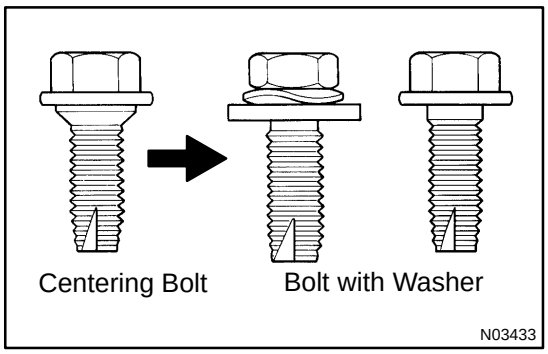
COMPONENTS

BO097–02



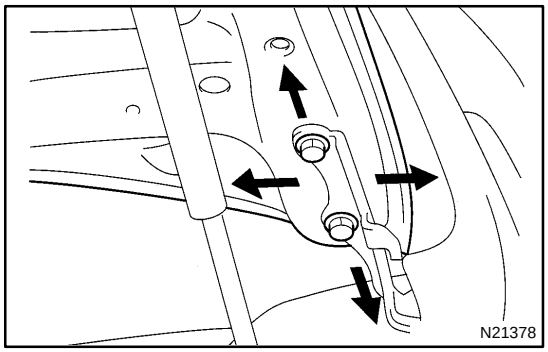
BO098–02

ADJUSTMENT



HINT:

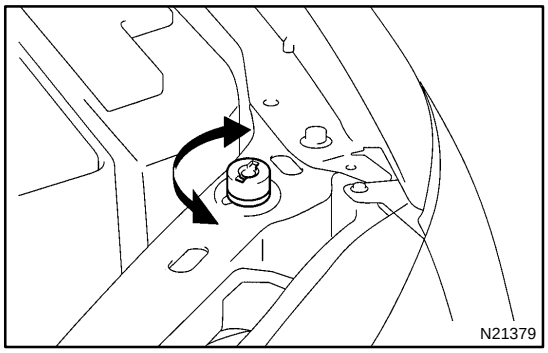
Since the centering bolt is used as the hood hinge and hood lock set bolt, the hood and hood lock cannot be adjusted with it on. Substitute a bolt with a washer for the centering bolt.



1. ADJUST HOOD IN FORWARD/REARWARD AND LEFT/RIGHT DIRECTIONS

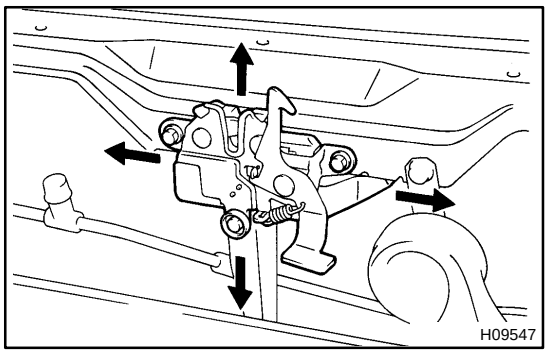
Adjust the hood by loosening the hood side hinge bolts.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



2. ADJUST FRONT EDGE OF HOOD IN VERTICAL DIRECTION

Adjust the hood by turning the cushions.



3. ADJUST HOOD LOCK

Adjust the hood lock by loosening bolts.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

HOOD SUPPORT

BO099–02

REPLACEMENT

1. REMOVE SUPPORT FROM HOOD

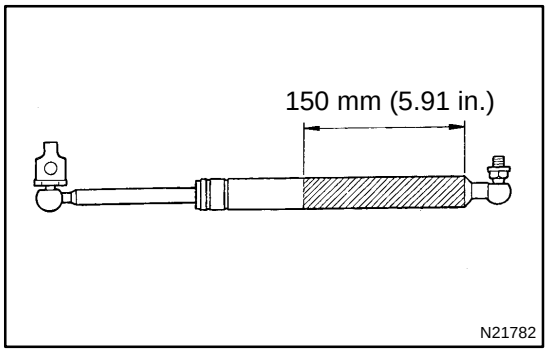
Remove the bolt and support from the hood.

HINT:

While supporting the hood by hand, remove the hood.

2. REMOVE SUPPORT FROM BODY

Remove the bolt and support.



3. IF NECESSARY, REPLACE HOOD SUPPORT

NOTICE:

Handling the hood support

- ★ **Do not disassemble the support because the cylinder is filled with pressurized gas.**
- ★ **If the 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 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 support fully extended.**

4. INSTALL HOOD SUPPORT

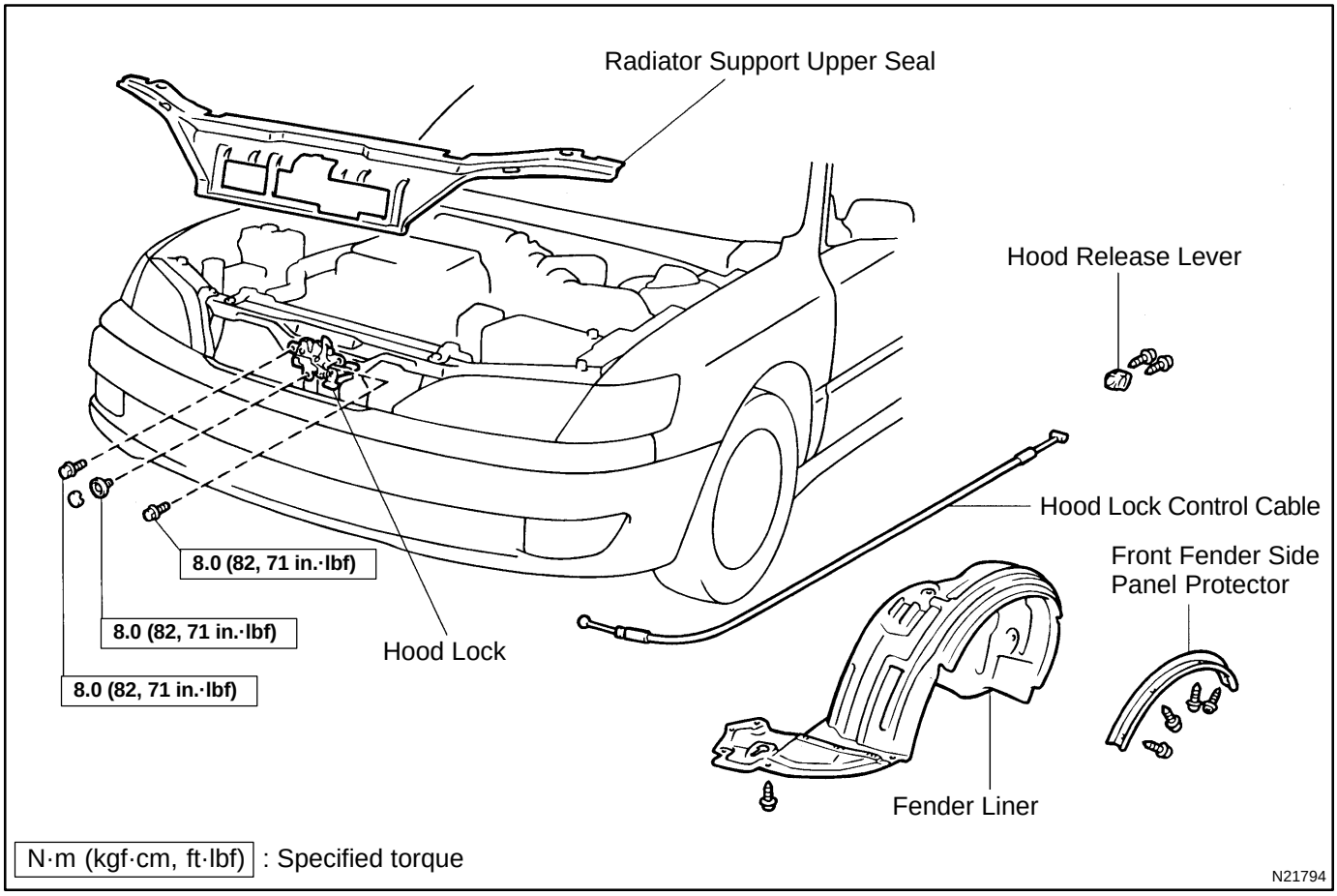
Install the hood support.

Torque: 17.5 N·m (178 kgf·cm, 13 ft·lbf)

HOOD LOCK CONTROL

COMPONENTS

BO09A–02



BO09B–02

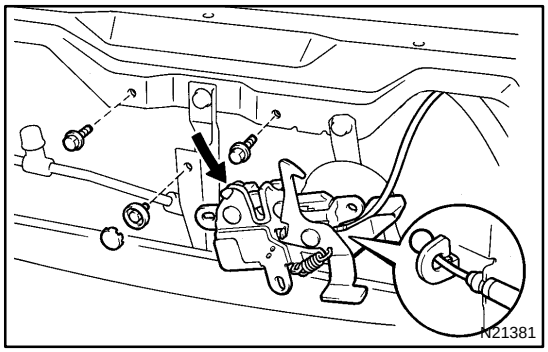
REMOVAL

1. REMOVE LH FRONT FENDER SIDE PANEL PROTECTOR

2. REMOVE LH FENDER LINER

3. REMOVE HOOD RELEASE LEVER

4. REMOVE RADIATOR SUPPORT UPPER SEAL



5. REMOVE HOOD LOCK

(a) Using a screwdriver, pry out the cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 3 bolts and hood lock.

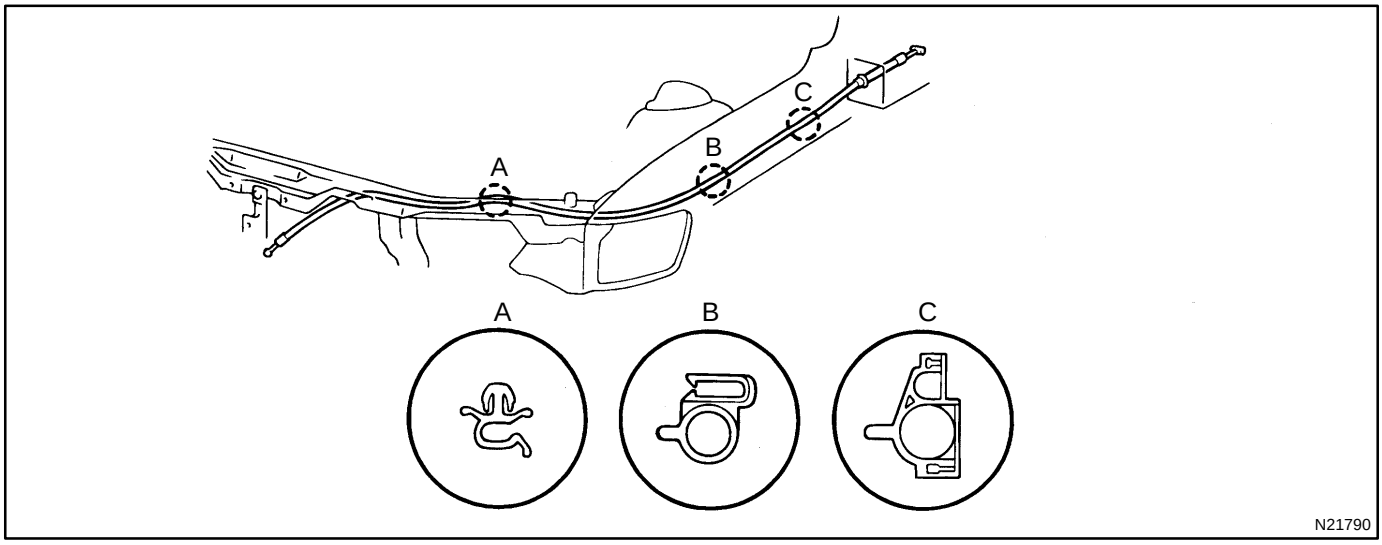
(c) Disconnect the link from the lock.

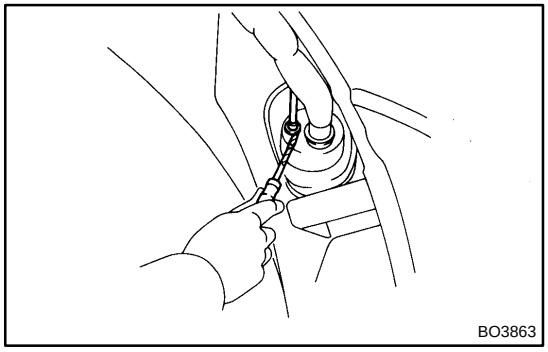
6. REMOVE HOOD LOCK CONTROL CABLE

(a) Using a screwdriver, disconnect the cable from the clamps.

HINT:

Tape the screwdriver tip before use.



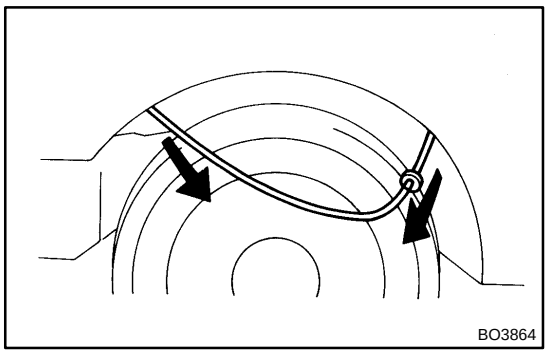


(b) Using a screwdriver, pry out the cable stopper from the grommet.

HINT:

★ Tape the screwdriver tip before use.

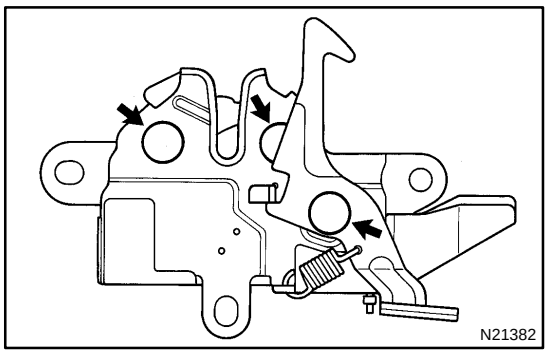
★ Do not damage the grommet with the screwdriver.



(c) Pull off the cable from the front wheel housing to remove it.

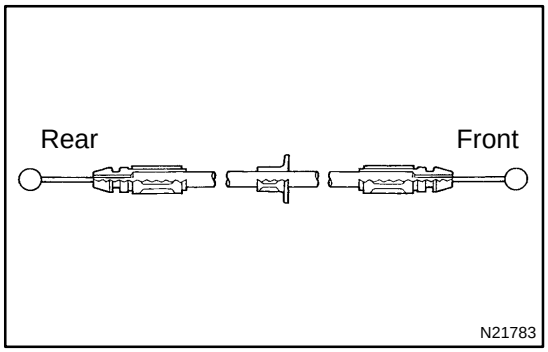
BO09C–02

INSTALLATION



1. BEFORE INSTALLING PARTS, COAT LOCK WITH MP GREASE

Apply MP grease to the sliding surface of the lock.



2. INSTALL HOOD LOCK CONTROL CABLE

(a) Push the rear side cable through the grommet.

(b) Using a screwdriver, push the cable stopper into the grommet.

HINT:

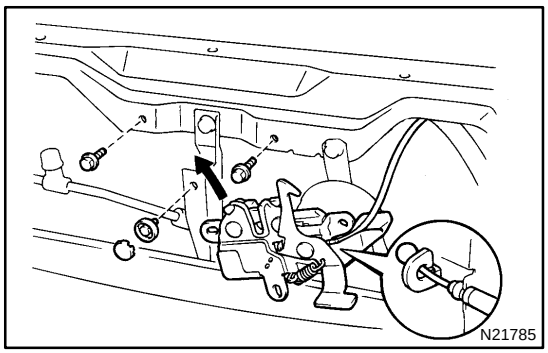
★ Tape the screwdriver tip before use.

★ Do not damage the grommet with the screwdriver.

(c) Pass the front side cable through the upper radiator support.

(d) Install the cable with clamps.

3. INSTALL HOOD RELEASE LEVER



4. CHECK HOOD LOCK CONTROL FOR PROPER OPERATION

After checking for proper operation, tighten the 3 bolts to install the lock.

Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

5. INSTALL RADIATOR SUPPORT UPPER SEAL

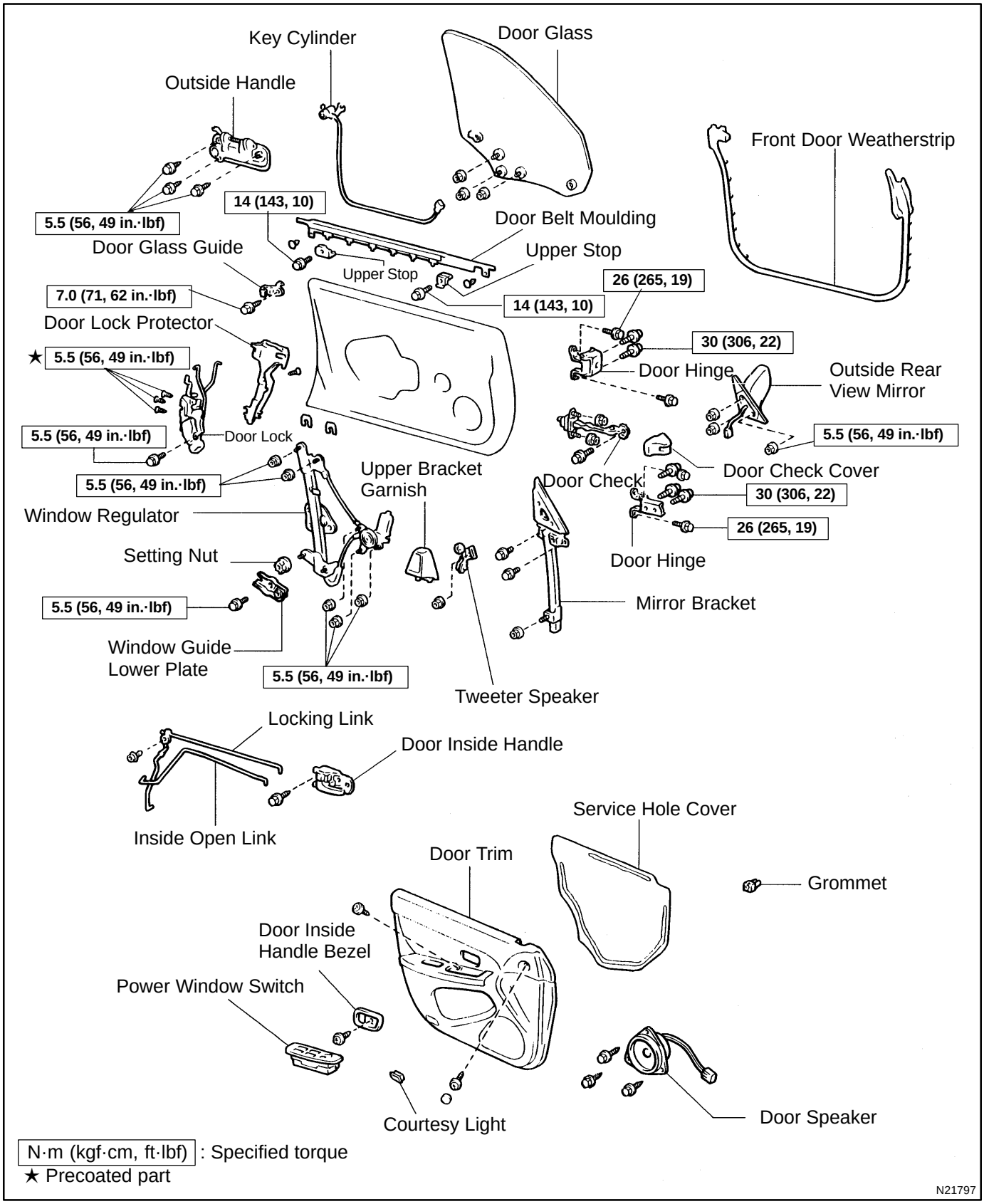
6. INSTALL LH FENDER LINER

7. INSTALL LH FRONT FENDER SIDE PANEL PROTECTOR

FRONT DOOR

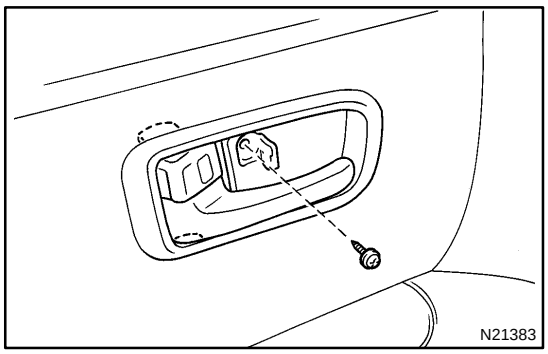
COMPONENTS

BO09D–02



BO09E–02

DISASSEMBLY



1. REMOVE DOOR INSIDE HANDLE BEZEL

(a) Open the cap, then remove the screw.

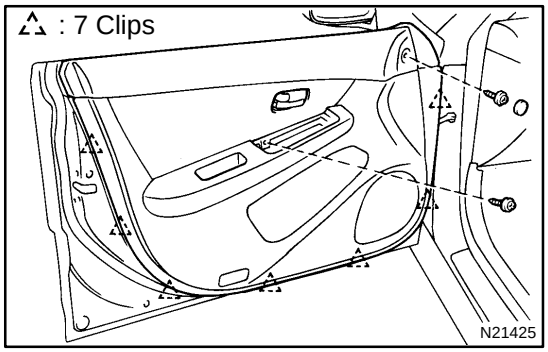
(b) Using a screwdriver, remove the inside handle bezel.

HINT:

Tape the screwdriver tip before use.

2. REMOVE UPPER BRACKET GARNISH

3. REMOVE POWER WINDOW SWITCH



4. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the screw cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws.

(c) Insert a screwdriver between the door panel and door trim to pry the trim out.

HINT:

Tape the screwdriver tip before use.

(d) Pull the trim upward to remove it, then disconnect the courtesy light connector.

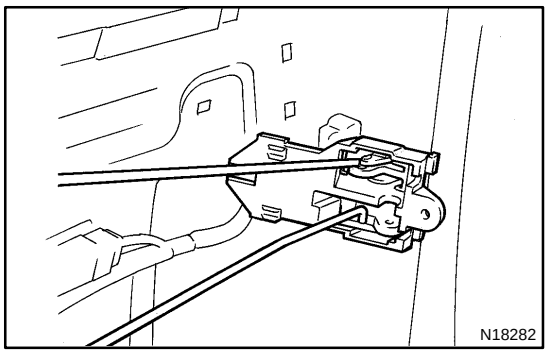
(e) Remove the courtesy light from the door trim.

5. REMOVE TWEETER SPEAKER

6. REMOVE OUTSIDE REAR VIEW MIRROR

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

7. REMOVE FRONT DOOR WEATHERSTRIP



8. REMOVE DOOR INSIDE HANDLE

(a) Remove the screw.

(b) Disconnect the 2 control links from the inside handle as shown in the illustration.

9. REMOVE SERVICE HOLE COVER

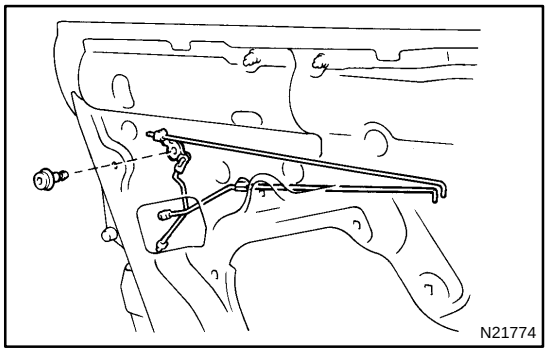
Remove the grommet and service hole cover.

HINT:

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

Bring out the links through the service hole cover.

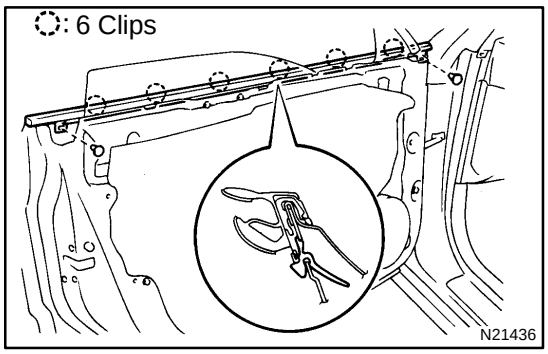
10. REMOVE SPEAKER



11. DISCONNECT INSIDE OPEN LINK AND LOCKING LINK

(a) Using a clip remover, remove the clip.

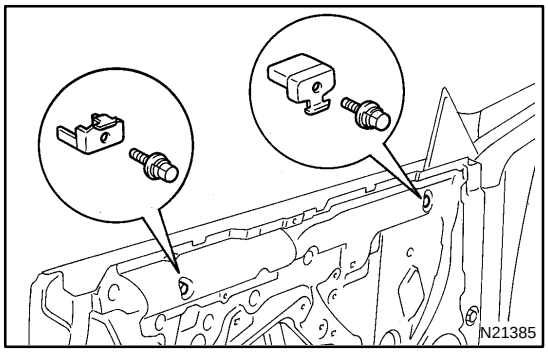
(b) Disconnect the 2 links from the door lock, then remove the 2 links.



12. REMOVE DOOR BELT MOULDING

(a) Remove the 2 clips from the front and rear edge of the moulding shown in the illustration.

(b) Pry out the clips from the edge of moulding and remove the moulding.



13. REMOVE UPPER STOP

Remove the 2 bolts and 2 upper stops as shown in the illustration.

Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)

14. REMOVE DOOR GLASS

(a) Open the door glass until the bolts appear in the service hole.

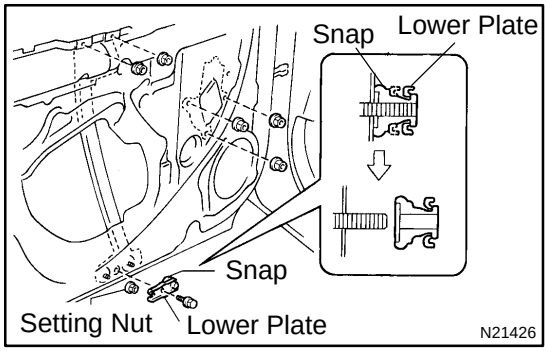
(b) Remove the 3 nuts.

(c) Pull the door glass out of the panel carefully.

HINT:

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

Insert a shop rag inside the panel to prevent scratching the glass.



15. REMOVE WINDOW REGULATOR

(a) Disconnect the connector.

(b) Remove the bolt of lower plate.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

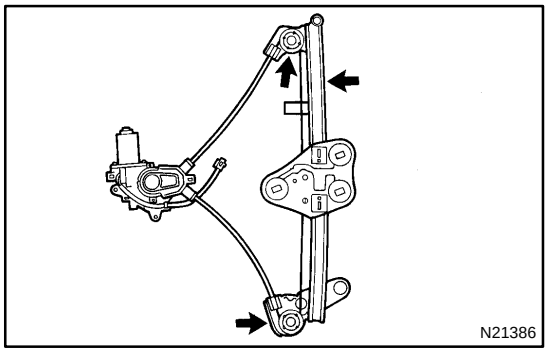
(c) Unlock the snap by pulling the lower plate.

(d) Remove the snap and lower plate from the stud bolt of lower bracket.

(e) Remove the setting nut from the lower plate.

(f) Remove the 5 nuts and window regulator.

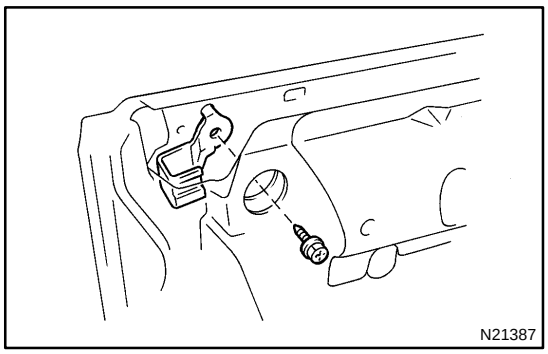
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



HINT:

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

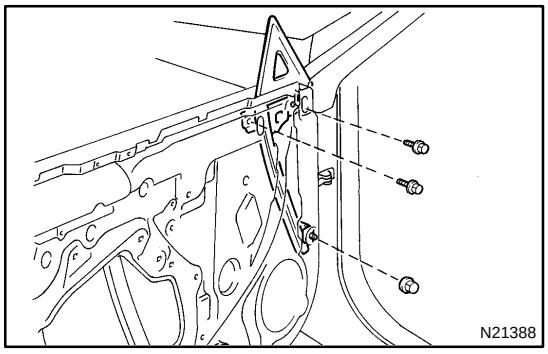
Apply MP grease to the glass guide and rollers of window regulator.



16. REMOVE DOOR GLASS GUIDE

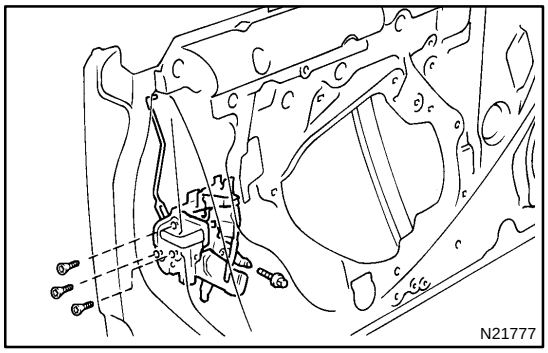
Remove the bolt and guide.

Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)



17. REMOVE MIRROR BRACKET

Remove the 2 bolts, nut and bracket.



18. REMOVE DOOR LOCK

(a) Disconnect the 2 links from the outside handle and key cylinder.

(b) Disconnect the connector.

(c) Remove the bolt.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(d) Remove the 3 screws and door lock.

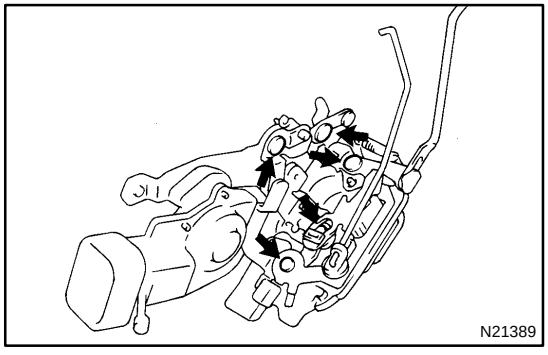
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

HINT:

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

Apply adhesive to the 3 screws.

Part No.08833–00070, THREE BOND 1324 or equivalent



HINT:

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

Apply MP grease to the sliding and rotating parts of the door lock.

19. REMOVE OUTSIDE HANDLE

(a) Disconnect the connector.

(b) Remove the 2 bolts and handle.

Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

(c) Remove the key cylinder from the handle.

BO09F–02

INSPECTION

INSPECT FRONT DOOR GLASS

Check the following items. If the conditions are not met, readjust the glass.

(1) When you close the door with the glass fully closed, the a–a and b–b sections are in the same condition as shown in the illustration.

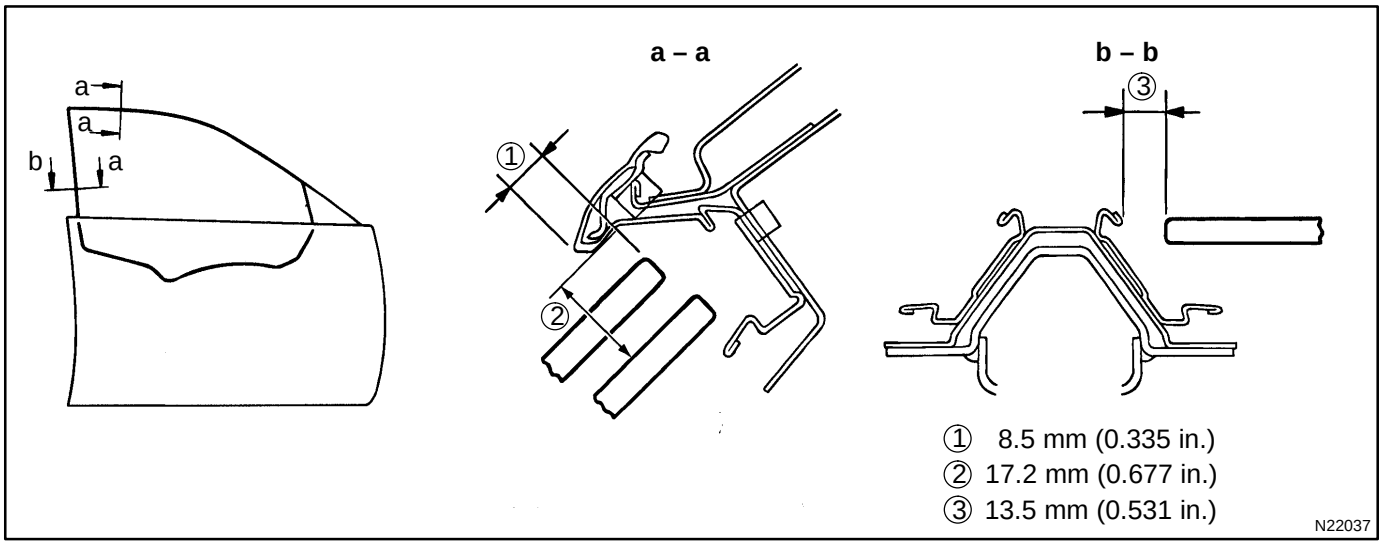
(2) When you close the door with the glass fully closed, check that the weatherstrip is not pinched and that the door glass is not in contact with the roof drip side finish moulding.

(3) When the door glass is fully closed, check that the outside edge of the door glass is in contact with the weatherstrip at the front pillar and roof side and that the edge of the glass cannot be seen.

(4) Check that the door glass is not loose when it is half open.

(5) When the door glass is rising up, check that the door glass and roof side rail weatherstrip are parallel and that the door glass is in contact with the 2 upper stops.

(6) Check that the door glass moves up and down smoothly over all areas.



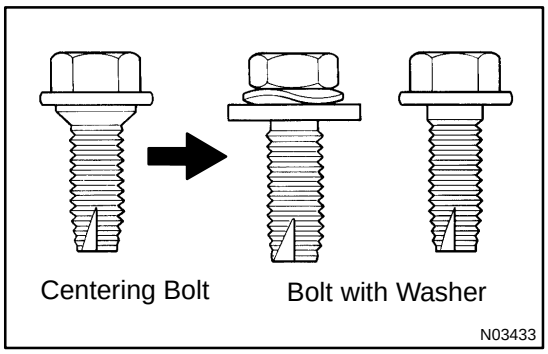
BO09G–02

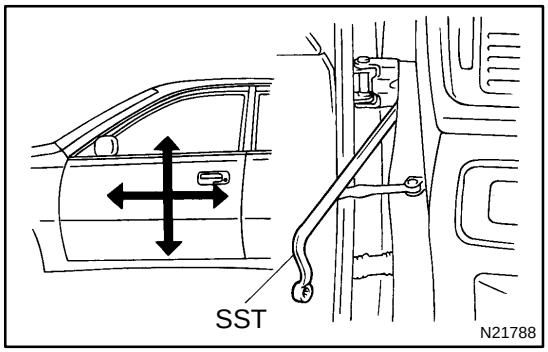
ADJUSTMENT

1. FRONT DOOR ADJUSTMENT

HINT:

Since the centering bolt is used as the door side hinge bolt, the door hinge cannot be adjusted with it on. Substitute a bolt with a washer for the centering bolt.





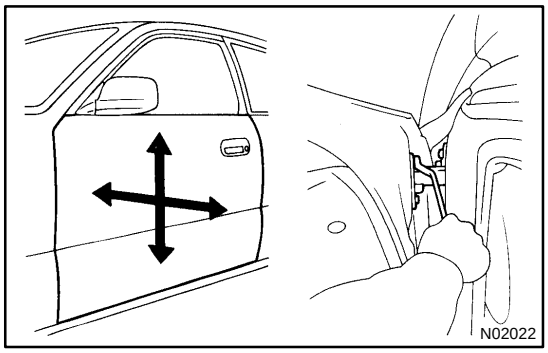
(a) Adjust the front door in forward/rearward and vertical directions.

(1) Using SST, adjust the door by loosening the body side hinge bolts.

SST 09812 – 00020

(2) Tighten the loosened bolts again.

Torque: 30 N·m (306 kgf·cm, 22 ft·lbf)

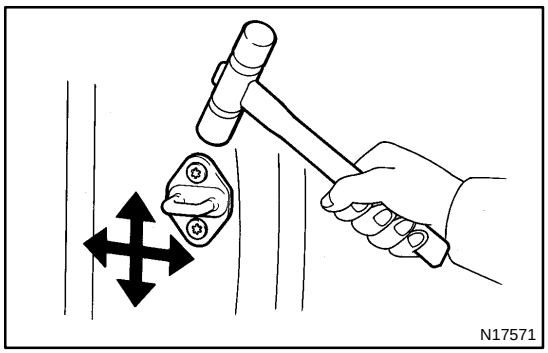


(b) Adjust the front door in horizontal and vertical directions.

(1) Loosen the door side hinge bolts to adjust.

(2) Tighten the loosened bolts again.

Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)



(c) Adjust the front door lock striker.

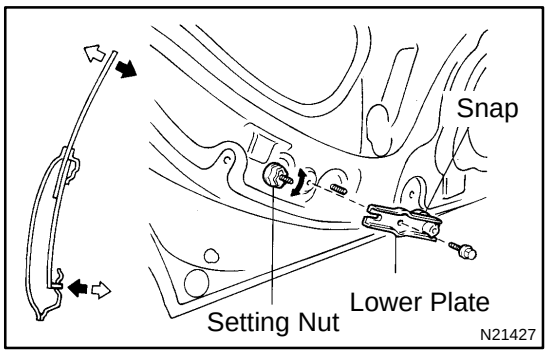
(1) Check that the door fit and door lock linkages are adjusted correctly.

(2) Remove the door lock striker cover.

(3) Adjust the striker position by slightly loosening the striker mounting screws, and hitting the striker with a hammer.

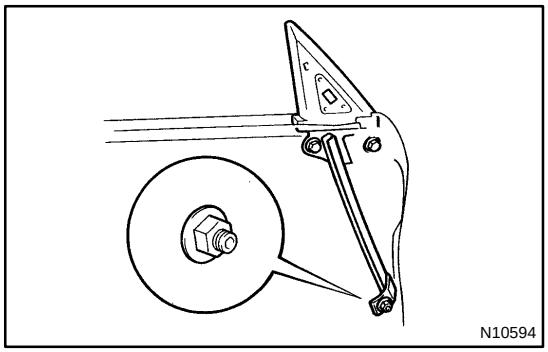
(4) Tighten the striker mounting screws again.

(5) Install the door lock striker cover.

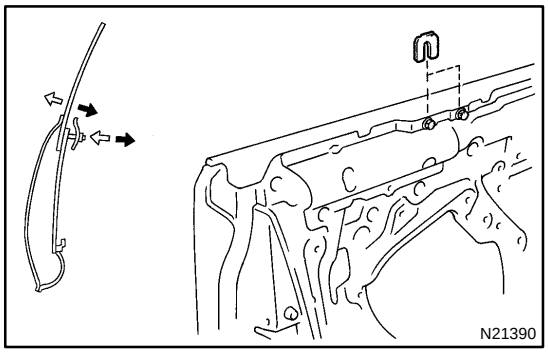


2. ADJUST FRONT DOOR GLASS

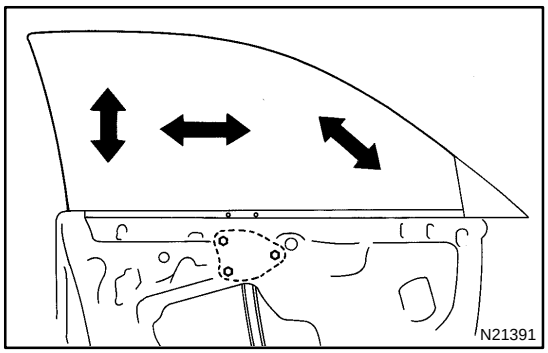
(a) Adjust the upper part of the glass to the inside/outside.
(1) Remove the bolt and lower plate.
(2) Pull the lower plate so that the snap is unlocked.
(3) Remove the snap and lower plate.
(4) Adjust the glass by turning the setting nut.
(5) Reinstall the lower plate, snap and bolt.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



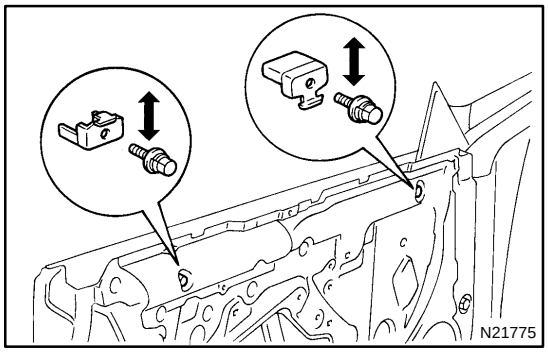
(6) In case the glass does not fit the mirror bracket:
★ Loosen the nut of the mirror bracket.
★ Using a screwdriver, adjust the mirror bracket in in/out direction by turning the stud bolt.



(b) Adjust the lower part of the glass to the inside/outside.
(1) Loosen the 2 nuts for the window regulator.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)
(2) Using a shim, adjust the glass in in/out direction.
Shim thickness:
1.0 mm (0.039 in.)
2.0 mm (0.079 in.)



(c) Adjust the glass in position (forward/rearward) and attitude.
Loosen the 3 nuts of the carrier plate of the window regulator and adjust.



(d) Adjust the glass in position (vertical) and attitude (when glass fully closed).
Adjust the door window upper stops.
Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)

BO09H–01

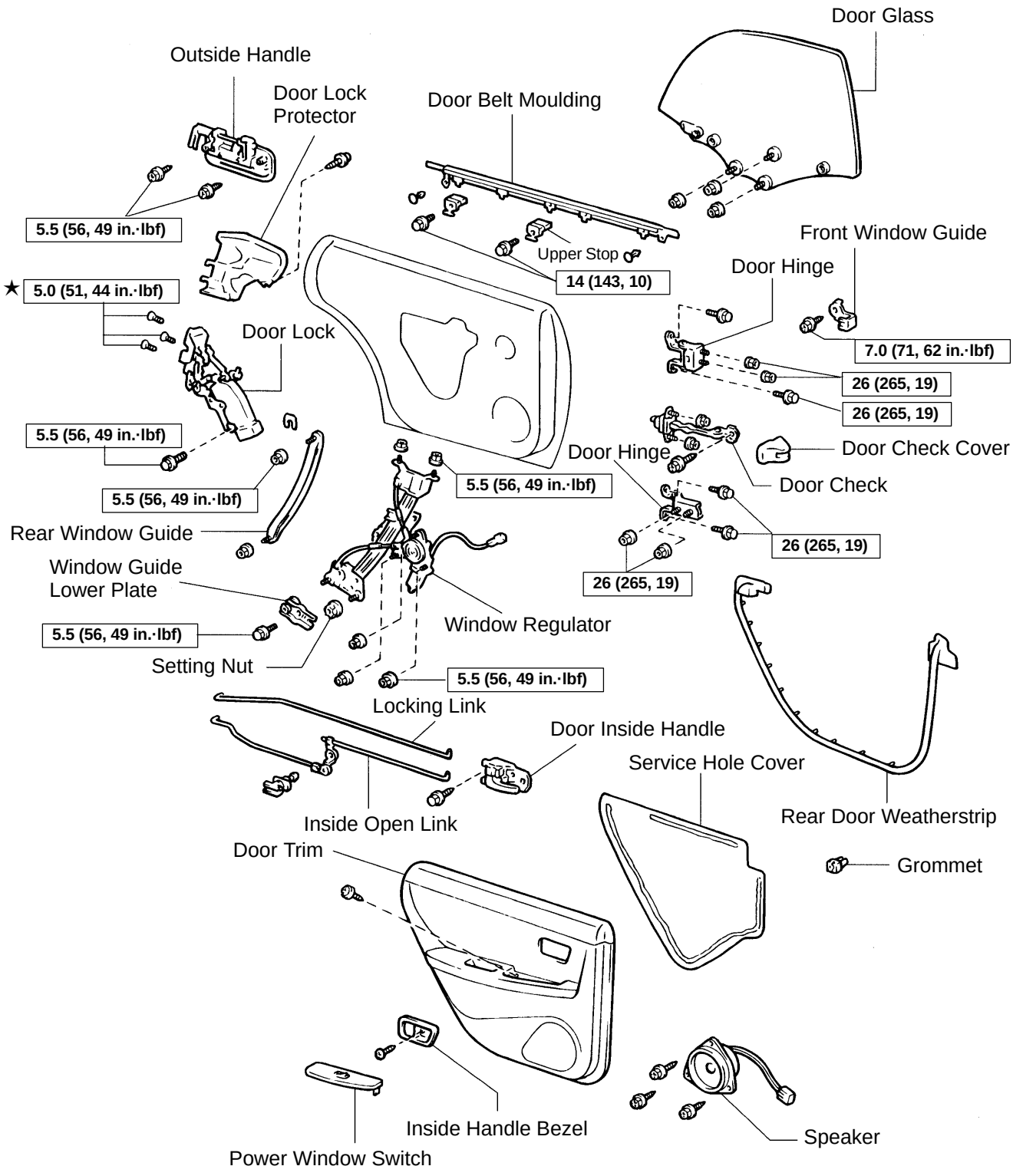
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–14).

REAR DOOR

COMPONENTS

BO09I–02



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

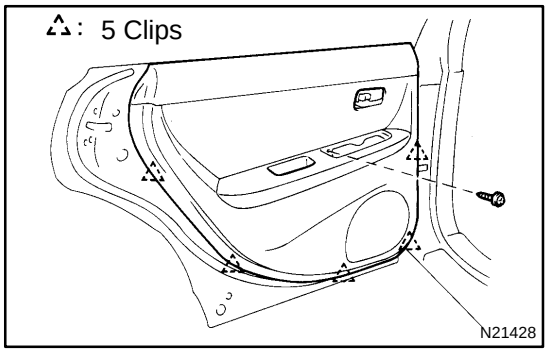
N21798

BO09J–02

DISASSEMBLY

1. REMOVE DOOR INSIDE HANDLE BEZEL
(See page BO–14)

2. REMOVE POWER WINDOW SWITCH



3. REMOVE DOOR TRIM

(a) Remove the screw.

(b) Insert a screwdriver between the door panel and door trim to pry the trim out.

HINT:

Tape the screwdriver tip before use.

(c) Pull the trim upward to remove it.

4. REMOVE DOOR INSIDE HANDLE
(See page BO–14)

5. REMOVE SERVICE HOLE COVER

Remove the grommet and service hole cover.

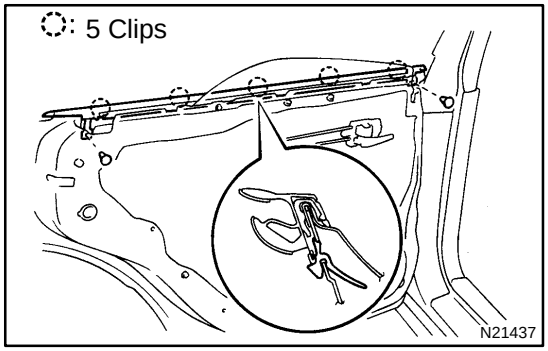
HINT:

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

Bring out the links through the service hole cover.

6. REMOVE SPEAKER

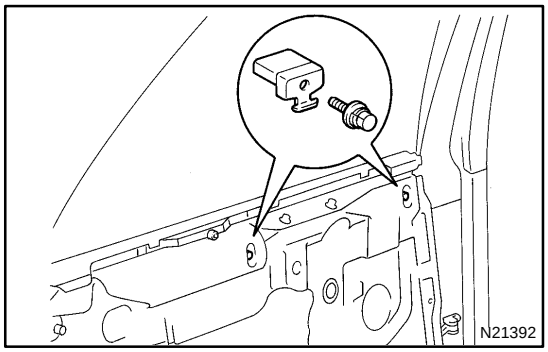
7. REMOVE REAR DOOR WEATHERSTRIP



8. REMOVE DOOR BELT MOULDING

(a) Remove the 2 clips from the front and rear edge of the moulding shown in the illustration.

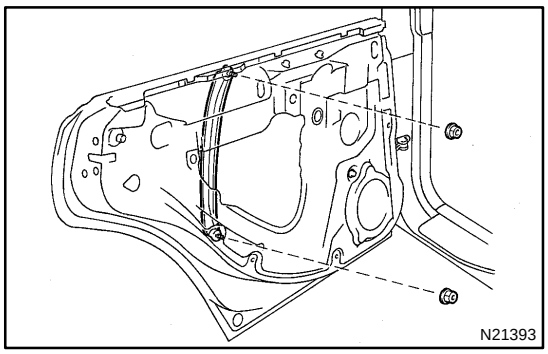
(b) Pry out the clips from the edge of moulding and remove the moulding.



9. REMOVE UPPER STOPS

Remove the 2 bolts and 2 upper stops as shown in the illustration.

Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)



10. REMOVE REAR WINDOW GUIDE

Remove the 2 nuts and rear window guide.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

11. REMOVE DOOR GLASS

(a) Open the door glass until the bolts appear the service hole.

(b) Remove the 3 nuts.

(c) Pull the door glass out of the panel carefully.

HINT:

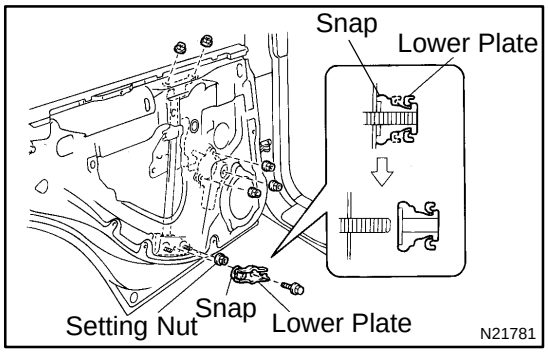
At the time of reassembly, please refer to the following item.

Insert a shop rag inside the panel to prevent scratching the glass.

12. REMOVE FRONT WINDOW GUIDE

Remove the bolt and front window guide.

Torque: 7.0 N·m (71 kgf·cm, 62 in.·lbf)



13. REMOVE WINDOW REGULATOR

(a) Disconnect the connector.

(b) Remove the bolt of lower plate.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

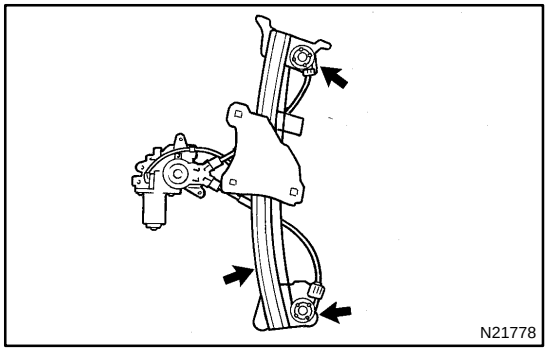
(c) Unlock the snap by pulling the lower plate.

(d) Remove the snap and lower plate from the stud bolt of lower bracket.

(e) Remove the setting nut from the lower bracket.

(f) Remove the 5 nuts and window regulator.

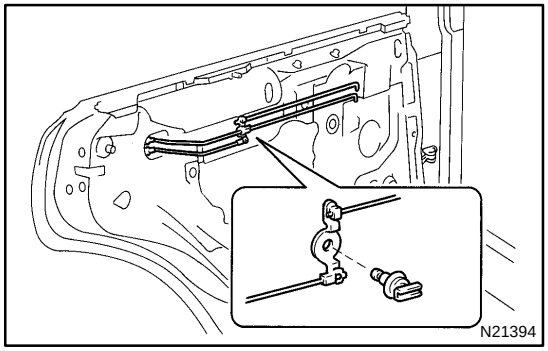
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



HINT:

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

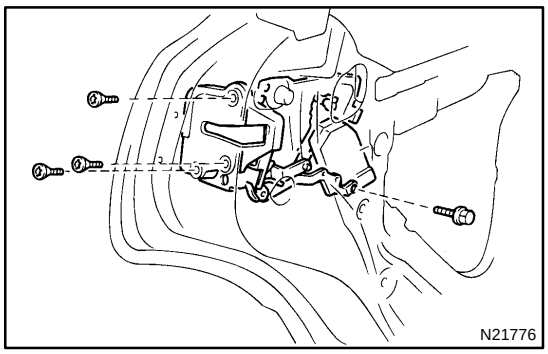
Apply MP grease to the glass guide and rollers of window regulator.



14. DISCONNECT INSIDE OPEN LINK AND LOCKING LINK

(a) Using a clip remover, remove the clip.

(b) Disconnect the 2 links from the door lock, then remove the 2 links.



15. REMOVE DOOR LOCK

(a) Disconnect the connector.

(b) Remove the bolt.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(c) Remove the 3 screws and door lock.

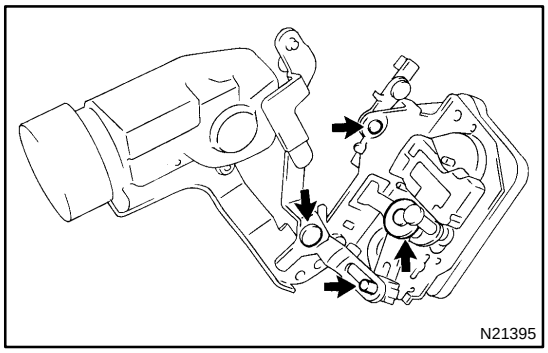
Torque: 5.0 N·m (51 kgf·cm, 44 in.·lbf)

HINT:

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

Apply adhesive to the 3 screws.

Part No. 08833–00070, THREE BOND, 1324 or equivalent



HINT:

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

Apply MP grease to the sliding and rotating parts of the door lock.

16. REMOVE OUTSIDE HANDLE

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

BO09K–02

INSPECTION

INSPECT REAR DOOR GLASS

Check the following items. If the conditions are not met, readjust the glass.

(1) When you close the door with the glass fully closed, the a–a and b–b sections are in the same condition as shown in the illustration.

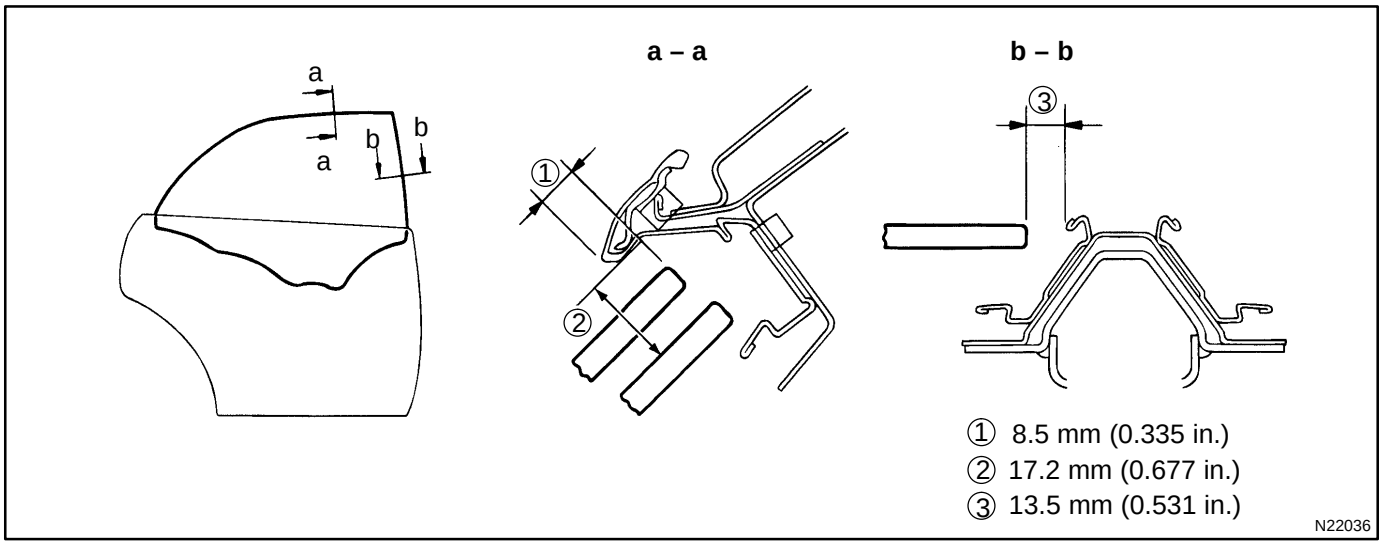
(2) When you close the door with the glass fully closed, check that the weatherstrip is not pinched and that the door glass is not in contact with the roof drip side finish moulding.

(3) When the door glass is fully closed, check that the outside edge of the door glass is in contact with the weatherstrip at the roof side and quarter pillar and that the edge of the glass cannot be seen.

(4) Check that the door glass is not loose when it is half open.

(5) When the door glass is rising up, check that the door glass and roof side rail weatherstrip are parallel and that the door glass is in contact with the 2 upper stops.

(6) Check that the door glass moves up and down smoothly over all areas.



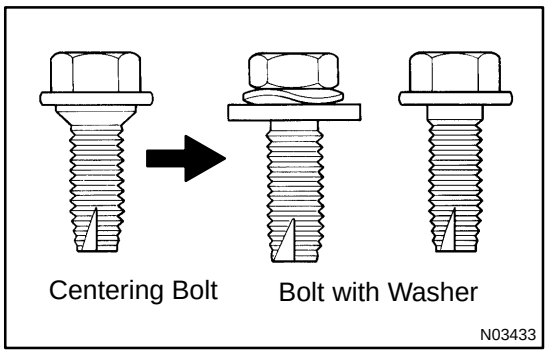
BO09L–02

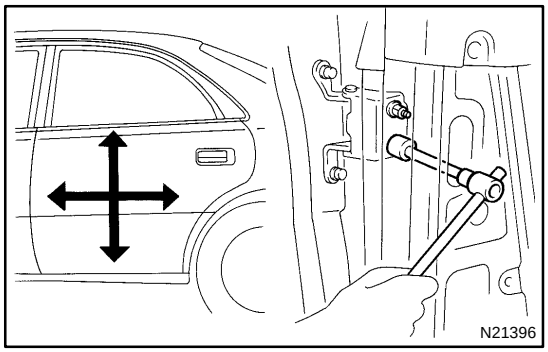
ADJUSTMENT

1. REAR DOOR ADJUSTMENT

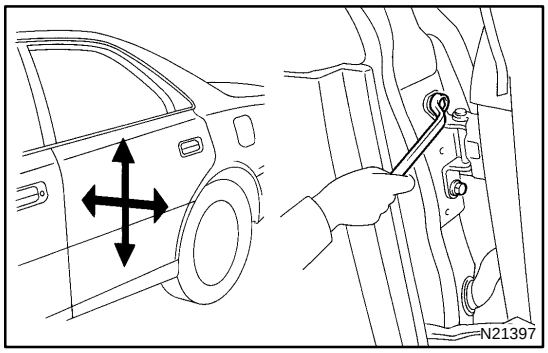
HINT:

Since the centering bolt is used as the door side hinge bolt, the door hinge cannot be adjusted with it on. Substitute a bolt with a washer for the centering bolt.





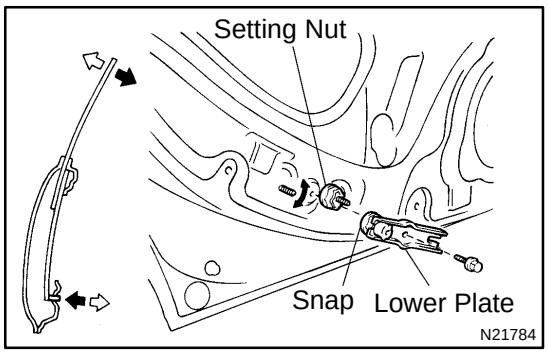
(a) Adjust the rear door in forward/rearward and vertical directions.
  (1) Remove the lower center pillar garnish.
  (2) Loosen the body side hinge nuts to adjust.
  (3) Tighten the loosened nuts again.
  Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)
  (4) Install the lower center pillar garnish.



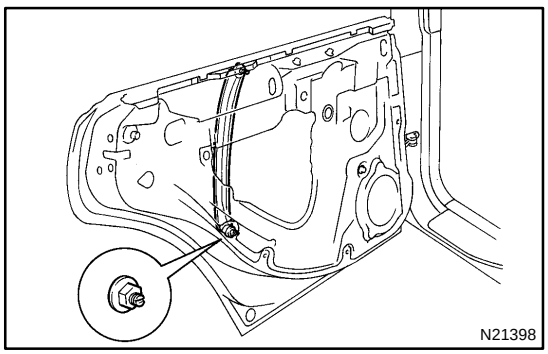
(b) Adjust the rear door in left/right and vertical directions.
  (1) Loosen the door side hinge bolts to adjust.
  (2) Tighten the loosened nuts again.
  Torque: 26 N·m (265 kgf·cm, 19 ft·lbf)

(c) Adjust the rear door lock striker (See page BO–18).

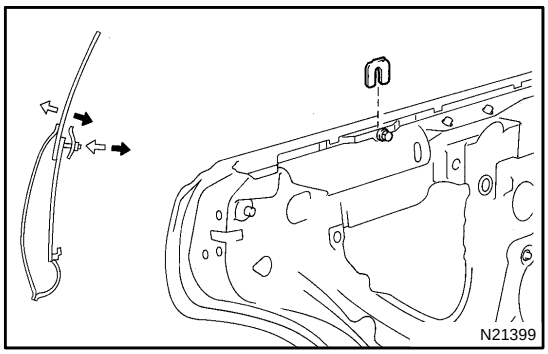
2. ADJUST REAR DOOR GLASS



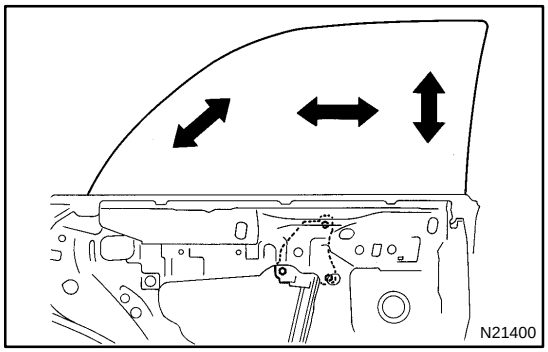
(a) Adjust the upper part of glass to the inside/outside.
  (1) Remove the bolt of lower plate.
  (2) Pull the lower plate so that the snap is unlocked.
  (3) Remove the snap and lower plate.
  (4) Adjust the glass by turning the setting nut.
  (5) Reinstall the lower plate, snap and bolt.
  Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)



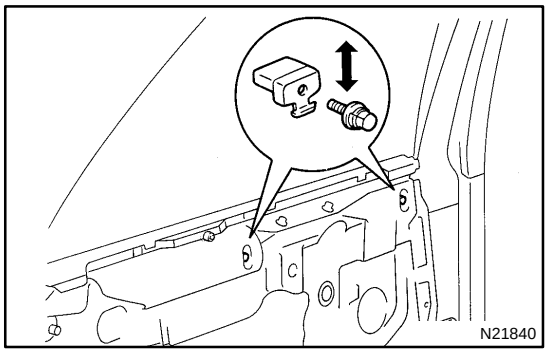
  (6) In case the glass does not fit the rear window guide:
    ★ Loosen the nut of the rear window guide.
    ★ Using a screwdriver, adjust the rear window guide in in/out direction by turning the stud bolt.



(b) Adjust the lower part of the glass to the inside/outside.
(1) Loosen the nut of rear window guide.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)
(2) Using a shim, adjust the glass in in/out direction.
Shim thickness:
1.0 mm (0.039 in.)
2.0 mm (0.079 in.)



(c) Adjust the glass in position (forward/rearward) and attitude.
Loosen the 3 nuts of the carrier plate and adjust.



(d) Adjust the glass in position (vertical) and attitude (when glass fully closed).
Adjust the door window upper stops.
Torque: 14 N·m (143 kgf·cm, 10 ft·lbf)

BO09M–01

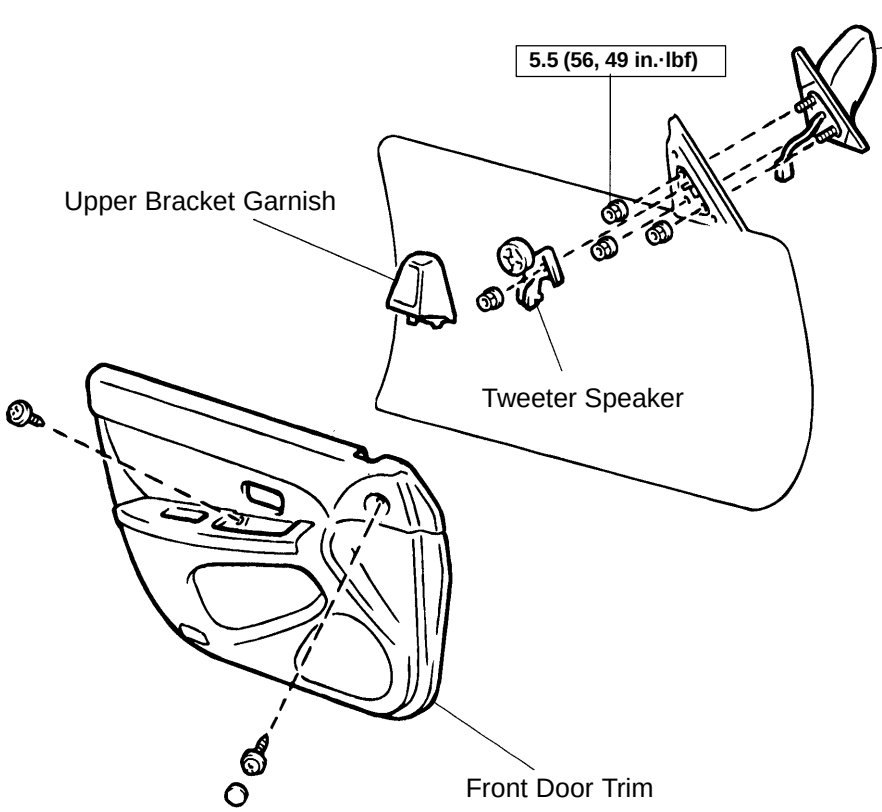
REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–22).

OUTSIDE REAR VIEW MIRROR

BO09N–02

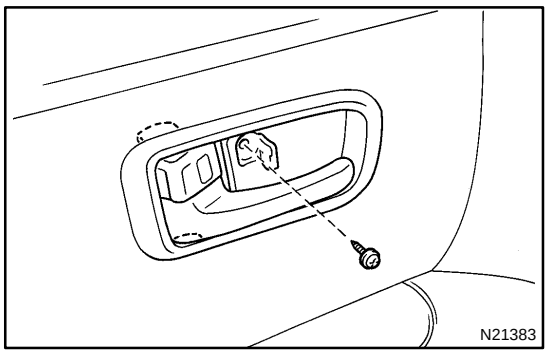
COMPONENTS



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

N21792

BO09O–02



REMOVAL

1. REMOVE DOOR INSIDE HANDLE BEZEL

(a) Open the cap, then remove the screw.

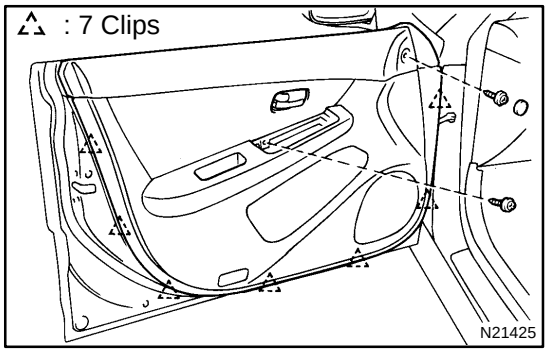
(b) Using a screwdriver, remove the inside handle bezel.

HINT:

Tape the screwdriver tip before use.

2. REMOVE UPPER BRACKET GARNISH

3. REMOVE POWER WINDOW SWITCH



4. REMOVE DOOR TRIM

(a) Using a screwdriver, remove the screw cap.

HINT:

Tape the screwdriver tip before use.

(b) Remove the 2 screws.

(c) Insert a screwdriver between the door panel and door trim to pry the trim out.

HINT:

Tape the screwdriver tip before use.

(d) Pull the trim upward to remove it, then disconnect the courtesy light connector.

5. REMOVE TWEETER SPEAKER

Remove the nut and tweeter speaker.

6. REMOVE OUTSIDE REAR VIEW MIRROR

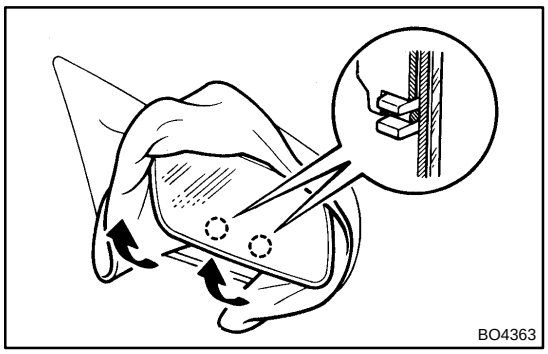
(a) Disconnect the connector.

(b) Remove the 3 nuts and outside rear view mirror.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

BO09P–02

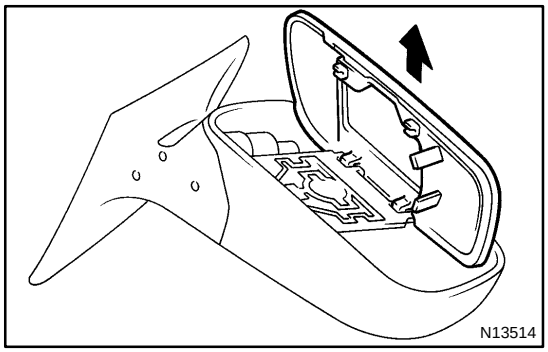
REPLACEMENT



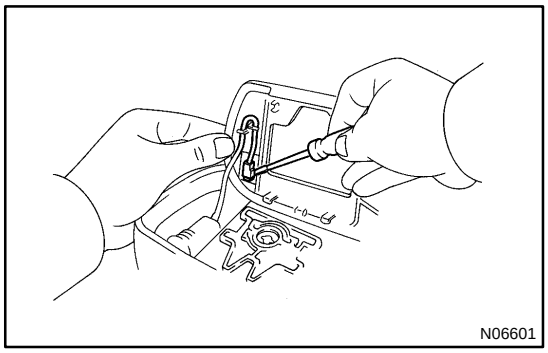
1. IF NECESSARY, DISCONNECT MIRROR

(a) Insert a shop rag between the mirror and mirror body to wrap up the mirror in the shop rag.

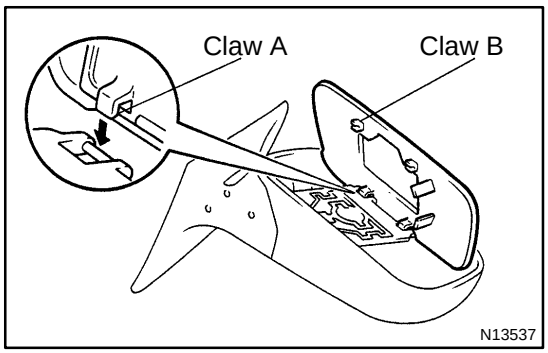
(b) Pull up the lower side of the shop rag to disconnect the mirror joint.



(c) Pull up the mirror and disconnect it.



(d) Disconnect the connector.



2. CONNECT MIRROR

(a) Engage the claws (A) and set the mirror to the mirror body.

(b) Push the mirror to engage the claws (B) and connect it.

BO09Q–01

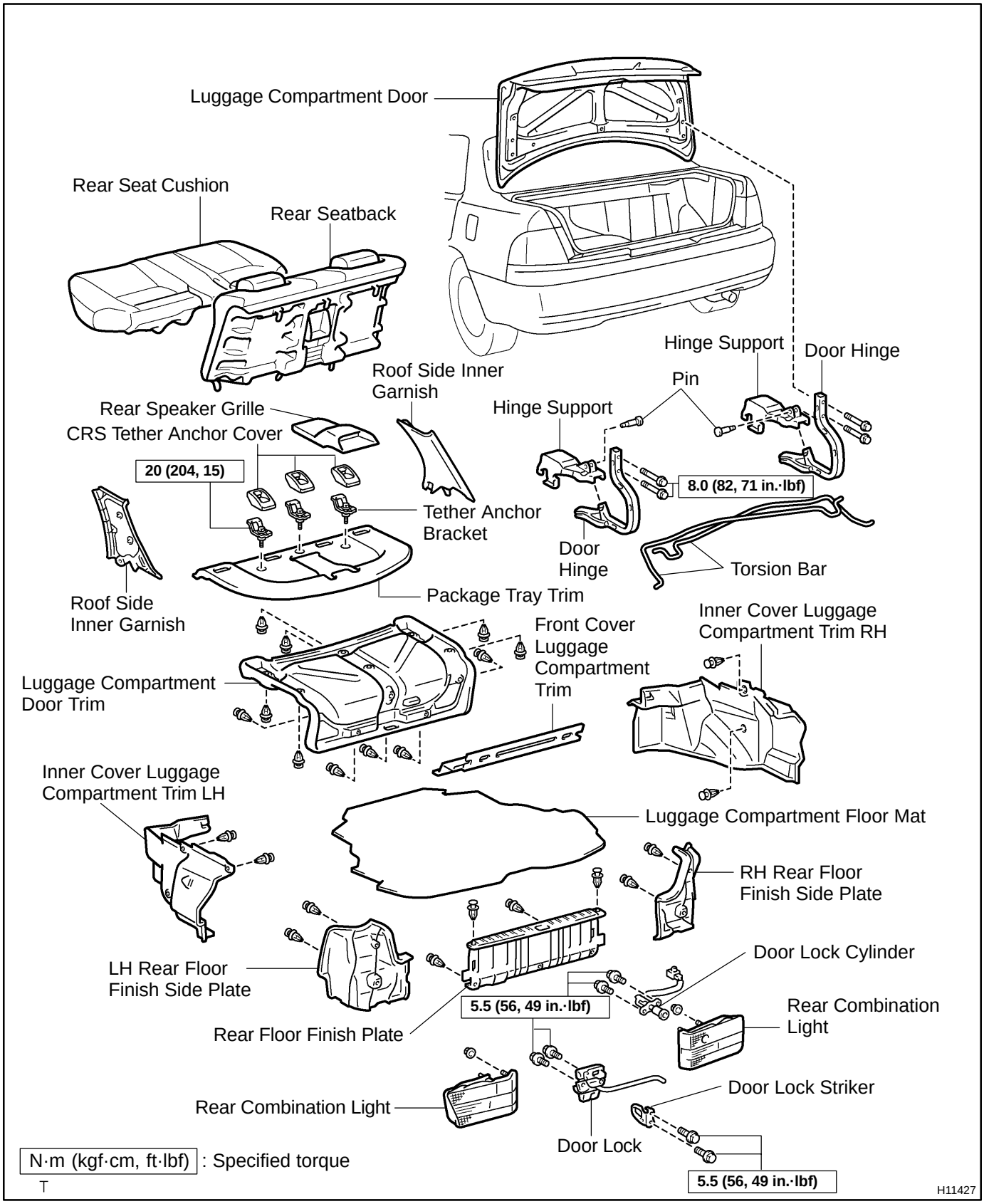
INSTALLATION

Installation is in the reverse order of removal (See page BO–30).

LUGGAGE COMPARTMENT DOOR AND HINGE

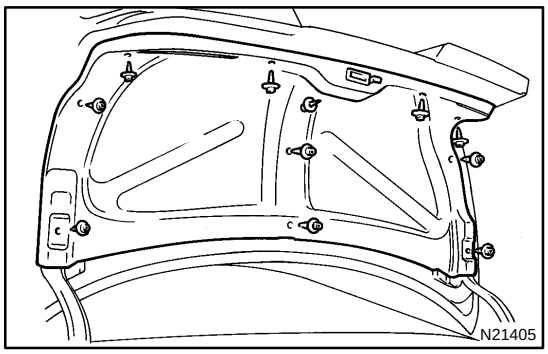
BO09R–03

COMPONENTS



BO09S–03

REMOVAL



1. REMOVE LUGGAGE COMPARTMENT DOOR TRIM

Remove the 11 clips and trim.

2. REMOVE LUGGAGE COMPARTMENT DOOR

(a) Disconnect the connector.

(b) Using a clip remover, disconnect the clamps.

(c) Remove the 4 bolts and door.

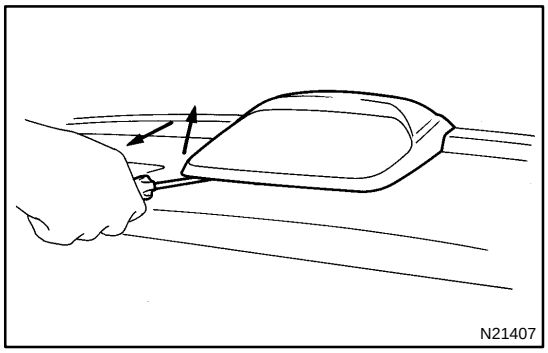
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

3. REMOVE LUGGAGE COMPARTMENT FLOOR MAT

4. REMOVE LH AND RH REAR FLOOR FINISH SIDE PLATES

5. REMOVE INNER COVER LUGGAGE COMPARTMENT TRIMS

6. REMOVE REAR SEAT (See page BO–112)



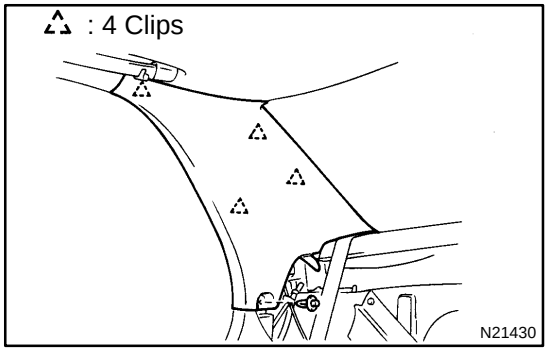
7. REMOVE REAR SPEAKER GRILLE

(a) Using a screwdriver, remove the rear speaker grille.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.



8. REMOVE ROOF SIDE INNER GARNISH

(a) Remove the clip.

(b) Using a screwdriver, pry loose and remove the garnish.

HINT:

Tape the screwdriver tip before use.

9. REMOVE TETHER ANCHOR

(a) Using a screwdriver, remove the CRS tether anchor cover.

HINT:

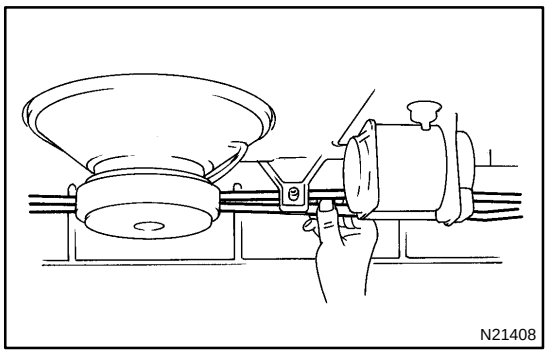
Tape the screwdriver tip before use.

(b) Remove the tether anchor by loosening the bolt,

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

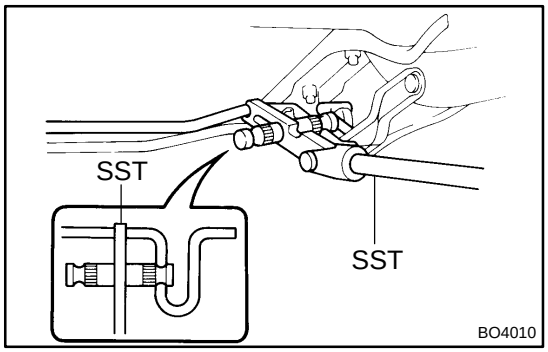
(c) Employ the same manner described above to the other sides.

10. REMOVE PACKAGE TRAY TRIM

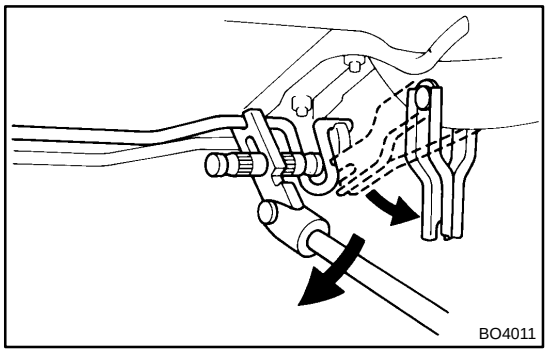


11. REMOVE TORSION BARS

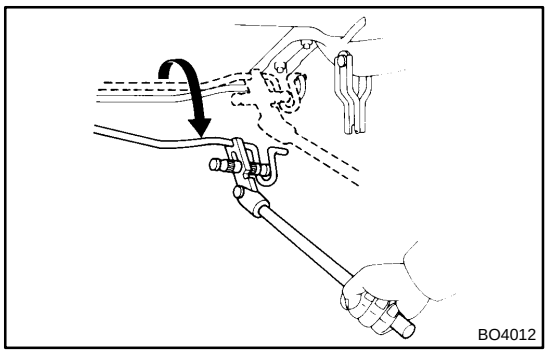
(a) Remove the torsion bars from the center bracket.



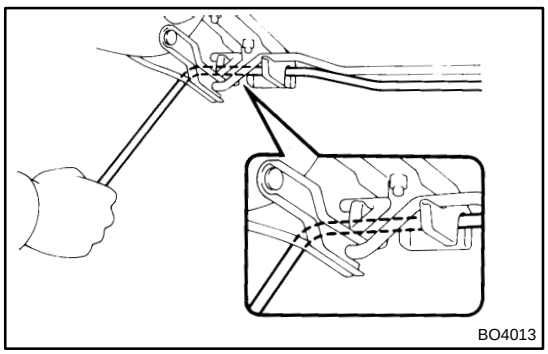
(b) Install SST to the torsion bar on the hinge side.
SST 09804–24010



(c) Push down on SST, and pull the luggage compartment door hinge from the torsion bar.



(d) Slowly lift SST, and remove the torsion bar from the torsion bar bracket with SST.



(e) Disconnect the torsion bar from the bracket.

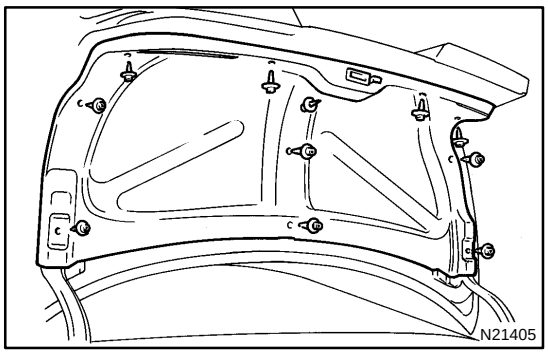
(f) Employ the same manner described above to the other side.

12. REMOVE LUGGAGE COMPARTMENT DOOR HINGE

Remove the 2 pins and 2 hinges.

BO09S–03

REMOVAL



1. REMOVE LUGGAGE COMPARTMENT DOOR TRIM

Remove the 11 clips and trim.

2. REMOVE LUGGAGE COMPARTMENT DOOR

(a) Disconnect the connector.

(b) Using a clip remover, disconnect the clamps.

(c) Remove the 4 bolts and door.

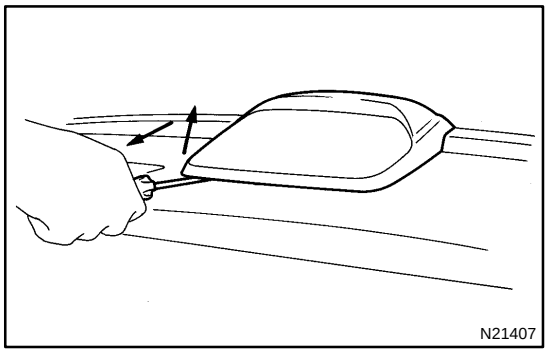
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

3. REMOVE LUGGAGE COMPARTMENT FLOOR MAT

4. REMOVE LH AND RH REAR FLOOR FINISH SIDE PLATES

5. REMOVE INNER COVER LUGGAGE COMPARTMENT TRIMS

6. REMOVE REAR SEAT (See page BO–112)



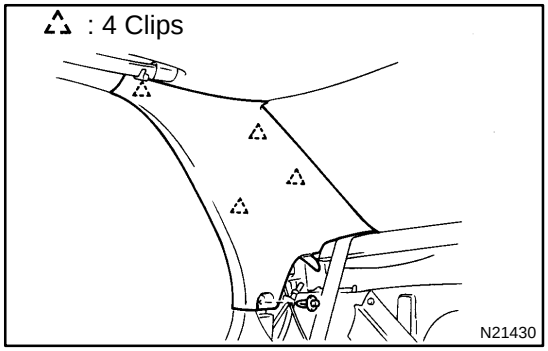
7. REMOVE REAR SPEAKER GRILLE

(a) Using a screwdriver, remove the rear speaker grille.

HINT:

Tape the screwdriver tip before use.

(b) Disconnect the connector.



8. REMOVE ROOF SIDE INNER GARNISH

(a) Remove the clip.

(b) Using a screwdriver, pry loose and remove the garnish.

HINT:

Tape the screwdriver tip before use.

9. REMOVE TETHER ANCHOR

(a) Using a screwdriver, remove the CRS tether anchor cover.

HINT:

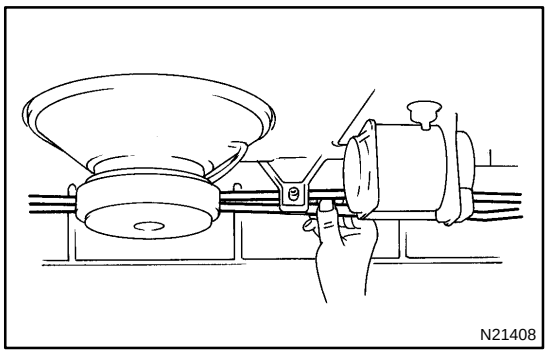
Tape the screwdriver tip before use.

(b) Remove the tether anchor by loosening the bolt,

Torque: 20 N·m (204 kgf·cm, 15 ft·lbf)

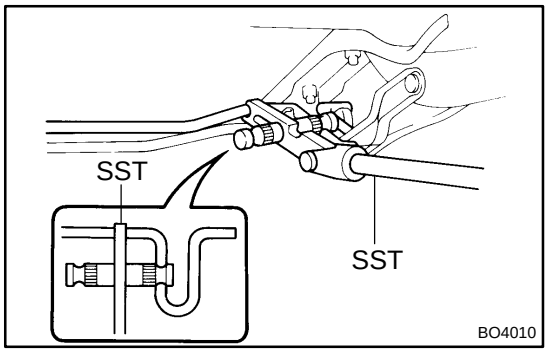
(c) Employ the same manner described above to the other sides.

10. REMOVE PACKAGE TRAY TRIM

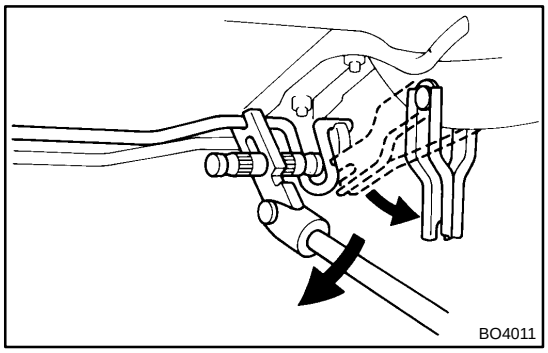


11. REMOVE TORSION BARS

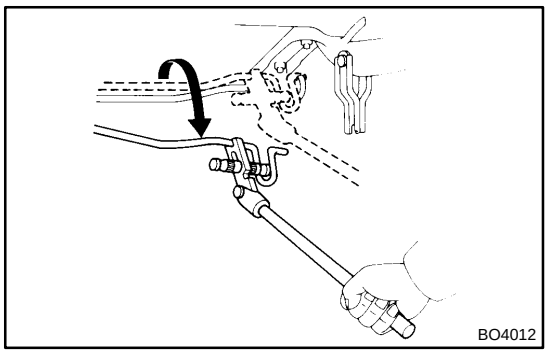
(a) Remove the torsion bars from the center bracket.



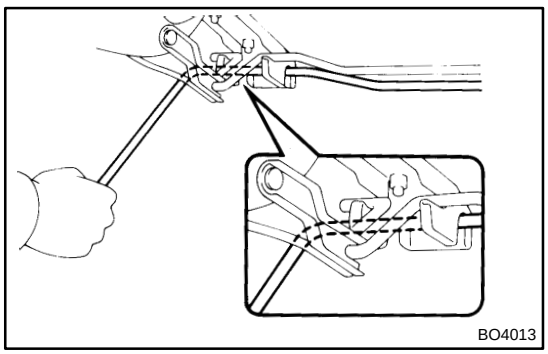
(b) Install SST to the torsion bar on the hinge side.
SST 09804–24010



(c) Push down on SST, and pull the luggage compartment door hinge from the torsion bar.



(d) Slowly lift SST, and remove the torsion bar from the torsion bar bracket with SST.



(e) Disconnect the torsion bar from the bracket.

(f) Employ the same manner described above to the other side.

12. REMOVE LUGGAGE COMPARTMENT DOOR HINGE

Remove the 2 pins and 2 hinges.

DISASSEMBLY

1. REMOVE DOOR LOCK

(a) Disconnect the control link.

(b) Remove the 2 bolts and lock.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

2. REMOVE REAR FLOOR FINISH PLATE

Remove the 4 clips and rear floor finish plate.

3. REMOVE REAR COMBINATION LIGHTS

(a) Disconnect the connectors.

(b) Remove the 10 nuts and rear combination lights.

4. REMOVE DOOR LOCK CYLINDER

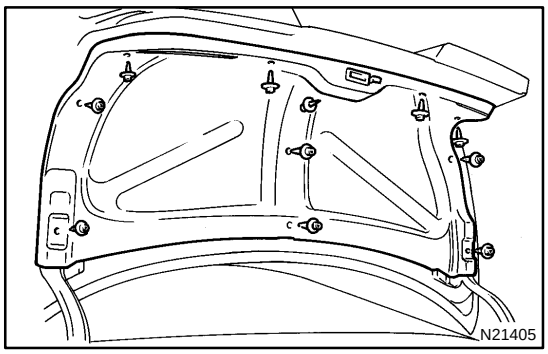
(a) Disconnect the connector.

(b) Remove the 2 bolts and lock cylinder.

Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

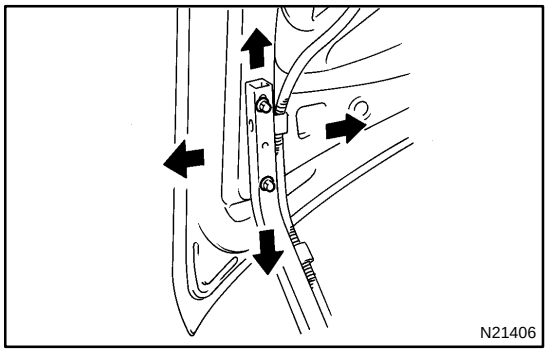
BO09U–02

ADJUSTMENT



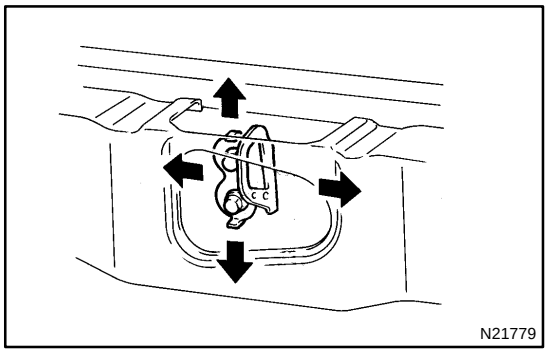
1. ADJUST LUGGAGE COMPARTMENT DOOR

(a) Remove the 11 clips and luggage compartment door trim.



(b) For forward/rearward and horizontal adjustment loosen the bolts.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)

(c) For vertical adjustment of the front end of the door, increase or decrease the number of washers between the hinge and the door.
Torque: 8.0 N·m (82 kgf·cm, 71 in.·lbf)



2. ADJUST DOOR LOCK STRIKER

(a) Remove the LH and RH rear floor finish side plates.

(b) Remove the rear floor finish plate.

(c) Loosen the 2 lock striker set bolts.
Torque: 5.5 N·m (56 kgf·cm, 49 in.·lbf)

(d) Using a hammer and a brass bar, tap the striker to adjust it.

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page BO–36).

CHARGING SYSTEM

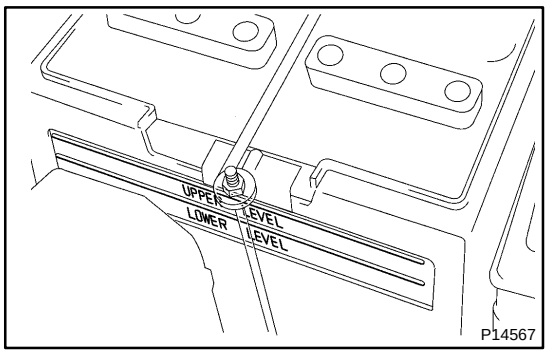
CH013–01

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.**

CH014–01

ON–VEHICLE INSPECTION



1. CHECK BATTERY ELECTROLYTE LEVEL

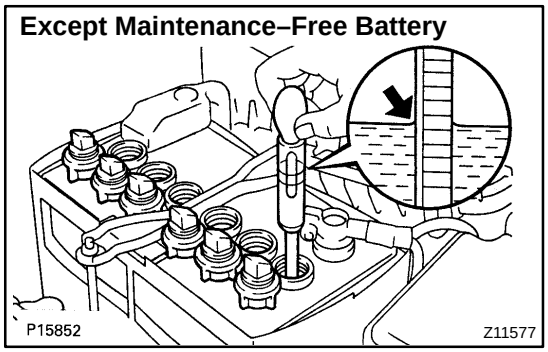
Check the electrolyte quantity of each cell.

Maintenance–Free Battery:

If under the lower level, replace the battery (or add distilled water if possible). Check the charging system.

Except Maintenance–Free Battery:

If under the lower level, add distilled water.

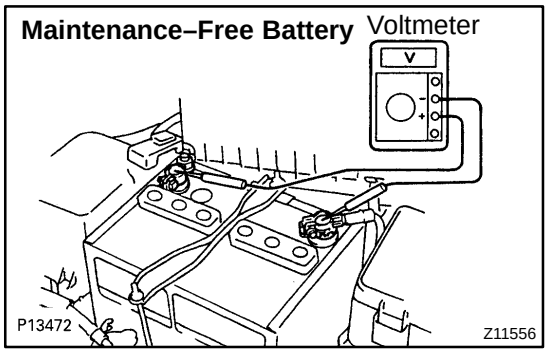


2. Except Maintenance–Free Battery: CHECK BATTERY SPECIFIC GRAVITY

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.

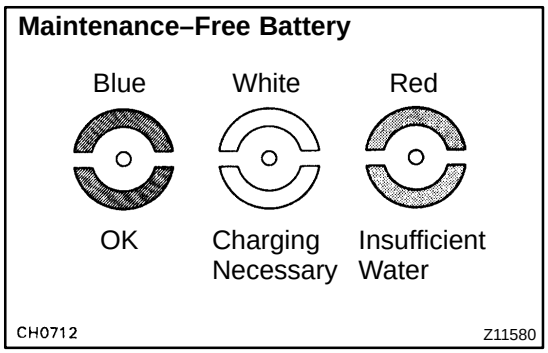
(c) Measure the battery voltage between the negative (–) and positive (+) terminals of the battery.

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.

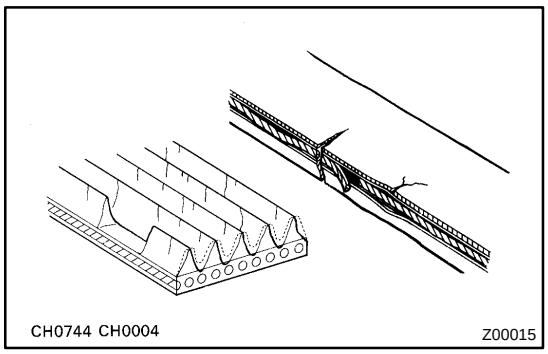


4. CHECK BATTERY TERMINALS, FUSIBLE LINK AND FUSES

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean the terminals.

(b) Check the fusible link, H–fuses, M–fuse and fuses for continuity.



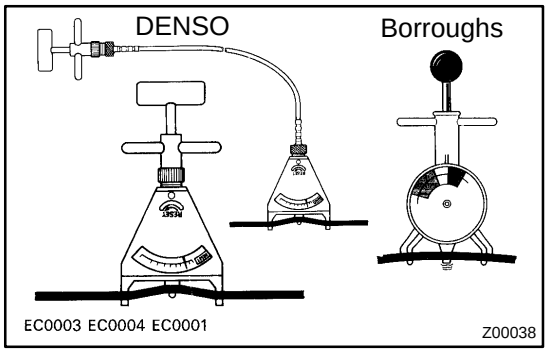
5. INSPECT DRIVE BELTS

(a) Visually check the drive 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 drive belt are considered acceptable. If the drive belt has chunks missing from the ribs, it should be replaced.

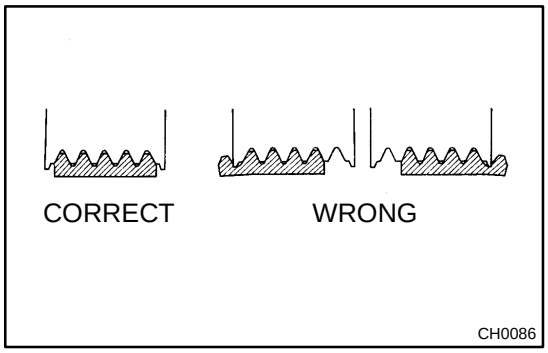


(b) Using a belt tension gauge, measure the belt tension.
Belt tension gauge:
DENSO BTG–20 (95506–00020)
Borroughs No. BT–33–73F
Drive belt tension:
New belt: 175 ± 5 lbf
Used belt: 115 ± 20 lbf

If the belt tension is not as specified, adjust it.

HINT:

- ”New belt” refers to a belt which has been used less than 5 minutes on a running engine.
- ”Used belt” refers to a belt which has been used on a running engine for 5 minutes or more.
- After installing a belt, check that it fits properly in the ribbed grooves.
- Check with your hand to confirm that the belt has not slipped out of the groove on the bottom of the pulley.
- After installing a new belt, run the engine for about 5 minutes and recheck the belt tension.



6. 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.

7. CHECK DISCHARGE WARNING LIGHT CIRCUIT

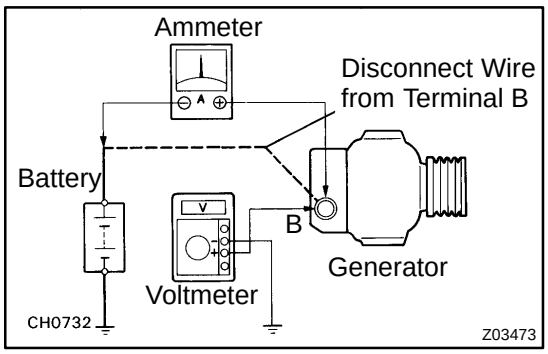
(a) Warm up the engine and then turn it off.

(b) Turn off all accessories.

(c) Turn the ignition switch ”ON”. Check that the discharge warning light is lit.

(d) Start the engine. Check that the light goes off.

If the light does not go off as specified, troubleshoot the discharge light circuit.



8. 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.

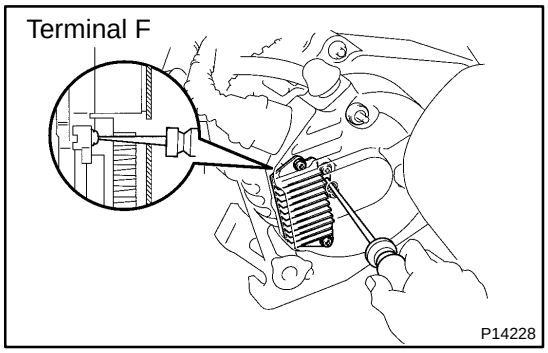
(a) If a tester is not available, connect a voltmeter and ammeter to the charging circuit as follows:
- Disconnect the wire from terminal B of the generator, and connect it to the negative (–) tester probe of the ammeter.
- Connect the positive (+) tester probe of the ammeter to terminal B of the generator.
- 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 voltmeter reading is more than standard voltage, replace the voltage regulator.

If the voltmeter reading is less than standard voltage, check the voltage regulator and generator as follows:
- With terminal F grounded, start the engine and check the voltmeter reading of terminal B.
- If the voltmeter reading is more than standard voltage, replace the voltage regulator.
- If the voltmeter reading is less than standard voltage, check the generator.

9. 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.

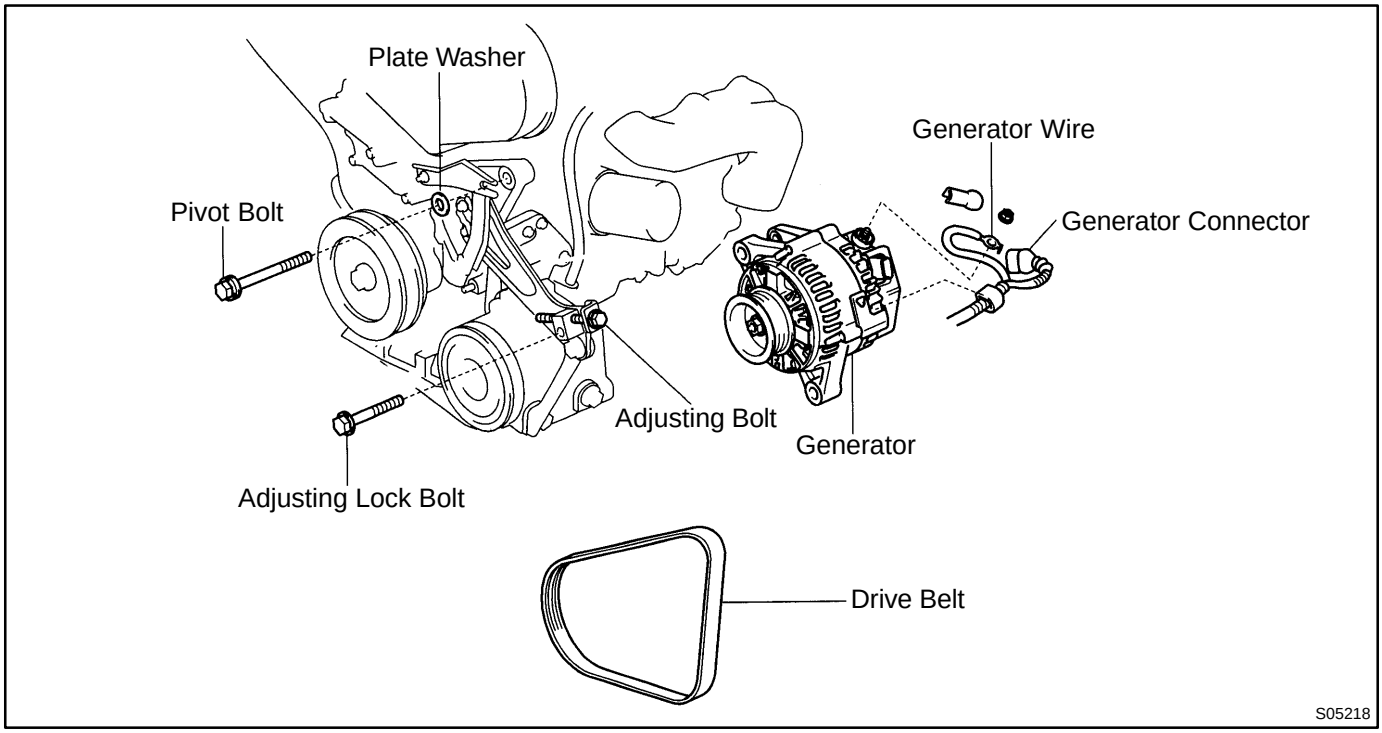
HINT:

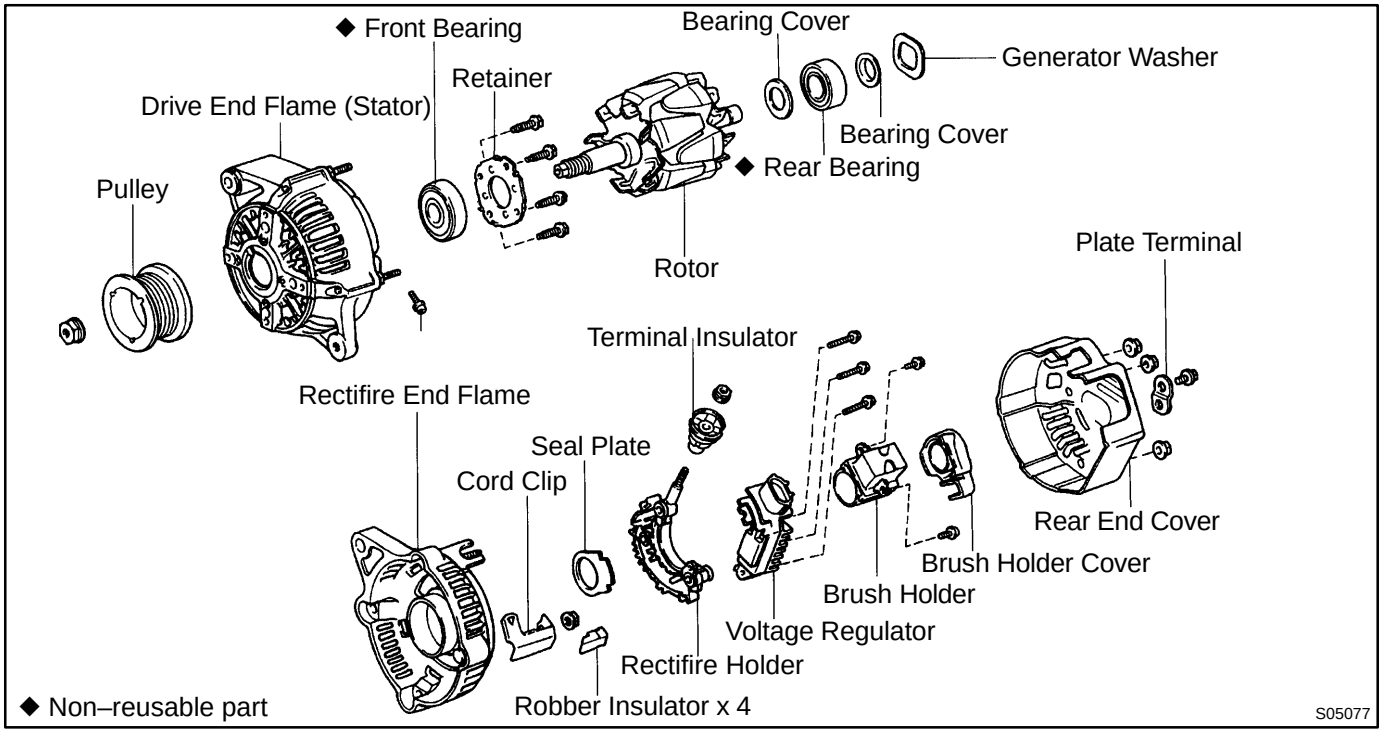
If the battery is fully charged, the indication will sometimes be less than standard amperage.

GENERATOR

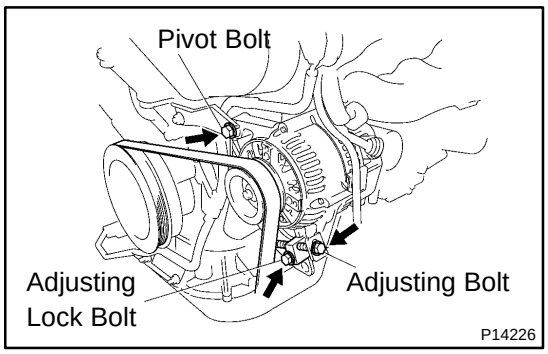
COMPONENTS

CH015–01





CH016–01

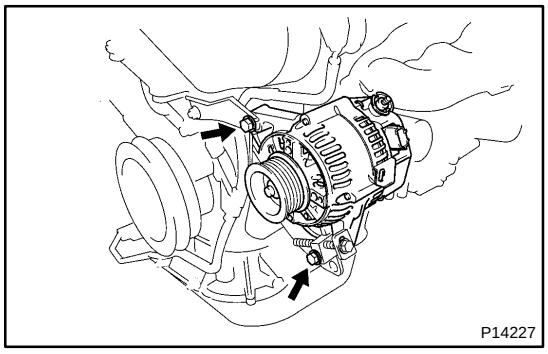


REMOVAL

1. REMOVE DRIVE BELT

Loosen the pivot bolt, adjusting lock bolt and adjusting bolt, and remove the drive belt.

Torque:
Pivot bolt: 56 N·m (570 kgf·cm, 41 ft·lbf)
Lock bolt: 18 N·m (180 kgf·cm, 13 ft·lbf)

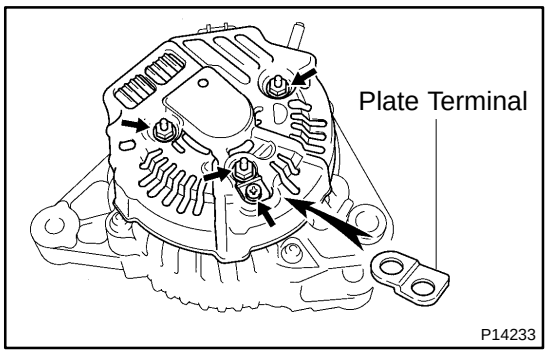


2. REMOVE GENERATOR

(a) Disconnect the generator connector.
(b) Remove the nut, and disconnect the generator wire.
(c) Disconnect the wire harness from the clip.
(d) Remove the pivot bolt, plate washer, adjusting lock bolt and generator.

CH017–01

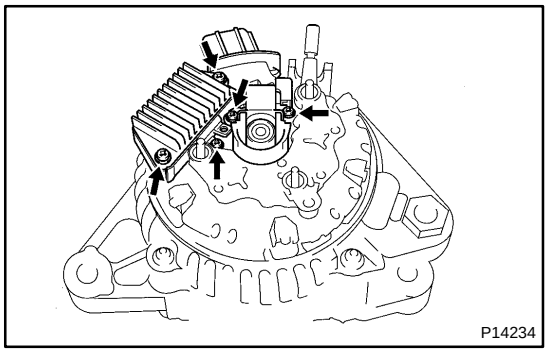
DISASSEMBLY



1. REMOVE REAR END COVER

(a) Remove the nut and terminal insulator.

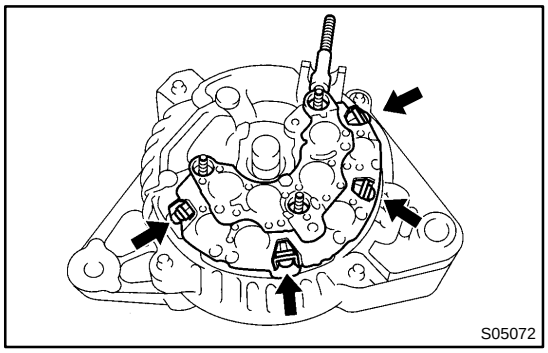
(b) Remove the screw, 3 nuts, plate terminal and end cover.



2. REMOVE BRUSH HOLDER AND VOLTAGE REGULATOR

(a) Remove the brush holder cover from the brush holder.

(b) Remove the 5 screws, brush holder and voltage regulator.

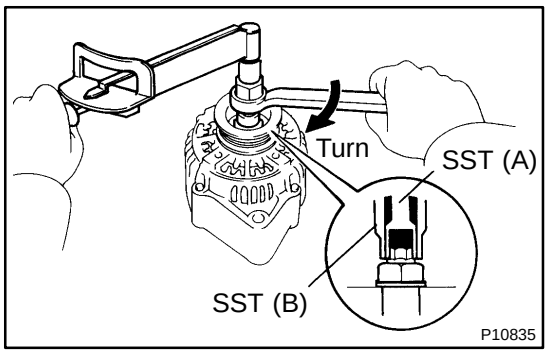


3. REMOVE RECTIFIER HOLDER

(a) Remove the 4 screws and rectifier holder.

(b) Remove the 4 rubber insulators.

(c) Remove the seal plate.



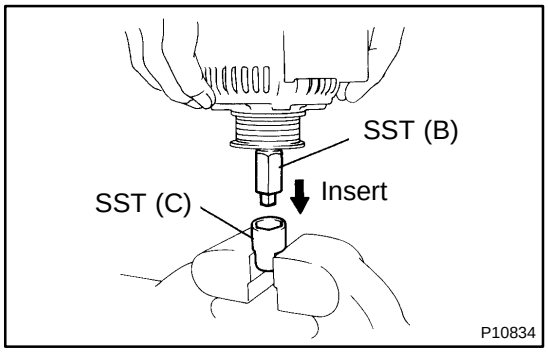
4. REMOVE PULLEY

(a) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.

SST 09820–63010

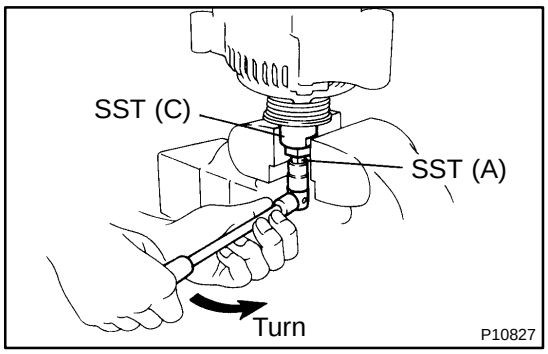
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(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).

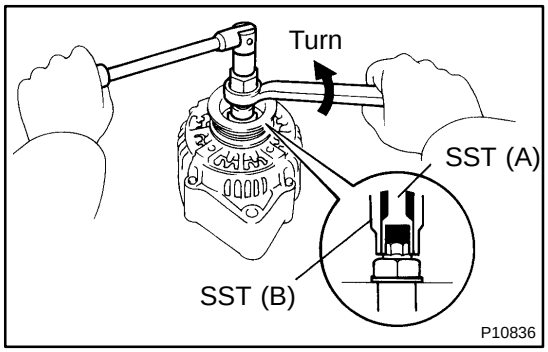


(e) To loosen the pulley nut, turn SST (A) in the direction shown in the illustration.

NOTICE:

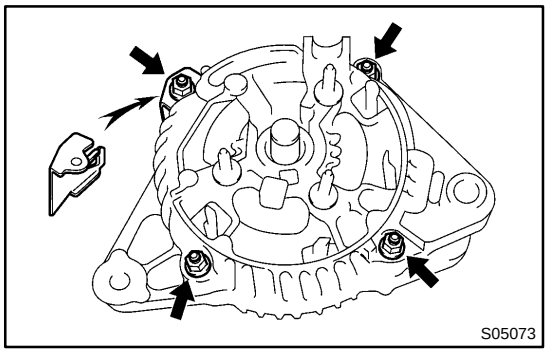
To prevent damage to the rotor shaft, do not loosen the pulley nut more than one–half of a turn.

(f) Remove the generator from SST (C).



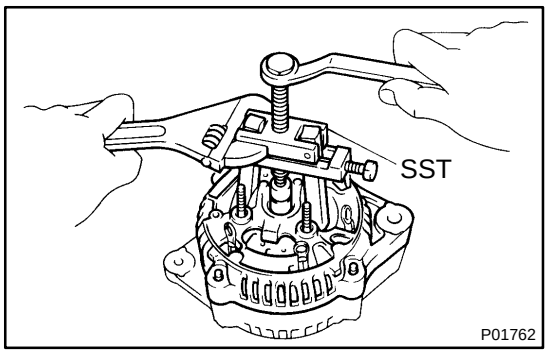
(g) Turn SST (B), and remove SST (A and B).

(h) Remove the pulley nut and pulley.



5. REMOVE RECTIFIER END FRAME

(a) Remove the 4 nuts and cord clip.



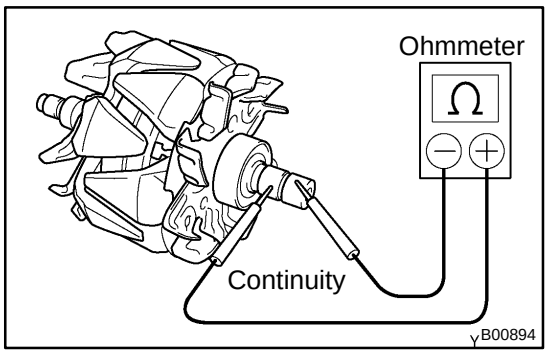
(b) Using SST, remove the rectifier end frame.
SST 09286–46011

(c) Remove the generator washer.

6. REMOVE ROTOR FROM DRIVE END FRAME

CH018–01

INSPECTION

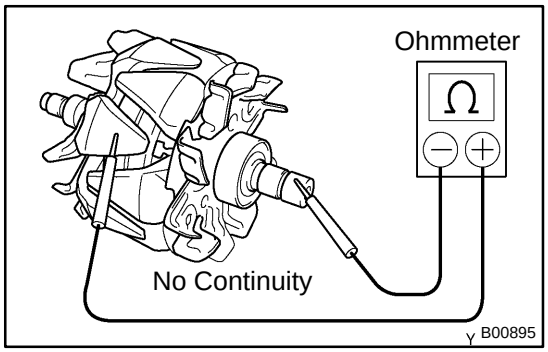


1. INSPECT ROTOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the slip rings.

Standard resistance: 2.1 – 2.5 Ω at 20˚C (68˚F)

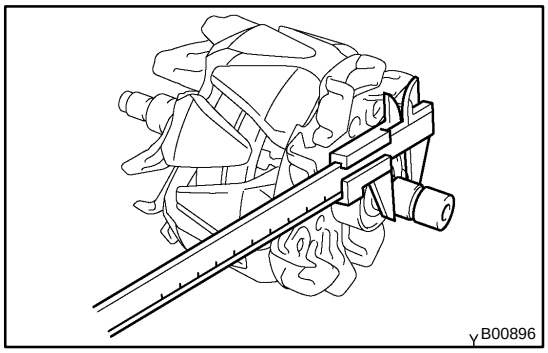
If there is no continuity, replace the rotor.



2. INSPECT 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.



3. INSPECT SLIP RINGS

(a) Check that the slip rings are not rough or scored.

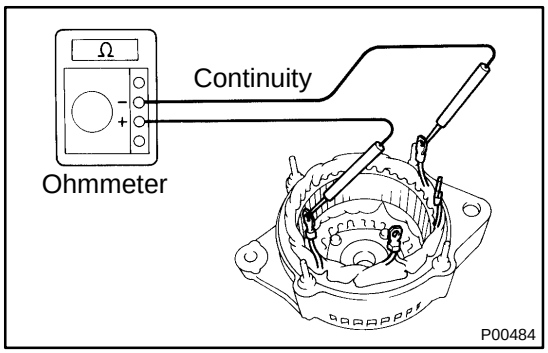
If rough or scored, replace the rotor.

(b) Using a vernier caliper, measure the slip ring diameter.

Standard diameter: 14.2 – 14.4 mm (0.559–0.567 in.)

Minimum diameter: 12.8 mm (0.504 in.)

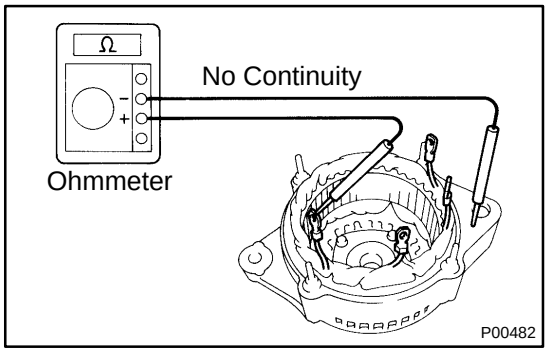
If the diameter is less than minimum, replace the rotor.



4. INSPECT STATOR FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the coil leads.

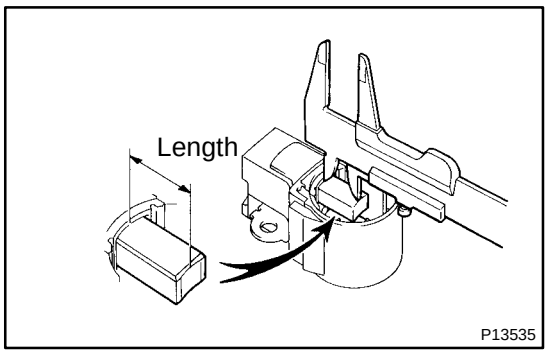
If there is no continuity, replace the drive end frame assembly.



5. INSPECT STATOR FOR GROUND

Using an ohmmeter, check that there is no continuity between the coil lead and drive end frame.

If there is continuity, replace the drive end frame assembly.



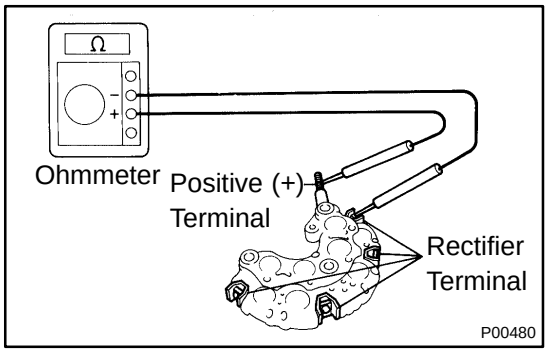
6. INSPECT EXPOSED BRUSH LENGTH

Using a vernier caliper, measure the exposed brush length.

Standard exposed length: 10.5 mm (0.413 in.)

Minimum exposed length: 1.5 mm (0.059 in.)

If the exposed length is less than minimum, replace the brushes and brush holder assembly.



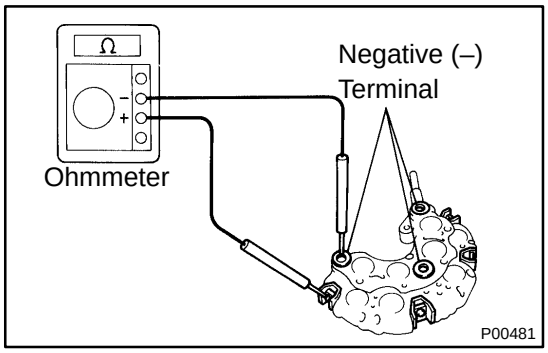
7. INSPECT POSITIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to the positive (+) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

(c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.



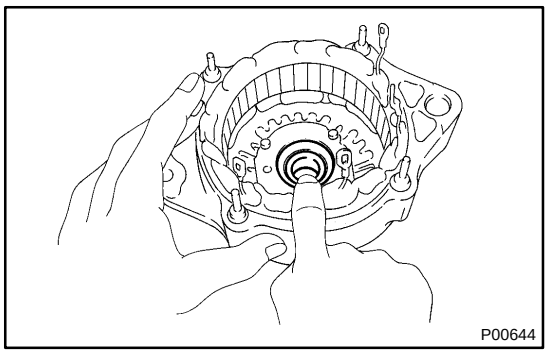
8. INSPECT NEGATIVE RECTIFIER

(a) Using an ohmmeter, connect one tester probe to each negative (–) terminal and the other to each rectifier terminal.

(b) Reverse the polarity of the tester probes and repeat step (a).

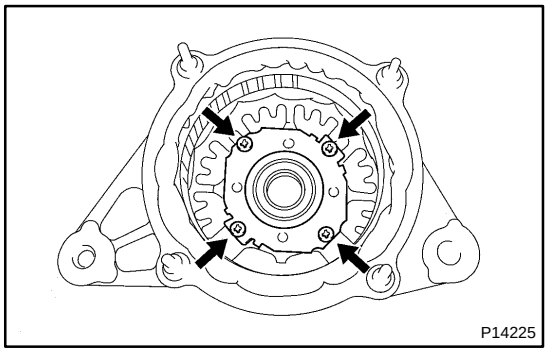
(c) Check that one shows continuity and the other shows no continuity.

If continuity is not as specified, replace the rectifier holder.



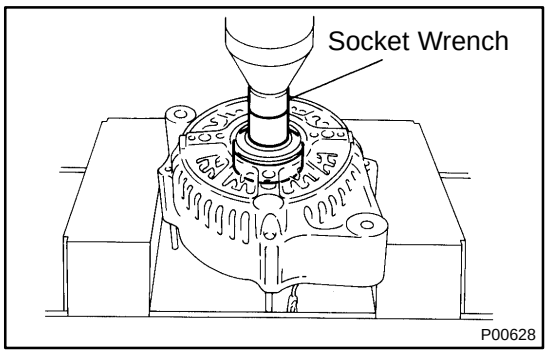
9. INSPECT FRONT BEARING

Check that the bearing is not rough or worn.

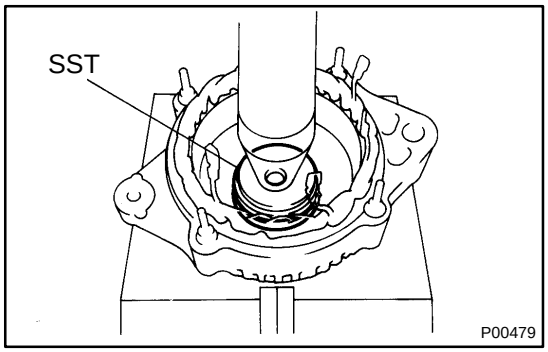


10. IF NECESSARY, REPLACE FRONT BEARING

(a) Remove the 4 screws, bearing retainer and bearing.

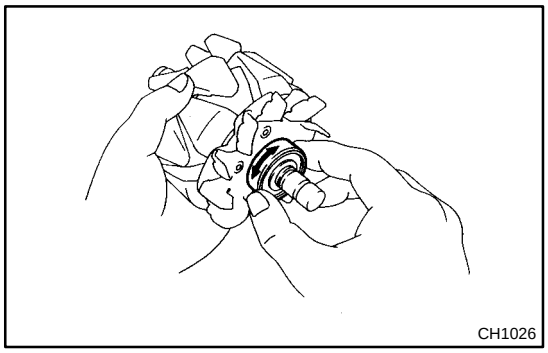


(b) Using a socket wrench and press, press out the bearing.



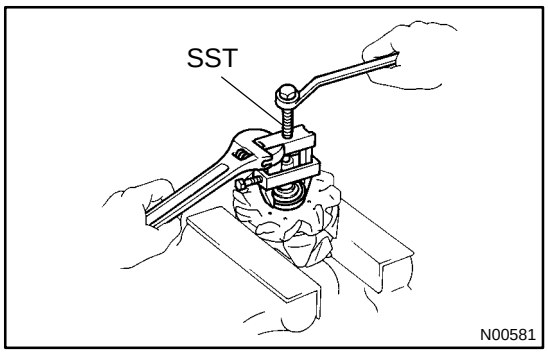
(c) Using SST and a press, press in a new bearing.
SST 09950–60010 (09951–00500)

(d) Install the bearing retainer with the 4 screws.
Torque: 3.0 N·m (31 kgf·cm, 27 in.·lbf)



11. INSPECT REAR BEARING

Check that the bearing is not rough or worn.

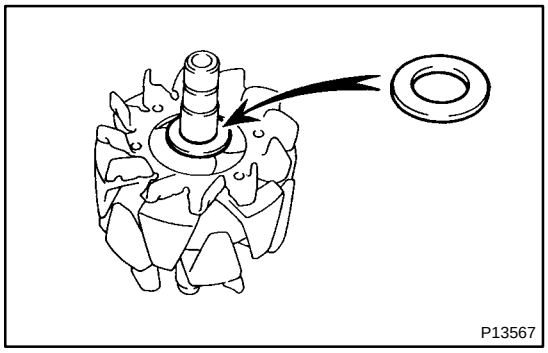


12. IF NECESSARY, REPLACE REAR BEARING

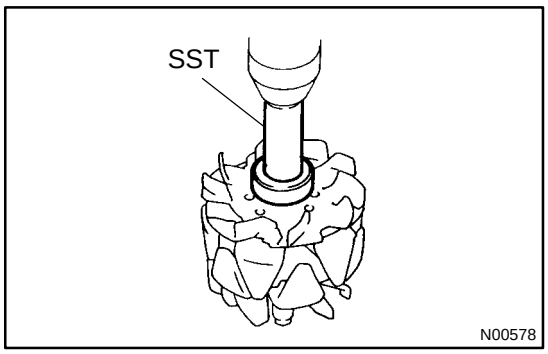
(a) Using SST, remove the bearing cover (outside) and bearing.
SST 09820–00021

NOTICE:
Be careful not to damage the fan.

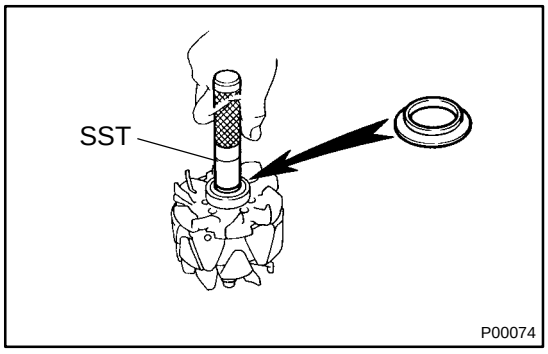
(b) Remove the bearing cover (inside).



(c) Place the bearing cover (inside) on the rotor.



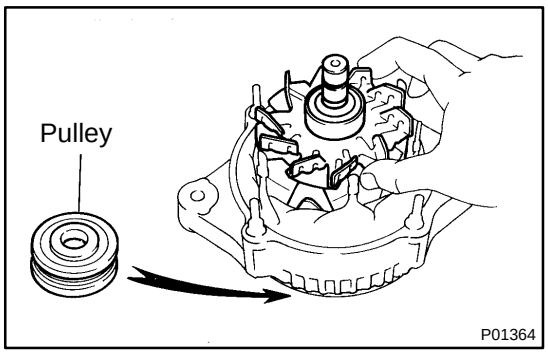
(d) Using SST and a press, press in a new bearing.
SST 09820–00030



(e) Using SST, push in the bearing cover (outside).
SST 09285–76010

CH019–01

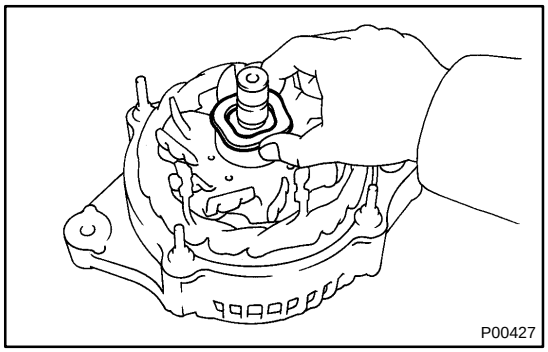
REASSEMBLY



1. INSTALL ROTOR TO DRIVE END FRAME

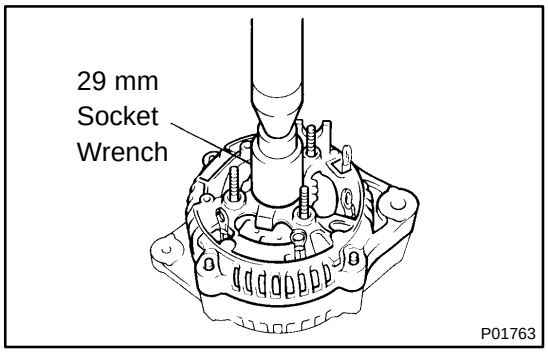
(a) Place the rectifier end frame on the pulley.

(b) Install the rotor to the rectifier end frame.

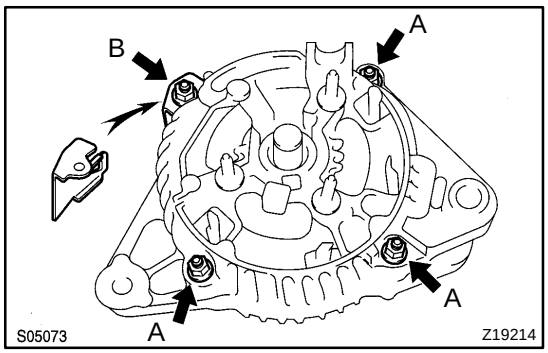


2. INSTALL RECTIFIER END FRAME

(a) Place the generator washer on the rotor.

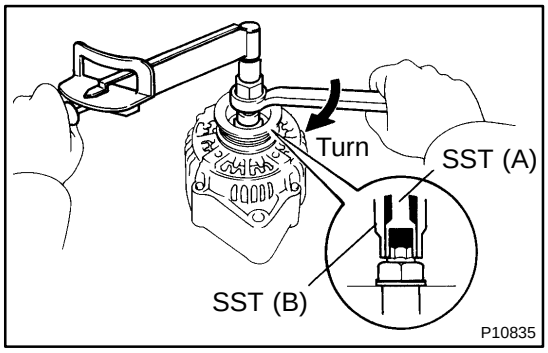


(b) Using a 29 mm socket wrench and press, slowly press in the rectifier end frame.



(c) Install the cord clip with the 4 nuts.

Torque:
Nut A: 4.5 N·m (46 kgf·cm, 40 in.·lbf)
Nut B: 5.4 N·m (55 kgf·cm, 48 in.·lbf)

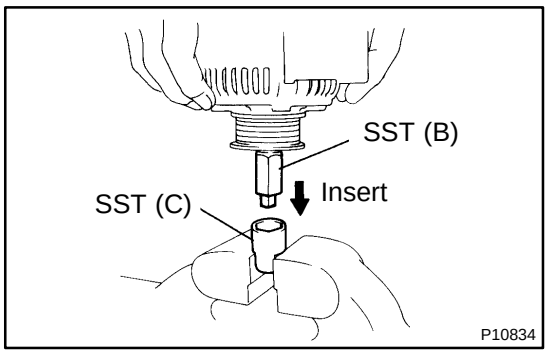


3. INSTALL PULLEY

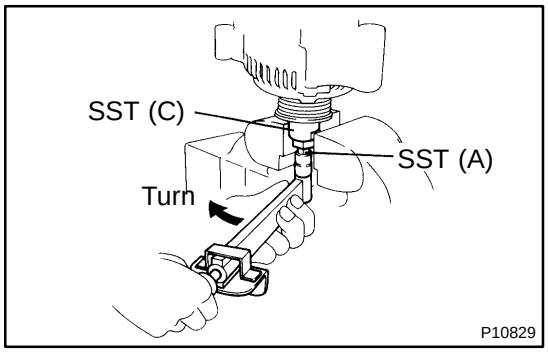
(a) Install the pulley to the rotor shaft by tightening the pulley nut by hand.

(b) Hold SST (A) with a torque wrench, and tighten SST (B) clockwise to the specified torque.
SST 09820–63010
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

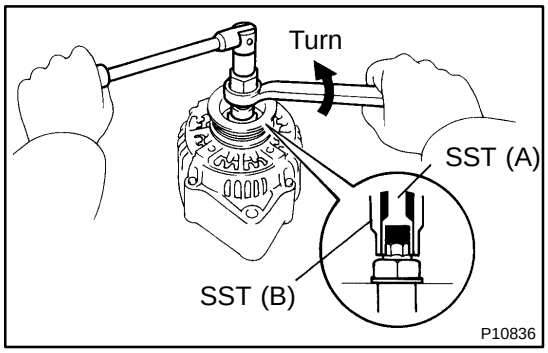
(c) Check that SST (A) is secured to the pulley shaft.



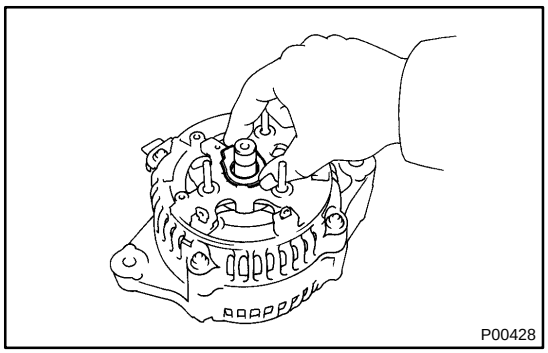
(d) Mount SST (C) in a vise.
(e) Insert SST (B) into SST (C), and attach the pulley nut to SST (C).



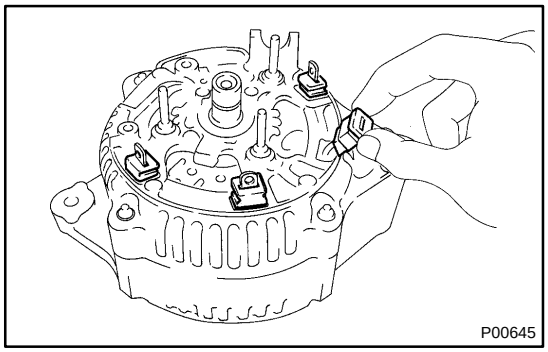
(f) To torque the pulley nut, turn SST (A) in the direction shown in the illustration.
Torque: 110.5 N·m (1,125 kgf·cm, 81 ft·lbf)
(g) Remove the generator from SST (C).



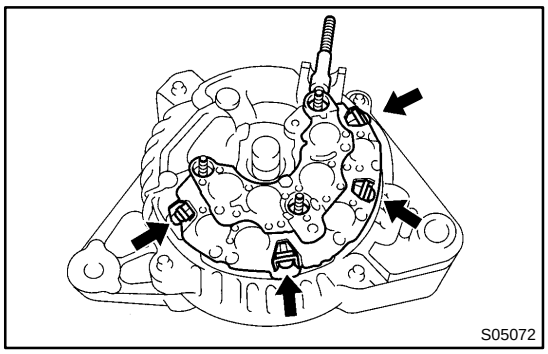
(h) Turn SST (B), and remove SST (A and B).



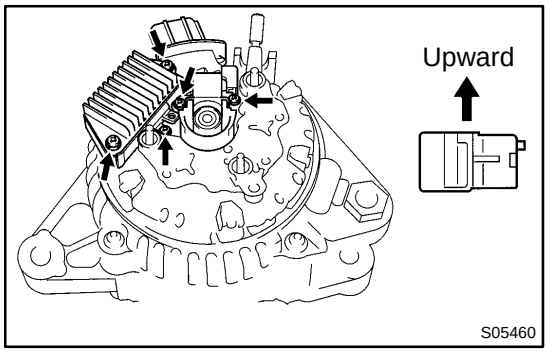
4. INSTALL RECTIFIER HOLDER
(a) Place the seal plate on the rectifier end frame.



(b) Install the 4 rubber insulators on the lead wires.



(c) Install the rectifier holder with the 4 screws.
Torque: 2.9 N·m (30 kgf·cm, 26 in.·lbf)

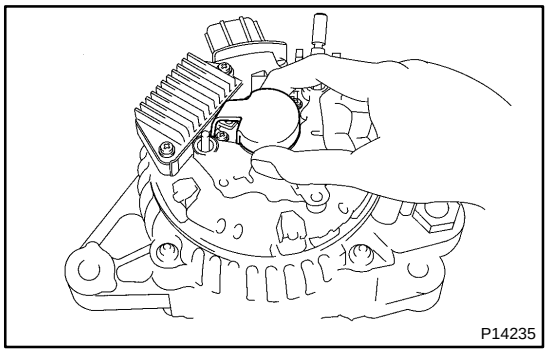


5. INSTALL VOLTAGE REGULATOR AND BRUSH HOLDER

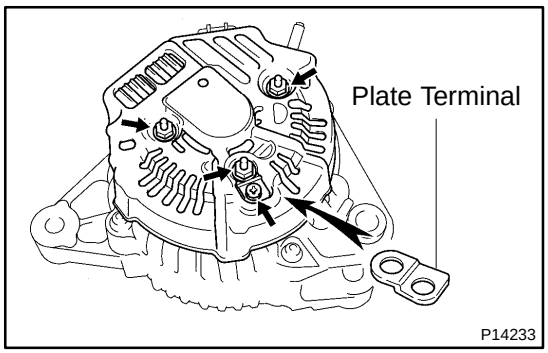
(a) Place the voltage regulator and brush holder on the rectifier end frame.

NOTICE:
Be careful of the holder installation direction.

(b) Install the 5 screws.
Torque: 2.0 N·m (20 kgf·cm, 18 in.·lbf)

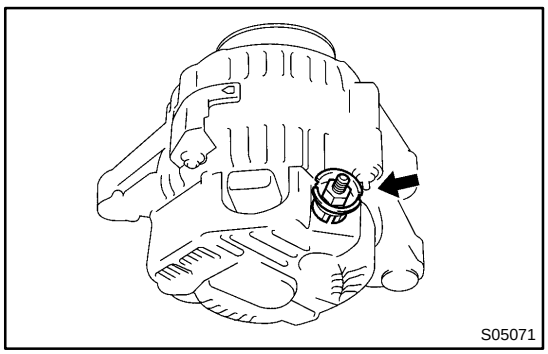


(c) Place the brush holder cover on the brush holder.



6. INSTALL REAR END COVER

(a) Install the end cover and plate terminal with the 3 nuts and screw.
Torque:
Screw: 3.9 N·m (39 kgf·cm, 35 in.·lbf)
Nut: 4.4 N·m (45 kgf·cm, 39 in.·lbf)



(b) Install the terminal insulator with the nut.
Torque: 4.1 N·m (42 kgf·cm, 36 in.·lbf)

7. CHECK THAT ROTOR ROTATES SMOOTHLY

CH01A–01

INSTALLATION

Installation is in the reverse order of removal (See page CH–6).

COOLANT

CO02K–02

INSPECTION

1. CHECK ENGINE COOLANT LEVEL AT RADIATOR RESERVOIR

The engine coolant level should be between the ”LOW” and ”FULL” lines, when the engine is cold.

If low, check for leaks and add ”Toyota Long Life Coolant” or Equivalent up to the ”FULL” line.

2. CHECK ENGINE COOLANT QUALITY

(a) Remove the radiator cap from the water outlet.

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 water outlet 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.

CO02L–02

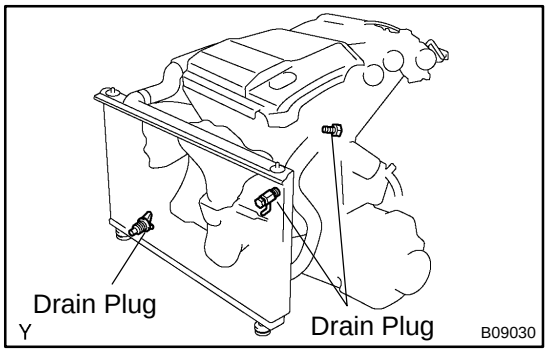
REPLACEMENT

1. DRAIN ENGINE COOLANT

(a) Remove the radiator cap from the water outlet.

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) Loosen the radiator drain plug and engine drain plugs, and drain the coolant.

(c) Close the drain plugs.

Torque:

RH engine drain plug on cylinder block side cover:
7 N·m (70 kgf·cm, 61 in.·lbf)
LH engine drain plug on union:
13 N·m (130 kgf·cm, 9 ft·lbf)

2. FILL ENGINE COOLANT

(a) Slowly fill the system with coolant.

- Use of improper coolants may damage engine cooling system.
- Use ”Toyota Long life Coolant” or equivalent and mix it with plan water according to the manufacturer’s directions.
- Using of coolant which includes more than 50 % (freezing protection down to –35˚C (–31˚F) or 60 % (freezing protection down to –50˚C (–58˚F)) of ethylene–glycol is recommended but not more than 70 %.

NOTICE:

- **Do not use an alcohol type coolant or plain water alone.**
- **The coolant should be mixed with plain water (preferably demineralized water or distilled water).**
  Capacity: 9.2 liters (9.7 US qts, 8.1 lmp. qts)

(b) Install the radiator cap.

(c) Start the engine, and bleed the cooling system.

(d) If necessary, refill coolant into the reservoir up to the ”FULL” line.

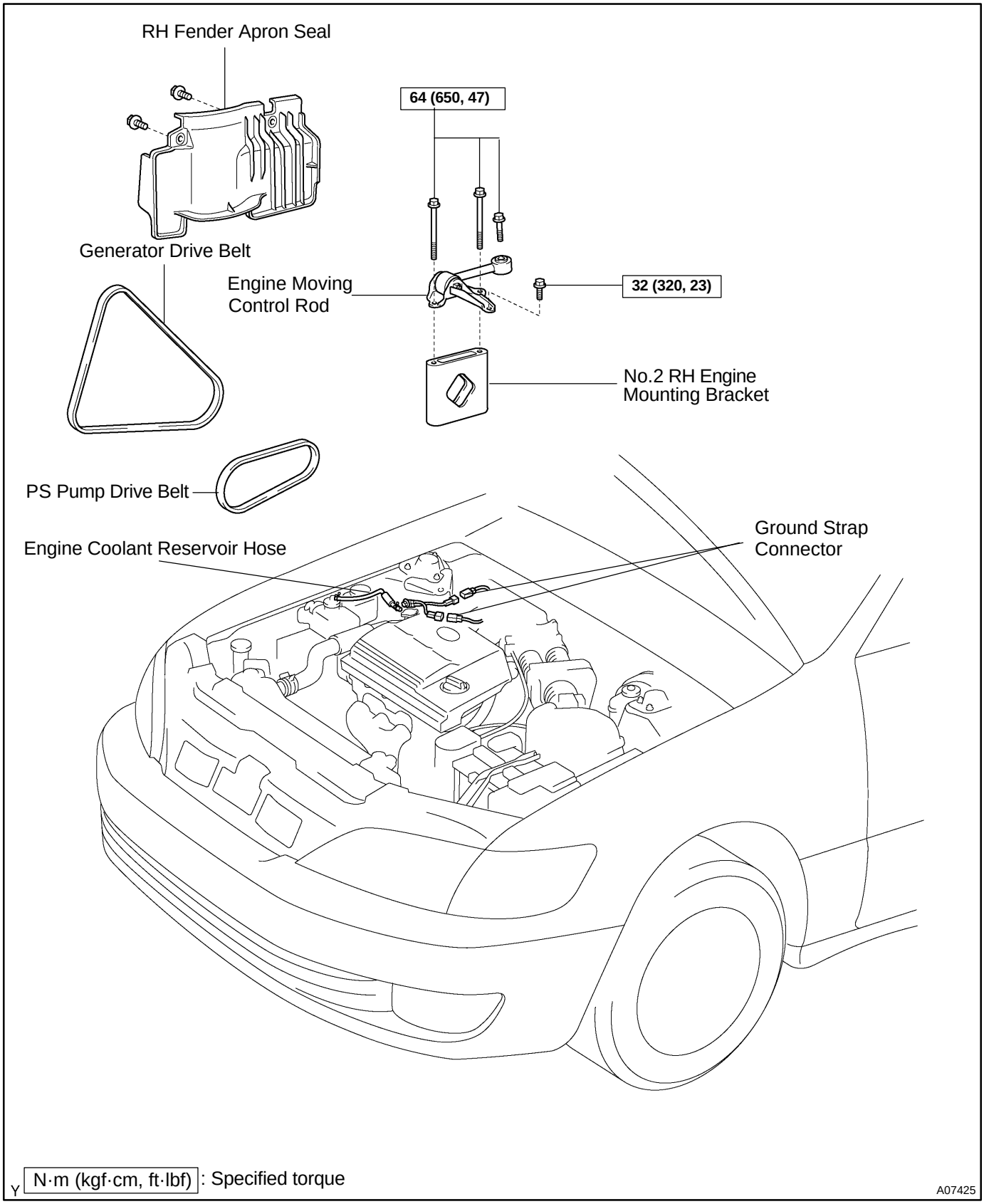
3. CHECK ENGINE COOLANT FOR LEAKS

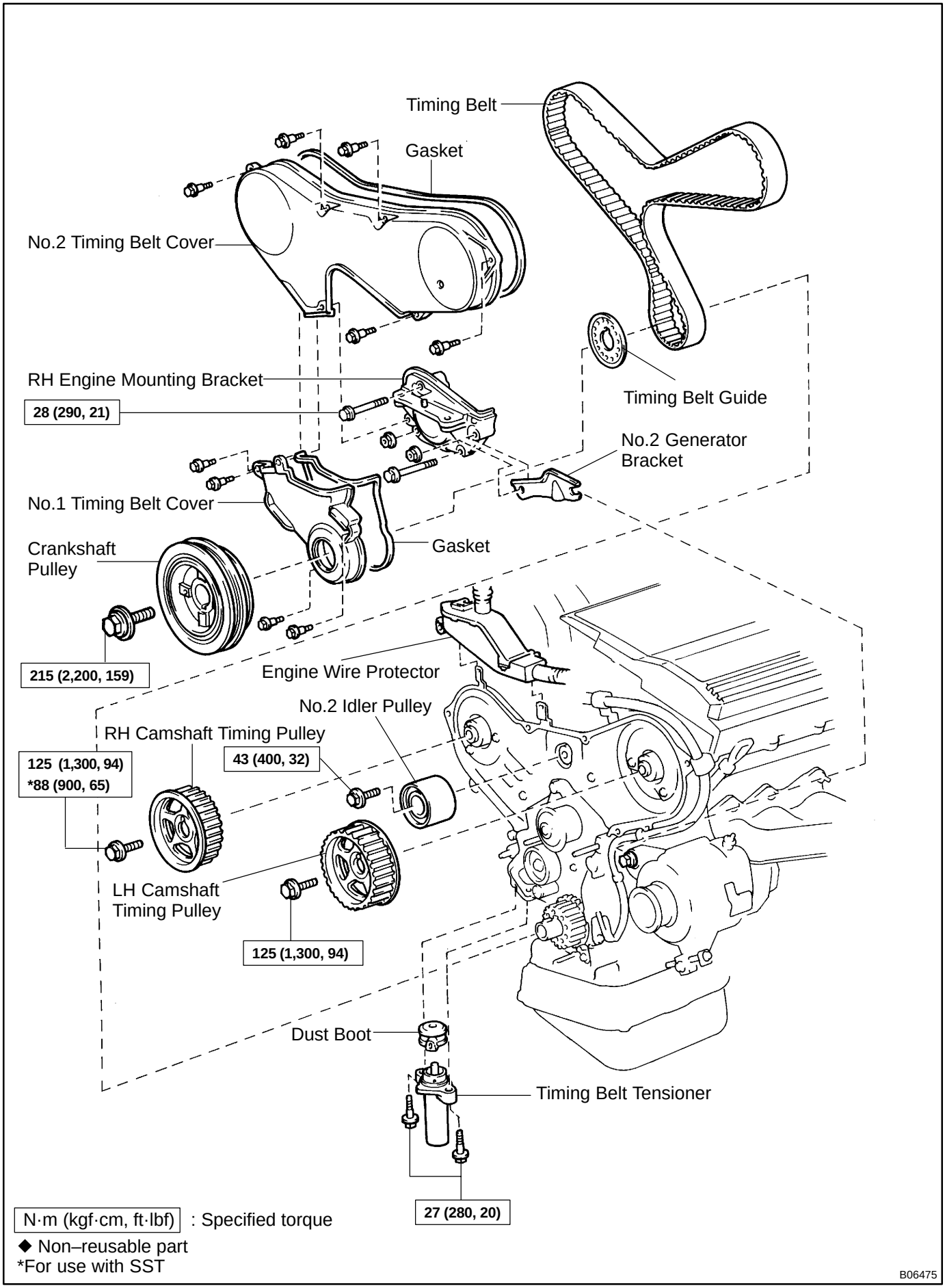
4. CHECK ENGINE COOLANT SPECIFIC GRAVITY CORRECTLY

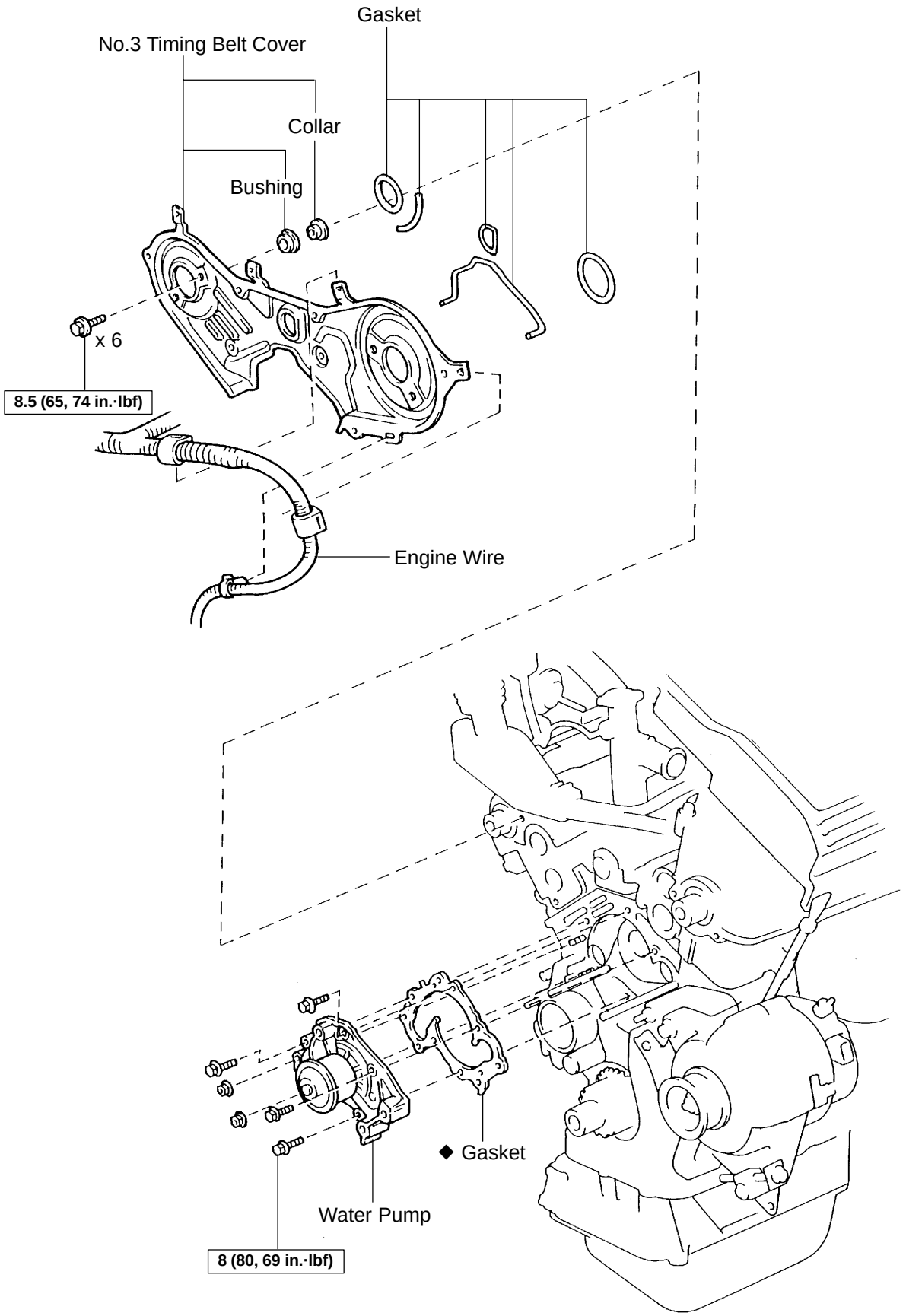
WATER PUMP

COMPONENTS

CO02M–02




Timing Belt
Gasket
No.2 Timing Belt Cover
RH Engine Mounting Bracket
28 (290, 21)
Timing Belt Guide
No.2 Generator Bracket
No.1 Timing Belt Cover
Gasket
Crankshaft Pulley
215 (2,200, 159)
Engine Wire Protector
No.2 Idler Pulley
RH Camshaft Timing Pulley
125 (1,300, 94)
*88 (900, 65)
43 (400, 32)
LH Camshaft Timing Pulley
125 (1,300, 94)
Dust Boot
Timing Belt Tensioner
27 (280, 20)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
*For use with SST
B06475



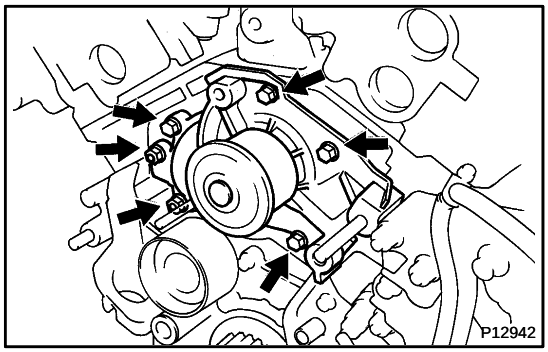
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part

B06476

CO0SV–01

REMOVAL

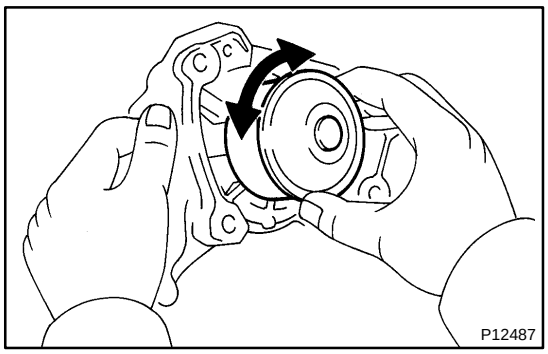
1. DRAIN ENGINE COOLANT
2. REMOVE TIMING BELT (See page EM–15)
3. REMOVE CAMSHAFT TIMING PULLEYS (See page EM–15)
4. REMOVE NO.2 IDLER PULLEY (See page EM–31)
5. REMOVE NO.3 TIMING BELT COVER (See page EM–15)



6. REMOVE WATER PUMP

Remove the 4 bolts, 2 nuts, water pump and gasket.

CO02O–02



INSPECTION

1. INSPECT WATER PUMP

(a) Visually check the drain hole for coolant leakage.

If leakage is found, replace the water pump.

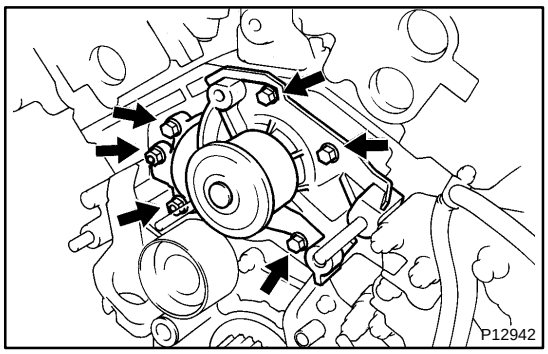
(b) Turn the pulley, and check that the water pump bearing moves smoothly and quietly.

If necessary, replace the water pump.

2. INSPECT TIMING BELT COMPONENTS

(See page EM–19)

CO02P–02



INSTALLATION

1. INSTALL WATER PUMP

Install a new gasket and the water pump with the 4 bolts and 2 nuts.

Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

NOTICE:

Do not get oil on the gasket.

2. INSTALL NO.3 TIMING BELT COVER
(See page EM–59)

3. INSTALL NO.2 IDLER PULLEY
(See page EM–21)

4. INSTALL CAMSHAFT TIMING PULLEYS
(See page EM–21)

5. INSTALL TIMING BELT
(See page EM–21)

6. FILL WITH ENGINE COOLANT

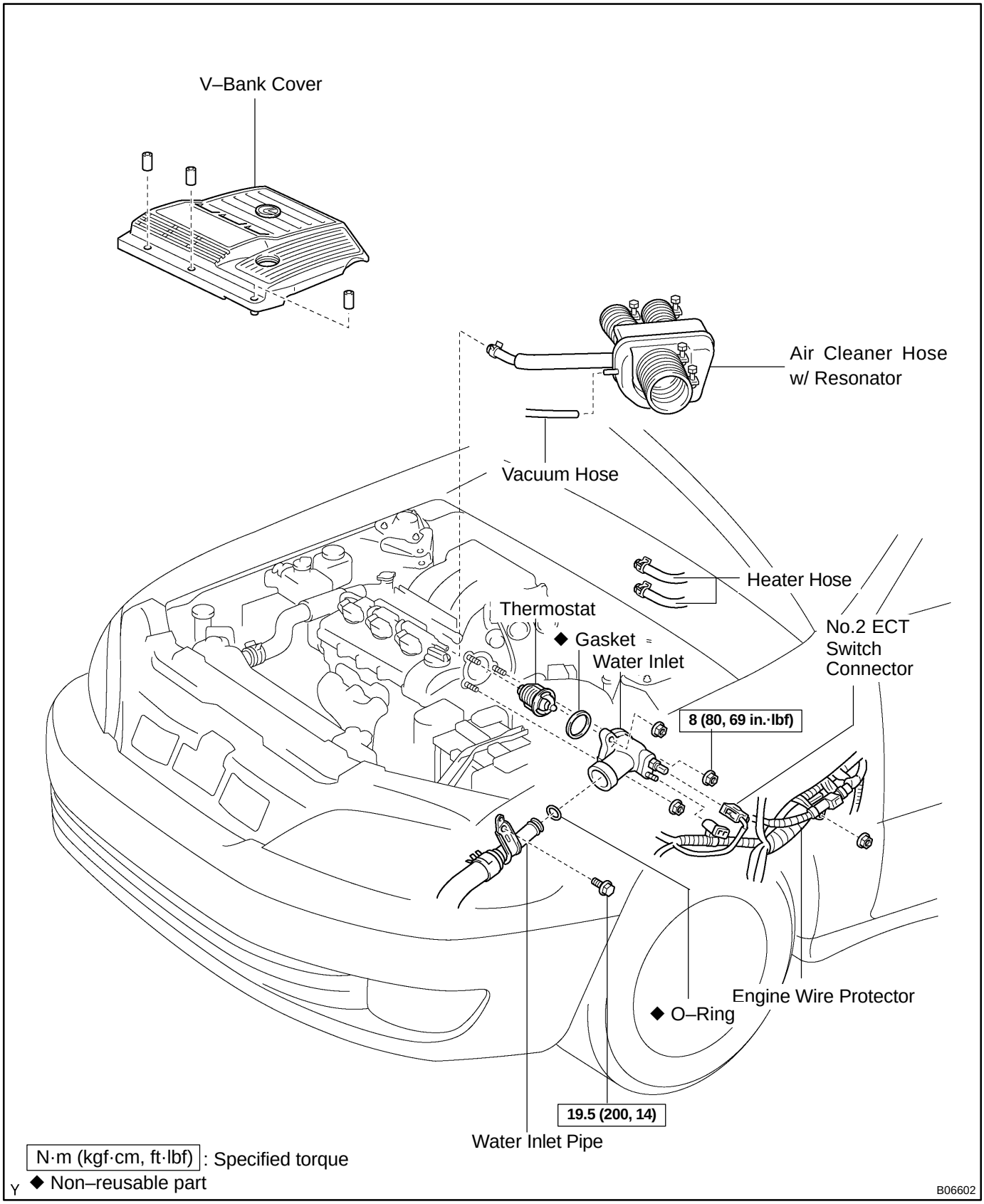
7. START ENGINE AND CHECK FOR LEAKS

8. RECHECK ENGINE COOLANT LEVEL

THERMOSTAT

COMPONENTS

CO02Q–02



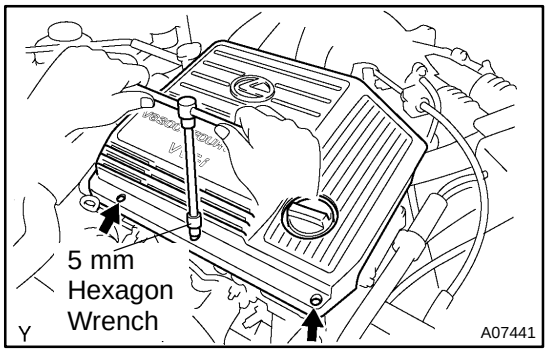
CO0SW–01

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. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

(c) Remove the V–bank cover.

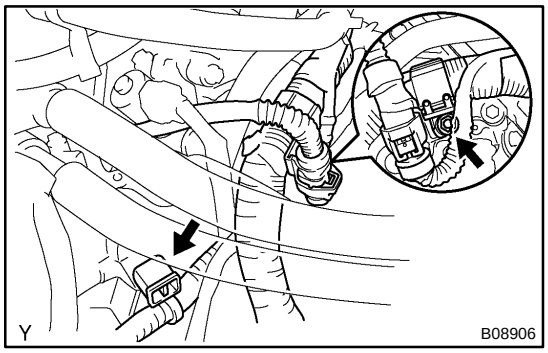
3. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

4. REMOVE AIR CLEANER HOSE WITH RESONATOR

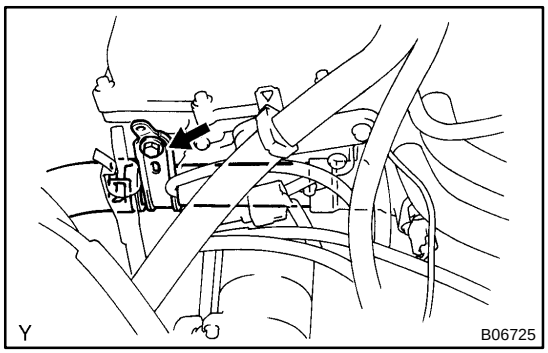
5. DISCONNECT HEATER HOSES

6. DISCONNECT NO.2 ECT SWITCH CONNECTOR



7. DISCONNECT ENGINE WIRE PROTECTOR FROM WATER INLET AND RH CYLINDER HEAD

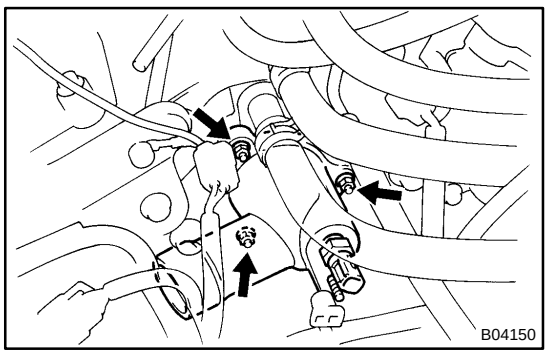
Remove the nut and disconnect the clamp, and disconnect the engine wire protector from the water inlet and cylinder head.



8. DISCONNECT WATER INLET PIPE FROM WATER INLET AND LH CYLINDER HEAD

(a) Remove the bolt, and disconnect the inlet pipe from the water inlet.

(b) Remove the O–ring from the inlet pipe.

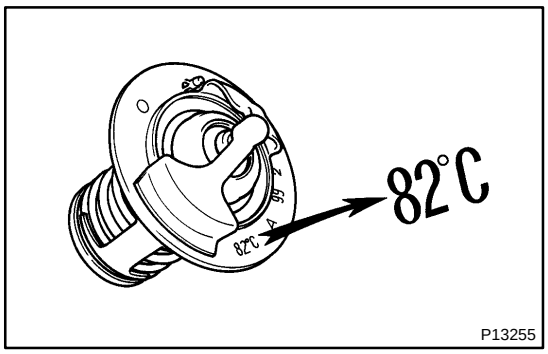


9. REMOVE WATER INLET AND THERMOSTAT

(a) Remove the 3 nuts, water inlet and thermostat.

(b) Remove the gasket from the thermostat.

CO02S–02

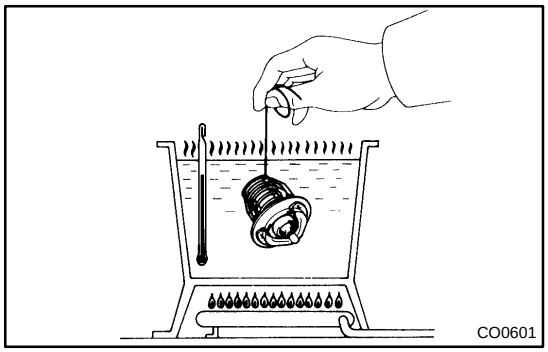


INSPECTION

INSPECT THERMOSTAT

HINT:

The thermostat is numbered with the valve opening temperature.

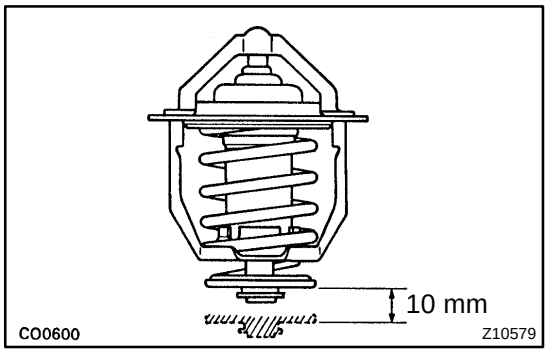


(a) Immerse the thermostat in water and gradually heat the water.

(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.



(c) Check the valve lift.

Valve lift: 10.0 mm (0.394 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)).

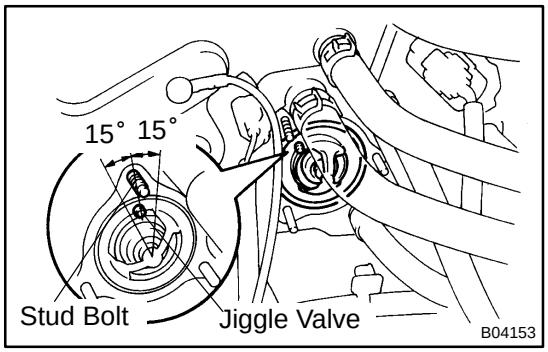
If not closed, replace the thermostat.

CO02T–02

INSTALLATION

1. PLACE THERMOSTAT IN WATER PUMP

(a) Install a new gasket on to the thermostat.



(b) Align the thermostat jiggle valve with the upper stud bolt, and insert the thermostat in the water inlet housing.

HINT:

The jiggle valve may be set within 15° of either side of the prescribed position.

2. INSTALL WATER INLET

Install the water inlet with the 3 nuts.

Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

3. INSTALL WATER INLET PIPE

(a) Install a new O–ring to the water inlet pipe.

(b) Apply soapy water to the O–ring.

(c) Connect the water inlet pipe to the water inlet.

(d) Install the bolt holding the water inlet pipe to the LH cylinder head.

Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

4. INSTALL ENGINE WIRE PROTECTOR

5. CONNECT NO.2 ECT SWITCH CONNECTOR

6. CONNECT HEATER HOSES

7. REINSTALL AIR CLEANER HOSE WITH RESONATOR

8. INSTALL V–BANK COVER

(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

(b) Press down the V–bank cover fastener.

9. FILL WITH ENGINE COOLANT

10. START ENGINE AND CHECK FOR LEAKS

11. RECHECK ENGINE COOLANT LEVEL

RADIATOR
ON–VEHICLE CLEANING

CO02U–01

Using water or a steam cleaner, remove any mud or dirt from the radiator core.

NOTICE:

If using a high pressure type cleaner, be careful not to deform the fins of the radiator core. (i.e. Maintain a distance between the cleaner nozzle radiator core)

CO02V–02

ON–VEHICLE INSPECTION

1. REMOVE RADIATOR CAP

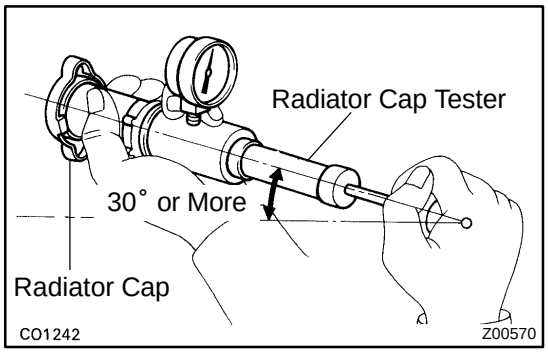
CAUTION:

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 blow out under pressure.

2. INSPECT RADIATOR CAP

NOTICE:

- **If the radiator cap has contaminations, always rinse it with water.**
- **When performing steps (a) and (b) below, keep the radiator cap tester at an angle of over 30° above the horizontal.**
- **Before using a radiator cap tester, wet the relief valve and pressure valve with engine coolant or water.**



(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 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:

83 – 113 kPa (0.85 – 1.15 kgf/cm^2, 12.1 – 16.4 psi)

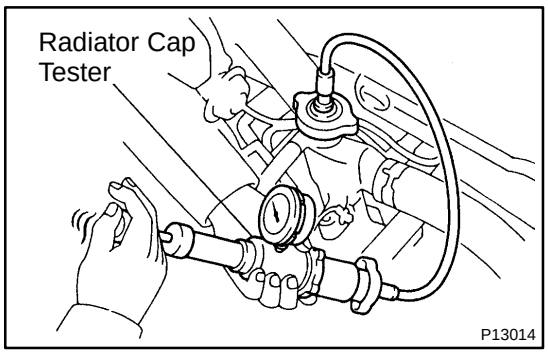
Minimum opening pressure:

69 kPa (0.7 kgf/cm^2, 10.0 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.

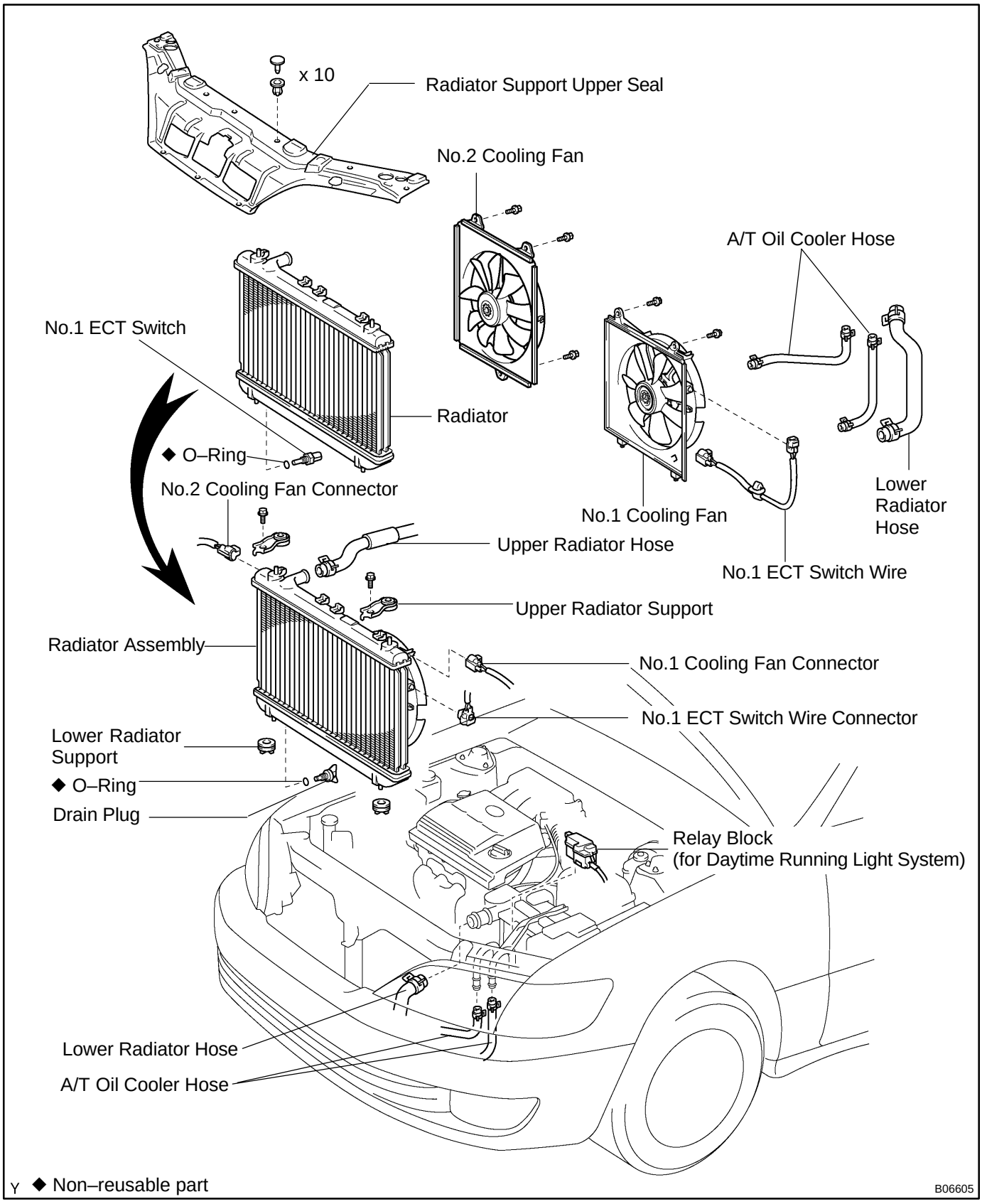
(c) Pump it to 127 kPa (1.3 kgf/cm^2, 18.5 psi), and check that the pressure does not drop.

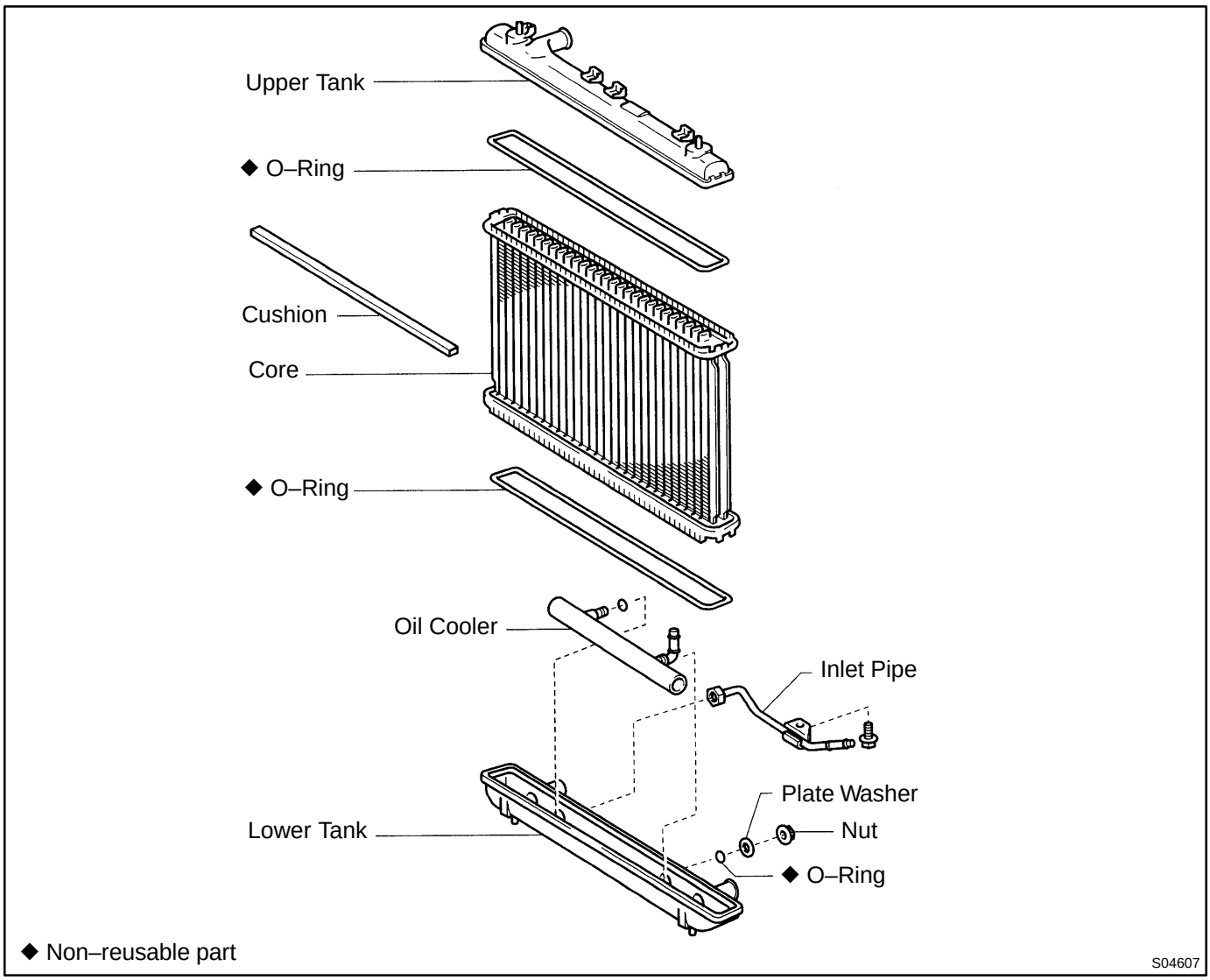
If the pressure drops, check the hoses, radiator or water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

4. REINSTALL RADIATOR CAP

CO02W–02

COMPONENTS




Upper Tank
◆ O–Ring
Cushion
Core
◆ O–Ring
Oil Cooler
Inlet Pipe
Plate Washer
Nut
◆ O–Ring
Lower Tank
◆ Non–reusable part
S04607

CO02X–02

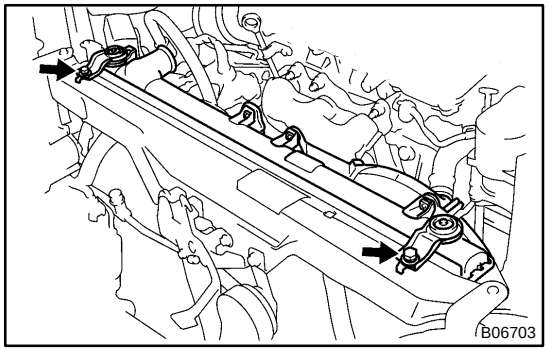
REMOVAL

HINT:

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

- Start the engine, and check for coolant and A/T fluid leaks.
- Check the A/T fluid level (See page DI–163).

1. **DRAIN ENGINE COOLANT**
2. **REMOVE RADIATOR SUPPORT UPPER SEAL**
3. **DISCONNECT RELAY BLOCK (FOR DAYTIME RUNNING LIGHT SYSTEM) FROM BATTERY HOLD–DOWN CLAMP**
4. **DISCONNECT UPPER RADIATOR HOSE FROM RADIATOR**
5. **DISCONNECT LOWER RADIATOR HOSE FROM WATER INLET PIPE**
6. **DISCONNECT A/T OIL COOLER HOSES FROM OIL COOLER PIPES**
7. **DISCONNECT NO.1 AND NO.2 COOLING FAN CONNECTORS**
8. **DISCONNECT NO.1 ECT SWITCH WIRE CONNECTOR**

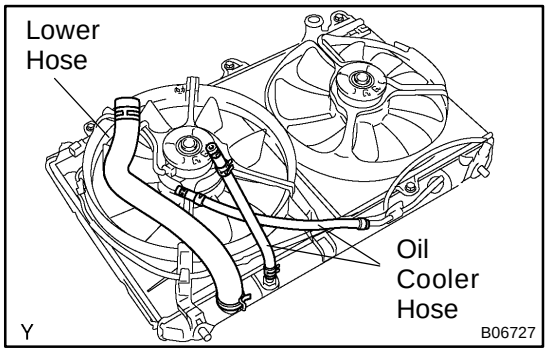


9. **REMOVE RADIATOR AND COOLING FANS ASSEMBLY**

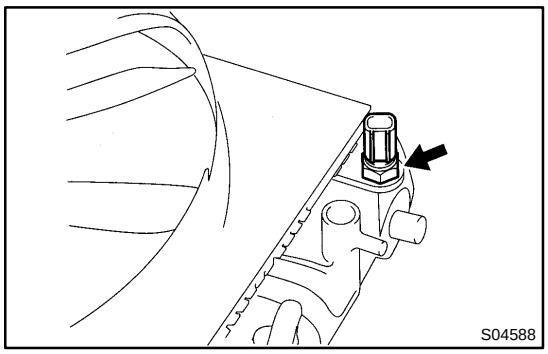
(a) Remove the 2 bolts and 2 upper supports.
Torque: 12.8 N·m (130 kgf·cm, 9 ft·lbf)

(b) Lift out the radiator, and remove the radiator and cooling fans assembly.

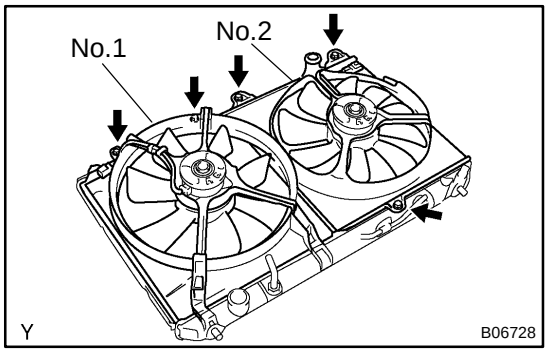
(c) Remove the 2 lower supports.



10. **REMOVE A/T OIL COOLER HOSES FROM RADIATOR**
11. **REMOVE LOWER RADIATOR HOSE FROM RADIATOR**



12. REMOVE NO.1 ECT SWITCH



13. REMOVE NO.1 COOLING FAN FROM RADIATOR

Remove the 2 bolts and cooling fan.

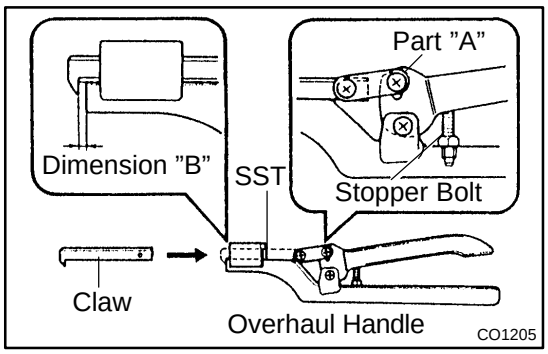
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

14. REMOVE NO.2 COOLING FAN FROM RADIATOR

Remove the 3 bolts and cooling fan.

Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

CO02Y–02



DISASSEMBLY

1. REMOVE CUSHION FROM RADIATOR

2. ASSEMBLE SST

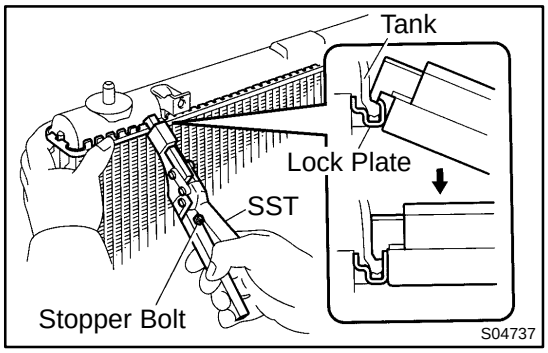
SST 09230–01010

(a) Install the claw to the overhaul handle, inserting it in the hole in part ”A” as shown in the diagram.

(b) While gripping the handle, adjust the stopper bolt so that dimension ”B” shown in the diagram is 0.2 – 0.5 mm (0.008 – 0.020 in.).

NOTICE:

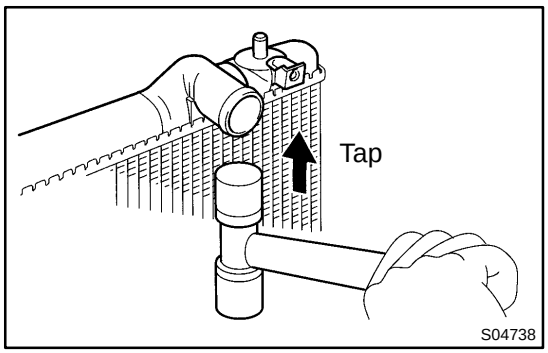
If this adjustment is not done, the claw may be damaged.



3. UNCAULK LOCK PLATES

Using SST to release the caulking, squeeze the handle until stopped by the stopper bolt.

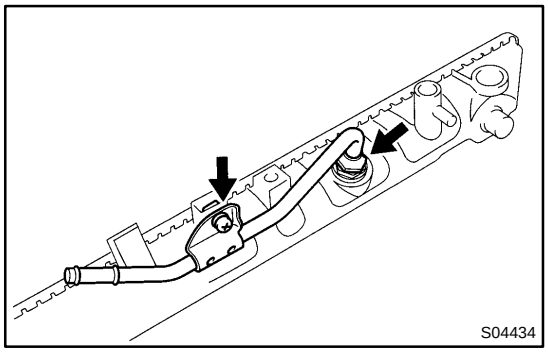
SST 09230–01010



4. REMOVE TANKS AND O–RINGS

(a) Lightly tap the bracket of the radiator (or radiator hose inlet or outlet) with a soft–faced hammer and remove the tank.

(b) Remove the O–ring.



5. REMOVE OIL COOLER FROM LOWER TANK

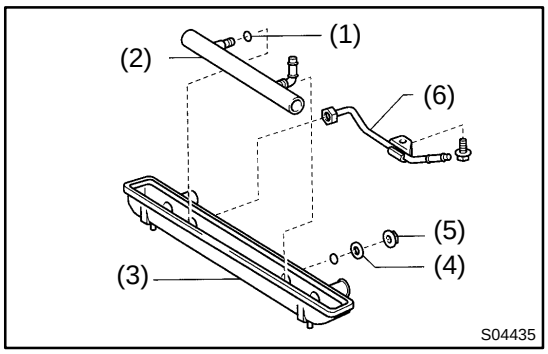
(a) Remove the pipe.

(b) Remove the nuts and plate washers.

(c) Remove the oil cooler and O–rings.

CO02Z–02

REASSEMBLY



1. INSTALL OIL COOLER TO LOWER TANK

(a) Clean the O–ring contact surface of the lower tank and oil cooler.

(b) Install a new O–rings (1) to the oil cooler (2).

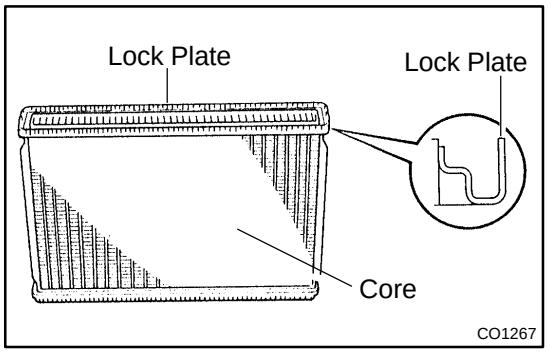
(c) Install the oil cooler with the O–rings to the lower tank (3).

(d) Install the plate washers (4), and nuts (5). Torque the nuts.

Torque: 8.3 N·m (85 kgf·cm, 74 in.·lbf)

(e) Install the pipe (6).

Torque: 14.7 N·m (150 kgf·cm, 11 ft·lbf)



2. INSPECT LOCK PLATE

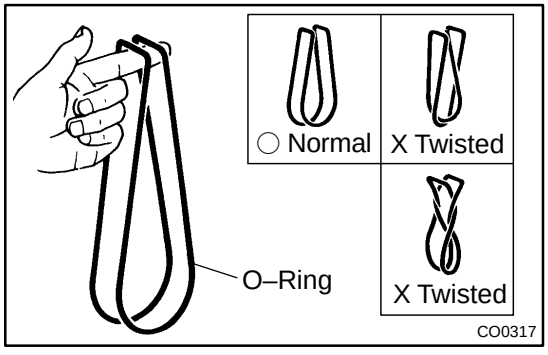
Inspect the lock plate for damage.

HINT:

- If the sides of the lock plate groove are deformed, reassembly of the tank will be impossible.
- Therefore, first correct any deformation with pliers or similar object. Water leakage will result if the bottom of the lock plate groove is damaged or dented, Therefore, repair or replace if necessary.

NOTICE:

The radiator can only be recaulked 2 times. After the 2nd time, the radiator core must be replaced.

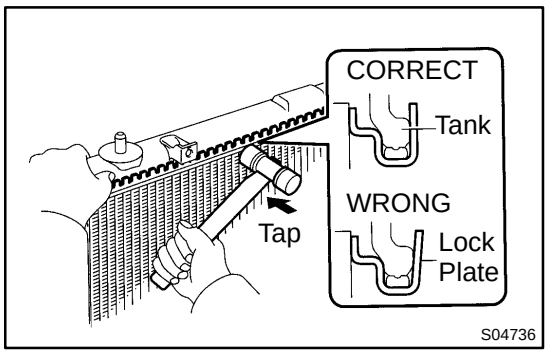


3. INSTALL NEW O–RINGS AND TANKS

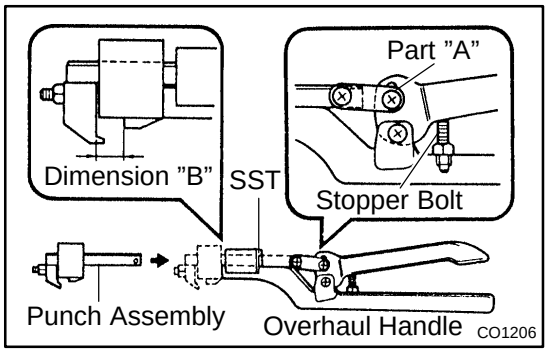
(a) After checking that there are no foreign objects in the lock plate groove, install the new O–ring without twisting it.

HINT:

When cleaning the lock plate groove, lightly rub it with sand paper without scratching it.



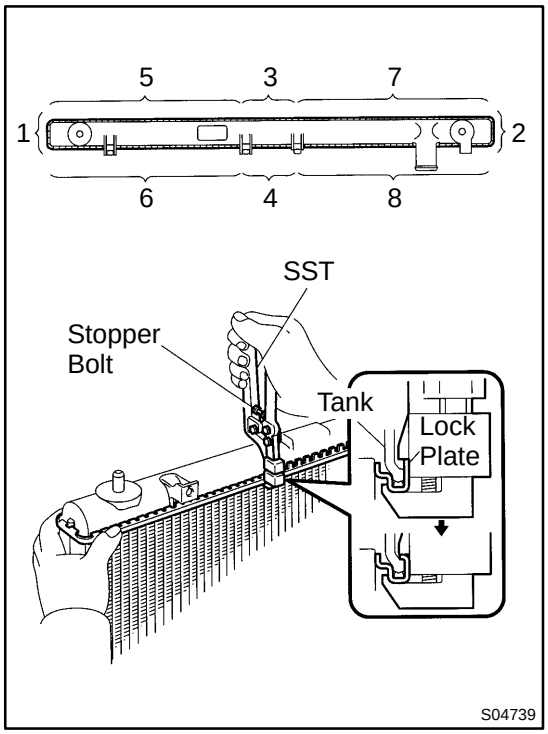
(b) Install the tank without damaging the O–ring.
(c) Tap the lock plate with a soft–faced hammer so that there is no gap between it and the tank.



4. ASSEMBLE SST

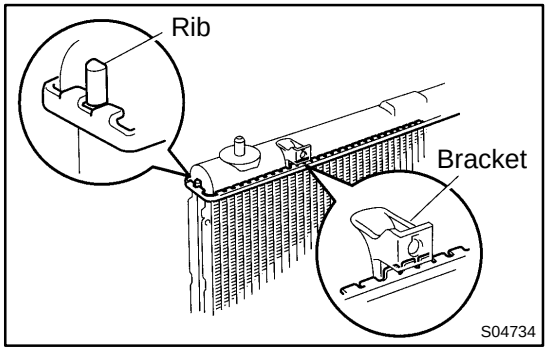
SST 09230–01010, 09231–14010

(a) Install the punch assembly to the overhaul handle, inserting it in the hole in part ”A” as shown in the illustration.
(b) While gripping the handle, adjust the stopper bolt so that dimension ”B” shown in the diagram.
Dimension ”B”: 8.4 mm (0.34 in.)



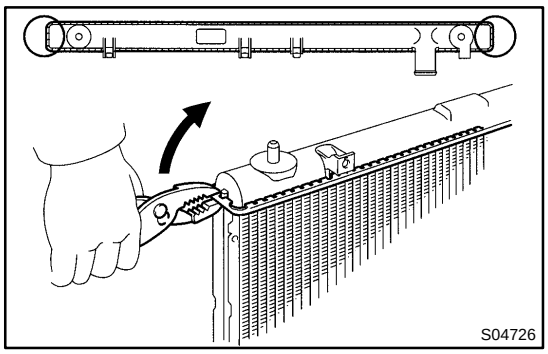
5. CAULK LOCK PLATE

(a) Lightly press SST against the lock plate in the order shown in the illustration. After repeating this a few times, fully caulk the lock plate by squeezing the handle until stopped by the stopper plate.
SST 09230–01010

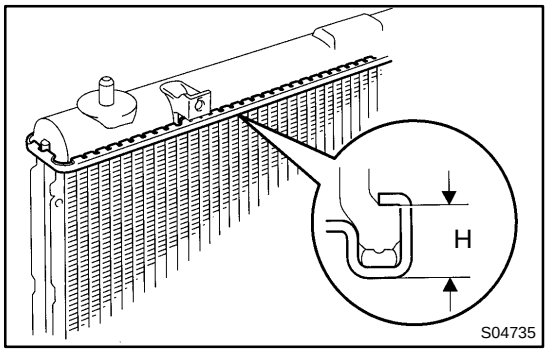


HINT:

◆ Do not stake the areas protruding around the pipes, brackets or tank ribs.



◆ The points shown in the rib sides and oil cooler near here cannot be staked with SST. Use pliers or similar object and be careful not to damage the core plates.



(b) Check the lock plate height (H) after completing the caulking.

Plate height (H): 7.4 – 7.8 mm (0.2959 – 0.3119 in.)

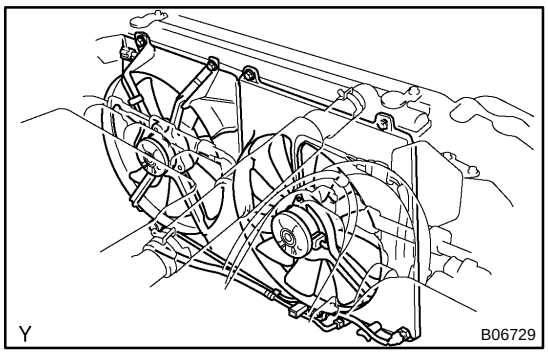
If not within the specified height, adjust the stopper bolt of the handle again and caulk again.

6. INSTALL CUSHION

CO030–01

INSTALLATION

Installation is in the reverse order of removal (See page CO–18).



ELECTRIC COOLING FAN

CO031–02

ON–VEHICLE INSPECTION

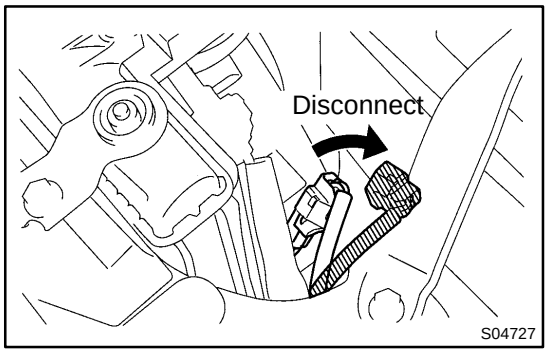
1. CHECK COOLING FAN OPERATION WITH LOW TEMPERATURE (Below 88˚C (190˚F))

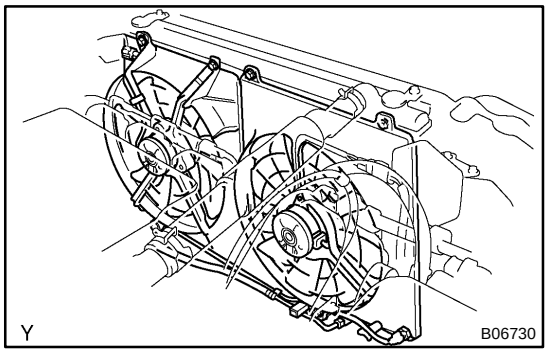
(a) Turn the ignition switch ON.

(b) Check that the cooling fan stops.

If not, check the cooling fan relay and ECT switch, and check for a separated connector or severed wire between the cooling fan relay and ECT switch.

(c) Disconnect the No.1 ECT switch connector.

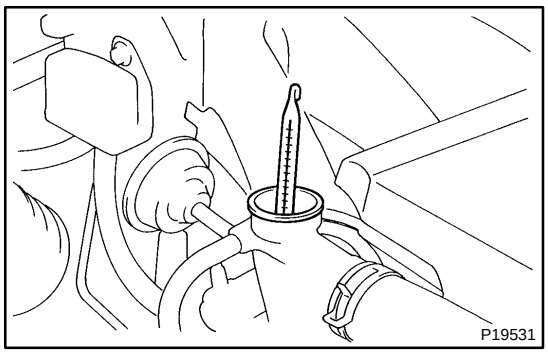




(d) Check that the cooling fan rotates.

If not, check the fuses, engine main relay, cooling fan relay, cooling fan, and check for a short circuit between the cooling fan relay and ECT switch.

(e) Reconnect the No.1 ECT switch connector.

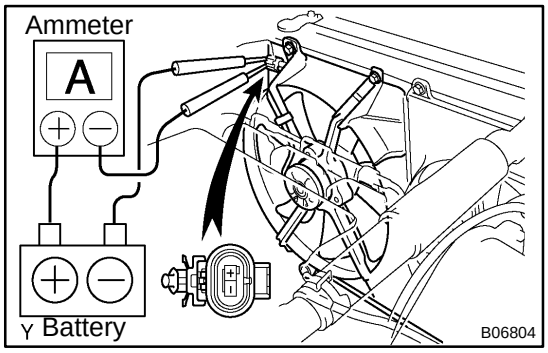


2. CHECK COOLING FAN OPERATION WITH HIGH TEMPERATURE (Above 98˚C (208˚F))

(a) Start the engine, and raise coolant temperature to above 98˚C (208˚F).

(b) Check that the cooling fan rotates.

If not, replace the No.1 ECT switch.



3. INSPECT NO.1 COOLING FAN

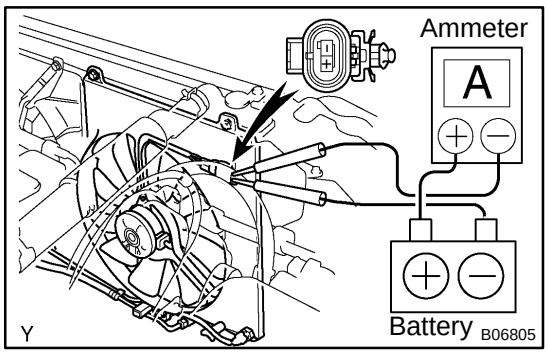
(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

Standard amperage: 8.5 – 11.5 A at 20˚C (68˚F)

(d) Reconnect the cooling fan connector.



4. INSPECT NO.2 COOLING FAN

(a) Disconnect the cooling fan connector.

(b) Connect battery and ammeter to the cooling fan connector.

(c) Check that the cooling fan rotates smoothly, and check the reading on the ammeter.

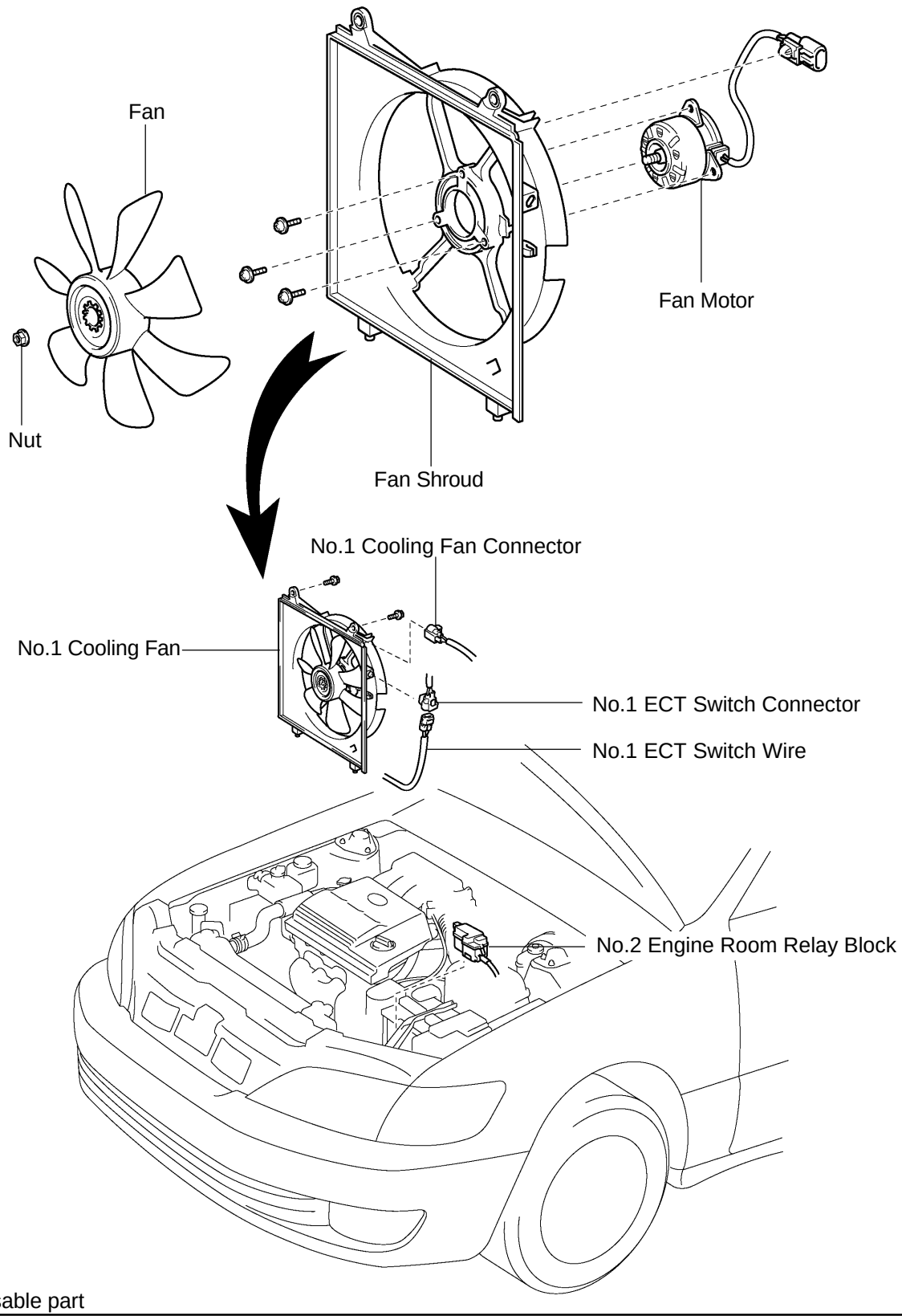
Standard amperage: 8.5 – 11.5 A at 20˚C (68˚F)

(d) Reconnect the cooling fan connector.

CO032–03

COMPONENTS

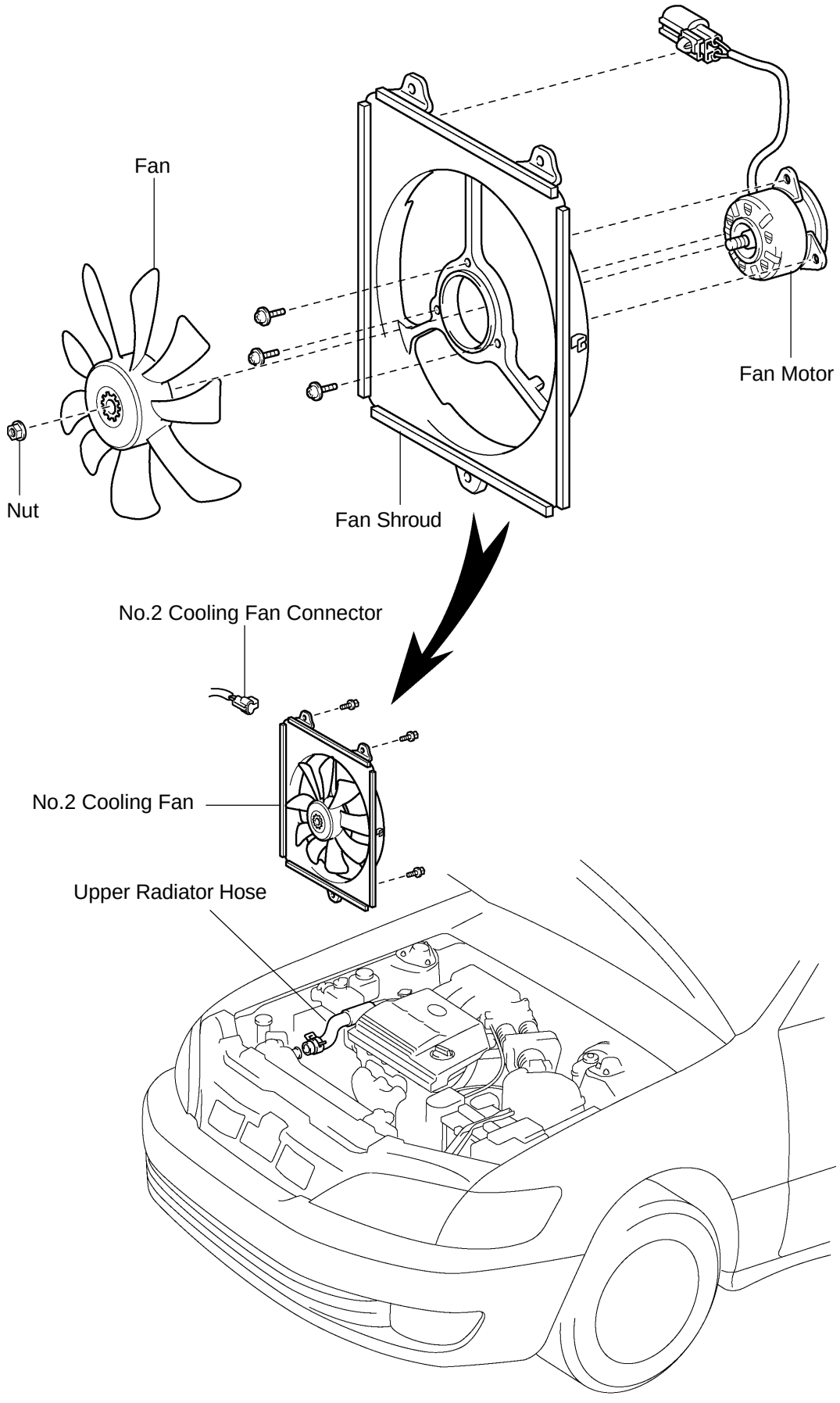
No.1



Y ◆ Non–reusable part

B08643

No.2



Y ◆ Non–reusable part

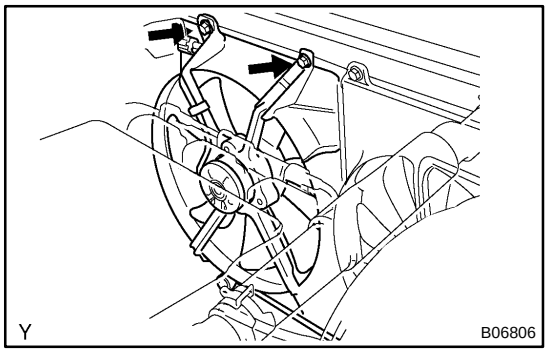
B08644

CO033–03

REMOVAL

1. REMOVE NO.1 COOLING FAN

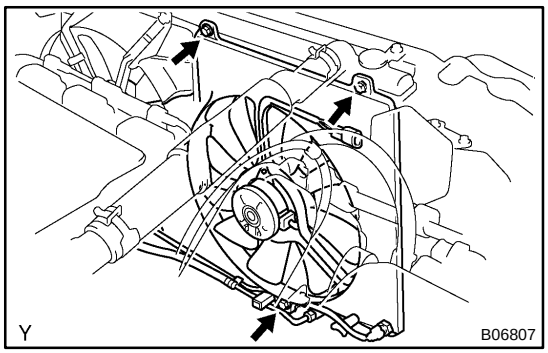
(a) Disconnect the No.2 engine room relay block from the battery hold–down clamp.
(b) Disconnect the cooling fan connector.
(c) Disconnect the No.1 ECT switch wire connector.
(d) Disconnect the No.1 ECT switch wire clamps.



(e) Remove the 2 bolts and cooling fan.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

2. REMOVE NO.2 COOLING FAN

(a) Drain the engine coolant.
(b) Disconnect the upper radiator hose from the radiator.
(c) Disconnect the cooling fan connector.



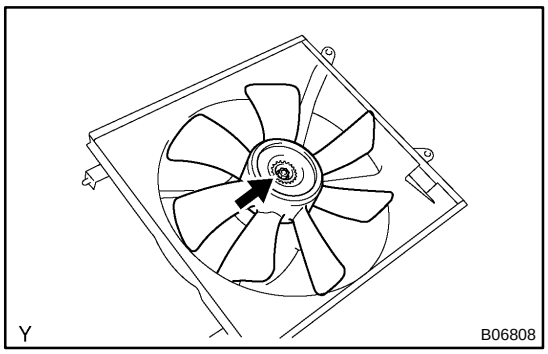
(d) Remove the 3 bolts and cooling fan.
Torque: 5.0 N·m (50 kgf·cm, 44 in.·lbf)

CO034–02

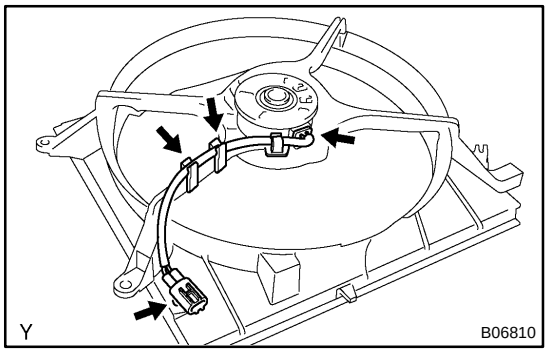
DISASSEMBLY

1. REMOVE NO.1 COOLING FAN

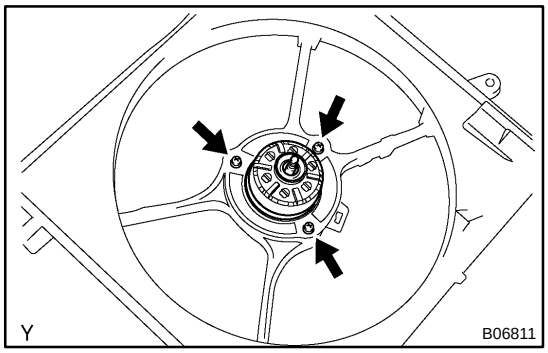
(a) Remove the nut and fan.



(b) Disconnect the lead wire from the fan shroud.

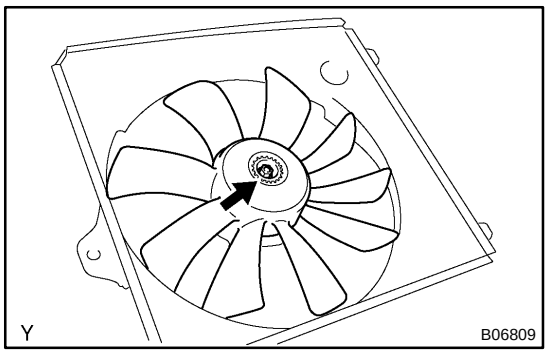


(c) Remove the 3 screws and fan motor.

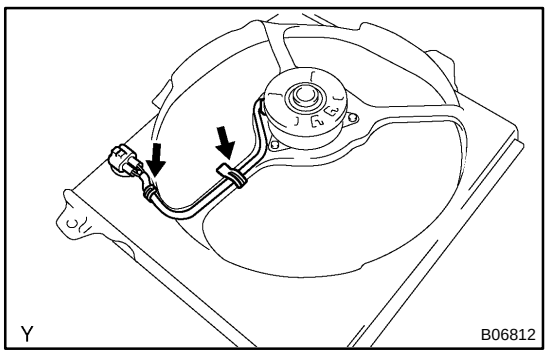


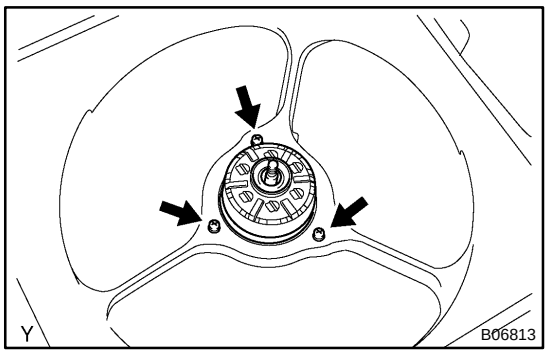
2. REMOVE NO.2 COOLING FAN

(a) Remove the nut and fan.



(b) Disconnect the lead wire from the fan shroud.





(c) Remove the 3 screws and fan motor.

CO035–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page CO–30).

CO036–01

INSTALLATION

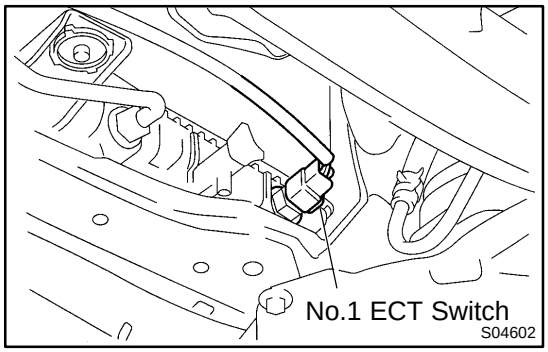
Installation is in the reverse order of removal (See page CO–29).

ENGINE COOLANT TEMPERATURE (ECT) SWITCH

CO037–02

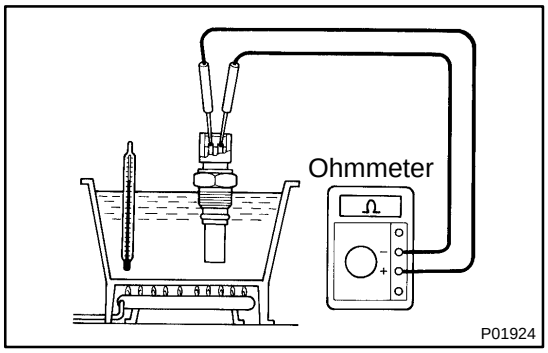
INSPECTION

1. DRAIN ENGINE COOLANT



2. INSPECT NO.1 ECT SWITCH

(a) Remove the No.1 ECT switch.



(b) Inspect the No.1 ECT switch.

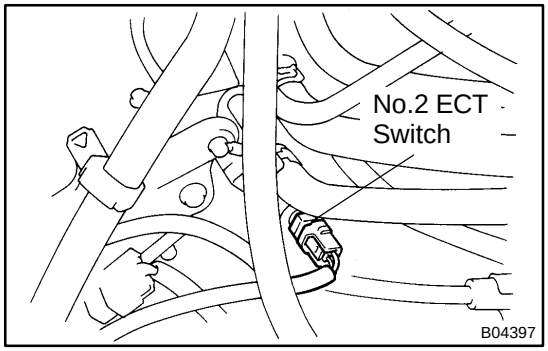
(1) Using an ohmmeter, check that there is no continuity between the terminals when the coolant temperature is above 98˚C (208˚F).

If there is continuity, replace the switch.

(2) Check that there is continuity, between the terminals when the coolant temperature is below 88˚C (190˚F).

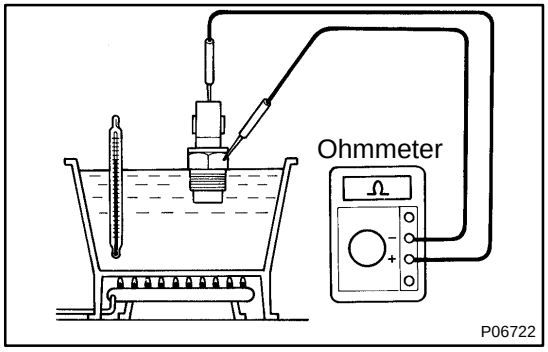
If there is no continuity, replace the switch.

(c) Reinstall the No.1 ECT switch.



3. INSPECT NO.2 ECT SWITCH

(a) Remove the No.2 ECT switch.



(b) Inspect the No.2 ECT switch.

(1) Using an ohmmeter, check that there is continuity between terminals when the coolant temperature is above 94˚C (201˚F).

If there is no continuity, replace the switch.

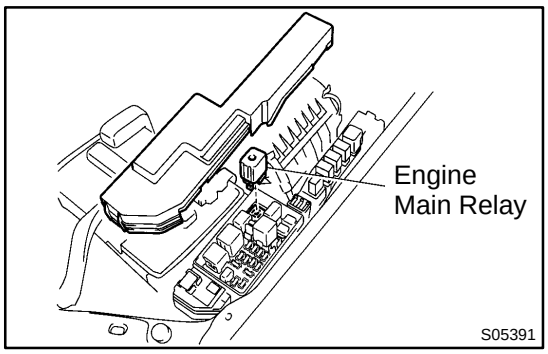
(2) Check that there is no continuity between the terminals when the coolant temperature is below 83˚C (181˚F).

If there is continuity, replace the switch.

(c) Reinstall the No.2 ECT switch.

4. REFILL ENGINE COOLANT

5. START ENGINE AND CHECK FOR COOLANT LEAKS



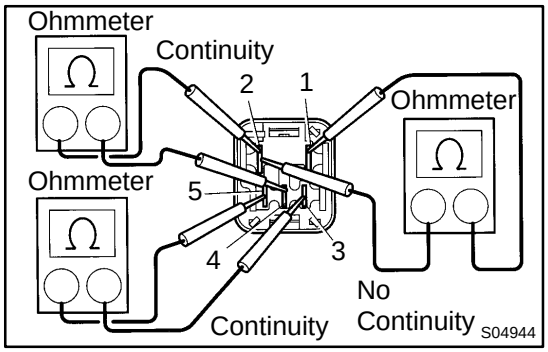
ENGINE MAIN RELAY

CO038–03

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE ENGINE MAIN RELAY (Marking: ENGINE MAIN)



3. INSPECT RELAY CONTINUITY

(a) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

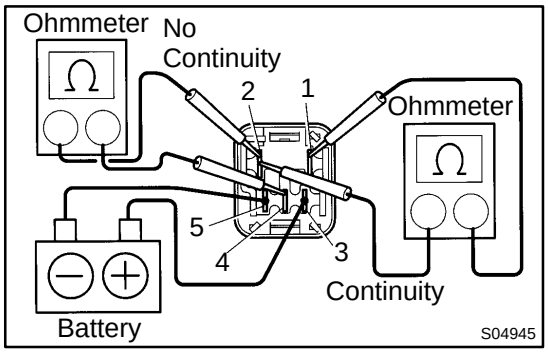
If there is no continuity, replace the relay.

(b) Check that there is continuity between terminals 2 and 4.

If there is no continuity, replace the relay.

(c) Check that there is no continuity between terminals 1 and 2.

If there is continuity, replace the relay.



4. INSPECT RELAY OPERATION

(a) Apply battery positive voltage across terminals 3 and 5.

(b) Using an ohmmeter, check that there is no continuity between terminals 2 and 4.

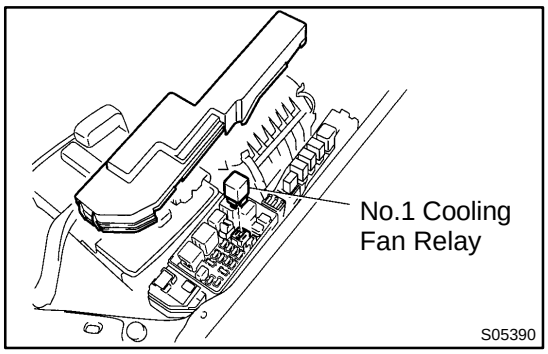
If there is continuity, replace the relay.

(c) Check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

5. REINSTALL ENGINE MAIN RELAY

6. REINSTALL RELAY BOX COVER



COOLING FAN RELAY

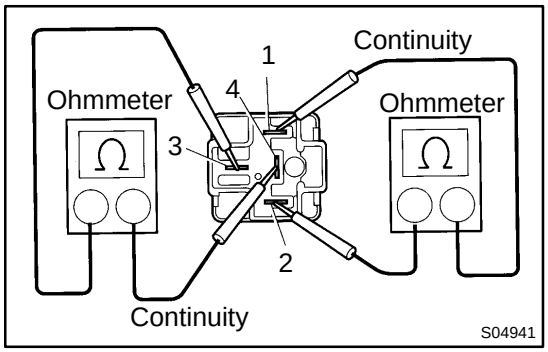
CO039–02

INSPECTION

1. REMOVE RELAY BOX COVER

2. INSPECT NO.1 COOLING FAN RELAY

(a) Remove the No.1 cooling fan relay. (Marking: FAN NO.1)



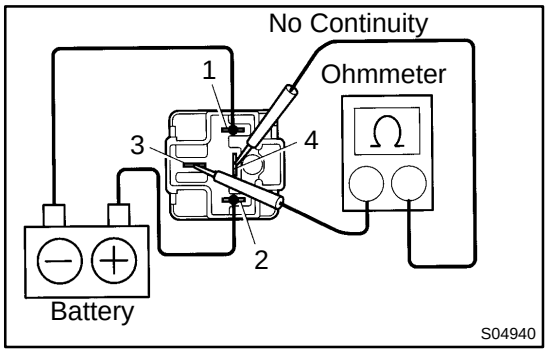
(b) Inspect the No.1 cooling fan relay continuity. (DENSO)

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(2) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.

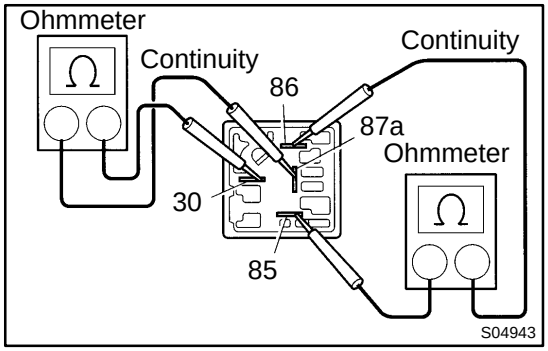


(c) Inspect the No.1 cooling fan relay operation. (DENSO)

(1) Apply battery positive voltage across terminals 1 and 2.

(2) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.



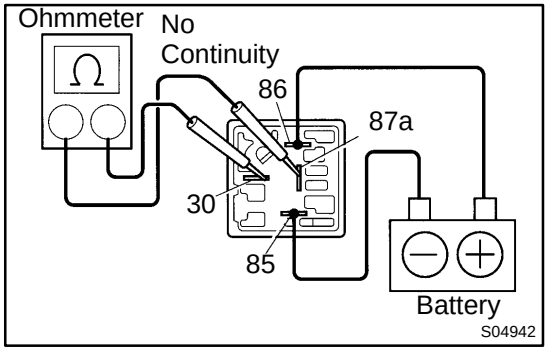
(d) Inspect the No.1 cooling fan relay continuity. (BOSCH)

(1) Using an ohmmeter, check that there is continuity between terminals 85 and 86.

If there is no continuity, replace the relay.

(2) Check that there is continuity between terminals 30 and 87a.

If there is no continuity, replace the relay.



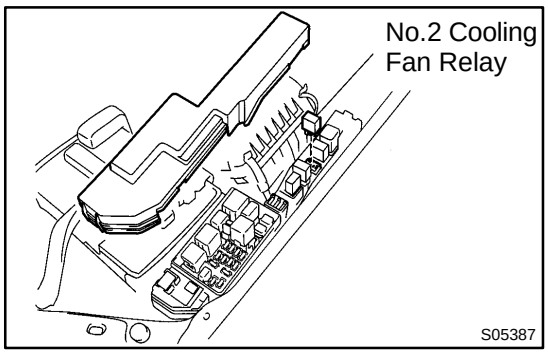
(e) Inspect the No.1 cooling fan relay operation. (BOSCH)

(1) Apply battery positive voltage across terminals 85 and 86.

(2) Using an ohmmeter, check that there is no continuity between terminals 30 and 87a.

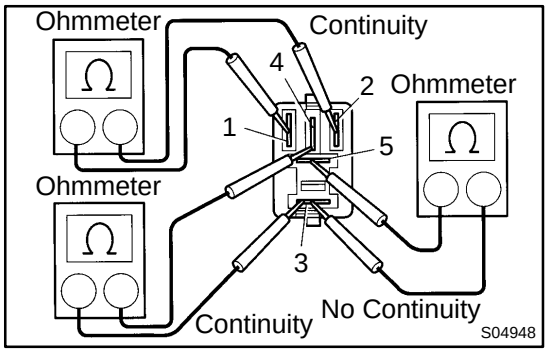
If there is continuity, replace the relay.

(f) Install the No.1 cooling fan relay.



3. INSPECT NO.2 COOLING FAN RELAY

(a) Remove the No.2 cooling fan relay. (Marking: FAN NO.2)



(b) Inspect the No.2 cooling fan relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

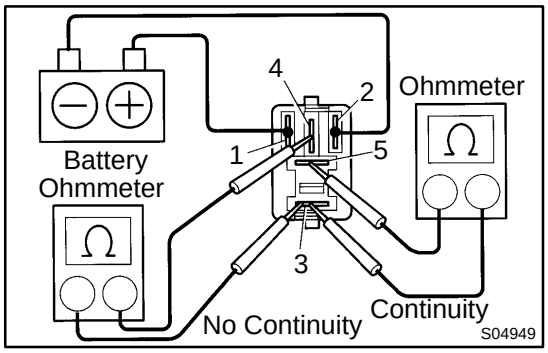
If there is no continuity, replace the relay.

(2) Check that there is continuity between terminals 3 and 4.

If there is no continuity, replace the relay.

(3) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



(c) Inspect the No.2 cooling fan relay operation.

(1) Apply battery positive voltage across terminals 1 and 2.

(2) Using an ohmmeter, check that there is no continuity between terminals 3 and 4.

If there is continuity, replace the relay.

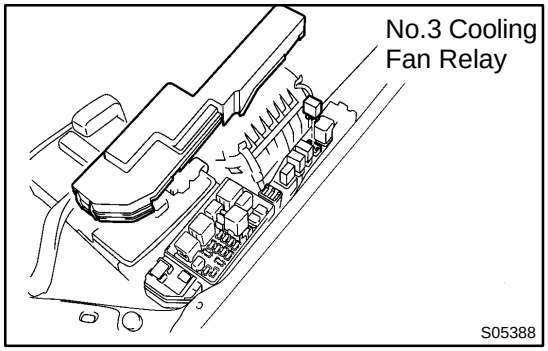
(3) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

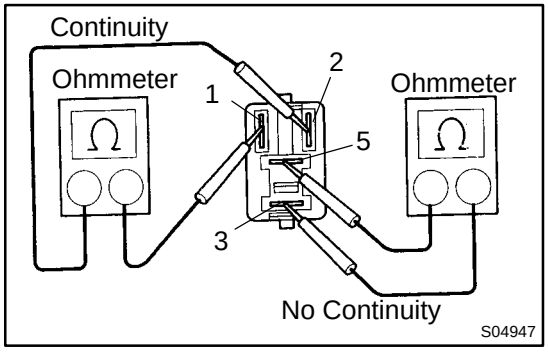
If there is no continuity, replace the relay.

(d) Install the No.2 cooling fan relay.

4. INSPECT NO.3 COOLING FAN RELAY

(a) Remove the No.3 cooling fan relay. (Marking: FAN NO.3)





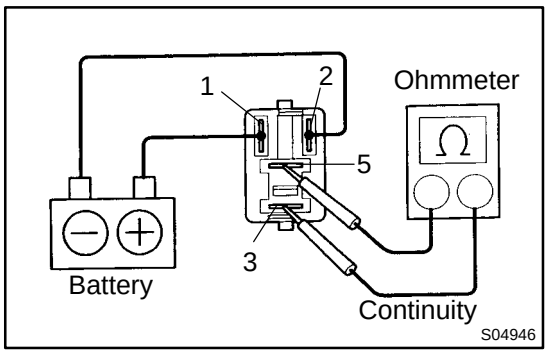
(b) Inspect the No.3 cooling fan relay continuity.

(1) Using an ohmmeter, check that there is continuity between terminals 1 and 2.

If there is no continuity, replace the relay.

(2) Check that there is no continuity between terminals 3 and 5.

If there is continuity, replace the relay.



(c) Inspect the No.3 cooling fan relay operation.
  (1) Apply battery positive voltage across terminals 1 and 2.
  (2) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

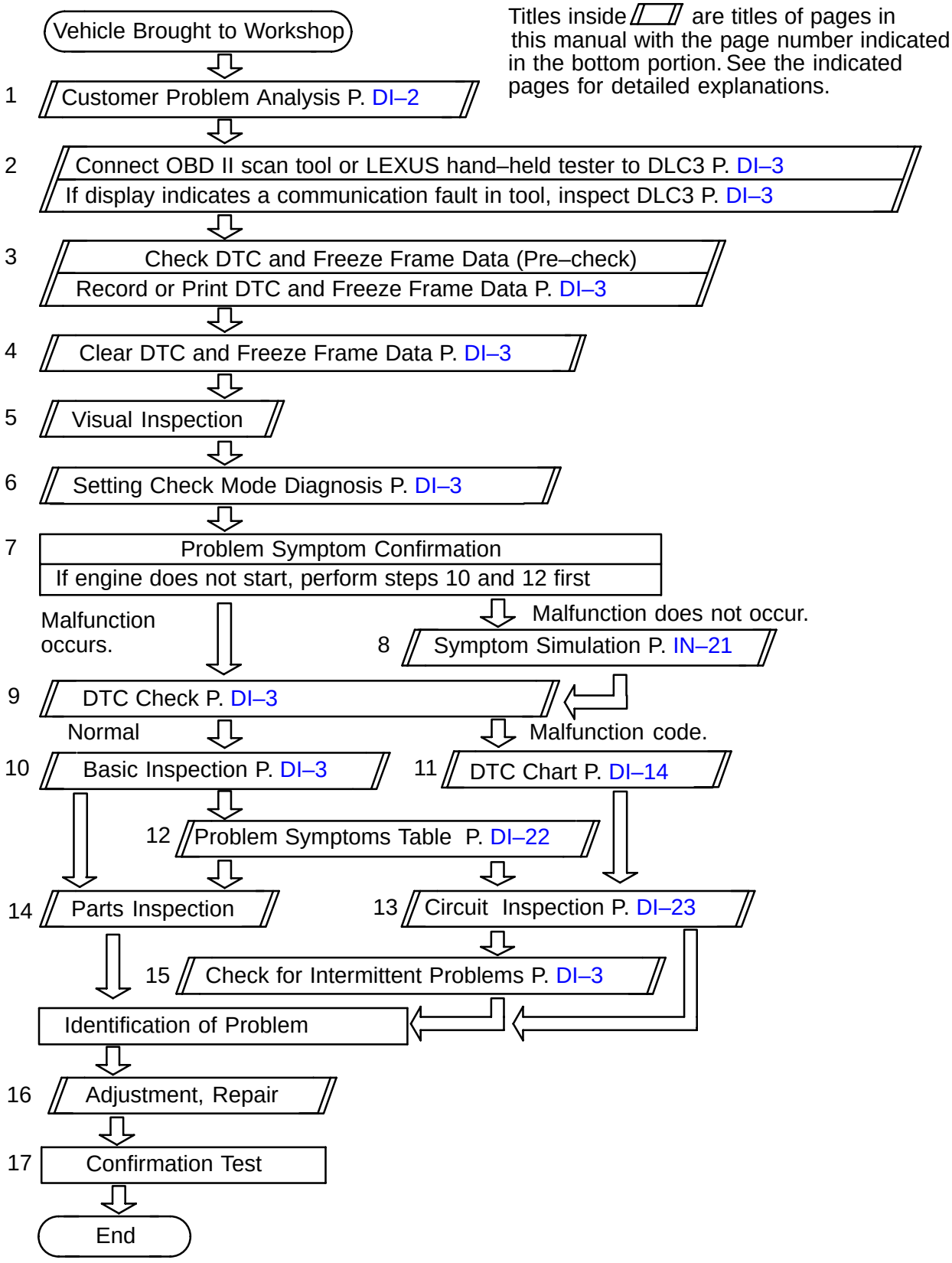
(d) Install the No.3 cooling fan relay.

ENGINE

DI094–08

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshoot in accordance with the procedure on the following page.



DI095–07

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE CONTROL SYSTEM Check Sheet

Inspector's Name

Customer's Name		Model and Model Year	
Driver's Name		Frame No.	
Date 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 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. ____°F/____°C)
	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 MIL		☐ Remains on	☐ Sometimes lights up ☐ Does not light up
DTC Inspection	Normal Mode (Precheck)	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )
	Check Mode	☐ Normal	☐ Malfunction code(s) (code) ☐ Freeze frame data ( )

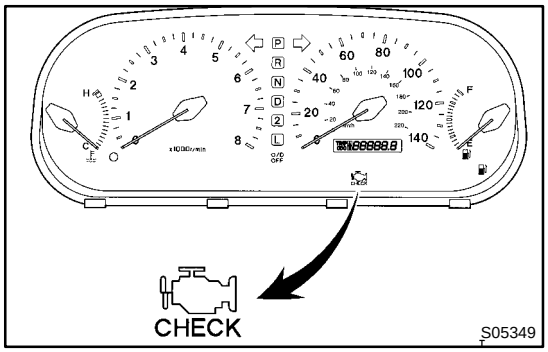
DI096–08

PRE–CHECK

1. DIAGNOSIS SYSTEM

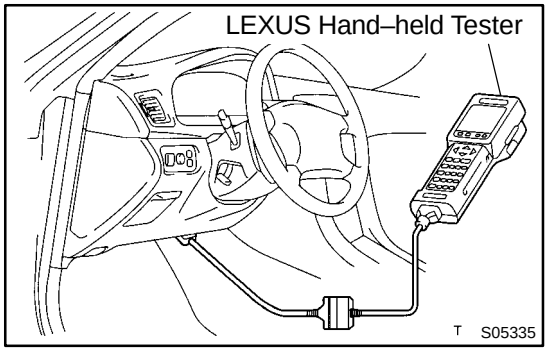
(a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you connect the vehicle to the OBD II scan tool complying with SAE J1978 or LEXUS hand–held tester, and read off various data output from the vehicle's ECM.



- OBD II regulations require that the vehicle's on–board computer lights up the Malfunction Indicator Lamp (MIL) on the instrument panel when the computer detects a malfunction in the emission control system/components or in the powertrain control components which affect vehicle emissions, or a malfunction in the computer. In addition to the MIL lighting up when a malfunction is detected, the applicable Diagnostic Trouble Codes (DTCs) prescribed by SAE J2012 is recorded in the ECM memory (See page DI–14).

If the malfunction does not reoccur in 3 consecutive trips, the MIL goes off automatically but the DTC remain in the ECM memory.



- To check the DTC, connect the OBD II scan tool or LEXUS hand–held tester to the Data Link Connector 3 (DLC3) on the vehicle. The OBD II scan tool or LEXUS hand–held tester also enables you to erase the DTC and check freeze frame data and various forms of engine data (For operating instructions, see the OBD II scan tool's instruction book.). DTC 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 the manufacturer within the prescribed limits (See DTC chart on page DI–14).

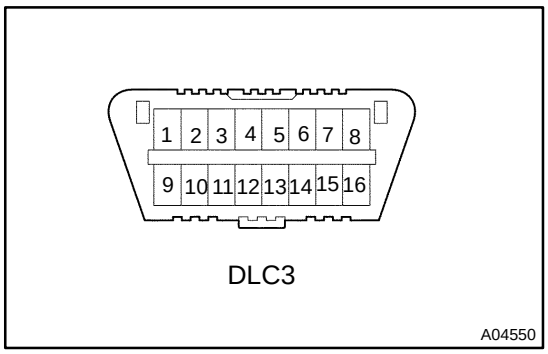
- The diagnosis system operates in the normal mode during the normal vehicle use. It also has the check mode for technicians to simulate malfunction symptoms and troubleshoot. Most DTC use 2 trip detection logic* to prevent erroneous detection, which ensures the malfunction detection. By switching the ECM to check mode when troubleshooting, the technician can cause the MIL to light up for a malfunction that is only detected once or momentarily (LEXUS hand–held tester only) (See step 2).
- *2 trip detection logic:
  When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected again during the second drive test, this second detection causes the MIL to light up (2nd trip). The 2 trip repeats the same mode a 2nd time (however, the ignition switch must be turned OFF between the 1st 2 trip and 2nd 2 trip.).
- Freeze frame data:
  Freeze frame data records the engine condition when a misfire (DTCs P0300 – P0306) or fuel trim malfunction (DTCs P0171 and P0172) or other malfunction (first malfunction only), is detected. Freeze frame data records the engine conditions (fuel system, calculated load, engine coolant temperature, fuel trim, engine speed, vehicle speed, etc.) when the 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.

Priorities for troubleshooting:

If troubleshooting priorities for multiple DTCs are given in the applicable DTC chart, these should be followed.

If no instructions are given, troubleshoot the DTCs according to the following priorities.

(1) DTC other than fuel trim malfunction (DTCs P0171 and P0172), and misfire (DTCs P0300 – P0306).
(2) Fuel trim malfunction (DTCs P0171 and P0172).
(3) Misfire (DTCs P0300 – P0306).

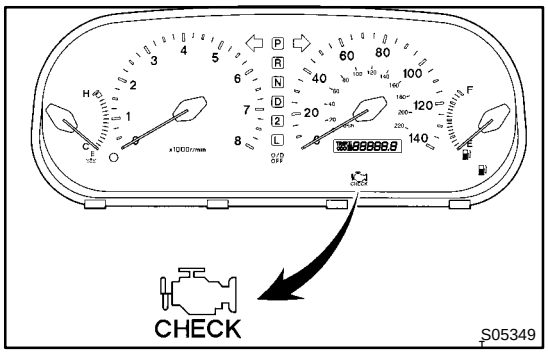


(b) Check the DLC3.
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

Terminal No.	Connection/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 the OBD II scan tool or LEXUS 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.



2. Normal Mode:
INSPECT DIAGNOSIS

(a) 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–65).

(2) When the engine starts, the MIL should go off. If the lamp remains on, it means the diagnosis system has detected a malfunction or abnormality in the system.

(b) Check the DTC.

NOTICE:

- **If there is no DTC in the normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) or the OBD II scan tool or LEXUS hand–held tester.**

- **LEXUS hand–held tester only:**
  When the diagnosis system is switched from the normal mode to the check mode, all the DTC and freeze frame data recorded in the normal mode will be erased. So before switching modes, always check the DTC and freeze frame data, and note them down.
  (1) Prepare the OBD II scan tool (complying with SAE J 1978) or LEXUS hand–held tester.
  (2) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3 at the lower center of the instrument panel.
  (3) Turn the ignition switch ON, and push the OBD II scan tool or LEXUS hand–held tester switch ON.
  (4) Use the OBD II scan tool or LEXUS hand–held tester to check the DTC and freeze frame data and note them down (For operating instructions, see the OBD II scan tool's instruction book.).
  If there is no DTC in the normal mode, check the 1st trip DTC using Continuous Test Results function (Mode 7 for SAE J1979) on the OBD II scan tool or TOYOTA hand–held tester.
  (5) See page DI–14 to confirm the details of the DTC.

NOTICE:

- **When simulating symptoms with an OBD II scan tool (excluding LEXUS hand–held tester) to check the DTC, use the normal mode. For code on the DTC chart subject to "2 trip detection logic", perform the following either action.**
- **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 lights up and the DTCs are recorded in the ECM.**
- **Check the 1st trip DTC using Mode 7 (Continuous Test Results) for SAE J1979.**

(c) Clear the DTC.
The DTCs and freeze frame data will be erased by either action.
(1) Operating the OBD II scan tool (complying with SAE J1978) or LEXUS hand–held tester to erase the codes. (See the OBD II scan tool's instruction book for operating instructions.)
(2) Disconnecting the battery terminals or EFI fuse.

NOTICE:

If the LEXUS 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 DTCs and freeze frame data will be erased.

3. Check Mode:
INSPECT DIAGNOSIS

HINT:

LEXUS hand–held tester only:

Compared to the normal mode, the check mode has an increased sensitivity to detect malfunctions. Furthermore, the same diagnostic items as ones detected in the normal mode can also be detected in the check mode.

Check the DTC.

(1) Initial conditions.
- Battery positive voltage 11 V or more
- Throttle valve fully closed
- Transmission in P or N position
- A/C switched OFF

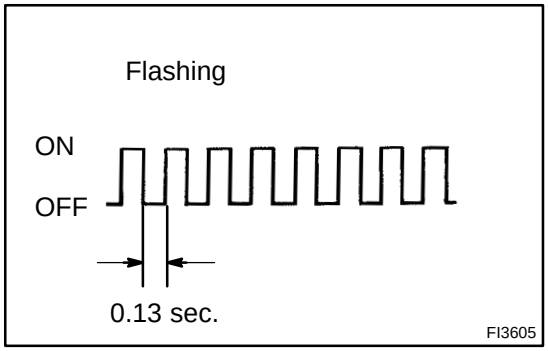
(2) Turn the ignition switch OFF.

(3) Prepare the LEXUS hand–held tester.

(4) Connect the LEXUS hand–held tester to the DLC3 at the lower center of the instrument panel.

(5) Turn the ignition switch ON and push the LEXUS hand–held tester switch ON.

(6) Switch the LEXUS hand–held tester from the normal mode to the check mode (Check that the MIL flashes.).



(7) Check if the MIL blinks.

NOTICE:

If the LEXUS 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.

(8) Start the engine (The MIL goes off after the engine starts.).

(9) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTC, etc.

(10) After simulating the malfunction conditions, use the LEXUS hand–held tester diagnosis selector to check the DTC and freeze frame data, etc.

HINT:

Take care not to turn the ignition switch OFF. Turning the ignition switch OFF switches the diagnosis system from the check mode to the normal mode, so all the DTC, etc. will be erased.

(11) After checking the DTC, inspect the applicable circuit.

4. FAIL–SAFE CHART

If any of the following codes are recorded, the ECM enters fail–safe mode.

DTC No.	Fail–safe Operation	Fail–safe Deactivation Conditions
P0100	Ignition timing fixed at 10˚ BTDC	Returned to normal condition
P0110	Intake air temp. is fixed at 20˚C (68˚F)	Returned to normal condition
P0115	Engine coolant temp. is fixed at 80˚C (176˚F)	Returned to normal condition
P0120	VTA is fixed at 0˚	The following condition must be repeated at least 2 times consecutively 0.1 V ∼ VTA ∼ 0.95 V, SPD = 0 km/h
P0135 P0141 P0155 P1135 P1155	The heater circuit in witch an abnormality is detected is turned off	Ignition switch OFF
P0325 P0330	Max. timing retardation	Ignition switch OFF
P1300	Fuel cut	Returned to normal condition

5. CHECK FOR INTERMITTENT PROBLEMS

HINT:

LEXUS hand–held tester only:

By putting the vehicle's ECM in the check mode, 1 trip detection logic is possible instead of 2 trip detection logic and the sensitivity to detect open circuits is increased. This makes it easier to detect intermittent problems.

(a) Clear the DTC (See step 2).
(b) Set the check mode (See step 3).
(c) Perform a simulation test (See page IN–21).
(d) Check the connector and terminal (See page IN–31).
(e) Handle the connector (See page IN–31).

6. BASIC INSPECTION

When the malfunction code is not confirmed in the DTC check, troubleshooting should be performed in all the possible circuits considered as the cause of the problems. In many cases, by carrying out the basic engine check shown in the following flow chart, the location causing the problem can be found quickly and efficiently. Therefore, it is essential to use this check in the engine troubleshooting.

1	**Is battery positive voltage 11 V or more when engine is stopped?**

NO → **Charge or replace battery.**

YES

2	**Is engine cranked?**

NO → **Proceed to page ST–19, and continue to trouble-shoot.**

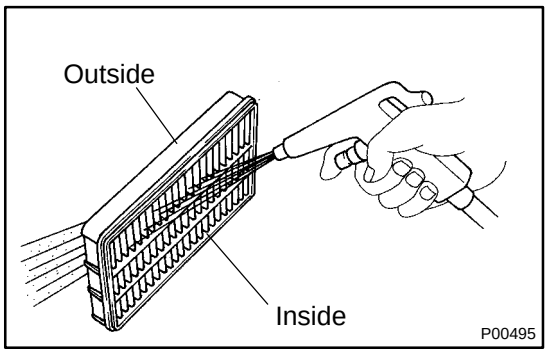
YES

3	**Does engine start?**

NO → **Go to step 7.**

YES

4	**Check air filter.**



PREPARATION:
Remove the air filter.
CHECK:
Visually check that the air filter is not dirty or excessive oily.
HINT:
If necessary, clean the air filter with compressed air. First blow from inside thoroughly, then blow from outside of the air filter.

NG → **Repair or replace.**

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 LEXUS hand–held tester to the DLC3 on the vehicle.

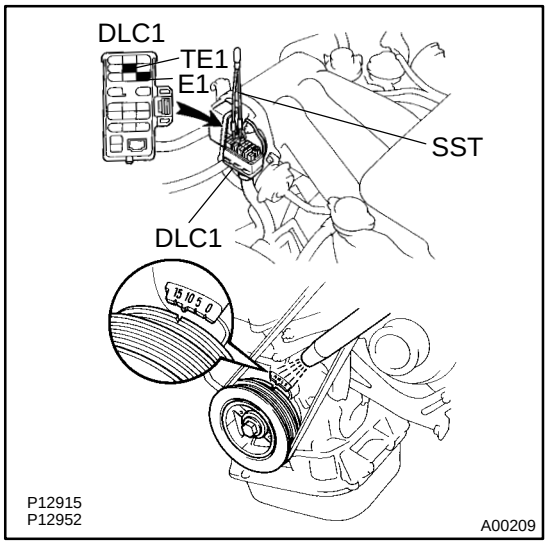
CHECK:
Use the CURRENT DATA to check the idle speed.

OK:
Idle speed: 650 – 750 rpm

NG → **Proceed to problem symptoms table in page DI–22.**

OK

6	**Check ignition timing.**



PREPARATION:

(a) Warm up 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) Keep the engine speed at idle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843 – 18020
(g) Using a timing light, connect the tester to check wire.

CHECK:

Check the ignition timing.

OK:

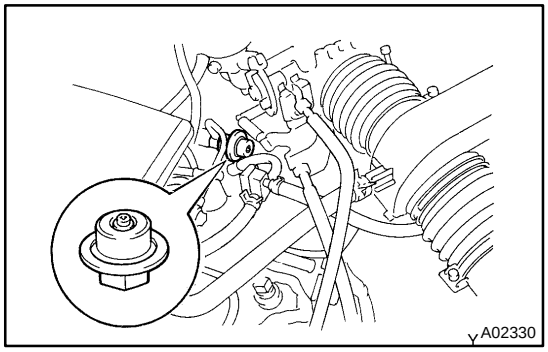
Ignition timing: 10° BTDC at idle

NG → **Proceed to page IG–1, and continue to troubleshoot.**

OK

Proceed to problem symptoms table in page DI–22.

7	**Check fuel pressure.**



PREPARATION:

(a) Be sure that there is enough fuel is in the tank.
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push LEXUS hand–held tester main switch ON.
(d) Use the ACTIVE TEST mode to operate the fuel pump.
(e) If you have no LEXUS hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page SF–6).

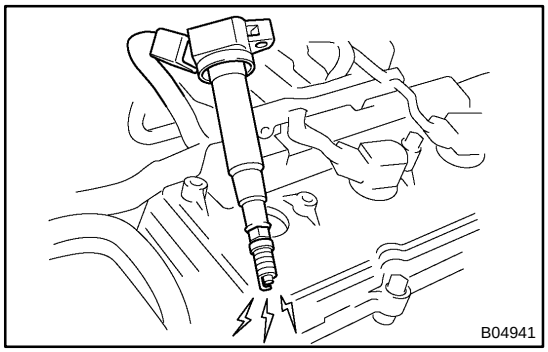
CHECK:

Check that the pulsation damper screw rises up when the fuel pump operates.

NG → **Proceed to page SF–6, and continue to troubleshoot.**

OK

8	**Check for spark.**



PREPARATION:

(a) Remove the ignition coil from the spark plug.
(b) Remove the spark plug.
(c) Install the spark plug to the ignition coil.
(d) Disconnect the injector connector.
(e) Be sure to ground the screw of the spark plug securely.

CHECK:

Check if spark occurs while the engine is being cranked.

NOTICE:

- **Do not crash the electrode gap.**
- **To prevent excess fuel from being injected from the injectors during this test, don't crank the engine for more than 5 – 10 seconds at one time.**

NG → **Proceed to page IG–1 and continue to troubleshoot.**

OK

Proceed to problem symptoms table in page DI–22.

7. ENGINE OPERATING CONDITION

NOTICE:

The values given below for "Normal Condition" are representative values, so a vehicle may still be normal even if its value differ from those listed here. So do not depend solely on the "Normal Condition" here when deciding whether the part is faulty or not.

(a) CARB mandated signals.

LEXUS hand–held tester display	Measurement Item	Normal Condition*
FUEL SYS #1	Fuel System Bank 1 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
FUEL SYS #2	Fuel System Bank 2 OPEN: Air–fuel ratio feedback stopped CLOSED: Air–fuel ratio feedback operating	Idling after warming up: CLOSED
CALC LOAD	Calculator Load: Current intake air volume as a proportion of max. intake air volume	Idling: 13.1 – 18.7 % Racing without load (2,500rpm): 11.7 – 17.3 %

COOLANT TEMP	Engine Coolant Temp. Sensor Value	After warming up: 80 – 95˚C (176 – 203˚F)
SHORT FT #1	Short–term Fuel Trim Bank 1	0 ± 20 %
LONG FT #1	Long–term Fuel Trim Bank 1	0 ± 20 %
SHORT FT #2	Short–term Fuel Trim Bank 2	0 ± 20 %
LONG FT #2	Long–term Fuel Trim Bank 2	0 ± 20 %
ENGINE SPD	Engine Speed	Idling: 650 – 750 rpm
VEHICLE SPD	Vehicle Speed	Vehicle stopped: 0 km/h (0 mph)
IGN ADVANCE	Ignition Advance: Ignition Timing of Cylinder No.1	Idling: BTDC 10 – 25.0˚
INTAKE AIR	Intake Air Temp. Sensor Value	Equivalent to Ambient Temp.
MAF	Air Flow Rate Through Mass Air Flow Meter	Idling: 3.3 – 4.7 gm/sec. Racing without load (2,500 rpm): 10.4 – 15.4 gm/sec.
THROTTLE POS	Output Voltage of Throttle Position Sensor Calculated as a percentage: 0 V → 0 %, 5 V → 100 %	Throttle valve fully closed: 7 – 11 % Throttle valve fully open: 65 – 75 %
O2FT B1 S1	Oxygen Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
O2S B1 S2	Output Voltage of Oxygen Sensor Bank 1 Sensor 2	Driving 50 km/h (31 mph): 0.05 – 0.95 V
O2FT B2 S1	Oxygen Sensor Fuel Trim Bank 2 Sensor 1 (Same as SHORT FT #2)	0 ± 20 %
A/FS B1 S1	Output Voltage of A/F Sensor Bank 1 Sensor 1	Idling: 2.8 – 3.8 V
A/FS B2 S1	Output Voltage of A/F Sensor Bank 2 Sensor 1	Idling: 2.8 – 3.8 V
A/FFT B1 S1	A/F Sensor Fuel Trim Bank 1 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %
A/FFT B2 S1	A/F Sensor Fuel Trim Bank 2 Sensor 1 (Same as SHORT FT #1)	0 ± 20 %

*: If ”Idling” conditions are not specified, it means the shift lever is at the N or P position, the A/C switch is OFF and all the accessory switches are OFF.

(b) LEXUS Enhanced Signals.

LEXUS hand–held tester display	Measurement Item	Normal Condition*
MISFIRE RPM	Engine RPM for first misfire range	Misfire 0: 0 rpm
MISFIRE LOAD	Engine load for first misfire range	Misfire 0: 0 g/r
INJECTOR	Fuel injection time for cylinder No.1	Idling: 1.6 – 2.9 ms
IAC DUTY RATIO	Intake Air Control Valve Duty Ratio Opening ratio rotary solenoid type IAC valve	Idling: 27 – 47 %
STARTER SIG	Starter Signal	Cranking: ON
CTP SIG	Closed Throttle Position Signal	Throttle fully closed: ON
A/C SIG	A/C Switch Signal	A/C ON: ON
PNP SW	Park/Neutral Position Switch Signal	P or N position: ON
ELCTRCL LOAD SIG	Electrical Load Signal	Defogger switch ON: ON
STOP LIGHT SW	Stop Light Switch Signal	Stop light switch ON: ON
PS OIL PRESS SW	Power Steering Oil Pressure Switch Signal	Turn steering wheel: ON
FC IDL	Fuel Cut Idle: Fuel cut when throttle valve fully closed, during deceleration	Fuel cut operating: ON
FC TAU	Fuel Cut TAU: Fuel cut during very light load	Fuel cut operating: ON
CYL#1 – CYL#6	Abnormal revolution variation for each cylinder	0 %
IGNITION	Total number of ignition for every 1,000 revolutions	0 – 3,000

INTAKE CTRL VSV	Intake Air Control Valve VSV Signal	VSV operating: ON
A/C CUT SIG	A/C Cut Signal	A/C S/W OFF: ON
FUEL PUMP	Fuel Pump Signal	Idling: ON
EVAP (PURGE) VSV	EVAP VSV Signal	VSV operating: Above 30 %
VAPOR PRESS VSV	Vapor Pressure VSV Signal	VSV operating: ON
TOTAL FT B1	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 1	Idling: 0.8 – 1.2
TOTAL FT B2	Total Fuel Trim Bank 1: Average value for fuel trim system of bank 2	Idling: 0.8 – 1.2

*: If ”Idling” conditions are not specified, it means the shift lever is at the N or P position, the A/C switch is OFF and all the accessory switches are OFF.

DI097–06

DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your readings due to the type of instrument or other factors.

If a malfunction code is displayed during the DTC check in the 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.

SAE CONTROLLED

DTC No. (See page)	Detection Item	Trouble Area	MIL*1	Memory
P0100 (DI–23)	Mass Air Flow Circuit Malfunction	Open or short in mass air flow meter circuit Mass air flow meter ECM	○	○
P0101 (DI–27)	Mass Air Flow Circuit Range/ Performance Problem	Mass air flow meter	○	○
P0110 (DI–28)	Intake Air Temp. Circuit Malfunction	Open or short in intake air temp. sensor circuit Intake air temp. sensor (built in mass air flow meter) ECM	○	○
P0115 (DI–32)	Engine Coolant Temp. Circuit Malfunction	Open or short in engine coolant temp. sensor circuit Engine coolant temp. sensor ECM	○	○
P0116 (DI–36)	Engine Coolant Temp. Circuit Range/Performance Problem	Cooling system Engine coolant temp. sensor	○	○
P0120 (DI–38)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Malfunction	Open or short in throttle position sensor circuit Throttle position sensor ECM	○	○
P0121 (DI–42)	Throttle/Pedal Position Sensor/ Switch ”A” Circuit Range/Performance Problem	Throttle position sensor	○	○
P0125 (DI–43)	Insufficient Coolant Temp. for Closed Loop Fuel Control	Open or short in A/F sensor (bank 1, 2 sensor 1) circuit A/F sensor (bank 1, 2 sensor 1) Air induction system Fuel pressure Injector Gas leakage on exhaust system ECM	○	○
P0128 (DI–48)	Thermostat Malfunction	Thermostat		
P0136 (DI–49)	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)	Open or short in heated oxygen sensor circuit Heated oxygen sensor	○	○
P0141 (DI–51)	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)	Open or short in heater circuit of heated oxygen sensor Heated oxygen sensor heater ECM	○	○
P0171 (DI–53)	System too Lean (Fuel Trim)	Air induction system Injector blockage Mass air flow meter Engine coolant temp. sensor Fuel pressure Gas leak on exhaust system Open or short in A/F sensor (bank 1, 2 sensor 1) circuit A/F sensor (bank 1, 2 sensor 1) ECM	○	○

P0172 (DI–53)	System too Rich (Fuel Trim)	Injector leak, blockage Mass air flow meter Engine coolant temp. sensor Ignition system Fuel pressure Gas leak on exhaust system Open or short in A/F sensor (bank 1, 2 sensor 1) circuit A/F sensor (bank 1, 2 sensor 1) ECM	○	○
P0174 (DI–53)	System too Lean (A/F Lean malfunction, Bank 2)	Same as DTS No. P0171	○	○
P0175 (DI–53)	System too Lean (A/F Rich malfunction, Bank 2)	Same as DTS No. P0172	○	○
P0300 (DI–58)	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 temp. sensor Compression pressure Valve clearance Valve timing ECM	○*2	○
P0301 (DI–58)	Cylinder 1 Misfire Detected			
P0302 (DI–58)	Cylinder 2 Misfire Detected			
P0303 (DI–58)	Cylinder 3 Misfire Detected			
P0304 (DI–58)	Cylinder 4 Misfire Detected			
P0305 (DI–58)	Cylinder 5 Misfire Detected			
P0306 (DI–58)	Cylinder 6 Misfire Detected			
P0325 (DI–64)	Knock Sensor 1 Circuit Malfunction (Bank 1)	Open or short in knock sensor 1 circuit Knock sensor 1 (looseness) ECM	○	○
P0330 (DI–64)	Knock Sensor 2 Circuit Malfunction (Bank 2)	Open or short in knock sensor 2 circuit Knock sensor 2 (looseness) ECM	○	○
P0335 (DI–67)	Crankshaft Position Sensor ”A” Circuit Malfunction	Open or short in crankshaft position sensor circuit Crankshaft position sensor Crankshaft timing pulley ECM	○	○
P0340 (DI–69)	Camshaft Position Sensor Circuit Malfunction	Open or short in camshaft position sensor circuit Camshaft position sensor Camshaft timing gear ECM	○	○
P0420 (DI–71)	Catalyst System Efficiency Below Threshold (Bank 1)	Gas leak on exhaust system A/F sensor (bank 1, 2 sensor 1) Heated oxygen sensor (bank 1 sensor 2) Three–way catalytic converter	○	○

P0440 (DI–74)	Evaporative Emission Control System Malfunction	Hose or tube cracked, holed, damaged or insufficient seal Fuel tank cap incorrectly installed Fuel tank cap cracked or damaged Vacuum hose cracked, holed, blocked, damaged or disconnected Fuel tank cracked, holed or damaged Charcoal canister cracked, holed or damaged Open or short in vapor pressure sensor circuit Vapor pressure sensor Fuel tank over fill check valve cracked or damaged ECM	○	○
P0441 (DI–83)	Evaporative Emission Control System Incorrect Purge Flow	Vacuum hose cracked, holed blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) 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 VSV for EVAP Open or short in VSV circuit for CCV VSV for CCV Open or short in VSV circuit for pressure switching valve VSV for pressure switching valve Fuel tank cracked, holed or damaged Charcoal canister cracked, holed or damaged Fuel tank over fill check valve cracked or damaged ECM	○	○
P0442 (DI–74)	Evaporative Emission Control System Leak Detected (Small Leak)	Same as DTC No. P0440	○	○
P0446 (DI–83)	Evaporative Emission Control System Vent Control Malfunction	Same as DTC No. P0441	○	○
P0450 (DI–101)	Evaporative Emission Control System Pressure Sensor Malfunction	Open or short in vapor pressure sensor circuit Vapor pressure sensor ECM	○	○
P0451 (DI–101)	Evaporative Emission Control System Pressure Sensor Range/ Performance			
P0500 (DI–103)	Vehicle Speed Sensor Malfunction	Combination meter Open or short in vehicle speed sensor circuit Vehicle speed sensor ECM	○	○
P0505 (DI–106)	Idle Control System Malfunction	Open or short in IAC valve circuit IAC valve is stuck or closed Open or short in A/C signal circuit Air induction system ECM	○	○

*1: MIL lights up
*2:MIL light up or blinking

MANUFACTURER CONTROLLED

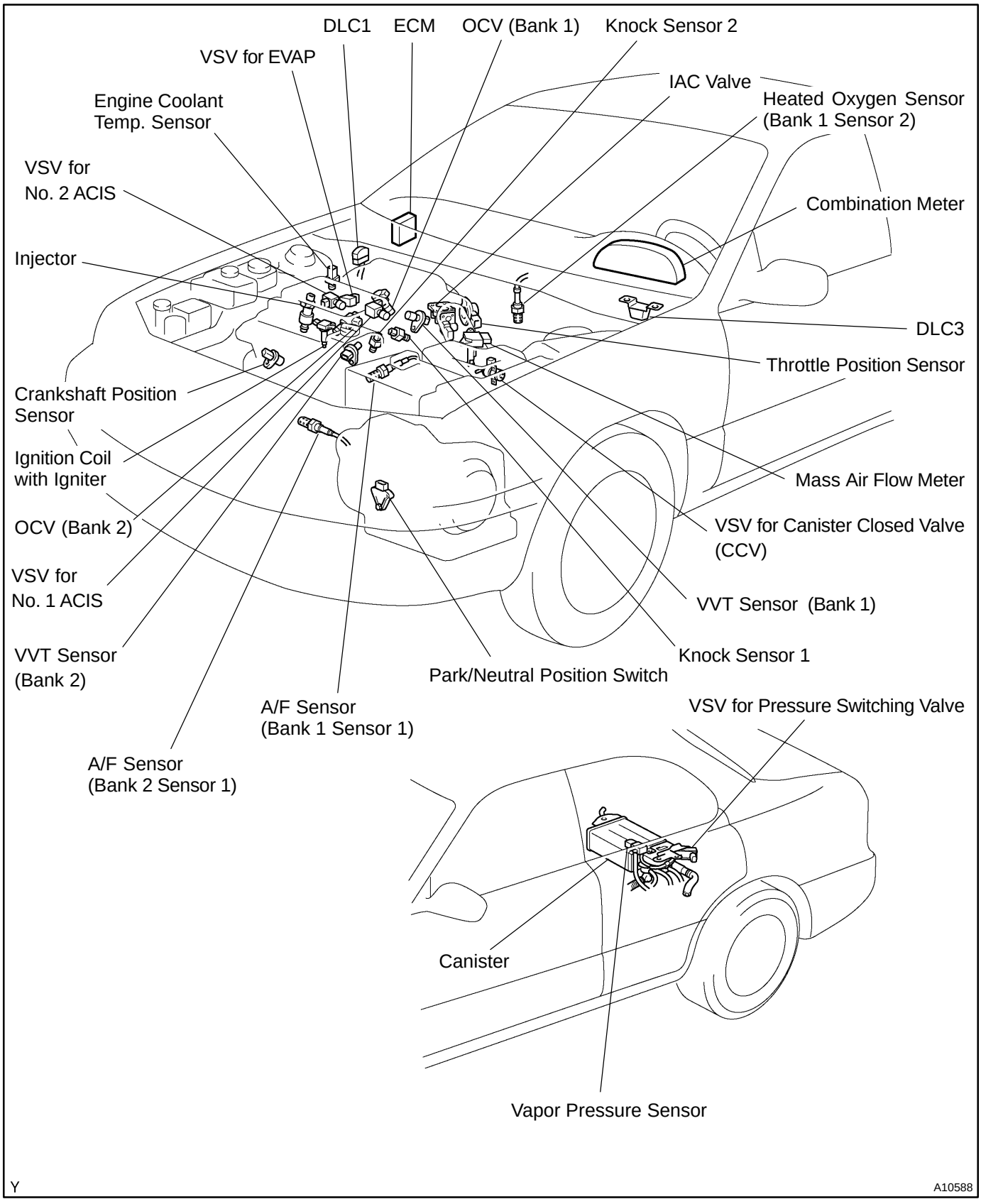
DTC No. (See page)	Detection Item	Trouble Area	MIL*	Memory
P1130 (DI–110)	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)	Open or short in A/F sensor circuit A/F sensor Air induction system Fuel pressure Injector ECM	○	○
P1133 (DI–115)	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)	Open or short in A/F sensor circuit A/F sensor Air induction system Fuel pressure Injector ECM	○	○
P1135 (DI–119)	A/F Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)	Open or short in heater circuit of A/F sensor A/F sensor heater ECM	○	○
P1150 (DI–110)	A/F Sensor Circuit Range/Performance Malfunction (Bank 2 Sensor 1)	Same as DTC No. P1130	○	○
P1153 (DI–115)	A/F Sensor Circuit Response Malfunction (Bank 2 Sensor 1)	Same as DTC No. P1133	○	○
P1155 (DI–119)	A/F Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)	Same as DTC No. P1135	○	○
P1300 (DI–121)	Igniter Circuit Malfunction (No. 1)	Ignition system Open or short in IGF1 or IGT1 circuit from No. 1 ignition coil with igniter to ECM No. 1 ignition coil with igniter ECM	○	○
P1305 (DI–121)	Igniter Circuit Malfunction (No. 2)	Ignition system Open or short in IGF2 or IGT2 circuit from No. 2 ignition coil with igniter to ECM No. 2 ignition coil with igniter ECM	○	○
P1310 (DI–121)	Igniter Circuit Malfunction (No. 3)	Ignition system Open or short in IGF2 or IGT3 circuit from No. 3 ignition coil with igniter to ECM No. 3 ignition coil with igniter ECM	○	○
P1315 (DI–121)	Igniter Circuit Malfunction (No. 4)	Ignition system Open or short in IGF1 or IGT4 circuit from No. 4 ignition coil with igniter to ECM No. 4 ignition coil with igniter ECM	○	○
P1320 (DI–121)	Igniter Circuit Malfunction (No. 5)	Ignition system Open or short in IGF2 or IGT5 circuit from No. 5 ignition coil with igniter to ECM No. 5 ignition coil with igniter ECM	○	○
P1325 (DI–121)	Igniter Circuit Malfunction (No. 6)	Ignition system Open or short in IGF1 or IGT6 circuit from No. 6 ignition coil with igniter to ECM No. 6 ignition coil with igniter ECM	○	○

P1335 (DI–127)	Crankshaft Position Sensor Circuit Malfunction (During engine running)	Open or short in crankshaft position sensor circuit Crankshaft position sensor Camshaft timing gear ECM	–	○
P1346 (DI–128)	VVT Sensor/Crankshaft position Sensor Circuit Range/Performance Problem (Bank 1)	Mechanical system (Jumping teeth of timing belt, belt stretched) ECM	○	○
P1349 (DI–129)	VVT System Malfunction (Bank 1)	Valve timing OCV VVT controller assembly ECM	○	○
P1350 (DI–135)	VVT Sensor/Camshaft position Sensor Circuit Malfunction (Bank 2)	Open or short in VVT sensor (camshaft position Sensor) circuit VVT sensor (camshaft position Sensor) ECM	○	○
P1351 (DI–128)	VVT Sensor/Crankshaft position Sensor Circuit Range/Performance Problem (Bank 2)	Same as DTC No. P1346	○	○
P1354 (DI–129)	VVT System Malfunction (Bank 2)	Same as DTC No. P1349	○	○
P1520 (DI–137)	Stop Light Switch Signal Malfunction	Short in stop light switch signal circuit Stop light switch ECM	○	○
P1600 (DI–139)	ECM BATT Malfunction	Open in back up power source circuit ECM	○	○
P1656 (DI–141)	OCV Circuit Malfunction (Bank 1)	Open or short in OCV circuit OCV ECM	○	○
P1663 (DI–141)	OCV Circuit Malfunction (Bank 2)			
P1780 (DI–144)	Park/Neutral Position Switch Malfunction	Short in park/neutral position switch circuit Park/neutral position switch ECM	○	○
B2795 (DI–695)	Unmatched Key Code	Immobiliser system	–	○
B2796 (DI–696)	No Communication in Immobiliser System	Immobiliser system	–	○
B2797 (DI–698)	Communication Malfunction No.1	Immobiliser system	–	○
B2798 (DI–700)	Communication Malfunction No.2	Immobiliser system	–	○

*: ○ ~~~MIL lights up. – ~~~MIL does not light up.

DI0ZH–06

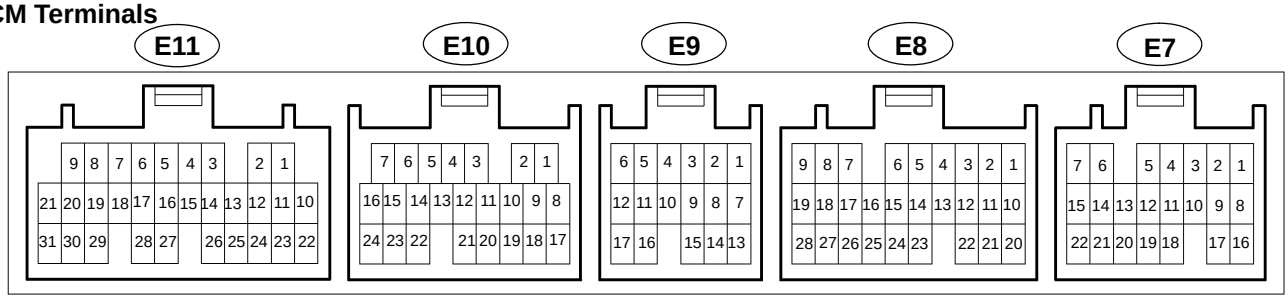
PARTS LOCATION



DI099–09

TERMINALS OF ECM

ECM Terminals



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
BATT (E7–1) – E1 (E10–17)	B–Y – BR	Always	9 – 14
+B (E7–16) – E1 (E10–17)	B–Y – BR	IG switch ON	9 – 14
VC (E10–2) – E2 (E10–18)	Y – BR	IG switch ON	4.5 – 5.5
VTA1 (E10–23) – E2 (E10–18)	L – BR	IG switch ON Throttle valve fully closed	0.3 – 1.0
		IG switch ON Throttle valve fully open	2.7 – 5.2
VG (E10–10) – E2G (E10–19)	P – R–B	Idling A/C switch OFF	1.1 – 1.5
VV1+ (E11–10) – NE– (E10–24)	O – BR	Idling	Pulse generation (See page DI–135)
VV2+ (E11–22) – NE– (E10–24)	L – BR		
NE+ (E10–16) – NE– (E10–24)	B–R – BR	Idling	Pulse generation (See page DI–135)
OC1+ (E11–6) – OC1– (E11–5)	G – G–W	IG switch ON	Pulse generation (See page DI–129)
OC2+ (E11–29) – OC2– (E11–18)	G–R – G–Y		
THA (E10–22) – E2 (E10–18)	L–Y – BR	Idling Intake air temp. 20°C (68°F)	0.5 – 3.4
THW (E10–14) – E2 (E10–18)	G–B – BR	Idling Engine coolant temp. 80°C (176°F)	0.2 – 1.0
STA (E7–7) – E1 (E10–17)	GR – BR	Cranking	6.0 or more
#10 (E10–5) – E01 (E11–21) #20 (E10–6) – E01 (E11–21) #30 (E11–1) – E01 (E11–21) #40 (E11–2) – E01 (E11–21) #50 (E11–3) – E01 (E11–21) #60 (E11–4) – E01 (E11–21)	L – BR R – BR Y – BR W – BR R–W – BR G – BR	IG switch ON	9 – 14
		Idling	Pulse generation (See page DI–58)
IGT1 (E11–11) – E1 (E10–17)	L–B – BR	Idling	Pulse generation (See page DI–121)
IGT2 (E11–12) – E1 (E10–17)	L–W – BR		
IGT3 (E11–13) – E1 (E10–17)	L–R – BR		
IGT4 (E11–14) – E1 (E10–17)	L–Y – BR		
IGT5 (E11–15) – E1 (E10–17)	L – BR		
IGT6 (E11–16) – E1 (E10–17)	LG – BR		
IGF (E11–25) – E1 (E10–17)	W–R – BR	IG switch ON	4.5 – 5.5
		Idling	Pulse generation (See page DI–121)
ACIS (E11–17) – E01 (E11–21)	R–Y – BR	IG switch ON	9 – 14
FC (E7–3) – E01 (E11–21)	G–R – BR	IG switch ON	9 – 14
		Idling	0 – 3.0
EVP1 (E10–7) – E01 (E11–21)	LG – BR	IG switch ON	9 – 14

CCV (E7–10) – E01 (E11–21)	L–R – BR	IG switch ON	9 – 14
RSO (E11–26) – E01 (E11–21)	R–W – BR	IG switch ON Disconnect E11 connector from ECM	9 – 14
OXS (E8–8) – E1 (E10–17)	B – BR	Maintain engine speed at 2,500 rpm for 3 min. after warming up	Pulse generation (See page DI–71)
HTS (E8–9) – E03 (E11– 30)	P–B – BR	Idling	9 – 14
		IG switch ON	Below 3.0
KNKR (E11–27) – E1 (E10–17)	W – BR	Idling	Pulse generation (See page DI–64)
KNKL (E11–28) – E1 (E10–17)	W – BR		
NSW (E8–20) – E1 (E10–17)	B–W – BR	IG switch ON Other shift position in P, N	9 – 14
		IG switch ON Shift position in P, N	0
TACH (E8–27) – E1 (E10–17)	B–O – BR	Idling	Pulse generation
TBP (E8–3) – E01 (E11–21)	V – BR	IG switch ON Disconnect vacuum hose from vapor pressure sensor	9 – 14
PTNK (E7–17) – E2 (E10–18)	P – BR	IG switch ON	2.9 – 3.7
		IG switch ON Apply vacuum 4.0 kPa (30 mmHg, 1.18 in.Hg)	0.5 or less
SIL (E7–4) – E1 (E10–17)	W – BR	During transmission	Pulse generation
STP (E7–15) – E1 (E10–17)	G–W – BR	IG switch ON Brake pedal depressed	7.5 – 14
		IG switch ON Brake pedal released	Below 1.5
AFR+ (E10–11) – E1 (E10–17)	G – BR	IG switch ON	3.0 – 3.6
AFL+ (E10–12) – E1 (E10–17)	L – BR		
AFR– (E10–20) – E1 (E10–17)	R – BR	IG switch ON	2.7 – 3.3
AFL– (E10–21) – E1 (E10–17)	B–W – BR		
HAFR (E10–3) – E04 (E10–1)	B–W – BR	Idling	Below 3.0
HAFL (E10–4) – E05 (E10–8)	B–R – BR	IG switch ON	9 – 14
KSW (E8–23) – E1 (E10–17)	L–B – BR	At time of inserting key	Below 1.5
		In condition without key inserted	4 – 5
CODE (E8–28) – E1 (E10–17)	G–W – BR	At time of inserting key	Pulse generation
IGSW (E7–2) – E1 (E10–17)	B–R – BR	IG switch ON	9 – 14
TXCT (E8–18) – E1 (E10–17)	L–Y – BR	At time of inserting key	Pulse generation
IMLD (E7–22) – E1 (E10–17)	R–Y – BR	In condition without key inserted	Pulse generation
MREL (E7–8) – E1 (E10–17)	B–W – BR	IG switch ON	9 – 14
SPD (E8–22) – E1 (E10–17)	V–W – BR	IG switch ON Rotate driving wheel slowly	Pulse generation

DI09A–08

PROBLEM SYMPTOMS TABLE

When the malfunction is not confirmed in the DTC check and the problem still can not be confirmed in the basic inspection either, proceed to this problem symptoms table and troubleshoot according to the number given below.

Symptom	Suspect Area	See page
Engine does not crank (Does not start)	11. Starter 12. Starter relay	ST–19 ST–21
No initial combustion (Does not start)	1. ECM power source circuit 2. Fuel pump control circuit 3. ECM	DI–148 DI–152 IN–31
No complete combustion (Does not start)	1. Fuel pump control circuit	DI–152
Engine cranks normally (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit 3. Compression	DI–145 DI–152 EM–3
Cold engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–145 DI–152
Hot engine (Difficult to start)	1. Starter signal circuit 2. Fuel pump control circuit	DI–145 DI–152
High engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. ECM power source circuit	DI–758 DI–148
Low engine idle speed (Poor idling)	1. A/C signal circuit (Compressor circuit) 2. Fuel pump control circuit	DI–758 DI–152
Rough idling (Poor idling)	1. Compression 2. Fuel pump control circuit	EM–3 DI–152
Hunting (Poor idling)	1. ECM power source circuit 2. Fuel pump control circuit	DI–148 DI–152
Hesitation/Poor acceleration (Poor driveability)	1. Fuel pump control circuit 2. A/T faulty	DI–152 DI–161
Surging (Poor driveability)	1. Fuel pump control circuit	DI–152
Soon after starting (Engine stall)	1. Fuel pump control circuit	DI–152
During A/C operation (Engine stall)	1. A/C signal circuit (Compressor circuit) 2. ECM	DI–758 IN–31
Unable to refuel/ Difficult to refuel	1. ORVR system	EC–6

CIRCUIT INSPECTION

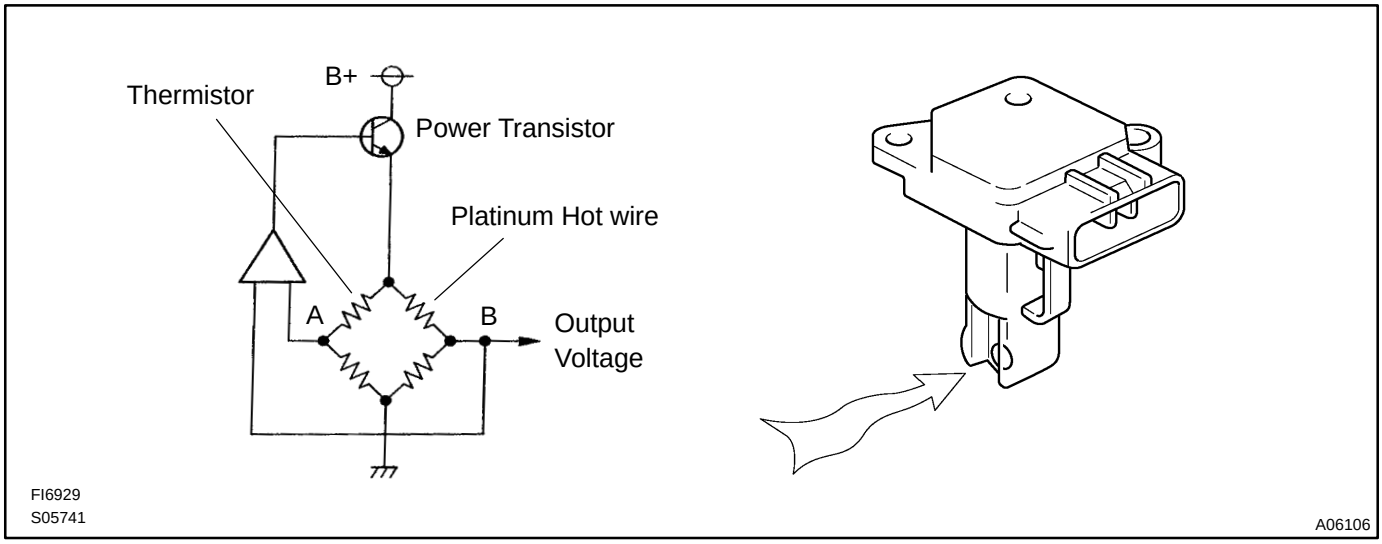
DTC	P0100	Mass Air Flow Circuit Malfunction

CIRCUIT DESCRIPTION

The mass air flow meter uses a platinum hot wire. The hot wire air flow meter consists of a platinum hot wire, thermistor and a control circuit installed in a plastic housing. The hot wire air flow meter works in principle that the hot wire and thermistor located in the intake air bypass of the housing detect any changes in the intake air temperature.

The hot wire is maintained at the set temperature by controlling the current flow through the hot wire. This current flow is then measured as the output voltage of the air flow meter.

The circuit is constructed so that the platinum hot wire and thermistor can provide a bridge circuit with the power transistor, and controlled so that the potential of A and B can remain equal in order to maintain the set temperature.



DTC No.	DTC Detecting Condition	Trouble Area
P0100	Open or short in mass air flow meter circuit with more than 3 sec. engine speed 4,000 rpm or less	●Open or short in mass air flow meter circuit ●Mass air flow meter ●ECM

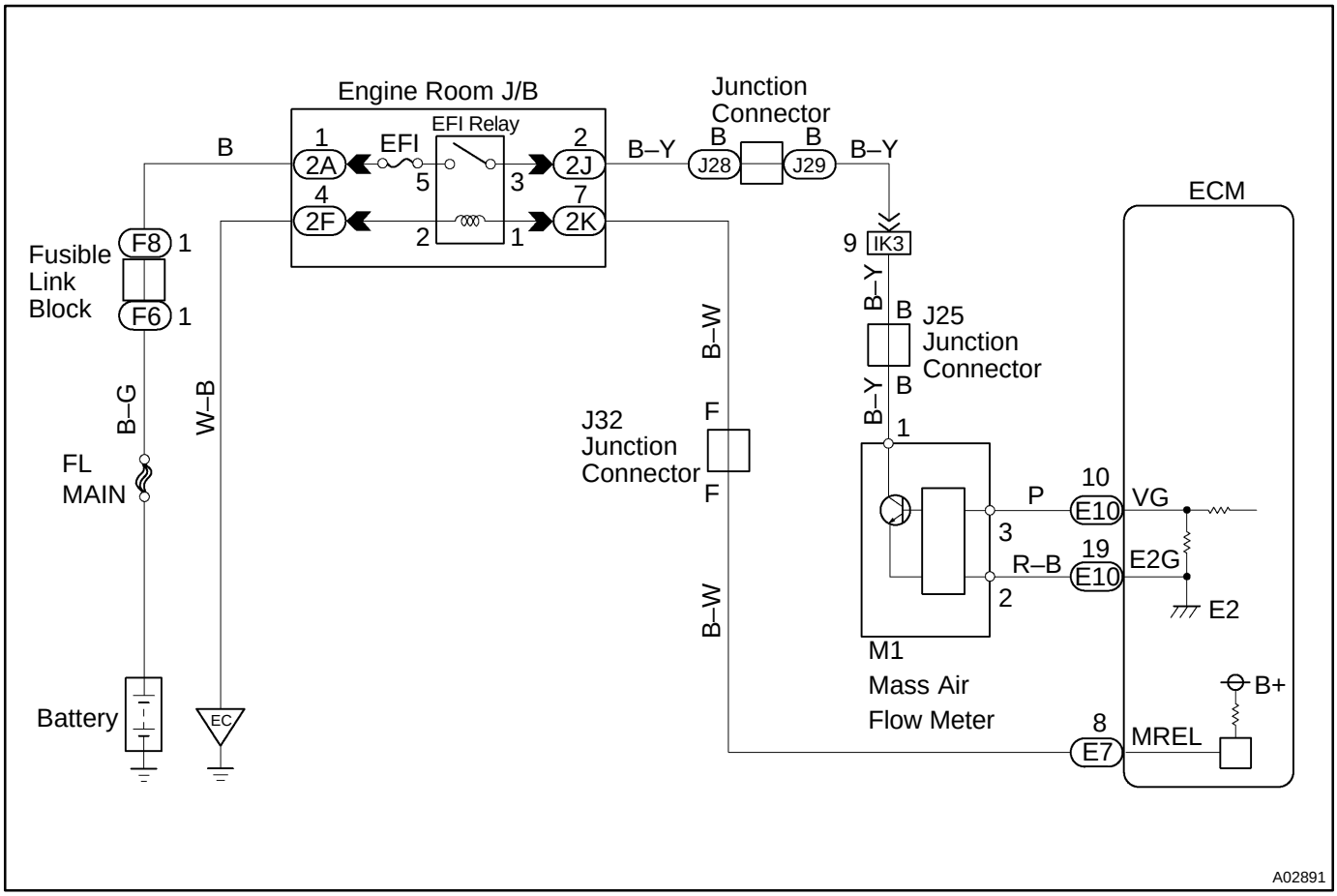
If the ECM detects DTC P0100 it operates the fail–safe function, keeping the ignition timing and injection volume constantly and making it possible to drive the vehicle.

HINT:

After confirming DTC P0100, use the OBD II scan tool or LEXUS hand–held tester to confirm the mass air flow ratio from the CURRENT DATA.

Mass Air Flow Value (gm/sec.)	Malfunction
0.0	●Mass air flow meter power source circuit open ●VG circuit open or short
271.0 or more	●E2G circuit open

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of mass air flow rate.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.
(c) Start the engine.

CHECK:

Read the mass air flow rate on the OBD II scan tool or LEXUS hand–held tester.

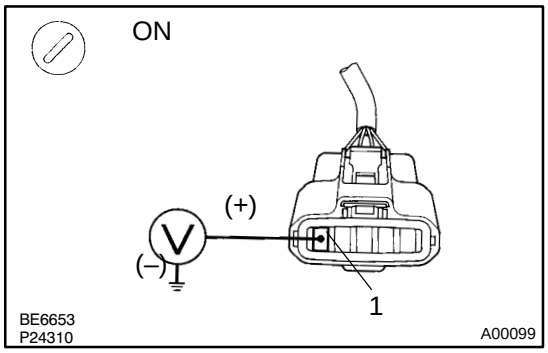
RESULT:

	Type I	Type II
Mass Air Flow Rate (gm/sec.)	0.0	271.0 or more

Type I	**Go to step 2.**

Type II → Go to step 5.

2	Check voltage of mass air flow meter power source.



PREPARATION:
(a) Disconnect the mass air flow meter connector.
(b) Turn the ignition switch ON.

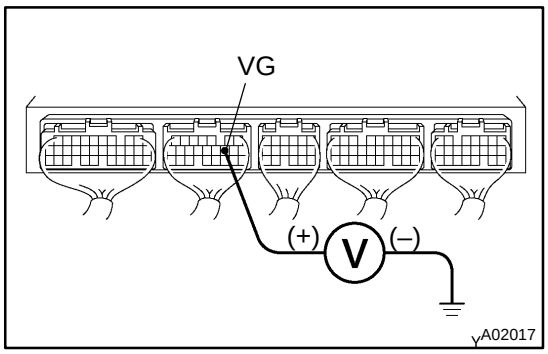
CHECK:
Measure the voltage between terminal 1 of the mass air flow meter connector and the body ground.

OK:
Voltage: 9 – 14 V

NG → **Check for open in harness and connector between EFI main relay (Marking: EFI) and mass air flow meter (See page IN–31).**

OK

3	Check voltage between terminal VG of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF–79).
(b) Start the engine.

CHECK:
Measure the voltage between terminal VG of the ECM connector and the body ground while the engine is idling.

OK:
Voltage:
1.1 – 1.5 V (P or N position and A/C switch OFF)

OK → **Check and replace ECM (See page IN–31).**

NG

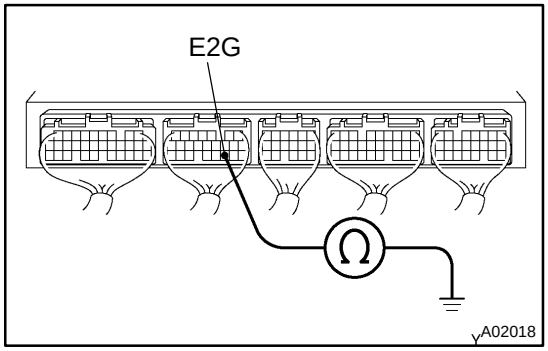
4	Check for open and short in harness and connector between mass air flow meter and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Replace mass air flow meter.

5	Check continuity between terminal E2G of ECM connector and body ground.



PREPARATION:
Remove the glove compartment (See page SF–79).
CHECK:
Check the continuity between terminal E2G of the ECM connector and the body ground.
OK:
Continuity (1 Ω or less)

NG → Check and replace ECM (See page IN–31).

OK

6	Check for open in harness and connector between mass air flow meter and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Replace mass air flow meter.

DTC	P0101	Mass Air Flow Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0100 on page DI–23.

DTC No.	DTC Detecting Condition	Trouble Area
P0101	Conditions (a), (b) and (c) continue 10 sec. or more with engine speed NE < 900: (2 trip detection logic) (a) Throttle valve fully closed (b) Mass air flow meter output ⊖ 2.2 V (c) THW ≧ 70˚C	●Mass air flow meter
	Conditions (a) and (b) continue 10 sec. or more with engine speed 1,500 rpm or more: (2 trip detection logic) (a) VTA ≧ 0.63 V (b) Mass air flow meter output ∼ 1.06 V	

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P0101) being output?

NO → Replace mass air flow meter.

YES

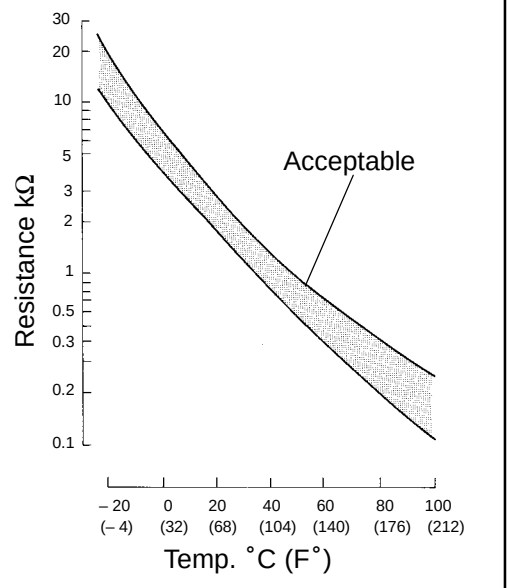
Go to relevant DTC chart.

DI09D–09

DTC	P0110	Intake Air Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

Fig. 1



The intake air temperature sensor is built in mass air flow meter and senses the intake air temperature.

A thermistor built in the sensor changes the resistance value according to the intake air temperature. The lower the intake air temperature, the greater the thermistor resistance value is, and the higher the intake air temperature, the lower the thermistor resistance value is (See Fig. 1).

The intake air temperature sensor is connected to the ECM. The 5 V power source voltage in the ECM is applied to the intake air temperature sensor from terminal THA via resistor R. That is, resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes in proportion to the changes in the intake air temperature, the potential at terminal THA also changes. Based on this signal, the ECM increases the fuel injection volume to improve driveability during the cold engine operation.

If the ECM detects the DTC P0110, it operates the fail–safe function in which the intake air temperature is assumed to be 20˚C (68˚F).

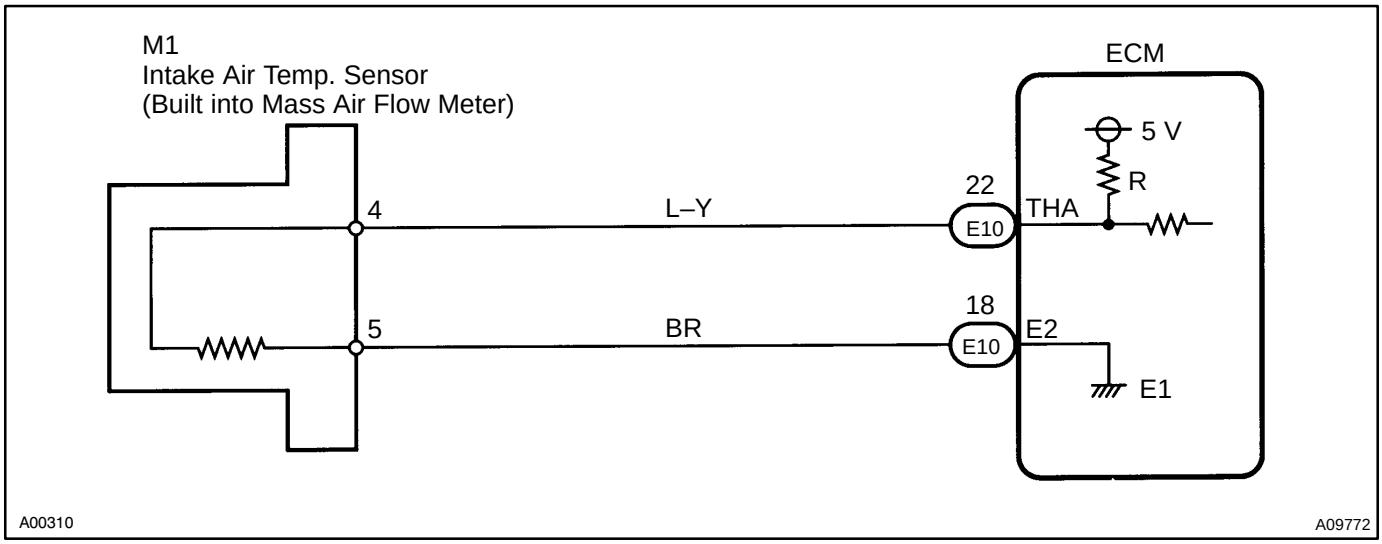
DTC No.	DTC Detecting Condition	Trouble Area
P0110	Open or short in intake air temp. sensor circuit	●Open or short in intake air temp. sensor circuit ●Intake air temp. sensor (built in mass air flow meter) ●ECM

HINT:

After confirming DTC P0110, use the OBD II scan tool or LEXUS hand–held tester to confirm the intake air temperature form the CURRENT DATA.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115, P0120 and P1410 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of intake air temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Same valve as the actual intake air temperature.

HINT:

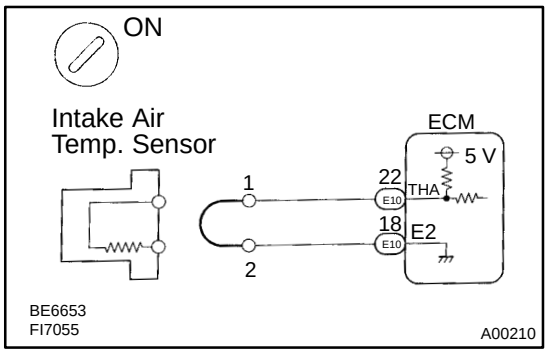
- If there is open circuit, OBD II scan tool or LEXUS hand–held tester indicates –40°C (–40°F).
- If there is short circuit, OBD II scan tool or LEXUS hand–held tester indicates 140°C (284°F) or more.

NG → **–40°C (–40°F) ... Go to step 2.**
140°C (284°F) or more ... Go to step 4.

OK

Check for intermittent problems (See page DI–3).

2	Check for open in harness or ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.
(b) Connect the sensor wire harness terminals together.
(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

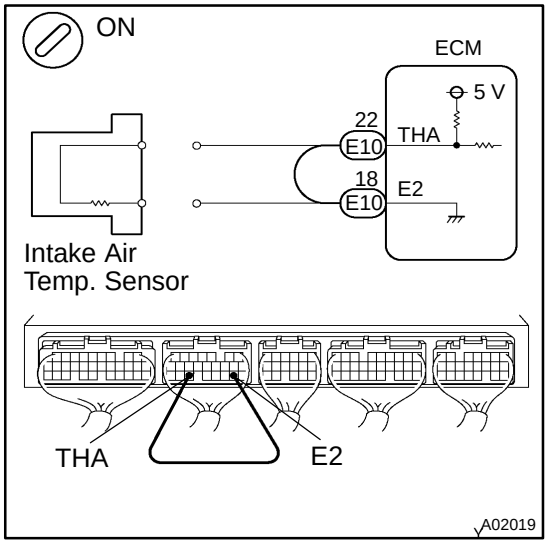
OK:

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) Remove the glove compartment (See page SF–79).
(b) Connect the terminals THA and E2 of the ECM connector.

HINT:

The mass air flow meter connector is disconnected. Before checking, do a visual and contact check of the pressure for the ECM connector (See page IN–31).

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

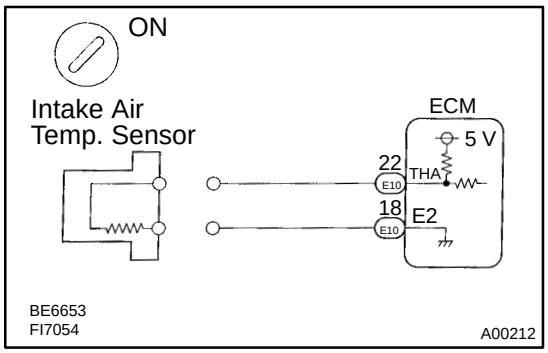
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminal E2 or THA, repair or replace harness.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN–31).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the mass air flow meter connector.

(b) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

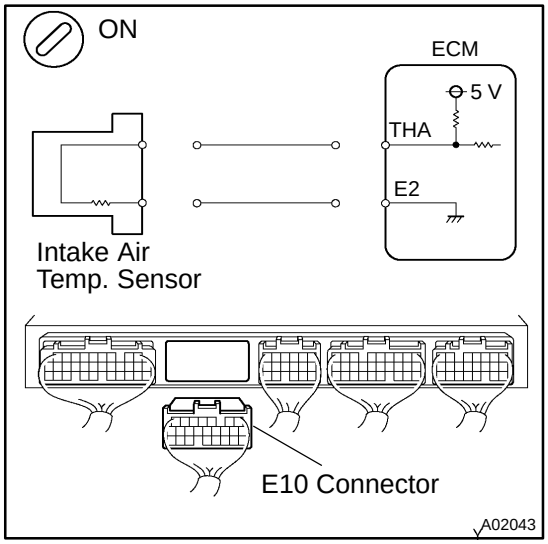
OK:

Temperature value: –40°C (–40°F)

OK	Replace mass air flow meter.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Disconnect the E10 connector from the ECM.

HINT:

Mass air flow meter connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Temperature value: –40°C (–40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN–31).

DTC	P0115	Engine Coolant Temp. Circuit Malfunction

CIRCUIT DESCRIPTION

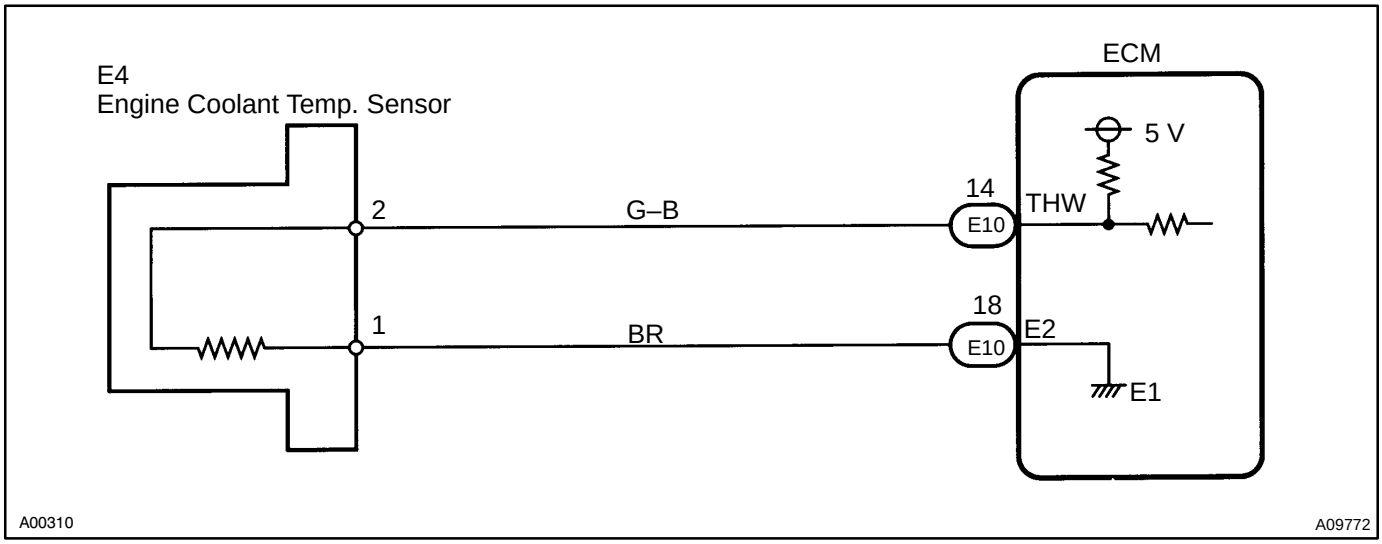
A thermistor built in the engine coolant temperature sensor changes the resistance value by to the engine coolant temperature.
The structure of the sensor and connection to the ECM is the same as one in the intake air temperature circuit malfunction shown in page DI–28.
If the ECM detects the DTC P0115, it operates the fail–safe function in which the engine coolant temperature is assumed to be 80˚C (176˚C).

DTC No.	Detection Item	Trouble Area
P0115	Open or short in engine coolant temp. sensor circuit	●Open or short in engine coolant temp. sensor circuit ●Engine coolant temp. sensor ●ECM

HINT:
After confirming DTC P0115, use the OBD II scan tool or LEXUS hand–held tester to confirm the engine coolant temperature from the CURRENT DATA.

Temperature Displayed	Malfunction
–40˚C (–40˚F)	Open circuit
140˚C (284˚F) or more	Short circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115, P0120 and P1410 are output simultaneously, E2 (sensor ground) may be open.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Connect OBD II scan tool or LEXUS hand–held tester, and read value of engine coolant temperature.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Same valve as the actual engine coolant temperature.

HINT:

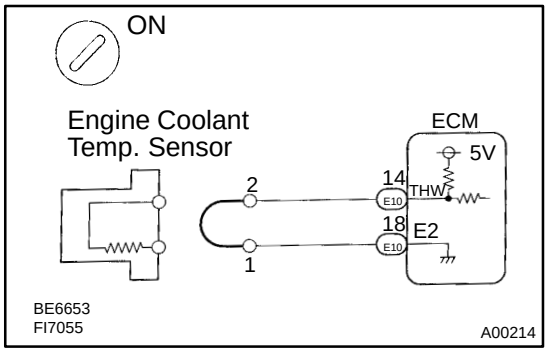
- If there is open circuit, OBD II scan tool or LEXUS hand–held tester indicates –40˚C (–40˚F).
- If there is short circuit, OBD II scan tool or LEXUS hand–held tester indicates 140˚C (284˚F) or more.

NG → **–40˚C (–40˚F) ... Go to step 2.**
140˚C (284˚F) or more ... Go to step 4.

OK

Check for intermittent problems (See page DI–3).

2	**Check for open in harness or ECM.**



PREPARATION:

(a) Disconnect the engine coolant temp. sensor connector.

(b) Connect the sensor wire harness terminals together.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

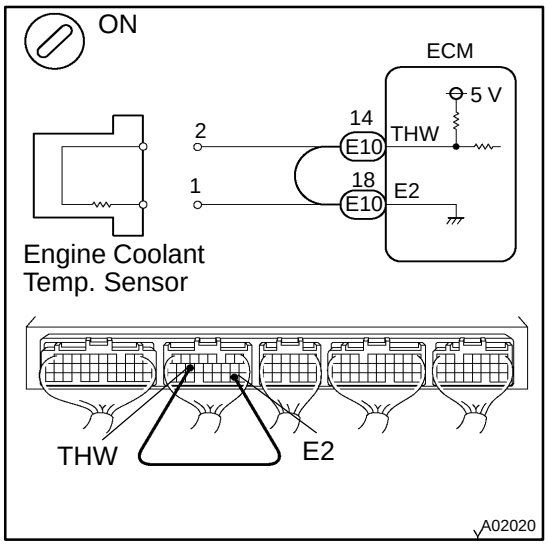
OK:

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) Remove the glove compartment (See page SF–79).

(b) Connect terminals THW and E2 of the ECM connector.

HINT:

The engine coolant temperature sensor connector is disconnected. Before checking, do a visual and contact check of the pressure for the ECM connector (See page IN–31).

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

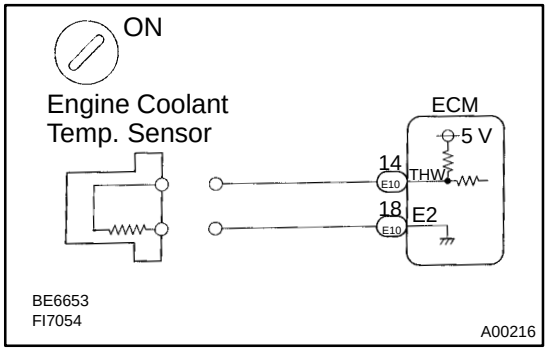
Temperature value: 140°C (284°F) or more

OK	Open in harness between terminal E2 or THW, repair or replace harness.

NG

Confirm good connection at ECM. If OK, check and replace ECM (See page IN–31).

4	Check for short in harness and ECM.



PREPARATION:

(a) Disconnect the engine coolant temperature sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

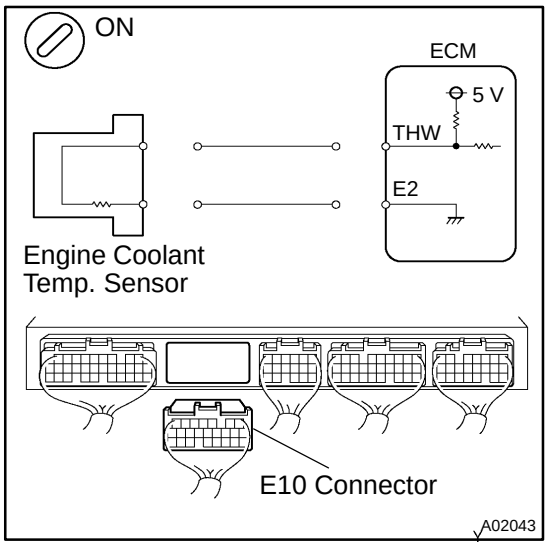
OK:

Temperature value: –40°C (–40°F)

OK	Replace engine coolant temperature sensor.

NG

5	Check for short in harness or ECM.



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Disconnect the E10 connector from the ECM.

HINT:

The engine coolant temperature sensor connector is disconnected.

(c) Turn the ignition switch ON.

CHECK:

Read the temperature value on the OBD II scan tool or LEXUS hand–held tester.

OK:

Temperature value: –40°C (–40°F)

OK	Repair or replace harness or connector.

NG

Check and replace ECM (See page IN–31).

DI09F–09

DTC	P0116	Engine Coolant Temp. Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0115 on page DI–32.

DTC No.	DTC Detecting Condition	Trouble Area
P0116	If THW –7°C (19.4°F), 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 temp. sensor
	If THW –7°C (19.4°F), and <10°C (50°F), 5 min. or more after starting engine, engine coolant temp. sensor value is 20°C (68°F) or less (2 trip detection logic)	
	If THW 10°C (50°F), 2 min. or more after starting engine, engine coolant temp. sensor value is 30°C (86°F) or less (2 trip detection logic)	
	When THW ~ 35°C (95°F) or more and less than 60°C (140°F), and THA ~ – 6.7°C (19.9°F) or more, when starting engine, conditions (a) and (b) continue (2 trip detection logic) (a) Vehicle speed is changing (Not stable) (b) THW change is lower than 3°C (37.5°F) from THW since when starting engine	
	In case that reading value of water temp. sensor will not change more than 1°C (33.8°F) even after repeating 6 trips (detection logic) of adjusting speed pattern with THW more than 60°C (140°F) when engine starts.	

INSPECTION PROCEDURE

HINT:

- If DTCs P0115 and P0116 are output simultaneously, engine coolant temperature sensor circuit may be open. Perform the troubleshooting of DTC P0115 first.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P0116) being output?

YES → Go to relevant DTC chart.

NO

2	Check thermostat (See page CO–11).

NG → Replace thermostat.

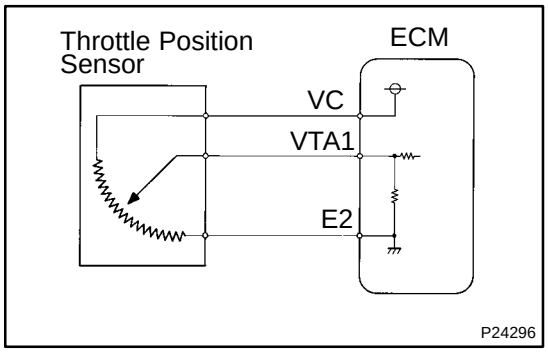
OK

Replace engine coolant temperature sensor.

DI6IF–02

DTC	P0120	Throttle/Pedal position Sensor/Switch ”A” Circuit Malfunction

CIRCUIT DESCRIPTION



The throttle position sensor is mounted in the throttle body and detects the throttle valve opening angle. When the throttle valve is fully closed, a voltage of approximately 0.7 V is applied to terminal VTA1 of the ECM. The voltage applied to terminals VTA1 of the ECM increases in proportion to the opening angle of the throttle valve and becomes approximately 2.7 – 5.2 V when the throttle valve is fully opened. The ECM judges the vehicle driving conditions by these signals output from terminals VTA1 and uses them as one of the conditions for deciding the air–fuel ratio correction, power increase correction and fuel–cut control etc.

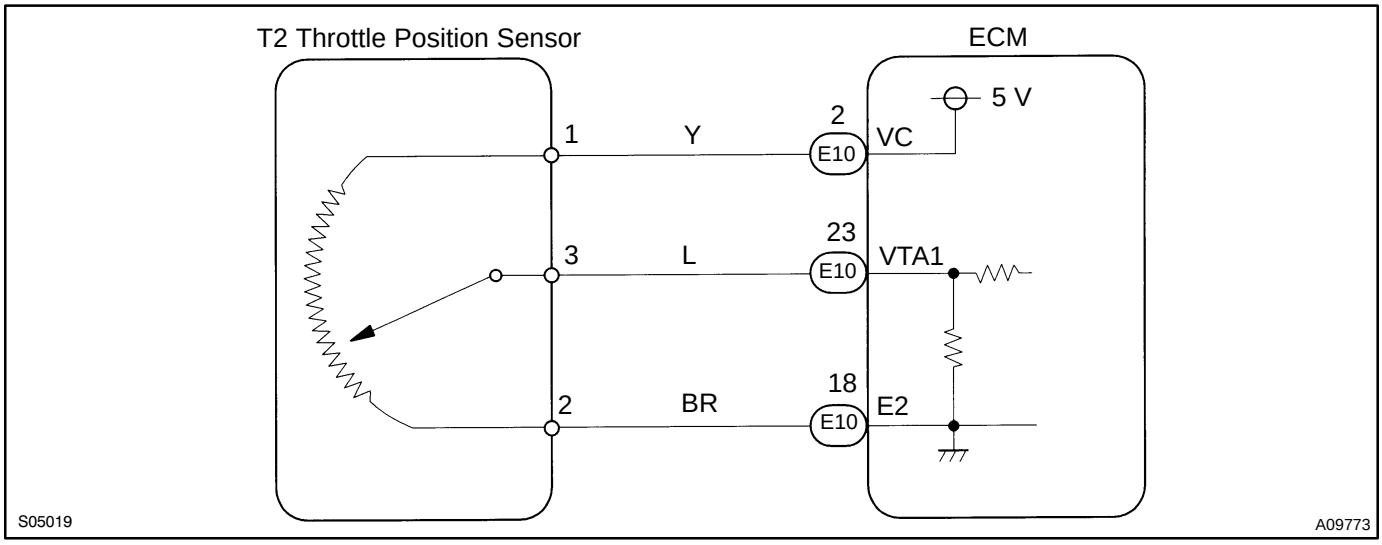
DTC No.	DTC Detecting Condition	Trouble Area
P0120	Condition (a) or (b) continues: (a) VTA1 ⍃ 0.1 V (b) VTA1 ⍄ 4.9 V	●Open or short in throttle position sensor circuit ●Throttle position sensor ●ECM

HINT:

After confirming DTC P0120, use the OBD II scan tool or LEXUS hand–held tester to confirm the throttle valve opening percentage and closed throttle position switch condition.

Throttle valve opening position expressed as percentage		Trouble Area
Throttle valve fully closed	Throttle valve fully open	
0 %	0 %	●VC circuit open ●VTA circuit open or short
Approx. 100 %	Approx. 100 %	●E2 circuit open

WIRING DIAGRAM

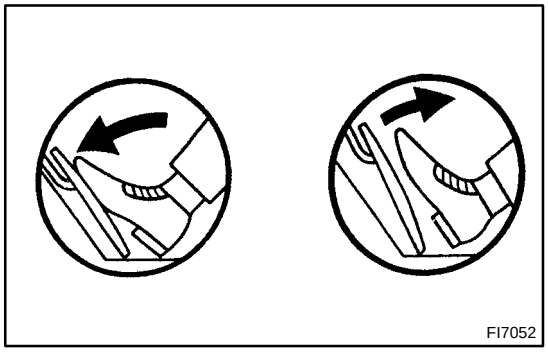


INSPECTION PROCEDURE

HINT:

- If DTCs P0110, P0115 and P0120 are output simultaneously, E2 (sensor ground) bay be open.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Connect OBD II scan tool or LEXUS hand–held tester, and read throttle valve opening percentage.**



PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.

CHECK:

Read the throttle valve opening percentage.

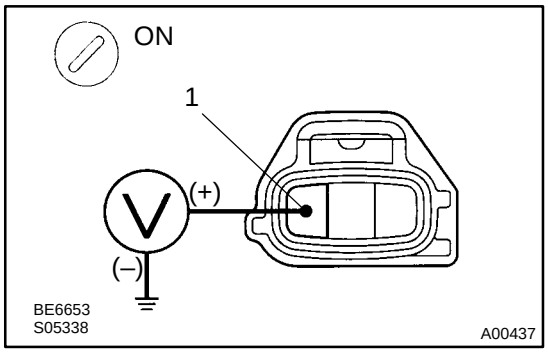
OK:

Throttle Valve	Throttle valve opening position expressed as percentage
Fully open	Approx. 75 %
Fully closed	Approx. 10 %

OK → **Check for intermittent problems (See page DI–3).**

NG

2	**Check voltage between terminal 1 of wire harness side connector and body ground.**



PREPARATION:

(a) Disconnect the throttle position sensor connector.

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal 1 (VC) of the wire harness side connector and the body ground.

OK:

Voltage: 4.5 – 5.5 V

NG → **Go to step 5.**

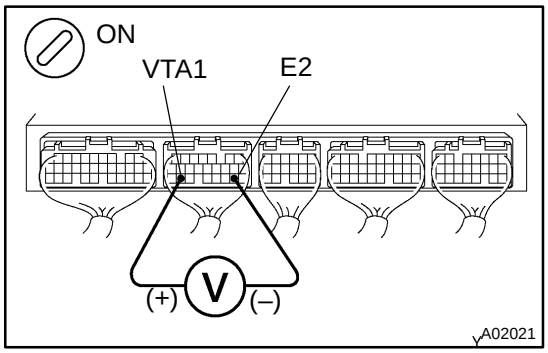
OK

3	**Check throttle position sensor (See page SF–31).**

NG → **Replace throttle position sensor.**

OK

4	**Check voltage between terminals VTA1 and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF–79).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VTA1 and E2 of the ECM connector.

OK:

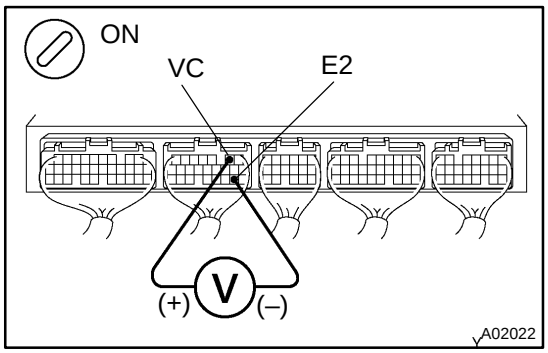
Throttle Valve	Voltage
Fully closed	0.3 – 1.0 V
Fully open	2.7 – 5.2 V

OK → **Check and replace ECM (See page IN–31).**

NG

Check for open and short in harness and connector in VTA1 circuit between ECM and throttle position sensor (See page IN–31).

5	**Check voltage between terminals VC and E2 of ECM connector.**



PREPARATION:
(a) Remove the glove compartment (See page SF–79).
(b) Turn the ignition switch ON.

CHECK:
Measure the voltage between terminals VC and E2 of the ECM connector.

OK:

Voltage: 4.5 – 5.5 V

OK → **Check and replace ECM (See page IN–31).**

NG

Check for open in harness and connector in VC circuit between ECM and sensor (See page IN–31).

DI09H–07

DTC	P0121	Throttle/Pedal Position Sensor/Switch ”A” Circuit Range/Performance Problem

CIRCUIT DESCRIPTION

Refer to DTC P0120 on page DI–38.

DTC No.	DTC Detecting Condition	Trouble Area
P0121	After vehicle speed has been exceeded 30 km/h (19 mph) even once, output value of throttle position sensor is out of applicable range while vehicle speed between 30 km/h (19 mph) and 0 km/h (0 mph) (2 trip detection logic)	●Throttle position sensor

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P0121) being output?**

YES → **Go to relevant DTC chart.**

NO

Replace throttle position sensor.

DI00U–05

DTC	P0125	Insufficient Coolant Temp. for Closed Loop Fuel Control

CIRCUIT DESCRIPTION

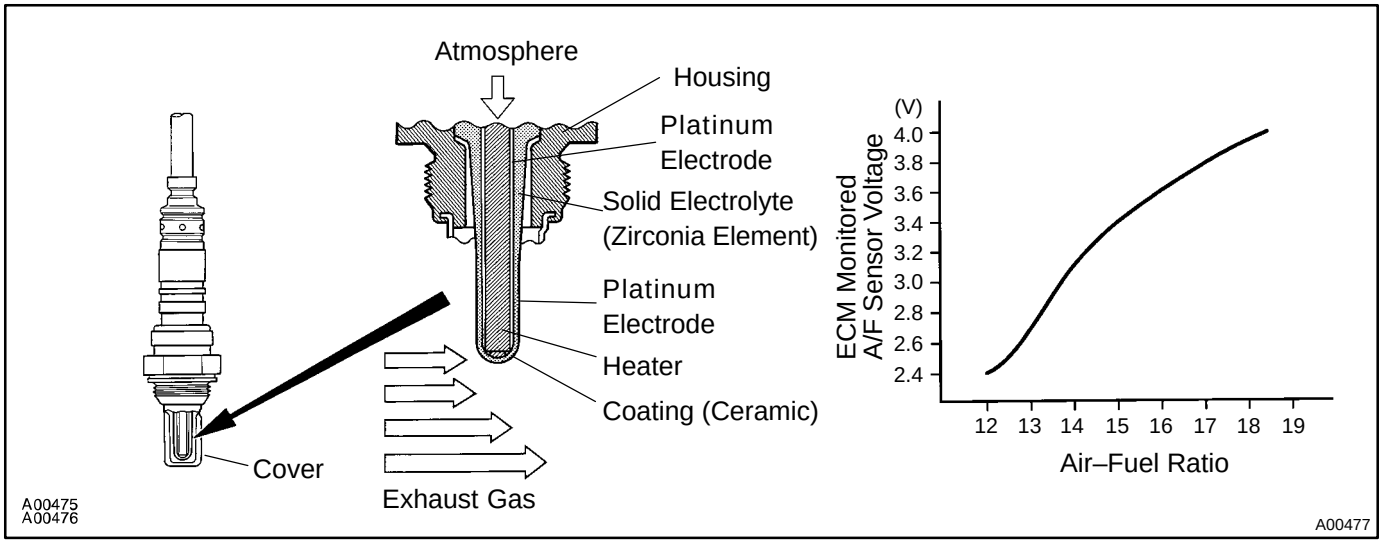
To obtain a high purification rate of the CO, HC and NOx components of the exhaust gas, a three–way catalytic converter is used. For the most efficient use of the three–way catalytic converter, the air–fuel ratio must be precisely controlled so that it is always close to the stoichiometric air–fuel ratio.

The A/F sensor has the characteristic that it provides output voltage* being approximately proportional to the existing air–fuel ratio. The A/F sensor output voltage* is used to provide feedback for the ECM to control the air–fuel ratio.

By the A/F sensor output voltage, the ECM can determine the deviation amount from the stoichiometric air–fuel ratio and control the proper injection time immediately. If the A/F sensor is malfunctioning, ECM is unable to perform the accurate air–fuel ratio control.

The A/F sensor is equipped with 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), the current flows to the heater to heat the sensor for the accurate oxygen concentration detection.

*: The voltage value changes at the inside of the ECM only.



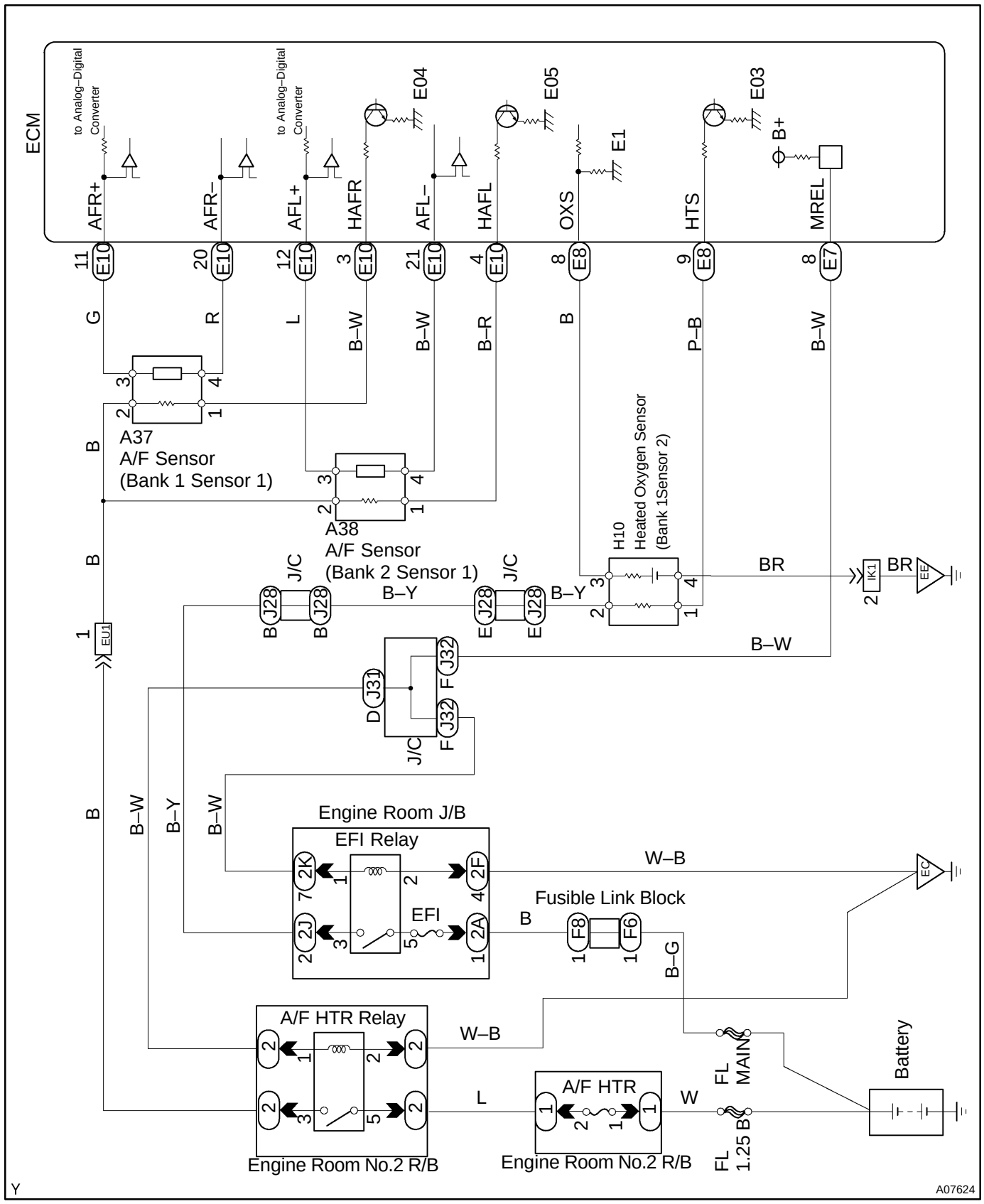
DTC No.	DTC Detecting Condition	Trouble Area
P0125	After engine is warmed up, A/F sensor output* does not change when conditions (a), (b), (c) and (d) continue for at least 1.5 min: *: Output value changes at inside of the ECM only (a) Engine speed: 1,500 rpm or more (b) Vehicle speed: 40 – 100 km/h (25 – 62 mph) (c) Throttle valve is not fully closed (d) 140 sec. or more after starting engine	●Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ●A/F sensor (bank 1, 2 sensor 1) ●Air induction system ●Fuel pressure ●Injector ●Gas leak on exhaust system ●ECM

HINT:

- After confirming DTC P0125, use the OBD II scan tool or LEXUS hand−held tester to confirm output voltage of the A/F sensor (bank 1, 2 sensor 1) from the CURRENT DATA.
- The ECM controls the voltage of the AFR+, AFL+, AFR– and AFL– terminals of the ECM to the fixed voltage, therefore it is impossible to confirm the A/F sensor output voltage without the OBDII scan tool or LEXUS hand–held tester.

- OBD II scan tool (excluding LEXUS hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the LEXUS hand–held tester.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P0125) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NO

2	**Connect the OBD II scan tool or LEXUS hand–held tester, and read value for output voltage of A/F sensor (bank 1, 2 sensor 1).**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage value of the A/F sensor on the screen of OBDII scan tool or LEXUS hand–held tester when you perform all the following conditions.

HINT:

The voltage of the AFR+ or AFL+ terminal of the ECM is fixed at 3.3 V and the voltage of the AFR– or AFL– terminal is fixed at 3.0 V, therefore it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	● Not remains at 3.30 V (0.660 V*) ● Not remains at 3.8 V (0.76 V*) or more ● Not remains at 2.8 V (0.56 V*) or less *: When you use OBD II scan tool (excluding LEXUS hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operating throttle valve open and close	

HINT:

- Although there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding LEXUS hand–held tester).

OK → **Go to step 9.**

NG

3	Check for open and short in harness and connector between ECM and A/F sensor (bank 1, 2 sensor 1) (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check resistance of A/F sensor heater (bank 1, 2 sensor 1) (See page SF–76).

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

7	Check injector injection (See page SF–21).

NG → Replace injector.

OK

8	Check gas leak on exhaust system.

NG → Repair or replace

OK

Replace A/F sensor (bank 1, 2 sensor 1).

9	Perform confirmation driving pattern (See page DI–110).

Go

10	Is there DTC P0125 being output again?

YES → Check and replace ECM (See page IN–31).

NO

11	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems (See page DI–3).

YES

DTC P0125 is caused by shortage of fuel.

DI6IG–03

DTC	P0128	Thermostat Malfunction

CIRCUIT DESCRIPTION

If the water temperature doesn't get 75˚C (167˚F) even after warning up, it is abnormal.

DTC No.	DTC Detecting condition	Trouble Area
P0128	Conditions (a), (b) or (c): (2 trip detection logic) (a) Even cold start (b) After engine is warmed up (c) THW < 75˚C (167˚F)	●Thermostat ●Cooling system ●Engine coolant temp. sensor ●ECM

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check thermostat (See page CO–11).**

NG → **Replace thermostat.**

YES

2	**Are there any other codes (besides DTC P0128) being output?**

YES → **Go to relevant DTC chart (See page DI–14).**

NG

Check and replace ECM (See page IN–31).

DTC	P0136	Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P0136	Output voltage of heated oxygen sensor remains at 0.4 V or more or 0.6 V or less when vehicle is driven at 50 km/h (31 mph) or more after engine is warmed up (2 trip detection logic)	●Open or short in heated oxygen sensor circuit ●Heated oxygen sensor

HINT:

- Bank 1 refers to the bank that includes cylinder No. 1.
- Sensor 2 refers to the sensor being farther from the engine body.

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check for open and short in harness and connector between ECM and heated oxygen sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Check output voltage of heated oxygen sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

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

CHECK:

Read the output voltage of the heated oxygen sensor when the engine is suddenly raced.

HINT:

Perform quick racing at 4,000 rpm 3 minutes by using the accelerator pedal.

OK:

Heated oxygen sensor output voltage: Alternates from 0.4 V or less to 0.6 V or more.

OK → **Check that each connector is properly connected.**

NG

Replace heated oxygen sensor.

DTC	P0141	Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P0141	When heater operates, heater current exceeds 2.35 A	●Open or short in heater circuit of heated oxygen sensor ●Heated oxygen sensor heater ●ECM
	Heater current of 0.2 A or less when heater operates	

HINT:

- Bank 1 refers to the bank that includes cylinder No. 1.
- Sensor 2 refers to the sensor being farther from the engine body.

WIRING DIAGRAM

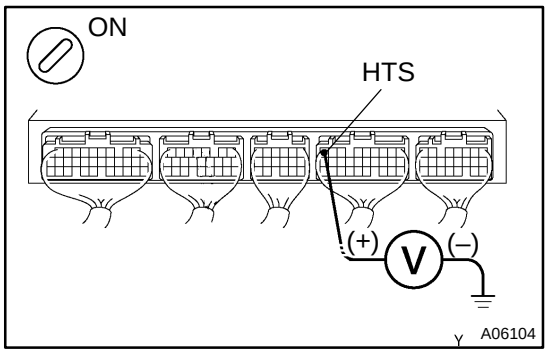
Refer to DTC P0125 on page DI–43.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check voltage between terminal HTS of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal HTS of the ECM connector and the body ground.

OK:

Voltage: 9 – 14 V

OK	**Check and replace ECM (See page IN–31).**

NG

2	**Check resistance of heated oxygen sensor heater (See page SF–78).**

NG	**Replace heated oxygen sensor.**

OK

Check and repair harness or connector between EFI main relay (Marking: EFI) and heated oxygen sensor, and heated oxygen sensor and ECM (See page IN–31).

DI8YI–01

DTC	P0171	System too Lean (Fuel Trim)

DTC	P0172	System too Rich (Fuel Trim)

DTC	P0174	System too Lean (Fuel Trim, Bank 2)

DTC	P0175	System too Rich (Fuel Trim, Bank 2

CIRCUIT DESCRIPTION

Fuel trim is related to the feedback compensation value, not to the basic injection time. Fuel trim includes short–term fuel trim and long–term fuel trim.

Short–term fuel trim is the short–term fuel compensation used to maintain the air–fuel ratio at its ideal theoretical value. The signal from the A/F sensor is approximately proportional to the existing air–fuel ratio, and ECM comparing it with the ideal theoretical value, the ECM reduces fuel volume immediately if the air–fuel ratio is RICH and increases fuel volume if it is LEAN.

Long–term fuel trim compensates the deviation from the central value of the short–term fuel trim stored up by each engine tolerance, and the deviation from the central value due to the passage of time and changes of using environment.

If both the short–term fuel trim and long–term fuel trim are LEAN or RICH beyond exceed a certain value, it is detected as a malfunction and the MIL lights up.

DTC No.	DTC Detecting Condition	Trouble Area
P0171 P0174	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on rich side (2 trip detection logic)	●Air induction system ●Injector blockage ●Mass air flow meter ●Engine coolant temp. sensor ●Fuel pressure ●Gas leakage on exhaust system ●Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ●A/F sensor (bank 1, 2 sensor 1) ●ECM
P0172 P0175	When air–fuel ratio feedback is stable after engine warming up, fuel trim is considerably in error on lean side (2 trip detection logic)	●Injector leak, blockage ●Mass air flow meter ●Engine coolant temp. sensor ●Ignition system ●Fuel pressure ●Gas leakage on exhaust system ●Open or short in A/F sensor (bank 1, 2 sensor 1) circuit ●A/F 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 is recorded. The MIL then lights up.
- If the total of the short–term fuel trim value and long–term fuel trim value is within ±35 % (80˚C (176˚F) or more), the system the system is functioning normally.
- The A/F sensor (bank 1, 2 sensor 1) output voltage and the short–term fuel trim value can be read by using the OBD II scan tool or LEXUS hand–held tester.
- The ECM controls the voltage of the AF+ and AF− terminals of the ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without OBDII scan tool or LEXUS hand–held tester.
- OBD II scan tool (excluding LEXUS hand–held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the LEXUS hand–held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check air induction system (See page SF–1).**

NG → **Repair or replace.**

OK

2	**Check injector injection (See page SF–21).**

NG → **Replace injector.**

OK

3	**Check mass air flow meter (See page SF–29) and engine coolant temperature sensor (See page SF–70).**

NG → **Repair or replace.**

OK

4	**Check for spark and ignition (See page IG–1).**

NG → **Repair or replace.**

OK

5	**Check fuel pressure (See page SF–6).**

NG → **Check and repair fuel pump, pressure regulator, fuel pipe line and filter.**

OK

6	**Check gas leak in exhaust system.**

NG → **Repair or replace.**

OK

7	**Check output voltage A/F sensor (bank 1, 2 sensor 1).**

PREPARATION:

(a) Connect the OBDII scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approx. 90 sec.

CHECK:

Read the voltage value of the A/F sensor on the screen of OBDII scan tool or LEXUS hand–held tester when you perform all the following conditions.

HINT:

The voltage of the AFR+ or AFL+ terminal of the ECM is 3.3 fixed the AFR– or AFL– terminal is 3.0 V fixed. Therefore, it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When you use OBDII scan tool (excluding LEXUS hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25mph) or more, and operate throttle valve open and close	

HINT:

- During fuel enrichment, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*), it is normal.
- During fuel cut, there is case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*), it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBDII scan tool (excluding LEXUS hand–held tester).

OK	Go to step 9.

NG

8	Check for open and short in harness and connector between ECM and A/F sensors (bank 1, 2 sensor 1) (See page IN–31).

NG	Repair or replace harness or connector.

OK

Replace A/F sensor.

9	Perform confirmation driving pattern (See page DI–110).

Go

10	Is there DTC P0171, P0172, P0174 or P0175 being output again?

YES	Check and replace ECM (See page IN–31).

NO

11	Did vehicle runs 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.

DI09O–08

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

CIRCUIT DESCRIPTION

Misfire: The ECM uses the crankshaft position sensor and camshaft position sensor to monitor changes in the crankshaft rotation of each cylinder.

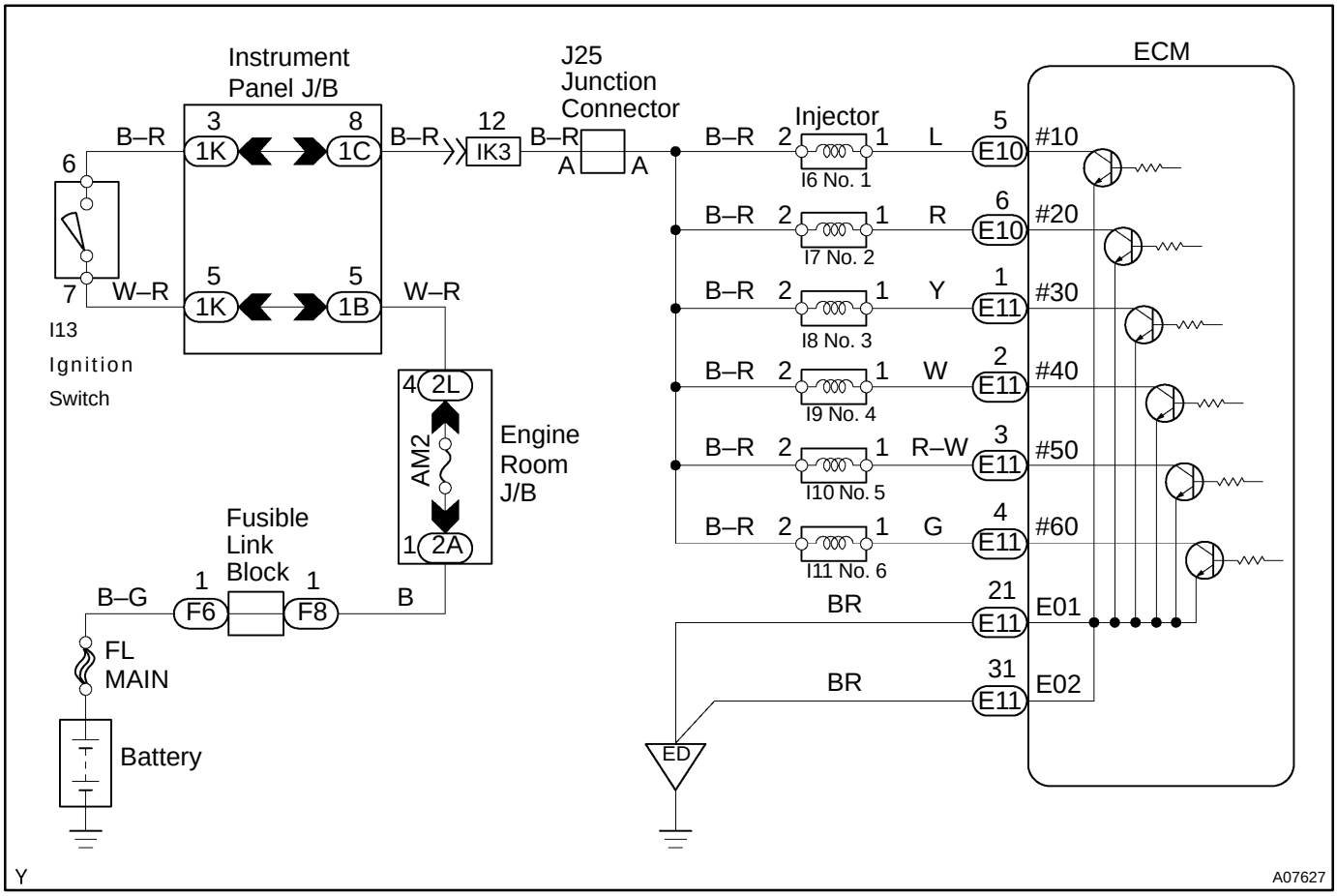
The ECM counts the number of times the engine speed change rate indicates that misfire has occurred. When the misfire rate equals to or exceeds the count, indicating that the engine condition has deteriorated, the MIL lights up.

If the misfire rate is high enough and the driving conditions will cause the catalyst to overheat, the MIL blinks when the misfire occurs.

DTC No.	DTC Detecting Condition	Trouble Area
P0300	Misfire of random cylinders is detected during any particular 200 or 1,000 revolutions (2 trip detection logic)	●Open or short in engine wire ●Connector connection ●Vacuum hose connection ●Ignition system ●Injector ●Fuel pressure ●Mass air flow meter ●Engine coolant temp. sensor ●Compression pressure ●Valve clearance ●Valve timing ●ECM
P0301 P0302 P0303 P0304 P0305 P0306	For any particular 200 revolutions for engine, misfire is detected which can cause catalyst to overheating (This causes MIL to blink)	
	For any particular 1,000 revolutions of engine, misfire is detected which causes a deterioration in emission (2 trip detection logic)	

HINT:
When the 2 or more codes for a misfiring cylinder are recorded repeatedly but no Random Misfire code is recorded, it is indicated that the misfires were detected and recorded at different times.

WIRING DIAGRAM



CONFIRMATION DRIVING PATTERN

(a) Connect the LEXUS hand–held tester or OBD II scan tool.
(b) Record the DTC and freeze frame data.
(c) Use the LEXUS hand–held tester to set to the check mode. (See page DI–3)
(d) Drive the vehicle several times with the engine speed, load and its surrounding range shown with the ENGINE SPD, CALC LOAD in the freeze frame data or the MISFIRE RPM, MISFIRE LOAD in the data list.

If you have no LEXUS 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 the misfire, it is necessary to drive around MISFIRE RPM, MISFIRE LOAD in the following data list.

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

(e) Check whether there is misfire or not by monitoring the DTC and freeze frame data, and then record them.

(f) Turn the ignition switch OFF and wait at least 5 seconds.

INSPECTION PROCEDURE

HINT:

- If the other DTC, besides misfire are memorized simultaneously, first perform the troubleshooting for them.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.
- If the misfire is not occurred when the vehicle is brought to the workshop, it can be confirmed by reproducing the condition of the freeze frame data. After finishing the repair, confirm that there is no misfire (See the confirmation driving pattern).
- 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 inclining either to ”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 warming up.
- In case that the misfire cannot be reproduced, the reason may be because of the driving with the shortage of fuel, the use of improper fuel, a stain of ignition plug and etc.

1	**Check wire harness, connector and vacuum hose in engine room.**

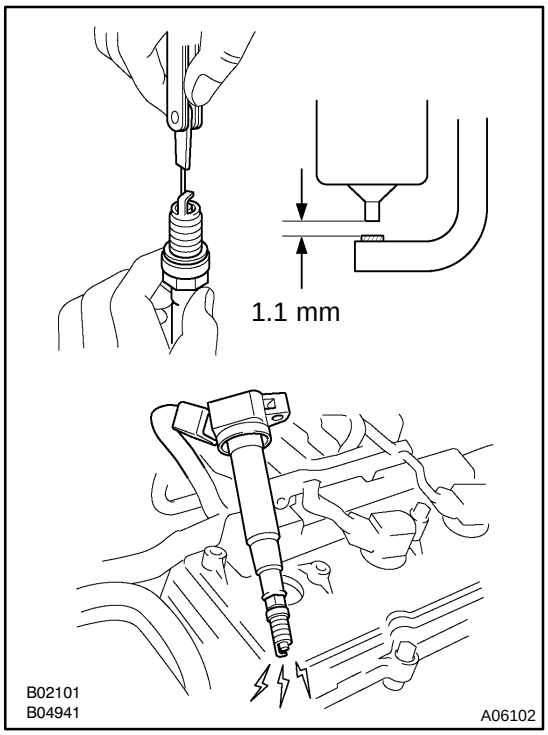
CHECK:

(a) Check the connection conditions of wire harness and connector.
(b) Check the disconnection, piping and break of vacuum hose.

NG → **Repair or replace, then confirm that there is no misfire (See the confirmation driving pattern).**

OK

2	Check spark plug and spark of misfiring cylinder.



PREPARATION:

(a) Remove the ignition coil (See page IG–5).

(b) Remove the spark plug.

CHECK:

(a) Check spark plug type.

(b) Check the electrode for carbon deposits.

(c) Check electrode gap.

OK:

(a) Iridium–tipped spark plug
Recommended spark plug:
DENSO made: SK20R11
NGK made: IFR6A11
(b) No large carbon deposit present.
Not wet with gasoline or oil.
(c) Electrode gap: 1.1 mm (0.043 in.)

PREPARATION:

(a) Install the spark plug to the ignition coil, and connect the ignition coil connector.

(b) Disconnect the injector connector.

(c) Ground the spark plug.

CHECK:

Check if spark occurs while engine is being cranked.

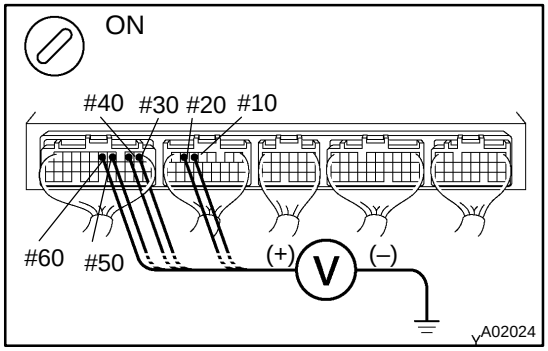
OK:

Spark jumps across electrode gap.

NG	Replace or check ignition system (See page IG–1).

OK

3	Check voltage of ECM terminal for injector of failed cylinder.



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between applicable terminal of the ECM connector and the body ground.

OK:

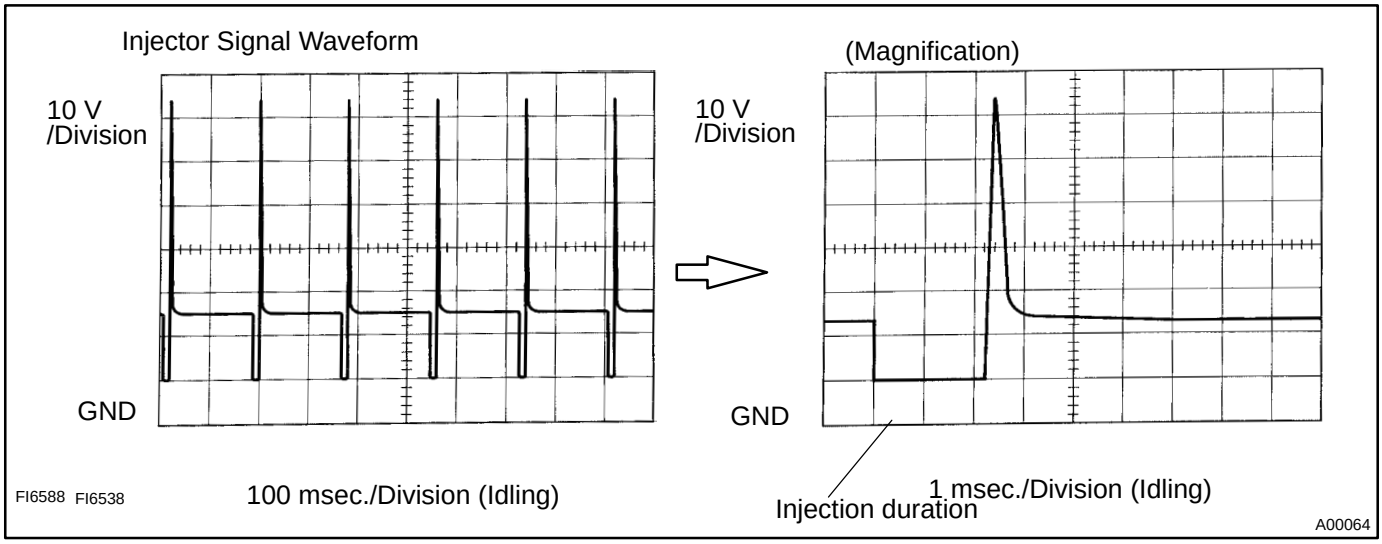
Voltage: 9 – 14 V

Reference: INSPECTION USING OSCILLOSCOPE

With the engine idling, check the waveform between terminals #10 – #60 and E01 of the ECM connector.

HINT:

The correct waveform is as shown below.



OK	**Go to step 5.**

NG

4	**Check resistance of injector of misfiring cylinder (See page SF–17).**

NG	**Replace injector.**

OK

Check for open and short in harness and connector between injector and ECM (See page IN–31).

5	**Check fuel pressure (See page SF–6).**

NG	**Check and repair fuel pump, fuel pipe line and filter (See page SF–1).**

OK

6	Check injector injection (See page SF–21).

NG → Replace injector.

OK

7	Check mass air flow meter (See page SF–29) and engine coolant temperature sensor (See page SF–70).

NG → Repair or replace.

OK

Check compression pressure (See page EM–3), valve clearance (See page EM–4) and valve timing (See page EM–10).

DI09P–09

DTC	P0325	Knock Sensor 1 Circuit Malfunction (Bank 1)

DTC	P0330	Knock Sensor 2 Circuit Malfunction (Bank 2)

CIRCUIT DESCRIPTION

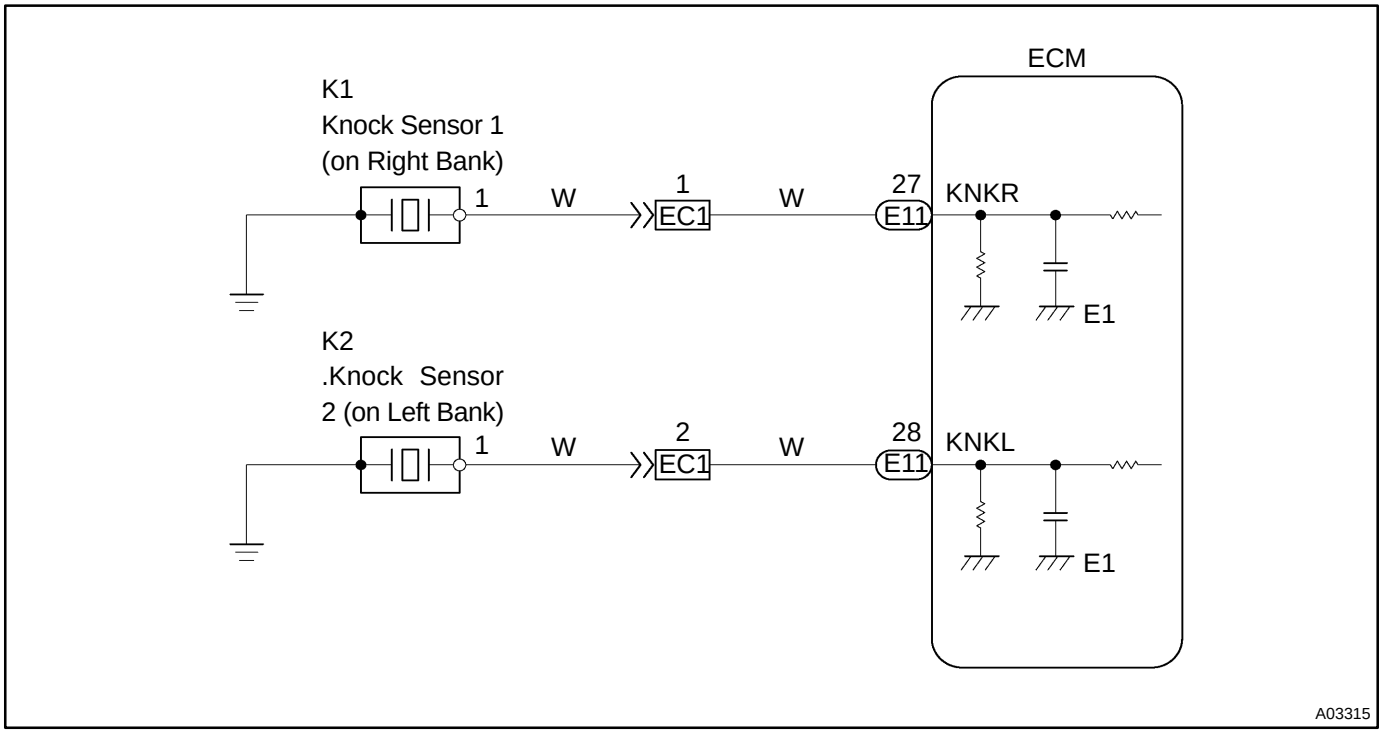
Each of knock sensor is fitted to the right bank and left bank of the cylinder block to detect the engine knocking. This sensor contains a piezoelectric element which generates a voltage when it becomes deformed, which occurs when the cylinder block vibrates due to knocking. If the engine knocking occurs, the ignition timing is delayed to suppress it.

DTC No.	DTC Detecting Condition	Trouble Area
P0325	No knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 1 circuit ●Knock sensor 1 (looseness) ●ECM
P0330	No knock sensor 1 signal to ECM with engine speed between 2,000 rpm and 5,600 rpm	●Open or short in knock sensor 2 circuit ●Knock sensor 2 (looseness) ●ECM

HINT:

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.

WIRING DIAGRAM



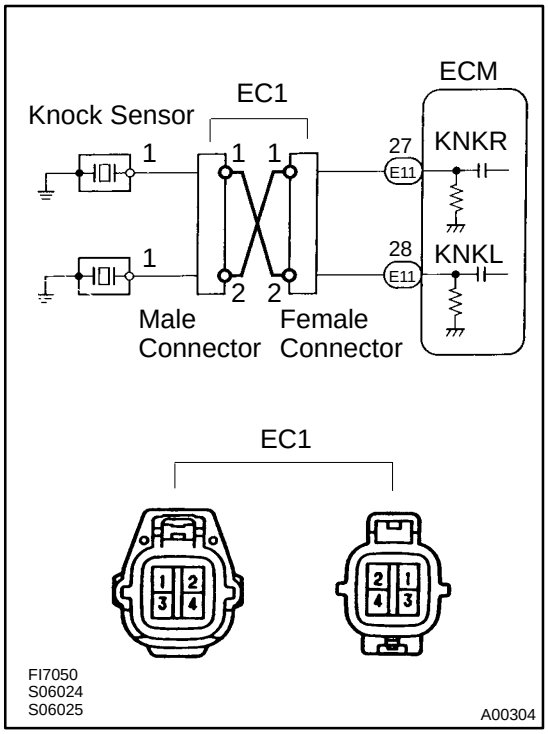
INSPECTION PROCEDURE

HINT:

- DTC P0325 is for the right bank knock sensor circuit.
- DTC P0330 is for the left bank knock sensor circuit.

- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Connect OBD II scan tool or LEXUS hand–held tester, and check knock sensor circuit.**



PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Disconnect the wire to wire connector EC1.

(c) Connect the terminals of the disconnected EC1 male connector and EC1 female as follows.

Male connector ↔ Female connector
Terminal 1 ↔ Terminal 2
Terminal 2 ↔ Terminal 1

(d) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester main switch ON.

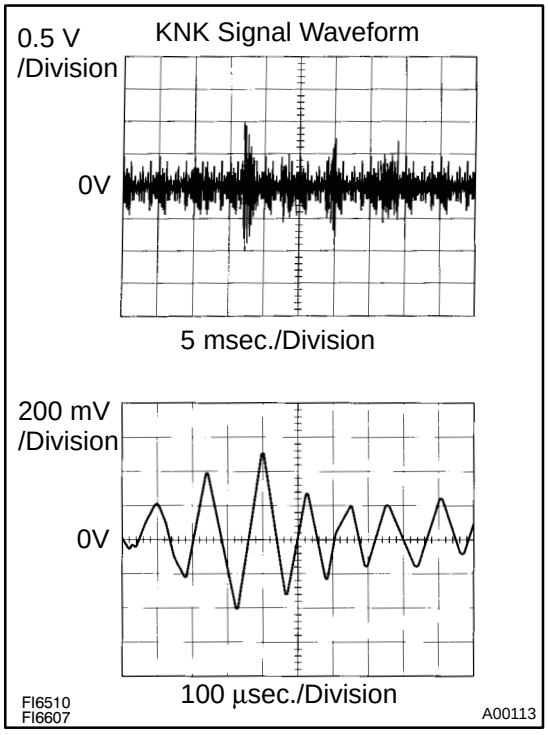
(e) After the engine is warmed up, perform quick racing to 4,000 rpm three times.

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



Reference: INSPECTION USING OSCILLOSCOPE

- With the engine racing (4,000 rpm), check the waveform between terminals KNKR, KNKL of the ECM connector and the body ground.

HINT:

The correct waveform is as shown.

- Spread the time on the horizontal axis, and confirm that period of the wave is 141 µseconds (Normal mode vibration frequency of knock sensor: 7.1 kHz)

HINT:

If normal mode vibration frequency is not 7.1 kHz, the sensor is out of order.

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–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

3	**Check for open and short in harness and connector between EC1 connector and knock sensor (See page IN–31).**

HINT:

- If DTC P0325 has changed to P0330, check the knock sensor circuit on the right bank side.
- If DTC P0330 has changed to P0325, check the knock sensor circuit on the left bank side.

NG → **Repair or replace harness or connector.**

OK

Replace knock sensor.

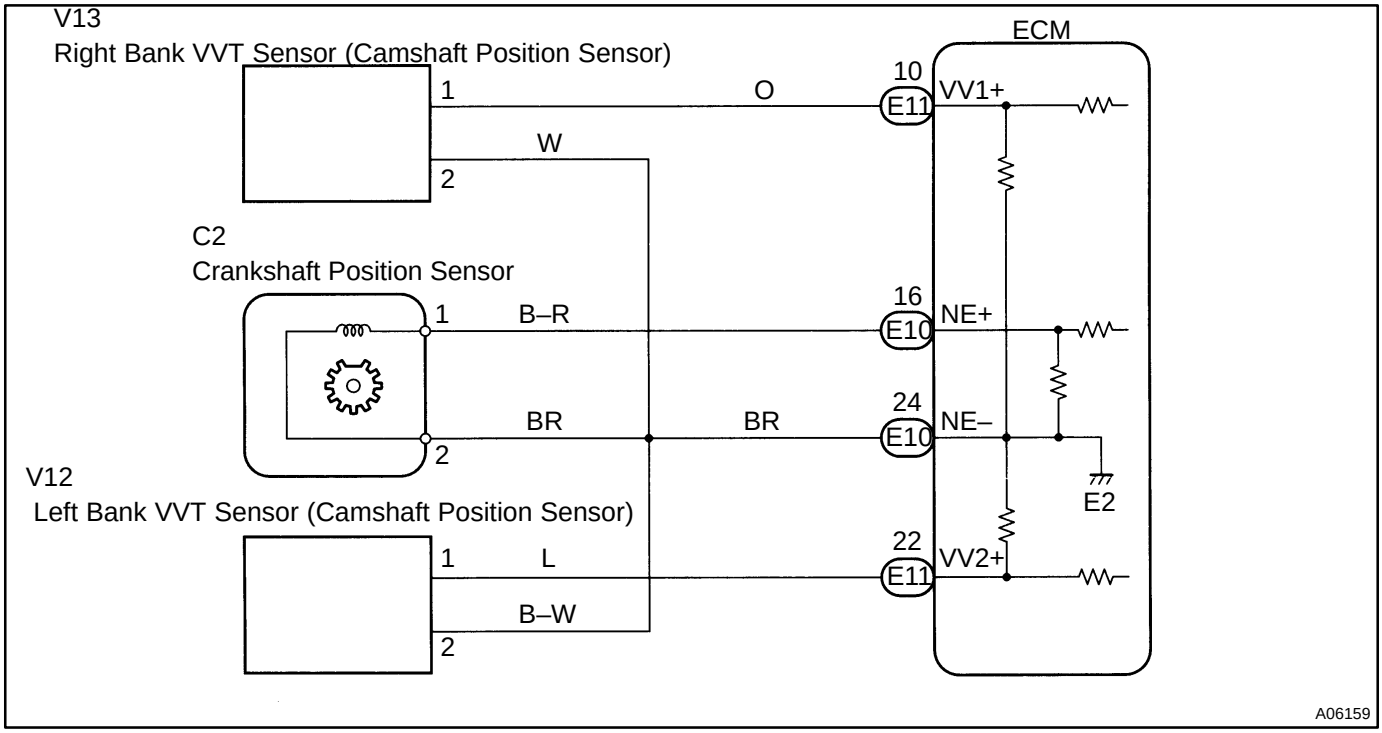
DTC	P0335	Crankshaft Position Sensor ”A” Circuit Malfunction

CIRCUIT DESCRIPTION

Crankshaft position sensor (NE signal) consists of a magnet, iron core and pickup coil.
The NE signal plate has 34 teeth and is installed the crankshaft timing pulley. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G (VV) signal, and the actual crankshaft angle and the engine speed by the NE signal.

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 ●Crankshaft timing pulley ●ECM
	No crankshaft position sensor signal to ECM with engine speed 600 rpm or more (2 trip detection logic)	

WIRING DIAGRAM

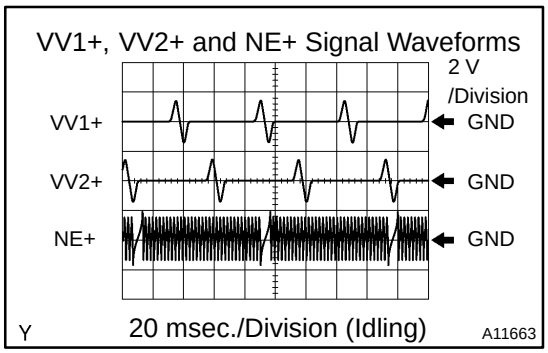


INSPECTION PROCEDURE

HINT:

- Perform troubleshooting of DTC P0335 first. If no trouble is found, troubleshoot the following mechanical systems.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check resistance of crankshaft position sensor (See page IG–9).**



Reference: INSPECTION USING OSCILLOSCOPE

During cranking or idling, check the waveforms between terminals VV1+ and NE–, VV2+ and NE–, and NE+ and NE– of the ECM connectors.

HINT:

The correct waveforms are as shown in the illustration.

NG → **Replace crankshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and crankshaft position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Inspect sensor installation and signal plate teeth of crankshaft timing pulley.**

NG → **Tighten sensor securely. Replace crankshaft timing pulley.**

OK

Check and replace ECM (See page IN–31).

DTC	P0340	Camshaft Position Sensor Circuit Malfunction

CIRCUIT DESCRIPTION

Camshaft position sensor (G (VV) signal) consists of a magnet, iron core and pickup coil. The G (VV) signal plate has 3 teeth, on the outside and is installed the camshaft timing gear. When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil changes, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The NE signal plate has 34 teeth and is installed in the crankshaft timing pulley. The NE signal sensor generates 34 signals at every engine revolution. The ECM detects the standard crankshaft angle based on the G (VV) signal and the actual crankshaft angle and the engine speed by the NE signal.

DTC No.	DTC Detecting 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 ●Camshaft timing gear ●ECM
	No camshaft position sensor signal to ECM with engine speed 600 rpm or more	

WIRING DIAGRAM

Refer to DTC P0335 on page DI–67.

INSPECTION PROCEDURE

HINT:
Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check resistance of camshaft position sensor (See page IG–1).**

Reference: INSPECTION USING OSCILLOSCOPE
Refer to DTC P0335 on page DI–67.

NG → **Replace camshaft position sensor.**

OK

2	**Check for open and short in harness and connector between ECM and camshaft position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	Inspect sensor installation and signal plate teeth of camshaft timing gear.

NG → Tighten sensor securely. Replace camshaft timing gear.

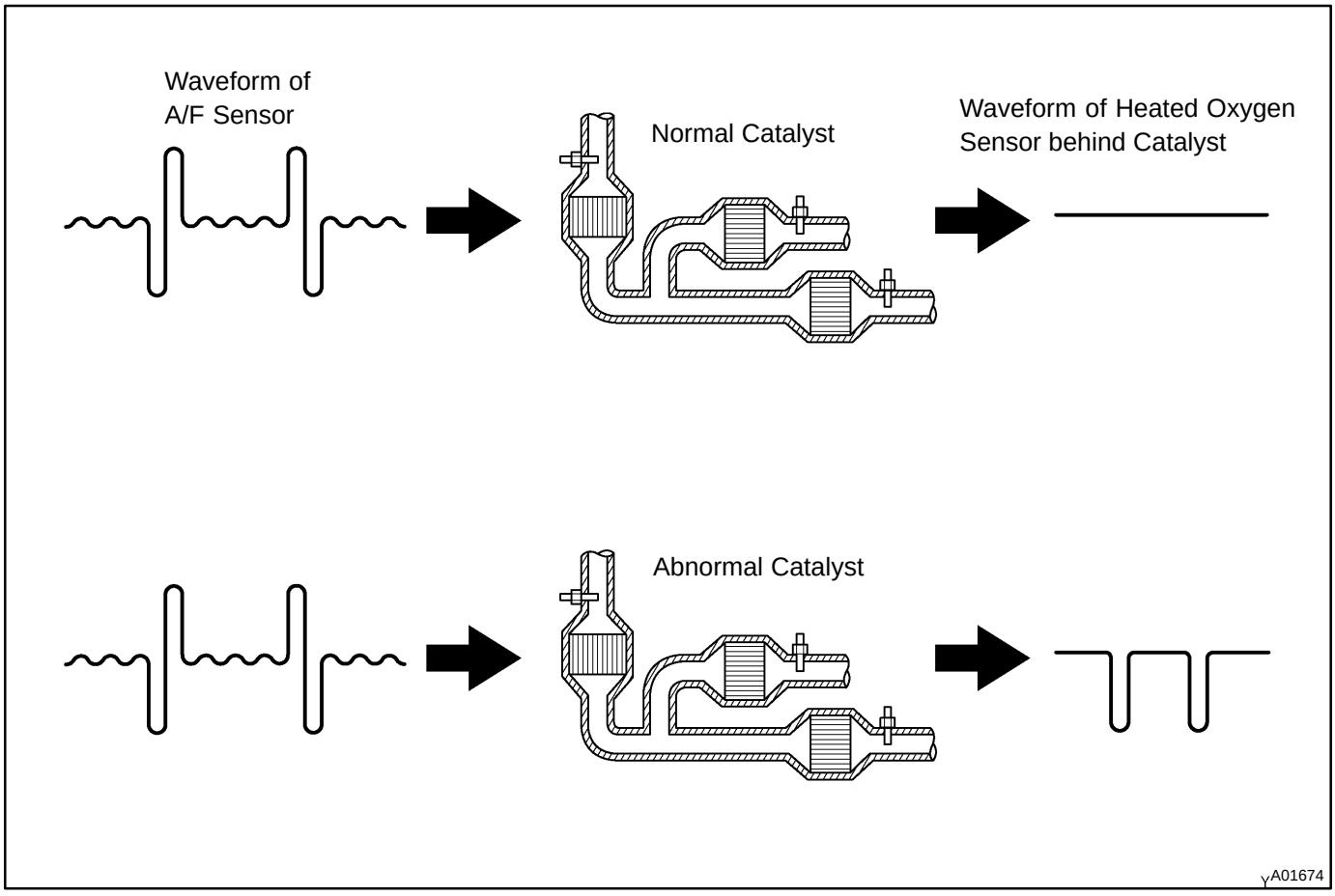
OK →

Check and replace ECM (See page IN–31).

DTC	P0420	Catalyst System Efficiency Below Threshold (Bank 1)

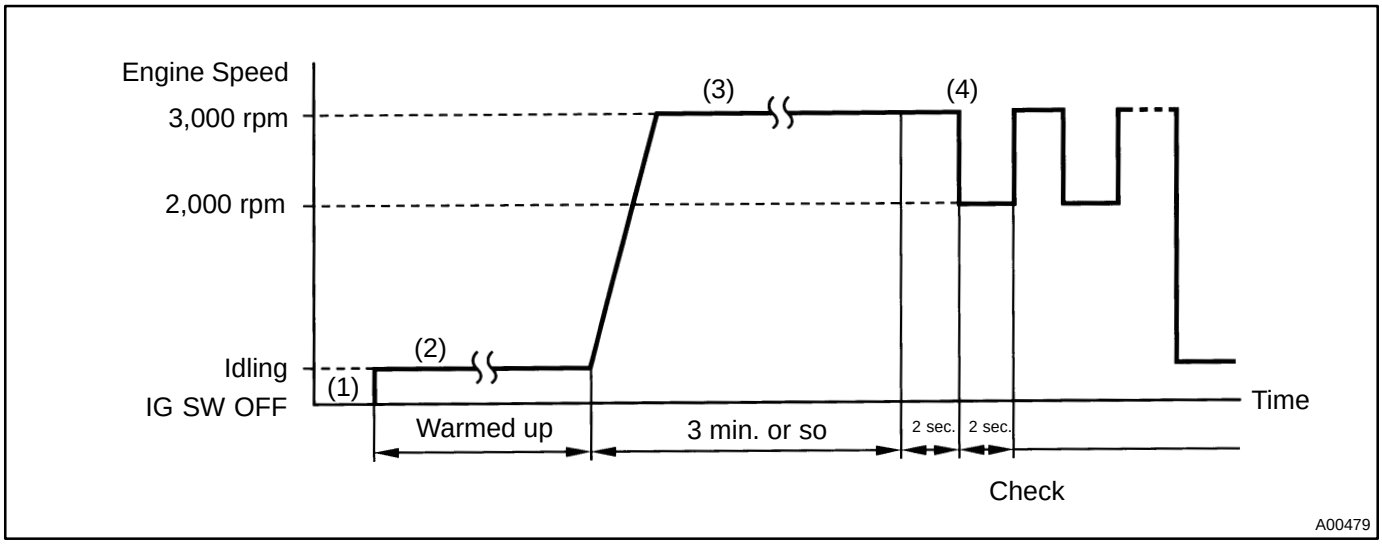
CIRCUIT DESCRIPTION

The ECM observes the waveform of the heated oxygen sensor located behind the catalyst to determine whether the catalyst performance has deteriorated.
If the catalyst is functioning normally, the waveform of the heated oxygen sensor located behind the catalyst switches back and forth between rich and lean much more slowly.
When the waveform of the heated oxygen sensor located behind the catalyst alternates flatteringly between rich and lean, it indicates that catalyst performance has deteriorated.



DTC No.	DTC Detecting Condition	Trouble Area
P0420	After engine and catalyst are warmed up, and while vehicle is driven within set vehicle and engine speed range, waveform of heated oxygen sensor (bank 1 sensor 2) alternates flatteringly between rich and lean (2 trip detection logic)	●Gas leakage on exhaust system ●A/F sensor (bank 1, 2 sensor 1) ●Heated oxygen sensor (bank 1 sensor 2) ●Three–way catalytic converter

CONFIRMATION ENGINE RACING PATTERN



(1) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.
(2) Start engine and warm it up with all the accessories switched OFF until the water temperature is stable.
(3) Race the engine at 2,500 – 3,000 rpm for about 3 min.
(4) When racing the engine at 3,000 rpm for 2 sec. and 2,000 rpm for 2 sec. alternately, check the waveform of the heated oxygen sensor (bank 1 sensor 2).

INSPECTION PROCEDURE

HINT:
Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P0420) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check gas leak on exhaust system.**

NG → **Repair or replace.**

OK

3	Check A/F sensor (bank 1, 2 sensor 1) (See page SF–76).

NG → Repair or replace.

OK

4	Check heated oxygen sensor (bank 1 sensor 2) (See page SF–78).

NG → Repair or replace.

OK

Replace three–way catalytic converter.

DI8YJ–01

DTC	P0440	Evaporative Emission Control System Malfunction

DTC	P0442	Evaporative Emission Control System Leak Detected (Small Leak)

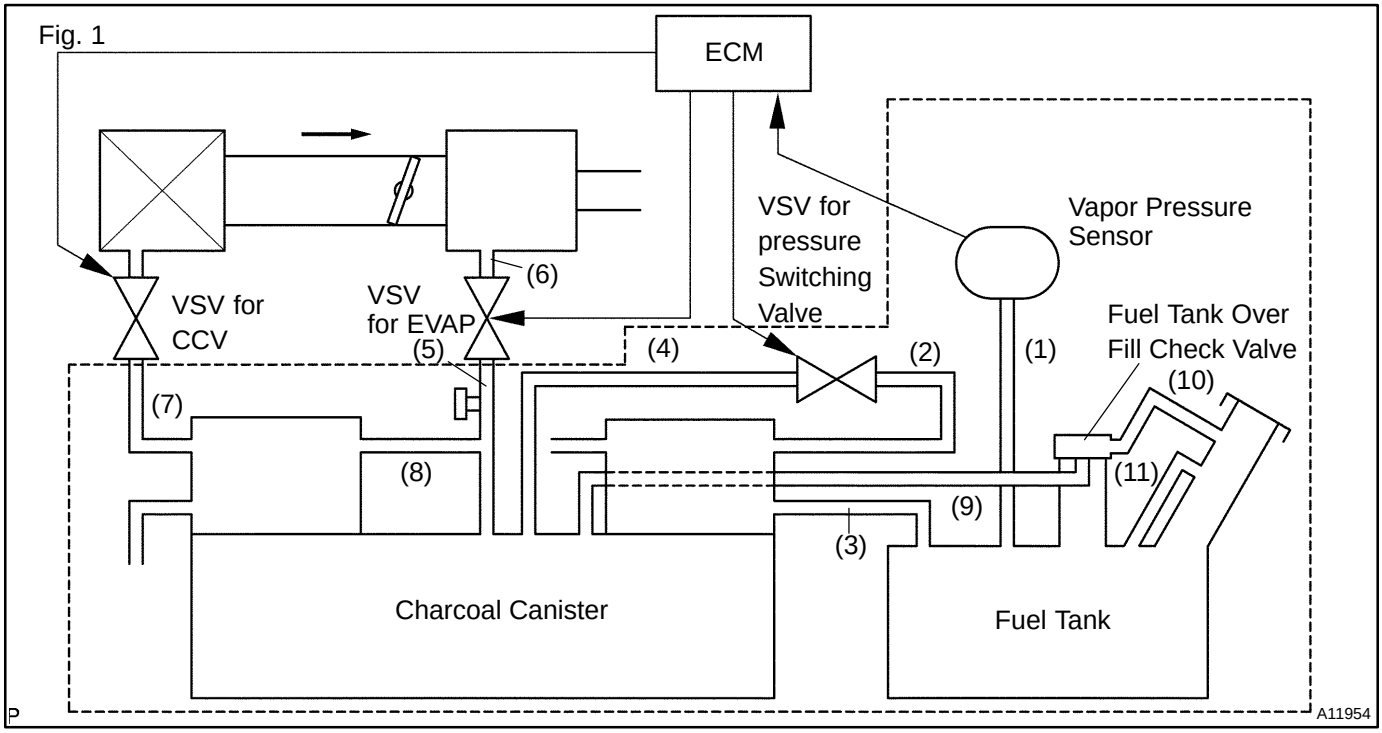
CIRCUIT DESCRIPTION

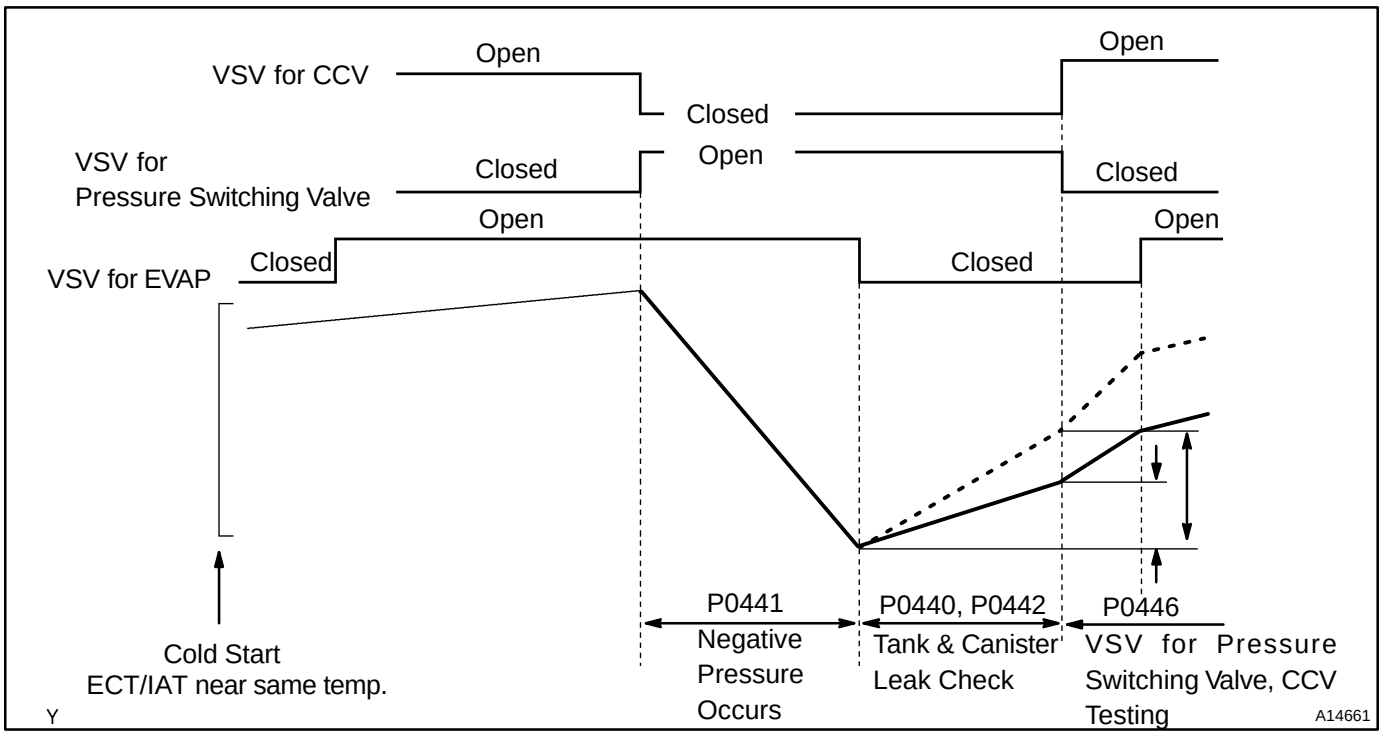
The vapor pressure sensor, VSV for Canister Closed Valve (CCV) and VSV for pressure switching valve are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether or not there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.

DTC P0440 or P0442 is recorded by the ECM when evaporative emissions leak from the components within the dotted line in Fig. 1 below, or vapor pressure sensor if self.

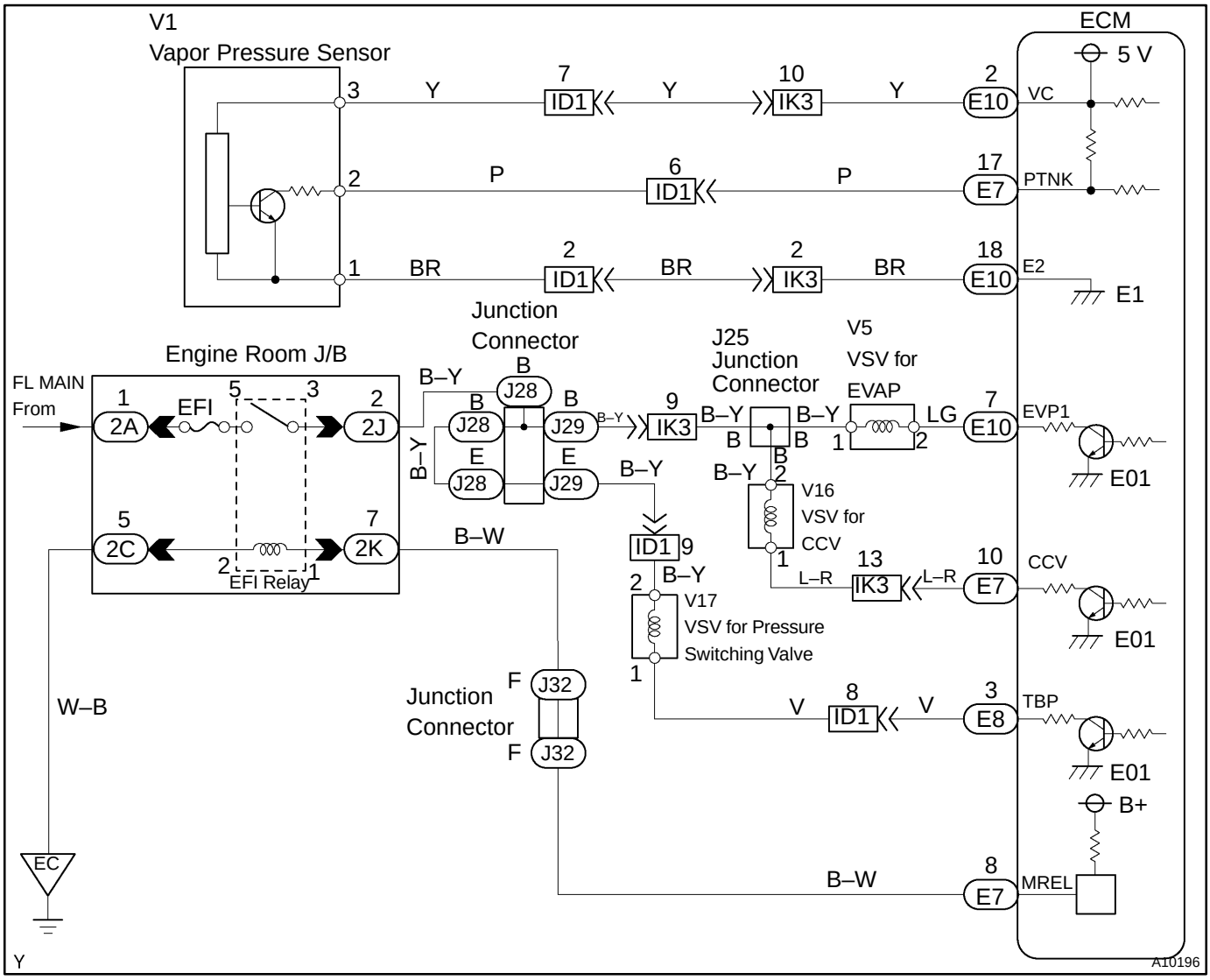
Fig. 1





DTC No.	DTC Detecting Condition	Trouble Area
P0440 P0442	After cold engine start. After VSV for EVAP operation, the VSV for EVAP is turned off sealing the vacuum in the system and the ECM begins to monitor the pressure increase. Some increase is normal. A very rapid, sharp increase in pressure indicates a leak in the EVAP system and sets the DTC P0440. This monitoring method is also able to distinguish what is called the small leak detection.(DTC P0442) A pressure rise just above normal indicates a very small hole. (2 trip detection logic)	●Hose or tube cracked, hole, damaged or loose seal ((3) or (9) 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), (10)and (11) 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 ●Fuel tank over fill check valve cracked or damaged ●ECM

WIRING DIAGRAM



CONFIRMATION READINESS TEST

First Trip Procedure

(a) Vehicle must be cold, ambient temperature approximately between 50˚F – 95˚F.

(b) Intake Air Temp. (IAT) and Engine Coolant Temp. (ECT) sensor almost same value.

```
READINESS TESTS

MISFIRE MON.............. AVAIL
FUEL SYS MON............. AVAIL
COMP MON................. AVAIL
CAT EVAL................. INCMPL
HTD CAT EVAL............. N/A
EVAP EVAL................ INCMPL
2nd AIR EVAL............. N/A
A/C EVAL................. N/A
02S EVAL................. INCMPL
02S HTR EVAL............. INCMPL
EGR EVAL................. INCMPL
```

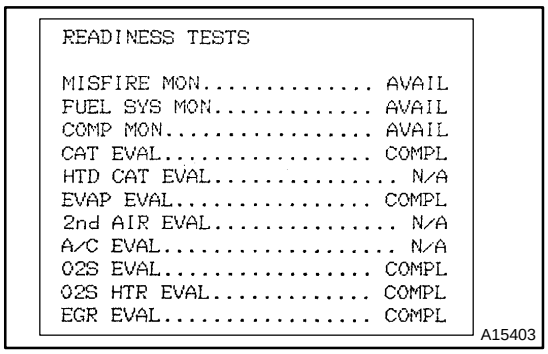
A15402

(c) Clear DTC's.
- Disconnecting the battery terminals or EFI fuse.
- Readiness tests will show INCMPL (incomplete).

(d) Drive the vehicle according to LA#4 drive cycle. Note the state of Readiness Tests. They will change to COMPL as the evaluation monitors operate and if the system passes. This procedure may take approximately 20 minutes or more.

NOTICE:

Do not shut off the engine – the results will be invalid.

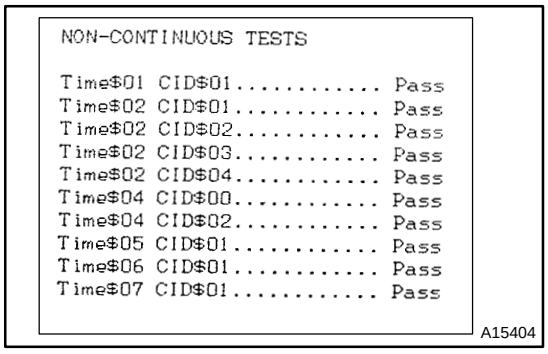


Pass Condition – No Problem Found by the ECM

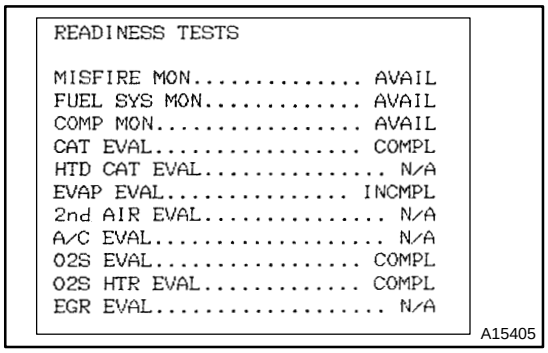
If the EVAP evaluation monitor shows COMPL, go to the Non–Continuous Test screen.

NOTICE:

Do not shut off the engine – the results will be invalid.

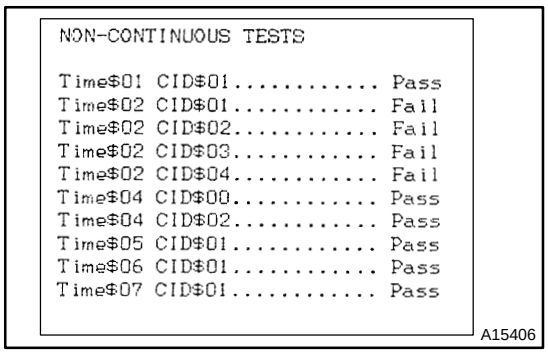


- To get there, go to Advanced OBD II, Onboard Tests, Non–continuous Tests.
- If all of the tests in the time $02 category Tests show Pass, the evaluation monitor has operated and no problem was detected.



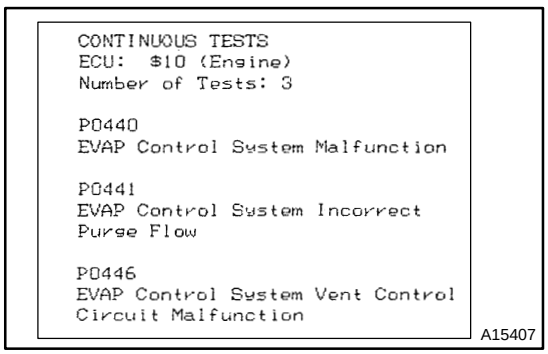
Fail Condition – Problem Detected by the ECM

If the EVAP evaluation monitor shows INCMPL, go to the Non–Continuous Test screen.



(1) If all Tests show Pass, the following may have occurred.
- The EVAP evaluation monitor did not operate.
- The EVAP evaluation monitor did not finish.
- The ECM withheld judgement.

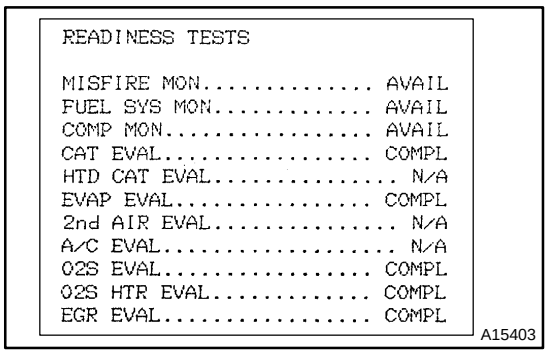
(2) If one or more of the tests in the time $02 category show Fail, the EVAP evaluation monitor did operate and the ECM detected a problem.



(3) Go to Continuous Tests screen. This is the only place DTC's are listed for the first trip.

NOTICE:

The DTC listed may not be valid. A second trip is needed to confirm the DTC.



Second Trip Procedure

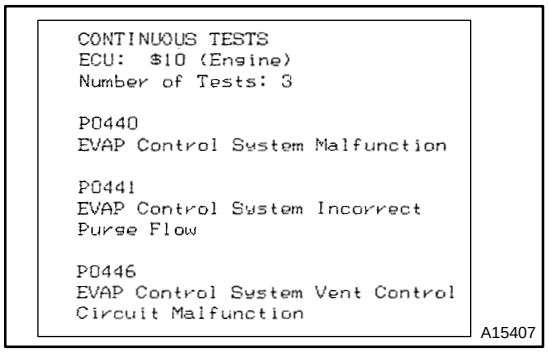
(a) Vehicle must be cold, ambient temperature approximately between 50˚F – 95˚F.

(b) Go to Readiness Tests screen.

(c) Drive the vehicle according to LA#4 drive cycle. Note the state of EVAP evaluation monitor. This procedure may take approximately 20 minutes or more.

NOTICE:

Do not shut off the engine – the results will be invalid.



(d) If Readiness Tests changes to COMPL, the EVAP evaluation monitor has operated. Check for any stored DTC's.

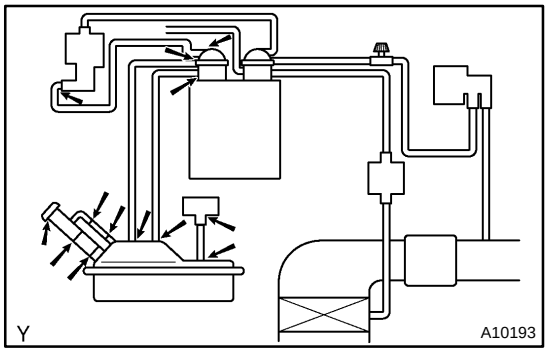
- If a DTC has stored, the problem has been detected and confirmed by the ECM.
- If no DTC was found, the EVAP monitor operated but no problem was detected.

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440 or P0442, first troubleshoot DTC P0441, P0446, P0450 or P0451. If no other malfunctions than them are detected, troubleshoot DTC P0440 or P0442 next.
- Ask the customer whether or not , after the MIL came on, the customer found the fuel tank cap was loose and tightened it. Also ask the customer whether the fuel tank cap was loose when refuelling. If the fuel tank cap was loose, it was the cause of the DTC. If the fuel tank cap was not loose or if the customer was not sure if it was loose, troubleshoot according to the following procedure.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**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.**

OK

2	**Check that fuel tank cap is LEXUS genuine parts.**

NG → **Replace to LEXUS genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed.**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC–6).**

NG → **Replace fuel tank cap.**

OK

5	**Check filler neck for damage.**

PREPARATION:
Remove the fuel tank cap.
CHECK:
Visually inspect the filler neck for damage.

NG → **Replace filler pipe.**

OK

6	**Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and VSV for pressure switching valve, and VSV for 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.**

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–6), 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.**

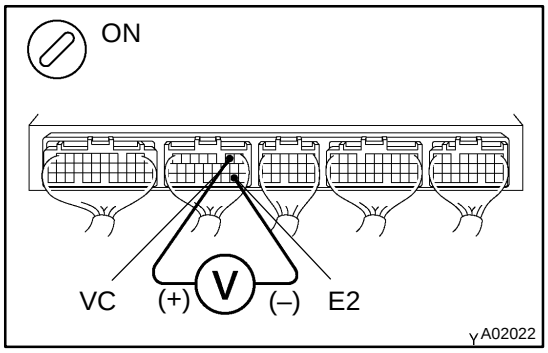
OK

8	**Check charcoal canister for cracks, hole and damage (See page EC–6).**

NG → **Replace charcoal canister.**

OK

9	**Check voltage between terminals VC and E2 of ECM connector.**



CHECK:

(a) Remove the grove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals VC and E2 of the ECM connector.

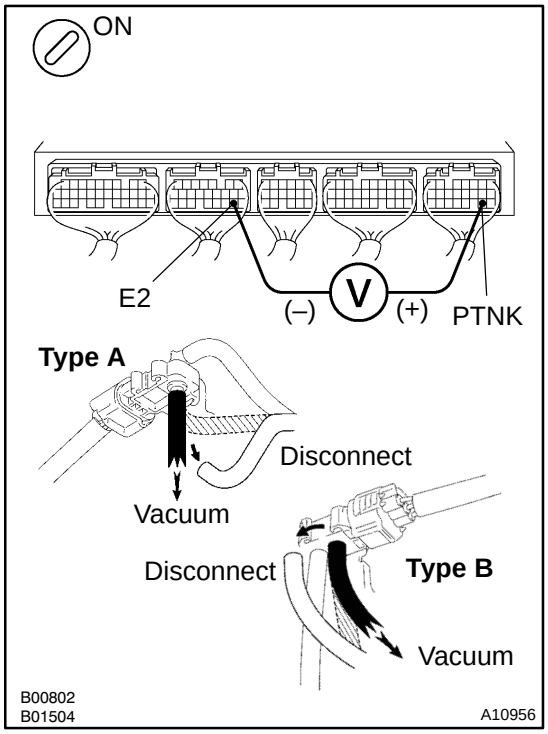
OK:

Voltage: 4.5 – 5.5 V

NG → **Check and replace ECM (See page IN–31).**

OK

10	**Check voltage between terminals PTNK and E2 of ECM connectors.**



PREPARATION:

(a) Remove the grove compartment (See page SF–79).

(b) 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.

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 – 3.7 V

(2) Voltage: 0.5 V or less

OK → **Go to step 12.**

NG

11	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK →

Replace vapor pressure sensor.

12	Check fuel tank and fuel tank over fill check valve for cracks and damage.

NG → Replace fuel tank or fuel tank over fill check valve.

OK →

There is a possibility that vehicle user did not properly close fuel tank cap. Please explain to customer how to properly install fuel tank cap.

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow

DTC	P0446	Evaporative Emission Control System Vent Control Malfunction

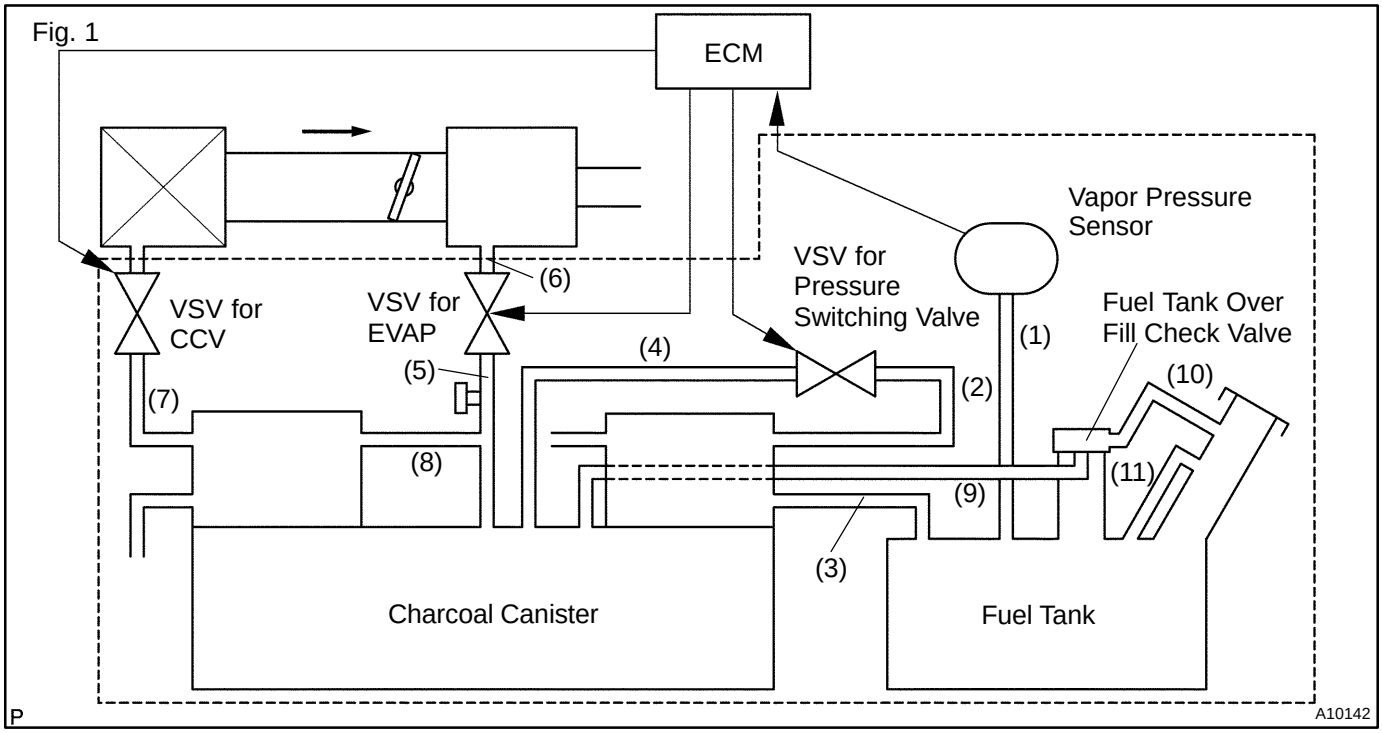
CIRCUIT DESCRIPTION

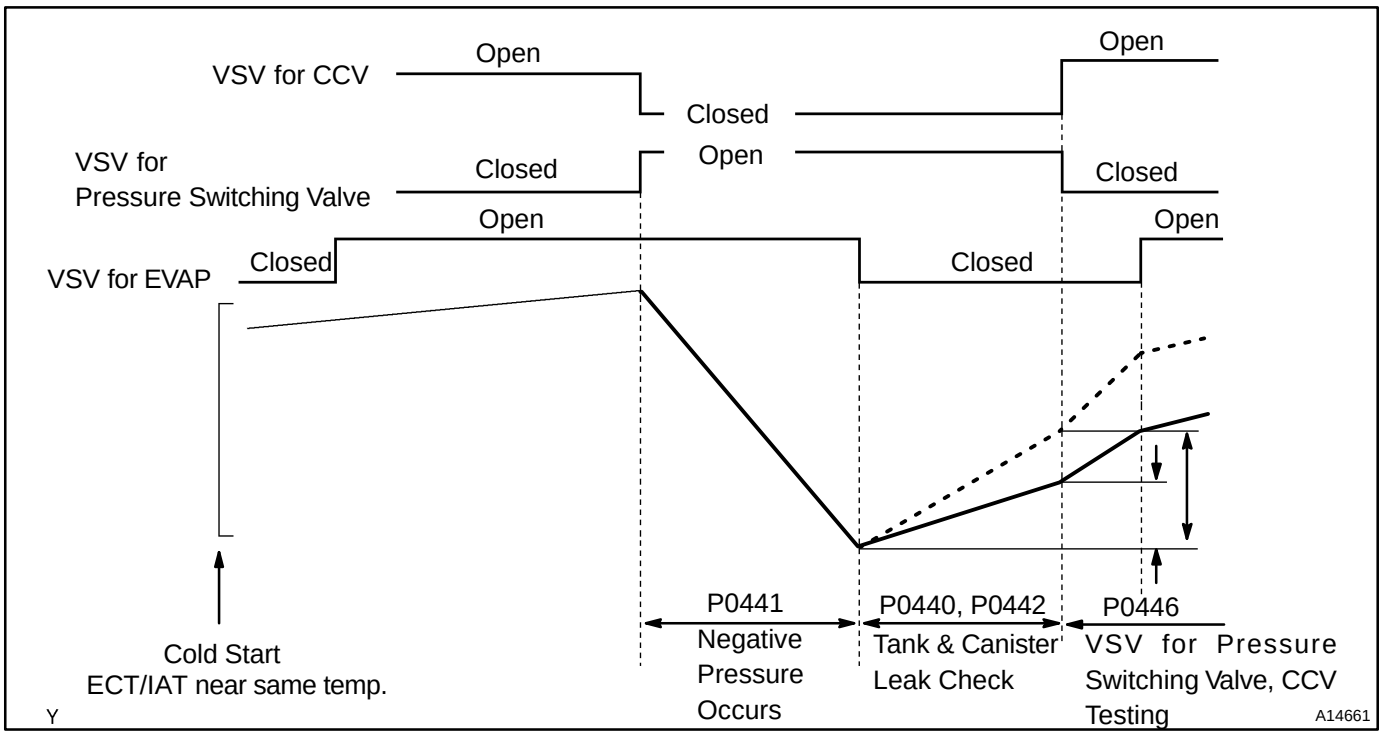
The vapor pressure sensor, VSV for Canister Closed Valve (CCV), VSV for pressure switching valve are used to detect abnormalities in the evaporative emission control system.

The ECM decides whether there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.

DTCs P0441 and P0446 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 VSV for EVAP, the VSV for 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 or drop in pressure increased beyond the specified limit during purge control (2 trip detection logic)	●Vacuum hose cracks, holed blocked, damaged or disconnected ((1), (2), (3), (4), (5), (6), (7), (8), (9), (10) and (11) 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 ●VSV for EVAP ●Open or short in VSV circuit for CCV ●VSV for CCV ●Open or short in VSV circuit for pressure switching valve ●VSV for pressure switching valve ●Fuel tank cracked, holed or damaged ●Charcoal canister cracked, holed or damaged ●Fuel tank over fill check valve cracked damaged ●ECM
P0446	When the vapor pressure rises to a specified point, the ECM opens the VSV for CCV. Pressure will increase rapidly because of the air allowed into the system. No increase or an increase below specified rate of pressure increase indicates a restriction on the air inlet side.	
	The ECM closes the VSV for pressure switching valve. The pressure rise is no longer as great. If there was no change in pressure, the ECM will conclude the VSV for pressure switching valve did not close.	

WIRING DIAGRAM

Refer to DTC P0440 or P0442 on page DI–74.

CONFIRMATION READINESS TEST

Refer to DTC P0440, P0442 on page DI–74.

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440 or P0442,first troubleshoot DTC P0441, P0446, P0450 or P0451. If no other malfunctions than them malfunction is detected, troubleshoot DTC P0440 or P0442 next.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

LEXUS hand–held tester:

1	**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 (See page DI–74, step 1).**

NG → **Repair or replace.**

OK

2	**Check that fuel tank cap is LEXUS genuine parts (See page DI–74, step 2).**

NG → **Replace to LEXUS genuine parts.**

OK

3	**Check that fuel tank cap is correctly installed (See page DI–74, step 3).**

NG → **Correctly install fuel tank cap.**

OK

4	**Check fuel tank cap (See page EC–6,.step 4).**

NG → **Replace fuel tank cap.**

OK

5	Check filler neck for damage (See page DI–74, step 5).

NG → Replace filler pipe.

OK

6	Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and VSV for pressure switching valve, and VSV for pressure switching valve and charcoal canister (See page DI–74, step 6).

NG → Repair or connect VSV or sensor connector.

OK

7	Check hose and tube between fuel tank and charcoal canister (See page DI–74, step 7).

NG → Repair or replace.

OK

8	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

9	**Check vacuum hoses ((8), (9), (10) and (11) 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.**

OK

10	**Check voltage between terminals VC and E2 of ECM connector (See page DI–74, step 9).**

NG → **Check and replace ECM (See page IN–31).**

OK

11	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–74, step 10).**

OK → **Go to step 13.**

NG

12	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).**

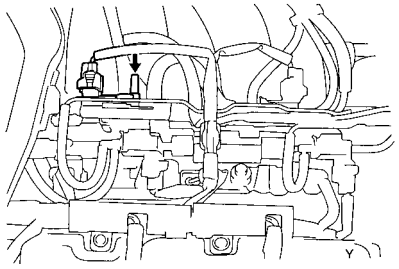
NG → **Repair or replace harness or connector.**

OK

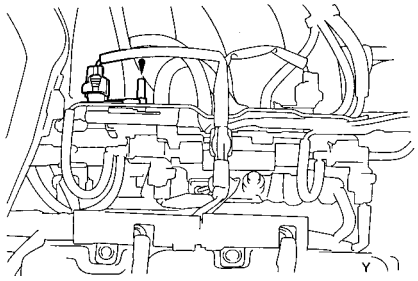
Replace vapor pressure sensor.

13	Check purge flow.

VSV is ON



VSV is OFF



A00230

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(c) Disconnect the vacuum hose for the VSV for the EVAP from the charcoal canister.
(d) Start the engine.

CHECK:

When the VSV for the EVAP is operated by the LEXUS 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 17.

NG

14	Check vacuum hose between intake manifold and VSV for EVAP, and VSV for EVAP 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.

OK

15	Check operation of VSV for EVAP (See page EC–6).

OK	Go to step 16.

NG

Replace VSV and charcoal canister, and then clean vacuum hose between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister.

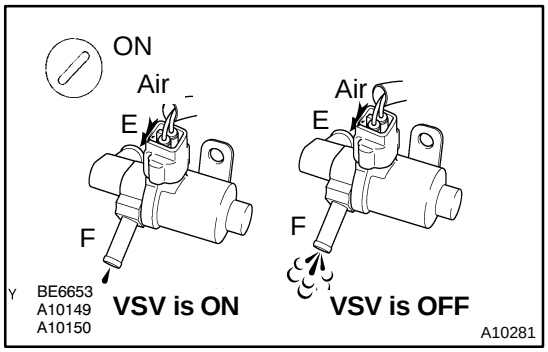
16	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

17	**Check VSV for CCV.**



PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Disconnect the vacuum hoses for the VSV for the CCV from the charcoal canister.
(c) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.
(d) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check the VSV operation when it is operated by the LEXUS 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 21.**

NG

18	**Check vacuum hose between VSV for 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.**

OK

19	**Check operation of VSV for CCV).**

OK → **Go to step 20.**

NG

Replace VSV and charcoal canister, and then clean vacuum hose between charcoal canister and VSV for CCV.

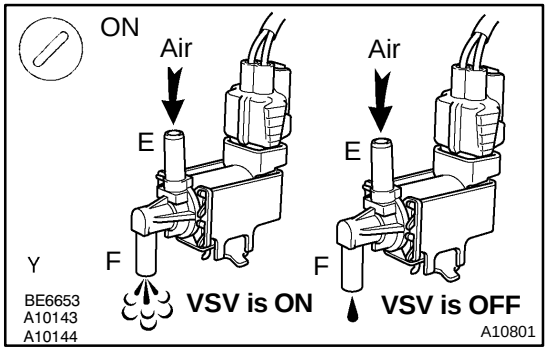
20	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for CCV, and VSV for CCV and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

21	**Check VSV for pressure switching valve.**



PREPARATION:
(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:
Check the VSV operation when it is operated by the LEXUS 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 24.

NG

22	Check operation of VSV for pressure switching valve.

OK	Go to step 23.

NG

Replace VSV and charcoal canister, and then clean vacuum hose between charcoal canister and VSV for pressure switching valve, and VSV for pressure switching valve and fuel tank.

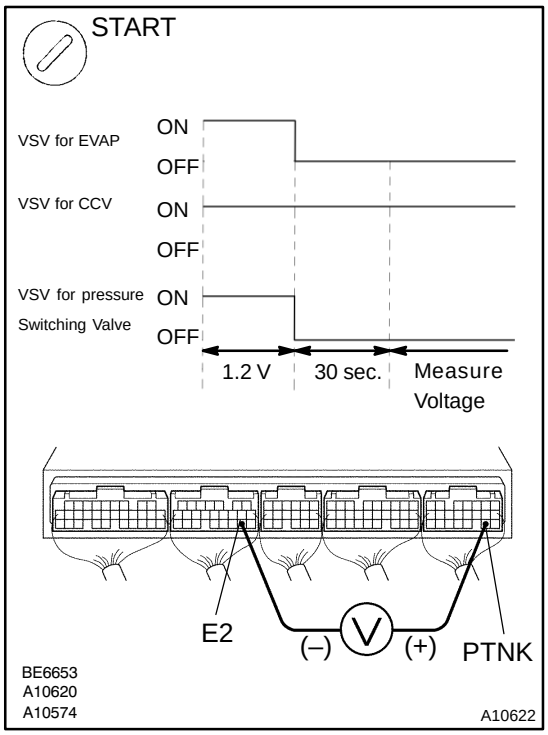
23	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for pressure switching valve, and VSV for pressure switching valve and ECM (See page IN–31).

NG	Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

24	Check fuel tank.



PREPARATION:

(a) Remove the grove compartment (See page SF–79).
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(d) Start the engine.
(e) Switch the VSV for the CCV is ON by the LEXUS hand–held tester.
(f) Switch the VSV for the EVAP and the VSV for the pressure switching valve are ON by the LEXUS hand–held tester and hold the VSV for the EVAP until voltage between terminals PTNK and E2 becomes 1.2 V.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors 30 sec. after switching the VSV for the EVAP and the VSV for the pressure switching valve from ON to OFF.

OK:

Voltage:
When there is no sharp change of the voltage with the voltage of more or less 1.2 V

NG	Replace fuel tank.

OK

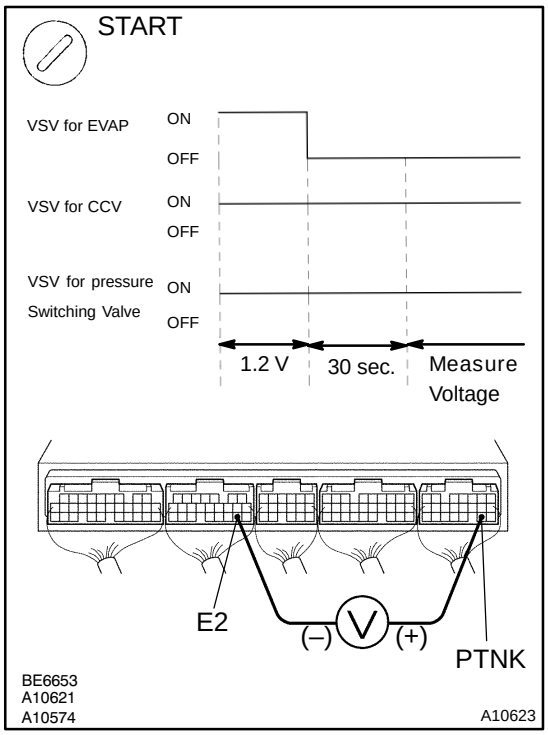
25	Remove charcoal canister and check it (See page EC–6).

NG	Replace charcoal canister.

OK

26	Check fuel tank over fill check valve (See page EC–6).

27	Check charcoal canister.



PREPARATION:

(a) Remove the grove compartment (See page SF–79).
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.
(d) Start the engine.
(e) Switch the VSV for the CCV and the VSV for the pressure switching valve are ON by the LEXUS hand–held tester.
(f) Switch the VSV for the EVAP is ON by the LEXUS hand–held tester and hold the VSV for the EVAP until voltage between terminals PTNK and E2 becomes 1.2 V.

CHECK:

Measure the voltage between terminals PTNK and E2 of the ECM connectors 30 sec. after switching the VSV for the EVAP from ON to OFF.

OK:

Voltage:
When there is no sharp change of the voltage with the voltage of more or less 1.2 V

NG	Replace charcoal canister.

OK

28	Remove charcoal canister and check it (See page EC–6).

NG	Replace charcoal canister.

OK

29	Check fuel tank over fill check valve (See page EC–6).

NG	Replace fuel tank over fill check valve or fuel tank.

OK

Check and replace charcoal canister (See page IN–31).

OBD II scan tool (excluding LEXUS hand–held tester):

1	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 (See page DI–74, step 1).

NG → Repair or replace.

OK

2	Check that fuel tank cap is LEXUS genuine parts (See page DI–74, step 2).

NG → Replace to LEXUS genuine parts.

OK

3	Check that fuel tank cap is correctly installed (See page DI–74, step 3).

NG → Correctly install fuel tank cap.

OK

4	Check fuel tank cap (See page EC–6, step 4).

NG → Replace fuel tank cap.

OK

5	Check filler neck for damage (See page DI–74, step 5).

NG → Replace filler pipe.

OK

6	Check vacuum hoses between vapor pressure sensor and fuel tank, charcoal canister and VSV for pressure switching valve, and VSV for pressure switching valve and charcoal canister (See page DI–74, step 6).

NG → Repair or connect VSV or sensor connector.

OK

7	Check hose and tube between fuel tank and charcoal canister (See page DI–74, step 7).

NG → Repair or replace.

OK

8	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

9	Check vacuum hoses ((8), (9), (10) and (11) 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.

OK

10	Check voltage between terminals VC and E2 of ECM connector (See page DI–74, step 9).

NG → Check and replace ECM (See page IN–31).

OK

11	Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–74, step 10).

OK → Go to step 13.

NG

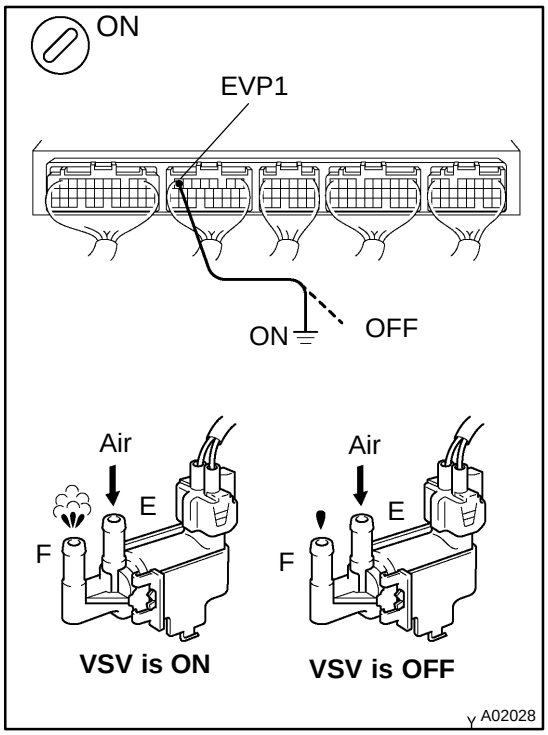
12	Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Replace vapor pressure sensor.

13	Check VSV for EVAP.



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect terminal EVP1 of the ECM connector the body ground (ON).

(2) Disconnect between terminal EVP1 of the ECM connector and the 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 16.

NG

14	Check operation of VSV for EVAP (See page SF–62).

OK	Go to step 15.

NG

Replace VSV and clean vacuum hoses between throttle body and VSV for EVAP, and VSV for EVAP and charcoal canister, and then check charcoal canister.

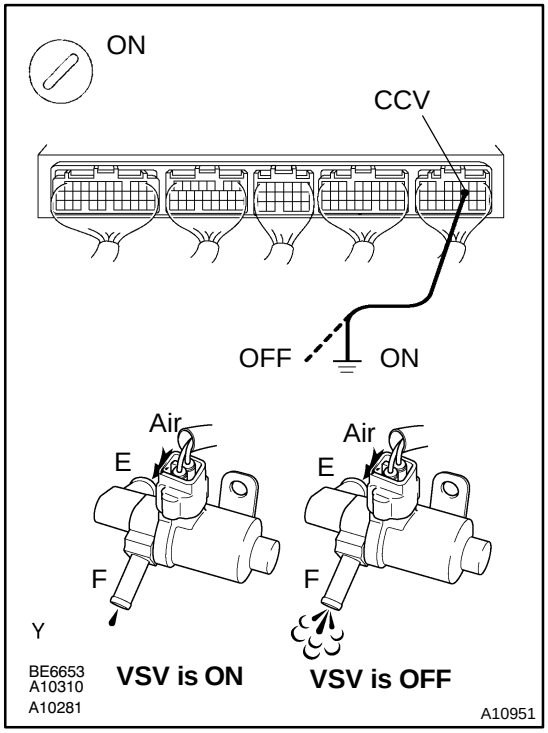
15	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for EVAP, and VSV for EVAP and ECM (See page IN–31).

NG	Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

16	Check VSV for CCV.



PREPARATION:

(a) Remove the grove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect terminal CCV of the ECM connector body ground (ON).

(2) Disconnect between terminal CCV of the ECM connector and the body ground (OFF).

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 19.

NG

17	Check operation of VSV for CCV (See page SF–67).

OK → Go to step 18.

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for CCV.

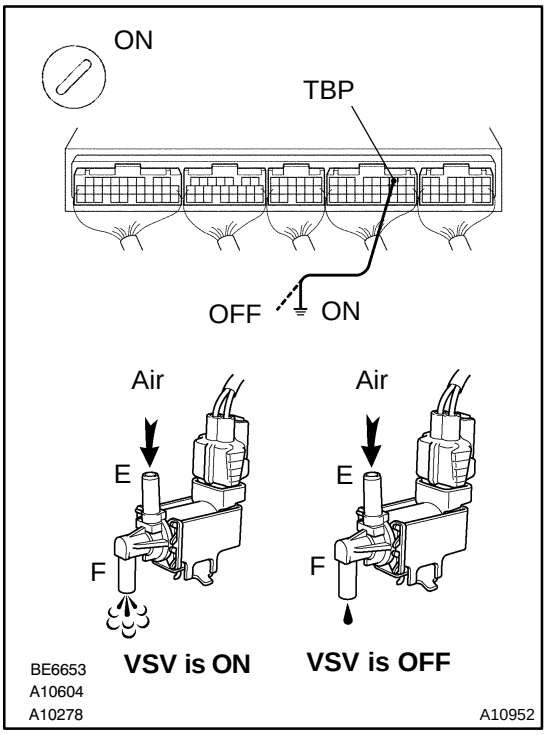
18	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for CCV, and VSV for CCV and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

19	**Check VSV for pressure switching valve.**



PREPARATION:

(a) Remove the grove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Check the VSV function.

(1) Connect terminal TBP of the ECM connector the body ground (ON).

(2) Disconnect between terminal TBP of the ECM connector and the body ground (OFF).

OK:

(1) VSV is ON:
Air from port E flows out through port F.
(2) VSV is OFF:
Air does not from flow port E to port F.

OK → **Go to step 22.**

NG

20	**Check operation of VSV for pressure switching valve (See page SF–69).**

OK → **Go to step 21.**

NG

Replace VSV and charcoal canister, and then clean vacuum hoses between charcoal canister and VSV for pressure switching valve, and VSV for pressure switching valve and fuel tank.

21	Check for open and short in harness and connector between EFI main relay (Marking: EFI) and VSV for pressure switching valve, and VSV for pressure switching valve and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK ↓

Check and replace ECM (See page IN–31).

22	Check the fuel tank over fill check valve (See page EC–6).

NG → Replace fuel tank over fill check valve or fuel tank.

OK ↓

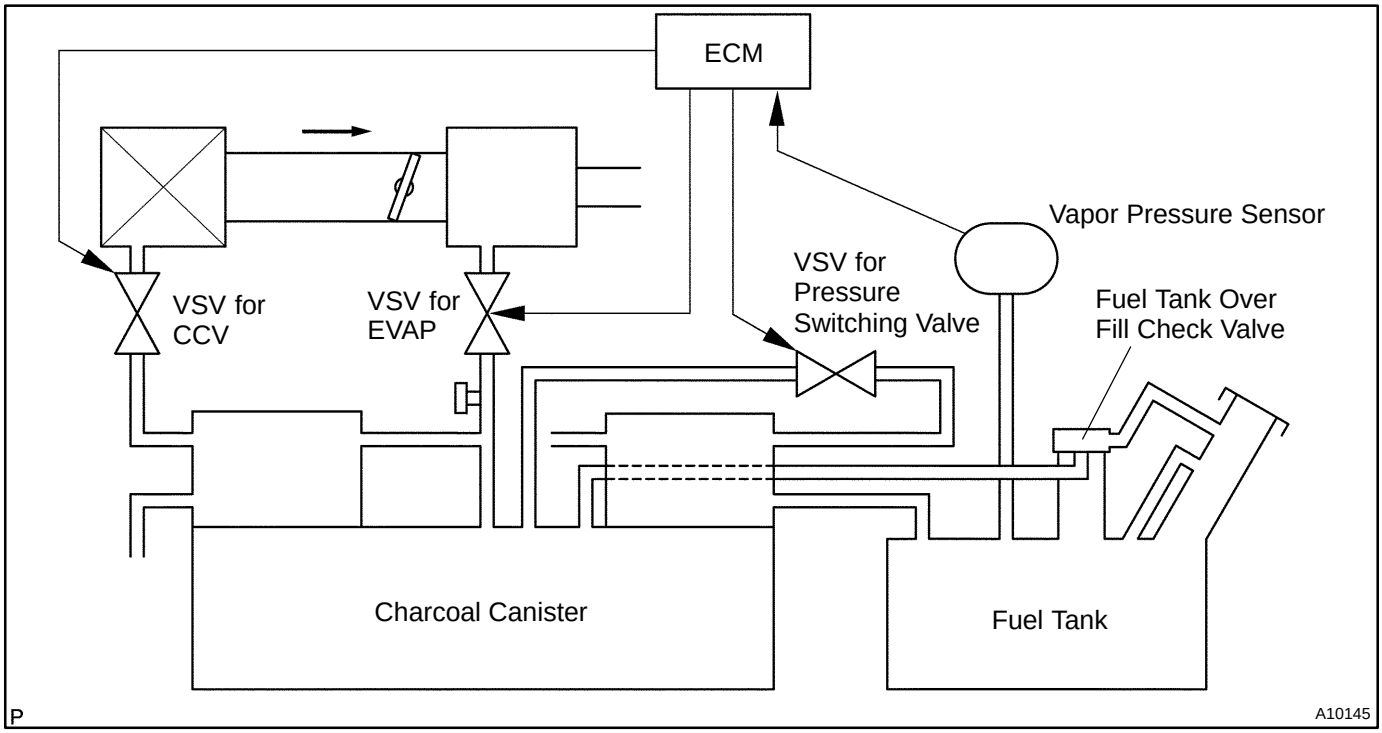
Check and replace charcoal canister (See page IN–31).

DTC	P0450	Evaporative Emission Control System Pressure Sensor Malfunction

DTC	P0451	Evaporative Emission Control System Pressure Sensor Range/Performance

CIRCUIT DESCRIPTION

The vapor pressure sensor, VSV for Canister Closed Valve (CCV) and VSV for pressure switching valve are used to detect abnormalities in the evaporative emission control system.
The ECM decides whether or not there is an abnormality in the evaporative emission control system by the vapor pressure sensor signal.
DTC P0450 or P0451 is recorded by the ECM when the vapor pressure sensor malfunction.



DTC No.	DTC Detecting Condition	Trouble Area
P0450	10 seconds or less after engine starting condition vapor pressure sensor fixed value continues for fixed value or more: (2 trip detection logic)	●Open or short in vapor pressure sensor circuit ●Vapor pressure sensor ●ECM
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 VSV for pressure switching valve is OFF (b) Vapor pressure sensor value ～ opening pressure valve of charcoal canister	

WIRING DIAGRAM

Refer to DTC P0440 or P0442 on page DI–74.

INSPECTION PROCEDURE

HINT:

- If DTC P0441, P0446, P0450 or P0451 is output after DTC P0440 or P0442, first trouble shoot DTC P0441, P0446 P0450 or P0451. If no other malfunctions than them are detected, troubleshoot DTC P0440 or P0442 next.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check voltage between terminals VC and E2 of ECM connector (See page DI–74, step 9).**

NG → **Check and replace ECM (See page IN–31).**

OK

2	**Check voltage between terminals PTNK and E2 of ECM connectors (See page DI–74, step 10).**

OK → **Check and replace ECM (See page IN–31).**

NG

3	**Check for open and short in harness and connector between vapor pressure sensor and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

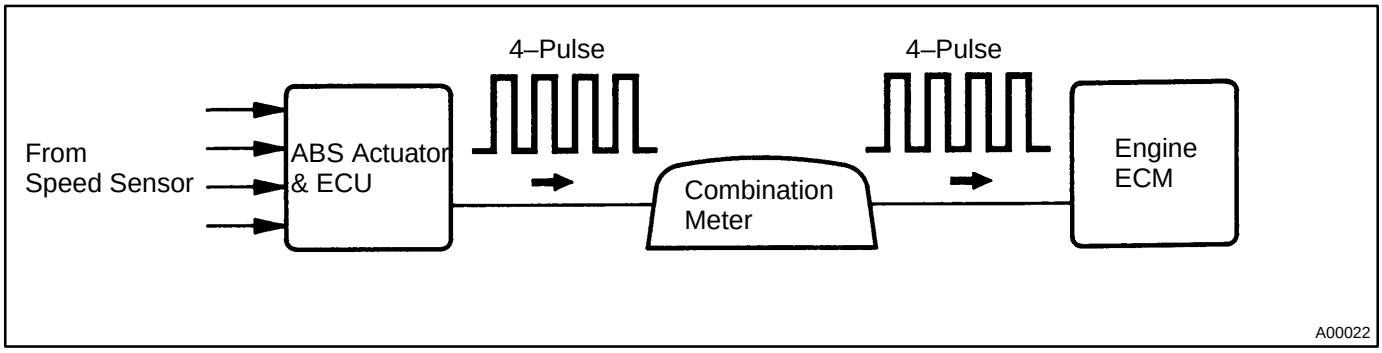
Replace vapor pressure sensor.

DI09Y–09

DTC	P0500	Vehicle Speed Sensor Malfunction

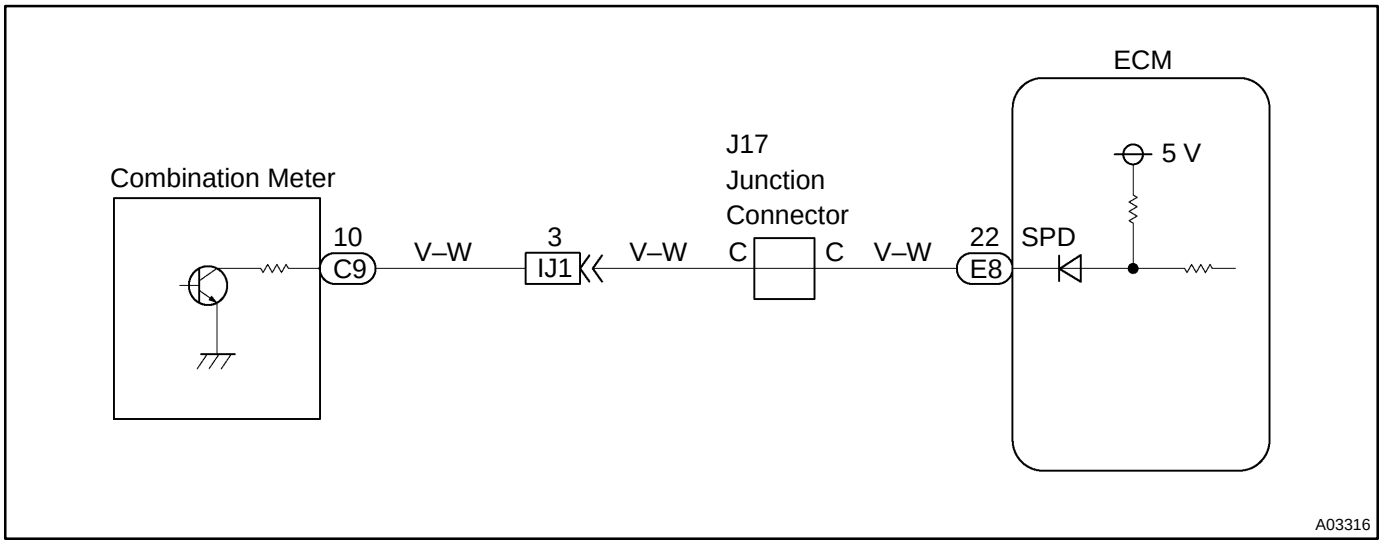
CIRCUIT DESCRIPTION

The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU converts these wheel speed signals into a 4–pulse signal and outputs it to the ECM via the combination meter. The ECM determines the vehicle speed based on the frequency of these pulse signals.



DTC No.	DTC Detecting Condition	Trouble Area
P0500	No vehicle speed sensor signal to Engine & ECT ECU under following conditions Vehicle is being driven	●Combination meter ●Open or short in speed sensor circuit ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check operation of speedometer.**

CHECK:

Drive the vehicle and check if the operation of the speedometer in the combination meter is normal.

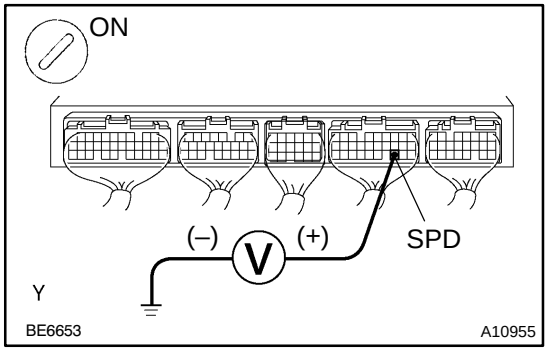
HINT:

The vehicle speed sensor is operating normally if the speedometer display is normal.

NG → **Check speedometer circuit. See combination meter troubleshooting (See page BE–99).**

OK

2	**Check voltage between terminal SPD of ECM connector and body ground.**



PREPARATION:

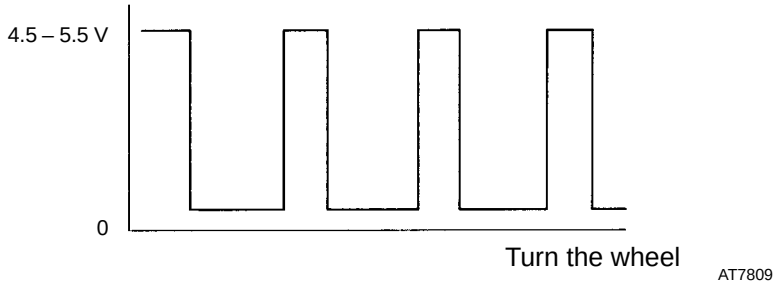
(a) Remove glove compartment (See page BO–82).
(b) Shift the shift lever to neutral.
(c) Jack up one of the front wheels.
(d) Turn ignition switch ON.

CHECK:

Measure voltage between terminal SPD of the ECM connector and the body ground when the wheel is turned slowly.

OK:

Voltage is generated intermittently.



NG → **Check and repair harness and connector between combination meter and ECM (See page IN–31).**

OK

3	Check ECM (See page IN–31).

NG → Replace ECM.

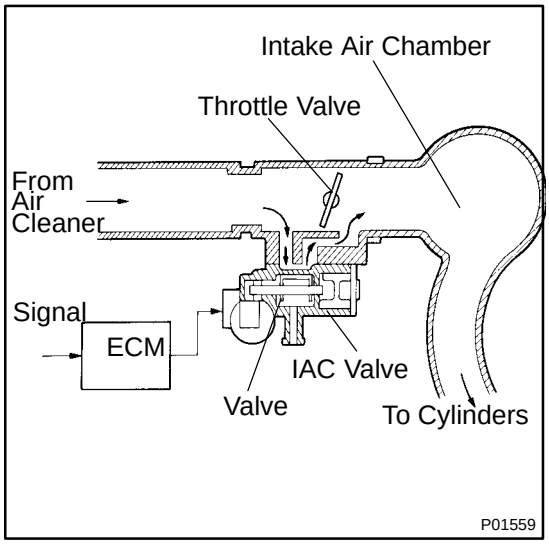
OK

Check and repair transaxle (clutch, brake or gear etc.).

DI09Z–09

DTC	P0505	Idle Control System Malfunction

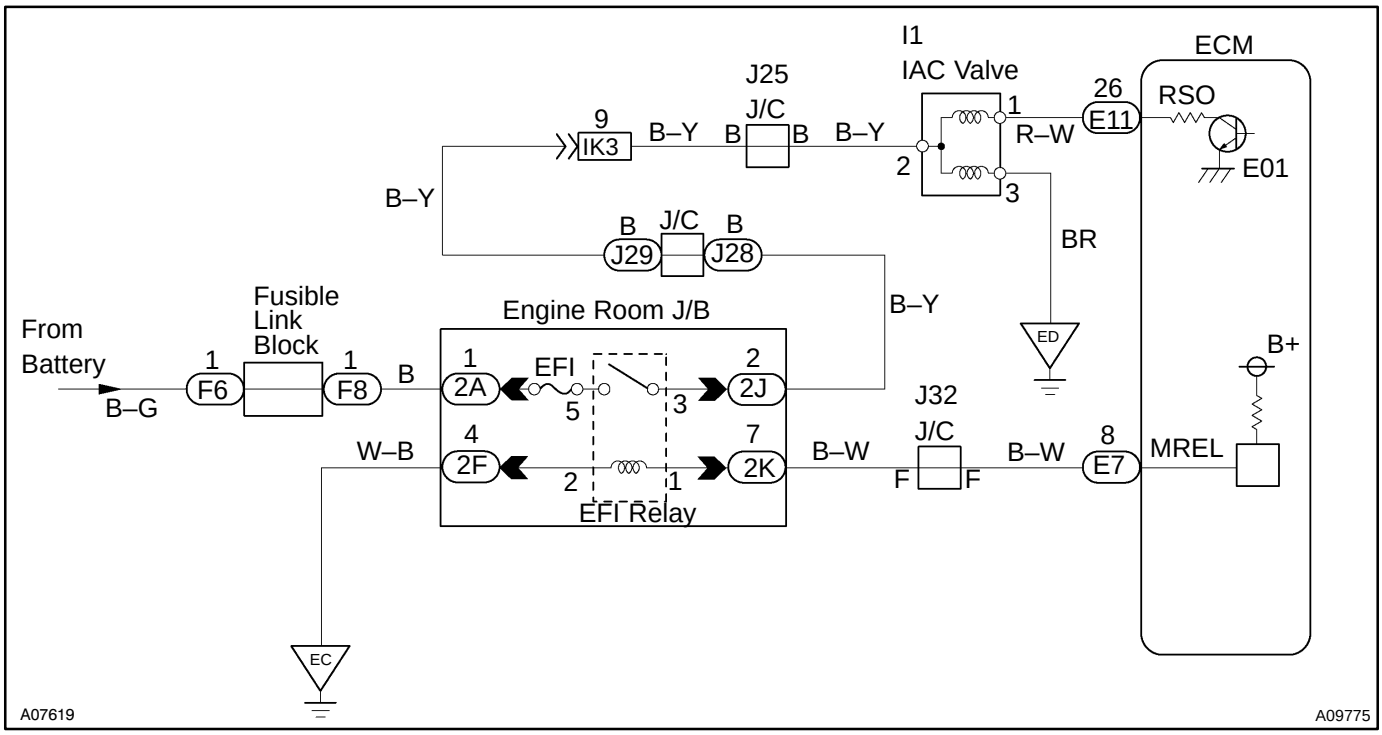
CIRCUIT DESCRIPTION



The rotary solenoid type IAC valve is located in front of the intake air chamber and intake air bypassing the throttle valve is directed to the IAC valve through the passage.
In this way the intake air volume bypassing the throttle valve is regulated, controlling the engine speed.
The ECM operates the IAC valve only to perform idle–up and provide feedback for the target idling speed.

DTC No.	DTC Detecting Condition	Trouble Area
P0505	Idle speed continues to vary greatly from the target speed (2 trip detection logic)	●Open or short in IAC valve circuit ●IAC valve is stuck or closed ●Open or short in A/C signal circuit ●Air induction system ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check idle speed.**

When using LEXUS hand–held tester:

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 transmission into the P range or neutral position.
(e) Connect the LEXUS hand–held tester to the DLC3 on the vehicle and select the ACTIVE TEST mode.

CHECK:

Check the difference of the engine speed between the ones, less than 5 seconds and more than 5 seconds after switching the TE1 from OFF to ON by the LEXUS hand–held tester.

OK:

Difference of engine speed: More than 100 rpm

When not using LEXUS hand–held tester:

PREPARATION:

(a) Warm up the engine to normal operating temperature.
(b) Switch off all the accessories.
(c) Switch off the A/C.
(d) Shift transmission into the P range or neutral position.
(e) Connect the OBDII scan tool to DLC3 on the vehicle.
(f) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020

CHECK:

Check the difference of engine speed between the ones, less than 5 seconds and more than 5 seconds after connecting terminals TE1 and E1 of the DLC1.

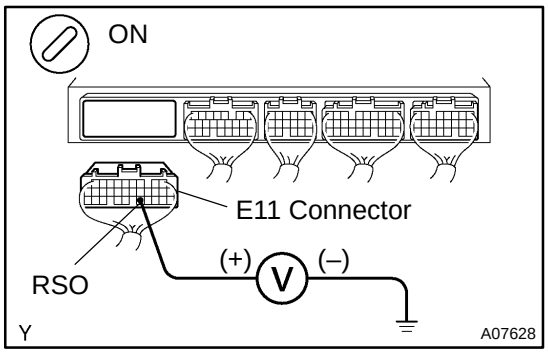
OK:

Difference of engine speed: More than 100 rpm

OK → **Go to step 6.**

NG

2	Check voltage between terminal RSO of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–80).
(b) Disconnect the E11 connector from the ECM.
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal RSO of the ECM connector and body ground.

OK:

Voltage: 9 – 14 V

OK	Go to step 4.

NG

3	Check IAC valve (See page SF–41).

NG	Replace IAC valve.

OK

Check for open and short in harness and connector between engine room J/B and IAC valve, and IAC valve and ECM (See page IN–31).

4	Check operation of IAC valve (See page SF–44).

NG	Repair or replace IAC valve.

OK

5	Check blockage of IAC valve and passage to bypass throttle valve.

NG	Repair or replace IAC valve.

OK

Check and replace ECM (See page IN–31).

6	Check for A/C signal circuit (See page DI–758).

NG → Repair or replace.

OK

Check air induction system (See page SF–1).

DTC	P1130	A/F Sensor Circuit Range/Performance Malfunction (Bank 1 Sensor 1)

DTC	P1150	A/F Sensor Circuit Range/Performance Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P1130 P1150	Output voltage* of A/F sensor remains at 3.8 V or more, or 2.8 V or less, during engine running after the engine is warmed up (2 trip detection logic) *: Output value changes at inside of ECM only	●Open or short in A/F sensor circuit ●A/F sensor ●Air induction system ●Fuel pressure ●Injector ●ECM
	Output voltage* of A/F sensor does not change from 3.30 V, during engine running after the engine is warmed up (2 trip detection logic) *: Output value changes at the inside of ECM only	
	Open or short in A/F sensor circuit (2 trip detection logic)	

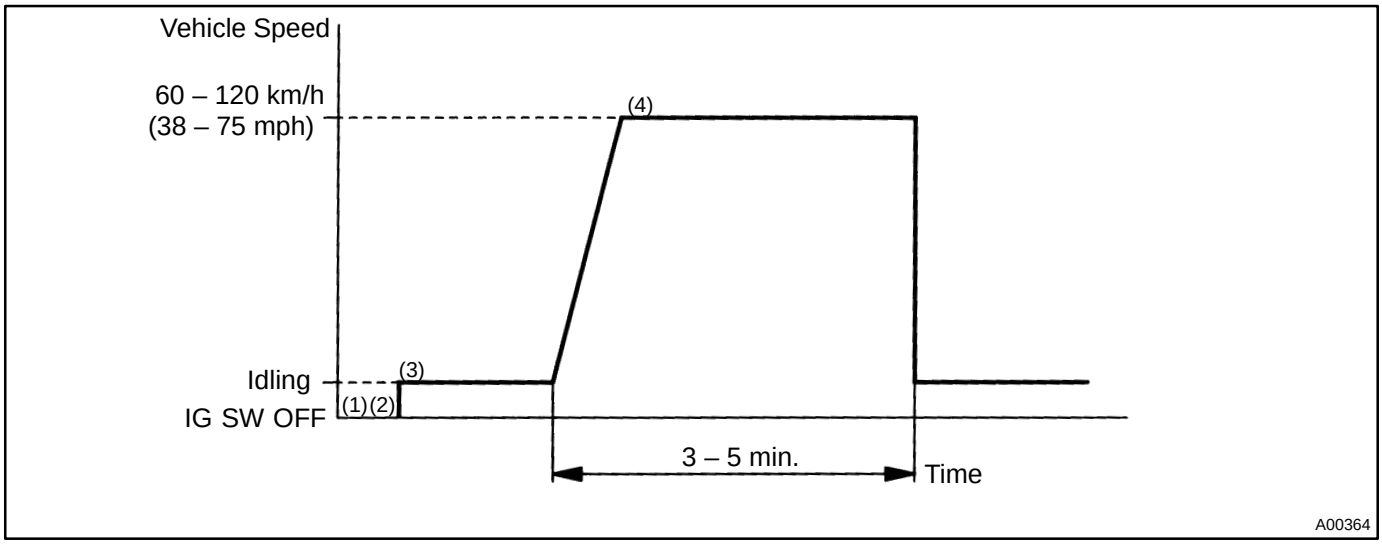
HINT:

- After confirming DTC P1130 and P1150, use the OBD II scan tool or LEXUS hand−held tester to confirm output voltage of A/F sensor (AFS B1 S1/O2S B1 S1) from the CURRENT DATA.
- The A/F sensor's output voltage and the short−term fuel trim value can be read by using the OBD II scan tool or LEXUS hand−held tester.
- The ECM controls the voltage of the AFR+, AFL+, AFR− and AFL− terminals of the ECM to the fixed voltage. Therefore, it is impossible to confirm the A/F sensor output voltage without the OBDII scan tool or LEXUS hand–held tester.
- OBD II scan tool (excluding LEXUS hand−held tester) displays the one fifth of the A/F sensor output voltage which is displayed on the LEXUS hand−held tester.

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43.

CONFIRMATION DRIVING PATTERN



(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Switch the LEXUS hand–held tester from the normal mode to the check mode (See page DI–3).
(3) Start the engine and warm it up with all the accessory switches OFF.
(4) Drive the vehicle at 60 – 120 km/h (38 – 75 mph) and engine speed at 1,400 – 3,200 rpm for 3 – 5 minutes.

HINT:
If a malfunction exists, the MIL will light up during step (d).
NOTICE:
If the conditions in this test are not strictly followed, the detection of the malfunction is impossible. If you do not have a LEXUS hand–held tester, turn the ignition switch OFF after performing steps (c) and (d) once, then perform steps (c) and (d) again.

INSPECTION PROCEDURE

HINT:
- If DTC P1130 is displayed, check Bank 1 Sensor 1 circuit.
- If DTC P1150 is displayed, check Bank 2 Sensor 1 circuit.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P1130, P1150) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Check output voltage of A/F sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage value of A/F sensor on the screen of OBDII scan tool or LEXUS hand–held tester when performing all the following conditions.

HINT:

The voltage of the AFR+ or AFL+ terminal of the ECM is fixed at 3.3 V and the voltage of the AFR– or AFL– terminal is fixed at 3.0 V, therefore it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

OK:

Condition	A/F Sensor Voltage Value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When you use OBD II scan tool (excluding LEXUS hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:

- Although, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normally.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76 V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding LEXUS hand–held tester).

OK → **Go to step 9.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	**Check resistance of A/F sensor heater (See page SF–76).**

NG → Replace A/F sensor.

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

7	Check injector injection (See page SF–21).

NG → Replace injector.

OK

Replace A/F sensor.

8	Perform confirmation driving pattern (See page DI–110).

Go

9	Is there DTC P1130 or P1150 being output again?

YES → Check and replace ECM (See page IN–31).

NO

10	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems (See page DI–3).

YES

DTC P1130 or P1150 is caused by running out of fuel.

DTC	P1133	A/F Sensor Circuit Response Malfunction (Bank 1 Sensor 1)

DTC	P1153	A/F Sensor Circuit Response Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P1133 P1153	After engine is warmed up, and during vehicle driving at engine speed 1,400 rpm or more and vehicle speed 60 km/h (38 mph) or more, the response characteristic of A/F sensor becomes deteriorated (2 trip detection logic)	●Open or short in A/F sensor circuit ●A/F sensor ●Air induction system ●Fuel pressure ●Injector ●ECM

WIRING DIAGRAM

Refer to DTC P0125 on page DI–43.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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 P1133, P1153) being output?**

YES → **Go to relevant DTC chart.**

NO

2	**Connect OBDII scan tool or LEXUS hand–held tester, and read value for voltage output of A/F sensor.**

PREPARATION:

(a) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3.

(b) Warm up the A/F sensor with the engine speed at 2,500 rpm for approximately 90 seconds.

CHECK:

Read the voltage of the A/F sensor on the screen of the OBD II scan tool or LEXUS hand–held tester when performing all the following conditions.

HINT:
The voltage of the AFR+ or AFL+ terminal of the ECM is fixed at 3.3 V and the voltage of the AFR– or AFL– terminal is fixed at 3.0 V, therefore it is impossible to check the A/F sensor output voltage at the terminals (AFR+, AFL+/AFR–, AFL–) of the ECM.

OK:

Condition	A/F Sensor Voltage value
Engine idling	●Not remains at 3.30 V (0.660 V*) ●Not remains at 3.8 V (0.76 V*) or more ●Not remains at 2.8 V (0.56 V*) or less *: When you use the OBD II scan tool (excluding LEXUS hand–held tester)
Engine racing	
Driving at engine speed 1,500 rpm or more and vehicle speed 40 km/h (25 mph) or more, and operate throttle valve open and close	

HINT:

- Although, there is a case that the output voltage of the A/F sensor is below 2.8 V (0.56 V*) during fuel enrichment, it is normal.
- Although, there is a case that the output voltage of the A/F sensor is above 3.8 V (0.76 V*) during fuel cut, it is normal.
- If the output voltage of the A/F sensor remains at 3.30 V (0.660 V*) even after performing all the above conditions, the A/F sensor circuit may be open.
- If the output voltage of the A/F sensor remains at 3.8 V (0.76V*) or more, or 2.8 V (0.56 V*) or less even after performing all the above conditions, the A/F sensor circuit may be short.

*: When you use the OBD II scan tool (excluding LEXUS hand–held tester).

OK → **Go to step 9.**

NG

3	**Check for open and short in harness and connector between ECM and A/F sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	**Check resistance of A/F sensor heater (See page SF–76).**

NG → **Replace A/F sensor.**

OK

5	Check air induction system (See page SF–1).

NG → Repair or replace.

OK

6	Check fuel pressure (See page SF–6).

NG → Check and repair fuel pump, pressure regulator, fuel pipe line and filter (See page SF–1).

OK

7	Check injector injection (See page SF–21).

NG → Replace injector.

OK

Replace A/F sensor.

8	Perform confirmation driving pattern (See page DI–110).

Go

9	Is there DTC P1133 or P1153 being output again?

YES → Check and replace ECM (See page IN–31).

NO

10	Did vehicle runs out of fuel in past?

NO → Check for intermittent problems (See page DI–3).

YES

DTC P1133 or P1153 is caused by running out of fuel.

DTC	P1135	A/F Sensor Heater Circuit Malfunction (Bank 1 Sensor 1)

DTC	P1155	A/F Sensor Heater Circuit Malfunction (Bank 2 Sensor 1)

CIRCUIT DESCRIPTION

Refer to DTC P0125 on page DI–43.

DTC No.	DTC Detecting Condition	Trouble Area
P1135 P1155	When the heater operates, heater current exceeds 8 A	●Open or short in heater circuit of A/F sensor ●A/F sensor heater ●ECM
	Heater current is 0.25 A or less when the heater operates	

WIRING DIAGRAM

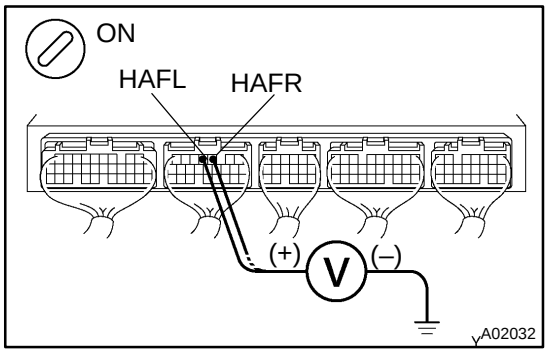
Refer to DTC P0125 on page DI–43.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check voltage between terminals HAFL, HAFR of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–80).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals HAFL, HAFR of the ECM connector and the body ground.

OK:

Voltage: 9 – 14 V

OK	**Check and replace ECM (See page IN–31).**

NG

2	**Check resistance of A/F sensor heater (See page SF–76).**

NG → Replace A/F sensor.

OK

3	Check A/F sensor heater relay (Marking: A/F HTR) (See page SF–59).

NG → Replace A/F sensor heater relay.

OK

Check and repair harness or connector between A/F sensor heater relay and A/F sensor, and A/F sensor and ECM (See page IN–31).

DTC	P1300	Igniter Circuit Malfunction (No. 1)

DTC	P1305	Igniter Circuit Malfunction (No. 2)

DTC	P1310	Igniter Circuit Malfunction (No. 3)

DTC	P1315	Igniter Circuit Malfunction (No. 4)

DTC	P1320	Igniter Circuit Malfunction (No. 5)

DTC	P1325	Igniter Circuit Malfunction (No. 6)

CIRCUIT DESCRIPTION

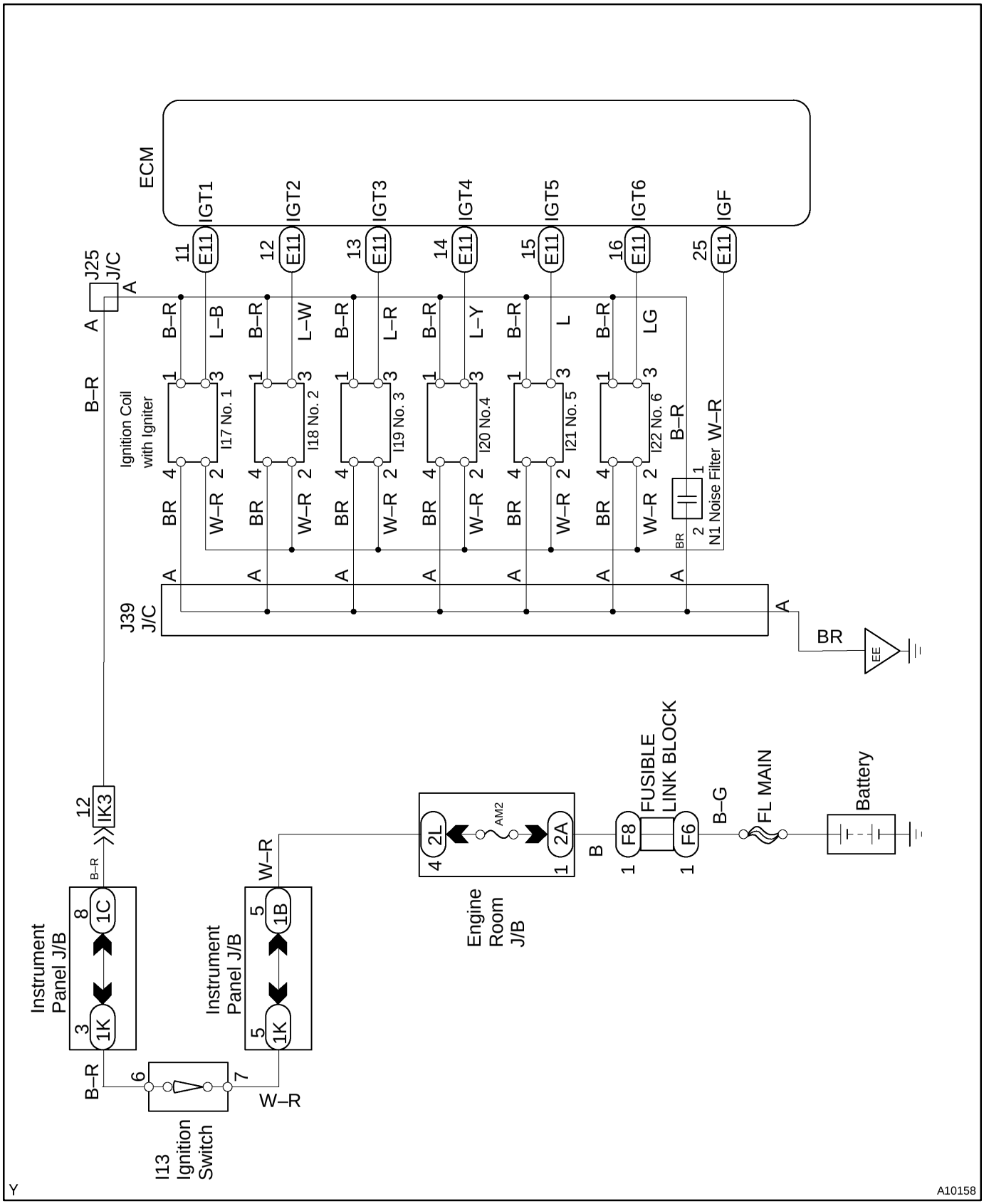
A Direct Ignition System (DIS) has been adopted. The DIS improves the ignition timing accuracy, reduces the high–voltage loss, and enhances the the overall reliability of the ignition system by eliminating the distributor.

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 pass from the center electrode to the ground electrode.

The ECM determines ignition timing and outputs the ignition signal (IGT) for each cylinder. Based on IGT signal, the igniter controls the primary ignition signal (IGC) for all ignition coils. At the same time, the igniter also sends an ignition confirmation signal (IGF) as a fail–safe measure to the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
P1300 P1305 P1310 P1315 P1320 P1325	Condition (a) is repeated 3 times consecutively during 6 consecutively IGT signals while engine is running (a) IGF signal is not input to ECM for 2 or more ignitions	●Ignition system ●Open or short in IGF or IGT circuit from ignition coil with igniter ●Ignition coil with igniter ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1300 is displayed, check No.1 ignition coil with igniter circuit.
- If DTC P1305 is displayed, check No.2 ignition coil with igniter circuit.
- If DTC P1310 is displayed, check No.3 ignition coil with igniter circuit.
- If DTC P1315 is displayed, check No.4 ignition coil with igniter circuit.
- If DTC P1320 is displayed, check No.5 ignition coil with igniter circuit.
- If DTC P1325 is displayed, check No.6 ignition coil with igniter circuit.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check spark plug and spark (See page DI–58).**

NG → **Go to step 4.**

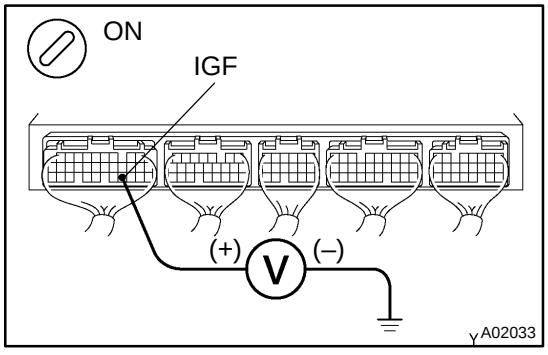
OK

2	**Check for open and short in harness and connector in IGF and IGT signal circuits between ECM and ignition coil with igniter (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGF of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–80).
(b) Disconnect the ignition coil with the igniter connector.
(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals IGF of the ECM connector and the body ground.

OK:

Voltage: 4.5 – 5.5 V

OK → **Replace ignition coil with igniter.**

NG

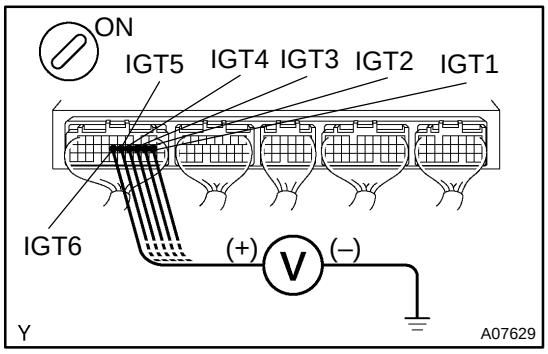
Check and replace ECM (See page IN–31).

4	Check for open and short in harness and connector in IGT signal circuit between ECM and ignition coil with igniter (See page IN–31).

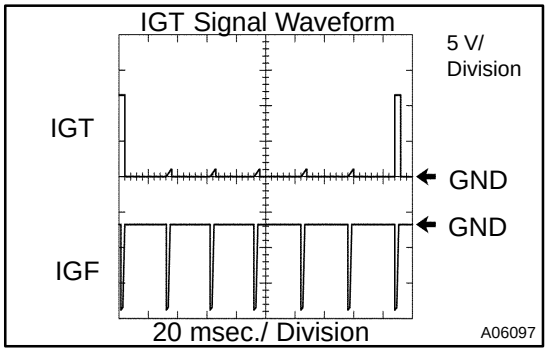
NG → Repair or replace harness or connector.

OK

5	Check voltage between terminals IGT1 – IGT6 of ECM connector and body ground.



PREPARATION:
Remove the glove compartment (See page SF–80).
CHECK:
Measure the voltage between terminals IGT1 – IGT6 of the ECM connector and the body ground when the engine is cranked.
OK:
Voltage: More than 0.1 V and less than 4.5 V

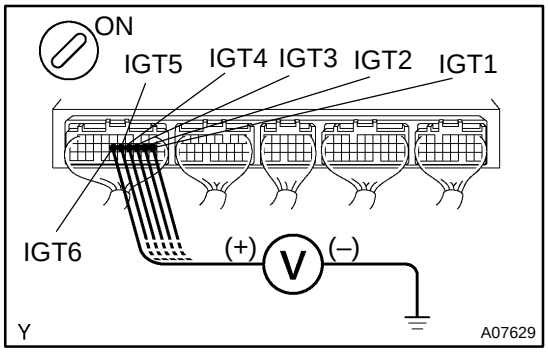


Reference: INSPECTION USING OSCILLOSCOPE
During cranking or idling, check the waveform between terminals IGT1 – IGT6 and E1 of the ECM connector.
HINT:
Correct waveform appears as shown in the illustration, with rectangle waves.

NG → Check and replace ECM (See page IN–31).

OK

6	**Disconnect ignition coil with igniter connector, and check voltage between terminals IGT1 – IGT6 of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–80).

(b) Disconnect the ignition coil with the igniter connector.

CHECK:

Measure the voltage between terminals IGT1 – IGT6 of the ECM connector and the body ground when the engine is cranked.

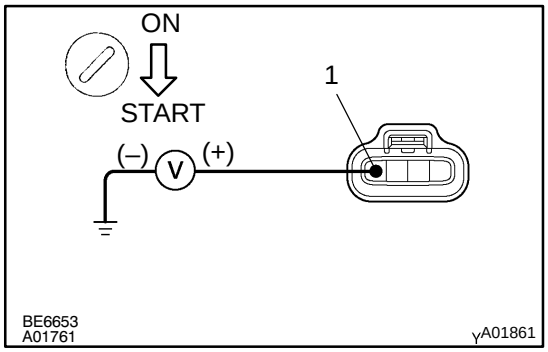
OK:

Voltage: More than 0.1 V and less than 4.5 V

NG	**Check and replace ECM (See page IN–31).**

OK

7	**Check ignition coil with igniter power source circuit.**



PREPARATION:

Disconnect the ignition coil with the igniter connector.

CHECK:

Measure the voltage between terminal 1 of the ignition coil with the igniter connector and the body ground when the ignition switch is turned to ON and START position.

OK:

Voltage: 9 – 14 V

NG	**Repair ignition coil with igniter power source circuit.**

OK

8	**Check for open and short in harness and connector between ignition switch and ignition coil with igniter (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Replace ignition coil with igniter.

DTC	P1335	Crankshaft Position Sensor Circuit Malfunction (During engine running)

CIRCUIT DESCRIPTION

Refer to DTC P0335 on page DI–67.

DTC No.	DTC Detecting Condition	Trouble Area
P1335	No crankshaft position sensor signal to ECM with engine speed 1,000 rpm or more	●Open or short in crankshaft position sensor circuit ●Crankshaft position sensor ●Crankshaft timing pulley ●ECM

WIRING DIAGRAM

Refer to DTC P0335 on page DI–67.

INSPECTION PROCEDURE

Refer to DTC P0335 on page DI–67.

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

DTC	P1346	VVT Sensor/Crankshaft Position Sensor Circuit Range/Performance Problem (Bank 1)

DTC	P1351	VVT Sensor/Crankshaft Position Sensor Circuit Range/Performance Problem (Bank 2)

CIRCUIT DESCRIPTION

Refer to DTC P1350 on page DI–135.

DTC No.	Detection Item	Trouble Area
P1346	Deviation in crankshaft position sensor signal and VVT sensor (bank 1) signal (2 trip detection logic)	●Mechanical system malfunction (Jumping teeth of timing belt, belt stretched) ●ECM
P1351	Deviation in crankshaft position sensor signal and VVT sensor (bank 2) signal (2 trip detection logic)	

WIRING DIAGRAM

Refer to DTC P1350 on page DI–135.

INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	**Check valve timing (Check for loose and jumping teeth of timing belt) (See page EM–15).**

NG → **Adjust valve timing (Repair or replace timing belt).**

OK

Check and replace ECM (See page IN–31).

DTC	P1349	VVT System Malfunction (Bank 1)

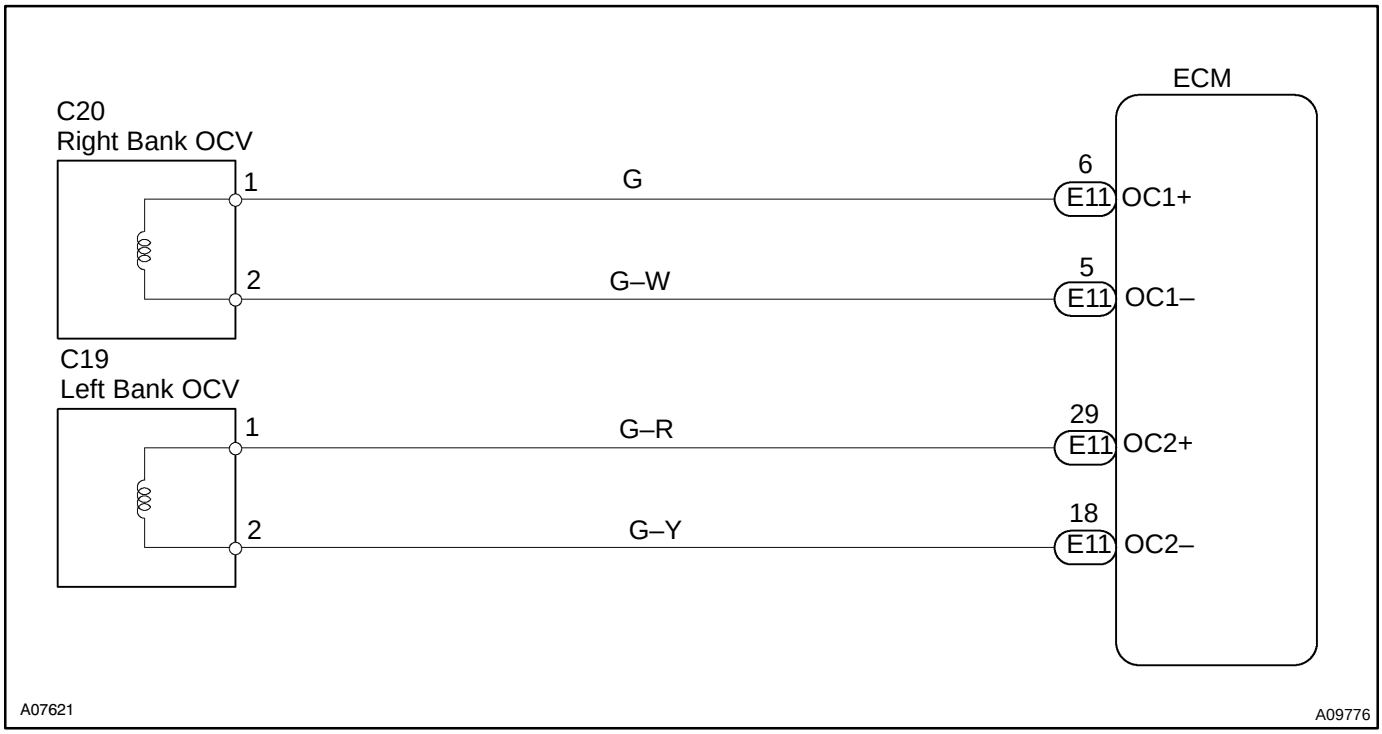
DTC	P1354	VVT System Malfunction (Bank 2)

CIRCUIT DESCRIPTION

The VVT system constantly adjusts intake valve timing based upon operating conditions. The ECM system controls the Oil Control Valve (OCV) with a variable duty cycle. The Oil Control Valve then supplies oil to the advance or retard side of the VVT Controller. The oil applied to the VVT Controller will cause the intake cam to advance or retard depending on the position of the Oil Control Valve. The ECM verifies that the desired camshaft angle has been achieved by monitoring the camshaft position sensor.

DTC No.	DTC Detecting Condition	Trouble Area
P1349 P1354	Condition (a) or (b) continues after the engine is warmed up and engine speed at 400 – 4,000 rpm: (2 trip detection logic) (a) Valve timing does not change from current valve timing (b) Current valve timing is fixed	●Valve timing ●OCV ●VVT controller assembly ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

- If DTC P1349 is displayed, check right bank VVT system circuit.
- If DTC P1354 is displayed, check left bank VVT system circuit.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

LEXUS hand–held tester:

1	**Check valve timing (See page EM–15).**

NG → **Repair valve timing.**

OK

2	**Check operation of OCV.**

PREPARATION:

(a) Start the engine and warmed it up.

(b) Connect the LEXUS hand–held tester and select the VVT on the ACTIVE TEST menu.

CHECK:

Check the engine speed when operate the OCV by the LEXUS hand–held tester.

OK:

OCV is OFF: Normal engine speed

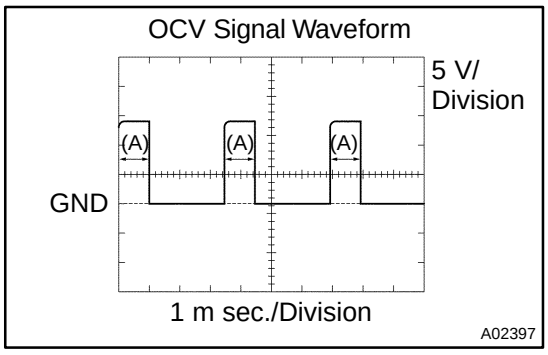
OCV is ON: Rough idle or engine stall

OK → **VVT system is OK.***

*: DTCs P1349 and P1354 are also output when a foreign object is defected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign objects, there is no problem on the VVT. There is also no problem no the VVT as the oil filter should catch the foreign object in the engine oil.

NG

3	**Check voltage between terminals OCV+ and OCV– of ECM connector.**



Reference: INSPECTION USING OSCILLOSCOPE

Turn the ignition switch ON, and check the waveform between terminals OCV+ and OCV– of the ECM connector.

HINT:

- The correct waveform is as shown in the illustration.
- The waveform frequency (A) becomes longer as the engine speed becomes higher.

NG → **Check and replace ECM (See page IN–31).**

OK

4	**Check VVT controller assembly.**

PREPARATION:
(a) Remove the timing belt (See page EM–15).
(b) Remove the cylinder head cover.
(c) Remove the OCV (See page EM–31).
(d) Drain oil into the VVT controller assembly (See page EM–31).
CHECK:
Check whether the oil into VVT controller assembly is drained or not.
OK:
The oil into VVT controller assembly is drained.

NG → **Replace VVT controller assembly, and then go to step 5.**

OK

5	**Check OCV (See page SF–49).**

NG → **Replace OCV, and then go to step 6.**

OK

6	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG → **Repair or replace.**

OK

7	**Check whether or not DTC P1349/P1354 is stored.**

PREPARATION:
(a) Clear the DTC (See page DI–3).
(b) Perform the simulation test.
CHECK:
Check whether or not DTC P1349/P1354 is stored (See page DI–3).
OK:
DTC P1349/P1354 is not stored.

OK	VVT system is OK.*

*: DTCs P1349 and P1354 are also output when a foreign object is defected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign objects, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG

Replace ECM.

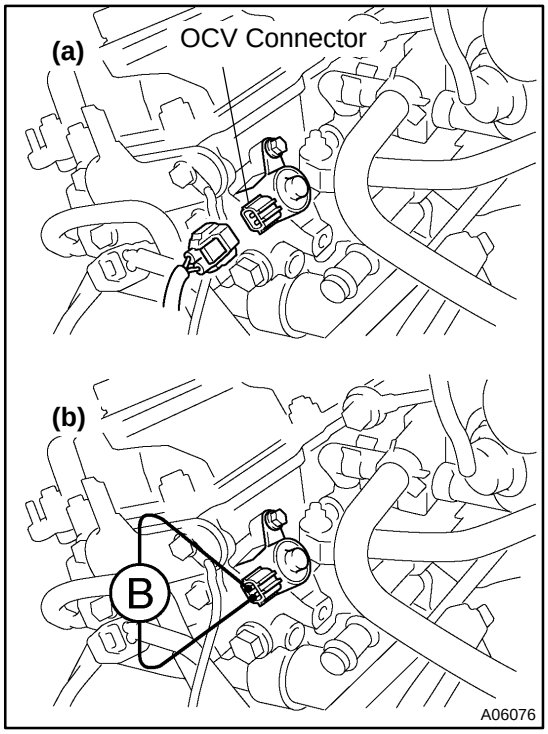
OBD II scan tool (excluding LEXUS hand–held tester):

1	**Check valve timing (See page EM–15).**

NG	**Repair valve timing.**

OK

2	**Check operation of OCV.**



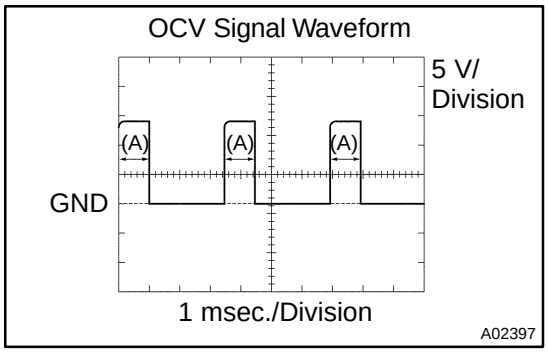
PREPARATION:
Start the engine.
CHECK:
(a) Check the engine speed when disconnecting the OCV connector.
(b) Check the engine speed while applying battery positive voltage to the terminals of the OCV.
RESULT:

Result	Check (a)	Check (b)
1	Normal engine speed	Rough idle or engine stall
2	Except 1	

2	**Go to step 4.**

1

3	Check voltage between terminals OCV+ and OCV– of ECM connector.



Reference: INSPECTION USING OSCILLOSCOPE
Turn the ignition switch ON, check the waveform between terminals OCV+ and OCV– of the ECM connector.
HINT:

- The correct waveform is as shown in the illustration.
- The waveform frequency (A) becomes longer as the engine speed becomes higher.

OK	VVT system is OK.*

*: DTCs P1349 and P1354 are also output when a foreign object is defected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign objects, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should catch the foreign object in the engine oil.

NG

Check and replace ECM (See page IN–31).

4	Check VVT controller assembly.

PREPARATION:
(a) Remove the timing belt (See page EM–15).
(b) Remove the cylinder head cover.
(c) Remove the OCV (See page EM–31).
(d) Drain oil into the VVT controller assembly (See page EM–31).
CHECK:
Check whether the oil into VVT controller assembly is drained or not.
OK:
The oil into VVT controller assembly is drained.

NG	Replace VVT controller assembly, and then go to step 5.

OK

5	**Check OCV (See page SF–49).**

NG → **Replace OCV, and then go to step 6.**

OK

6	**Check blockage of OCV, oil check valve and oil pipe No.1.**

NG → **Repair or replace.**

OK

7	**Check whether or not DTC P1349/P1354 is stored.**

PREPARATION:

(a) Clear the DTC (See page DI–3).

(b) Perform the simulation test.

CHECK:

Check whether or not DTC P1349/P1354 is stored (See page DI–3).

OK:

DTC P1349/P1354 is not stored.

OK → **VVT system is OK.***

*: DTCs P1349 and P1354 are also output when a foreign object is defected in some parts of the system in the engine oil, and then the system returns to normal in a short time. As ECM is controlled to eject a foreign objects, there is no problem on the VVT. There is also no problem on the VVT as the oil filter should get the foreign object in the engine oil.

NG

Replace ECM.

DI8YL–01

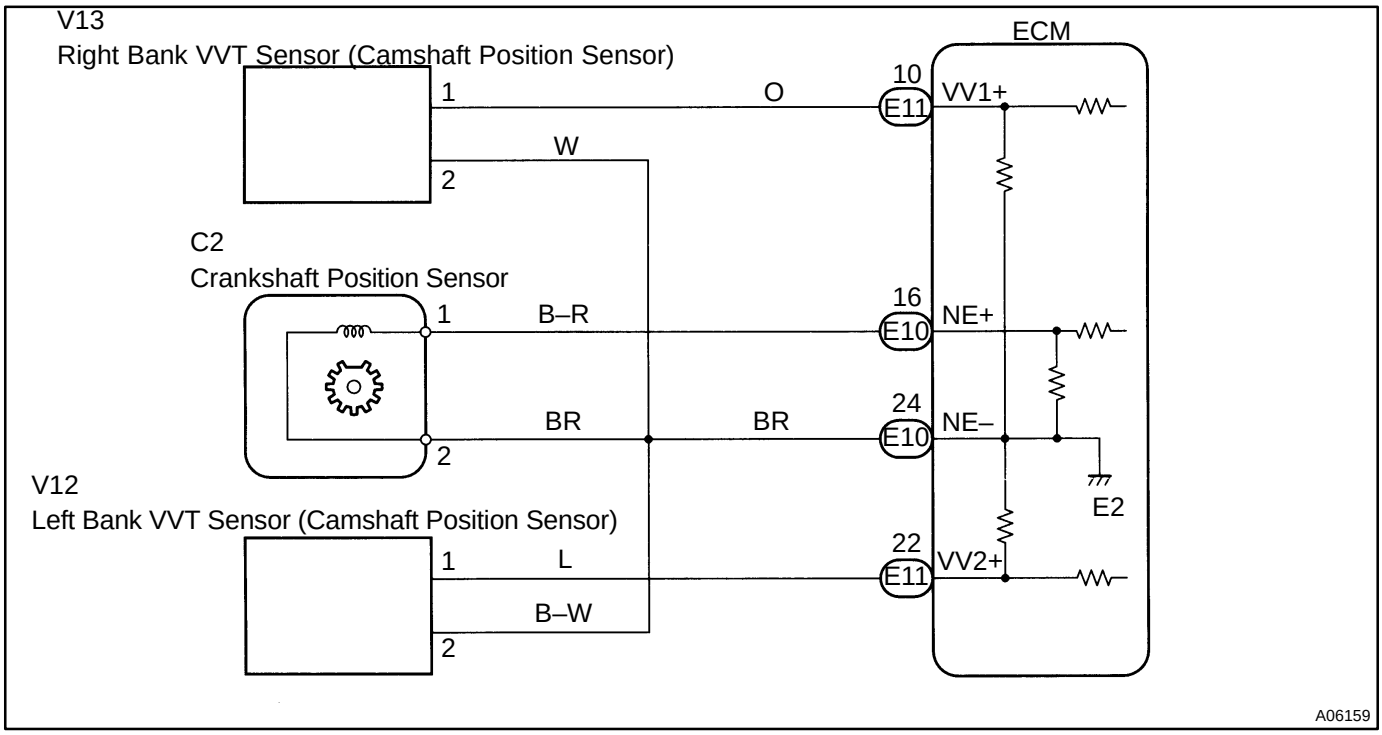
DTC	P1350	VVT Sensor/Camshaft Position Sensor Circuit Malfunction (Bank 2)

CIRCUIT DESCRIPTION

VVT sensor (VV signal) consists of a magnet, iron core and pickup coil.
The VV signal plate has 3 teeth on its outer circumference and is installed the camshaft timing gear.
When the camshafts rotate, the protrusion on the signal plate and the air gap on the pickup coil change, causing fluctuations in the magnetic field and generating an electromotive force in the pickup coil.
The actual camshaft angle is detected by the VVT sensor and it provides feedback to the ECM to control the intake valve timing in response to during condition.

DTC No.	DTC Detecting Condition	Trouble Area
P1350	No VVT sensor (Camshaft position sensor) signal to ECM during cranking at 4 sec. or more (2 trip detection logic)	●Open or short in VVT sensor (camshaft position sensor) circuit ●VVT sensor (camshaft position sensor) ●Camshaft timing gear ●ECM
	No VVT sensor (Camshaft position sensor) signal to ECM with 5 sec. or more engine speed 600 rpm or more	
	While crankshaft rotates twice, VVT sensor (Camshaft position sensor) signal will be input to ECM 5 times.	

WIRING DIAGRAM

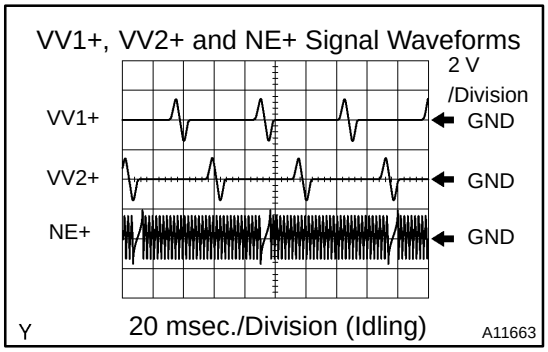


INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS 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 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	**Check resistance of VVT sensor (See page IG–7).**



Reference: INSPECTION USING OSCILLOSCOPE

During idling, check the waveforms between terminals VV1+ and NE+, and VV2+ and NE– of the ECM connector.

HINT:

- The correct waveforms are as shown.
- The waveform frequency is shortened as the engine speed becomes higher.

NG → **Replace VVT sensor.**

OK

2	**Check for open and short in harness and connector between ECM and VVT sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Inspect sensor installation and signal plate teeth of camshaft timing gear.**

NG → **Tighten sensor. Replace camshaft timing gear.**

OK

Check and replace ECM (See page IN–31).

DI0A4–08

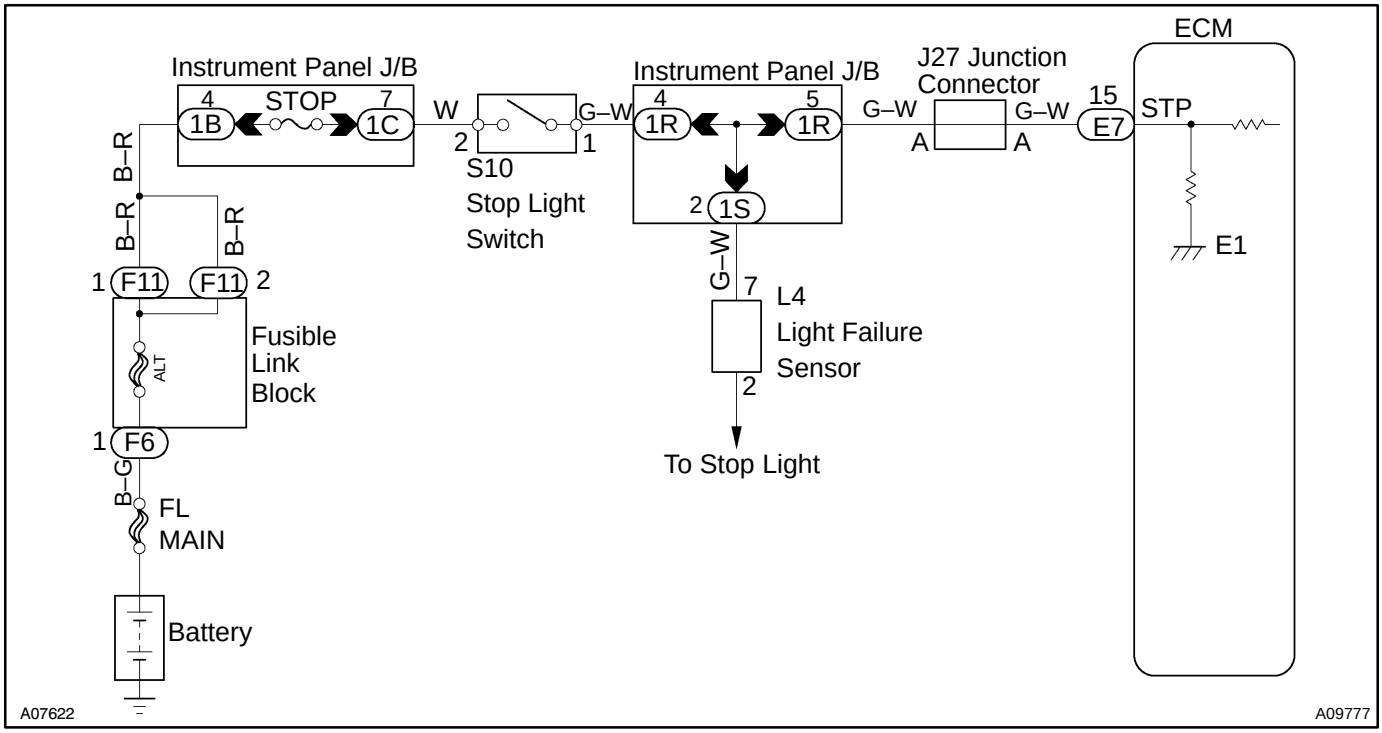
DTC	P1520	Stop Light Switch Signal Malfunction

CIRCUIT DESCRIPTION

This signal is used to detect that the brakes have been applied. The STP signal voltage is the same as the one supplied to the stop lights.
The STP signal is used mainly to control the fuel cut–off engine speed (The fuel cut–off engine speed is reduced slightly when the vehicle is braking.).

DTC No.	DTC Detecting Condition	Trouble Area
P1520	Stop light switch does not turn off when repeating driving at 30 km or more and 10 time or more after depressing brake (2 trip detection logic)	●Short in stop light switch signal circuit ●Stop light switch ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:
Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

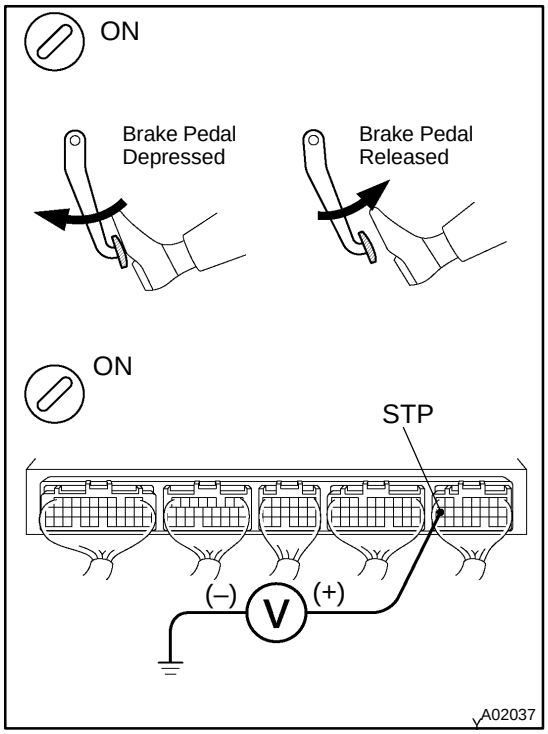
1	**Check operation of stop light.**

CHECK:
Check if the stop lights go on and off normally when the brake pedal is operated and released.

NG	**Check and repair stop light circuit.**

OK

2	Check STP signal.



When using LEXUS hand–held tester:

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

CHECK:

Read the STP signal on the LEXUS hand–held tester.

OK:

Brake Pedal	STP Signal
Depressed	ON
Released	OFF

When not using LEXUS hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Check the voltage between terminal STP of the ECM connector and the body ground.

OK:

Brake Pedal	Voltage
Depressed	7.5 – 14 V
Released	Below 1.5 V

OK → **Check for intermittent problems (See page DI–3).**

NG

3	Check harness and connector between ECM and stop light switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

DI0A5–06

DTC	P1600	ECM BATT Malfunction

CIRCUIT DESCRIPTION

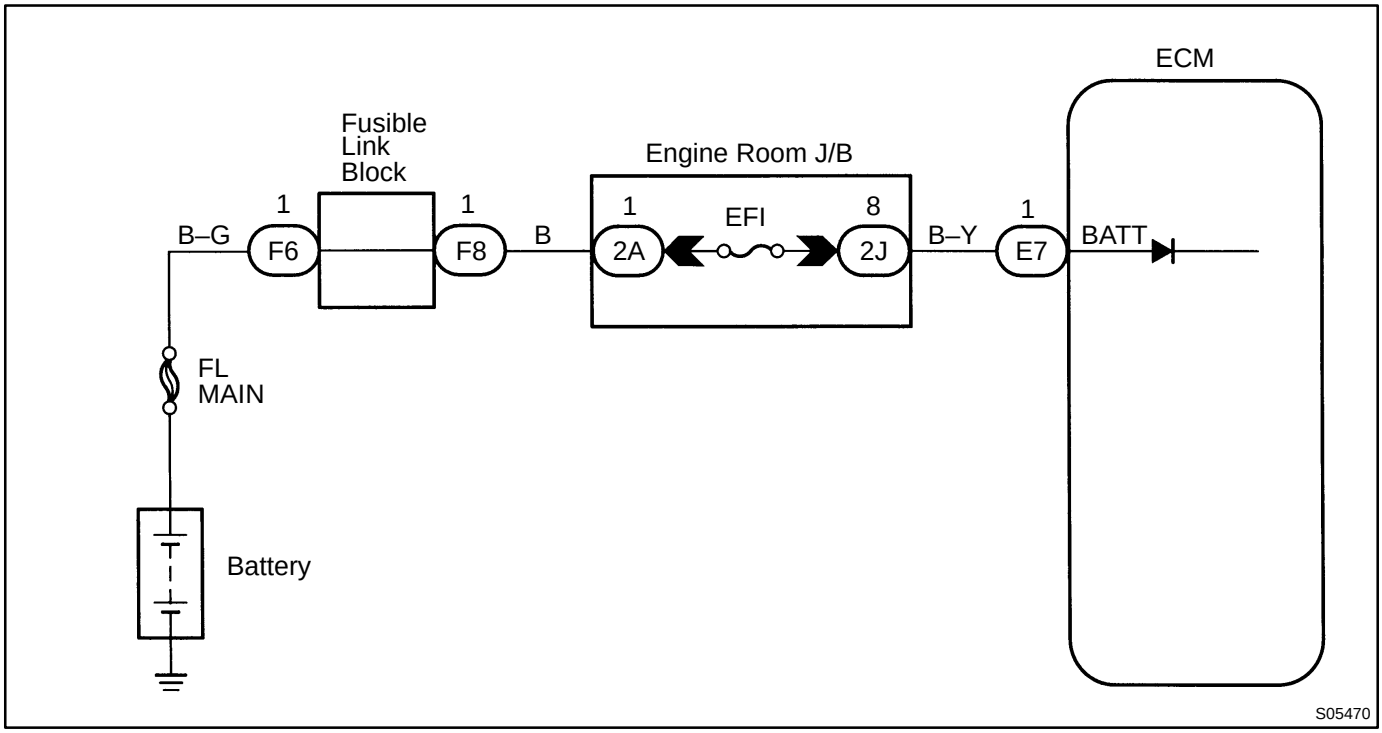
Battery positive voltage is applied to terminal BATT of the ECM even when the ignition switch is OFF for use by the DTC memory and air–fuel ratio adaptive control value memory, etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1600	Open in back up power source circuit	●Open in back up power source circuit ●ECM

HINT:

If DTC P1600 is displayed, the ECM does not store another DTC.

WIRING DIAGRAM

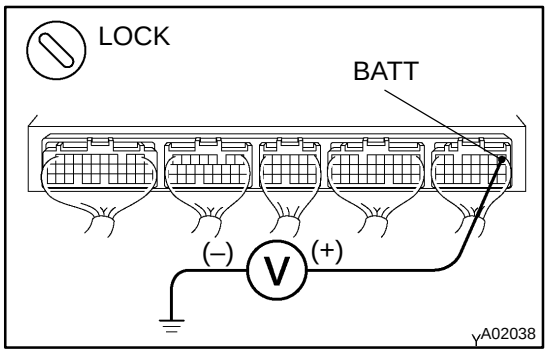


INSPECTION PROCEDURE

HINT:

Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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	Check voltage between terminal BATT of ECM connector and body ground.

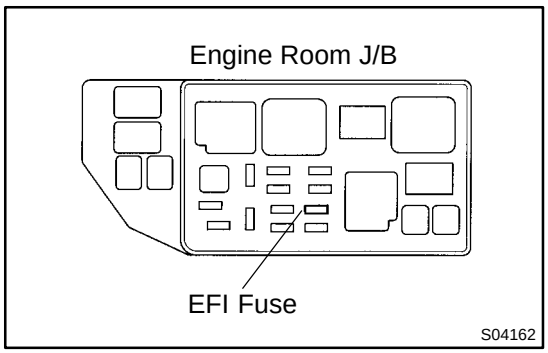


PREPARATION:
Remove the glove compartment (See page SF–79).
CHECK:
Measure the voltage between terminal BATT of the ECM connector and the body ground.
OK:
Voltage: 9 – 14 V

OK	Check and replace ECM (See page IN–31).

NG

2	Check EFI fuse.



PREPARATION:
Remove the EFI fuse from the engine room J/B.
CHECK:
Check the continuity of the EFI fuse.
OK:
Continuity

NG	Check for short in all harness and components connected to EFI fuse.

OK

Check and repair harness or connector between battery and EFI fuse, and EFI fuse and ECM.

DI1MH–15

DTC	P1656	OCV Circuit Malfunction (bank 1)

DTC	P1663	OCV Circuit Malfunction (bank 2)

CIRCUIT DESCRIPTION

Refer to DTC P1349, P1354 on page DI–129.

DTC No.	DTC Detecting Condition	Trouble Area
P1656 P1663	Open or short in oil control valve circuit	●Open or short in OCV circuit ●OCV ●ECM

WIRING DIAGRAM

Refer to DTC P1349, P1354 on page DI–129.

INSPECTION PROCEDURE

HINT:

- If DTC P1656 displayed, check right bank OCV circuit.
- If DTC P1663 displayed, check left bank OCV circuit.
- Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

LEXUS hand–held tester:

1	**Check OCV circuit.**

PREPARATION:

(a) Start the engine and warmed it up.

(b) Connect the LEXUS hand–held tester and select the VVT an the ACTIVE TEST menu.

CHECK:

Check the engine speed when operate the OCV by using the LEXUS hand–held tester.

OK:

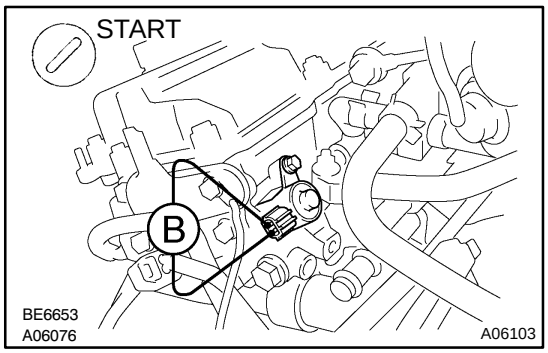
VVT system is OFF (OCV is OFF): Normal engine speed

VVT system is ON (OCV is ON): Rough idle or engine stalled

OK → **Check for intermittent problems (See page DI–3).**

NG

2	**Check operation of OCV.**



PREPARATION:

(a) Start the engine and warmed it up.
(b) Disconnect the OCV connector.
(c) Apply battery positive voltage between terminals of the OCV.

CHECK:

Check the engine speed.

OK:

Rough idle or engine stalled.

NG → **Replace OCV.**

OK

3	**Check voltage between terminals OCV+ and OCV– of ECM connector (See page DI–129, step 3).**

NG → **Check and replace ECM (See page IN–31).**

OK

4	**Check for open and short in harness and connector between OCV and ECM (See page IN–31).**

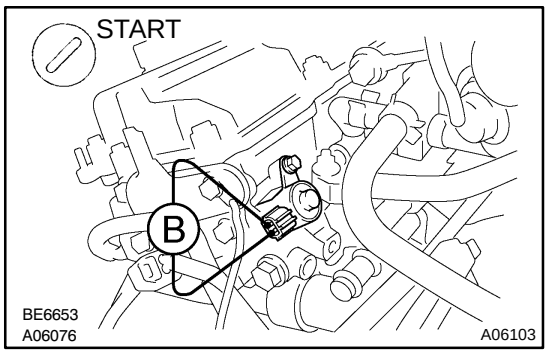
NG → **Repair or replace.**

OK

Check for intermittent problems (See page DI–3).

OBD II scan tool (excluding LEXUS hand–held tester):

1	**Check operation of OCV.**



PREPARATION:

(a) Start the engine and warmed it up.

(b) Disconnect the OCV connector.

(c) Apply battery positive voltage to terminals of the OCV.

CHECK:

Check the engine speed.

OK:

Rough idle or engine stalled

NG → **Replace OCV.**

OK

2	**Check voltage between terminals OCV+ and OCV– of ECM connector (See page DI–129, step 3).**

NG → **Check and replace ECM (See page IN–31).**

OK

3	**Check for open and short in harness and connector between OCV and ECM (See page IN–31).**

NG → **Repair or replace.**

OK

Check for intermittent problems (See page DI–3).

DI6IJ–02

DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch goes on when the shift lever is in the N or P shift position. When it goes on, terminal NSW of the ECM is grounded to the body ground via the starter relay, thus the terminal NSW voltage becomes 0V. When the shift lever is in the D, 2, L or R position, the park/neutral position switch goes off, so the voltage of ECM. Terminal NSW becomes battery voltage and the voltage of the ECM internal power source. If the shift lever is moved from the N position to the D position, this signal is used for air–fuel ratio correction and for idle speed control (estimated control), etc.

DTC No.	DTC Detecting Condition	Trouble Area
P1780	2 or more switches are ON simultaneously for N, 2, L and R positions (2 trip detection logic)	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM
	When driving under conditions (a) and (b) for 30 sec. or more the park/neutral position switch is ON (N position): (2 trip detection logic) (a) Vehicle speed: 40 km/h (25 mph) or more (b) Engine speed: 1,500 – 4,000 rpm	

HINT:
After confirming DTC P1780, use the LEXUS hand–held tester to confirm the PNP switch signal from the CURRENT DATA.

WIRING DIAGRAM

Refer to DTC P1780 on page DI–203.

INSPECTION PROCEDURE

Refer to DTC P1780 on page DI–203.
HINT:
Read freeze frame data using LEXUS hand–held tester or OBD II scan tool, as freeze frame data records the engine conditions when the 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.

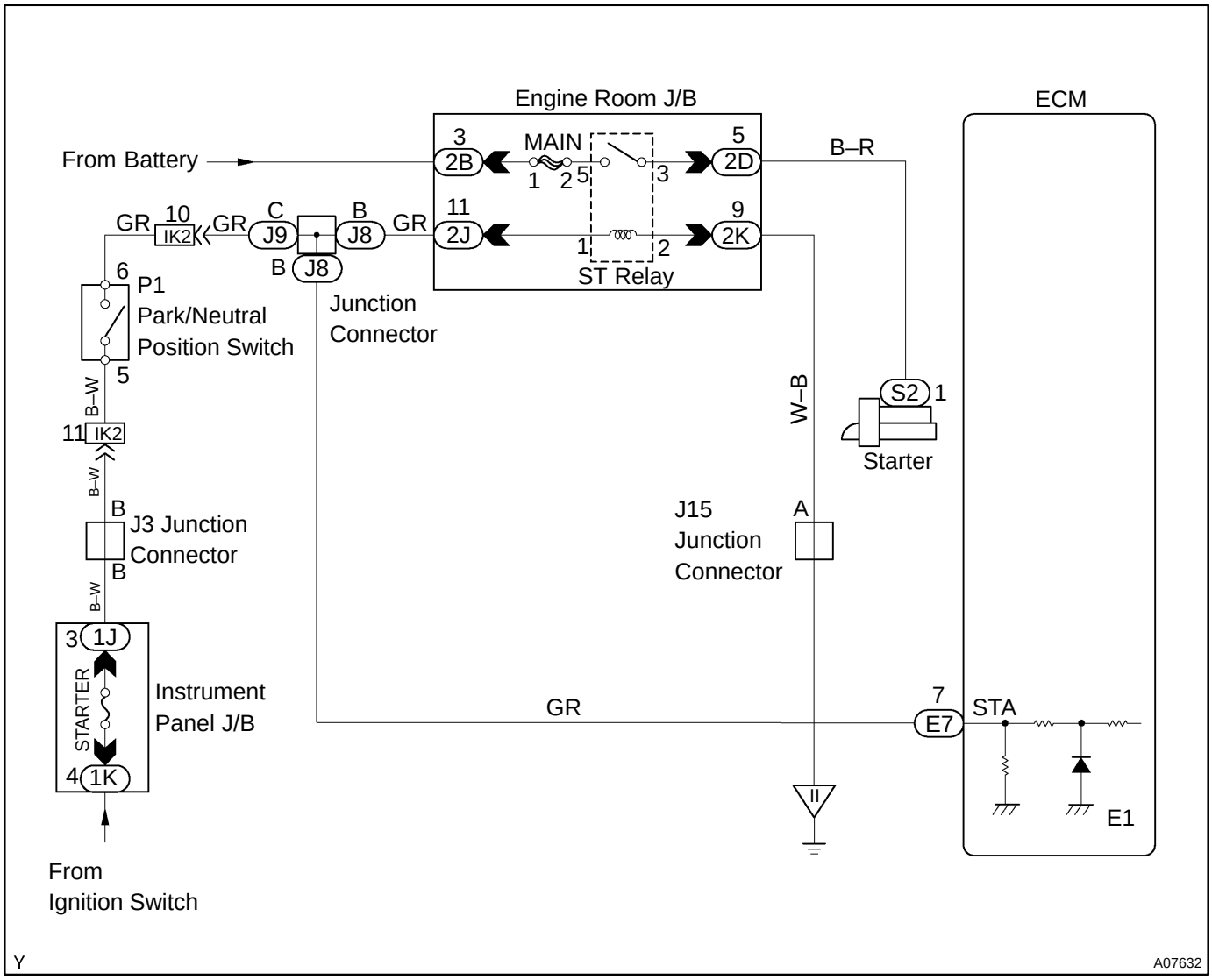
DI0A7–09

Starter Signal Circuit

CIRCUIT DESCRIPTION

When the engine is cranked, the intake air flow is slow, so fuel vaporization is poor. A rich mixture is therefore necessary in order to achieve good startability. While the engine is being cranked, the battery positive voltage is applied to terminal STA of the ECM. The starter signal is mainly used to increase the fuel injection volume for the starting injection control and after–start injection control.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

This diagnostic chart is based on the premise that the engine is cranked normally. If the engine is not cranked, proceed to the problem symptoms table in page DI–22.

LEXUS hand–held tester:

1	**Connect LEXUS hand–held tester, and check STA signal.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

CHECK:

Read the STA signal on the LEXUS hand–held tester while the starter operates.

OK:

Ignition Switch Position	ON	START
STA Signal	OFF	ON

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–22).**

NG

2	**Check for open in harness and connector between ECM and starter relay (See page IN–31).**

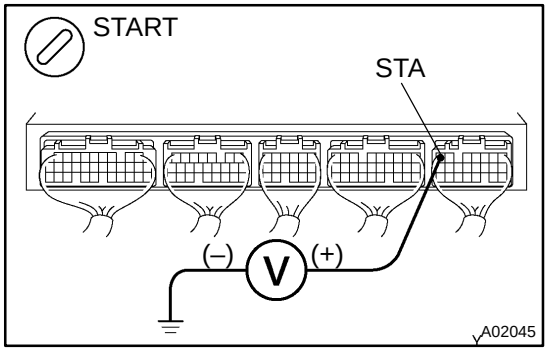
NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding LEXUS hand–held tester):

1	**Check voltage between terminal STA of ECM connector and body ground.**



PREPARATION:

Remove the glove compartment (See page SF–80).

CHECK:

Measure the voltage between terminal STA of the ECM connector and the body ground during the engine cranking.

OK:

Voltage: 6 V or more

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–22).**

NG

2	Check for open in harness and connector between ECM and starter relay (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ECM (See page IN–31).

DI1BV–04

ECM Power Source Circuit

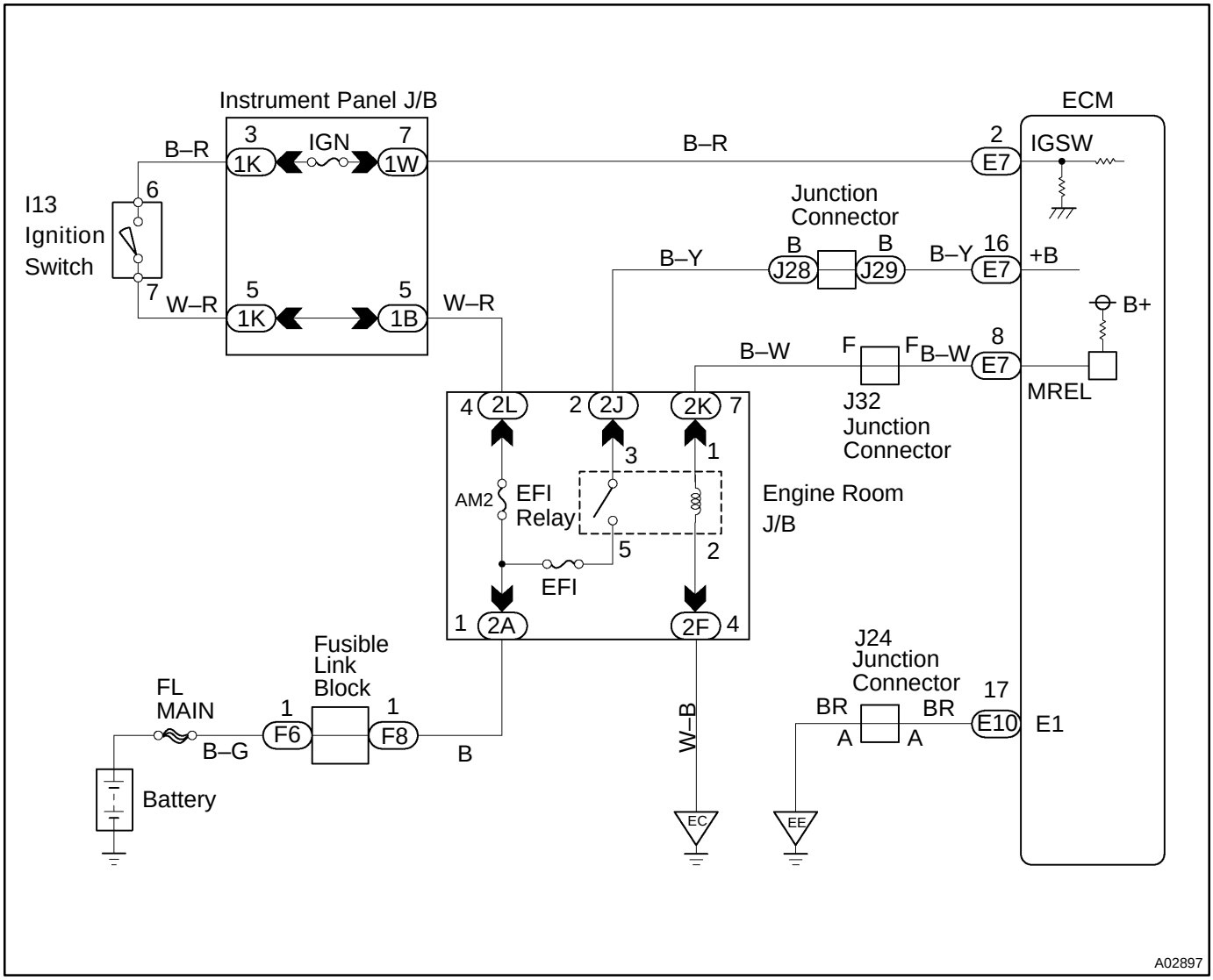
CIRCUIT DESCRIPTION

When the ignition switch is turned ON, battery positive voltage is applied to terminal IGSW of the ECM and the EFI main relay (Marking: EFI) control circuit in the ECM sends a signal to terminal MREL of the ECM the switching on the EFI main relay.

This signal causes current to flow to the coil, closing the contacts of the EFI main relay and supplying power to terminal +B of the ECM.

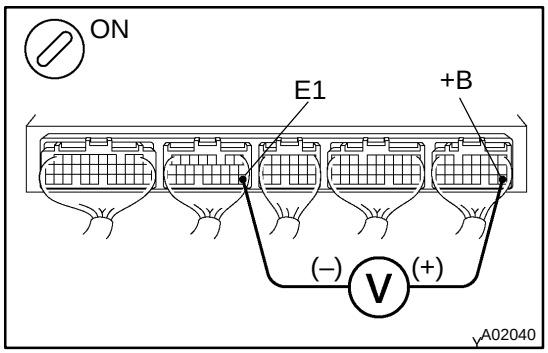
If the ignition switch is turned off, the ECM continues to switch on the EFI main relay for a maximum of 2 seconds for the initial setting of the IAC valve.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and E1 of ECM connectors.**



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals +B and E1 of the ECM connectors.

OK:

Voltage: 9 – 14 V

OK	**Proceed to next circuit inspection shown in problem symptoms table (See page DI–22).**

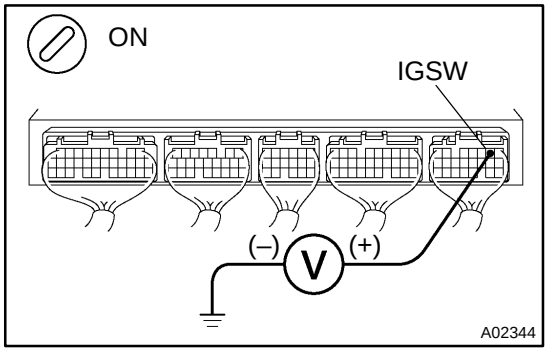
NG

2	**Check for open in harness and connector between terminal E1 of ECM and body ground (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

3	**Check voltage between terminal IGSW of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal IGSW of the ECM connector and the body ground.

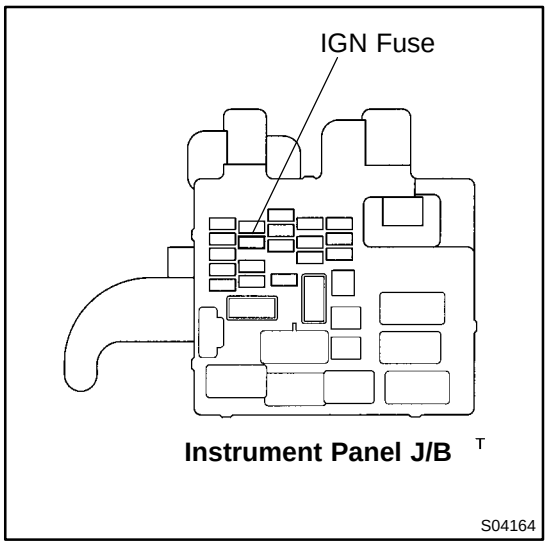
OK:

Voltage: 9 – 14 V

OK	**Go to step 6.**

NG

4	Check IGN fuse.



PREPARATION:
Remove the IGN fuse from the instrument panel J/B.
CHECK:
Check the continuity of the IGN fuse.
OK:
Continuity

NG → **Check for short in all the harness and components connected to IGN fuse.**

OK

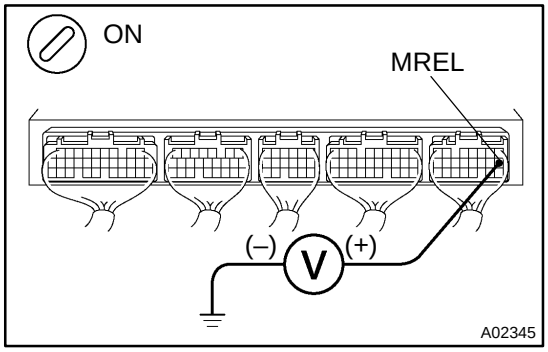
5	Check ignition switch (See page BE–21).

NG → **Replace ignition switch.**

OK

Check and repair harness and connector between battery and ignition switch, and ignition switch and ECM.

6	Check voltage between terminal MREL of ECM connector and body ground.



PREPARATION:
(a) Remove the glove compartment (See page SF–79).
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal MREL of the ECM connector and the body ground.
OK:
Voltage: 9 – 14 V

NG → **Check and replace ECM (See page IN–31).**

OK

7	Check EFI fuse (See page DI–139, step 2).

NG → Check for short in all the harness and components connected to EFI fuse.

OK

8	Check EFI main relay (Marking: EFI) (See page SF–58).

NG → Replace EFI main relay.

OK

9	Check for open and short in harness and connector between terminal MREL of ECM and body ground (See page IN–31).

NG → Repair or replace harness or connector.

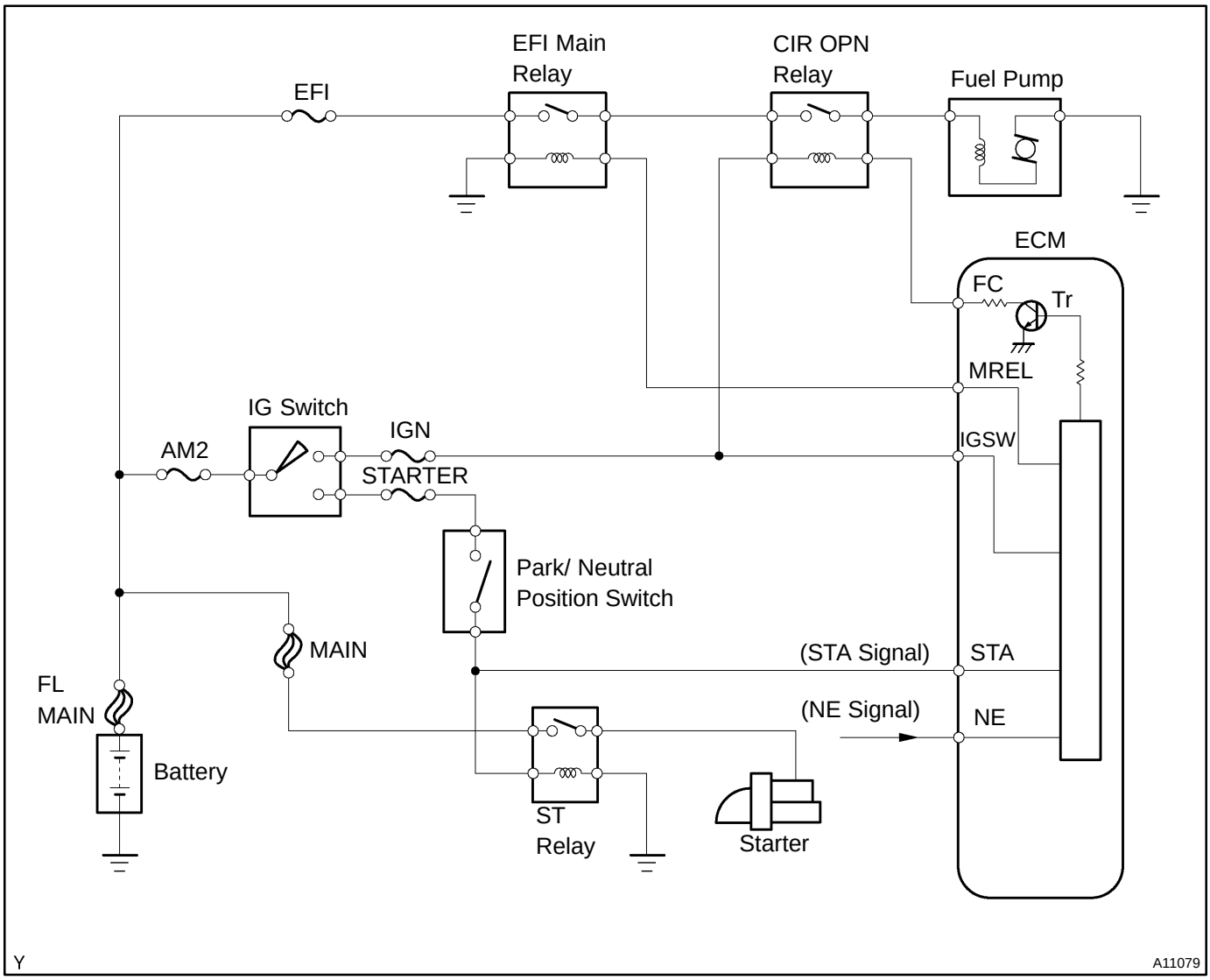
OK

Check and repair harness or connector between EFI fuse and battery.

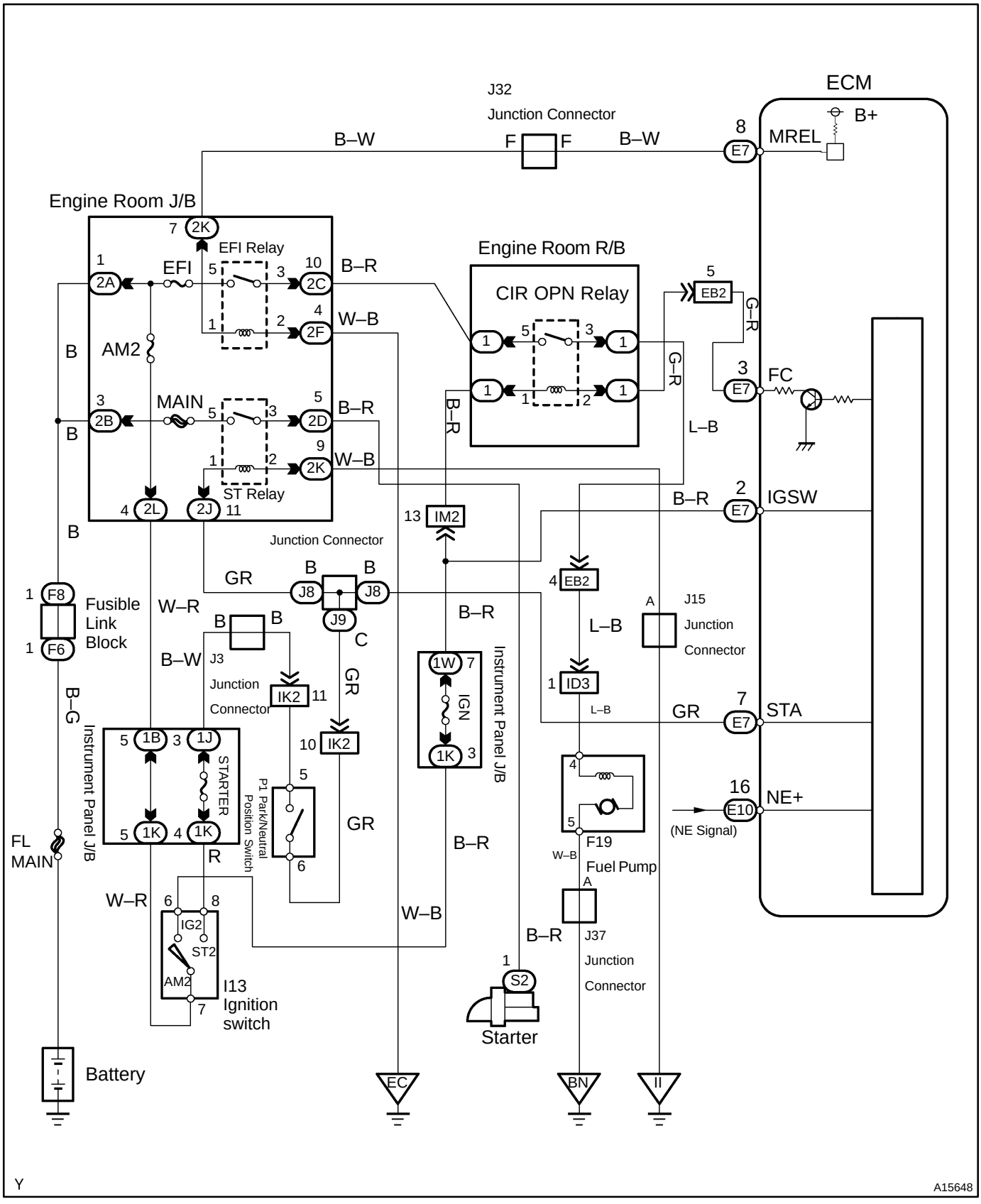
Fuel Pump Control Circuit

CIRCUIT DESCRIPTION

In the diagram below, when the engine is cranked, current flows from terminal ST of the ignition switch to the starter relay coil and also current flows to terminal STA of ECM (STA signal).
When the STA signal and NE signal are input to the ECM, Tr 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 Tr ON (circuit opening relay ON) and the fuel pump also keeps operating.

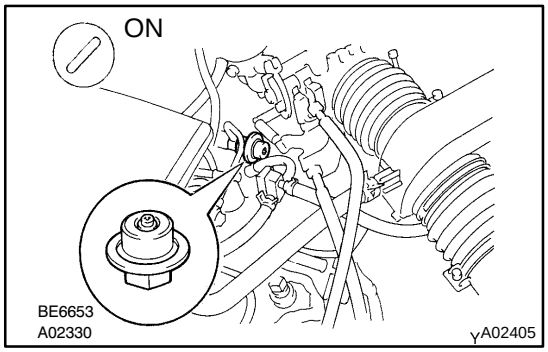


WIRING DIAGRAM



INSPECTION PROCEDURE
LEXUS hand–held tester:

1	**Connect LEXUS hand–held tester, and check operation of fuel pump.**



PREPARATION:1

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.
(c) Use the ACTIVE TEST mode to operate the fuel pump.

CHECK:

Check that the pulsation damper screw rises up when the fuel pump is operated by the LEXUS hand–held tester.

OK:

The pulsation damper screw rises up.

OK	**Check for starter signal circuit (See page DI–145).**

NG

2	**Check for ECM power source circuit (See page DI–148).**

NG	**Repair or replace.**

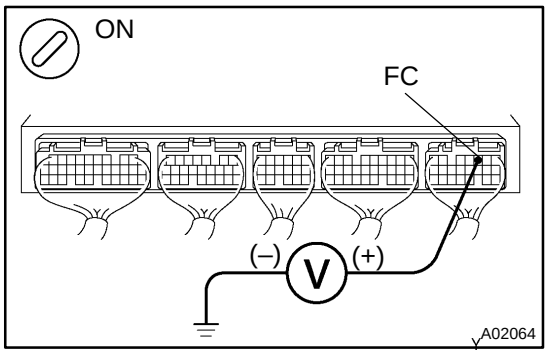
OK

3	**Check circuit opening relay (Marking: CIR OPN) (See page SF–60).**

NG	**Replace circuit opening relay.**

OK

4	**Check voltage between terminal FC of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–80).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal FC of the ECM connector and the body ground.

OK:

Voltage: 9 – 14 V

OK	**Go to step 5.**

NG

Check for open in harness and connector between EFI main relay and circuit opening relay (Marking: CIR OPN), and circuit opening relay and ECM.

5	**Check fuel pump (See page SF–6).**

NG	**Repair or replace fuel pump.**

OK

6	**Check for open in harness and connector between circuit opening relay (Marking: CIR OPN) and fuel pump, and fuel pump and body ground (See page IN–31).**

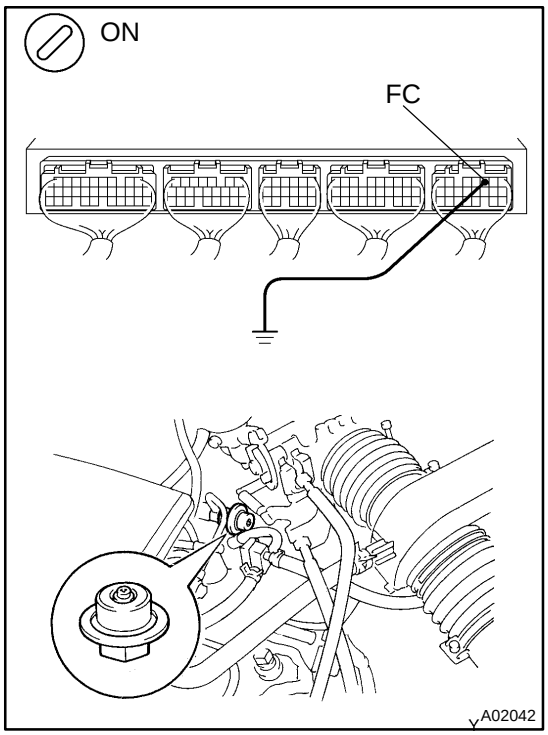
NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

OBD II scan tool (excluding LEXUS hand–held tester):

1	**Check operation of fuel pump.**



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

(a) Connect terminal FC of the ECM connector the body ground.

(b) Check that the pulsation damper screw rises up when connecting between terminal FC of the ECM connector and the body ground.

OK:

The pulsation damper screw rises up.

OK	**Check for starter signal circuit (See page DI–145).**

NG

2	**Check for ECM power source circuit (See page DI–148).**

NG	**Repair or replace.**

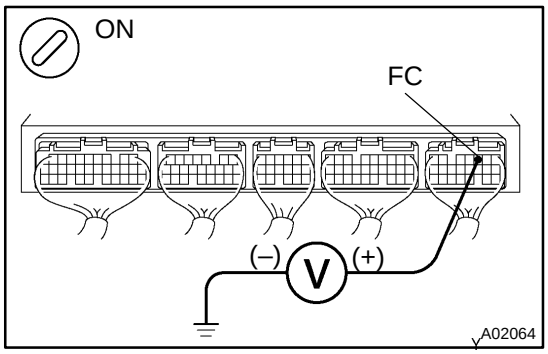
OK

3	**Check circuit opening relay (Marking: CIR OPN) (See page SF–60).**

NG	**Replace circuit opening relay.**

OK

4	**Check voltage between terminal FC of ECM connector and body ground.**



PREPARATION:

(a) Remove the glove compartment (See page SF–80).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal FC of the ECM connector and the body ground.

OK:

Voltage: 9 – 14 V

OK	**Go to step 5.**

NG

Check for open in harness and connector between EFI main relay and circuit opening relay (Marking: CIR OPN), and circuit opening relay and ECM.

5	**Check fuel pump (See page SF–6).**

NG	**Repair or replace fuel pump.**

OK

6	**Check for open in harness and connector between circuit opening relay (Marking: CIR OPN) and fuel pump, and fuel pump and body ground (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

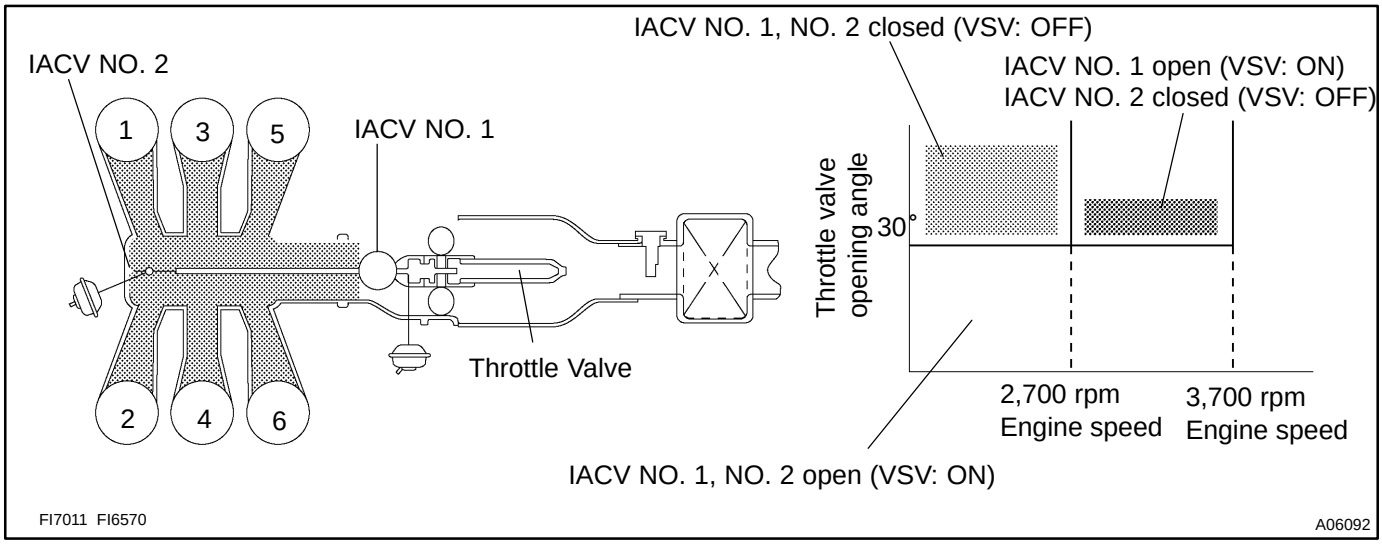
Check and replace ECM (See page IN–31).

DI0AA–05

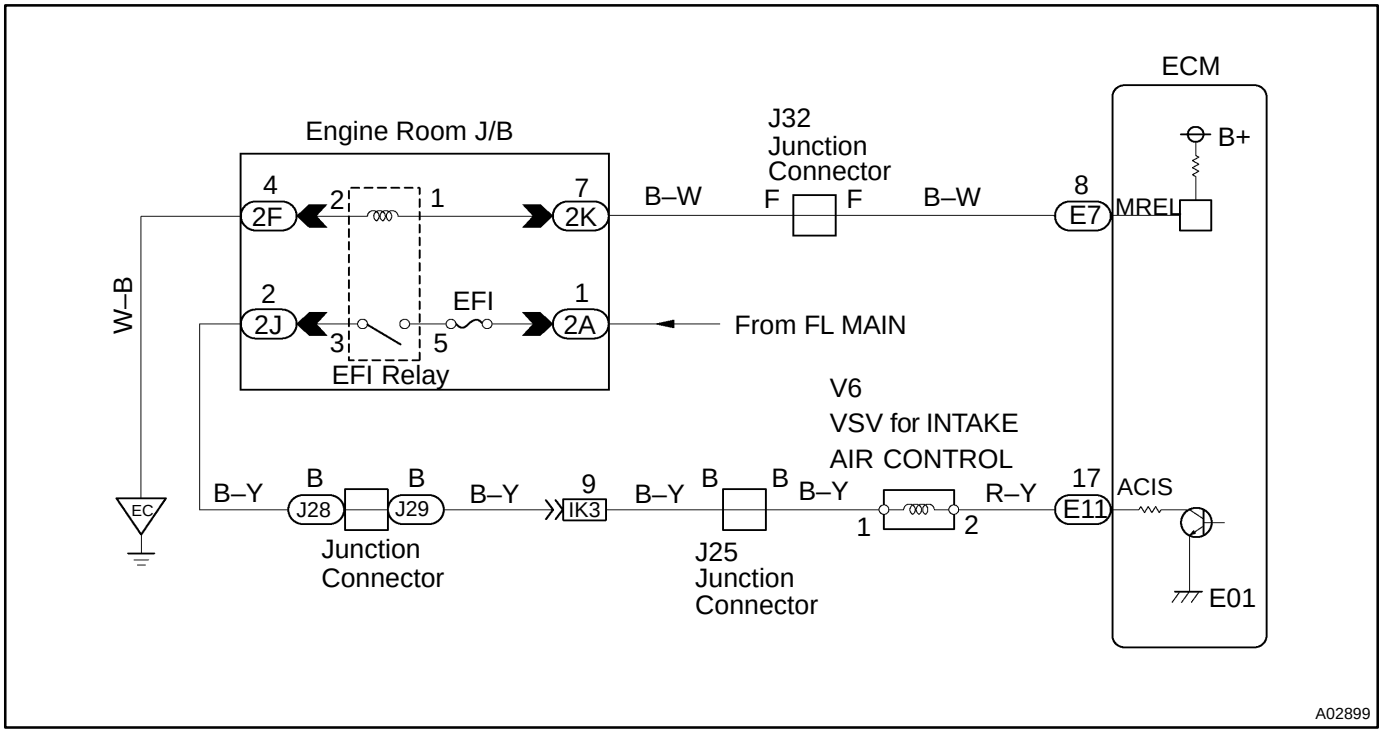
IACV Control Circuit

CIRCUIT DESCRIPTION

This circuit opens and closes the IACV (Intake Air Control Valve) in response to the engine load in order to increase the intake efficiency (ACIS: Acoustic Control Induction System).
When the engine speed is 3,700 rpm or less and the throttle valve opening angle is 30° or more, the ECM turns the two VSV ON or OFF and operate the IACV.

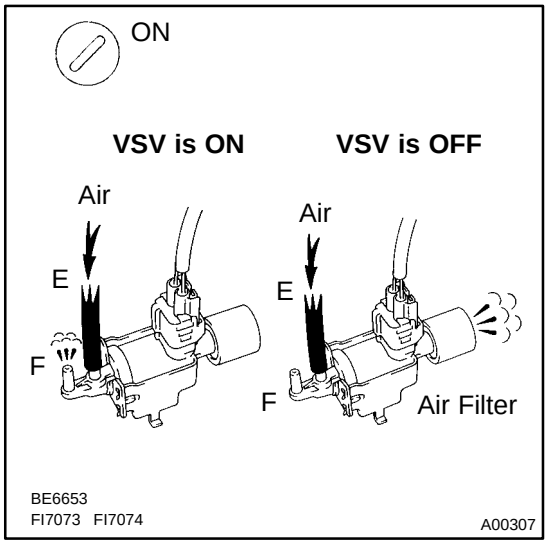


WIRING DIAGRAM



INSPECTION PROCEDURE
LEXUS hand–held tester:

1	**Connect LEXUS hand–held tester and check operation of VSV for ACIS.**



PREPARATION:

(a) Remove the fuse cover on the instrument panel.
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON and LEXUS hand–held tester main switch ON.
(d) Select the INTAKE CTRL VSV from the ACTIVE TEST menu on the LEXUS hand–held tester.

CHECK:

Check the operation of the VSV when the VSV is operated by the LEXUS hand–held tester.

OK:

VSV is ON:
Air from port E flows out through port F.
VSV is OFF:
Air from port E flows out through the air filter.

OK	**Check vacuum tank (See page SF–44).**

NG

2	**Check VSV for ACIS (See page SF–65).**

NG	**Replace VSV for ACIS.**

OK

3	**Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

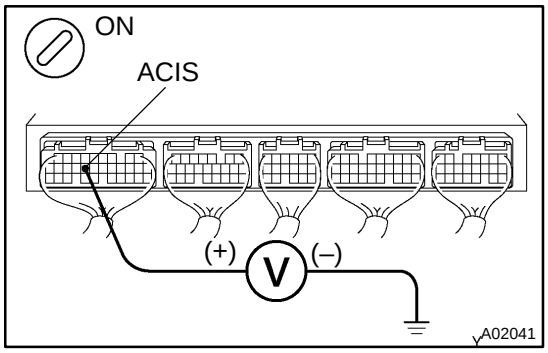
OBD II scan tool (excluding LEXUS hand–held tester):

1	Check VSV for ACIS (See page SF–65).

NG → Replace VSV for ACIS.

OK

2	Check voltage between terminal ACIS of ECM connector and body ground.



PREPARATION:

(a) Remove the glove compartment (See page SF–79).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal ACIS of the ECM connector and the body ground.

OK:

Voltage: 9 – 14 V

NG → Check for open and short in harness and connector between EFI main relay (Marking: EFI) and ECM (See page IN–31).

OK

3	Check vacuum tank (See page SF–56).

NG → Repair or replace.

OK

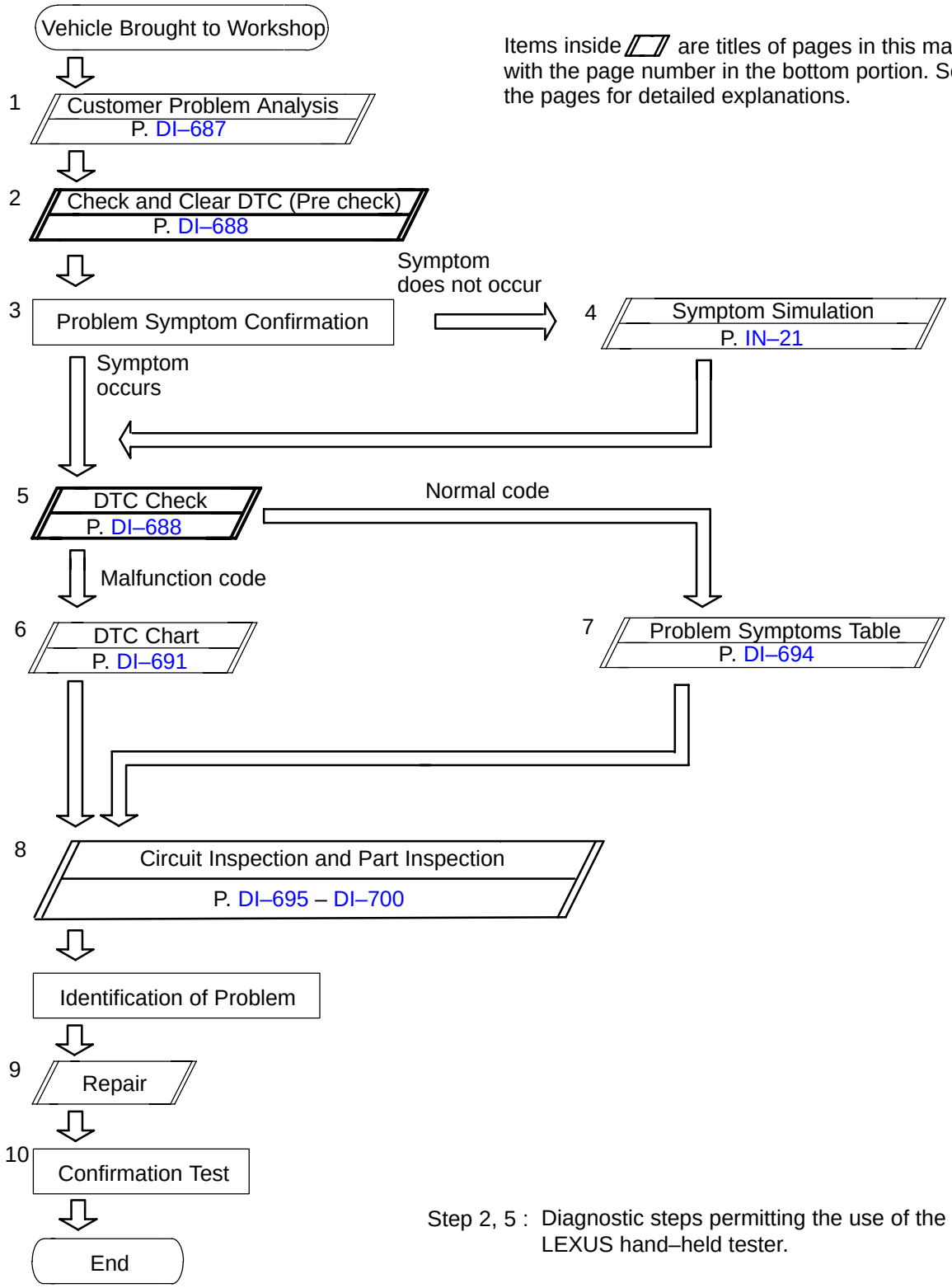
Check and replace ECM (See page IN–31).

ENGINE IMMOBILISER SYSTEM

DI1AJ–28

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting 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 LEXUS hand–held tester.

DI1AK–08

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBLISER Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

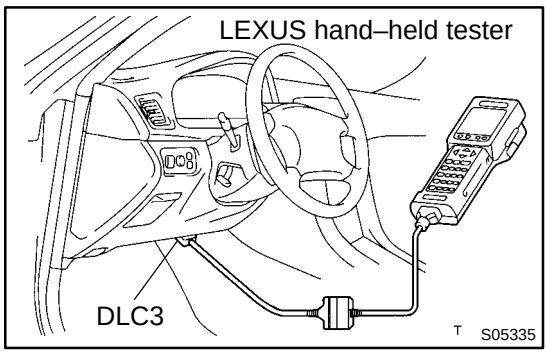
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

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)

DI1AL–12



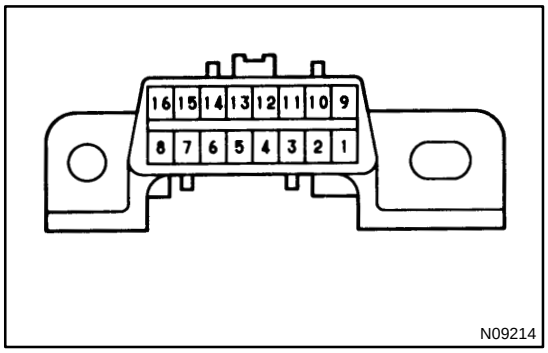
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read form DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light on but DTC inspection is performed.

Therefore when there seems to be a trouble on immobiliser, use LEXUS 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 OBD ll scan tool or LEXUS hand–held tester to 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 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 LEXUS hand–held tester).

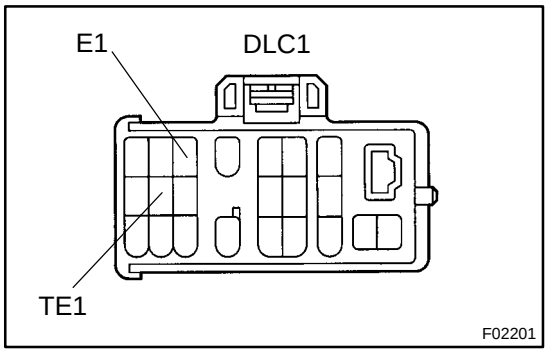
(1) Prepare the OBD ll scan tool (complying with SAEJ 1978) or LEXUS hand–held tester.

(2) Connect the OBD ll scan tool or LEXUS hand–held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn the OBD ll scan tool or LEXUS hand–held tester switch ON.

(4) Use the OBD ll scan tool or LEXUS hand–held tester to check the DTCs and freeze frame data; note them down. (For operating instructions, see the OBD ll scan tool's instruction book.)

(5) See page DI–691 to confirm the details of the DTCs.



(b) Check the DTC (Using diagnosis check wire).

(1) Turn ignition switch ON.

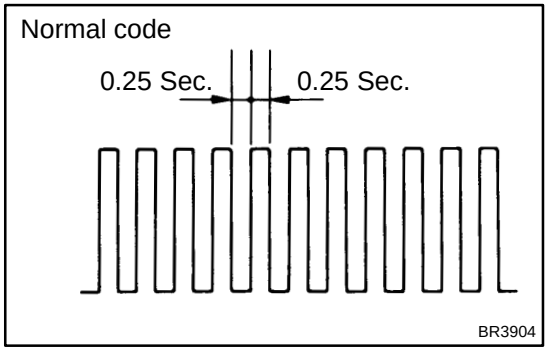
(2) Using SST, connect between terminals 8 (TE1) and 3 (E1) of DLC 1.

SST 09843–18040

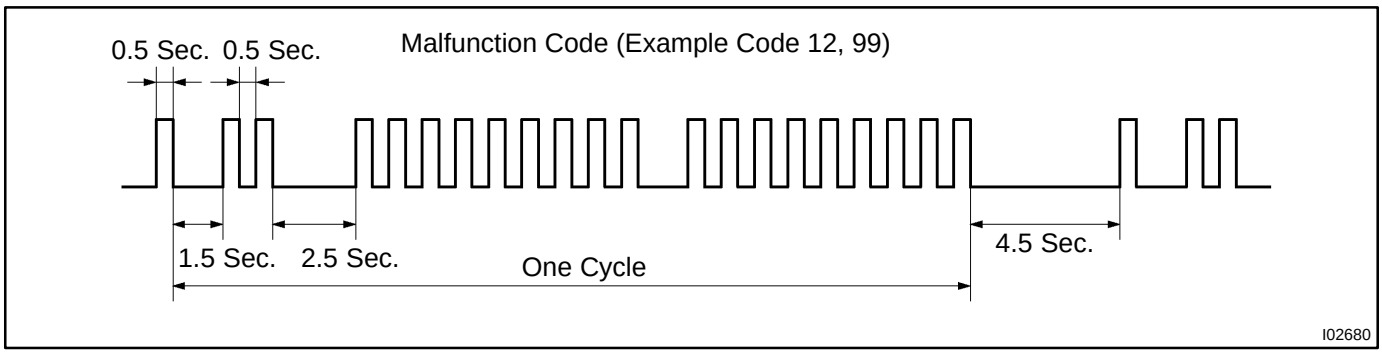
(3) Read the diagnostic trouble code from malfunction indicator lamp.

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 illustration.



(4) When DTC ”99” is output, there is a trouble of immobiliser. Start troubleshooting referring to PROBLEM SYMPTOM TABLE.

(5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) 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 actions will erase the DTCs and freeze frame data.

(1) Operating the OBD ll scam tool (complying with SAEJ1978) or LEXUS hand–held tester to erase the codes. (See the OBD ll scan tool’s instruction book for operating instructions.)

(2) Disconnecting the battery terminals or EFI fuse.

DI1AM–12

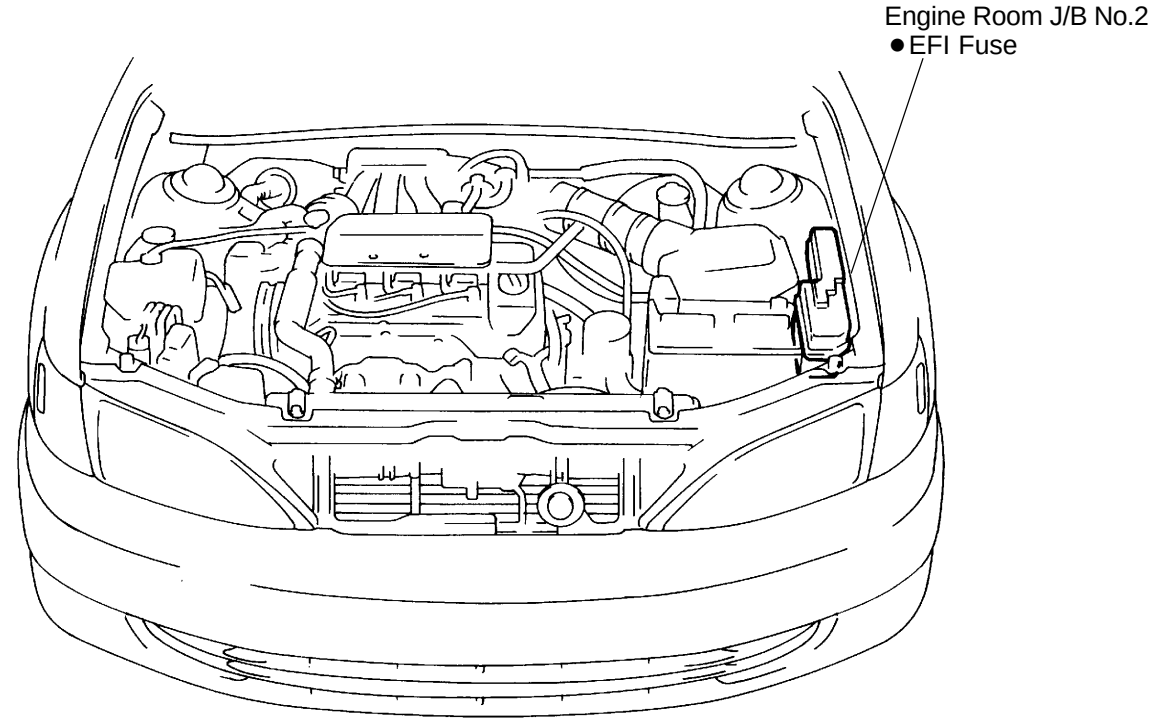
DIAGNOSTIC TROUBLE CODE CHART

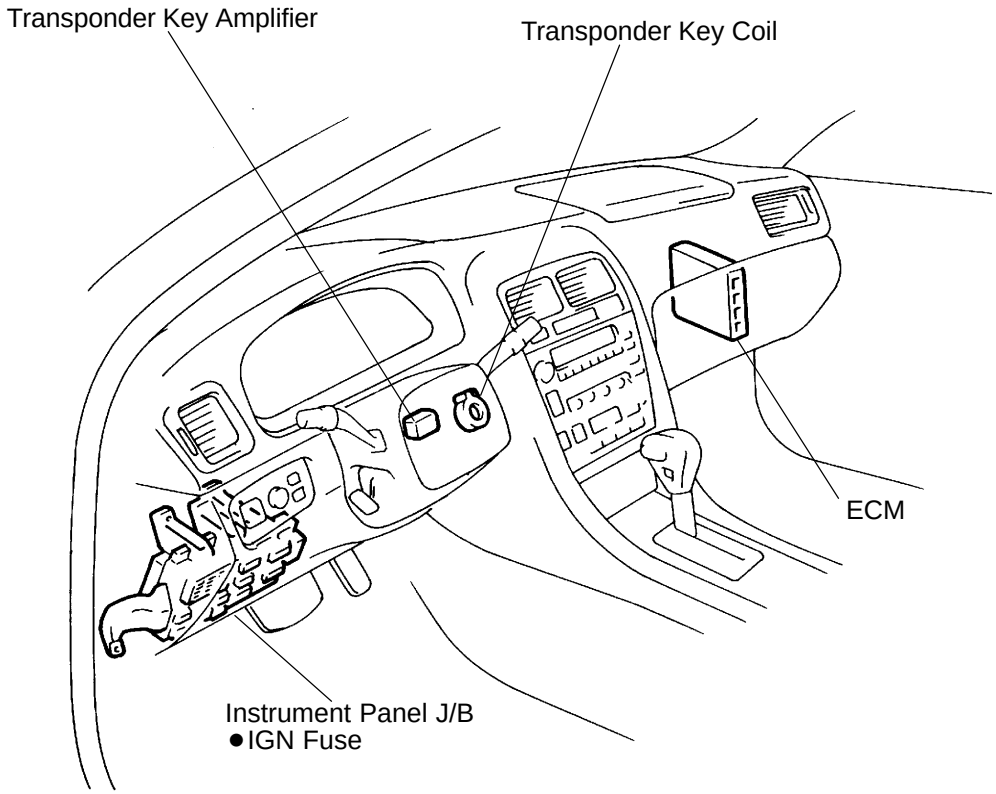
DTC No. (See page)	Detection Item	Trouble Area
B2795 (DI–695)	Unmatched key code	●Key ●Unregistered key inserted before
B2796 (DI–696)	No communication in immobiliser system	●Key ●Transponder key coil ●Amplifier ●Wirehaness ●ECM
B2797 (DI–698)	Communication malfunction No.1	●Communication contests ●Unregistered key inserted before
B2798 (DI–700)	Communication malfunction No.2	●Key ●Transponeder key coil ●Amplifier ●Wirehaness ●ECM

HINT:
To reduce the unnecessary exchange of ECM, check that a trouble occurs with the original ECM at the time of exchanging ECM and the trouble will disappear with a new ECM.

DI1AN–05

PARTS LOCATION

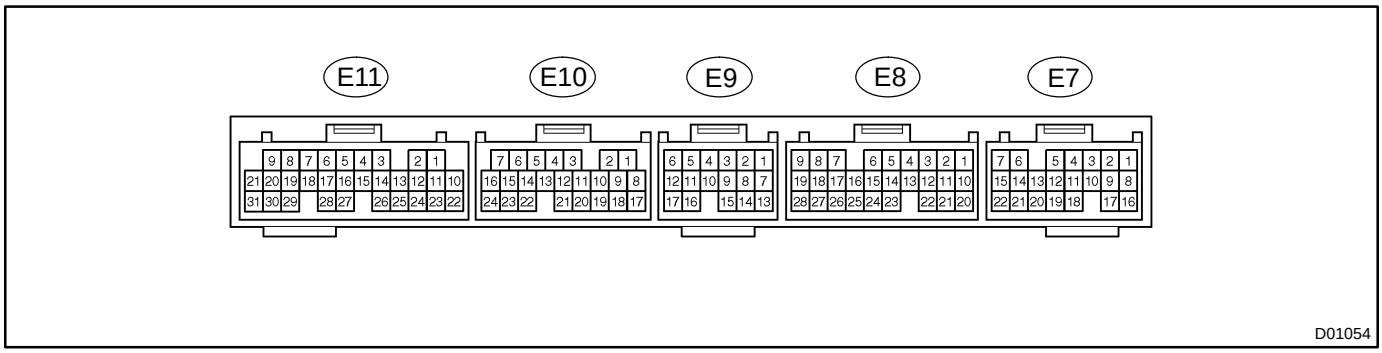




I02683

DI1AO–05

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CODE – E1 (E8 – 28 ↔ E10–17)	G–W ↔ BR	Ignition Switch ON	10 – 14
TXCT – E1 (E8 – 18 ↔ E10–17)	L–Y ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E8 – 19 ↔ E10–17)	R–L ↔ BR	Ignition Switch ON	10 – 14

DI1AP–10

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. ECM	IN–31
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. ECM	*1 IN–31 BE–231 IN–31
Security indicator is always ON.	1. Security indicator 2. Wire harness 3. ECM	*2 IN–31 IN–31
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2. Tranxponder key coil 3. Amplifier 4. ECM	IN–31 BE–231 IN–31
Security indicator is OFF (When DTC of immobiliser is output)	1. Wire harness 2. Tranxponder key coil 3. Amplifier 4. ECM	IN–31 BE–231 IN–31
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Wire harness 2. ECM	IN–31 IN–31
Security indicator is abnormal blinking.	1. Wire harness 2. ECM	IN–31 IN–31

*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 codes.

*2 : Finish the automatic registration mode because the mode might still remain.

DI1AS–11

CIRCUIT INSPECTION

DTC	B2795/99	Unmatched Key Code

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key that a customer keeps to check that B2795 is output.
When a key that outputs B2795 is found, register this key. when B2795 is not output, there is a possibility that the unregistered key has been inserted before. (ECM is normal.)
Inquire a customer the condition of using the system to find the cause of the trouble.
(Example: Another key has been inserted, etc..)

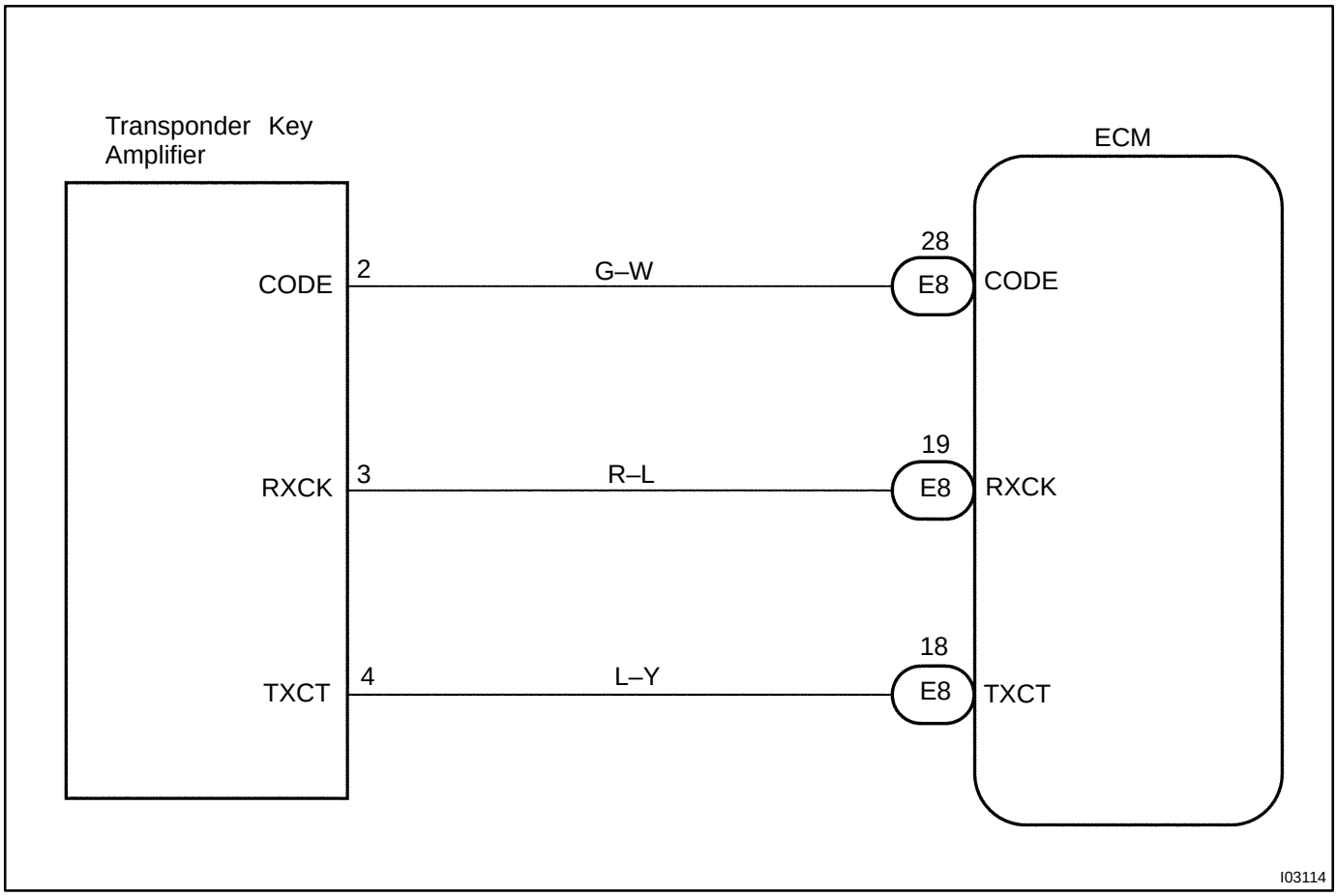
DI1AT–14

DTC	B2796/99	No Communication in Immobiliser system

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2796/99	No communication	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wire harness ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–231).

NG → Replace transponder key coil.

OK

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector.

OK

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No

Replace ECM.

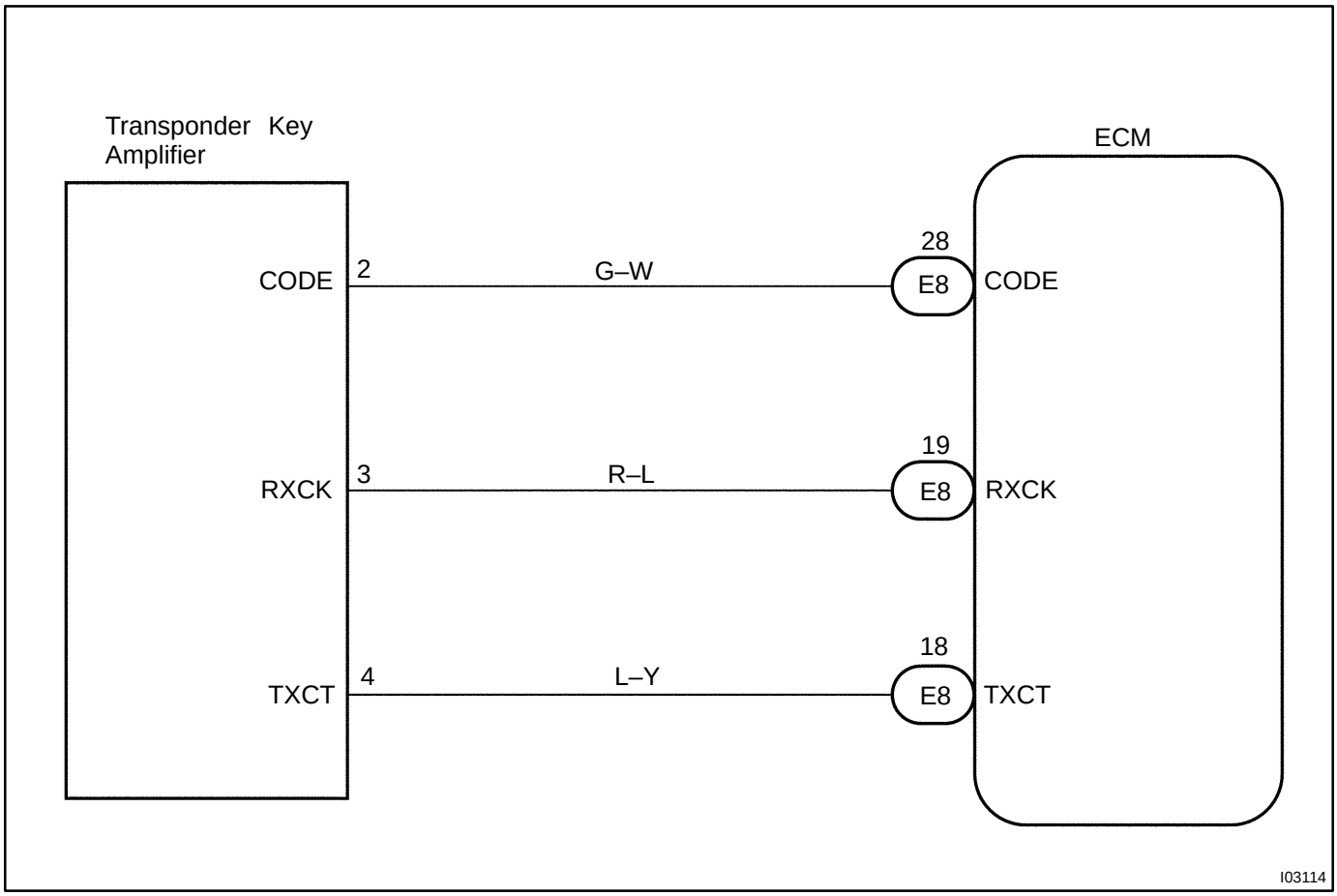
DTC	B2797/99	Communication Malfunction No.1

CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is in cluded in communication line.)

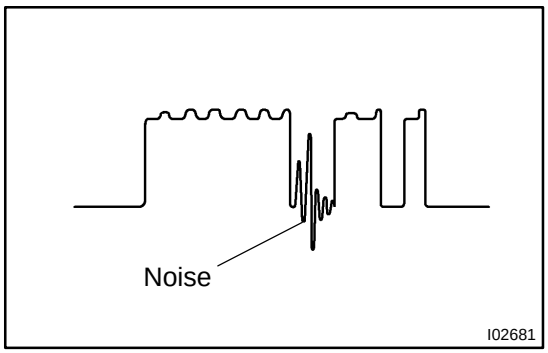
DTC No.	DTC Detecting Condition	Trouble Area
B2797/99	Communication error	●Wire Harness ●Transponder Key Amplifier ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Noise check



PREPARATION:
Insert already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or LEXUS hand–held tester, check that noise is included in the CODE terminal of EMC.
OK:
No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK

2	Does it operate normally after replacement of transponder key amplifier?

Yes → **Replace transponder key amplifier.**

No

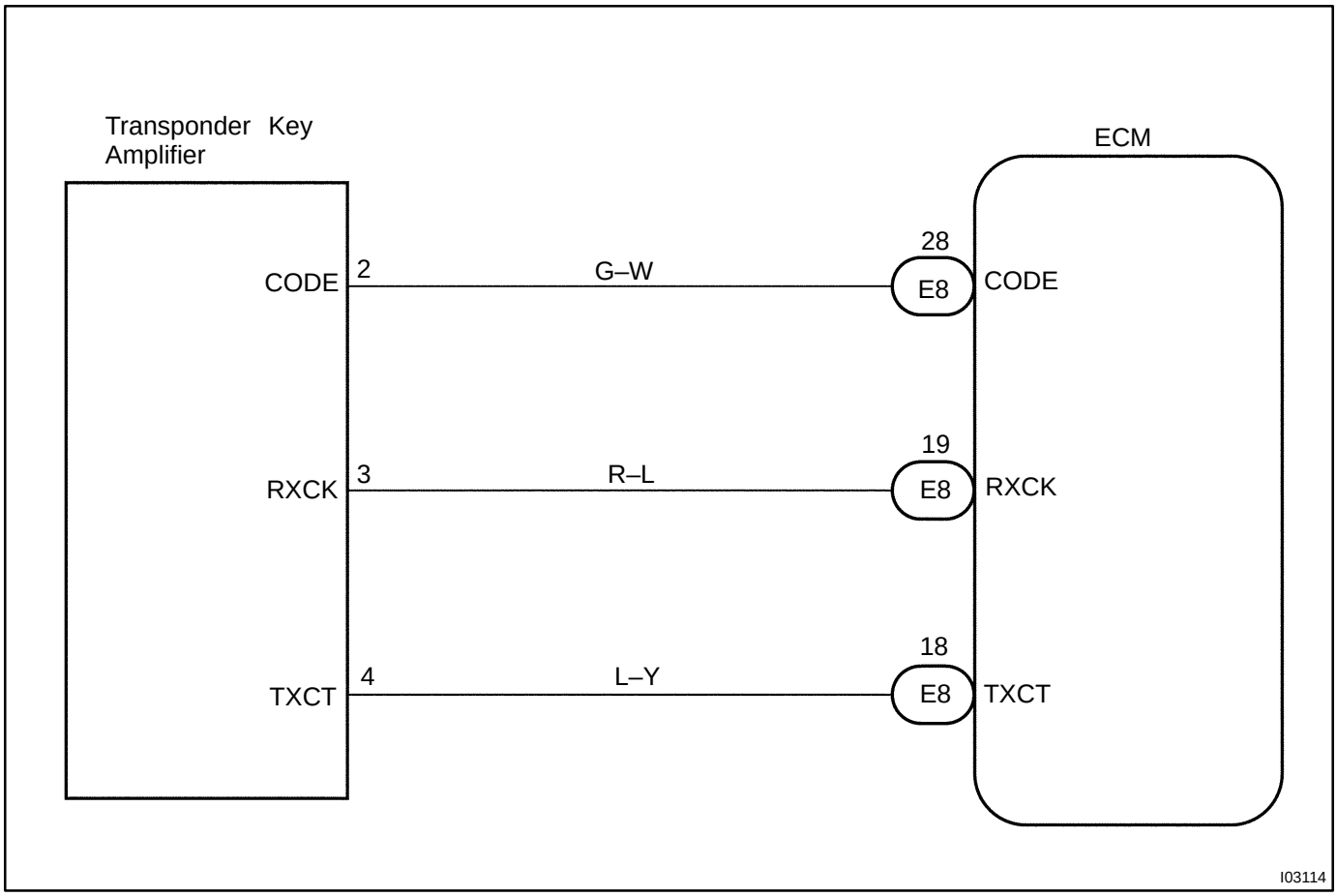
Replace ECM.

DTC	B2798/99	Communication malfunction No.2

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2798/99	Communication error	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wire harness ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–231).

NG → Replace transponder key coil.

OK

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector.

OK

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No

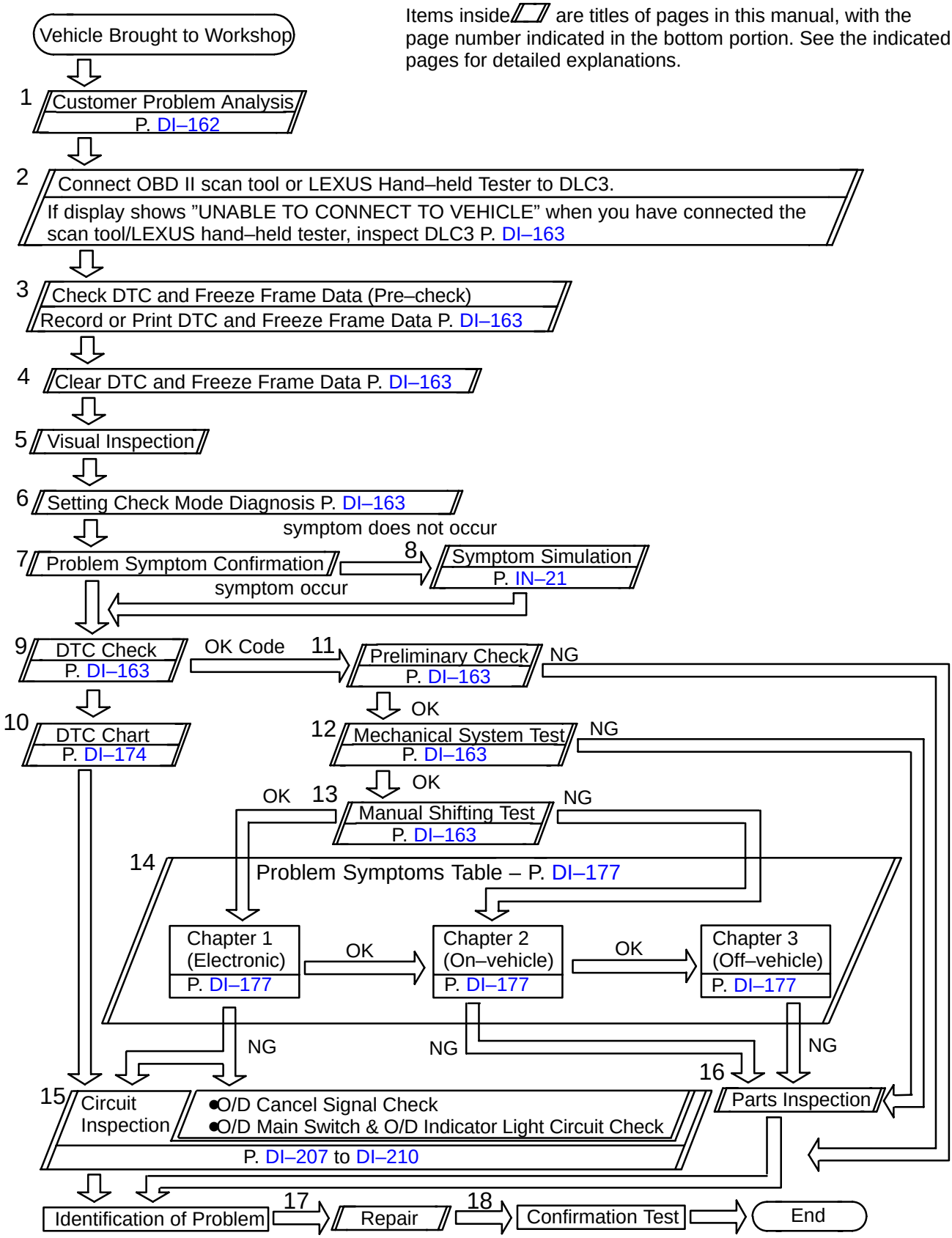
Replace ECM.

AUTOMATIC TRANSAXLE (U140E)

HOW TO PROCEED WITH TROUBLESHOOTING

DI4YY–04

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.



DI4YZ–02

CUSTOMER PROBLEM ANALYSIS CHECK

Automatic Transaxle 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 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 → O/D)
	☐ No down–shift (☐ O/D → 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)

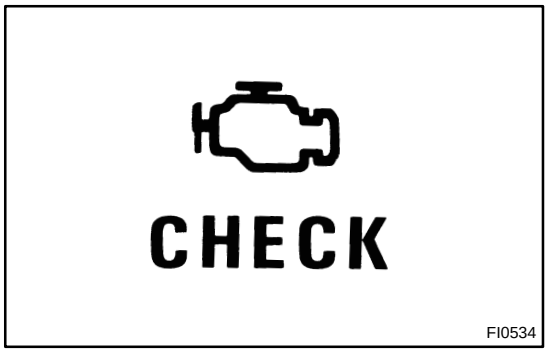
DI502–04

PRE–CHECK

1. DIAGNOSIS SYSTEM

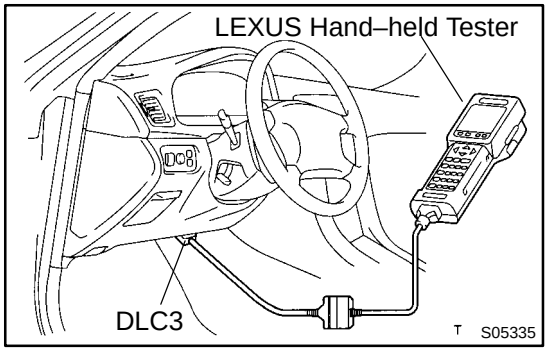
(a) Description

- When troubleshooting OBD II vehicles, the only difference from the usual troubleshooting procedure is that you need to connect to the vehicle an OBD II scan tool complying with SAE J1987 or LEXUS hand–held tester, and read off various data output from the vehicle's ECM.



- OBD II regulations require that the vehicle's on–board computer lights up 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 lighting up when a malfunction is detected, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory (See page DI–14).

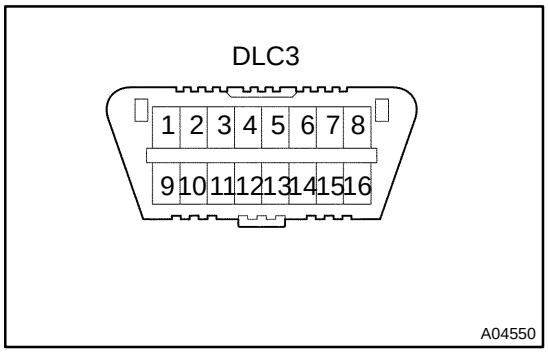
If the malfunction only occurs in 3 consecutive trips, the MIL goes off but the DTCs remain in the ECM memory.



- To check the DTCs, connect the OBD II scan tool or the LEXUS hand–held tester to DLC3 of the vehicle. The OBD II scan tool or LEXUS hand–held tester also enables you to erase the DTCs and check freeze frame data and various forms of engine data (For instruction book).
- The DTCs include SAE controlled codes and Manufacturer controlled codes. SAE controlled codes must be set as the codes 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–174).

- 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 (LEXUS hand–held tester) (See page DI–163).
- *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 light up .

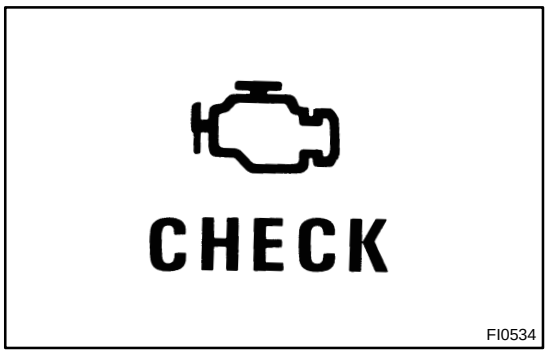


(b) Inspect the DLC3.
The vehicle's ECM uses ISO 9141–2 for communication. The terminal arrangement of DLC3 complies with SAE J1962 and matches the ISO 9141–2 format.

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 – 14 V

HINT:
If your display shows UNABLE TO CONNECT TO VEHICLE when you have connected the cable of OBD II scan tool or LEXUS hand–held tester to 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 DLC3 on the original vehicle.
- If the communication is still impossible when the tool is connected 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. Normal Mode:
INSPECT DIAGNOSIS

(a) Check the MIL.

(1) The MIL comes on when the ignition switch is turned ON and the engine is not running.

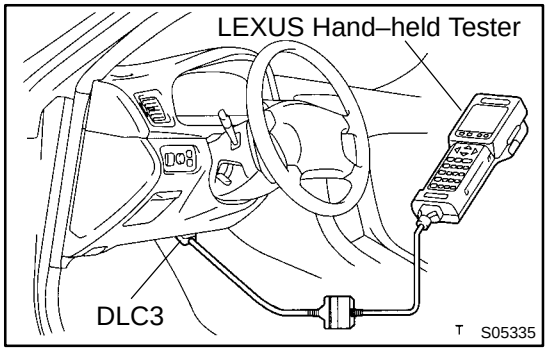
HINT:
If the MIL does not light up, troubleshoot the combination meter (See page BE–94).

(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.

(b) Check the DTC.

NOTICE:
LEXUS hand–held tester only:
When the diagnostic system is switched from normal mode to 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.

(1) Prepare an OBD II scan tool (complying with SAE J1978) or LEXUS hand–held tester.



(2) Connect the OBD II scan tool or LEXUS hand–held tester to the DLC3 at the lower of the instrument panel.

(3) Turn the ignition switch ON and push the OBD II scan tool or LEXUS hand–held tester switch ON.

(4) Use the OBD II scan tool or LEXUS 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).

(5) See page DI–174 to confirm the details of the DTCs.

NOTICE:
When simulating symptoms with an OBD II scan tool (excluding LEXUS 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 symptoms is simulated once. Then repeat the simulation process again. When the program has been simulated twice, the MIL is indicated on the instrument panel and the DTCs are recorded in the ECM.

3. Check Mode:
INSPECT DIAGNOSIS

HINT:

LEXUS hand–held tester only:

Compared to the normal mode, the check mode has more sensitive ability to detect malfunctions. Furthermore, the same diagnostic items which are detected in the normal mode can also be detected in the check mode.

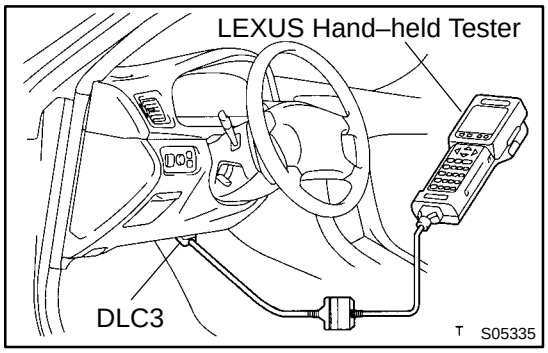
(a) Check the DTC.

(1) Check the initial conditions.

- Battery positive voltage 11 V or more.
- Throttle valve fully closed.
- Transaxle in P position.
- Air conditioning switched OFF.

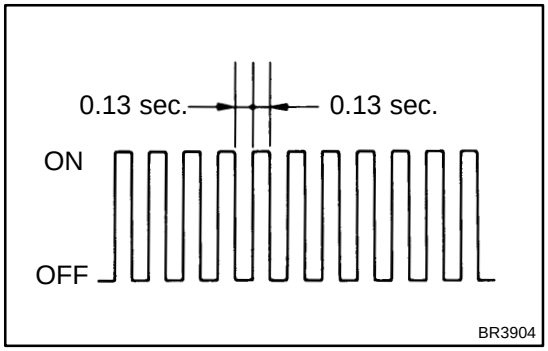
(2) Turn the ignition switch OFF.

(3) Prepare a LEXUS hand–held tester.



(4) Connect the LEXUS hand–held tester to the DLC3 at the lower of the instrument panel.

(5) Turn the ignition switch ON and push the LEXUS hand–held tester switch ON.



(6) Switch the LEXUS hand–held tester from the normal mode to the check mode (Check that the MIL flashes).

(7) Start the engine (MIL goes off after the engine starts).

(8) Simulate the conditions of the malfunction described by the customer.

NOTICE:

Leave the ignition switch ON until you have checked the DTCs, etc.

(9) After simulating the malfunction conditions, use the LEXUS hand–held tester diagnosis selector to check the DTCs and freeze frame data, etc.

HINT:

Take care not to turn the ignition switch OFF, as turning it OFF the diagnosis system from the check mode to the normal mode, which erases all the DTCs, etc.

(10) After checking the DTC, inspect the applicable circuit.

(b) Clear the DTC.
When operating an OBD II scan tool (complying with SAE J1978) or TOYOTA hand–held tester to erase the codes, the DTCs and freeze frame date will be erased (See the OBD II scan tool's instruction book for operating instructions.).

NOTICE:
If the LEXUS hand–held tester switches the ECM from the normal mode to the check mode or vice–versa, of if the ignition switch is turned from ON to ACC or OFF during chick mode, the DTCs and freeze frame data will be erased.

4. PROBLEM SYMPTOM CONFIRMATION

Taking into consideration the results of the customer problem analysis, try to reproduce the symptoms of the trouble. If the problem is that the transaxle does not up–shift, down–shift, or the shift point is too high or too low, conduct the following road test to confirm the automatic shift schedule and simulate the problem symptoms.

5. ROAD TEST

NOTICE:

Perform the test at the ATF temperature of 50 – 80 ˚C (122 – 176 ˚F) in the normal operating.

(a) D position test
Shift into the D position, depress the accelerator pedal fully and then check the following points.
(1) Check the up–shift operation.
Check to see that 1 → 2, 2 → 3 and 3 → O/D, up–shift takes place and that the shift points conform to the automatic shift schedule (See page SS–23).

HINT:

- O/D Gear Up–shift Prohibition Control (1. Coolant temp. is 60 ˚C (140 ˚F) or less. 2. If there is a difference of 10 km/h (6 mph) between the set cruise control speed and vehicle speed.)
- O/D Gear Lock–up Prohibition Control (1. Brake pedal is depressed. 2. Coolant temp. is 60 ˚C (140 ˚F) or less.)

(2) Check for shift shock and slip.
Check for shock and slip at the up–shift operation of 1 → 2, 2 → 3 and 3 → O/D.
(3) Check for abnormal noise and vibration.
Drive in the D position lock–up or O/D gear and check for abnormal noise and vibration.

HINT:

The check of the cause of abnormal noise and vibration must be made very thoroughly, as it could be due to the loss of balance in the differential torque converter clutch, etc.

(4) Check the kick–down operation.
While running in the D position, 2nd, 3rd and O/D gears, check that the possible kick–down vehicle speed limits of 2 → 1, 3 → 2 and O/D → 3 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 the D position, O/D gear, at steady speed (lock–up ON) of about 60 km/h (37 mph).
- Depress the accelerator pedal lightly and check that the engine speed does not change abruptly.

If there is a big jump in the engine speed, there is no lock–up.

(b) 2 position test

Shift into the 2 position, depress the accelerator pedal fully and check the following points.

(1) Check up–shift operation.

Check that the up–shift operation of 1 → 2 is taken place and that the shift point conforms to the automatic shift schedule (See page SS–23).

HINT:

There is no O/D up–shift and lock–up in the 2 position.

(2) Check the 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 noise during acceleration and deceleration, and for shock at up–shift and down–shift.

(c) L position test

Shift into the L position, depress the accelerator pedal fully 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 the engine braking.

While running in the L position, release the accelerator pedal and check the engine braking effect.

(3) Check for abnormal noise during acceleration and deceleration.

(d) R position test

Shift into the R position, depress the accelerator pedal fully and check for slipping.

CAUTION:

Before conducting this test ensure that the test area is free from people and obstruction.

(e) P position test

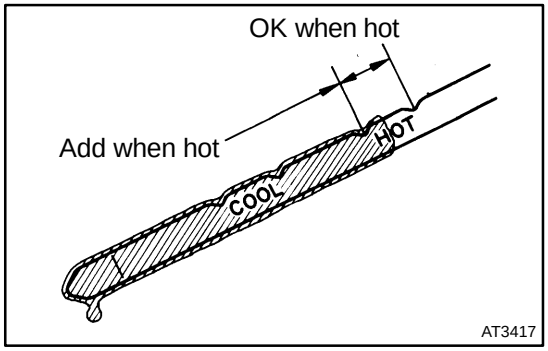
Stop the vehicle on a grade (more than 5˚) and after shifting into the P position, release the parking brake. Then, check that the parking lock pawl holds the vehicle in place.

6. BASIC INSPECTION

(a) Check the fluid level.

HINT:

- Drive the vehicle so that the engine and transaxle are at normal operating temperature.
  Fluid temp.: 70 – 80 ˚C (158 – 176 ˚F)
- Use the COOL range on the dipstick as a rough reference when the fluid is replaced or the engine does not run.



(1) Park the vehicle on a level surface and set the parking brake.

(2) With the engine idling and the brake pedal depressed, shift the shift lever into all positions from P to L position and return it to the P position.

(3) Pull out the dipstick and wipe it out.

(4) Push the dipstick back fully into the pipe.

(5) Pull the dipstick out and check that the fluid level is in the HOT range.

If the level is at the low side, add new fluid.

Fluid type: ATF Type T–IV

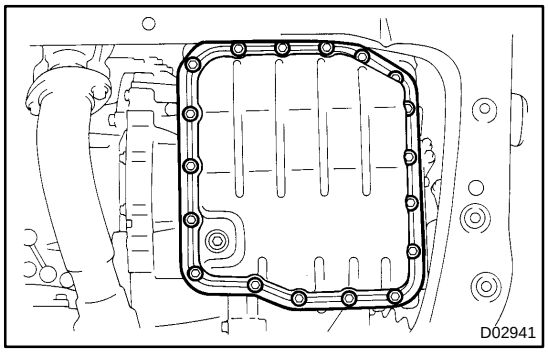
Capacity: 3.5 liters (3.7 US qts, 3.1 lmp. qts)

NOTICE:

Do not overfill.

(b) Check the fluid condition.

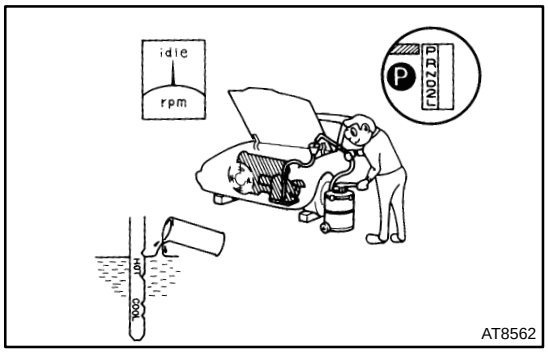
If condition of the fluid has deteriorated replace the fluid.



(c) Replace the ATF.

(1) Remove the drain plug and drain the fluid.

(2) Reinstall the drain plug securely.

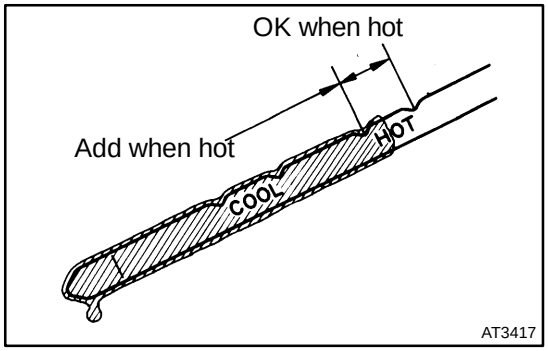


(3) With the engine OFF, add new fluid through the oil filler pipe.

Fluid type: ATF Type T–IV

Capacity: 3.5 liters (3.7 US qts, 3.1 lmp. qts)

(4) Start the engine and shift the shift lever into all positions from P to L and then shift into the P position.



(5) With the engine idling, check the fluid level. Add fluid to the COOL level on the dipstick.

(6) Check the fluid level at the normal operating temperature of 70 – 80 °C (158 – 176 °F), and add if necessary.

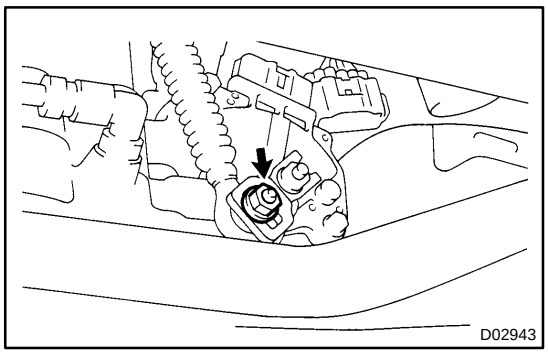
NOTICE:

Do not overfill.

(d) Check the fluid leak.

Check for leak in the transaxle.

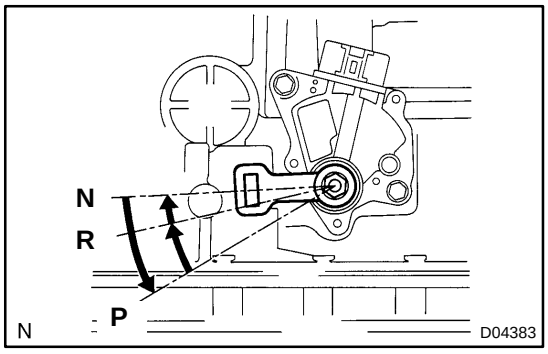
If there are leaks, it is necessary to repair or replace O–rings, gaskets, oil seals, plugs or other parts.



(e) Inspect and adjust the shift lever position.
When shifting the shift lever from the N position to the other positions, check that the lever can be shifted smoothly and accurately into 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.

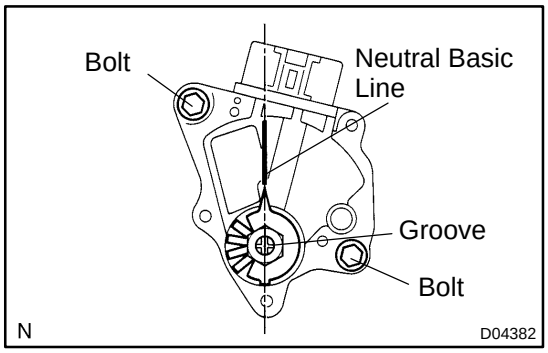
(1) Loosen the nut on the shift lever.
(2) Push the control shaft fully downward.



(3) Return the control shaft lever by 2 notches to the N position.
(4) Set the shift lever into the N position.
(5) 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)

(6) Start the engine and make sure that the vehicle moves forward when shifting the lever from N to D and reverses when shifting it to the R position.



(f) Inspect and adjust the park/neutral position.
Check that the engine can be started with the shift lever only in the N or P position, but never in the other positions.

If it is not as stated above, carry out the following adjustment procedures.

(1) Loosen the park/neutral position switch bolt and set the shift lever into the N position.
(2) Align the groove with the neutral basic line.
(3) Hold in position and tighten the bolt.

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

For further inspection of the park/neutral position switch, see page DI–203.

(g) Check the idle speed.
Idle speed: 700 ± 50 rpm
(In N position and air conditioner OFF)

7. MECHANICAL SYSTEM TESTS

(a) Measure the stall speed.
The object of this test is to check the overall performance of the transaxle and engine by measuring the stall speeds in the D and R positions.

NOTICE:

- **Do the test at the normal operating fluid temperature of 50 – 80 °C (122 – 176 °F).**
- **Do not continuously run this test longer than 10 seconds.**
- **To ensure safety, conduct this test in a wide, clear and level area which provide 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) Check the 4 wheels.
(2) Connect an OBD II scan tool or LEXUS hand–held tester to the DLC3.
(3) Fully apply the parking brake.
(4) Keep your left foot pressed 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: 2,350 – 2,800 rpm

Evaluation:

Problem	Possible cause
(a) Stall speed low in D and R positions	●Engine output may be insufficient ●Stator one–way clutch is operating properly HINT: If more than 600 rpm below the specified value, the torque converter clutch could be faulty.
(b) Stall speed high in D position	●Line pressure too low ●Forward clutch slipping ●No. 2 one–way clutch not operating properly ●O/D clutch slipping
(c) Stall speed high in R position	●Line pressure too low ●Direct clutch slipping ●1st and reverse brake slipping ●O/D clutch slipping
(d) Stall speed high in D and R positions	●Line pressure too low ●Improper fluid level ●O/D one–way clutch not operating properly

(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 conditions of the O/D direct clutch, forward clutch, and 1st & reverse brake.

NOTICE:

- **Do the test at the normal operating fluid temperature of 50 – 80 ˚C (122 – 176 ˚F).**
- **Be sure to allow 1 minute interval between the tests.**
- **Take 3 measurements and take the average value.**

(1) Connect an OBD II scan tool or LEXUS hand–held tester to the DLC3.

(2) Fully apply the parking brake.

(3) Start the engine and check idle speed.

Idle speed: 700 ± 50 rpm (In N position and air conditioner OFF)

(4) Shift the shift lever from the N to D position. Using a stop watch, measure the time from when the lever is shifted until the shock is felt.

(5) Measure the time lag for N → R in the same way.

Time lag:

N → D Less than 1.2 seconds

N → R Less than 1.5 seconds

Evaluation (If N → D time or N → R time lag is longer than specified):

Problem	Possible cause
N → D time lag is longer	●Line pressure too low ●Forward clutch worn ●O/D one–way clutch not operating
N → R time lag is longer	●Line pressure too low ●Direct clutch worn ●1st and reverse brake worn ●O/D one–way clutch not operating properly

8. HYDRAULIC TEST

Measure the line pressure.

NOTICE:

- **Do the test at the normal operation fluid temperature of 50 – 80 ˚C (122 – 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.**

(1) Warm up the ATF.

(2) Remove the test plug on the transaxle case front left side and connect SST (See page AX–14 for the location to connect SST).

SST 09992–00095 (09992–00231, 09992–00271)

(3) Fully apply the parking brake and check the 4 wheels.

(4) Connect an OBD II scan tool or LEXUS hand–held tester to the DLC3.

(5) Start the engine and check the idling speed.

(6) Keep your left foot pressed firmly on the brake pedal and shift into the D position.

(7) Measure the line pressure when the engine is idling.

(8) Depress the accelerator pedal all the way down. Quickly read the highest line pressure when the engine speed reaches the stall speed.

(9) Do the test in the R position in the same way.

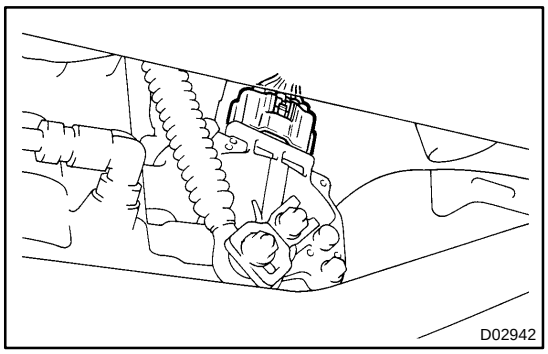
Specified line pressure:

Condition	D position kPa (kgf/cm^2, psi)	R position kPa (kgf/cm^2, psi)
Idling	372 – 412 (3.8 – 4.2, 54 – 59)	672 – 742 (6.9 – 7.6, 97 – 107)
Stall	931 – 1,031 (9.5 – 10.5, 134 – 149)	1,768 – 1,968 (18.0 – 20.1, 255 – 284)

If the measured pressure does not reach specified value, recheck the throttle cable adjustment and then retest.

Evaluation

Problem	Possible cause
If the measured values at all position are higher	●Throttle valve defective ●Regulator valve defective
If the measured values at all position are lower	●Throttle valve defective ●Regulator valve defective ●Oil pump defective ●O/D direct clutch defective
If pressure is low in the D position only	●D position circuit fluid leak ●Forward clutch defective
If pressure is low in the R position only	●R position circuit fluid leak ●Direct clutch defective ●1st and reverse brake defective



9. MANUAL SHIFTING TEST

HINT:

With this test, it can be determined whether the trouble occurs in the electrical circuit or is a mechanical problem in the transaxle.

(a) Disconnect the solenoid 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 and D positions. Check that the gear change corresponds to the shift position.

Shift Position	Gear Position
P	Pawl Lock
R	Reverse
D	O/D
2	O/D
L	1st

HINT:

If the L, 2 and D position gear positions are difficult to positions are difficult to distinguish, do the following read test.

If any abnormalities are found in the above test, the problem is in the transaxle itself.

(c) Connect the solenoid wire.

(d) Clear the DTC (See page DI–163).

DI4Z0–06

DIAGNOSTIC TROUBLE CODE CHART

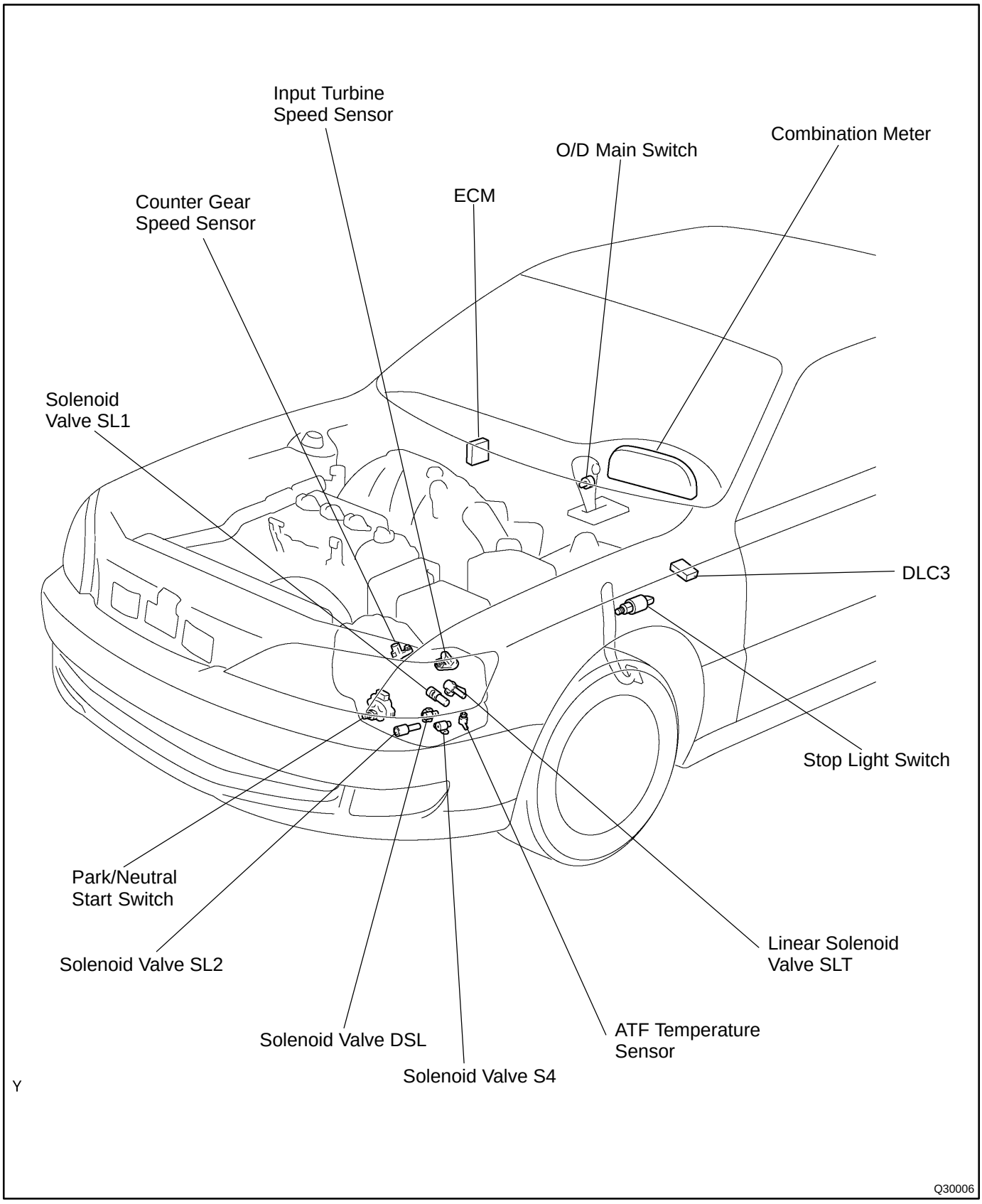
If a DTC is displayed during the DTC check, check the circuit listed in the table below and proceed to the page given.

* : –...MIL does not light /● ...MIL light up

DTC No. (See Page)	Detection Item	Trouble Area	MIL *	Memory
P0710 (DI–180)	Transmission Fluid Temperature Sensor Malfunction	Open or short in ATF temperature sensor circuit ATF temperature sensor ECM	●	○
P0750 (DI–182)	Shift Solenoid A Malfunction (Shift Solenoid Valve SL1)	Shift solenoid valve SL1 is stuck open or closed Valve body is blocked or stuck	●	○
P0753 (DI–184)	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve SL1)	Open or short in shift solenoid valve SL1 circuit Shift solenoid valve SL1 ECM	●	○
P0755 (DI–182)	Shift Solenoid B Malfunction (Shift Solenoid Valve SL2)	Shift solenoid valve SL2 is stuck open or closed Valve body is blocked up or stuck	●	○
P0758 (DI–184)	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve SL2)	Open or short in shift solenoid valve SL2 circuit Shift solenoid valve SL2 ECM	●	○
P0765 (DI–182)	Shift Solenoid D Malfunction (Shift Solenoid Valve S4)	Shift solenoid valve S4 is stuck open or closed Valve body is blocked up or stuck	●	○
P0768 (DI–184)	Shift Solenoid D Electrical Malfunction (Shift Solenoid Valve S4)	Open or short in shift solenoid valve S4 circuit Shift solenoid valve S4 ECM	●	○
P0770 (DI–190)	Shift Solenoid E Malfunction (Shift Solenoid Valve DSL)	Shift solenoid valve DSL is stuck open or closed Valve body is blocked up or stuck Lock–up clutch	●	○
P0773 (DI–192)	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve DSL)	Open or short in shift solenoid valve DSL circuit Shift solenoid valve DSL ECM	●	○
P1520 (DI–195)	Stop Light Switch Circuit	Open or short in stop light switch circuit Stop light switch ECM	●	○
P1725 (DI–196)	NT Revolution Sensor Circuit Malfunction (Input Turbine Speed Sensor)	Open or short in input turbine speed sensor circuit Input turbine speed sensor ECM	●	○
P1730 (DI–198)	NC Revolution Sensor Circuit Malfunction (Counter Gear Speed Sensor)	Open or short in counter gear speed sensor circuit Counter gear speed sensor ECM	●	○
P1760 (DI–200)	Linear Solenoid for Accumulator Pressure Control Circuit Malfunction (Shift Solenoid Valve SLT)	Open or short in shift solenoid valve SLT circuit Shift solenoid valve SLT ECM	●	○
P1780 (DI–203)	Park/Neutral Position Switch Malfunction	Short in park/neutral position switch circuit Park/neutral position switch ECM	●	○

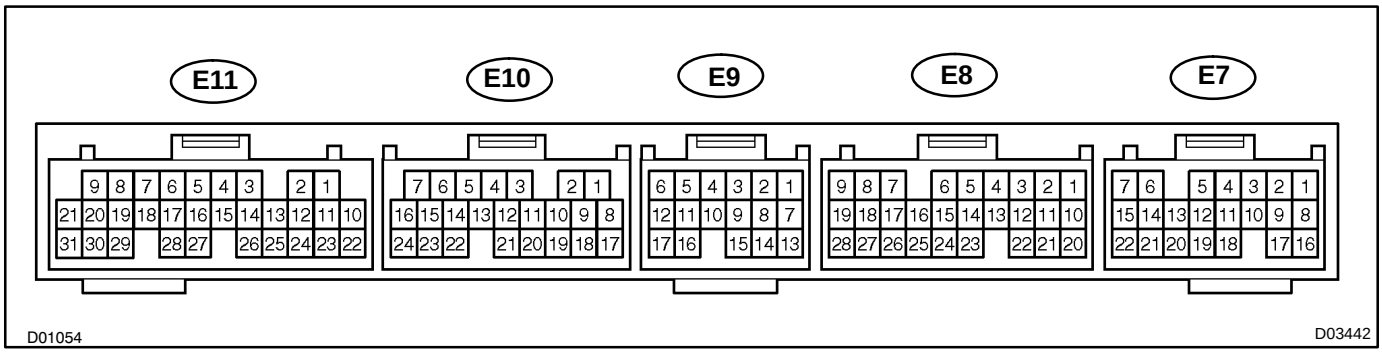
DI8YM–01

PARTS LOCATION



DI4ZQ–05

TERMINALS OF ECM



Symbols (Terminal No.)	Wiring Color	Condition	STD Voltage (V)
SPD (E8–22) – E1 (E10–17)	V–W – BR	IG switch ON Rotate driving wheel slowly	Pulse generation
SL1+ (E11–20) – SL1– (E11–19)	B–Y – Y	IG switch ON	10 – 14
		1st or 2nd gear	10 – 14
		3rd or O/D gear	Below 1
SL2+ (E11–9) – SL2– (E11–8)	P–L – W–L	IG switch ON	Below 1
		1st or 2nd gear	10 – 14
		3rd or O/D gear	Below 1
DSL (E11–7) – Body ground	V – Body ground	IG switch ON	Below 1
		Vehicle driving under lock–up position	10 – 14
NC+ (E11–24) – NC– (E11–23)	R – G	Engine is running	Pulse signal is output Below 1 ↔ 4 – 5
NT+ (E9–5) – NT– (E9–4)	L – LG	Engine is running	Pulse signal is output Below 1 ↔ 4 – 5
SLT+ (E9–3) – SLT– (E9–2)	L–R – G–Y	IG switch ON	10 – 14
OD1 (E8–24) – E1 (E10–17)	Y–B – BR	IG switch ON	5 – 6
L (E9–13) – E1 (E10–17)	Y – BR	IG switch ON Shift lever L position	10 – 14
		IG switch ON Shift lever other than L position	Below 1
2 (E9–14) – E1 (E10–17)	L–W – BR	IG switch ON Shift lever 2 position	10 – 14
		IG switch ON Shift lever other than 2 position	Below 1
R (E9–8) – E1 (E10–17)	R–B – BR	IG switch ON Shift lever R position	10 – 14
		IG switch ON Shift lever other than R position	Below 1
D (E9–16) – E1 (E10–17)	B–R – BR	IG switch ON Shift lever D position	10 – 14
		IG switch ON Shift lever other than D position	Below 1
NSW (E8–20) – E1 (E10–17)	B–W – BR	IG switch ON Shift lever P or N position	10 – 14
		IG switch ON Shift lever other than P or N position	Below 1
THO (E10–13) – E2 (E10–18)	B – BR	IG switch ON ATF temperature 110 ˚C (230 ˚F)	Below 1
S4 (E9–1) – E1 (E10–17)	L–B – BR	IG switch ON	Below 1
		IG switch ON O/D gear	10 – 14
ODLP (E7–9) – E1 (E10–17)	P – BR	IG switch ON O/D OFF indicator light lights up	Below 1
		IG switch ON O/D OFF indicator light goes off	10 – 14
ODMS (E9–12) – E1 (E10–17)	G–O – BR	IG switch ON	10 – 14
		IG switch ON Press continuously O/D main switch	Below 1

DI501–03

PROBLEM SYMPTOMS TABLE

If a normal code is displayed during the diagnostic trouble code check although the trouble still occurs, check the 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 of 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, check and replace the ECM.

Chapter 1: Electronic Circuit Matrix Chart

Symptom	Suspect Area	See page
No up–shift (A particular gear, from 1st to 3rd gear, is not up–shifted)	ECM	IN–31
No up–shift (3rd → O/D)	2. O/D main switch circuit 3. O/D cancel signal circuit 4. ECM	DI–210 DI–207 IN–31
No down–shift (O/D → 3rd)	ECM	IN–31
No down–shift (A particular gear, from 3rd to 1st gear, is not down–shifted)	ECM	IN–31
No lock–up or No lock–up off	ECM	IN–31
Shift point too high or too low	ECM	IN–31
Up–shift to 2nd while in L position	ECM	IN–31
Up–shift to 3rd while in L position	ECM	IN–31
Up–shift to O/D from 3rd while O/D main switch is OFF	1. O/D main switch circuit 2. ECM	DI–210 IN–31
Up–shift to O/D from 3rd while engine is cold	ECM	IN–31
Harsh engagement (N → D)	ECM	IN–31
Harsh engagement (Lock–up)	ECM	IN–31
Harsh engagement (Any driving position)	ECM	IN–31
Poor acceleration	ECM	IN–31
Engine stalls when starting off or stopping	ECM	IN–31

Chapter 2: On–Vehicle Repair
(● : U140E automatic transaxle repair manual Pub. No. RM633U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Manual valve 2. Primary regulator valve 3. Off–vehicle repair matrix chart	● ● –
Vehicle does not move in R position	Off–vehicle repair matrix chart	–
No up–shift (1st → 2nd)	1. 1–2 shift valve 2. Off–vehicle repair matrix chart	● –
No up–shift (2nd → 3rd)	1. 2–3 shift valve 2. Off–vehicle repair matrix chart	● –
No up–shift (3rd → O/D)	1. 3–4 shift valve 2. Off–vehicle repair matrix chart	● –
No down–shift (O/D → 3rd)	3–4 shift valve	●
No down–shift (3rd → 2nd)	2–3 shift valve	●
No down–shift (2nd → 1st)	1–2 shift valve	●
No lock–up or No lock–up off	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● –
Harsh engagement (N → D)	1. C_1 accumulator 2. Off–vehicle repair matrix chart	● –
Harsh engagement (N → R)	1. C_2 accumulator 2. Off–vehicle repair matrix chart	●
Harsh engagement (Lock–up)	1. Lock–up relay valve 2. Off–vehicle repair matrix chart	● –
Harsh engagement (2nd → 3rd)	C_2 accumulator	●
Harsh engagement (3rd → O/D)	B_0 accumulator	●
Harsh engagement (O/D → 3rd)	1. C_0 accumulator 2. B_0 accumulator	● ●
Slip or shudder (Forward and reverse)	1. Oil strainer 2. Off–vehicle repair matrix chart	● –
No engine braking (1st: L position)	Off–vehicle repair matrix chart	–
No engine braking (2nd: 2 position)	Off–vehicle repair matrix chart	–
No kick–down	1. 1–2 shift valve 2. 2–3 shift valve 3. 3–4 shift valve	● ● ●

Chapter 3: Off–Vehicle Repair
(● : U140E automatic transaxle repair manual Pub. No. RM633U)

Symptom	Suspect Area	See page
Vehicle does not move in any forward position and reverse position	1. Front and rear planetary gear 2. U/D planetary gear 3. U/D one–way clutch (F_2) 4. Forward clutch (C_1) 5. U/D brake (B_3)	● ● ● ● ●
Vehicle does not move in R position	1. Front and rear planetary gear unit 2. U/D planetary gear unit 3. Direct clutch (C_2) 4. U/D brake (C_3) 5. 1st & reverse brake (B_2)	● ● ● ● ●
No up–shift (1st → 2nd)	1. No. 1 one–way clutch (F_1) 2. 2nd brake (B_1)	● ●
No up–shift (2nd → 3rd)	Direct clutch (C_2)	●
No up–shift (3rd → O/D)	U/D clutch (C_3)	●
No lock–up or No lock–up off	Torque converter clutch	AX–24
Harsh engagement (N → D)	1. Forward clutch (C_1) 2. U/D one–way clutch (F_2) 3. No. 1 one–way clutch (F_1)	● ● ●
Harsh engagement (N → R)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_2)	● ●
Harsh engagement (Lock–up)	Torque converter clutch	AX–24
Slip or shudder (Forward position: After warm–up)	1. Torque converter clutch 2. Forward clutch (C_1) 3. Direct clutch (C_2) 4. U/D brake (C_3) 5. No. 1 one–way clutch (F_1) 6. U/D one–way clutch (F_2)	AX–24 ● ● ● ● ●
Slip or shudder (R position)	1. Direct clutch (C_2) 2. 1st and reverse brake (B_2)	● ●
Slip or shudder (1st)	No. 1 one–way clutch (F_1)	●
Slip or shudder (2nd)	1. U/D one–way clutch (F_2) 2. 2nd brake (B_1)	● ●
Slip or shudder (3rd)	Direct clutch (C_2)	●
Slip or shudder (O/D)	U/D clutch (C_3)	●
No engine braking (1st – 3rd: D position)	U/D brake (B_3)	●
No engine braking (1st: L position)	1st and reverse brake (B_2)	●
No engine braking (2nd: 2 position)	2nd brake (B_1)	●
Poor acceleration (All position)	1. Torque converter clutch 2. U/D planetary gear	AX–24 ●
Poor acceleration (O/D)	1. U/D clutch (C_3) 2. U/D planetary gear	● ●
Large shift shock or engine stalls when starting off or stopping	Torque converter clutch	AX–24

DI500–05

CIRCUIT INSPECTION

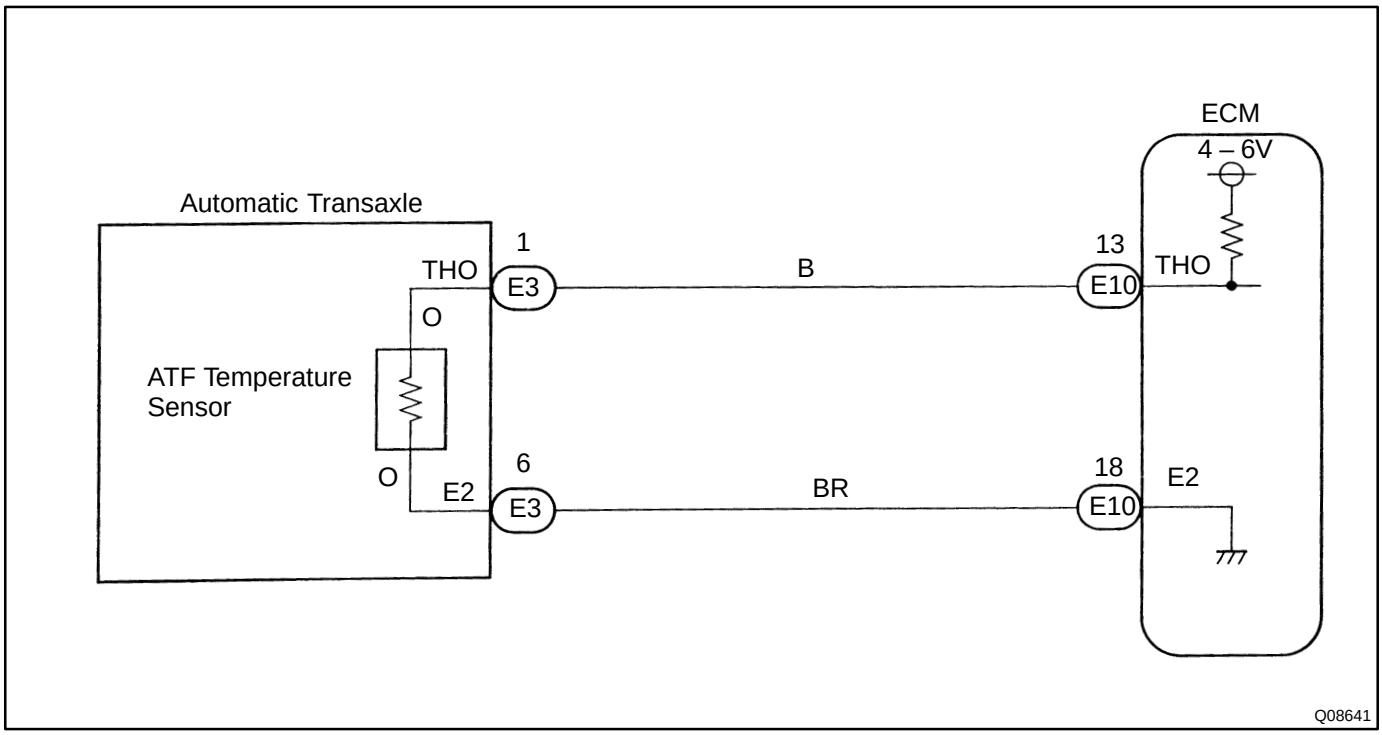
DTC	P0710	Transmission Fluid Temperature Sensor Malfunction (ATF Temperature Sensor)

CIRCUIT DESCRIPTION

The ATF temperature sensor converts fluid temperature into a resistance value which is input into the ECM.

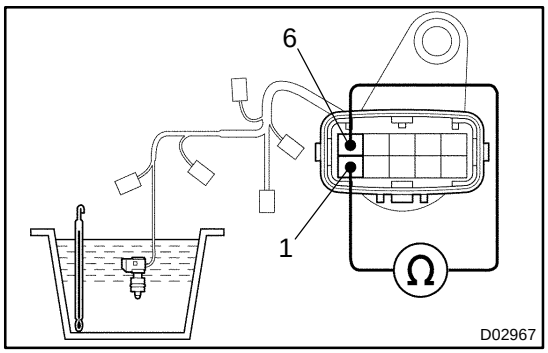
DTC No.	DTC Detecting Condition	Trouble Area
P0710	Either (a) or (b) is detected for 0.5 sec. or more (1–trip detection logic) (a) Temp. sensor resistance is less than 79 Ω. (b) After the engine has been operating for 15 minutes or more, the resistance at the temp. sensor is more than 156 kΩ.	●Open or short in ATF temp. sensor ●ATF temp. sensor ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ATF temperature sensor.**



PREPARATION:

(a) Disconnect the solenoid wire connector.
(b) Remove the oil pan (See page AX–7).
(c) Disconnect all solenoid valve connectors.
(d) Remove the transmission wire harness.

CHECK:

Measure the resistance between terminals 1 and 6 of the solenoid connector at 25 ˚C (77 ˚F) and 110 ˚C (230 ˚F).

OK:

Resistance (Approx.):
25 ˚C (77 ˚F): 3.5 kΩ
110 ˚C (230 ˚F): 231 – 263 Ω

NG → **Replace ATF temperature sensor (transmission wire).**

OK

2	**Check harness and connector between ATF temperature sensor and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM (See page IN–31).

DTC	P0750	Shift Solenoid A Malfunction (Shift Solenoid Valve SL1)

DTC	P0755	Shift Solenoid B Malfunction (Shift Solenoid Valve SL2)

DTC	P0765	Shift Solenoid D Malfunction (Shift Solenoid Valve S4)

SYSTEM DESCRIPTION

The ECM uses signals from the vehicle speed sensor to detect the actual gear position (1st, 2nd, 3rd or O/D gear).

Then the ECM compares the actual gear with the shift schedule in the ECM memory to detect mechanical troubles of the shift solenoid valves and valve body.

DTC No.	DTC Detecting Condition	Trouble Area
P0750 P0755 P0765	During normal driving, the gear required by the ECM does not match the actual gear (2–trip detection logic)	●Shift solenoid valve SL1, SL2, S4 is stuck open or closed ●Valve body is blocked up or stuck

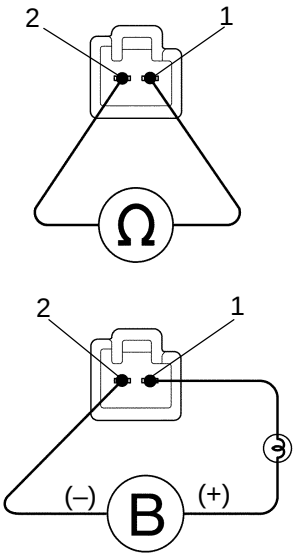
HINT:

- Check the shift solenoid valve SL1 when DTC P0750 is output.
- Check the shift solenoid valve SL2 when DTC P0755 is output.
- Check the shift solenoid valve S4 when DTC P0765 is output.

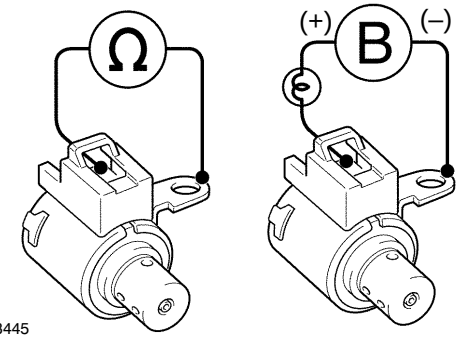
INSPECTION PROCEDURE

1	**Check shift solenoid valve SL1, SL2 or S4 operation.**

Shift solenoid valve SL1 and SL2



Shift solenoid valve S4



D03445
D03446
D03424 D03423
D03724

PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan (See page AX–7).
(c) Remove the shift solenoid valve SL1, SL2 or S4.

Check solenoid resistance:

CHECK:

(a) Shift solenoid valve SL1 or SL2:
Measure the resistance between terminals 1 and 2 of the solenoid connector.
(b) Shift solenoid valve S4:
Measure the resistance between terminal 1 of the solenoid connector and the solenoid body.

OK:

Resistance: 5.1 – 5.5 Ω

Check solenoid operation:

CHECK:

(a) Shift solenoid valve SL1 or SL2:
Connect the positive (+) lead with an 23–W bulb to terminal 1 and the negative (–) lead to the terminal 2 of the solenoid connector, then check the movement of the valve.
(b) Shift solenoid valve S4:
Connect the positive (+) lead with an 23–W bulb to terminal 1 of solenoid connector and the negative (–) lead to the solenoid valve body, then check the movement of the valve.

OK:

The shift solenoid valve makes the operation noise.

NG → **Replace shift solenoid valve SL1, SL2 or S4.**

OK

Check valve body (See page DI–177).

DI4ZY–04

DTC	P0753	Shift Solenoid A Electrical Malfunction (Shift Solenoid Valve SL1)

DTC	P0758	Shift Solenoid B Electrical Malfunction (Shift Solenoid Valve SL2)

DTC	P0768	Shift Solenoid D Electrical Malfunction (Shift Solenoid Valve S4)

CIRCUIT DESCRIPTION

Shifting from 1st to O/D is performed in combination with ON and OFF operation of the shift solenoid valves SL1 and SL2 which is controlled by the 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).

DTC No.	DTC Detecting Condition	Trouble Area
P0753 P0758	ECM checks for an open or short circuit in shift solenoid valves SL1 and SL2. (a) When solenoid is energized, duty ratio exceed 75 %. (b) When solenoid is not energized, duty ratio is less than 3 %.	
P0768	ECM checks for an open or short circuit in shift solenoid valve S4 circuit when it changes. ECM records DTC P0768 if condition (a) or (b) is detected. (a) When solenoid is energized, solenoid resistance is 8 Ω or less and it is counted. (b) When solenoid is not energized, solenoid resistance is 100 kΩ or more and it is counted.	●Open or short in shift solenoid valve SL1, SL2, S4 circuit ●Shift solenoid valve SL1, SL2, S4 ●ECM

HINT:

- Check the shift solenoid valve SL1 when DTC P0753 is output.
- Check the shift solenoid valve SL2 when DTC P0758 is output.
- Check the shift solenoid valve S4 when DTC P0768 is output.

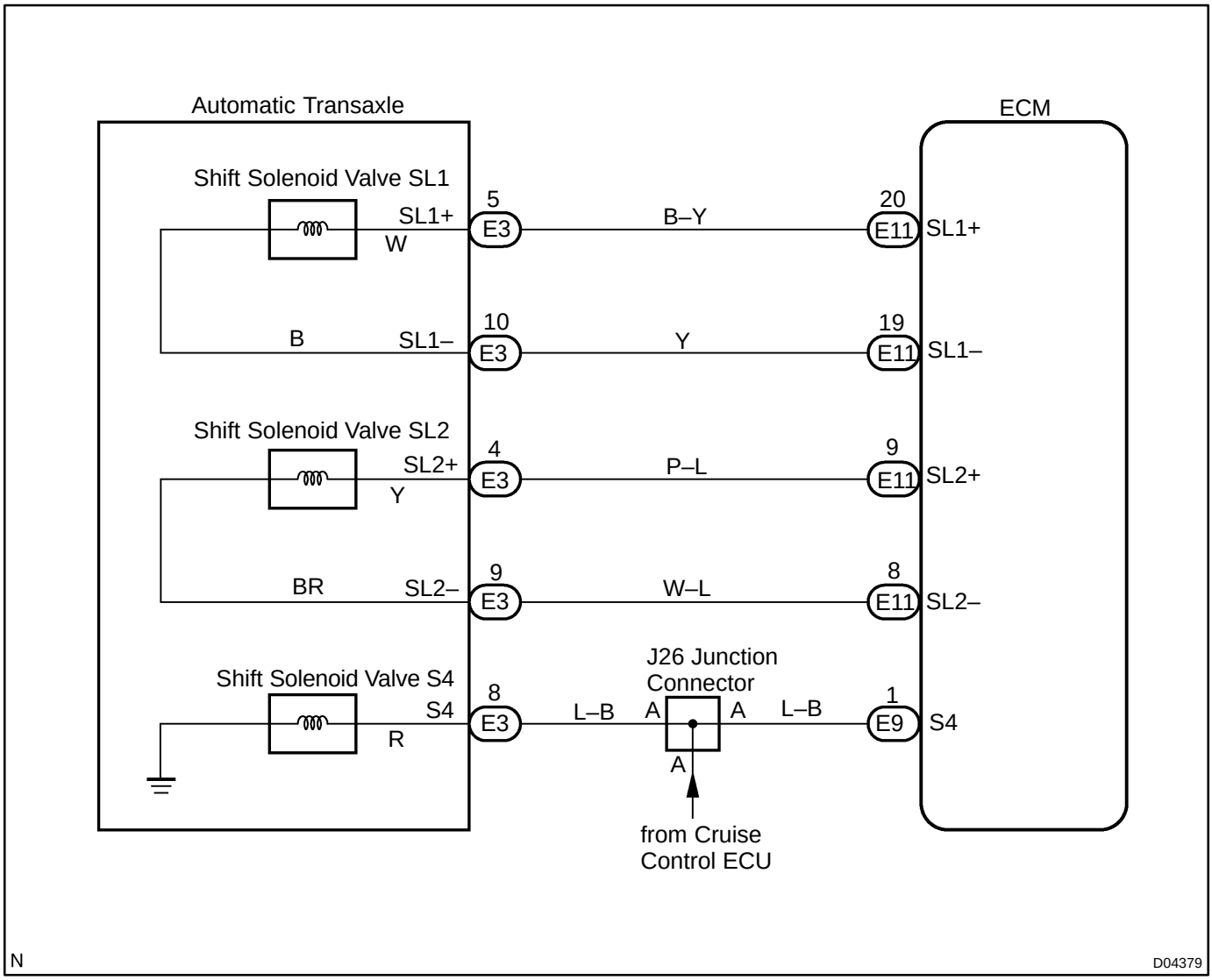
Fail safe function:
If either of the shift solenoid valve circuits develops an open or short, the ECM turns the other shift solenoid ON and OFF in order to shift into the gear positions shown in the table below. The ECM also turns the shift solenoid valve DSL OFF at the same time. If both solenoids malfunction, hydraulic control cannot be performed electronically, and so it must be done manually.
Manual shifting as shown in the following table must be done (In case of a short circuit, the ECM stops sending the current to the short circuited solenoid).

NORMAL				SHIFT SOLENOID SL1 MALFUNCTIONING								SHIFT SOLENOID SL2 MALFUNCTIONING			
				Driving at 3rd or O/D				Driving at 1st or 2nd							
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
ON	ON	OFF	1st	X	ON → OFF	OFF	3rd	X	ON	OFF	2nd	ON → OFF	X	OFF	3rd
OFF	ON	OFF	2nd	X	ON → OFF	OFF	3rd	X	ON	OFF	2nd	OFF	X	OFF	3rd
	OFF	OFF	3rd	X	OFF	OFF	3rd	X	OFF → ON	OFF → ON	3rd		X	OFF	3rd
	OFF	ON	O/D	X	OFF	ON	O/D	X	OFF → ON	ON	3rd		X	ON	O/D

SHIFT SOLENOID S4 MALFUNCTIONING				SHIFT SOLENOID SL1 AND SL2 MALFUNCTIONING				SHIFT SOLENOID SL1 AND S4 MALFUNCTIONING							
								Driving at 3rd or O/D				Driving at 1st or 2nd			
Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4		SL1	SL2	S4	
ON	ON	X	1st	X	X	OFF	3rd	X	ON → OFF	X	3rd	X	ON	X	2nd
OFF	ON	X	2nd	X	X	OFF	3rd	X	ON → OFF	X	3rd	X	ON	X	2nd
	OFF	X	3rd	X	X	OFF	3rd	X	OFF	X	3rd	X	OFF → ON	X	2nd
	OFF	X	3rd	X	X	ON	O/D	X	OFF	X	3rd	X	OFF → ON	X	2nd

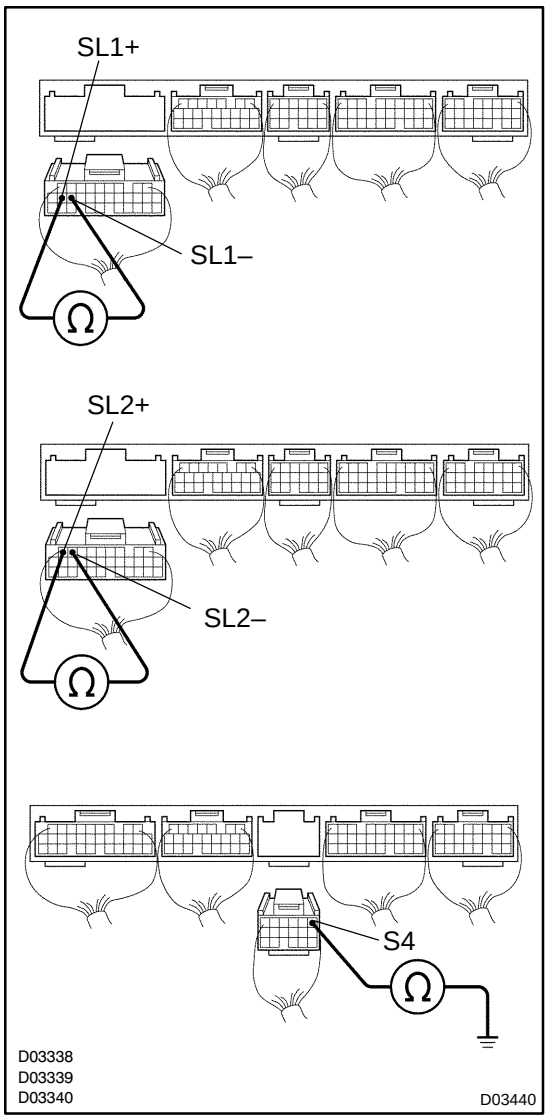
SHIFT SOLENOID SL2 AND S4 MALFUNCTIONING				SHIFT SOLENOID SL1, SL2 AND S4 MALFUNCTIONING			
Solenoid Valve			Gear	Solenoid Valve			Gear
SL1	SL2	S4		SL1	SL2	S4	
ON → OFF	X	X	3rd	X	X	X	3rd
OFF	X	X	3rd	X	X	X	3rd
	X	X	3rd	X	X	X	3rd
	X	X	3rd	X	X	X	3rd

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Measure resistance between terminals of ECM.**



PREPARATION:

Disconnect the connector from ECM.

CHECK:

(a) Measure the resistance between terminals SL1+ and SL1– of the ECM connector.

(b) Measure the resistance between terminals SL2+ and SL2– of the ECM connector.

(c) Measure the resistance between terminal S4 of the ECM connector and the body ground.

OK:

Resistance:

(a) SL1+ – SL1–: 5.3 ± 0.2 Ω

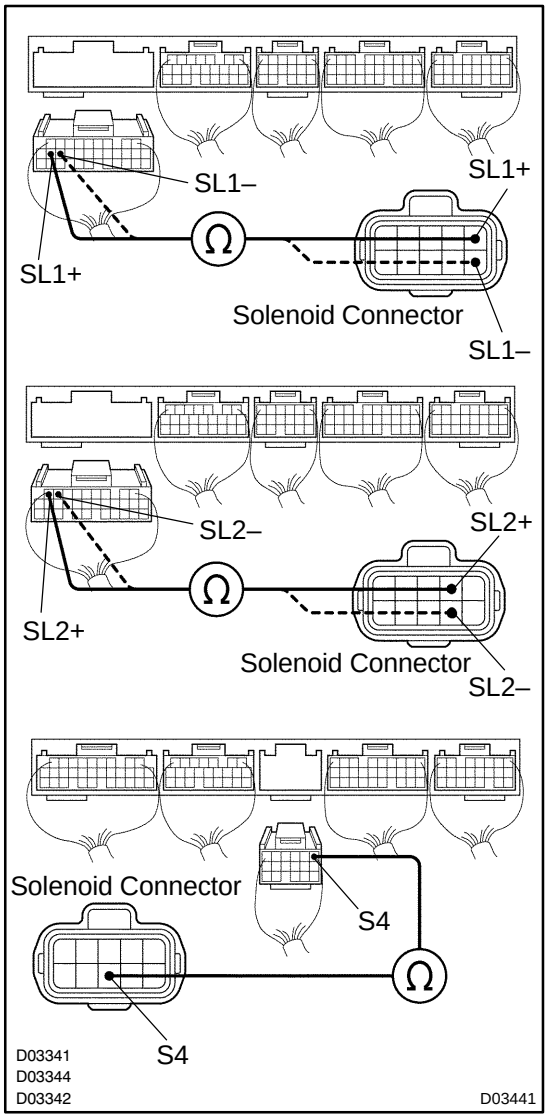
(b) SL2+ – SL2–: 5.3 ± 0.2 Ω

(c) S4 – Body ground: 13 ± 2 Ω

OK	**Check and replace ECM.**

NG

2	**Measure harness and connector between ECM and automatic transaxle solenoid connector.**



PREPARATION:

(a) Disconnect the solenoid connector from the automatic transaxle.

(b) Disconnect the connector from the ECM.

CHECK:

(a) Measure the harness and connector between terminal SL1+ or SL1– of the ECM and terminal SL1+ or SL1– of the solenoid connector.

(b) Measure the harness and connector between terminal SL2+ or SL2– of the ECM and terminal SL2+ or SL2– of the solenoid connector.

(c) Measure the harness and connector between terminal S4 of the ECM and terminal S4 of the solenoid connector.

OK:

0 Ω

NG → **Repair or replace harness or connector.**

OK

3	Check shift solenoid valve SL1, SL2 or S4 (See page DI–182).

NG → Replace shift solenoid valve.

OK →

Repair or replace solenoid wire, harness and connector between ECM and automatic transaxle solenoid connector.

DTC	P0770	Shift Solenoid E Malfunction (Shift Solenoid Valve DSL)

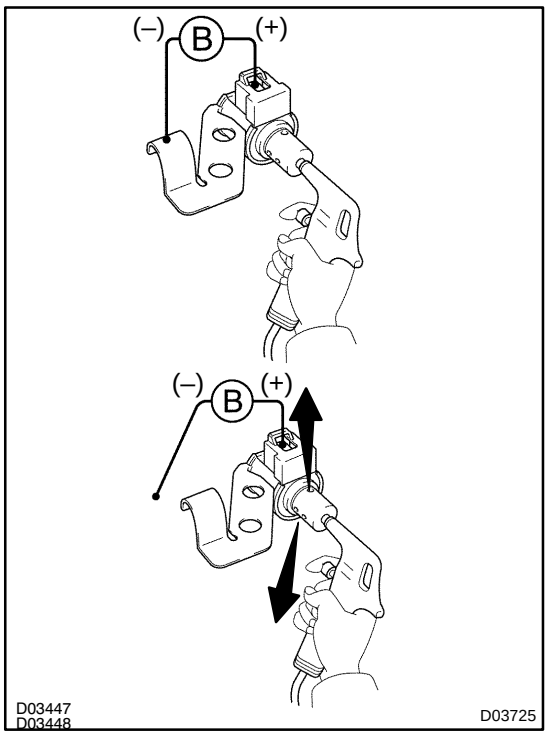
SYSTEM DESCRIPTION

The ECM uses the signals from the throttle position sensor, air–flow meter and crankshaft position sensor 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 DSL, valve body and torque converter clutch.

DTC No.	DTC Detecting Condition	Trouble Area
P0770	Lock–up does not occur when driving in lock–up range (normal driving at 80 km/h [50 mph]), or lock–up remains ON in the lock–up OFF range (2–trip detection logic)	●Shift solenoid valve DSL is stuck open or closed ●Valve body blocked up or stuck ●Lock–up clutch

INSPECTION PROCEDURE

1	Check solenoid valve DSL operation.



PREPARATION:
(a) Remove the oil pan (See page AX–7).
(b) Remove the shift solenoid valve DSL.

CHECK:
(a) Applying 490 kPa (5 kgf/cm^2, 71 psi) of compressed air, check that the solenoid valve does not leak air.
(b) When battery positive voltage is supplied to the shift solenoid valve, check that the solenoid valve opens.

OK:
(a) Solenoid valve does not leak air.
(b) Solenoid valve opens.

NG → **Replace solenoid valve DSL.**

OK

2	Check valve body (See page DI–177).

NG → Repair or replace valve body.

OK →

Replace torque converter clutch
(See page AX–14).

DI4ZW–04

DTC	P0773	Shift Solenoid E Electrical Malfunction (Shift Solenoid Valve DSL)

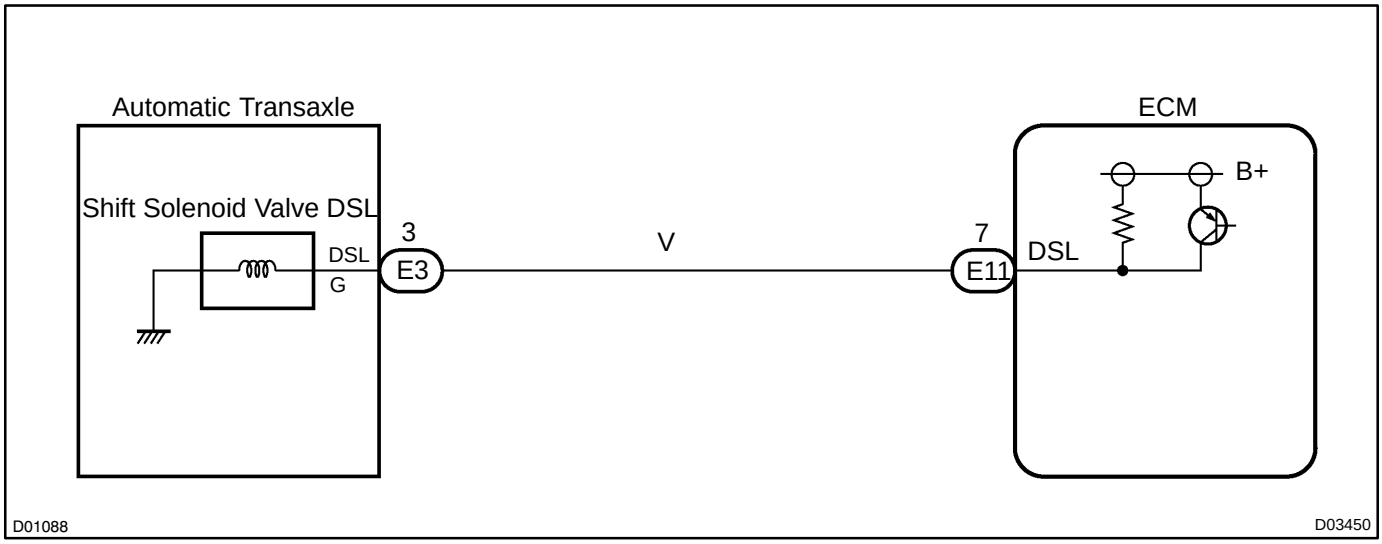
CIRCUIT DESCRIPTION

The shift solenoid valve DSL is turned ON and OFF by signals from the ECM in order to control the hydraulic pressure acting on the lock–up relay valve, which then controls the operation of the lock–up clutch.

DTC No.	DTC Detecting Condition	Trouble Area
P0773	Either (a) or (b) are detected at 1 time (2–trip detection logic) (a) Solenoid resistance is 8 Ω or less short circuit when solenoid is energized. (b) Solenoid resistance is 100 kΩ or more open circuit when solenoid is not energized.	●Open or short in shift solenoid valve DSL circuit ●Shift solenoid valve DSL ●ECM

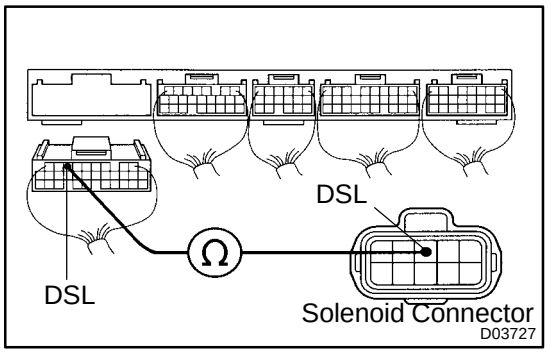
Fail safe function:
If the ECM detects a malfunction, it turns the shift solenoid valve DSL OFF.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check harness and connector between ECM and automatic transaxle solenoid connector.**



PREPARATION:

(a) Disconnect the solenoid connector from the transaxle.

(b) Disconnect the connector from the ECM.

CHECK:

Measure the harness and connector between terminal DSL of the ECM and terminal DSL of the solenoid connector.

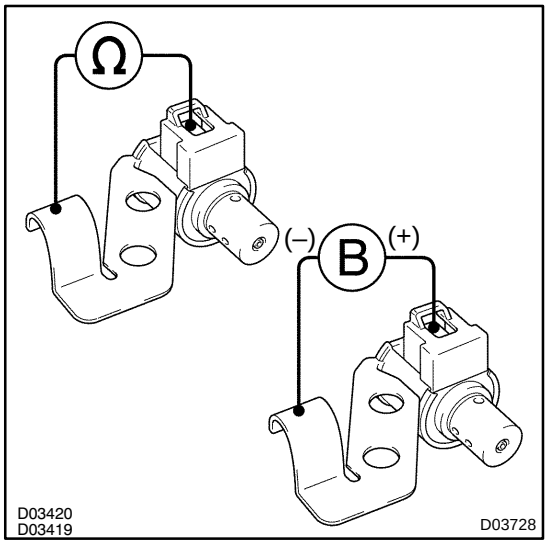
OK:

There is continuity.

NG → **Repair or replace harness or connector.**

OK

2	Check shift solenoid valve DSL.



PREPARATION:

(a) Jack up the vehicle.
(b) Remove the oil pan (See page AX–7).
(c) Disconnect the shift solenoid valve DSL connector.
(d) Remove the shift solenoid valve DSL.

CHECK:

(a) Measure the resistance between terminal DSL of the shift solenoid valve and the solenoid body.
(b) Connect the positive (+) lead to terminal of the solenoid connector, the negative (–) lead to the solenoid body.

OK:

(a) Resistance: 11 – 15 Ω
(b) The shift solenoid valve DSL makes operation noise.

NG → **Replace shift solenoid valve DSL.**

OK

Check and replace or repair solenoid wire.

DI4Z1–04

DTC	P1520	Stop Light Switch Signal Malfunction

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 signals to the ECM. Then the ECM cancels the operation of the lock–up clutch while braking is in progress.

DTC No.	DTC Detecting Condition	Trouble Area
P1520	No stop light switch signal to ECM during driving (2–trip detection logic)	●Open or short in stop light switch circuit ●Stop light switch ●ECM

WIRING DIAGRAM

See page DI–137.

INSPECTION PROCEDURE

See page DI–137.

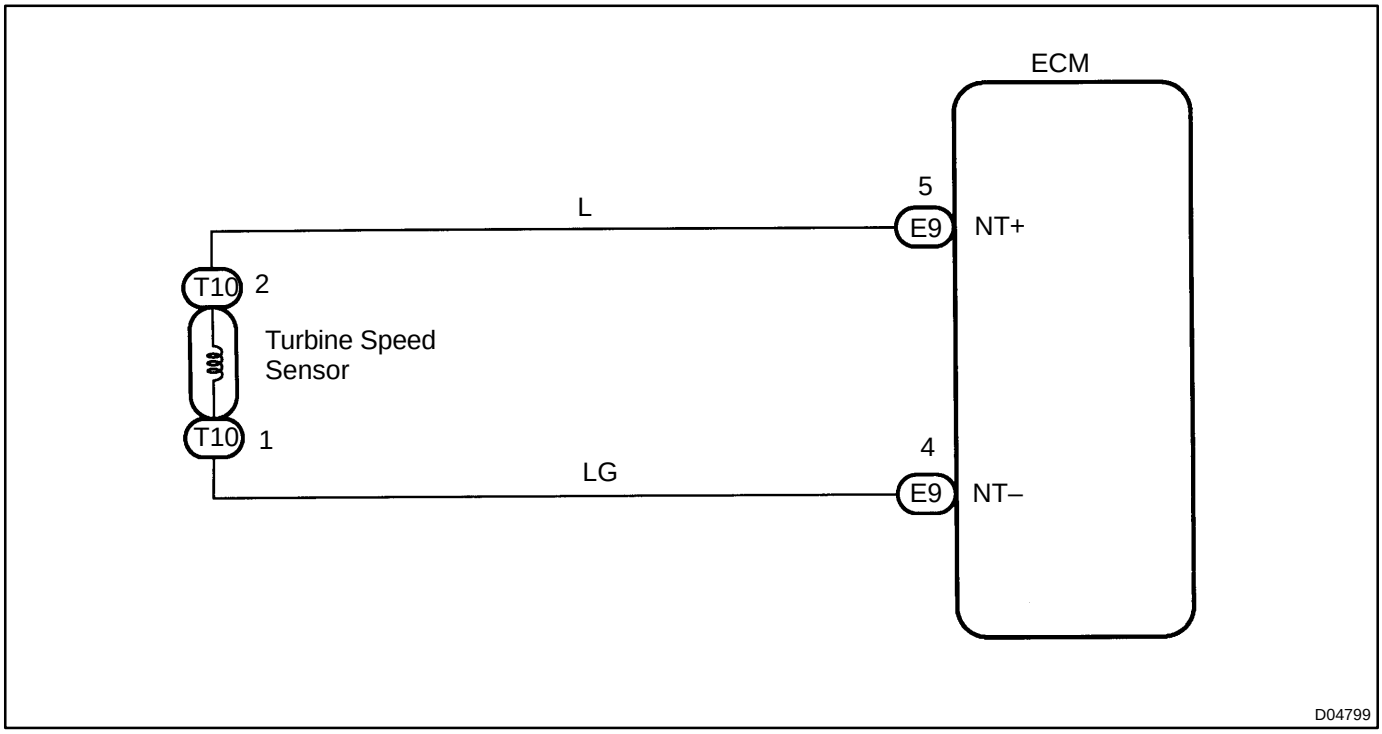
DTC	P1725	NT Revolution Sensor Circuit Malfunction (Input Turbine Speed Sensor)

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the input turbine. By comparing the input turbine speed signal (NT) and the counter gear speed sensor signal (NC), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

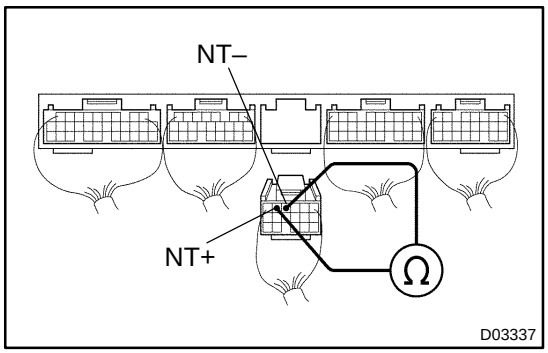
DTC No.	DTC Detecting Condition	Trouble Area
P1725	ECM detects conditions (a), (b), (c) and (d) continuity for 5 sec. or more (1–trip detection logic) (a) Vehicle speed : 50 km/h (20 mph) or more (b) 2nd, 3rd or O/D gear (c) Solenoid valves and neutral start switch are normal (d) NT < 300 rpm	●Open or short in input turbine (NT) speed sensor circuit ●Input turbine (NT) speed sensor ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check resistance between terminals NT+ and NT– of ECM.

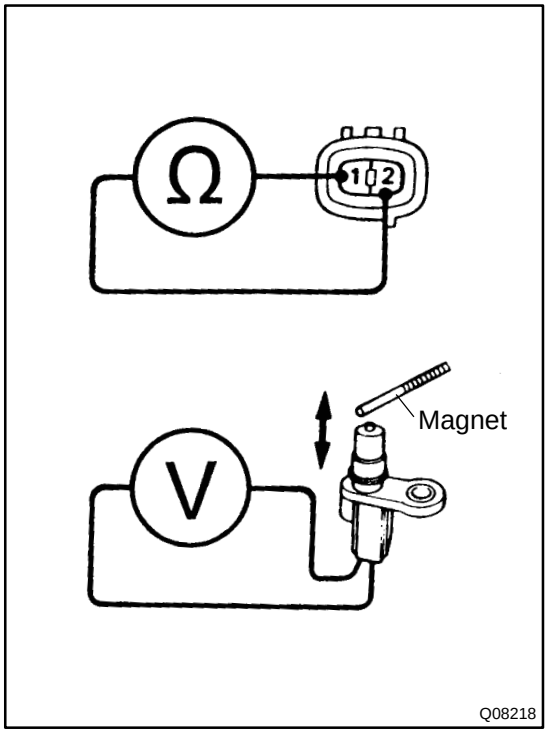


PREPARATION:
Disconnect the connector from ECM.
CHECK:
Check the resistance between terminals NT+ and NT– of the ECM.
OK:
Resistance: 620 ± 60 Ω

OK → **Check and replace ECM (See page IN–31).**

NG

2	Check NT revolution speed sensor.



PREPARATION:
Remove the NT revolution speed sensor from transaxle.
CHECK:
(a) Measure the resistance between terminals 1 and 2 of the speed sensor.
(b) Check the voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.
OK:
(a) Resistance: 620 ± 60 Ω
(b) Voltage is generated intermittently.
HINT:
The voltage generated is extremely low.

NG → **Replace NT revolution speed sensor.**

OK

Check and repair harness and connector between ECM and NT revolution speed sensor (See page IN–31).

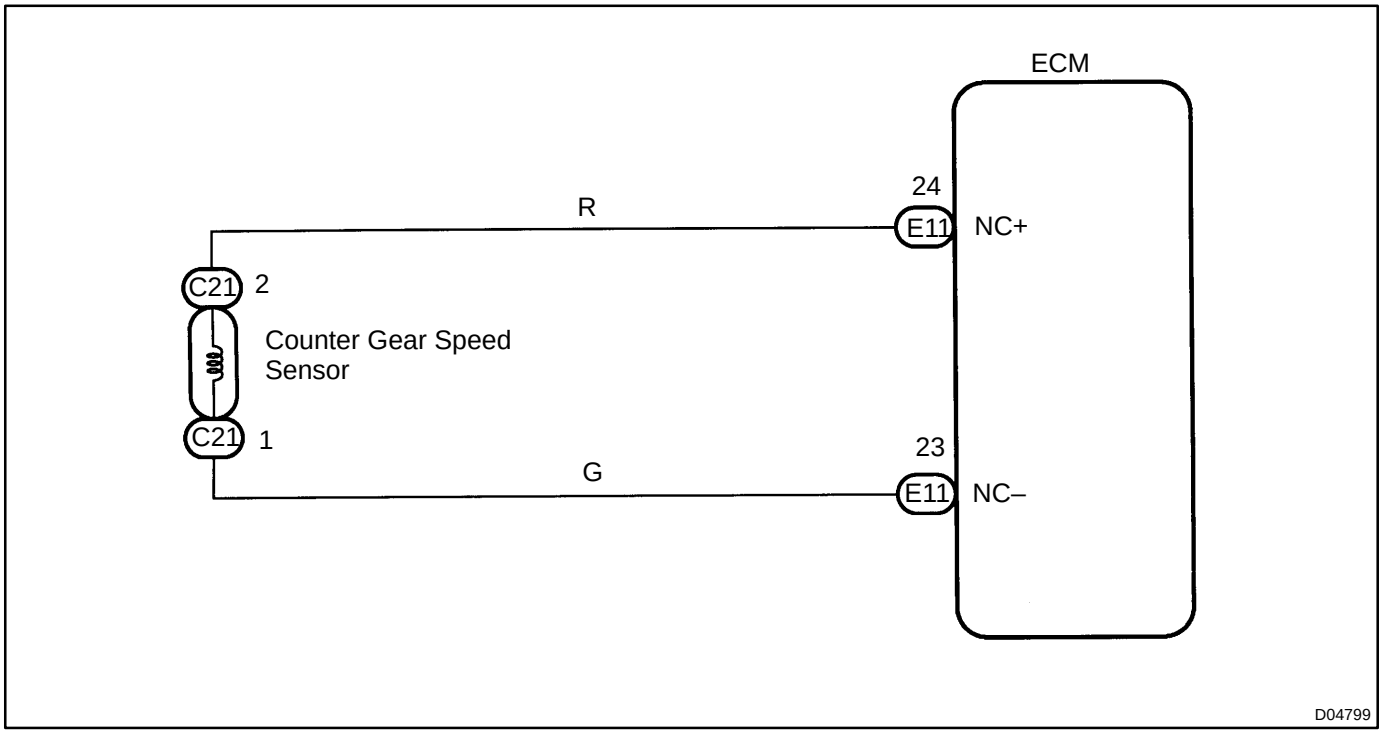
DTC	P1730	NC Revolution Sensor Circuit Malfunction (Counter Gear Speed Sensor)

CIRCUIT DESCRIPTION

This sensor detects the rotation speed of the counter gear. By comparing the counter gear speed signal (NC) and the input turbine speed sensor signal (NT), the ECM detects the shift timing of the gears and appropriately controls the engine torque and hydraulic pressure in response to various conditions, thus performing smooth gear shifting.

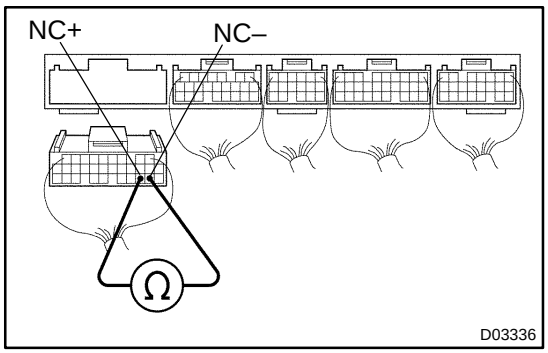
DTC No.	DTC Detecting Condition	Trouble Area
P1730	ECM detects conditions (a), (b), (c) and (d) continuity for 5 sec. or more (1–trip detection logic) (a) Vehicle speed: 50 km/h (20 mph) or more (b) 2nd, 3rd or O/D gear (c) Solenoid valves and park/neutral position switch are normal (d) NC < 300 rpm	●Open or short in NC revolution sensor circuit ●NC revolution speed sensor ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check resistance between terminals NC+ and NC– of ECM.

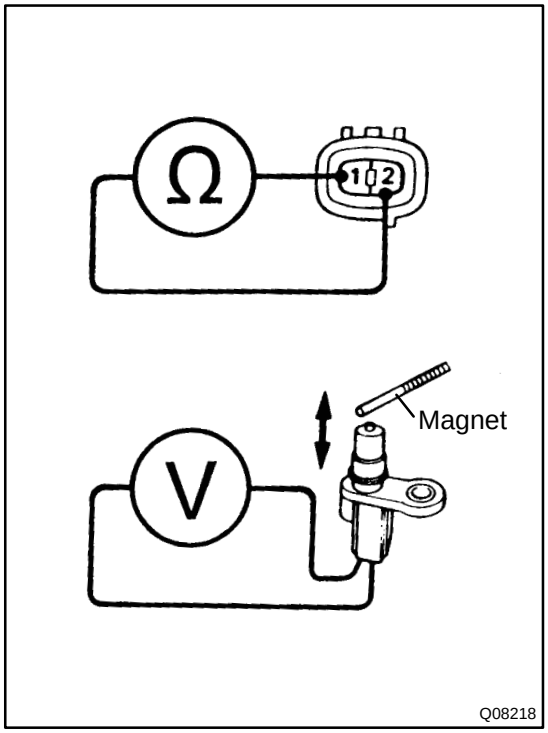


PREPARATION:
Disconnect the connector from the ECM.
CHECK:
Check the resistance between terminals NC+ and NC– of the ECM.
OK:
Resistance: 620 ± 60 Ω

OK	Check and replace ECM (See page IN–31).

NG

2	Check NC revolution speed sensor.



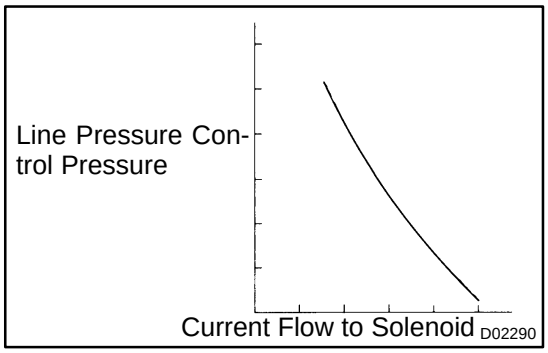
PREPARATION:
Remove the NC revolution speed sensor from transaxle.
CHECK:
(a) Measure the resistance between terminals 1 and 2 of the speed sensor.
(b) Check the voltage between terminals 1 and 2 of the speed sensor when a magnet is put close to the front end of the speed sensor then taken away quickly.
OK:
(a) Resistance: 620 ± 60 Ω
(b) Voltage is generated intermittently.
HINT:
The voltage generated is extremely low.

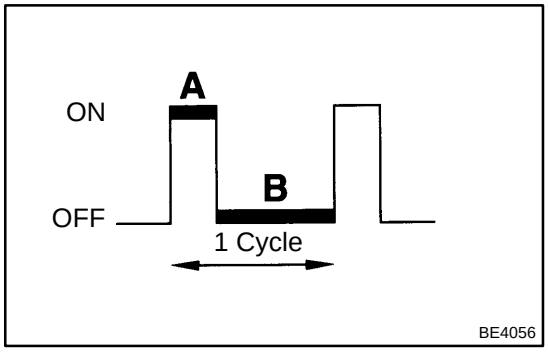
NG	Replace NC revolution speed sensor.

OK

Check and repair harness and connector between ECM and NC revolution speed sensor (See page IN–31).

DTC	P1760	Linear Solenoid for Line Pressure Control Circuit Malfunction (SLT)



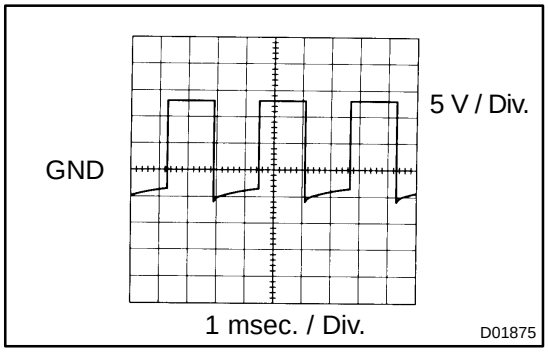


CIRCUIT DESCRIPTION

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 engine power output detected.
This reduces the function of 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, 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

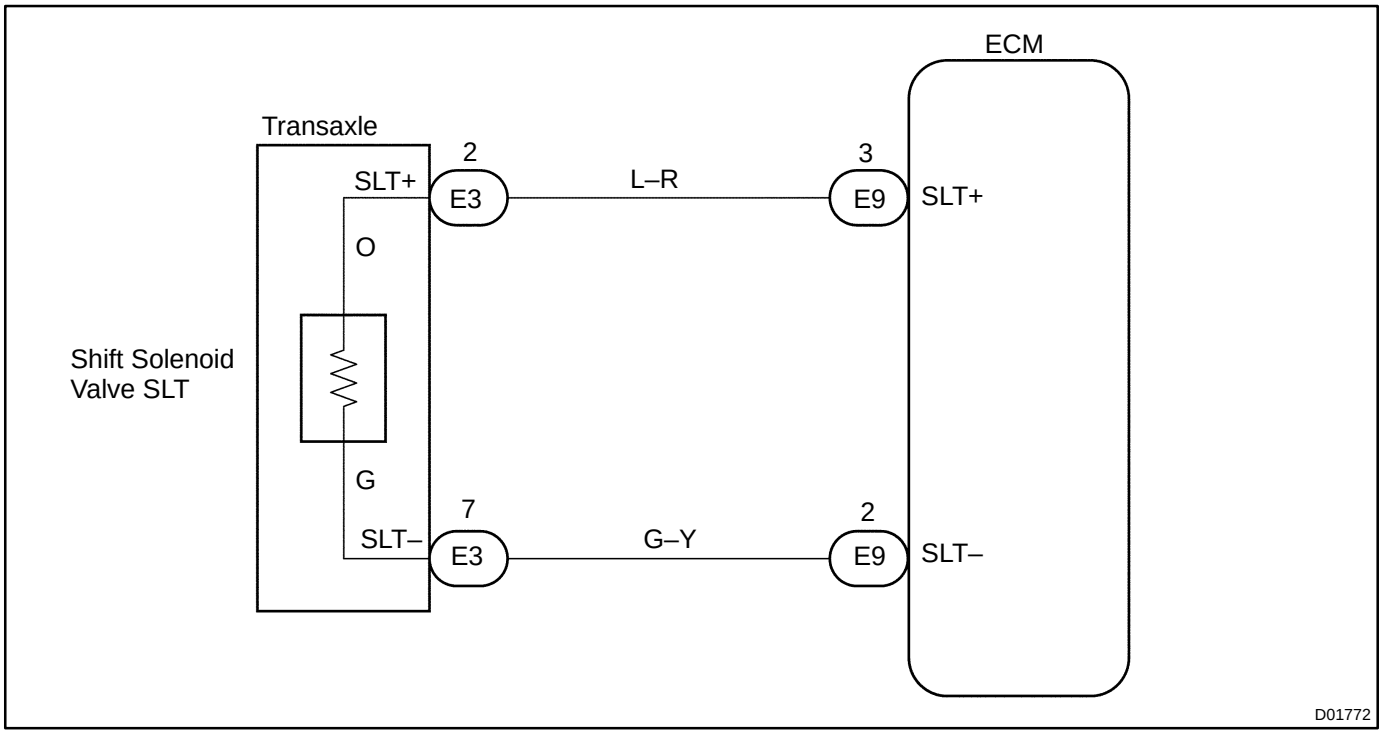
$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$

DTC No.	DTC Detecting Condition	Trouble Area
P1760	(a) or (b) condition below are detected 1 sec. or more. (a) SLT– terminal: 0V (b) SLT– terminal: 12V	●Open or short in shift solenoid valve SLT circuit ●Shift solenoid valve SLT ●ECM



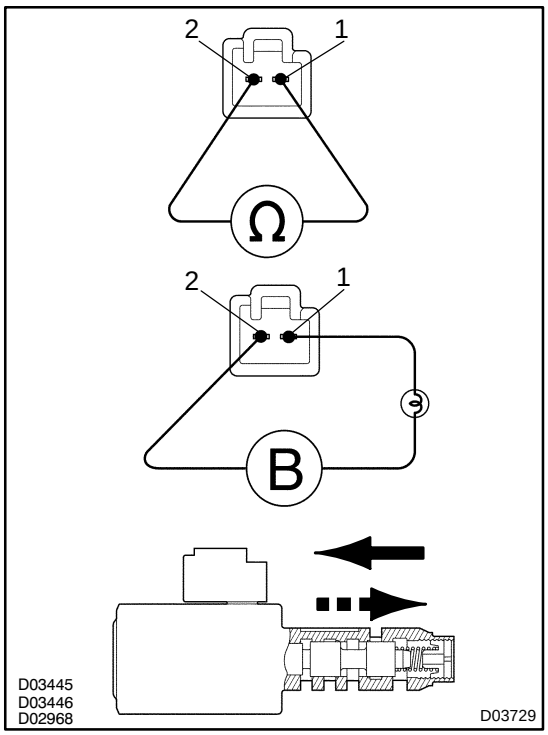
Reference:
Waveform between terminals SLT+ and SLT– during engine idling.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift solenoid valve SLT.**



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the oil pan (See page AX–7).

(c) Disconnect the solenoid connector.

Check solenoid resistance:

CHECK:

Measure the resistance between terminals 1 and 2 of the solenoid connector.

OK:

Resistance: 5.0 – 5.6 Ω

Check solenoid operation:

CHECK:

Connect the positive (+) lead with an 8 – 10W bulb to the terminal 1 of the solenoid connector and the negative (–) lead to the terminal 2, then check the movement of the valve.

OK:

When battery positive voltage is applied.	Valve moves in ■■➡ direction in illustration at right.
When battery positive voltage is cut off.	Valve moves in ⬅ direction in illustration at left.

NG → **Replace shift solenoid valve SLT.**

OK ↓

2	**Check harness and connector between shift solenoid valve SLT and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Replace ECM.

DI4ZS–06

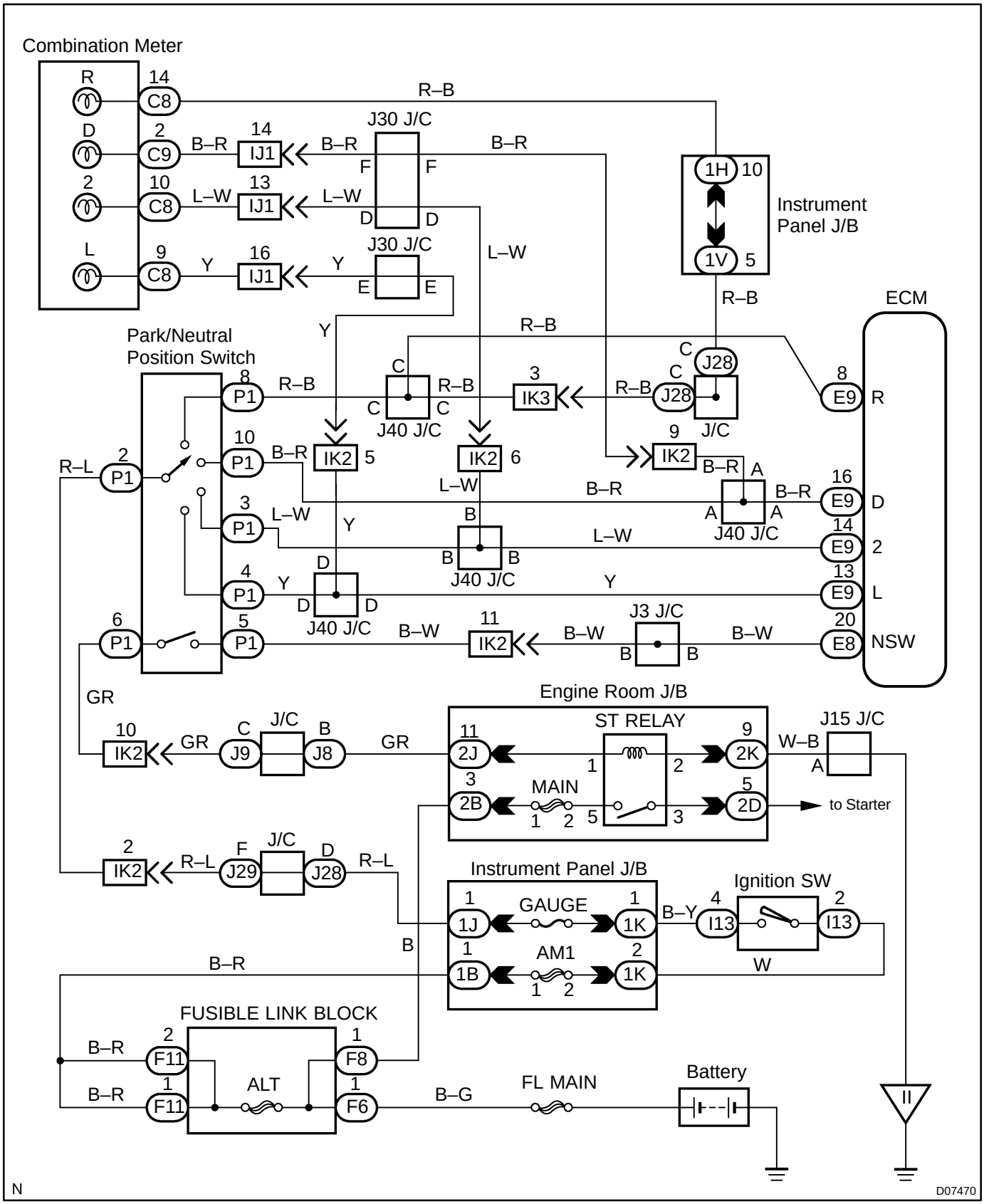
DTC	P1780	Park/Neutral Position Switch Malfunction

CIRCUIT DESCRIPTION

The park/neutral position switch detects the shift lever position and sends signals to the ECM.
The ECM receives signals (PNP, REVERSE, DRIVE, 2ND and LOW) from the park/neutral position switch. When the signal is not sent to the ECM from the park/neutral position switch, the ECM judges that the shift lever is in the D position.

DTC No.	DTC Detection Condition	Trouble Area
P1780	When driving under conditions (a) and (b) for 30 sec. or more, the park/neutral position switch is ON (N position) (2–trip detection logic) (a) Vehicle speed: 70 km/h (44 mph) or more (b) Engine speed: 1,500 – 2,500 rpm	●Short in park/neutral position switch circuit ●Park/neutral position switch ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Read PNP SW, REVERSE, 2ND and LOW signals.**

When using LEXUS hand–held tester:

PREPARATION:

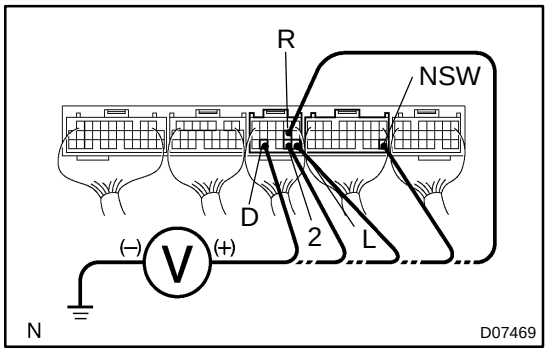
(a) Remove the DLC3 cover.
(b) Connect a LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

CHECK:

Shift the shift lever into the P, R, N, D, 2 and L positions, and read the signals of the PNP, REVERSE, 2ND DRIVE and LOW signals on the LEXUS hand–held tester.

OK:

Shift position	Signal
P, N	NSW OFF → ON
R	REVERSE OFF → ON
D	DRIVE OFF → ON
2	2ND OFF → ON
L	LOW OFF → ON



When not using LEXUS hand–held tester:

PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure voltage between each of terminal NSW, R, D, 2 and L of the ECM and the body ground when the shift lever is shifted into the following positions.

OK:

Position	NSW–Body ground	R–Body ground	D–Body ground	2–Body ground	L–Body ground
P, N	0 V	0 V	0 V	0 V	0 V
R	9 – 14 V*	7.5 – 14 V*	0 V	0 V	0 V
D	9 – 14 V	0 V	7.5 – 14 V	0 V	0 V
2	9 – 14 V	0 V	0 V	7.5 – 14 V	0 V
L	9 – 14 V	0 V	0 V	0 V	7.5 – 14 V

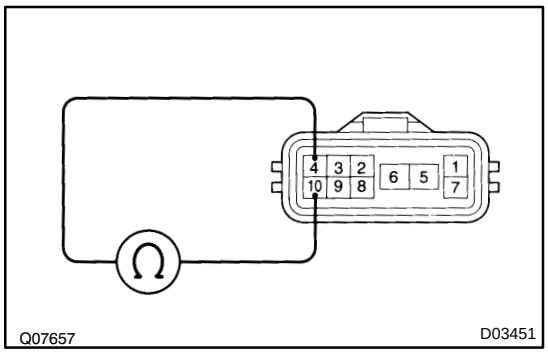
HINT:

*: The voltage will drop slightly due to lighting up of the back up light.

OK → **Check and replace ECM (See page DI–177).**

NG

2	Check park/neutral position switch.



PREPARATION:

(a) Jack up the vehicle.

(b) Remove the park/neutral position switch.

CHECK:

Check continuity between each terminal shown below when the shift lever is moved into each position.

Shift position	Terminal No. to continuity	
P	2 – 7	5 – 6
R	2 – 8	–
N	2 – 9	5 – 6
D	2 – 10	–
2	2 – 3	–
L	2 – 4	–

OK:

There is continuity.

NG → **Replace park/neutral position switch.**

OK

Repair or replace harness and connector between battery and park/neutral position switch, and park/neutral position switch and ECM (See page IN–31).

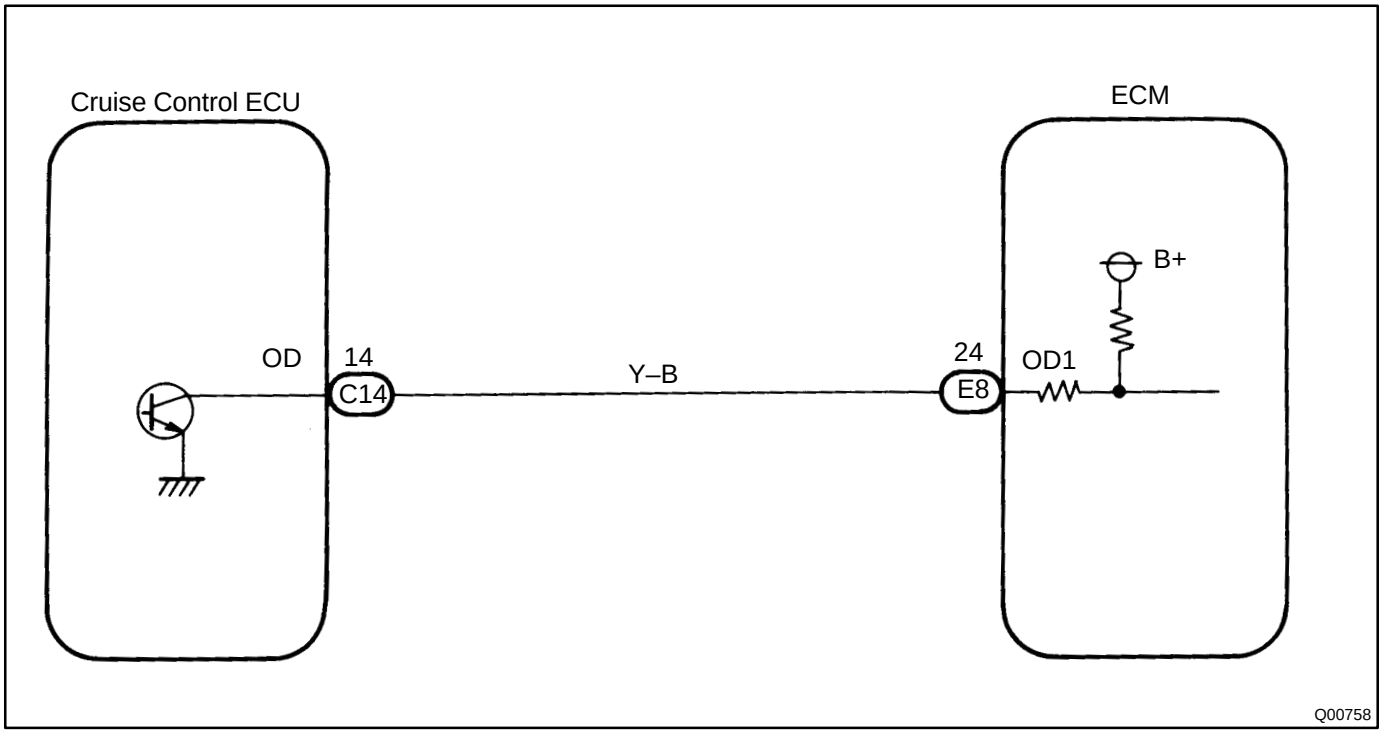
DI4ZR–04

O/D Cancel Signal Circuit

CIRCUIT DESCRIPTION

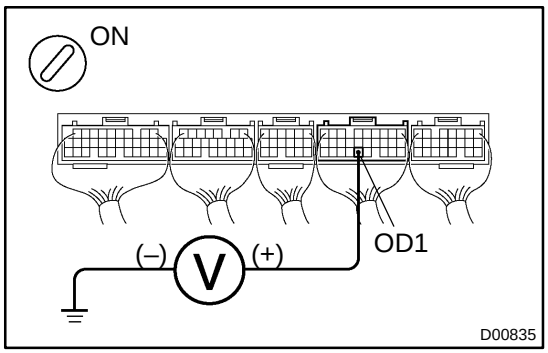
While driving uphill with cruise control activated, in order to minimize gear shifting and provide smooth cruising overdrive may be prohibited temporarily under some condition.
The cruise control ECU sends O/D cut signals to the ECM as necessary and the ECM cancels overdrive shifting until these signals are discontinued.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal OD1 of ECM and body ground.**

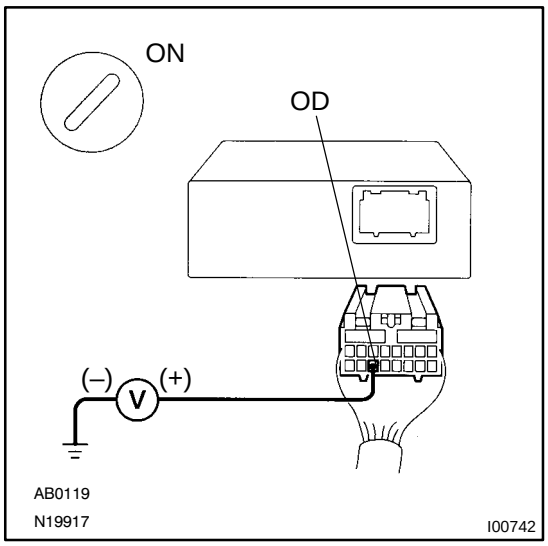


PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure voltage between terminal OD1 of the ECM and the body ground.
OK:
Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–177).**

NG

2	**Check voltage between terminal OD of cruise control ECU harness side connector and body ground.**



PREPARATION:
(a) Disconnect the cruise control ECU connector.
(b) Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal OD of the cruise control ECU harness side connector and the body ground.
OK:
Voltage: 10 – 14 V

OK	**Check and replace cruise control ECU. (See page DI–638)**

NG

3	**Check harness and connector between cruise control ECU and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

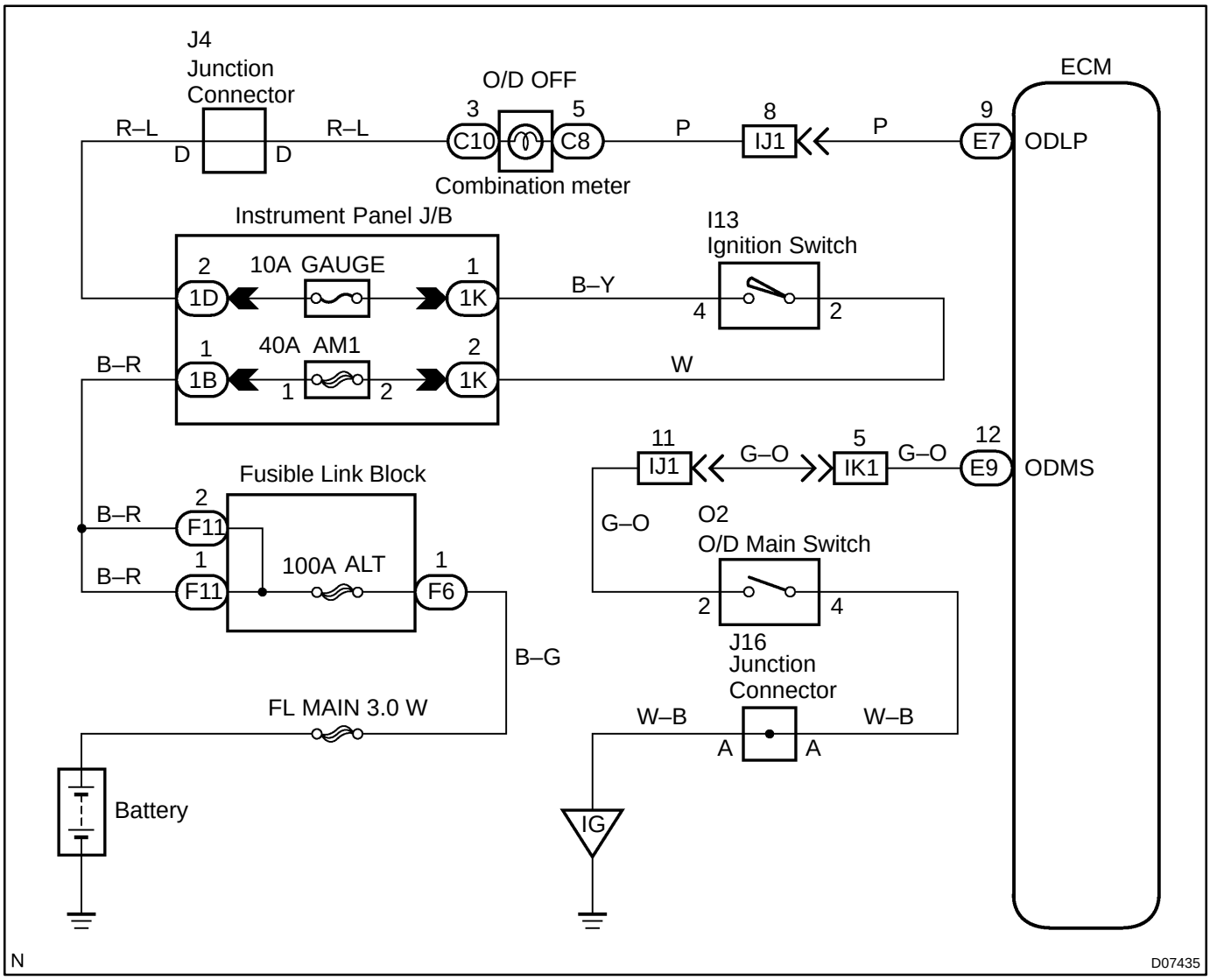
Check and replace ECM (See page IN–31).

O/D Main Switch & O/D OFF Indictor Light Circuit

CIRCUIT DESCRIPTION

The O/D main switch is a momentary type switch. When pressing the O/D main switch, the O/D OFF indicator light lights up and the ECM prohibits shifting into O/D, and when pressing it once again, the O/D OFF indicator light goes off and the ECM allows shifting into O/D. Turning the IG switch OFF will reset the O/D OFF indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of O/D main switch.**

PREPARATION:
Turn the ignition switch ON.
CHECK:
(a) Check the O/D OFF indicator light when the O/D main switch is pressed into ON.
(b) Check the O/D OFF indicator light when the O/D main switch is pressed once again.
OK:
(a) O/D OFF indicator light lights up.
(b) O/D OFF indicator light goes off.

OK → **Proceed to next inspection shown on problem symptoms table (See page DI–177).**

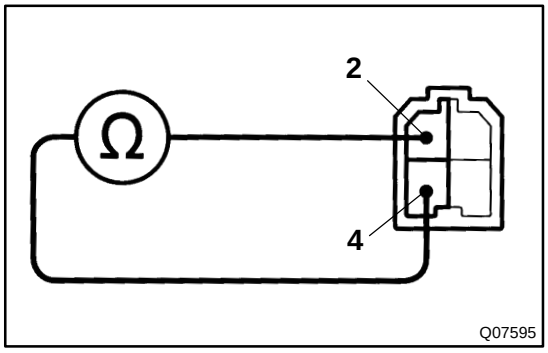
NG

2	**Check and replace combination meter (See page BE–65).**

NG → **Replace combination meter.**

OK

3	**Check O/D main switch.**



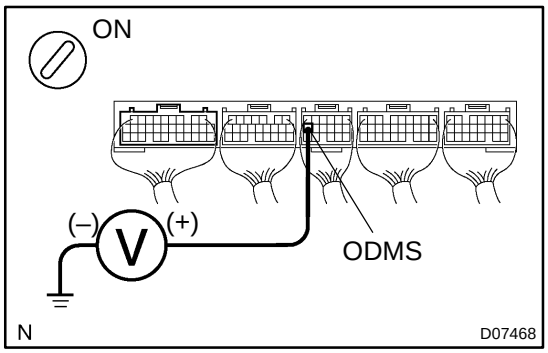
PREPARATION:
Disconnect the O/D main switch connector.
CHECK:
Check continuity between terminals 2 and 4 of the O/D main switch connector.
OK:

O/D main switch condition	Specified condition
Press continuously O/D main switch	Continuity
Release O/D main switch	No continuity

NG → **Replace and repair O/D main switch.**

OK

4	Check voltage between terminal ODMS of ECM and body ground.



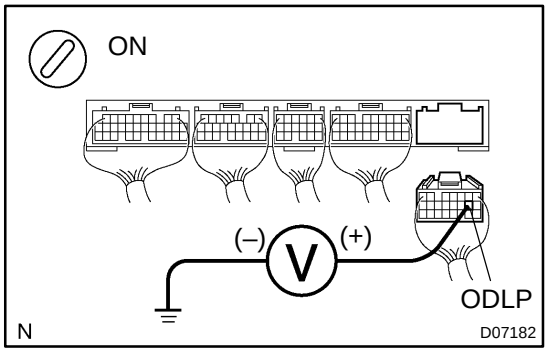
PREPARATION:
Turn the ignition switch ON.
CHECK:
Check the voltage between terminal ODMS of the ECM and the body ground when the O/D main switch is ON and OFF.
OK:

O/D main switch condition	Specified voltage
Press continuously O/D main switch	Below 1.0 V
Release O/D main switch	10 – 14 V

OK → **Check and replace ECM (See page IN–31).**

NG

5	Check voltage between terminal ODLP of ECM and body ground.



PREPARATION:
(a) Disconnect the connector of the ECM.
(b) Turn the ignition switch ON.
CHECK:
Check the voltage between terminal ODLP of the ECM and the body ground.
OK:
Voltage: 7.5 – 14 V

OK → **Check and replace ECM (See page IN–31).**

NG

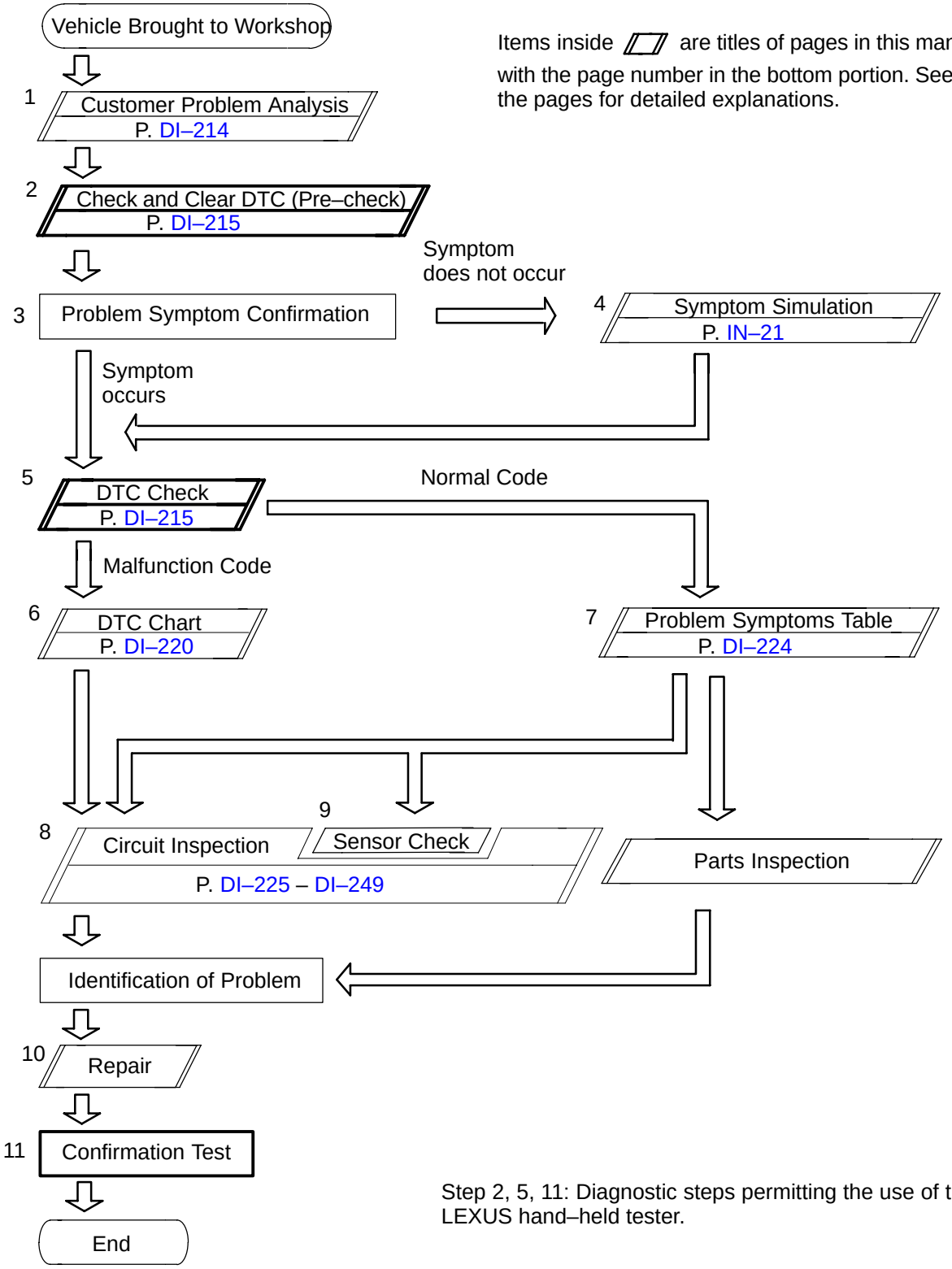
Check and replace harness and connector between combination meter and ECM, O/D main switch and ECM, O/D main switch and body ground (See page IN–31).

ELECTRONIC MODULATED SUSPENSION

DI0AB–05

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting 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, 11: Diagnostic steps permitting the use of the LEXUS hand–held tester.

DI0AC–03

CUSTOMER PROBLEM ANALYSIS CHECK

ELECTRONIC MODULATED SUSPENSION Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in		**Odometer Reading**	

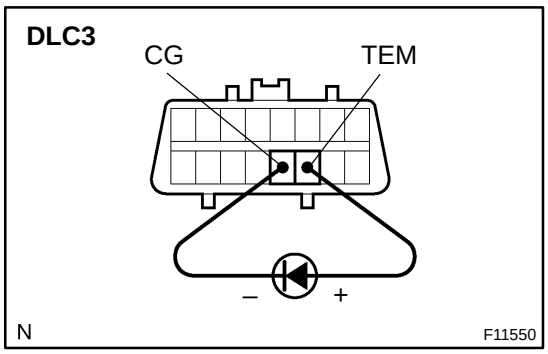
Date Problem First Occurred		
Frequency Problem Occurs		☐ Constant ☐ Sometimes (times per day, month) ☐ Once only
Conditions at Time of Problem Occurrence	**Weather**	☐ Fine ☐ Cloudy ☐ Rainy ☐ Snowy ☐ Various/ Others
	Outdoor Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (Approx. °F(°C))
	Place	☐ Highway ☐ Suburbs ☐ Inner City ☐ Hill (Up, Down) ☐ Rough Road ☐ Others ( )

Symptoms	☐ Malfunction in damping force control	☐ Anti–roll control does not operate ☐ Anti–squat control does not operate ☐ Anti–dive control does not operate ☐ High speed control does not operate ☐ Bounding control does not operate ☐ Others ( )
	☐ Others	

DTC Check	**1st Time**	☐ Normal code ☐ Malfunction code (code)
	2nd Time	☐ Normal code ☐ Malfunction code (code)

DI0AD–05

PRE–CHECK



1. DIAGNOSIS SYSTEM

(a) Check the TEM output (LED lightening check).

(1) Connect the LED to terminals TEM and CG of the DLC3.

NOTICE:

If connected reversely, the LED does not light.

HINT:

Use the LED whose recommended operating current is 10 – 20 mA.

(2) Turn the ignition switch ON, and check that the LED lights for about 2 seconds.

HINT:

If the LED does not light, inspect the TEM circuit (See page DI–245).

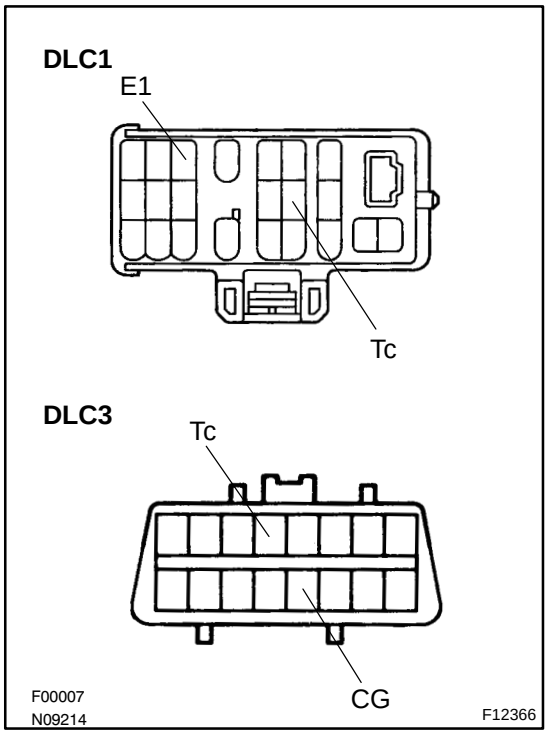
(b) DTC the check.

(1) Check the battery positive voltage.

Battery positive voltage: 10 – 14 V (When the engine stopped)

(2) After driving the vehicle, using SST, connect terminals Tc and E1 of the DLC1, or terminals Tc and CG of the DLC3.

SST 09843–18020 or 09843–18040

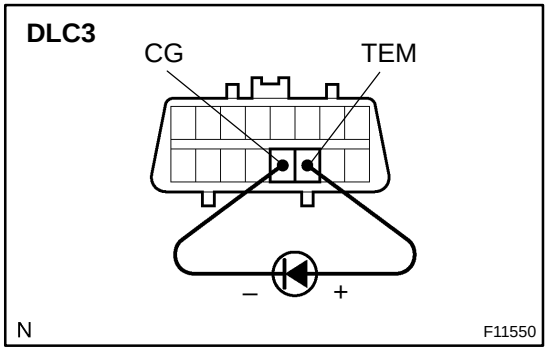


HINT:

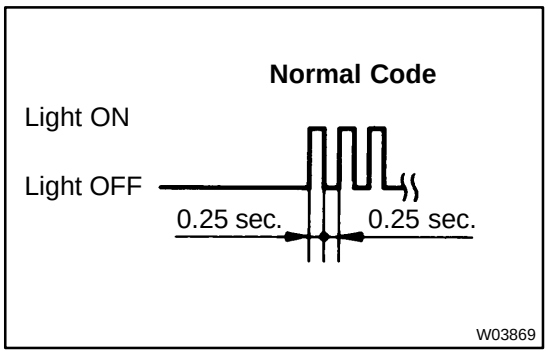
- Do not stop the engine.
- Under this condition, the ignition switch is ON.

NOTICE:

Wrong connection of the connector may cause a malfunction. With extreme caution, connect the connector.



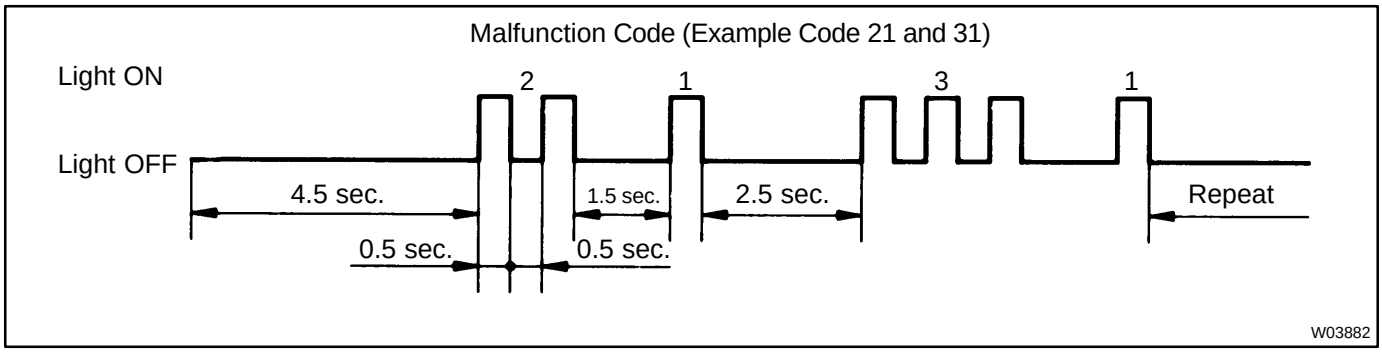
(3) Connect the LED to terminals TEM and CG of DLC3.



(4) Check the number that the LED blinks.

HINT:

- When the code is normal, the LED keeps on for 0.25 seconds and off for 0.25 seconds repeatedly.
- When more than 2 diagnosis codes are detected, the diagnosis codes are displayed in order from the smallest number.
- If no code appears, inspect the diagnostic circuit (See page DI–247).
- Codes are explained in the code table on page DI–220.

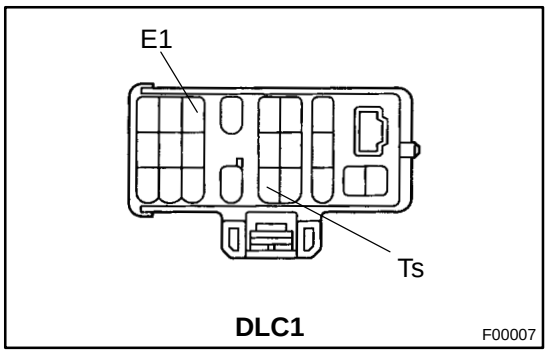


(5) Disconnect the SST from terminals Tc and E1 of the DLC1, or terminals Tc and CG of the DLC3.

SST 09843–18020 or 09843–18040

Confirm that the connected LED is off.

(6) When an abnormal code is output, inspect the function, absorber control ECU and input signal.



(c) Check the damping force controlling condition.

(1) Using SST, connect terminals Ts and E1 of the DLC1 with the ignition switch OFF (TEST mode).

SST 09843–18020

(2) Start the engine.

Under this condition, the absorber control actuator position becomes 1 (Soft).

(3) Starting from the above mentioned position, as the brake pedal is depressed, the absorber control actuator position increase (1 → 2 → 3 → ... 15 → 16).

At this time, bounce the vehicle and check that the shock absorber is becoming harder.

HINT:

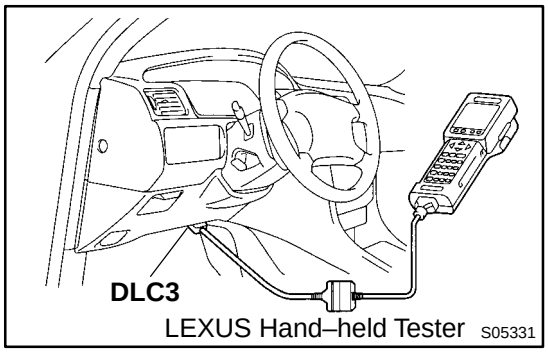
- To hold the shock absorber control actuator at a specific position, adjust it to the position using the above mentioned procedure then increase the vehicle speed to over 5 km/h.

  After that the shock absorber control actuator position does not change until the ignition switch is turned OFF.

- If the absorber control actuator does not operate, inspect the absorber control actuator circuit and absorber control ECU.

(4) Disconnect the SST from terminals Ts and E1 of the DLC1.

SST 09843–18020



(d) Using LEXUS hand–held tester, check the DTC.

(1) Connect the LEXUS hand–held tester to the DLC2.

(2) Monitor the ECU data by following the prompts on the tester screen.

Please refer to the LEXUS hand–held tester operator's manual.

LEXUS hand–held tester has a "Snapshot" function. This records the measured values and is effective in the diagnosis of intermittent problems.

(e) Clear the DTC.

The diagnosis memory is erased by turning the ignition switch OFF.

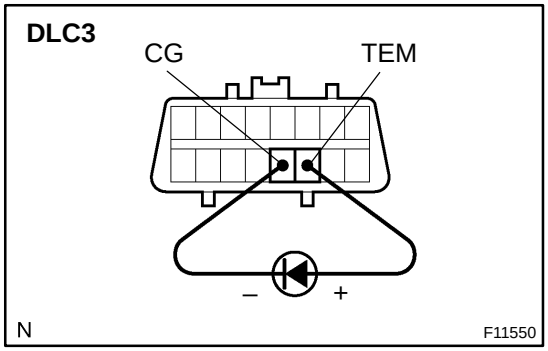
(f) Check the input signal (TEST mode check).

This function checks if signals from the steering sensor and stop light switch etc. are being input normally to the ECU.

(1) Check the battery positive voltage.

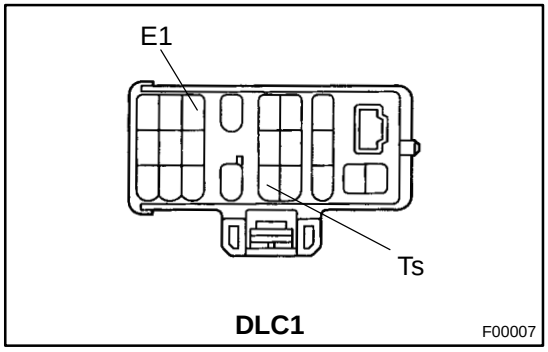
Battery positive voltage: 10 – 14 V (When the engine stopped)

(2) Turn ignition switch OFF.



(3) Connect the LED to terminals TEM and CG of the DLC3.

(4) Set each of the check items in the table below to the condition of operation (A).



(5) Using SST, connect terminals Ts and E1 of the DLC1 (TEST mode).

SST 09843–18020

(6) Start the engine.

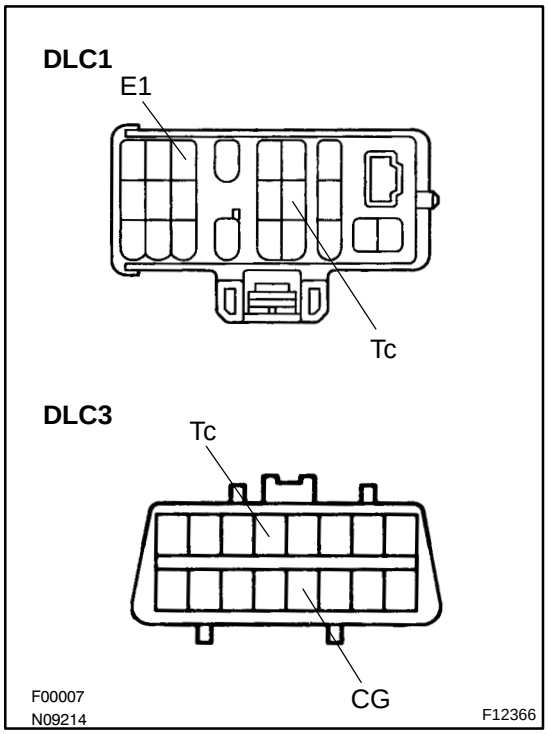
(7) Each of the check items is set to the condition of operation (B).

HINT:

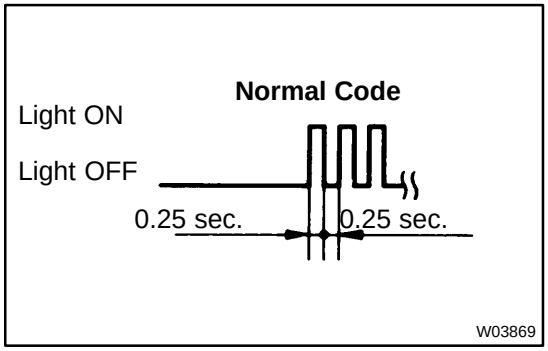
- The LED lights for 1 sec. before it blinks.
- If operation (B) has not been tone, DTC will indicate.

NOTICE:
Do not turn off the ignition switch OFF. Diagnosis code are erased by turning the ignition switch OFF.

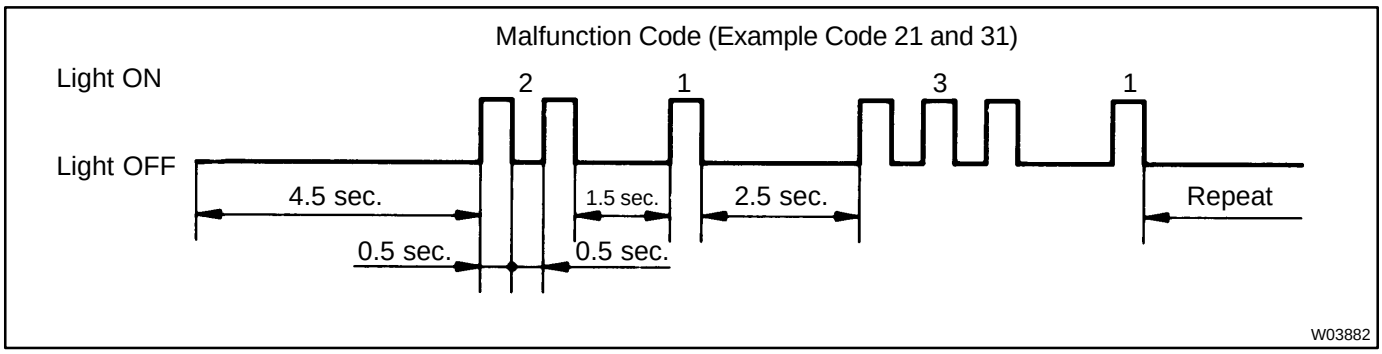
Check Item	Operation (A)	Operation (B)
Steering Sensor Signal	Steering wheel straight ahead	Steering wheel angle 36° degrees or larger
Vehicle Speed Sensor Signal	Vehicle speed below 12 mph (20 km/h)	Vehicle speed 12 mph (20 km/h) or higher
Stop Light Switch Signal	OFF (Brake pedal not depressed)	ON (Brake pedal depressed)
Crankshaft Position Sensor Signal	Engine speed below 2,000 rpm or more	Engine speed 2,000 rpm or higher
Absorber Control Switch Signal	–	Slowly move the absorber control switch "COMFORT" ↔ "SPORT" both ways once



(8) Using SST, connect terminals Tc and E1 of the DLC1, or terminals Tc and CG of the DLC3.
SST 09843–18020 or 09843–18040



(9) Check the number that the LED blinks.
HINT:
When the code is normal, the LED keeps on for 0.25 sec. and off for 0.25 sec. repeatedly.



(g) Desert from the input signal check mode.
With the ignition switch OFF, disconnect the SST from the DLC1 or DLC3.
SST 09843–18020 or 09843–18040

2. FAIL–SAFE FUNCTION

When short circuit of the shock absorber control actuator is detected, the shock absorber control actuator located on the other side of the detected shock absorber is held at step 8. The shock absorber control actuator remains uninterrogated until the ignition switch becomes OFF.

DI0AE–05

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during the DTC check, identify the DTC code and check the circuit listed in code. For details of each code, refer to the "See page" under respective "DTC No." in the DTC chart.

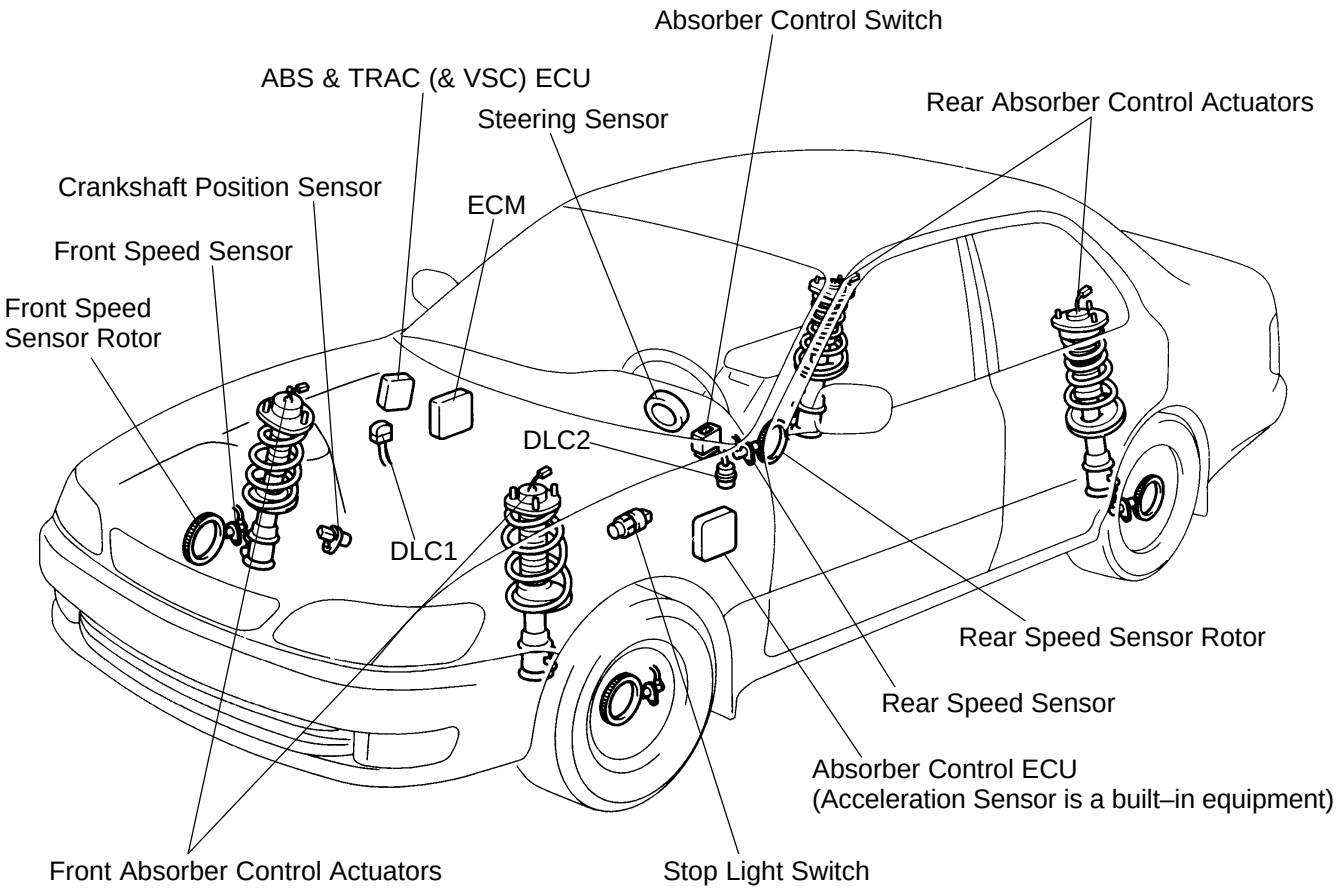
DTC No. (See Page)	Detection Item	Trouble Area
21 (DI–225)	Short circuit in front absorber control actuator circuit	●Left front, right front, left rear and right rear absorber control actuator ●Short circuit in between absorber control actuator and absorber control ECU ●Absorber control ECU
23 (DI–225)	Short circuit in rear absorber control actuator circuit	
31 (DI–229)	Acceleration sensor signal malfunction	●Absorber control ECU (Acceleration sensor is a built–in equipment)
34 (DI–230)	Front speed sensor signal malfunction	●Right front and right rear speed sensor ●Open or short circuit in between absorber control ECU and ABS & TRAC (& VSC) ECU ●Open or short circuit in between ABS & TRAC (& VSC) ECU and ABS speed sensor ●Error in other system that uses the same speed sensor signal ● ABS & TRAC (& VSC) ECU ●Absorber control ECU
35 (DI–230)	Rear speed sensor signal malfunction	
36 (DI–232)	Steering sensor signal malfunction	●Battery ●Steering sensor ●Open or short circuit in between absorber control ECU and steering sensor ●Absorber control ECU
41 (DI–235)	Crankshaft position sensor signal malfunction	●Open or short circuit in between absorber control ECU and ECM ●ECM ●Absorber control ECU
42 (DI–237)	Stop light switch signal does not input	●Stop light switch ●Open or short circuit in between absorber control ECU and stop light switch ●Error in other system that uses the same stop light switch ●Absorber control ECU
52 (DI–239)	Absorber control switch signal malfunction	●Absorber control switch ●Open or short circuit in between absorber control switch and absorber control ECU ●Absorber control ECU

HINT:

- DTCs 36, 42, and 52 can be detected only in the input signal inspecting mode.
- All the DTCs are erased when the ignition switch is turned OFF.

DI0AF–05

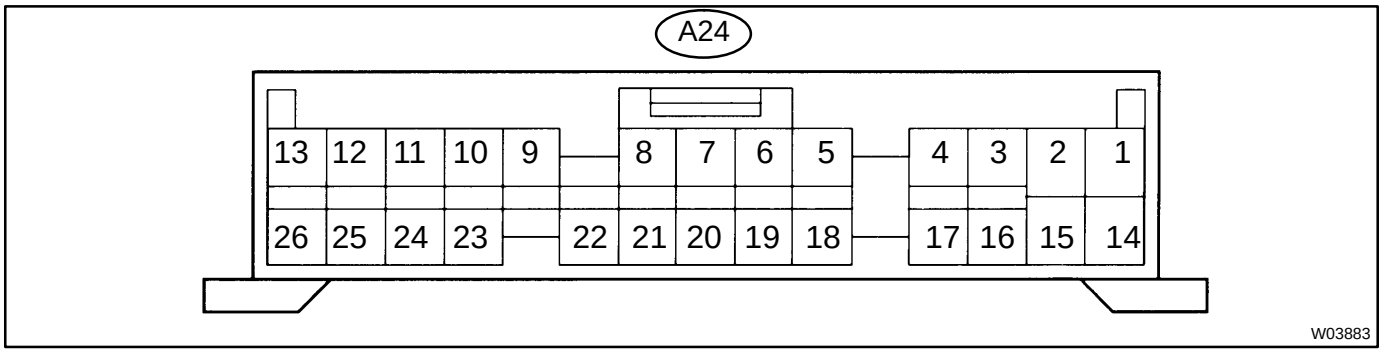
PARTS LOCATION



W04370

DI1AG–03

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
GND (A24 – 1) – Body ground	W–B – Body ground	Always	Continuity
+B (A24 – 2) – Body ground	B–R – Body ground	IG switch ON	10 – 14
SW2 (A24 – 3) – Body ground	V – Body ground	IG switch ON Absorber control switch 1	8 V or more
		IG switch ON Absorber control switch 2	Below 1.5
TEM (A24 – 4) – Body ground	P – Body ground	Connect terminals TEM and E1 of DLC2 for 2 sec. after the ignition	10 – 14
RB– (A24 – 5) – Body ground	R – Body ground	Always	Continuity
RB+ (A24 – 6) – Body ground	R–Y – Body ground	Always	Continuity
RA– (A24 – 7) – Body ground	R–W – Body ground	Always	Continuity
RA+ (A24 – 8) – Body ground	L–R – Body ground	Always	Continuity
FB– (A24 – 10) – Body ground	L–B – Body ground	Always	Continuity
FB+ (A24 – 11) – Body ground	L – Body ground	Always	Continuity
FA– (A24 – 12) – Body ground	L–W – Body ground	Always	Continuity
FA+ (A24 – 13) – Body ground	L–Y – Body ground	Always	Continuity
NEO (A24 – 14) – Body ground	B–O – Body ground	Start the engine Make it run at idle	1 – 14
SS1 (A24 – 16) – Body ground	R – Body ground	IG switch ON Steering wheel is being turned slowly	1.2 – 14
SS2 (A24 – 17) – Body ground	R–G – Body ground	IG switch ON Steering wheel is being turned slowly	1.2 – 14
RRO (A24 – 18) – Body ground	GR–L – Body ground	While driving	1.5 – 14
Ts (A24 – 19) – Body ground	R–Y – Body ground	IG switch ON , Connect terminals Ts and E1 of DLC1	Below 1.5
		IG switch ON Disconnect terminals Ts and E1 of DLC1	10 – 14
FRO (A24 – 20) – Body ground	GR–R – Body ground	While driving	1.5 – 14

SW1 (A24 – 21) – Body ground	Y – Body ground	IG switch ON	Absorber control switch 1	Below 1.5
		IG switch ON	Absorber control switch 4	8 V or more
Tc (A24 – 22) – Body ground	LG–R – Body ground	IG switch ON	Connect terminals Tc and E1 of DLC1	Below 1.5
		IG switch ON	Disconnect terminals Tc and E1 of DLC1	10 – 14
STP (A24 – 26) – Body ground	G–W – Body ground	IG switch ON	Brake pedal is released	10 – 14
		IG switch ON	Brake pedal is depressed	Below 1.5

DI0AH–05

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.

Symptom	Inspection Circuit	See page
Damping force control does not operate at all	1. Absorber control actuator circuit 2. Ts terminal circuit 3. Shock absorber 4. Absorber control ECU	DI–225 DI–249 SA–24 SA–49 –
Only anti–roll control does not operate	1. Steering sensor circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–232 DI–230 –
Only anti–squat control does not operate	1. Crankshaft position sensor circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–235 DI–230 –
Only anti–dive control does not operate	1. Stop light switch circuit 2. Speed sensor circuit 3. Absorber control ECU	DI–237 DI–230 –
Only semi–active control does not operate	1. Speed sensor circuit 2. Absorber control ECU (Deceleration sensor is a built–in equipment)	DI–230 –
Only speed sensing control does not operate	1. Speed sensor circuit 2. Absorber control ECU	DI–230 –
Only unsprung damping control does not operate	1. Speed sensor circuit 2. Absorber control ECU	DI–230 –

DI0AI–05

CIRCUIT INSPECTION

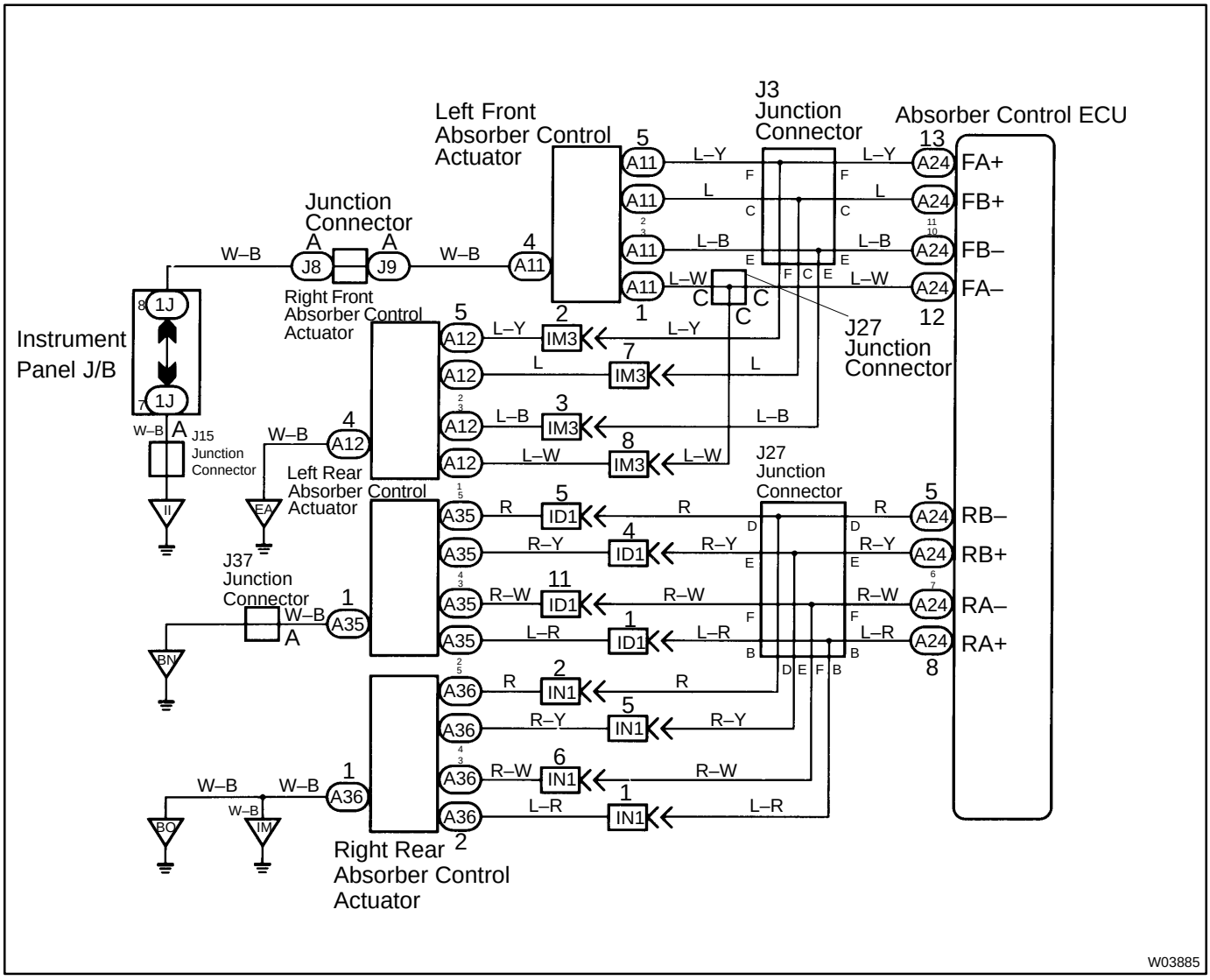
DTC	21, 23	Absorber Control Actuator Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
*1 21, *2 23	When the absorber control actuator is activated, over current flows through the front or rear driving circuit.	●Left front, right front, left rear and right rear absorber control actuator ●Short circuit in between absorber control actuator and absorber control ECU ●Absorber control ECU

*1: Code 21 corresponds to the left front and right front absorber control actuator circuit.
*2: Code 23 corresponds to the left rear and right rear absorber control actuator circuit.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of absorber control actuator.**

CHECK:

Using the same method as used for the clamping force control, check that clamping force of the absorber control actuator changes.

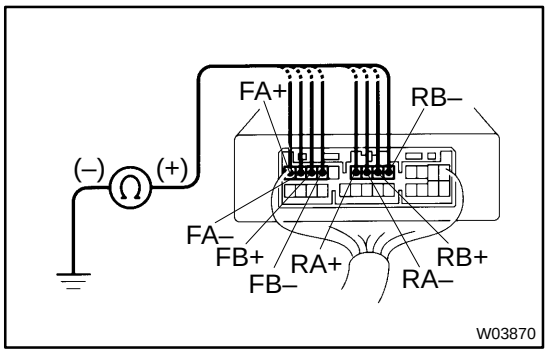
OK:

Bounce the vehicle and check that the shock absorber is becoming harder.

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	**Check continuity between terminals RB–, RB+, RA–, RA+, FB–, FB+, FA– and FA+ of absorber control ECU connector and body ground.**



PREPARATION:

Remove the No.1 lower panel (See page BO–82).

CHECK:

Check the continuity between terminals RB–, RB+, RA–, RA+, FB–, FB+, FA–, and FA+ of the absorber control ECU connector and the body ground.

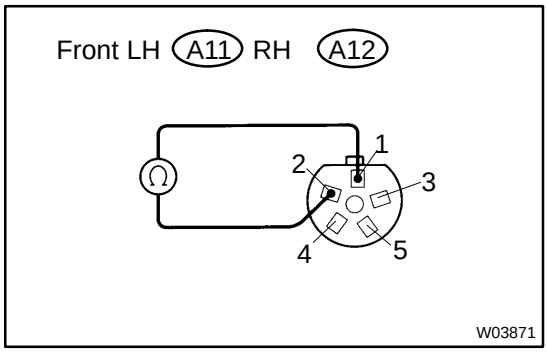
OK:

Continuity

NG → **Check and replace absorber control ECU**

OK

3	Check absorber control actuator.



FRONT ABSORBER CONTROL ACTUATOR

PREPARATION:

(a) Remove the shock absorber cap (See page SA–25).

(b) Remove the absorber control actuator connector.

CHECK:

Measure the resistance between each terminal of the front absorber control actuator.

OK:

Front absorber control actuator:

Terminal A11 or A12 – 1 and A11 or A12 – 2	13.4 – 15.0 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 3	13.4 – 15.0 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 4	13.4 – 15.0 Ω
Terminal A11 or A12 – 1 and A11 or A12 – 5	13.4 – 15.0 Ω

REAR ABSORBER CONTROL ACTUATOR

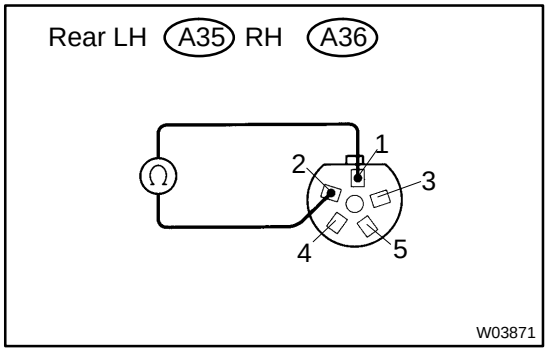
PREPARATION:

(a) Remove the rear seat cushion, rear seat back, roof side inner garnish, high mounted stop light and seat belt.

(b) Remove the absorber control actuator connector (See page SA–50).

CHECK:

Measure the resistance between each terminal of the rear absorber control actuator.



OK:

Rear absorber control actuator:

Terminal A35 or A36 – 1 and A35 or A36 – 2	13.4 – 15.0 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 3	13.4 – 15.0 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 4	13.4 – 15.0 Ω
Terminal A35 or A36 – 1 and A35 or A36 – 5	13.4 – 15.0 Ω

NG → **Replace absorber control actuator.**

OK

4	**Check harness and connectors between absorber control ECU and absorber control actuator, absorber control actuator and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).*

*: When DTC 21 or 23 is displayed, check and replace the absorber control ECU.

DI0AJ–03

DTC	31	Acceleration Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
31	Acceleration sensor signal malfunction.	●Absorber control ECU (Acceleration sensor is a built–in equipment)

INSPECTION PROCEDURE

As the acceleration sensor is a built–in equipment for the absorber control ECU, replace them as a unit.

DI0AK–06

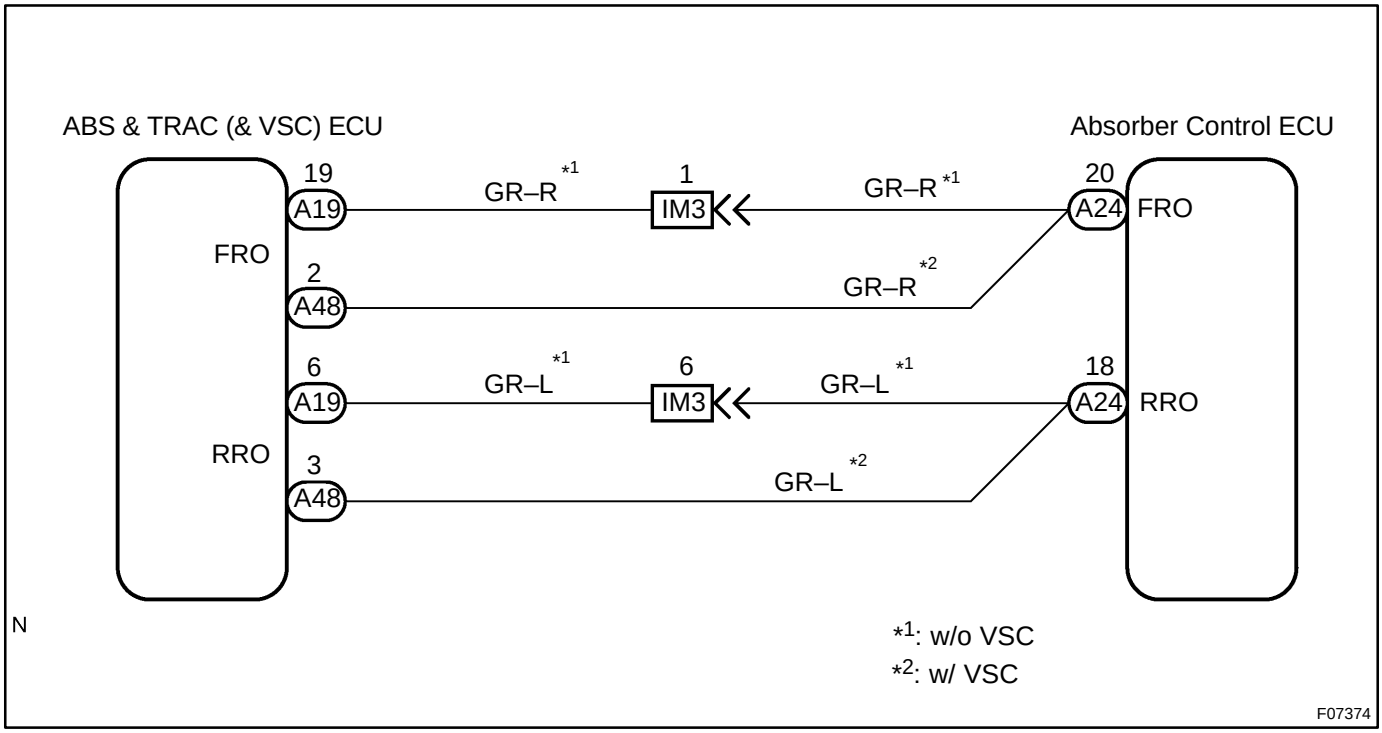
DTC	34, 35	Speed Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
34*1, 35*2	When vehicle speed is less than 20 km/h (12 mph), or any signal is not input at all.	●Right front and right rear speed sensor ●Open or short circuit in between absorber control ECU and ABS & TRAC (& VSC) ECU ●Open or short circuit in between ABS & TRAC (& VSC) ECU and ABS speed sensor ●Error in other system that uses the same speed sensor signal ●ABS & TRAC (& VSC) ECU ●Absorber control ECU

*1: Code 34 corresponds to the right front speed sensor circuit.
*2: Code 35 corresponds to the right rear speed sensor circuit.

WIRING DIAGRAM

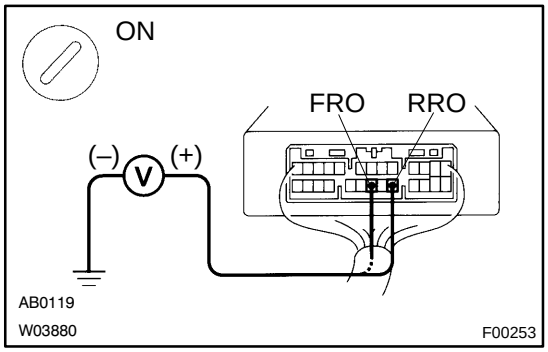


INSPECTION PROCEDURE

HINT:

- When DTC 34 is displayed, check the right front speed sensor circuit.
- When DTC 35 is displayed, check the right rear speed sensor circuit.

1	**Check voltage between terminals RRO and FRO of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Start the engine.

CHECK:

Measure the voltage between terminals RRO and FRO of the absorber control ECU connector and the body ground while driving.

OK:

Voltage: 1.5 – 8 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	**Check speed sensor (See page DI–253 or DI–368).**

NG → **Repair or replace harness, connector, speed sensor or rotor.**

OK

3	**Check harness and connectors between absorber control ECU and ABS & TRAC (& VSC) ECU (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace absorber control ECU or ABS & TRAC (& VSC) ECU.

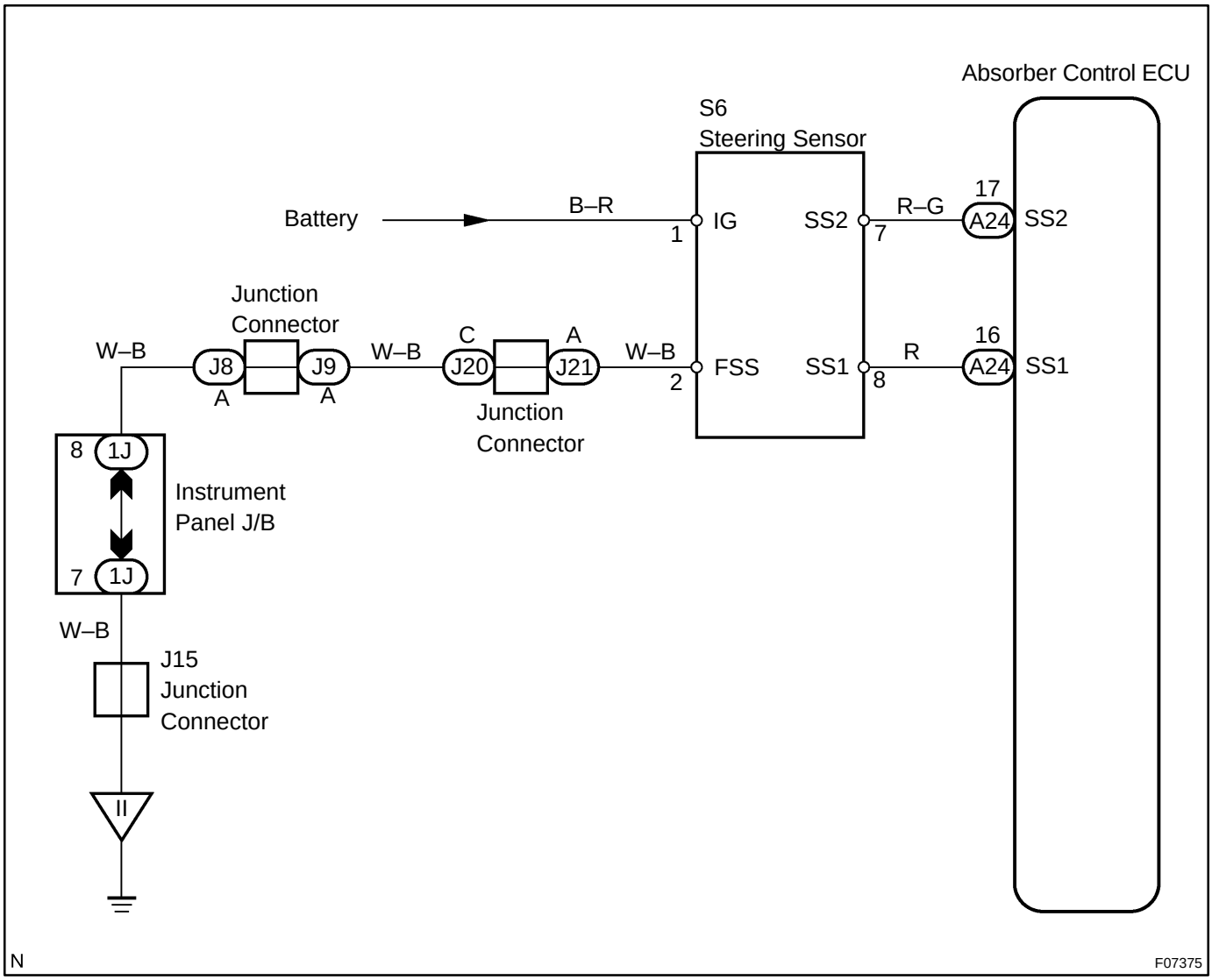
DI0AL–05

DTC	36	Steering Sensor Circuit

CIRCUIT DESCRIPTION

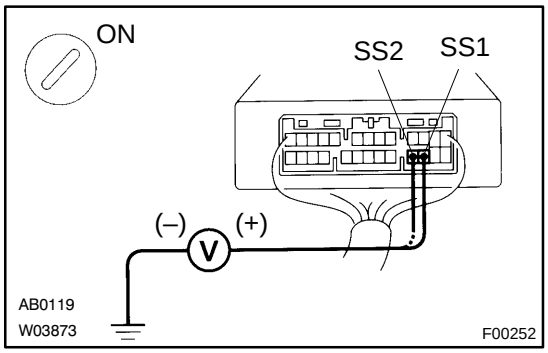
DTC No.	DTC Detecting Condition	Trouble Area
36	When steering angle is less than 36˚, or any signal is not input at all.	●Battery ●Steering sensor ●Open or short circuit in between absorber control ECU and steering sensor ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals SS1 and SS2 of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals SS1 and SS2 of the absorber control ECU connector and the body ground when the steering wheel is turned slowly.

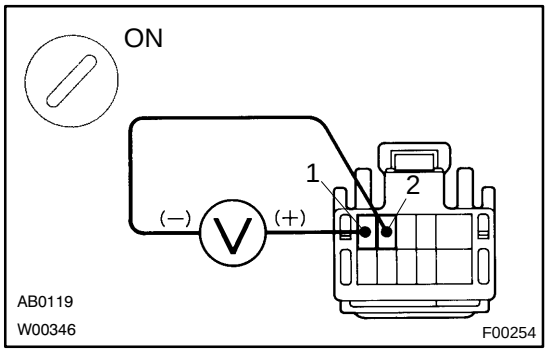
OK:

Changes between 1 V and approx. 3.5 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	**Check voltage between terminals 1 and 2 of steering sensor connector.**



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–11).

(b) Disconnect the steering sensor connector.

(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals 1 and 2 of the steering sensor connector.

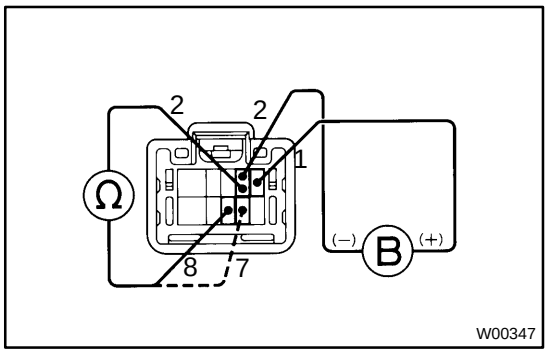
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness and connectors between battery and steering sensor.**

OK

3	**Check steering sensor.**



PREPARATION:
Apply battery positive voltage in between terminals 1 and 2.
CHECK:
Measure the resistance between terminal 2 and terminals 7 and 8 of the steering sensor connector when the rotating part of the steering sensor is turned slowly.
OK:

Changes between 0 Ω and ∞ Ω

NG → **Replace steering sensor.**

OK

4	**Check harness and connectors between absorber control ECU and steering sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace absorber control ECU.

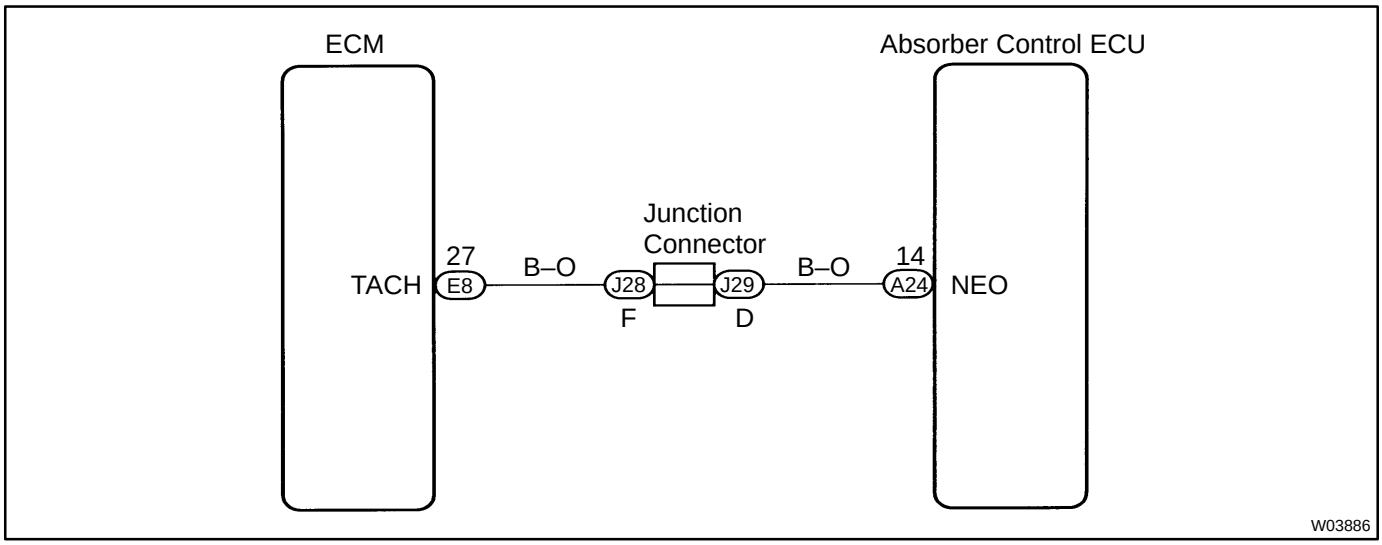
DI0AM–05

DTC	41	Crankshaft Position Sensor Circuit

CIRCUIT DESCRIPTION

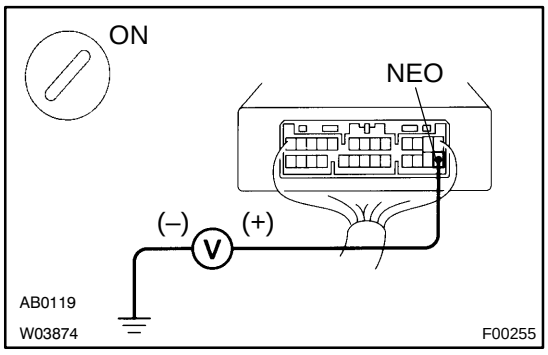
DTC No.	DTC Detecting Condition	Trouble Area
41	When engine speed is less than 2,000 rpm, or any signal is not input at all.	●Open or short circuit in between absorber control ECU and ECM ●ECM ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal NEO of absorber control ECU connector and body ground.**



PREPARATION:

(a) Remove the No. 1 lower panel (See page BO–82).

(b) Start the engine, make it run at idle.

CHECK:

Measure the voltage between terminal NEO of the absorber control ECU connector and the body ground.

OK:

Voltage: 1 – 8 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	Check crankshaft position sensor (See page DI–67).

OK → Go to step 4.

NG

3	Check harness and connectors between absorber control ECU and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace absorber control ECU.

4	Does malfunction disappear when a well–known good absorber control ECU is installed?

YES → Check and replace absorber control ECU.

NO

Check and replace ECM.

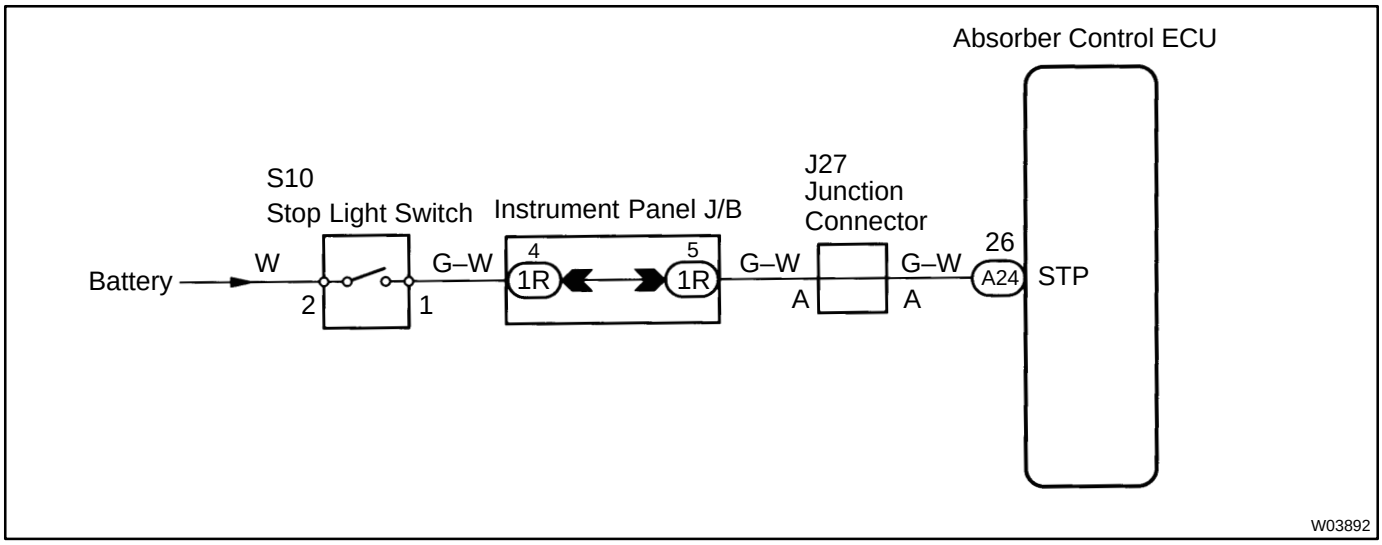
DI0AN–05

DTC	42	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
42	Stop light switch signal does not change.	●Stop light switch ●Open or short circuit in between absorber control ECU and stop light switch ●Error in other system that uses the same stop light switch ●Absorber control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of stop light.

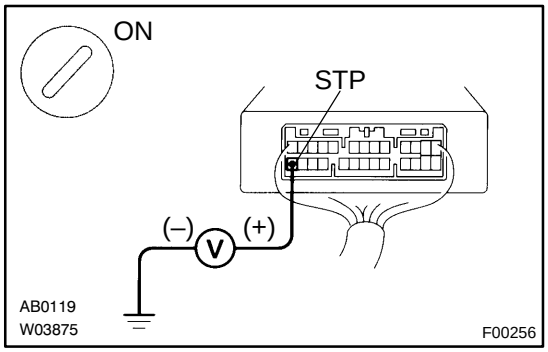
CHECK:

Check that the stop light comes on when the brake pedal is depressed, and goes off when the brake pedal is released.

NG → **Check stop light circuit (See page BE–58).**

OK

2	Check voltage between terminal STP of absorber control ECU connector and body ground.



PREPARATION:

(a) Remove the No. 1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal STP of the absorber control ECU connector and the body ground when the brake pedal is released and depressed.

OK:

Released	10 – 14 V
Depressed	Below 1.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

3	Check harness and connectors between absorber control ECU and stop light switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace absorber control ECU.

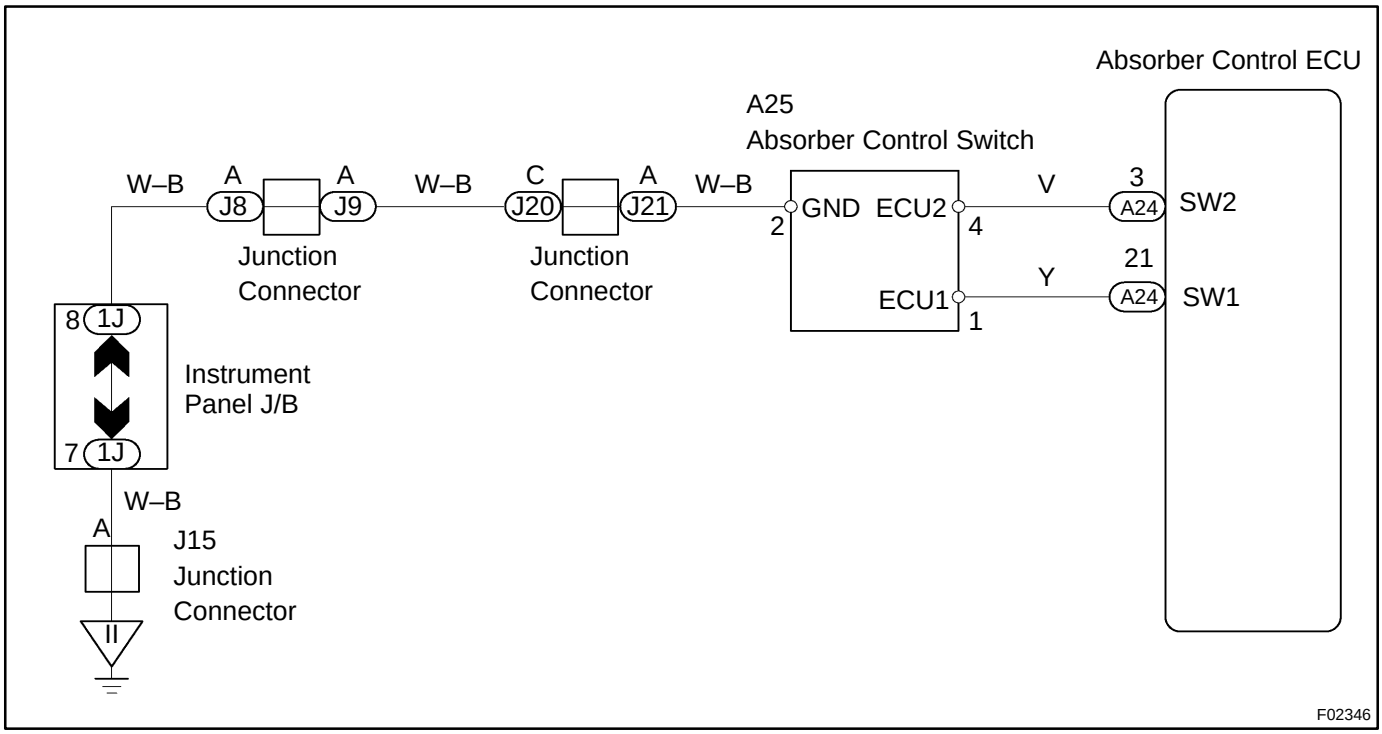
DI0AO–06

DTC	52	Absorber Control Switch Circuit

CIRCUIT DESCRIPTION

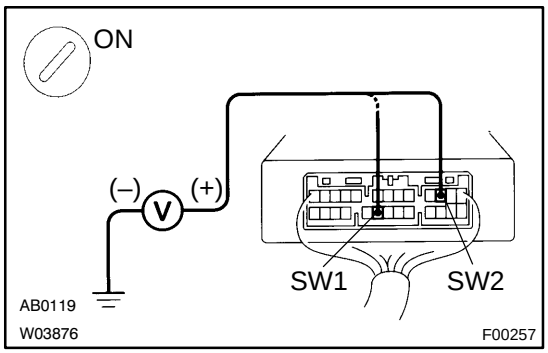
DTC No.	DTC Detecting Condition	Trouble Area
52	SW1 and SW2 of absorber control switch signals do not change.	●Absorber control switch ●Open or short circuit in between absorber control switch and absorber control ECU ●Absorber control ECU

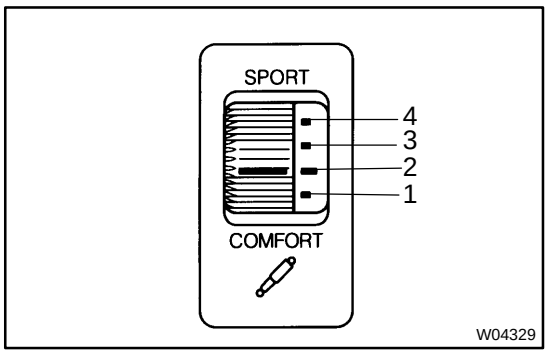
WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check operation of stop light.





PREPARATION:

(a) Remove the No. 1 lower panel (See page BO–82).

(b) Using SST, connect terminals Ts and E1 of the DLC1.
SST 09843–18020

(c) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals SW1 and SW2 of the absorber control ECU connector and the body ground when move slowly moving the absorber control switch "COMFORT" ↔ "SPORT" both ways one.

OK:

SW1:

Absorber control switch 4	8 V or more
Absorber control switch 1	Below 1.5 V

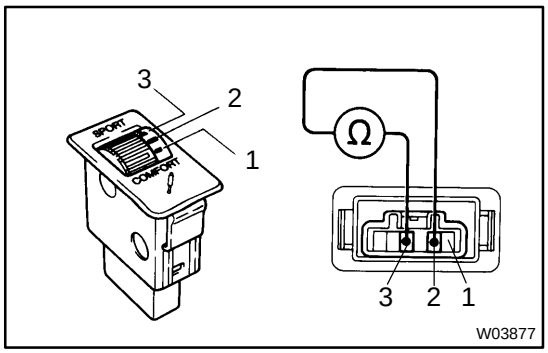
SW2:

Absorber control switch 1	8 V or more
Absorber control switch 2	Below 1.5 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	Check absorber control switch.



PREPARATION:

(a) Remove the upper control panel (See page BO–82).

(b) Disconnect the absorber control switch connector.

CHECK:

Check the continuity between each terminal of the absorber control switch at each switch position.

OK:

Absorber control switch 3:

Terminals 2 and 3	Continuity

Absorber control switch 2:

Terminals 1 and 2	Continuity
Terminals 2 and 3	Continuity

Absorber control switch 1:

Terminals 1 and 2	Continuity

NG → **Replace absorber control switch.**

OK →

3	Check harness and connectors between absorber control ECU and absorber control switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK →

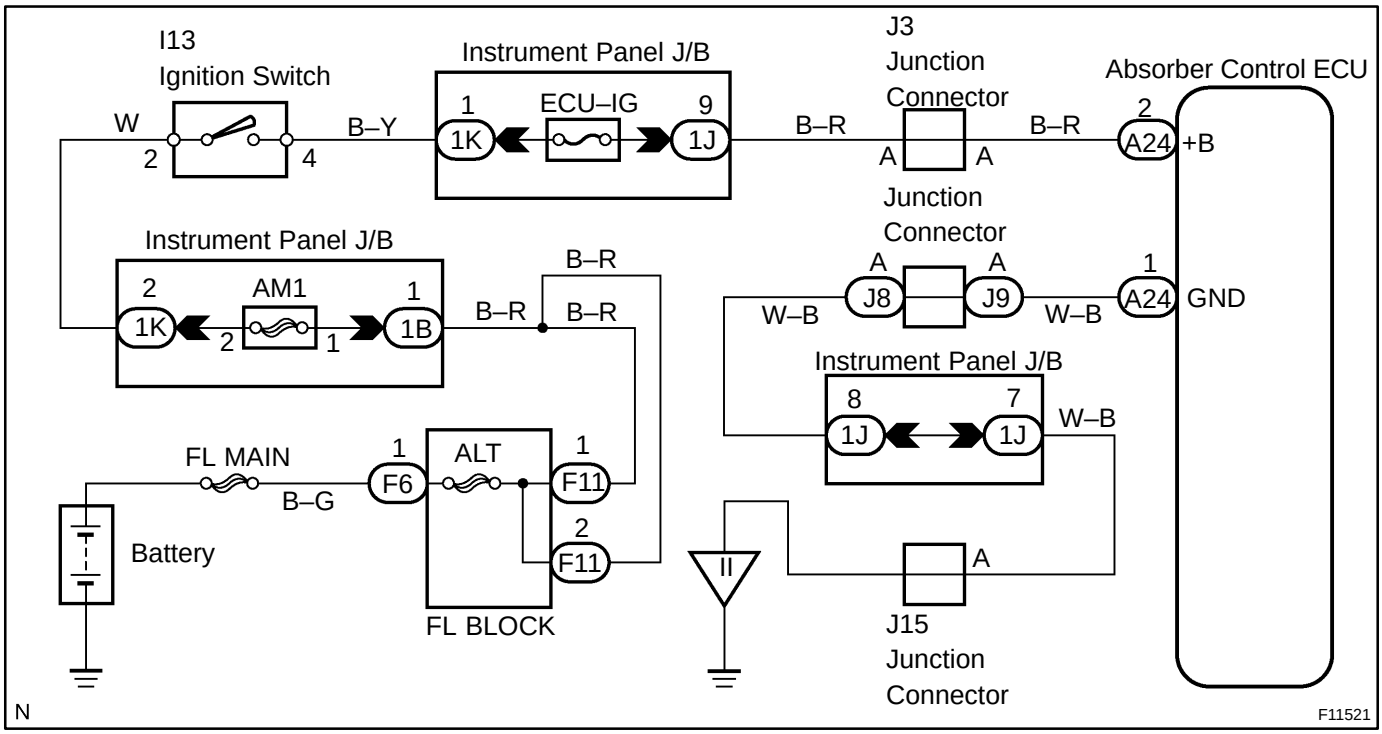
Check and replace absorber control ECU.

Power Source Circuit

CIRCUIT DESCRIPTION

This is the power source for the absorber control ECU, and the absorber control actuator.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check battery positive voltage.**

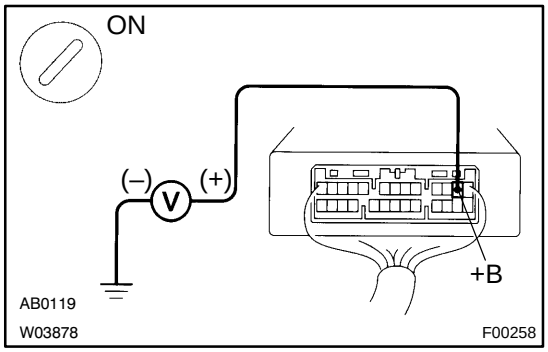
OK:

Voltage: 10 – 14 V

NG → **Charge or replace battery.**

OK

2	Check voltage between terminal +B of absorber control ECU connector and body ground.



PREPARATION:

(a) Remove the No.1 lower panel (See page BO–82).

(b) Turn the ignition switch ON.

CHECK:

Measure the voltage between terminal +B of the absorber control ECU and the body ground.

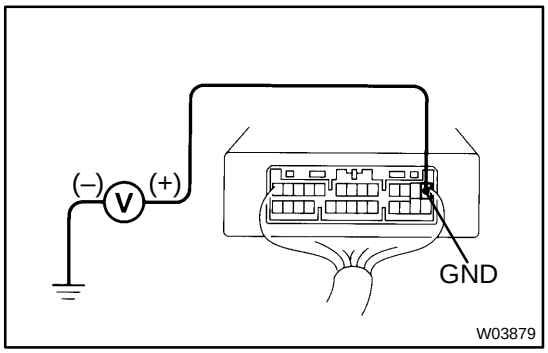
OK:

Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

3	Check continuity between terminal GND of absorber control ECU connector and body ground.



CHECK:

Measure the continuity between terminal GND of the absorber control ECU connector and the body ground.

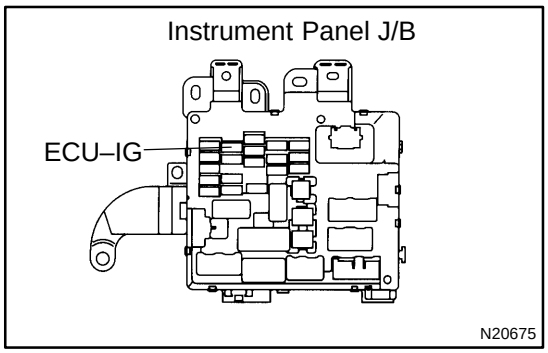
OK:

Continuity

OK → **Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

4	Check ECU–IG fuse.



PREPARATION:

Remove the ECU–IG fuse from the instrument panel J/B.

CHECK:

Check the continuity of the ECU–IG fuse.

OK:

Continuity

NG → **Check for short in all harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

Check for open in harness and connector between absorber control ECU and battery (See page IN–31).

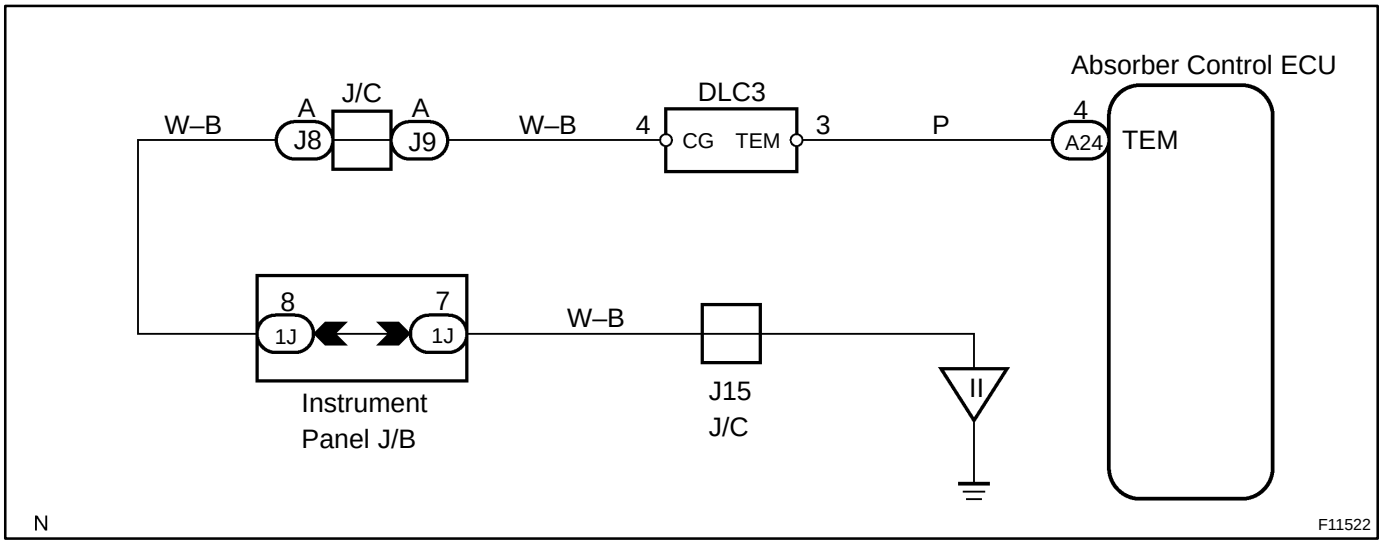
DI0AQ–06

TEM Terminal Circuit

CIRCUIT DESCRIPTION

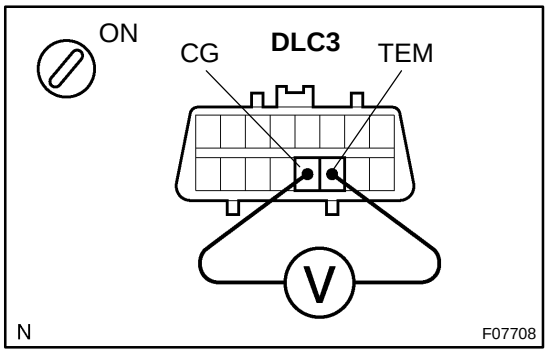
By connecting the LED to between terminals TEM and CG of the DLC3, a TEM output check can be performed (See page DI–215).

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals TEM and CG of DLC3.**



CHECK:

Measure the voltage between terminals TEM and CG of the DLC3 for 2 seconds after the ignition switch is ON.

OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	**Check for open in harness and connectors between terminals CG of DLC3 and body ground (See page IN–31).**

NG → Repair or replace harness or connector.

OK

3	Check harness and connectors between absorber control ECU and DLC3 (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check replace absorber control ECU.

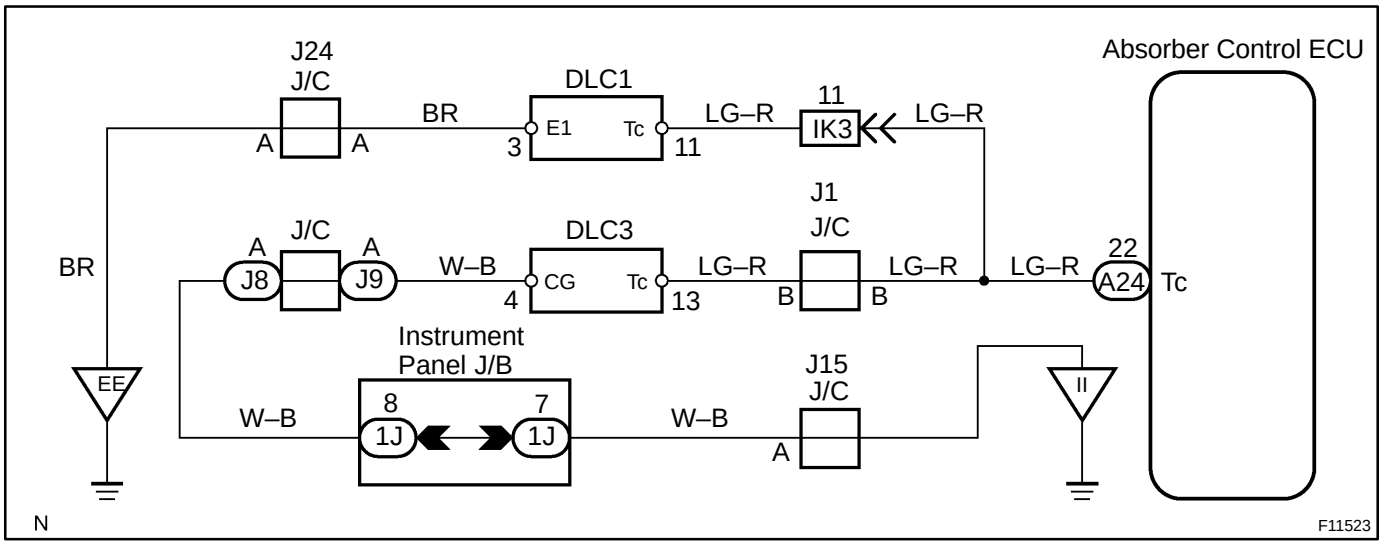
DI0AR–06

Tc Terminal Circuit

CIRCUIT DESCRIPTION

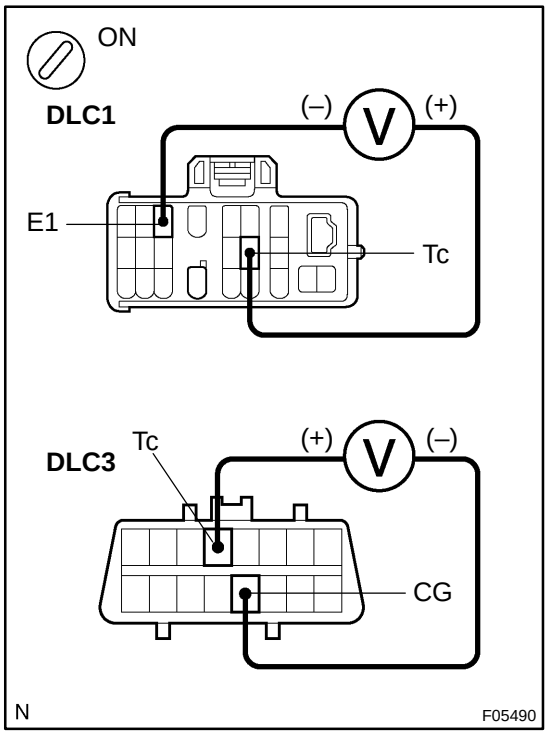
By connecting terminal Tc and E1 of the DLC1 or DLC3, the DTC check mode can be performed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E1 of DLC1 or TC and CG of DLC3.**



PREPARATION:

Turn the ignition switch ON.

CHECK:

Measure the voltage between terminals Tc and E1 of the DLC1, or terminals Tc and CG of the DLC3.

OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	Check for open in harness and connectors between terminals E1 of DLC1, DLC3 and body ground (See page IN–31).

NG → Repair or replace harness or connector.

OK

3	Check harness and connectors between absorber control ECU and DLC1 absorber control ECU and DLC3 (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace absorber control ECU.

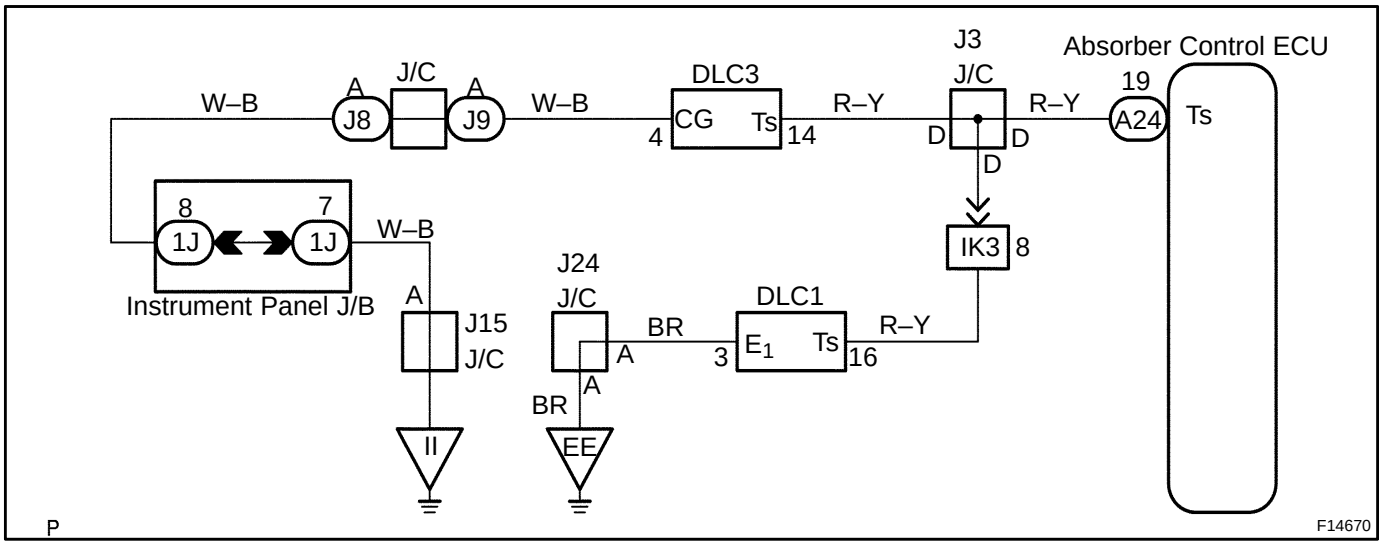
DI0AS–05

Ts Terminal Circuit

CIRCUIT DESCRIPTION

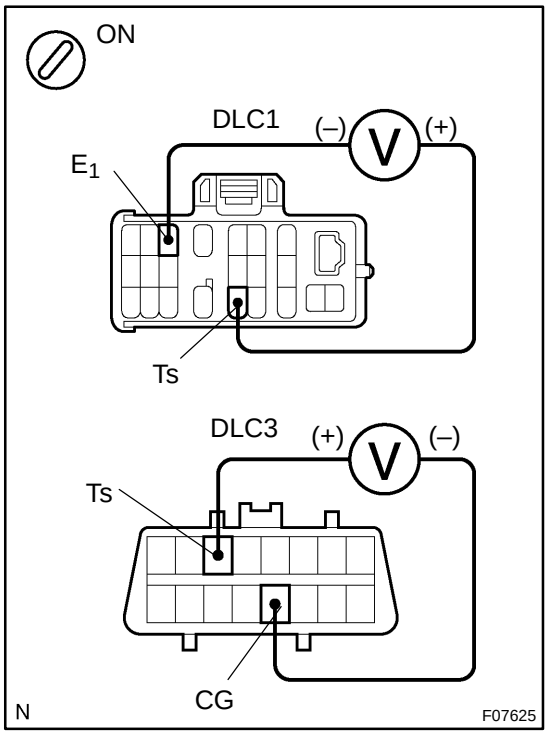
By connecting terminals Ts and E1 of the DLC1 or DLC3, an input signal check can be performed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1 or Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure the voltage between terminals Ts and E_1 of the DLC1, or terminals Ts and CG of the DLC3.

OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptoms table (See page DI–224).**

NG

2	Check for open and short circuit in harness and connector between absorber control ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN–31).

NG → Repair or replace harness or connector.

OK

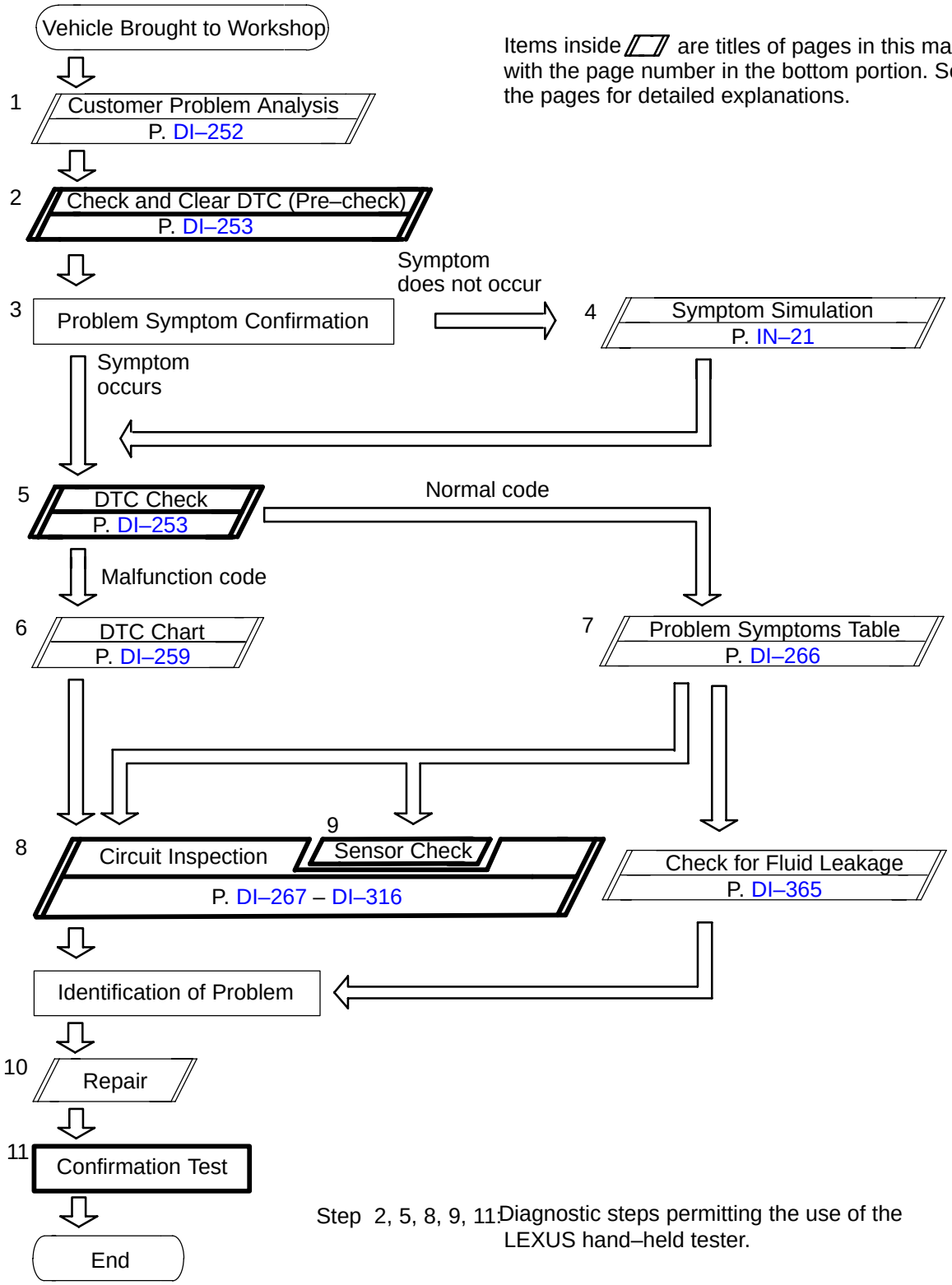
Check and replace absorber control ECU.

ANTI–LOCK BRAKE SYSTEM (Include w/ VSC)

DI0W3–10

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 LEXUS hand–held tester.

DI0W4–08

CUSTOMER PROBLEM ANALYSIS CHECK

ABS Check Sheet

Inspector's Name :

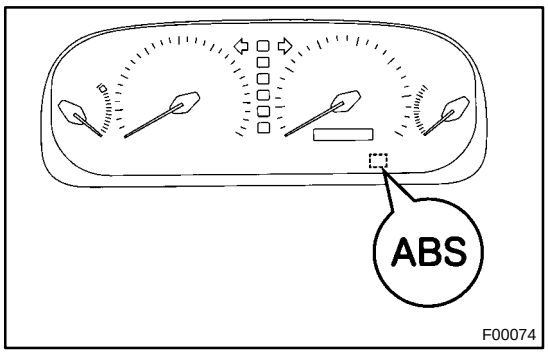
Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

Date Problem First Occurred	/ /
Frequency the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	ABS Warning Light Abnormal	☐ Remains on ☐ Does not light up

DTC Check	**1st Time**	☐ Normal code ☐ Malfunction code (code)
	2nd Time	☐ Normal code ☐ Malfunction code (code)

DI8YO–01

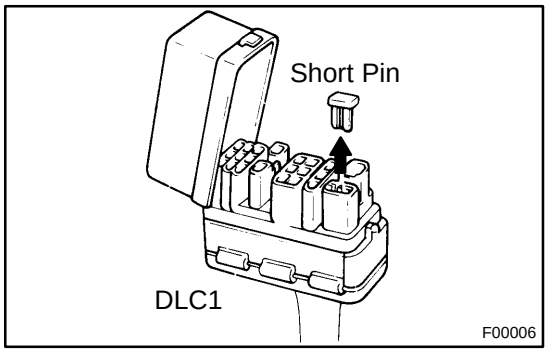


PRE–CHECK

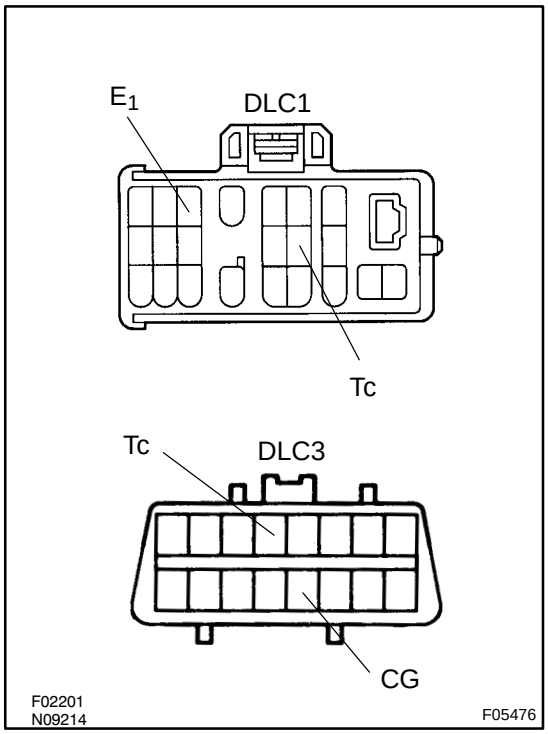
1. DIAGNOSIS SYSTEM

(a) Check the indicator.
When the ignition switch is turned ON, check that the ABS warning light comes on for 3 seconds.

HINT:
If the indicator check result is not normal, proceed to the troubleshooting for the ABS warning light circuit (See page DI–309).



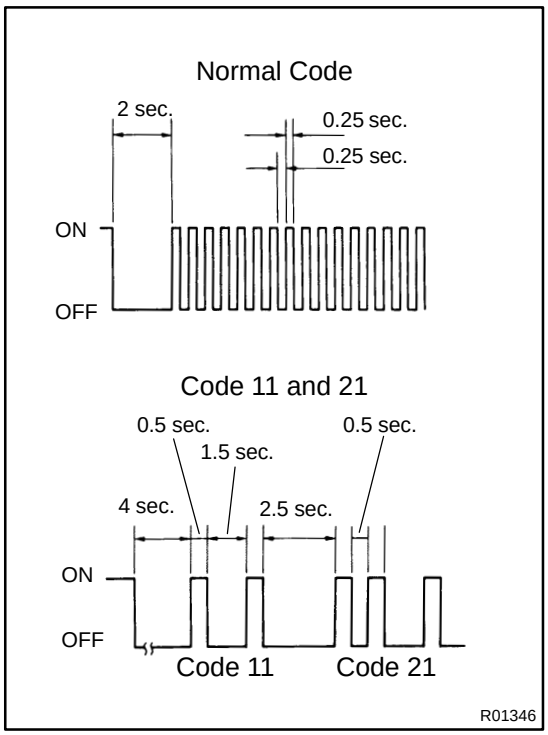
(b) In case of not using LEXUS hand–held tester:
Check the DTC.
(1) Disconnect the short pin from the DLC1.



(2) Using SST, connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3.
SST 09843–18020 or 09843–18040
(3) Turn the ignition switch ON.
(4) Read the DTC from the ABS warning light on the combination meter.

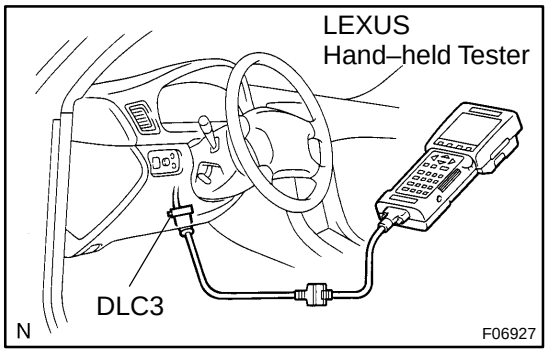
HINT:

- If no code appears, inspect the diagnostic circuit or ABS warning light circuit (See page DI–314 or DI–309).



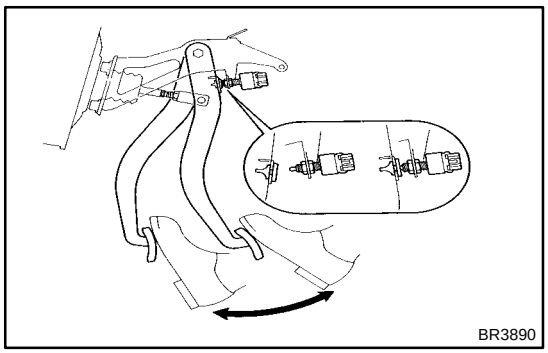
- As an example, the blinking patterns for the normal code and codes 11 and 21 are shown in the illustration.
  (5) Codes are explained in the code table on page DI–259.
  (6) After completing the check, disconnect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3, and turn off the display.

If 2 or more malfunctions are indicated simultaneously the lowest numbered DTC will be displayed first.

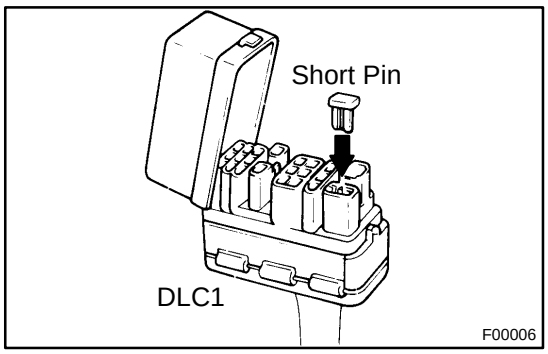


(c) In case of using LEXUS hand–held tester:
Check the DTC.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.

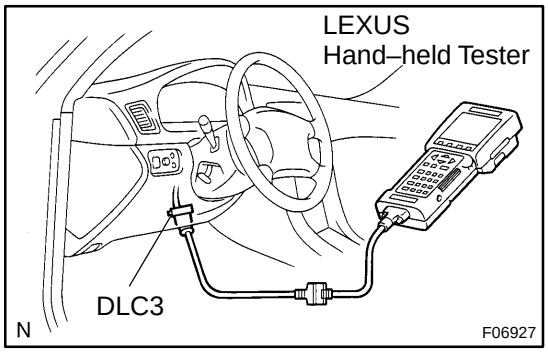


(d) In case of not using LEXUS hand–held tester:
Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of the DLC1 or terminals Tc and CG of the DLC3, and remove the short pin from the DLC1.
SST 09843–18020 or 09843–18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in the ECU by depressing the brake pedal 8 or more times within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the DLC1 or the DLC3.
SST 09843–18020 or 09843–18040

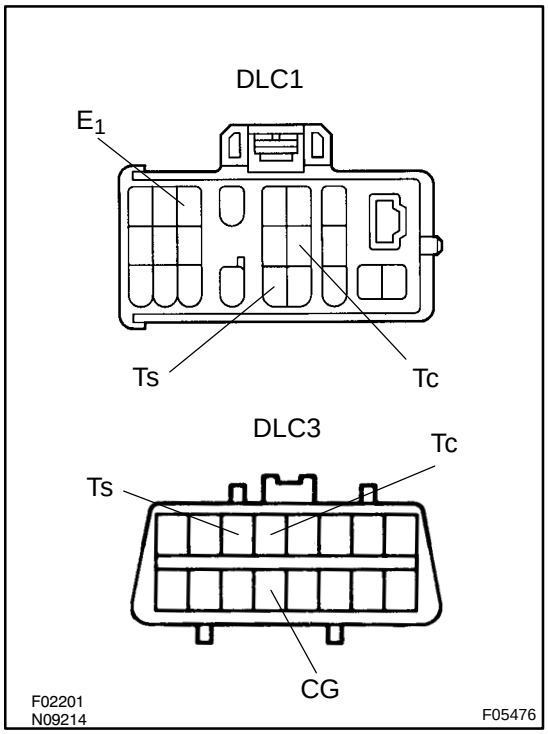


(6) Connect the short pin to the DLC1.

HINT:
The DTC stored in the ECU will be not erased when the battery terminal is disconnected for the troubleshooting.



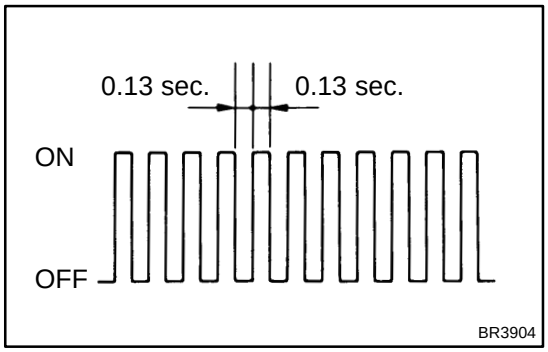
(e) In case of using LEXUS hand–held tester:
Clear the DTC.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the LEXUS hand–held tester to erase the codes.
(See the LEXUS hand–held tester operator's manual.)



2. Test Mode:
SENSOR SIGNAL CHECK

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

(a) In case of not using LEXUS hand–held tester:
Check the sensor signal.
(1) Turn the ignition switch OFF.
(2) Using SST, connect terminals Ts and E_1 of the DLC1 or terminals Ts and CG of the DLC3.
SST 09843–18020 or 09843–18040
(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 terminal circuit (See page DI–309, DI–316).

(5) Keep the vehicle in the stationary condition on the flat place for 1 sec. or more.

(6) Keeping the vehicle in the stationary condition and the brake pedal in free condition for 1 sec. or more, continue to depress the brake pedal with 147 N (15 kgf, 33 lbf) or more for 1 sec. or more.

(7) Keeping the vehicle in the stationary condition, depress the brake pedal with 98 N (10 kgf, 22 lbf) or more quickly.

HINT:

The above mentioned condition comes into existence, the ABS warning light comes ON for 3 seconds.

(8) Drive the vehicle straight forward.
When driving the vehicle at the speed faster than 45 km/h (28 mph) for several seconds, check that the ABS warning light comes off.

HINT:

There is a case that the sensor check is not completed if the vehicle has its rear wheels spun or its steering wheel steered during this check.

(9) Stop the vehicle.

(10) Using SST, connect terminals Tc and E_1 of the DLC1 or terminals Tc and CG of the DLC3.

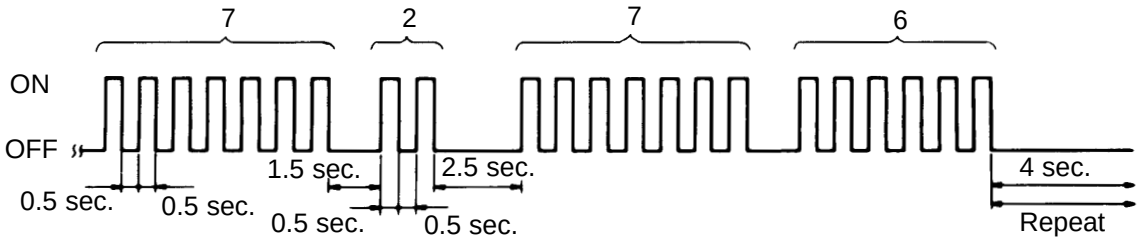
SST 09843–18020 or 09843–18040

(11) Read the number of blinks of the ABS warning light.

HINT:

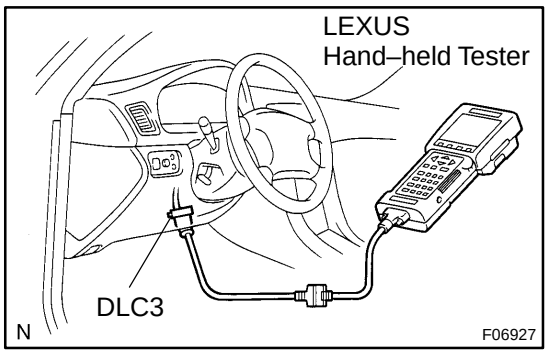
- See the DTC list shown in the bottom of this page.
- If every sensor is normal, a normal code is output (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated).
- If 2 or more malfunctions are indicated simultaneously, the lowest numbered code will be displayed first.

Malfunction Code (Example Code 72 and 76)



(12) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of the DLC1 or terminals Ts and CG, Tc and CG of the DLC3, and turn the ignition switch OFF.

SST 09843–18020 or 09843–18040



(b) In case of using LEXUS hand–held tester:
Check the sensor signal.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Do step (3) to (9) on the previous page.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.

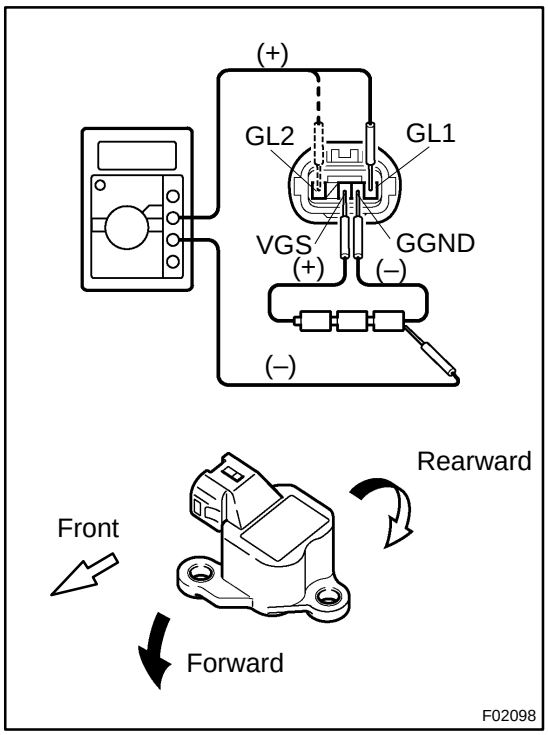
DTC of sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	●Right front speed sensor ●Sensor installation ●Sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	●Left front speed sensor ●Sensor installation ●Sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	●Right rear speed sensor ●Sensor installation ●Sensor rotor
C1274 / 74	Low output voltage of 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

*: w/ VSC only

3. w/ VSC:
DECELERATION SENSOR OPERATION DIAGNOSIS SYSTEM

CAUTION:
While checking the deceleration sensor operating diagnosis system, ABS does not work and brake system works as a conventional brake system.



4. w/ VSC:

DECELERATION SENSOR CHECK

(a) Connect 3 dry batteries of 1.5 V in series.

(b) Connect VGS terminal to the batteries' positive (+) terminal, and GGND terminal to the batteries' negative (–) terminal, apply about 4.5 V between VGS – GGND terminals.

NOTICE:

- **When inspecting deceleration sensor, remove it with the bracket together. Do not remove the sensor from the bracket. When replacing deceleration sensor, replace the sensor with it assembled to the bracket assembly.**
- **Do not apply voltage of 6 V or more to terminals VGS and GGND.**

(c) Check the output voltage of GL1 and GL2 terminals.

Symbols	Condition	Standard Value
GL1	Horizontal	About 2.3 V
GL1	Lean forward	0.4 V – about 2.3 V
GL1	Lean rearward	About 2.3 V – 4.1 V
GL2	Horizontal	About 2.3 V
GL2	Lean forward	About 2.3 V – 4.1 v
GL2	Lean rearward	0.4 V – 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.

DI0WA–14

DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

Before replacing or 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 terminals Tc and CG of the DLC3, and remove the short pin.
- If no abnormality is found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed by code. For details of each code, refer to the ”See page” under respective ”DTC No.” in the DTC chart.

DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI–281)	Open or short circuit of ABS solenoid relay circuit	●ABS solenoid relay ●ABS solenoid relay circuit
C0279 / 12 (DI–281)	B+ short circuit of ABS solenoid relay circuit	
C0273 / 13*1 (DI–277)	Open or short circuit of ABS motor relay circuit	●ABS motor relay ●ABS motor relay circuit
C0274 / 14 (DI–277)	B+ short circuit of ABS motor relay circuit	●ABS motor relay ●ABS motor relay circuit
C0226 / 21 (DI–273)	Open or short circuit of ABS (& BA & TRAC & VSC) actuator solenoid circuit (SFR circuit)	●ABS (& BA & TRAC & VSC) actuator ●SFRR or SFRH circuit
C0236 / 22 (DI–273)	Open or short circuit of ABS (& BA & TRAC & VSC) actuator solenoid circuit (SFL circuit)	●ABS (& BA & TRAC & VSC) actuator ●SFLR or SFLH circuit
C0246 / 23 (DI–273)	Open or short circuit of ABS (& BA & TRAC & VSC) actuator solenoid circuit (SRR circuit)	●ABS (& BA & TRAC & VSC) actuator ●SRRR or SRRH circuit
C0256 / 24 (DI–273)	Open or short circuit of ABS (& BA & TRAC & VSC) actuator solenoid circuit (SRL circuit)	●ABS (& BA & TRAC & VSC) actuator ●SRLR or SRLH circuit
C1225 / 25*3 (DI–287)	Open or short circuit of ABS & BA & TRAC & VSC actuator solenoid circuit (SMC1 or SMC2 circuit)	●ABS & BA & TRAC & VSC actuator ●SMC1 or SMC2 circuit
C1226 / 26*3 (DI–287)	Open or short circuit of ABS & BA & TRAC & VSC actuator solenoid circuit (SMV1 or SMV2 circuit)	●ABS & BA & TRAC & VSC actuator ●SMV1 or SMV2 circuit
C1227 / 27*3 (DI–287)	Open or short circuit of ABS & BA & TRAC & VSC actuator solenoid circuit (SRC1 or SRC2 circuit)	●ABS & BA & TRAC & VSC actuator ●SRC1 or SRC2 circuit
C0200 / 31*1 (DI–267)	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–267)	Left front wheel speed sensor signal malfunction	
C0210 / 33*1 (DI–267)	Right rear wheel speed sensor signal malfunction	
C0215 / 34*1 (DI–267)	Left rear wheel speed sensor signal malfunction	
C1241 / 41 (DI–290)	Low battery positive voltage or abnormally high battery positive voltage	●Battery ●Charging system ●Power source circuit

C1243 / 43*1, *3 (DI–294)	Malfunction in deceleration sensor (abnormal constant output)	●Deceleration sensor ●Wire harness for deceleration sensor system
C1244 / 44*3 (DI–294)	Open or short circuit of deceleration sensor circuit	●Deceleration sensor ●Deceleration sensor circuit
C1245 / 45*1, *3 (DI–294)	Malfunction in deceleration sensor	●Deceleration sensor ●Wire harness for deceleration sensor system
C1246 / 46*2, *3 (DI–298)	Malfunction in master cylinder pressure sensor	●Master cylinder pressure sensor ●Master cylinder pressure sensor circuit
C1249 / 49 (DI–301)	Open circuit of stop light switch circuit	Stop light switch circuit
C1251 / 51*1 (DI–304)	Pump motor is locked Open circuit of pump motor circuit	ABS pump motor
Always ON (DI–306)	Malfunction in ABS (& BA & TRAC & VSC) ECU	●Battery ●Charging system ●Power source circuit ●ECU

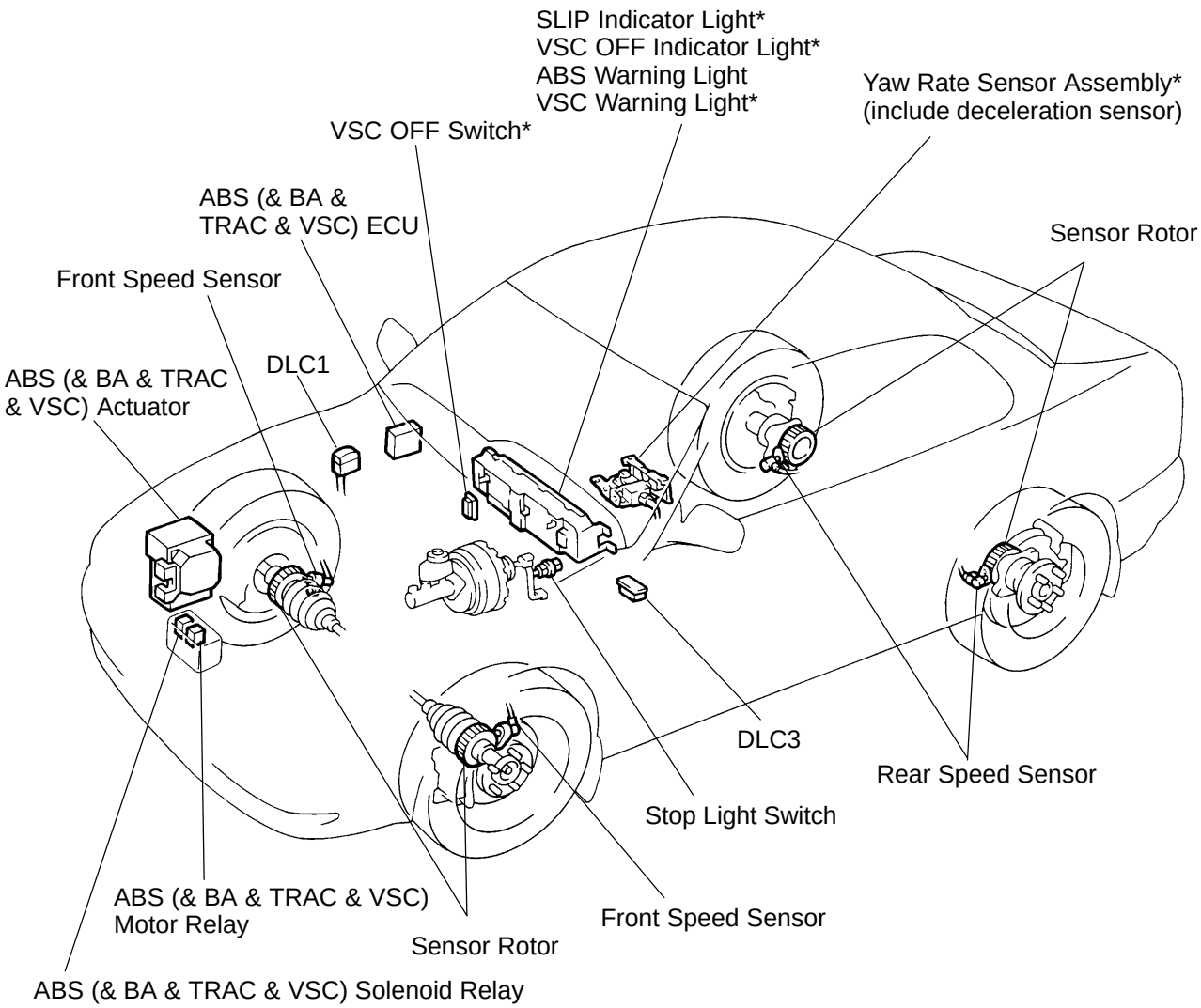
*1, *2: These DTC will not affect to cancel the ABS warning light by repairing the trouble area, so perform the following operations.

- *1:
  (1) Drive the vehicle at 20 km/h (12 mph) for 30 seconds or more and check that the ABS warning light goes off.
  (2) Clear the DTC (See page DI–253).
- *2:
  (1) Keep the vehicle in the stationary condition for 5 seconds or more and depress the brake pedal lightly 2 or 3 times.
  (2) Driving the vehicle at the vehicle speed 50 km/h (31 mph) and keep depressing the brake pedal strongly for about 3 seconds.
  (3) Repeat the above operation 3 times or more and check that the ABS warning light goes off.
  (4) Clear the DTC (See page DI–253).
- *3: w/ VSC only

HINT:
There is a case that LEXUS hand–held tester cannot be used when the ABS warning light is always on.

DI0WC–11

PARTS LOCATION



*: w/ VSC only

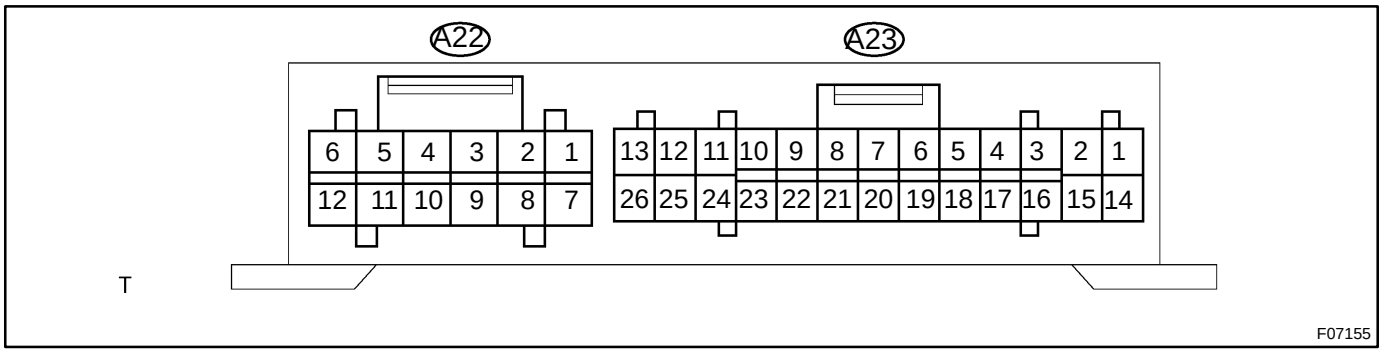
N

F10929

DI1GG–09

TERMINALS OF ECU

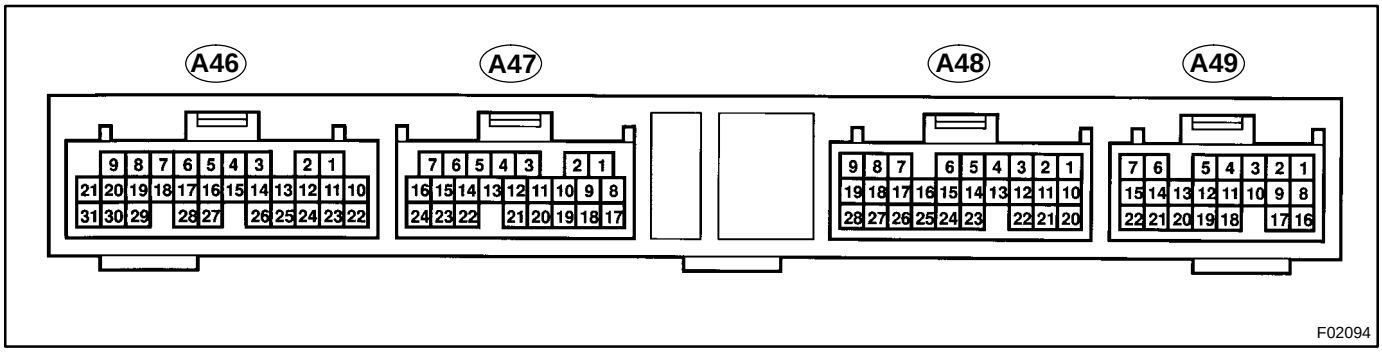
(ABS only):



Symbols (Terminals No.)	Wiring Color	Condition		STD Voltage (V)
IG1 (A23 – 13) – GND (A23 – 12, 25)	B–R – W–B	IG switch ON		10 – 14
R+ (A23 – 26) – SR (A22 – 7)	GR–R – GR	IG switch ON	ABS warning light OFF	9 – 14
R+ (A23 – 26) – MR (A22 – 1)	GR–R – GR–L	IG switch ON		Below 1.0
SFRR (A23 – 1) – GND (A23 – 12, 25)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRH (A23 – 2) – GND (A23 – 12, 25)	R–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLR (A22 – 6) – GND (A23 – 12, 25)	W–L – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLH (A22 – 5) – GND (A23 – 12, 25)	L–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRR (A22 – 12) – GND (A23 – 12, 25)	R–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRH (A22 – 11) – GND (A23 – 12, 25)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLR (A23 – 14) – GND (A23 – 12, 25)	LG–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLH (A23 – 15) – GND (A23 – 12, 25)	G–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
WA (A23 – 11) – GND (A23 – 12, 25)	G–B – W–B	IG switch ON	ABS warning light ON	Below 2.0
		IG switch ON	ABS warning light OFF	10 – 14
STP (A23 – 5) – GND (A23 – 12, 25)	G–W – W–B	Stop light switch OFF		Below 1.5
		Stop light switch ON		8 – 14
D/G (A23 – 24) – GND (A23 – 12, 25)	W – W–B	IG switch ON	ABS warning light OFF	10 – 14
Tc (A23 – 8) – GND (A23 – 12, 25)	LG–R – W–B	IG switch ON		8 – 14
Ts (A23 – 21) – GND (A23 – 12, 25)	R–Y – W–B	IG switch ON		8 – 14
FR+ (A22 – 3) – FR– (A22 – 9)	W – B	IG switch ON	Slowly turn right front wheel	AC generation
FL+ (A22 – 8) – FL– (A22 – 2)	R – G	IG switch ON	Slowly turn left front wheel	AC generation
RR+ (A23 – 10) – RR– (A23 – 23)	W – B	IG switch ON	Slowly turn right rear wheel	AC generation

RL+ (A23 – 22) – RL– (A23 – 9)	R ↔ G	IG switch ON	Slowly turn left rear wheel	AC generation
MT (A22 – 10) – GND (A23 – 12, 25)	R–W – W–B	IG switch ON		Below 1.5

(w/ VSC):



Symbols (Terminals No.)	Wiring Color	Condition		STD Voltage (V)
SMC1 (A46 – 2) – GND (A46 – 6, 31, A47 – 8, 17)	Y–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMC2 (A46 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	Y–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRC1 (A46 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	B–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRC2 (A46 – 5) – GND (A46 – 6, 31, A47 – 8, 17)	B–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLR (A46 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	W–L – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRH (A46 – 8) – GND (A46 – 6, 31, A47 – 8, 17)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRR (A46 – 9) – GND (A46 – 6, 31, A47 – 8, 17)	R–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
VCM (A46 – 10) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch ON		4.5 – 5.5
FR+ (A46 – 14) – FR– (A46 – 13)	W – B	IG switch ON	Slowly turn right front wheel	AC generation
FL+ (A46 – 16) – FL– (A46 – 15)	R – G	IG switch ON	Slowly turn left front wheel	AC generation
SR (A46 – 19) – R+ (A46 – 1)	GR – GR–R	IG switch ON	ABS warning light OFF	10 – 14
SFLH (A46 – 21) – GND (A46 – 6, 31, A47 – 8, 17)	L–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
PMC (A46 – 22) – E2 (A46 – 23)	B – W	IG switch ON	Stop light switch OFF	0.3 – 0.7
E2 (A46 – 23) – GND (A46 – 6, 31, A47 – 8, 17)	W – W–B	IG switch OFF		Continuity

FSS (A46 – 24) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF	Continuity
MT (A46 – 28) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON, Motor relay is OFF	Below 1.5
MR (A46 – 29) – GND (A46 – 6, 31, A47 – 8, 17)	GR–L – W–B	IG switch ON, ABS motor stops	10 – 14
VGS (A47 – 1) – GGND (A47 – 10)	W – R	IG switch ON	4.5 – 5.5
GL1 (A47 – 2) – GGND (A47 – 10)	G – R	IG switch ON, Vehicle is placed on the horizontal surface	2 – 3
Tc (A47 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	LG–R – W–B	IG switch ON	10 – 14
Ts (A47 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	R–Y – W–B	IG switch ON	10 – 14
IG1 (A47 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	B–R – W–B	IG switch ON	10 – 14
NEO (A47 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	BR–W – W–B	Engine idling	Pulse generation
GL2 (A47 – 9) – GGND (A47 – 10)	B – R	IG switch ON, Vehicle is placed on the level surface	2.0 – 3.0
GGND (A47 – 10) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch OFF	Continuity
RR+ (A47 – 11) – RR– (A47 – 12)	W – B	IG switch ON, Slowly turn right rear wheel	AC generation
ENG+ (A47 – 14) – ENG– (A47 – 22)	W – B	IG switch ON, Engine idling	Pulse generation
GSS (A47 – 18) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF	Continuity
RL+ (A47 – 19) – RL– (A47 – 20)	R – G	IG switch ON, Slowly turn left rear wheel	AC generation
TRC+ (A47 – 24) – TRC– (A47 – 16)	LG – L	IG switch ON, Engine idling	Pulse generation
LBLO (A48 – 1) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)	10 – 14
FRO (A48 – 2) – GND (A46 – 6, 31, A47 – 8, 17)	GR–R – W–B	Vehicle driving at about 20 km/h (12 mph)	Pulse generation
RRO (A48 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	GR–L – W–B	Vehicle driving at about 20 km/h (12 mph)	Pulse generation
VSCW (A48 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	R–L – W–B	IG switch ON, VSC warning light ON	Below 2.0
		IG switch ON, VSC warning light OFF	10 – 14
WA (A48 – 5) – GND (A46 – 6, 31, A47 – 8, 17)	G–B – W–B	IG switch ON, ABS warning light ON	Below 2.0
		IG switch ON, ABS warning light OFF	10 – 14
IND (A48 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	LG – W–B	IG switch ON, SLIP indicator light ON	Below 2.0
		IG switch ON, SLIP indicator light OFF	10 – 14
STP (A48 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	G–W – W–B	Stop light switch OFF	Below 1.5
		Stop light switch ON	8 – 14
VYS (A48 – 9) – GYAW (A48 – 27)	R – W–B	IG switch ON	4.5 – 5.5
LBL– (A48 – 11) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON Fluid in master cylinder reservoir above MIN level	About 4 – 8

WT (A48 – 13) – GND (A46 – 6, 31, A47 – 8, 17)	L – W–B	IG switch ON	VSC OFF indicator light ON	Below 2.0
		IG switch ON	VSC OFF indicator light OFF	10 – 14
SS1+ (A48 – 14) – SS1– (A48 – 23)	P – V	Engine idling	Slowly turn steering wheel	Pulse generation (See page DI–343)
R (A48 – 15) – GND (A46 – 6, 31, A47 – 8, 17)	R–B – W–B	IG switch ON	Shift lever is in R range	8 – 14
		IG switch ON	Shift lever is in other than R range	Below 1.5
SP1 (A48 – 16) – GND (A46 – 6, 31, A47 – 8, 17)	L – W–B	Vehicle driving at about 20 km/h (12 mph)		Pulse generation
YSS (A48 – 18) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF		Continuity
YD (A48 – 19) – GND (A46 – 6, 31, A47 – 8, 17)	B–L – W–B	IG switch ON	VSC warning light OFF	4.5 – 5.5
BZ (A48 – 20) – GND (A46 – 6, 31, A47 – 8, 17)	P–B – W–B	IG switch ON	VSC buzzer sounds	Below 1.0 ↔ 10 – 14
		IG switch ON	VSC buzzer does not sound	10 – 14
P (A48 – 24) – GND (A46 – 6, 31, A47 – 8, 17)	G–W – W–B	IG switch ON	Shift lever is in P range	8 – 14
		IG switch ON	Shift lever is in other than P range	Below 1.5
D/G (A48 – 25) – GND (A46 – 6, 31, A47 – 8, 17)	W – W–B	IG switch ON		10 – 14
CSW (A48 – 26) – GND (A46 – 6, 31, A47 – 8, 17)	LG – W–B	IG switch ON	VSC cut switch pushed in	Below 1.5
		IG switch ON	VSC cut switch released	8 –14
GYAW (A48 – 27) – GND (A46 – 6, 31, A47 – 8, 17)	B – W–B	IG switch OFF		Continuity
YAW (A48 – 28) – GYAW (A48 – 27)	W – B	IG switch ON	Vehicle is in stationary condition	2 – 3
SRLR (A49 – 1) – GND (A46 – 6, 31, A47 – 8, 17)	LG–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
AST (A49 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLH (A49 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	G–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRR (A49 – 8) – GND (A46 – 6, 31, A47 – 8, 17)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMV2 (A49 – 15) – GND (A46 – 6, 31, A47 – 8, 17)	Y–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRH (A49 – 16) – GND (A46 – 6, 31, A47 – 8, 17)	R–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMV1 (A49 – 22) – GND (A46 – 6, 31, A47 – 8, 17)	L–R – W–B	IG switch ON	ABS warning light OFF	10 – 14

DI0WG–14

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 ABS (& BA & TRAC & VSC) ECU, sensor or etc., turn the ignition switch OFF.

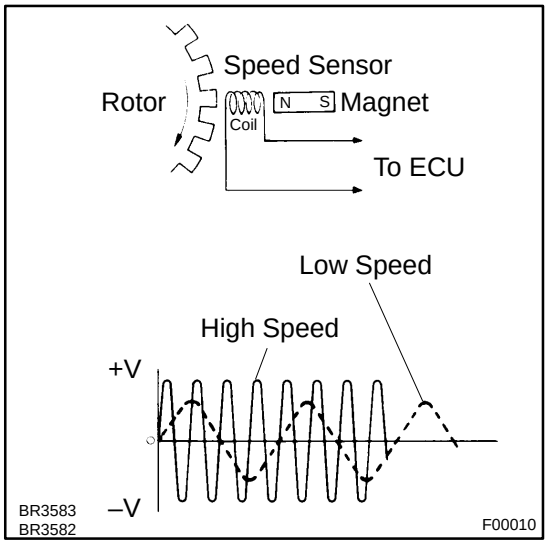
Symptom	Suspected Area	See page
ABS does not operate	Only when 1 to 4 are all normal but the problem still occurs, replace the ABS (& BA & TRAC & VSC) ECU. 3. Check the DTC reconfirming that the normal code is output 4. IG power source circuit 5. Speed sensor circuit 6. Check the ABS (& BA & TRAC & VSC) actuator with a LEXUS hand–held tester If abnormal, check the hydraulic circuit for leakage (See page DI–365).	 DI–253 DI–290 DI–267 BR–54 BR–60
ABS does not operate efficiently	Only when 1 to 4 are all normal but the problem still occurs, replace the ABS (& BA & TRAC & VSC) ECU. 1. Check the DTC reconfirming that the normal code is output 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the ABS (& BA & TRAC & VSC) actuator with a LEXUS hand–held tester If abnormal, check the hydraulic circuit for leakage (See page DI–365).	 DI–253 DI–267 DI–301 BR–54 BR–60
ABS warning light is abnormal	1. ABS warning light circuit 2. ABS (& BA & TRAC & VSC) ECU	DI–309 DI–306
DTC check is impossible	Only when 1 and 2 are all normal but the problem still occurs, replace the ABS (& BA & TRAC & VSC) ECU. 1. ABS warning light circuit 2. Tc terminal circuit	 DI–309 DI–314
Speed sensor signal check is impossible	1. Ts terminal circuit 2. ABS (& BA & TRAC & VSC) ECU	DI–316 DI–306

DI1GH–08

CIRCUIT INSPECTION

DTC	C0200 / 31 to C0215 / 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION

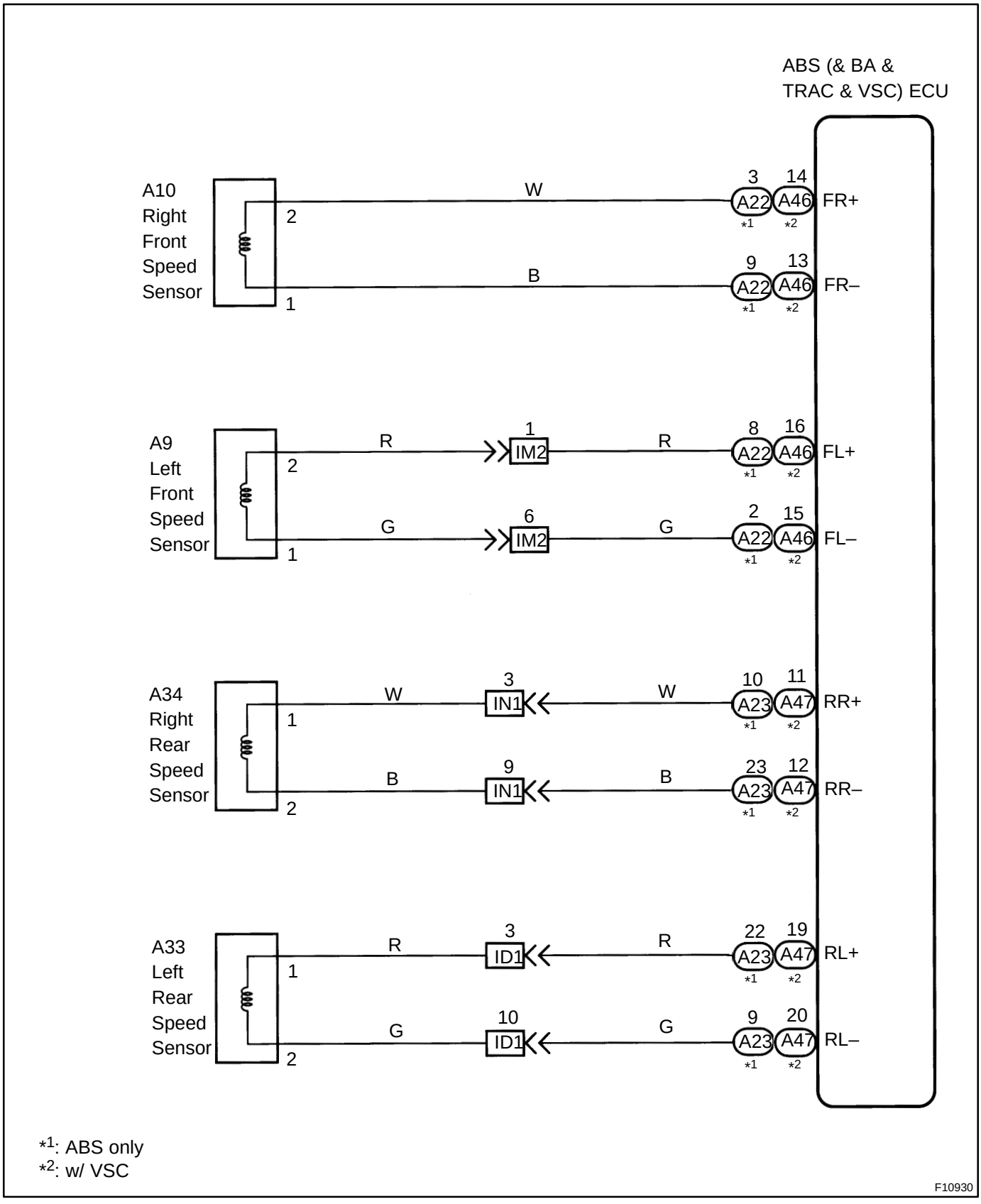


Speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used for control of the ABS (& BA & TRAC & VSC) control system. The front and rear rotors each has 48 serrations.
When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an 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 conditions 1 to 4: 1. At vehicle speed of 10 km/h (6 mph) 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. The condition that the continuos noise occurs in the speed sensor signal with the vehicle speed of 20 km/h (12 mph) or more continues for 5 sec. or more. 4. The condition that the speed signal circuit is open continues for 0.5 sec. or more.	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Sensor rotor

HINT:
DTC No. C0200 / 31 is for the right front speed sensor.
DTC No. C0205 / 32 is for the left front speed sensor.
DTC No. C0210 / 33 is for the right rear speed sensor.
DTC No. C0215 / 34 is for the left rear speed sensor.
Fail safe function:
If a trouble has occurred in the speed sensor circuit, the ECU cuts off current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check output value of speed sensor.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the DATALIST mode on the LEXUS hand–held tester.

CHECK:

Check that there is no change between the speed value output from each speed sensor displayed by the LEXUS hand–held tester and the speed value displayed by the speedometer when the vehicle is driven.

OK:

There is almost no difference from the displayed speed value.

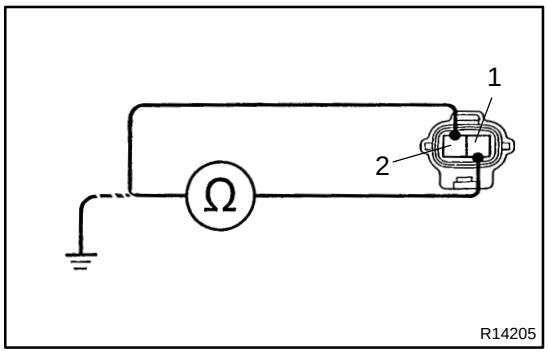
HINT:

There is tolerance of ± 10 % in the speedometer indication.

OK → **Check and replace ABS (& BA & TRAC & VSC) ECU.**

NG

2	Check speed sensor.



Front:

PREPARATION:

(a) Remove front fender liner.

(b) Disconnect speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

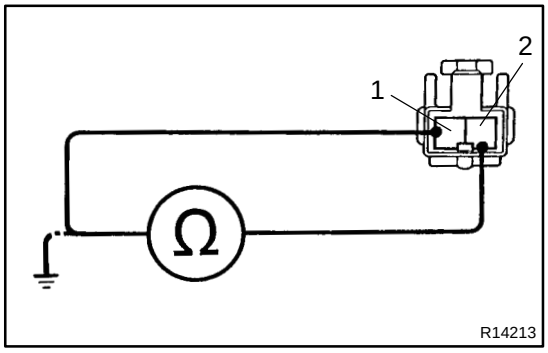
Resistance: 0.6 – 2.5 kΩ

CHECK:

Measure the resistance between each of terminals 1 and 2 of the speed sensor connector and the body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the seat cushion and seat back.

(b) Disconnect speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

Measure the resistance between each of terminals 1 and 2 of the speed sensor connector and the body ground.

OK:

Resistance: 1 MΩ or higher

NG	Replace speed sensor.

NOTICE:

Check the speed sensor signal last (See page DI–253).

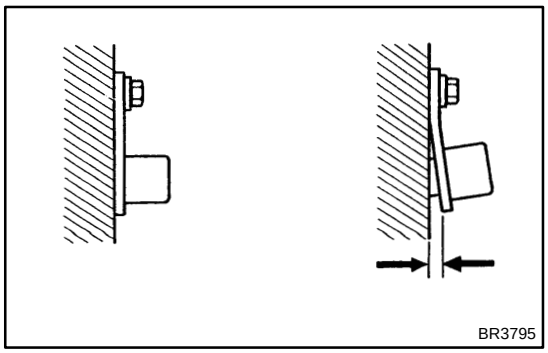
OK

3	Check for open and short circuit in harness and connector between each speed sensor and ABS (& BA & TRAC & VSC) ECU (See page IN–31).

NG	Repair or replace harness or connector.

OK

4	Check sensor installation.



CHECK:
Check the speed sensor installation.
OK:

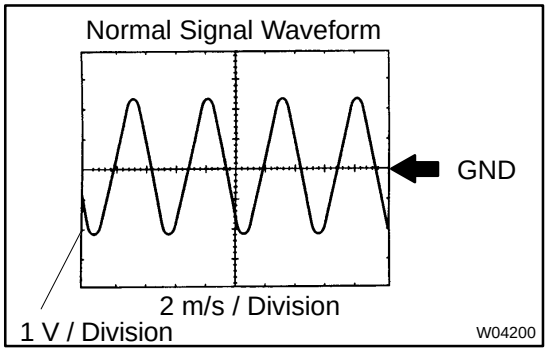
The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or rear axle carrier.

NG	Replace speed sensor.

NOTICE:
Check the speed sensor signal last (See page DI–253).

OK

5	Check speed sensor and sensor rotor serrations.



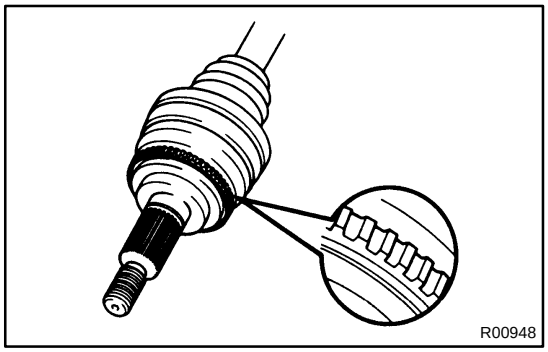
REFERENCE: INSPECTION USING OSCILLOSCOPE
PREPARATION:
(a) Remove the ABS (& BA & TRAC & VSC) ECU.
(b) Connect an oscilloscope to terminals FR+, FL+, RR+ or RL+ and GND of the ABS (& BA & TRAC & VSC) ECU harness side connector.

CHECK:
Drive the vehicle at about 20 km/h (12 mph), and check the signal waveform.
HINT:
Check the foreign objects sticking to the sensor tip when noise occurs.

OK	Check and replace ABS (& BA & TRAC & VSC) ECU.

NG

6	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove front drive shaft (See page SA–16).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, no missing teeth or no foreign objects.

PREPARATION:

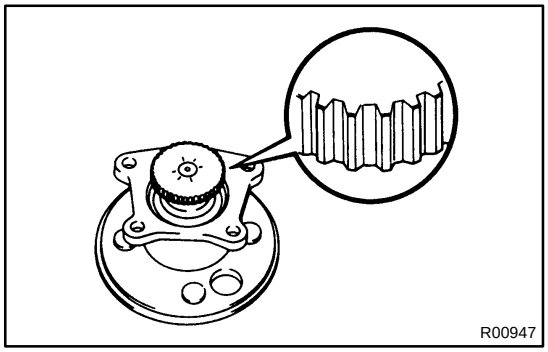
Remove the front speed sensor (See page BR–65).

CHECK:

Check the sensor tip.

OK:

No scratches or no foreign objects on the sensor tip.



Rear:

PREPARATION:

Remove the rear axle hub (See page SA–45).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, no missing teeth or no foreign objects.

PREPARATION:

Remove rear speed sensor (See page BR–68).

CHECK:

Check the sensor tip.

OK:

No scratches or no foreign objects on the sensor tip.

NG	Replace speed sensor or rotor.

NOTICE:

Check the speed sensor signal last (See page DI–253).

OK

Check and replace ABS (& BA & TRAC & VSC) ECU.

DI1GI–08

DTC	C0226 / 21 to C0256 / 24	ABS Solenoid Circuit

CIRCUIT DESCRIPTION

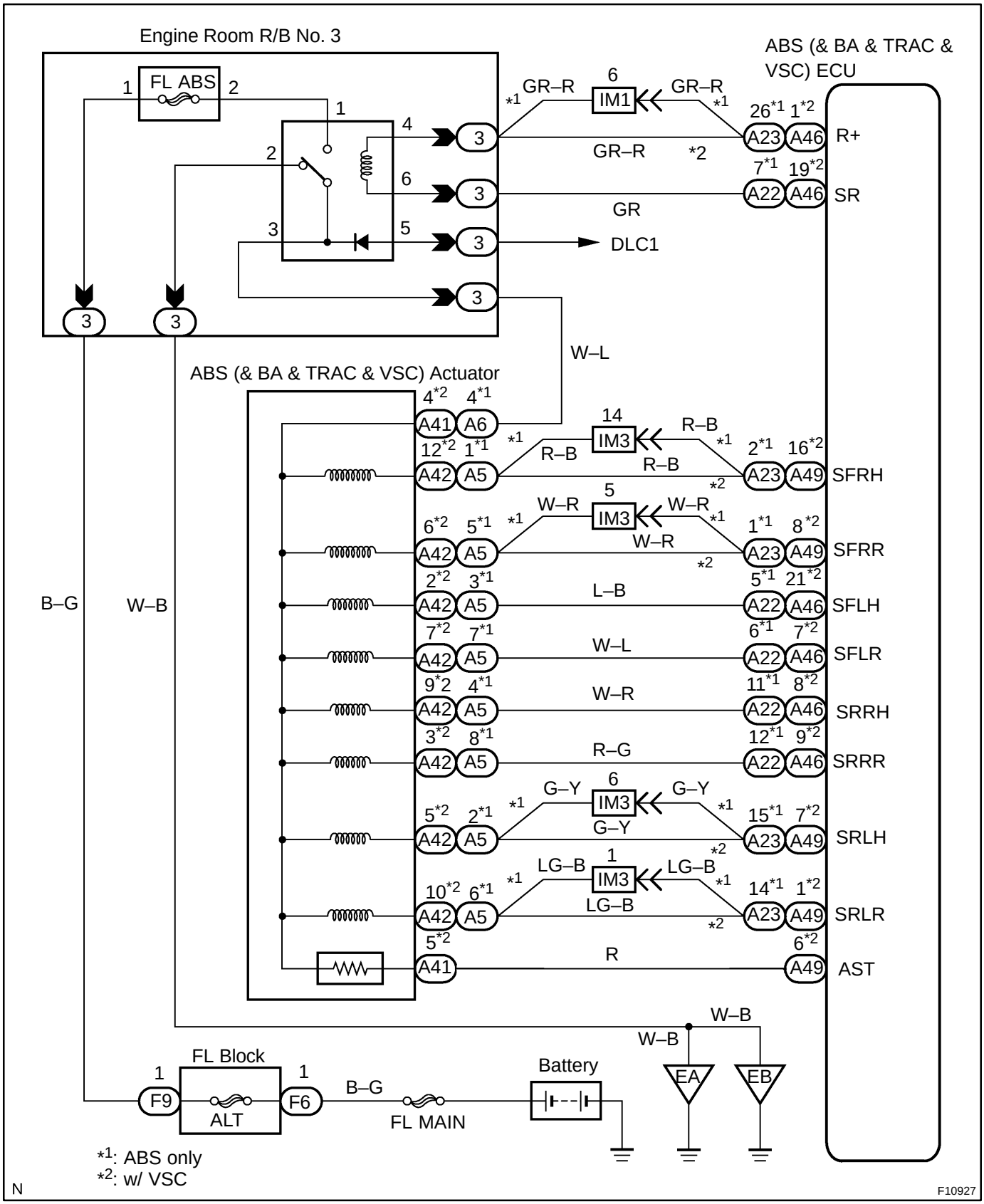
This solenoid comes on when receiving signals from the ECU controlled and controls the pressure acting on the wheel cylinders, thus the braking force is controlled.

DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	Open or short circuit for SFRH or SFRR circuit continues for 0.05 sec. or more. (When the solenoid is normally ON.)	●ABS (& BA & TRAC & VSC) actuator ●SFRH or SFRR circuit
C0236 / 22	Open or short circuit for SFLH or SFLR circuit continues for 0.05 sec. or more. (When the solenoid is normally ON.)	●ABS (& BA & TRAC & VSC) actuator ●SFLH or SFLR circuit
C0246 / 23	Open or short circuit for SRRH or SRRR circuit continues for 0.05 sec. or more. (When the solenoid is normally ON.)	●ABS (& BA & TRAC & VSC) actuator ●SRRH or SRRR circuit
C0256 / 24	Open or short circuit for SRLH or SRLR circuit continues for 0.05 sec. or more. (When the solenoid is normally ON.)	●ABS (& BA & TRAC & VSC) actuator ●SRLH or SRLR circuit

Fail safe function:

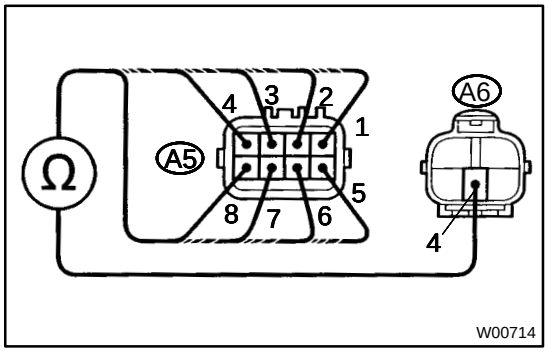
If a trouble has occurred in the actuator solenoid circuit, the ECU cuts off current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake actuator solenoid.**



ABS only:

PREPARATION:

Disconnect the 2 connectors from the ABS actuator.

CHECK:

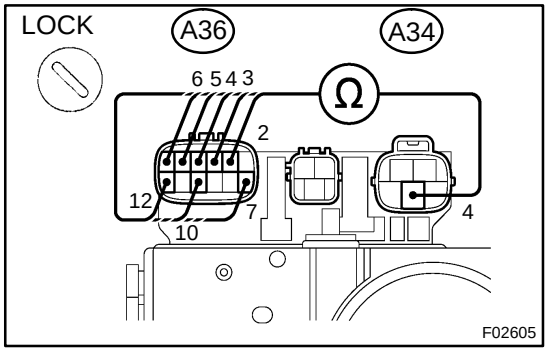
Check the continuity between terminals A6 – 4 and A5 – 1, 2, 3, 4, 5, 6, 7 and 8 of the ABS actuator.

OK:

Continuity

HINT:

Resistance of each solenoid coil is 1.2 Ω.



w/ VSC:

PREPARATION:

Disconnect the 2 connectors from THE ABS & BA & TRAC & VSC actuator.

CHECK:

Check the continuity between terminal A34 – 4 and each of A36 – 2, 3, 4, 5, 6, 7, 10 and 12 of the ABS & BA & TRAC & VSC actuator.

OK:

Continuity

HINT:

(Reference)

Resistance of each solenoid

SFRH, SFLH, SRRH, SRLH: 8.0 – 10.0 Ω

SFRR, SFLR, SRRR, SRLR: 3.0 – 5.5 Ω

NG → **Replace ABS (& BA & TRAC & VSC) actuator.**

OK

2	**Check for open and short circuit in harness and connector between ABS (& BA & TRAC & VSC) ECU and ABS (& BA & TRAC & VSC) actuator (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Check voltage between terminal SR of ABS (& BA & TRAC & VSC) ECU and body ground.**

PREPARATION:

Remove the ABS (& BA & TRAC & VSC) ECU with connectors still connected.

CHECK:

Turn the ignition switch ON, measure between terminal SR and GND.

OK:

Voltage: 1V or less

NG → **Check and repair harness or ABS solenoid relay.**

OK

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

DI1GJ–12

DTC	C0273 / 13, C0274 / 14	ABS Motor Relay Circuit

CIRCUIT DESCRIPTION

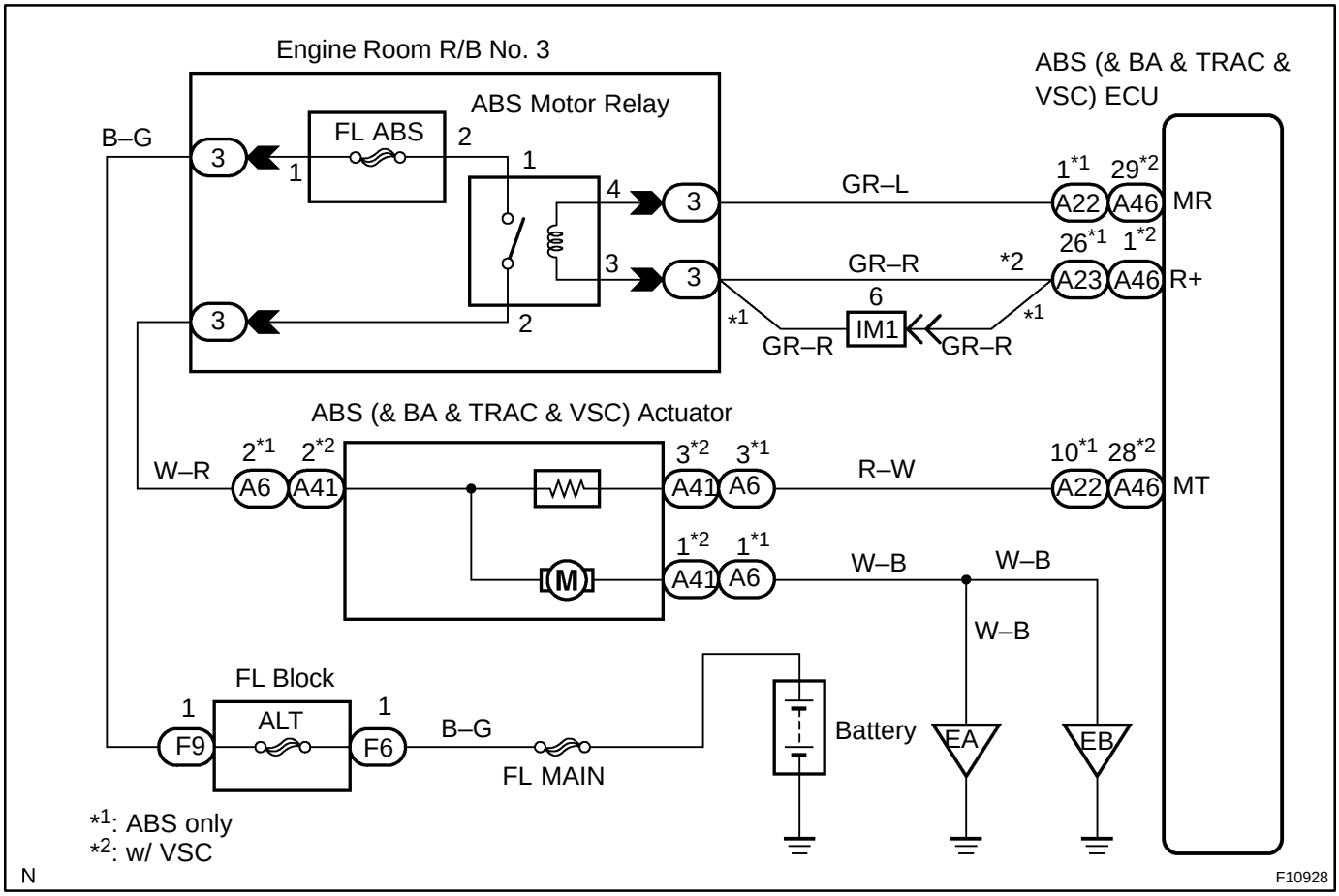
ABS motor relay supplies power to the ABS pump motor. While the ABS (& BA & TRAC & VSC) are being activated, the ECU switches the motor relay on and operates the ABS pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1 and 2 continue for 0.2 sec. or more: 1. ECU terminal IG1 voltage is 9.5 V to 17.2 V in the initial check or ABS, TRAC or VSC are in operation, and when the motor relay is on, however the contact point of the motor relay is off. 2. ECU terminal IG1 is 9.5 V or less, and when the motor relay is on, but the contact point of the motor relay does not become on,	●ABS motor relay ●ABS motor relay circuit
C0274 / 14	When the motor relay is off, the condition that the contact point of motor relay is on continues for 4 sec. or more.	

Fail safe function:

If a trouble has occurred in the ABS motor relay circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using LEXUS hand–held tester.

1	**Check ABS motor relay operation.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check the operation sound of the ABS motor relay when operating it with the LEXUS hand–held tester.

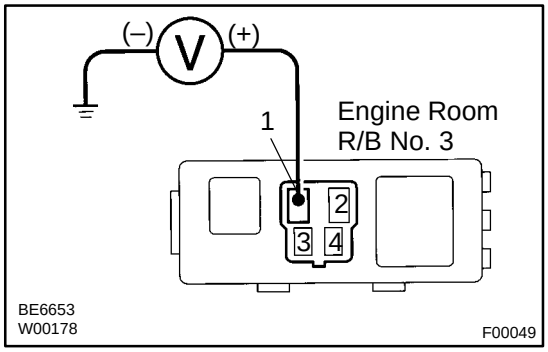
OK:

The operation sound of the ABS motor relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminal 1 of engine room R/B No. 3 (for ABS motor relay) and body ground.**



PREPARATION:

Remove the ABS motor relay from the engine room R/B No. 3.

CHECK:

Measure the voltage between terminal 1 of the engine room R/B No. 3 (for the ABS motor relay) and the body ground.

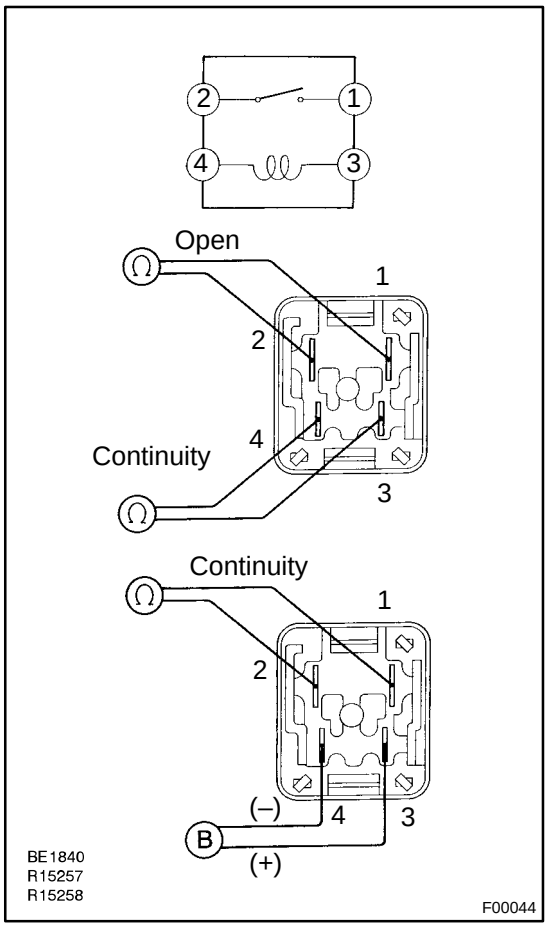
OK:

Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS motor relay.



CHECK:

Check the continuity between each pair of terminals of the motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage to terminals 3 and 4.

(b) Check the continuity between terminals of the ABS motor relay.

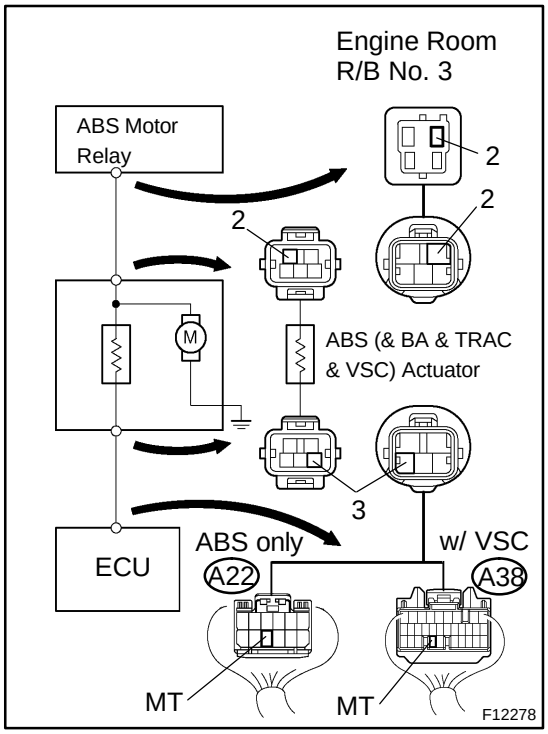
OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS motor relay.**

OK

4	Check continuity between terminal 2 of ABS motor relay and terminal MT of ABS (& BA & TRAC & VSC) ECU.



CHECK:

Check the continuity between terminal 2 of the engine room R/B No. 3 (for the ABS motor relay) and terminal MT of the ABS (& BA & TRAC & VSC) ECU.

OK:

Continuity

HINT:

ABS only:

There is a resistance of 4 – 6 Ω between terminals A6 – 2 and A6 – 3 of the ABS actuator.

w/ VSC:

There is a resistance of 26 – 40 Ω between terminals A41 – 2 and A41 – 3 of the ABS & BA & TRAC & VSC actuator.

NG	Repair or replace harness or ABS (& BA & TRAC & VSC) actuator.

OK

5	Check for open and short circuit in harness and connector between ABS motor relay and ABS (& BA & TRAC & VSC) ECU (See page IN–31).

NG	Repair or replace harness or connector.

OK

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

DI1GK–08

DTC	C0278 / 11, C0279 / 12	ABS Solenoid Relay Circuit

CIRCUIT DESCRIPTION

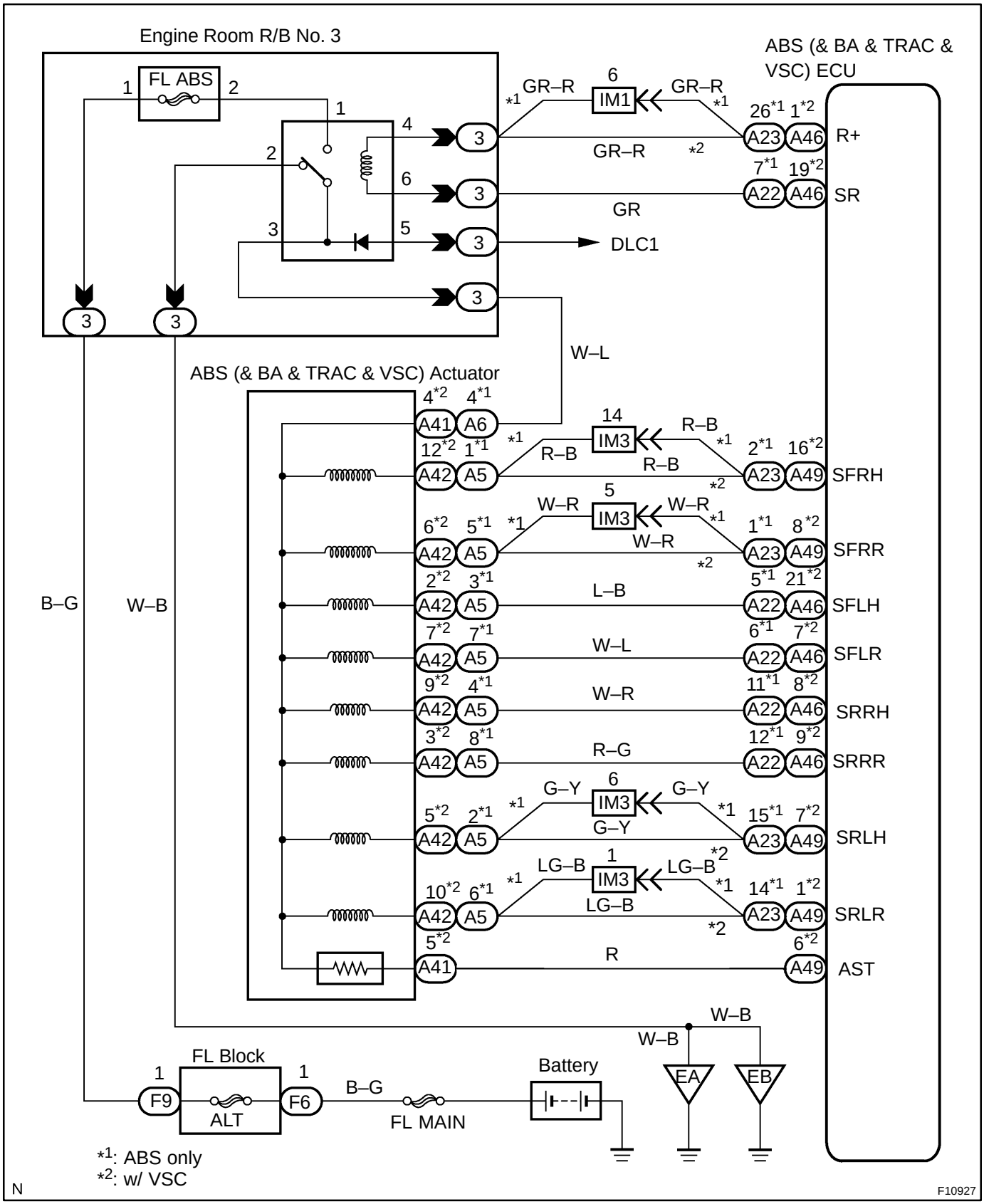
This relay supplies power to each ABS solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay comes on.

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 17.2 V and the solenoid relay is on, however the contact point of the solenoid relay is off. 2. With solenoid relay onN driving, 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 the condition that the contact point of the solenoid relay is on continues for 0.2 sec. or more.	

Fail safe function:

If a trouble has occurred in the ABS solenoid relay circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check ABS solenoid relay operation.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check the operation sound of the ABS solenoid relay when operating it with the LEXUS hand–held tester.

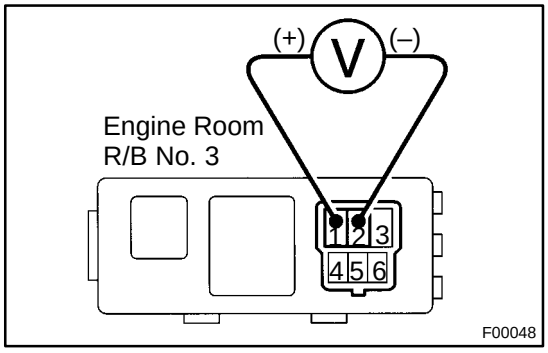
OK:

The operation sound of the ABS solenoid relay should be heard.

OK → **Go to step 4.**

NG

2	**Check voltage between terminals 1 and 2 of engine room R/B (for ABS solenoid relay).**



PREPARATION:

Remove the ABS solenoid relay from the engine room R/B No. 3.

CHECK:

Measure the voltage between terminals 1 and 2 of the engine room R/B No. 3 (for the ABS solenoid relay).

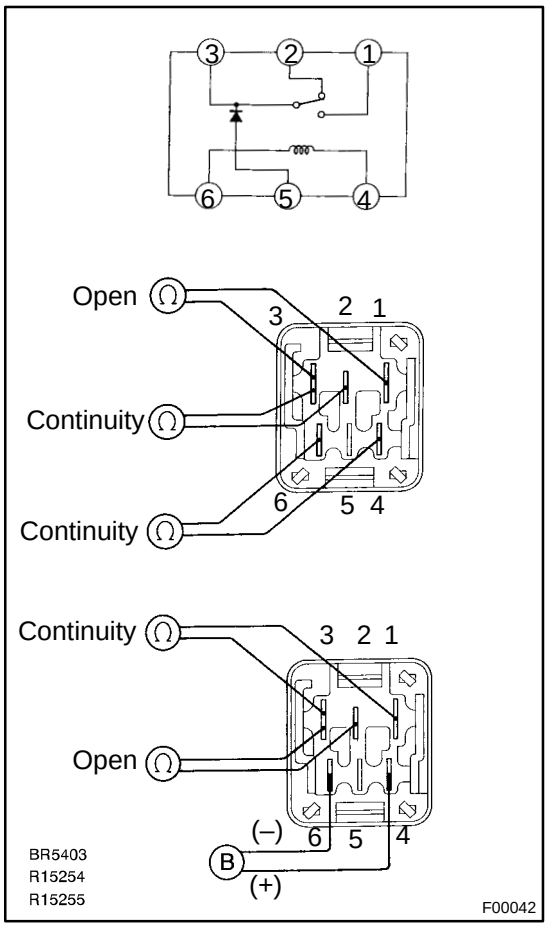
OK:

Voltage: 10 – 14 V

NG → **Check and repair harness or connector.**

OK

3	Check ABS solenoid relay.



CHECK:

Check the 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 the continuity between each terminal of the ABS solenoid relay.

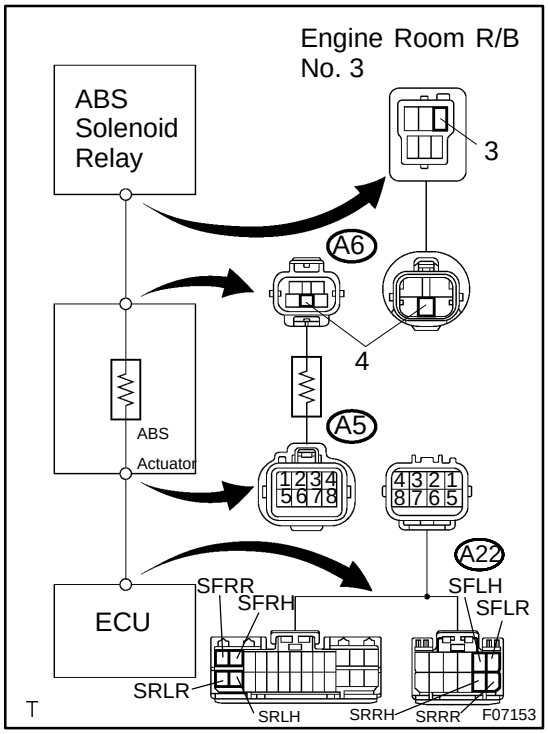
OK:

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 each solenoid terminal of ABS (& BA & TRAC & VSC) ECU.**



ABS only:

CHECK:

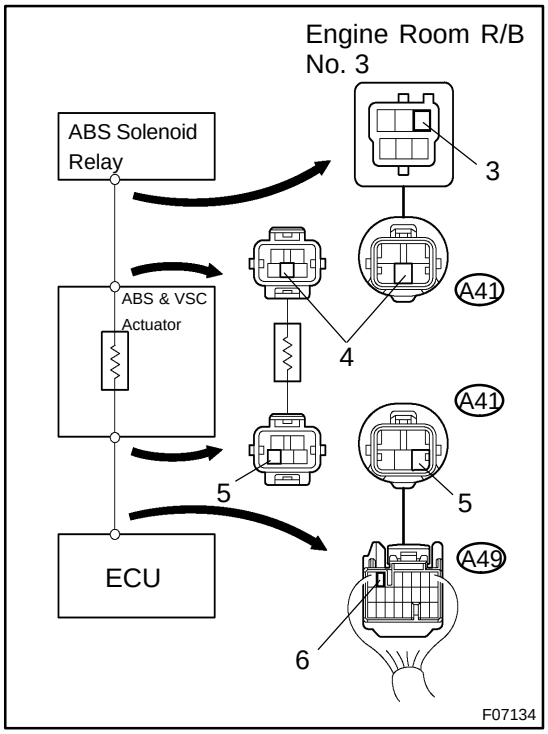
Check the continuity between terminal 3 of the engine room R/B No. 3 (for the ABS solenoid relay) and terminal SRLR, SRLH, SRRR, SRRH, SFLR, SRLH, SFRR or SFRH of the ABS ECU.

OK:

Continuity

HINT:

Resistance of each solenoid coil
SRLR, SRRR, SFLR, SFRR: 4.3 Ω
SRLH, SRRH, SFLH, SFRH: 8.8 Ω



w/ VSC:

CHECK:

Check the continuity between terminal 3 of the engine room R/B No. 3 (for the ABS solenoid relay) and terminal AST of the ABS & BA & TRAC & VSC ECU

OK:

Continuity

HINT:

There is a resistance of 26 – 40 Ω between terminals 4 and 5 of the ABS & BA & TRAC & VSC actuator.

NG → **Repair or replace harness or ABS (& BA & TRAC & VSC) actuator.**

OK

5	**Check for open and short circuit in harness and connector between ABS solenoid relay and ABS (& BA & TRAC & VSC) ECU (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

DI0WQ–11

DTC	C1225 / 25 to C1227 / 27	BA & TRAC & VSC Solenoid Circuit

CIRCUIT DESCRIPTION

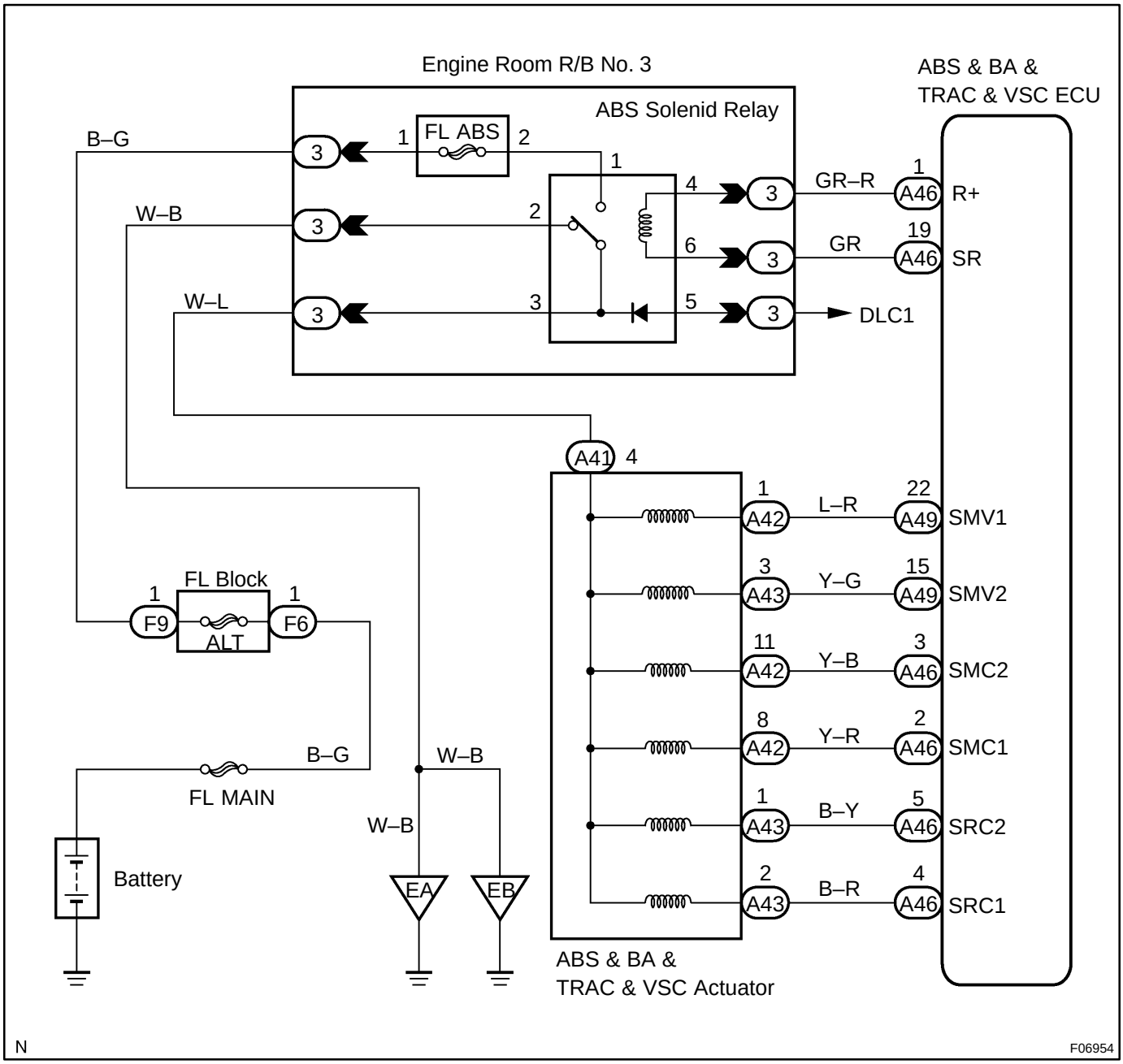
TRAC & VSC solenoid operates in accordance with signals from the ECU and raises the fluid pressure in and releases it from the brake cylinders.

DTC No.	DTC Detecting Condition	Trouble Area
C1225 / 25	Open or short circuit for SMC1 or SMC2 circuit continues for 0.05 sec. or more.	●ABS & BA & TRAC & VSC actuator ●SMC1 or SMC2 circuit
C1226 / 26	Open or short circuit for SMV1 or SMV2 circuit continues for 0.05 sec. or more.	●ABS & BA & TRAC & VSC actuator ●SMV1 or SMV2 circuit
C1227 / 27	Open or short circuit for SRC1 or SRC2 circuit continues for 0.05 sec. or more.	●ABS & BA & TRAC & VSC actuator ●SRC1 or SRC2 circuit

Fail safe function:

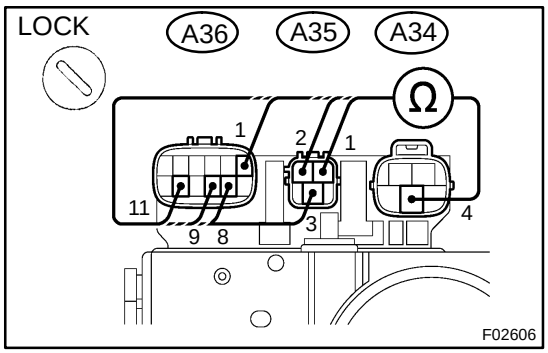
If a trouble has occurred in the actuator solenoid circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS & BA & TRAC & VSC controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check TRAC & VSC solenoid.**



PREPARATION:

Disconnect the 3 connectors from the ABS & BA & TRAC & VSC actuator.

CHECK:

Check the continuity between terminal A34 – 4 and each of A35 – 1, 2, 3, A36 – 1, 8, 9, 11 of the ABS & BA & TRAC & VSC actuator.

OK:

Continuity

HINT:

(Reference)

Resistance of each solenoid

SRC1, SRC2: 8.6 Ω

SMC1, SMC2, SMV1, SMV2: 8.8 Ω

NG → **Replace ABS & BA & TRAC & VSC actuator.**

OK ↓

2	**Check for open and short circuit in harness and connector between ABS & BA & TRAC & VSC ECU and ABS & BA & TRAC & VSC actuator (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

If same code is still output after DTC is deleted, check contact condition of each connection. If connections are normal, ECU may be defective.

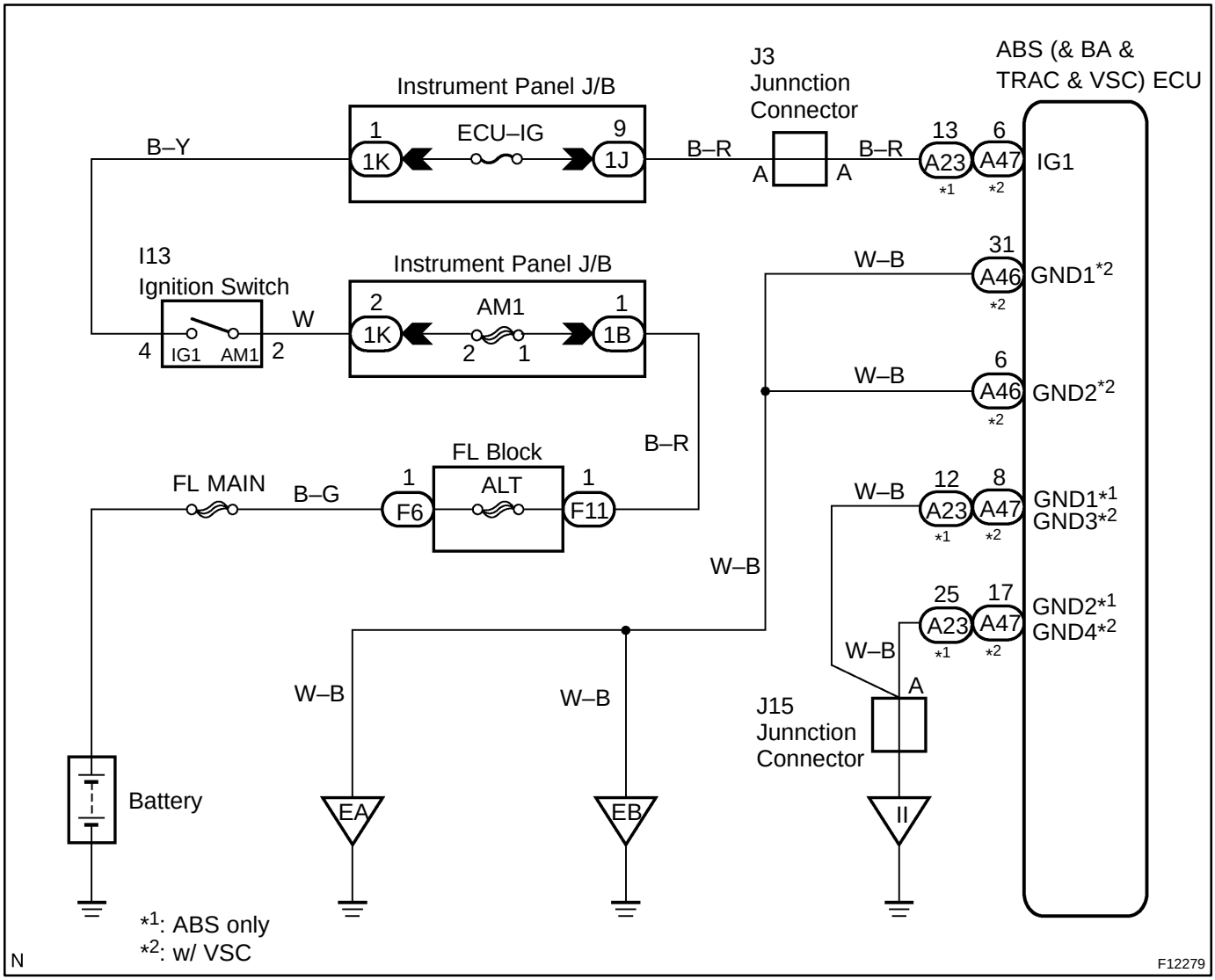
DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of conditions 1 or 2: 1. Vehicle speed is 3 km/h (1.9 mph) 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.	●Battery ●Charging system ●Power source circuit

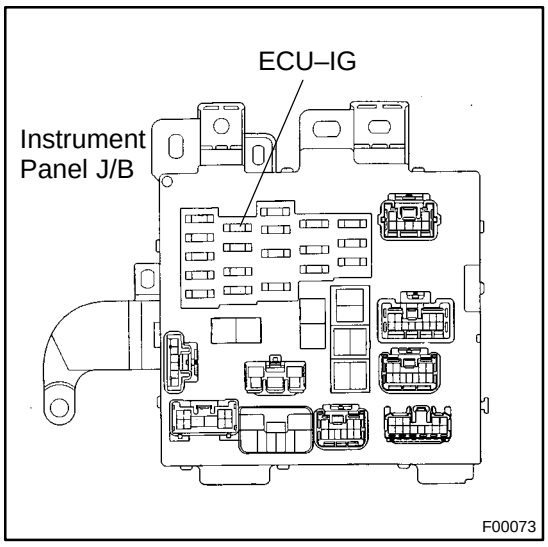
Fail safe function:
If a trouble occurred in the power source circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:
Remove the ECU–IG fuse from the instrument panel J/B.
CHECK:
Check the continuity of the ECU–IG fuse.
OK:
Continuity

NG → **Check for short circuit in all harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

2	**Check battery positive voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair charging system (See page CH–2).**

OK

3	**Check voltage of ECU–IG power source.**

In case of using the LEXUS hand–held tester:

PREPARATION:

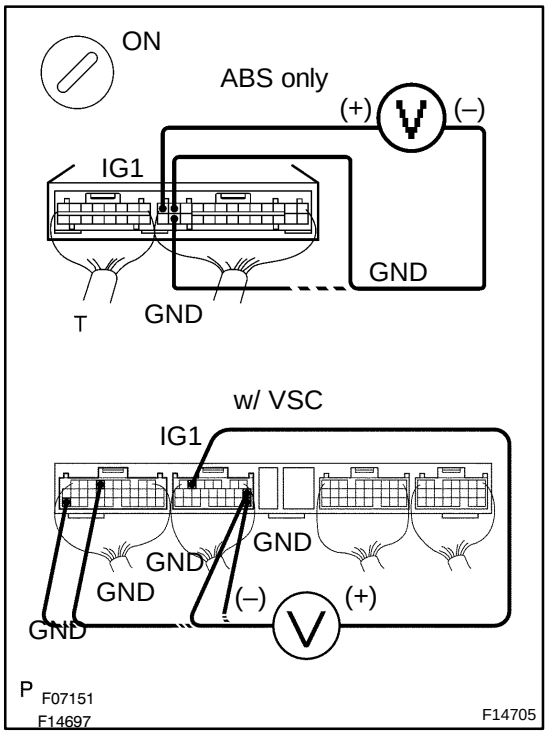
(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the DATALIST mode on the LEXUS hand–held tester.

CHECK:

Check the voltage condition output from the ECU displayed on the LEXUS hand–held tester.

OK:

"Normal" is displayed.



In case of not using the LEXUS hand–held tester:

PREPARATION:

Remove the ABS (& BA & TRAC & VSC) ECU with the connectors still connected.

CHECK:

Turn the ignition switch ON, measure the voltage between terminals IG1 and GND of the ABS (& BA & TRAC & VSC) ECU connector.

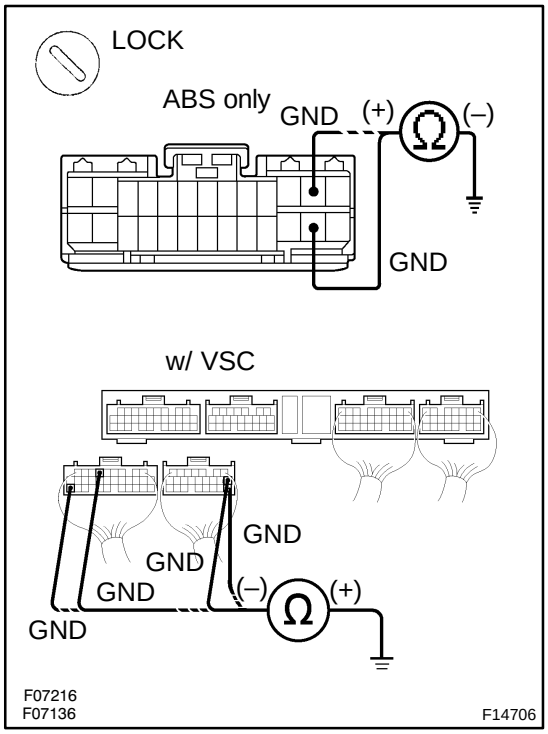
OK:

Voltage: 10 – 14 V

OK	**Ignition switch OFF, check and replace ABS (& BA & TRAC & VSC) ECU.**

NG

4	**Check continuity between terminal GND of ABS (& BA & TRAC & VSC) ECU connector and body ground.**



PREPARATION:

Disconnect the 2 connectors from the ABS (& BA & TRAC & VSC) ECU.

CHECK:

Measure the resistance between terminals GND of the ABS (& BA &
TRAC & VSC) ECU connector and the 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 ABS (& BA & TRAC & VSC) ECU and battery (See page IN–31).

DI1GL–07

DTC	C1243 / 43, C1245 / 45	Malfunction in Deceleration Sensor

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1243 / 43	While vehicle speed gets to 0 km/h (0 mph) from 30 km/h (18 mph), and the condition that GL1 and GL2 signals of ECU terminals did not change 10 mV or more continued in a sequence 16 times.	●Deceleration sensor ●Wire harness for deceleration sensor system
C1245 / 45	At the vehicle speed of 30 km/h (18 mph) 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.	

Fail safe function:
If a trouble has occurred in the deceleration sensor circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS & BA & TRAC & VSC controls and the brake system becomes normal.

INSPECTION PROCEDURE

HINT:
Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	Check output value of deceleration sensor.

PREPARATION:
(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the DATALIST mode on the LEXUS hand–held tester.

CHECK:
Check that the deceleration value of the deceleration sensor displayed by the LEXUS 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 deceleration sensor (See page DI–253).

NG → Replace YAW rate sensor assembly (Include deceleration sensor).

OK

3	Check for open or short circuit in harness and connector between deceleration sensor and ABS & BA & TRAC & VSC ECU (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DI1GM–08

DTC	C1244 / 44	Deceleration Sensor Circuit

CIRCUIT DESCRIPTION

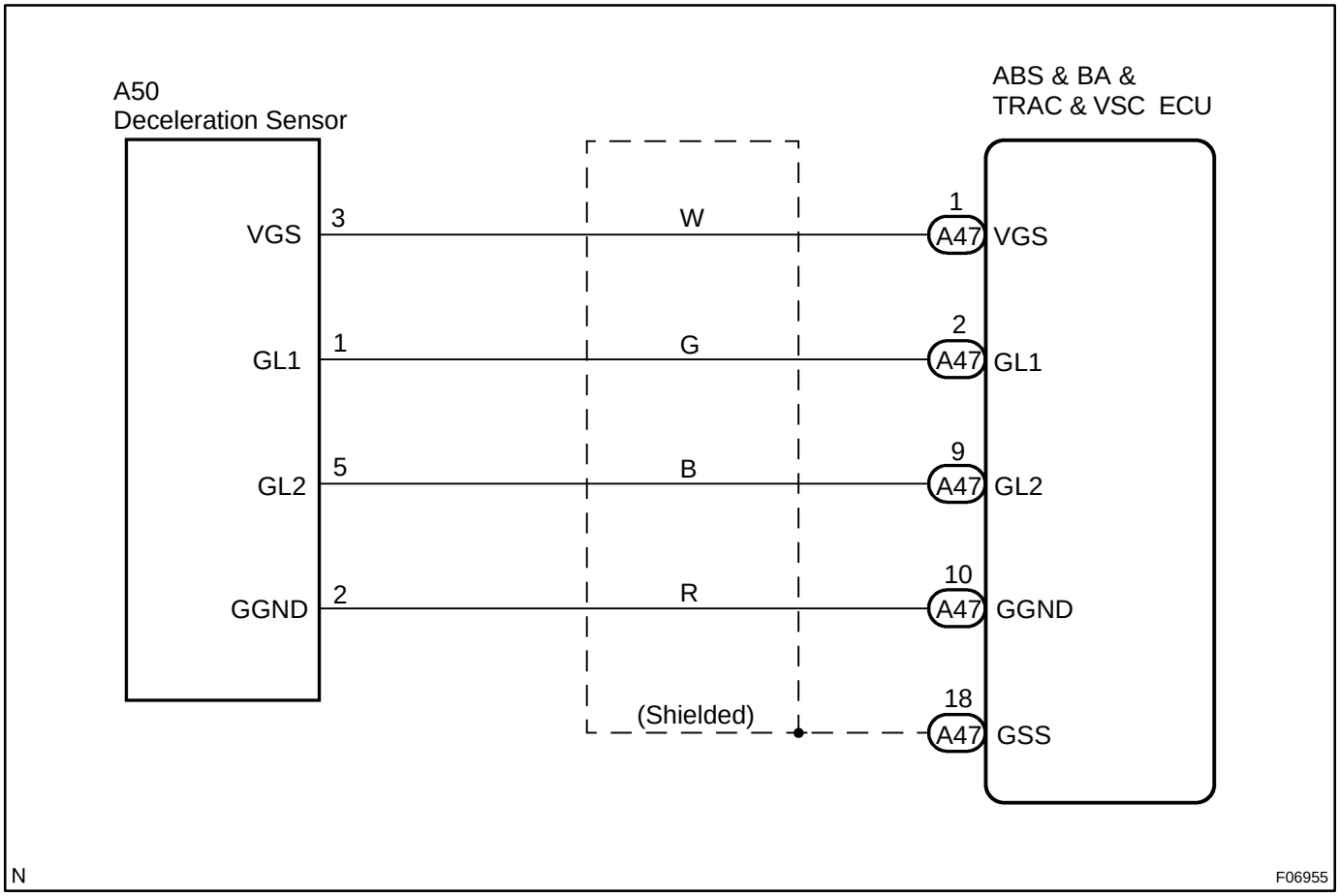
This sensor detects deceleration on the vehicle. The sensor signal is used in the ABS & BA & TRAC & VSC control. If the sensor functions abnormally, the ABS warning light comes on.

DTC No.	DTC Detecting Condition	Trouble Area
C1244 / 44	Either of the following 1, 2, 3, or 4 is detected: 1. Condition that ECU terminals GL1 and GL2 G conversion values are –1.5 G or less or 1.5 G or more continues for 1.2 sec. or more. 2. Condition that 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 vehicle speed of 0 km/h (0 mph), after difference of output absolute value of G conversion value between deceleration sensor terminals GL1 and GL2 becomes 0.6 G or more, and condition that does not become 0.4 G continues for 60 sec. or more. 4. Deceleration sensor signal momentary open occurs for 7 times or more.	●Deceleration sensor ●Deceleration sensor circuit

Fail safe function:

If a trouble has occurred in the deceleration sensor circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS & BA & TRAC & VSC controls and the brake system becomes normal.

WIRING DIAGRAM



2001 LEXUS ES300 (RM831U)

INSPECTION PROCEDURE

1	Check for open and short circuit in harness and connector between deceleration sensor and ABS & BA & TRAC & VSC ECU (See page IN–31).

NG → Repair or replace harness or connector.

OK

2	Check deceleration sensor (See page DI–253).

NG → Replace YAW rate sensor assembly (Include deceleration sensor).

OK

Check and replace ABS & BA & TRAC & VSC ECU.

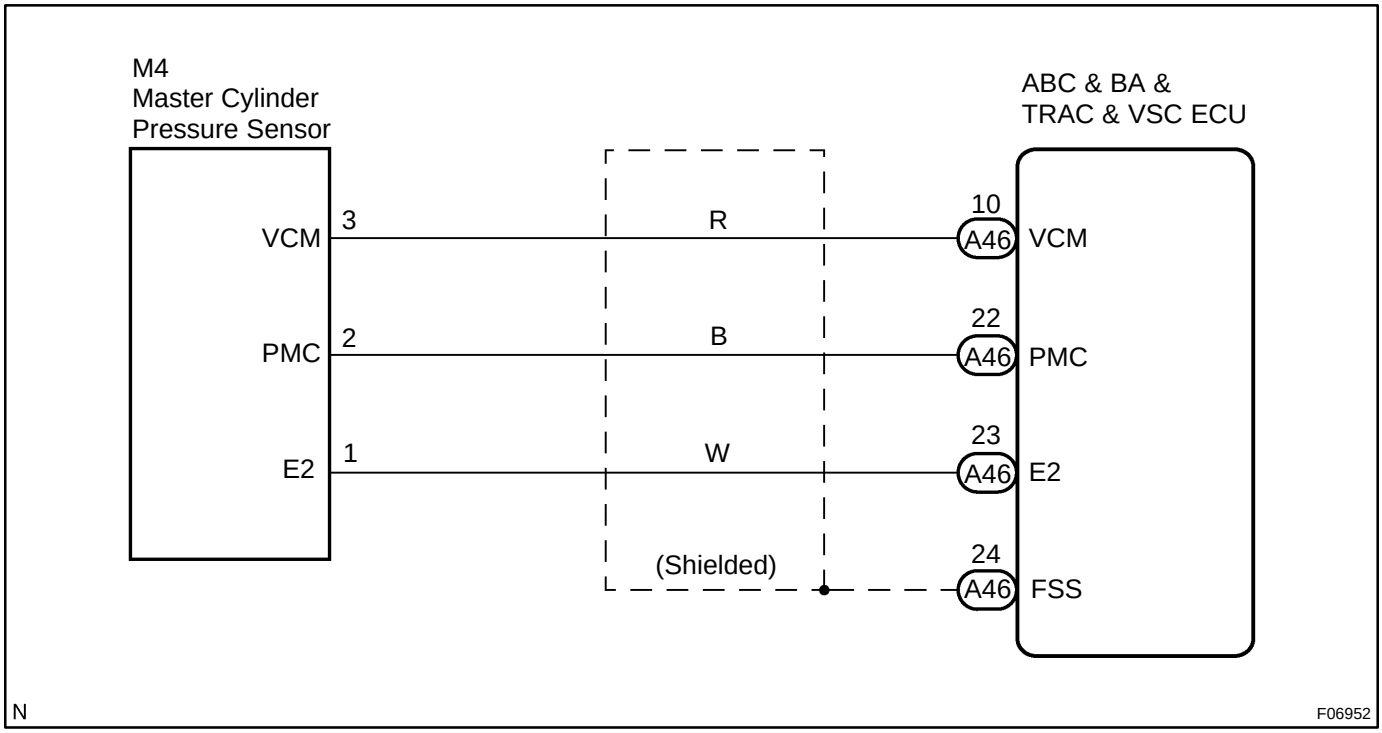
DTC	C1246 / 46	Master Cylinder Pressure Sensor Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1246 / 46	Either of the following 1, 2, 3, 4 or 5 is detected: 1. When the vehicle speed is 7 km/h (4.3 mph) and ECU terminal PMC voltage is 0.86 V or more, the condition that the terminal voltage does not change by more than 0.005 V continues for 30 sec. 2. The noise to ECU terminal PMC occurs 7 times for 5 sec. 3. When ECU terminal STP is OFF, the condition that ECU terminal PMC voltage is 0.86 or more or 0.3 V or less continues for more than 5 sec. 4. When the ECU terminal IG1 is 9.5 V to 17.2 V the condition that ECU terminal VCM voltage is out of range of 4.4 V to 5.6 V continues for 1.2 sec. 5. When ECU terminal VCM voltage is 4.4 V to 5.6 V the condition that ECU terminal PMC voltage is out of range of 0.14 V to 4.85 V continues for more than 1.2 sec.	●Master cylinder pressure sensor ●Master cylinder pressure sensor circuit

Fail safe function:
If a trouble has occurred in the master cylinder pressure sensor circuit, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABC & BA & TRAC & VSC controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check output value of master cylinder pressure sensor.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the DATALIST mode on the LEXUS hand–held tester.

CHECK:

Check that the brake fluid pressure value of the master cylinder pressure sensor displayed on the LEXUS hand–held tester is changing when depressing the brake pedal.

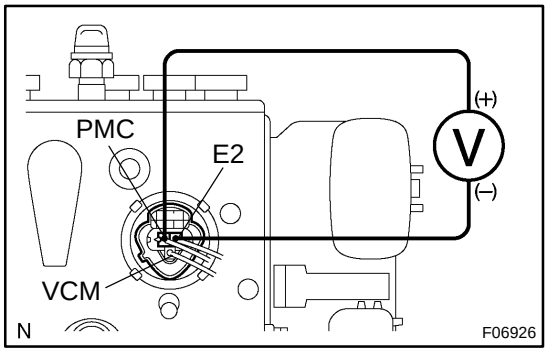
OK:

Brake fluid pressure value must be changing.

OK → **Go to step 4.**

NG

2	**Check master cylinder pressure sensor.**



PREPARATION:

Install LSPV gauge to the front brake caliper bleeder plug portion, and bleed air from the LSPV gauge.

SST 09709–29018

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 master cylinder pressure sensor with connector still connected.

OK:

Front brake caliper fluid pressure	Voltage
0 kPa (0 Kgf/cm^2, 0 psi)	0.37 – 0.63 V
5,883 kPa (60 kgf/cm^2, 853 psi)	1.57 – 1.83 V
11,768 kPa (120 kgf/cm^2, 1,706 psi)	2.77 – 3.03 V

HINT:

Voltage between terminals VCM and E2: 4.7 – 5.3 V

NG → **Replace ABS & BA & TRAC & VSC actuator.**

OK

3	Check for open and short circuit in harness and connector between master cylinder pressure sensor and ABC & BA & TRAC & VSC ECU (See page IN–31).

NG → Repair or replace harness or connector.

OK

4	Check whether or not ECU terminal STP input voltage is changed when stop light switch is turned on and off.

NO → Check stop light switch circuit (See page BE–58).

YES

Check and replace ABC & BA & TRAC & VSC ECU.

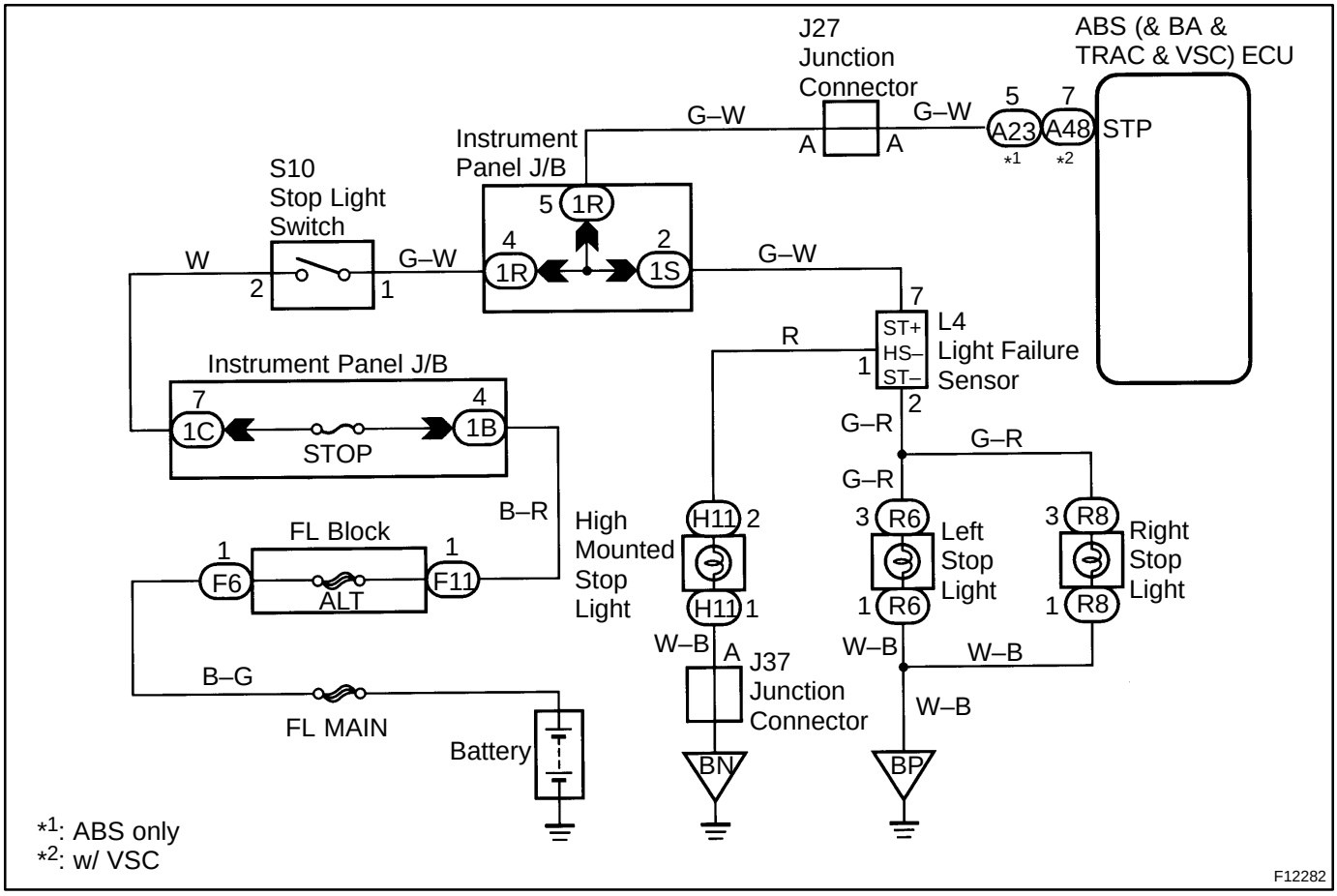
DI1GO–15

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 and ABS is in non–operation, the open circuit of stop light switch circuit continues for 0.3 sec. or more.	Stop light switch circuit

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of stop light switch.**

CHECK:
Check that the stop light lights up when the brake pedal is depressed, and turns off when the brake pedal is released.

OK → **Go to step 3.**

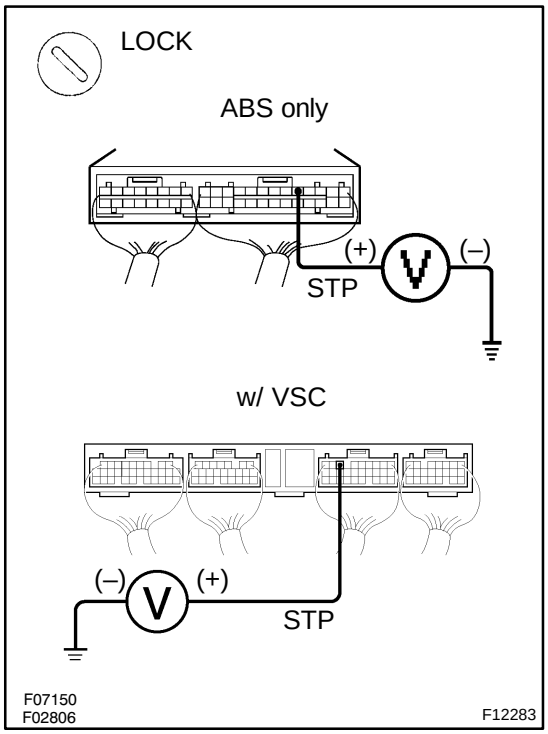
NG

2	**Check stop light circuit (See page BE–58).**

NG → **Repair or replace stop light circuit.**

OK

3	**Check voltage between terminal STP of ABS (& BA & TRAC & VSC) ECU and body ground.**



PREPARATION:
Remove the ABS (& BA & TRAC & VSC) ECU with the connectors still connected.

CHECK:
Measure the voltage between terminal STP of the ABS (& BA & TRAC & VSC) ECU and the body ground when the brake pedal is depressed.

OK:

Voltage: 8 – 14 V

OK	Check and replace ABS (& BA & TRAC & VSC) ECU.

NG

4	Check for open circuit in harness and connector between ABS (& BA & TRAC & VSC) ECU and stop light switch (See page IN–31).

NG	Repair or replace harness or connector.

OK

Proceed to next circuit inspection on problem symptoms table (See page DI–266).

DTC	C1251 / 51	ABS Pump Motor Lock

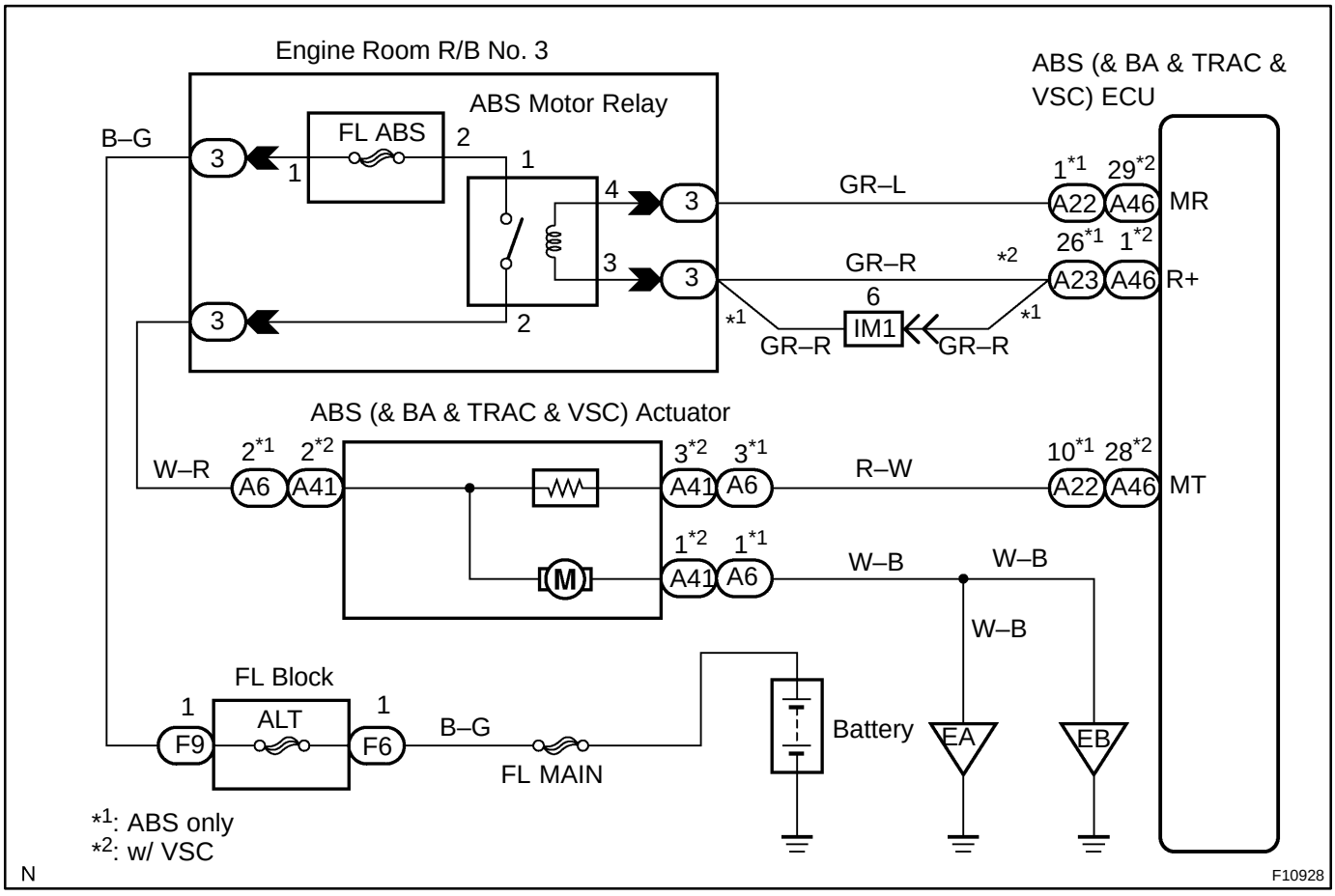
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	Either of the following 1 or 2 is detected: 6. ABS actuator pump motor is not operating normally. 7. Open circuit condition of ABS actuator pump motor continues for 2 sec. or more.	ABS pump motor

Fail safe function:

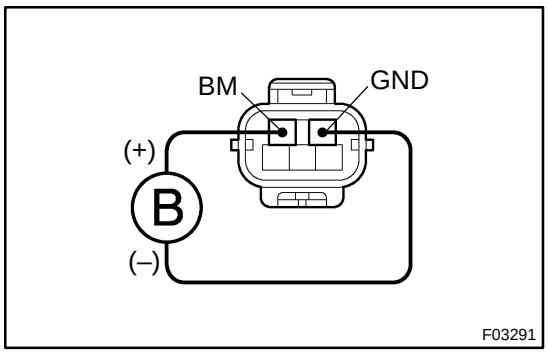
If a trouble has occurred in the ABS pump motor, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of pump motor.**



PREPARATION:

Disconnect the connector from the ABS (& BA & TRAC & VSC) actuator.

CHECK:

Connect positive (+) lead to BM terminal and negative (–) lead to GND terminal of the ABS (&BA & TRAC & VSC) actuator, check that the pump motor is operated.

OK:

The running sound of the pump motor should be heard.

OK → **Check for open circuit in harness and connector between motor relay, actuator and ABS (& BA & TRAC & VSC) ECU (See page IN–31).**

NG

Replace ABS (& BA & TRAC & VSC) actuator.

DI1GP–08

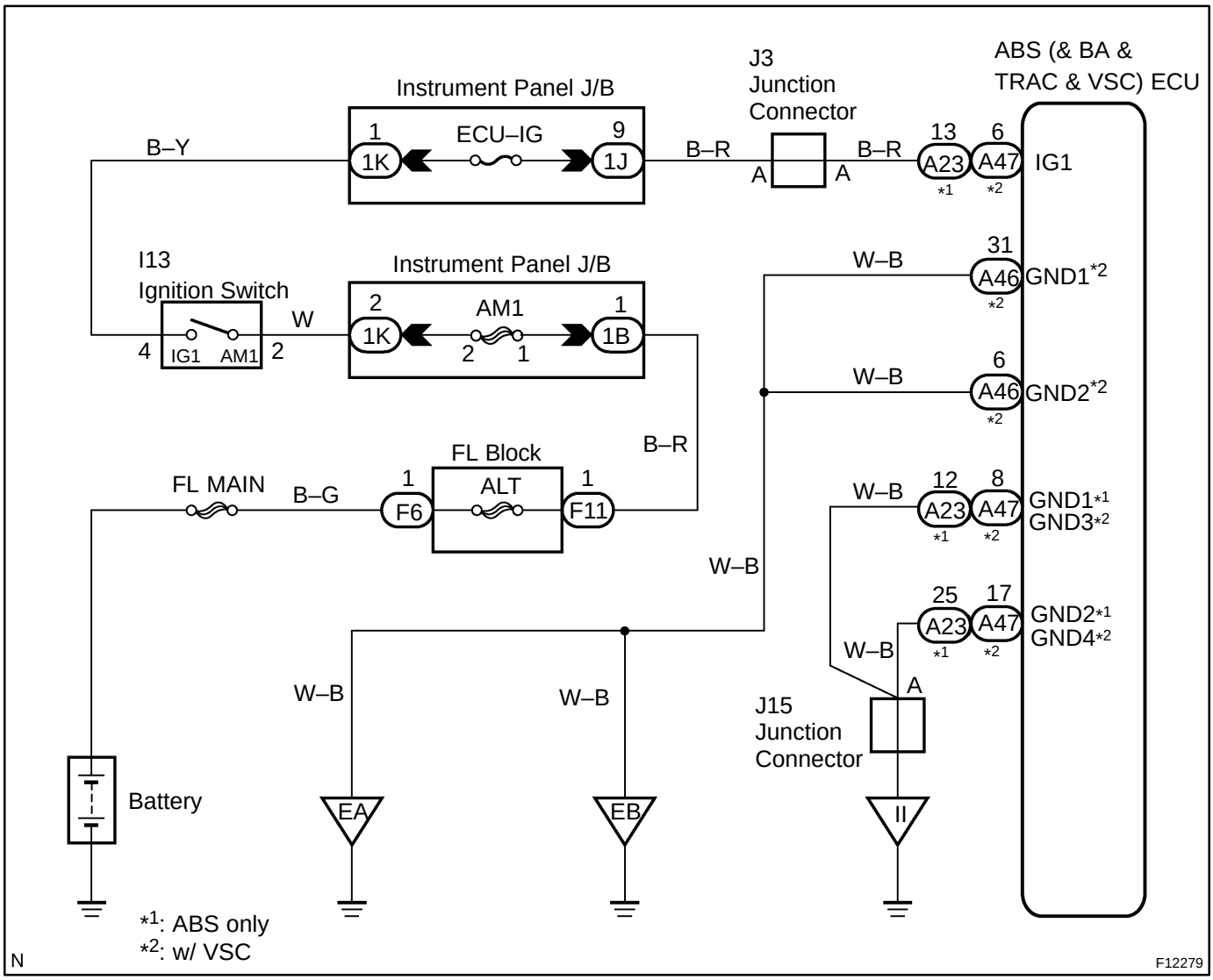
DTC	Always ON	Malfunction in ECU

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	Either of the following 1., 2. or 3. is detected: 1. Voltage of ECU terminal IG1 remains at more than 17 V. 2. The ECU connectors are off from the ECU. 3. There is a malfunction in the ECU internal circuit.	●Battery ●Charging system ●Power source circuit ●ECU

HINT:
There is a case that LEXUS hand–held tester cannot be used when ECU is abnormal.
Fail safe function:
If a trouble has occurred in the ECU, the ECU cuts off the current to the ABS solenoid relay and prohibits the ABS (& BA & TRAC & VSC) controls and the brake system becomes normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check that ECU connectors are securely connected to ECU.**

NO → **Connect connector to ECU.**

YES

2	**Is DTC output?**

Check the DTC on page DI–253.

YES → **Repair circuit indicated by code output.**

NO

3	**Is normal code displayed?**

YES → **Check ABS solenoid relay. Check for short circuit in harness and connector between ABS solenoid relay and DLC1 (See page IN–31).**

NO

4	**Does ABS warning light go off?**

YES → **Check for open and short circuit in harness and connector between ECU–IG fuse and ECU (See page IN–31).**

NO

5	Check battery positive voltage.

CHECK:

Check the battery positive voltage.

OK:

Voltage: 10 – 16 V

NG → **Check and repair charging system (See page CH–2).**

OK ↓

6	Check operation of ABS warning light.

In case of using the LEXUS hand–held tester:

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the LEXUS hand–held tester.

In case of not using the LEXUS hand–held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the ABS (& BA & TRAC & VSC) ECU.
(c) Turn the ignition switch ON.

CHECK:

Check the ABS warning light condition when pushing in and pulling out the short pin from the DLC1.

OK:

When the short pin is pulled out: ABS warning light goes off
When the short pin is pushed in: ABS warning light comes on

OK → **Check and replace ABS (& BA & TRAC & VSC) ECU.**

NG ↓

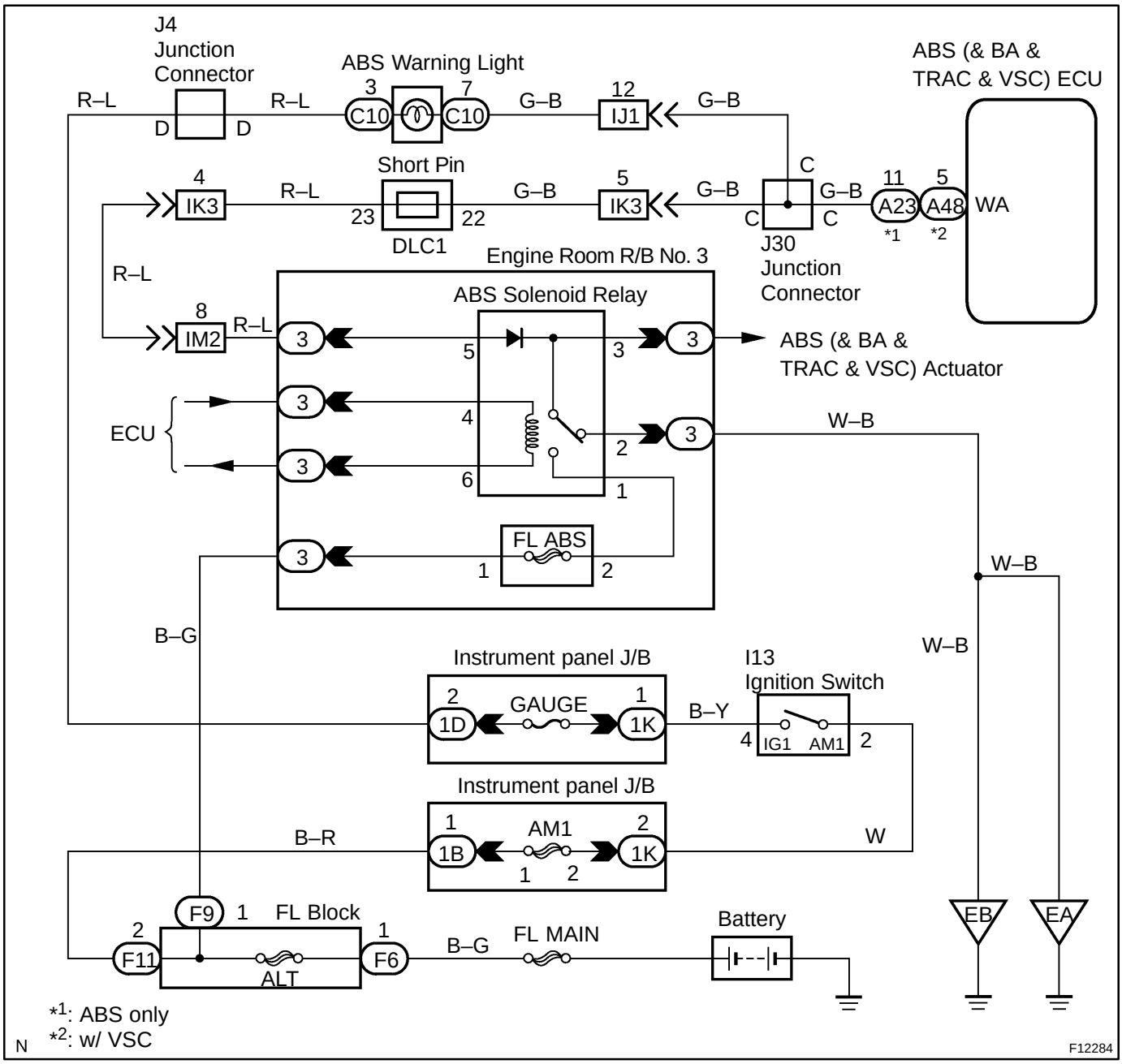
Check for short circuit in harness and connector between combination meter and ABS (& BA & TRAC & VSC) ECU, combination meter and DLC1 (See page IN–31).
Check ABS solenoid relay circuit (See page DI–281).

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU detects a trouble, it lights the ABS warning light, and prohibits the ABS control simultaneously. At this time, the ECU records a DTC in memory.
After removing the short pin of the DLC1, connect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Troubleshooting in accordance with the chart 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 LEXUS hand–held tester and start from step 2 in case of not using LEXUS hand–held tester.

*2: After inspection with step 4, start the inspection from step 5 in case of using the LEXUS hand–held tester and start from step 6 in case of not using LEXUS hand–held tester.

1	**Check operation of ABS warning light.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the ABS warning light can be shown on the combination meter by the LEXUS hand–held tester.

OK → **Check and replace ABS (& BA & TRAC & VSC) ECU.**

NG

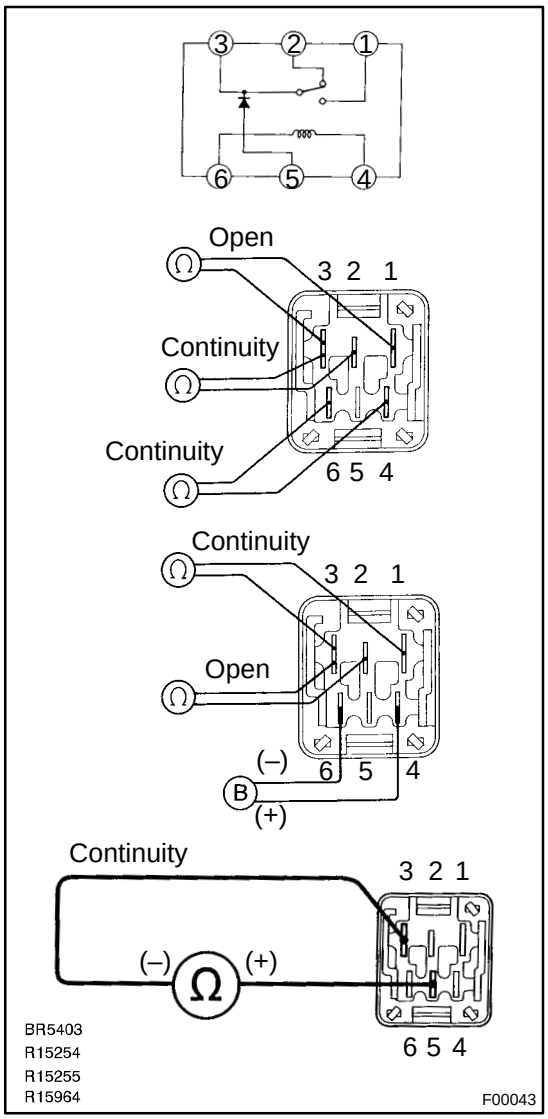
2	**Check ABS warning light.**

See the combination meter troubleshooting on page BE–65.

NG → **Repair bulb or combination meter assembly.**

OK

3	Check ABS solenoid relay.



PREPARATION:

Remove the ABS solenoid relay from the engine room R/B.

CHECK:

Check the 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 the continuity between each terminal of the ABS solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

Connect positive (+) test lead to terminal 5 and negative (–) lead to terminal 3. Check the continuity between the terminals.

OK:

Continuity

If there is no continuity, connect negative (–) test lead to terminal 5 and positive (+) lead to terminal 3. Check continuity between the terminals.

NG → **Replace ABS solenoid relay.**

OK

Repair or replace and check for open circuit in harness and connector between DLC1 and ABS solenoid relay and body ground (See page IN–31).

4	**Check that ECU connectors are securely connected to ECU.**

NO → **Connect connector to ECU.**

YES

5	**Check operation of ABS warning light (See step 1).**

OK → **Check and replace ABS (& BA & TRAC & VSC) ECU.**

NG

6	**Is DTC output?**

Check the DTC on page DI–253.

YES → **Repair circuit indicated by code output.**

NO

7	**Does ABS warning light go off if short pin is removed?**

NO → **Check for short circuit in harness and connector between warning light and DLC1 and ECU (See page IN–31).**

YES

8	**Check ABS solenoid relay (See step 3).**

NG → **Replace ABS solenoid relay.**

OK

Check for short circuit in harness and connector between DLC1 and ABS solenoid relay (See page IN–31).

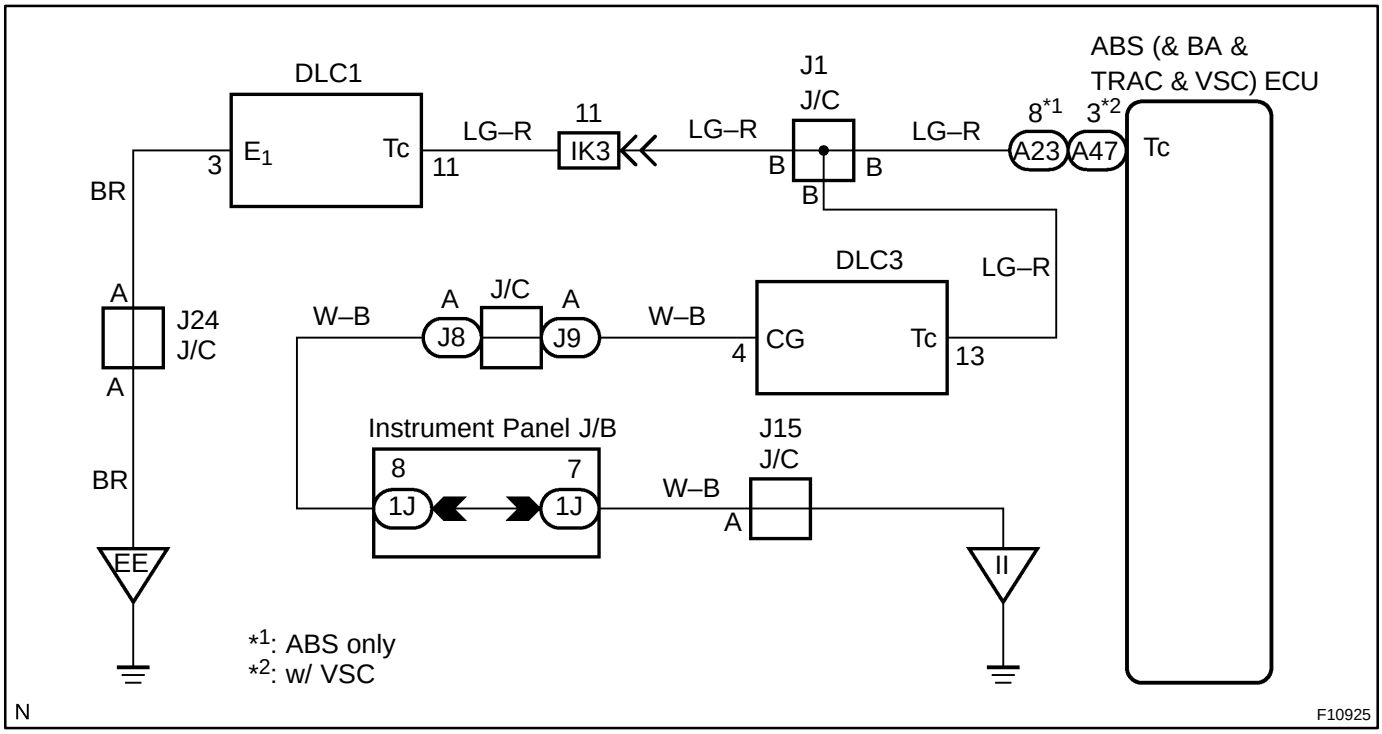
DI0X4–15

Tc Terminal Circuit

CIRCUIT DESCRIPTION

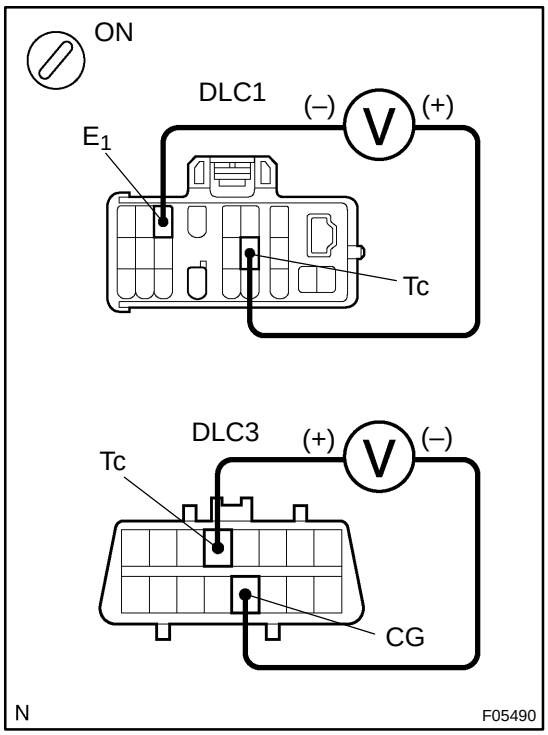
Connecting terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3 causes the ECU to display the DTC by flashing the ABS warning light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC1 or Tc and CG of the DLC3.**



PREPARATION:
Turn the ignition switch ON.
CHECK:
Measure the voltage between terminal Tc and E1 of the DLC1 or Tc and CG of the DLC3.
OK:
Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 or Tc and CG have been connected, the ECU may be defective.**

NG

2	**With ignition switch OFF, check for open and short circuit in harness and connector between ABS (& BA & TRAC & VSC) ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ABS (& BA & TRAC & VSC) ECU.

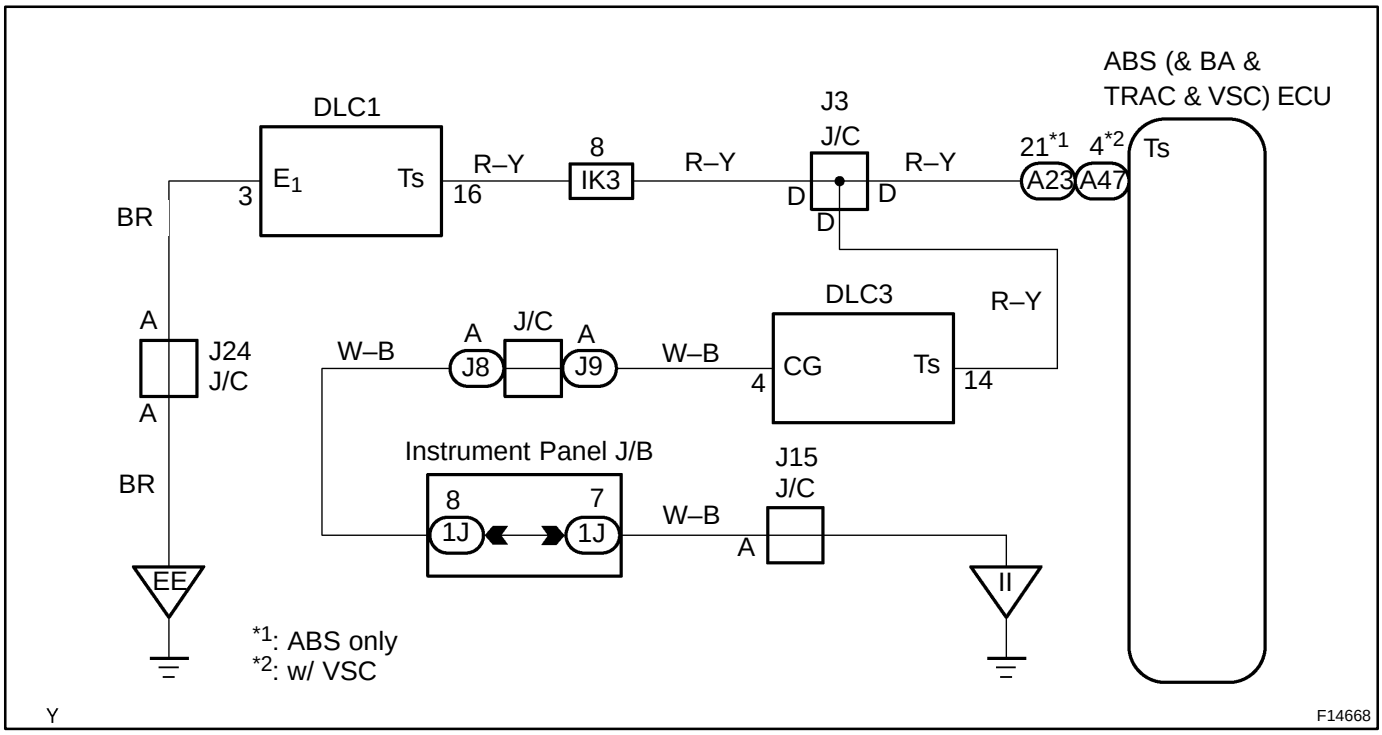
DI0X6–15

Ts Terminal Circuit

CIRCUIT DESCRIPTION

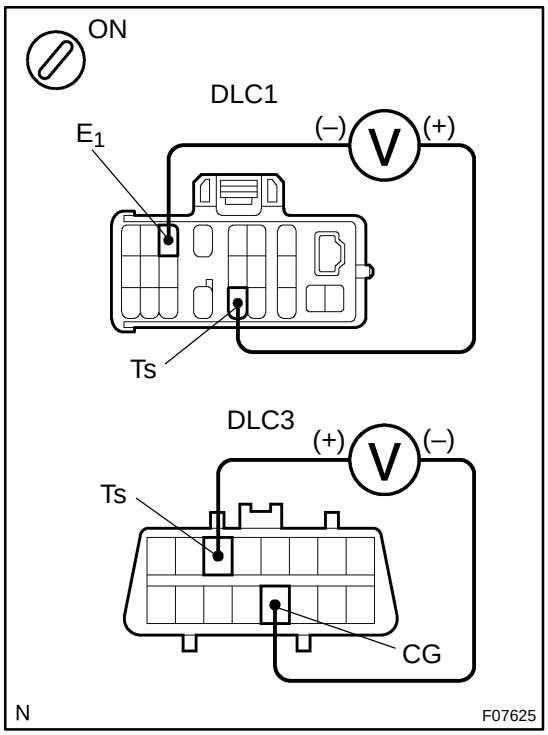
In the sensor check mode, a malfunction of the speed sensor that can not be judged when the vehicle is stopped is judged while driving.
Transition to the sensor check mode can be performed by connecting terminals Ts and E_1 of the DLC1 or Ts and CG of the DLC3 and turning the ignition switch from OFF to ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1 or Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure the voltage between terminals Ts and E_1 of the DLC1 or Ts and CG of the DLC3.

OK:

Voltage: 10 – 14 V

OK → **If ABS warning light does not blink even after Ts and E_1 or Ts and CG have been connected, the ECU may be defective.**

NG

2	**With ignition switch OFF, check for open and short circuit in harness and connector between ABS (& BA & TRAC & VSC) ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

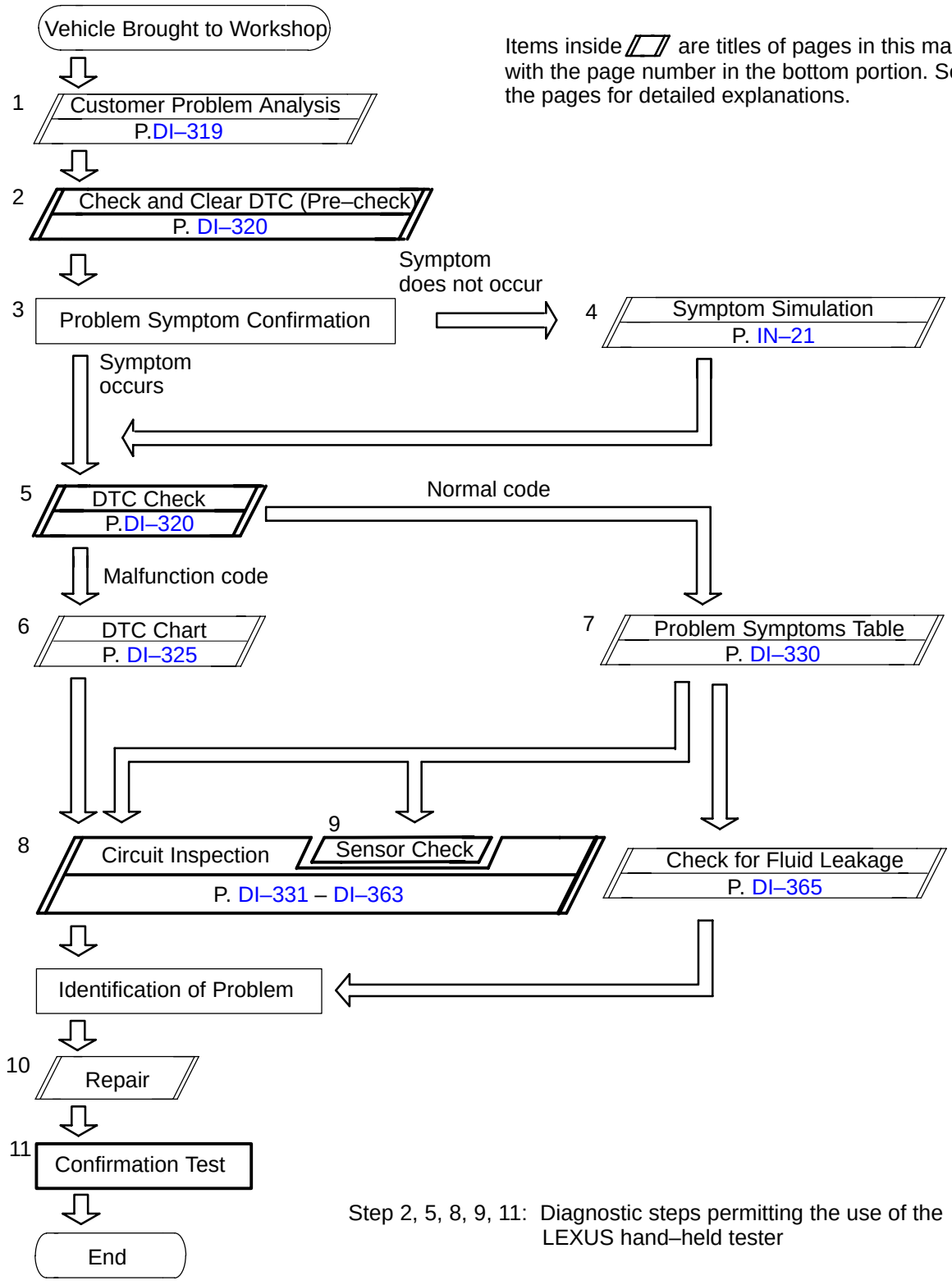
OK

Check and replace ABS (& BA & TRAC & VSC) ECU.

VEHICLE SKID CONTROL (VSC) & BRAKE ASSIST (BA) SYSTEM

HOW TO PROCEED WITH TROUBLESHOOTING

DI1GR–08



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 LEXUS hand–held tester

DI1GS–05

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & BA & VSC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

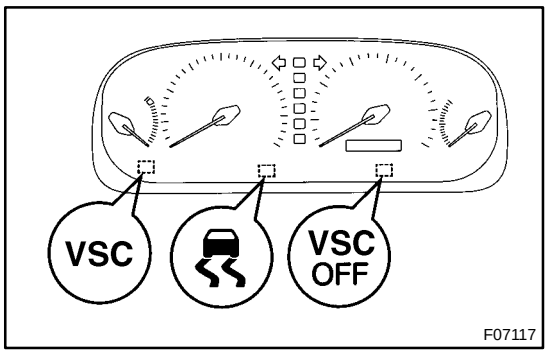
Date Problem First Occurred	/ /
Frequency the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ BA does not operate.	
	☐ TRAC does not operate.	
	☐ VSC does not operate. (Wheels sideslip at the time of sharp turning.)	
	VSC OFF Indicator Light Abnormal	☐ Remains on ☐ Does not light up
	VSC Warning Indicator Abnormal	☐ Displays ☐ Does not display
	SLIP Indicator Light Abnormal	☐ Remains on ☐ Does not light up

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)

DI8YP–01



PRE–CHECK

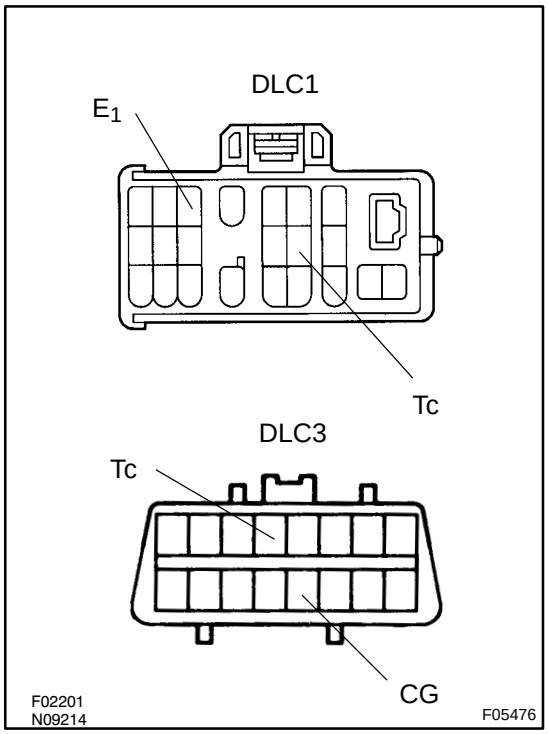
1. DIAGNOSIS SYSTEM

(a) Check the indicator.

When the ignition switch is turned ON, check that the VSC warning light, VSC OFF indicator light and SLIP indicator light comes on for about 3 seconds.

HINT:

- If the ECU stores DTC, VSC warning light and VSC OFF indicator light are on.
- If the indicator check result is not normal, proceed to troubleshooting for the VSC warning light circuit, VSC OFF indicator light circuit, and SLIP indicator light circuit (See page DI–353, DI–357, DI–360).



(b) In case of not using LEXUS hand–held tester:

Check the DTC

(1) Using SST, connect terminals Tc and E_1 of the DLC1 or terminals Tc and CG of the DLC3.

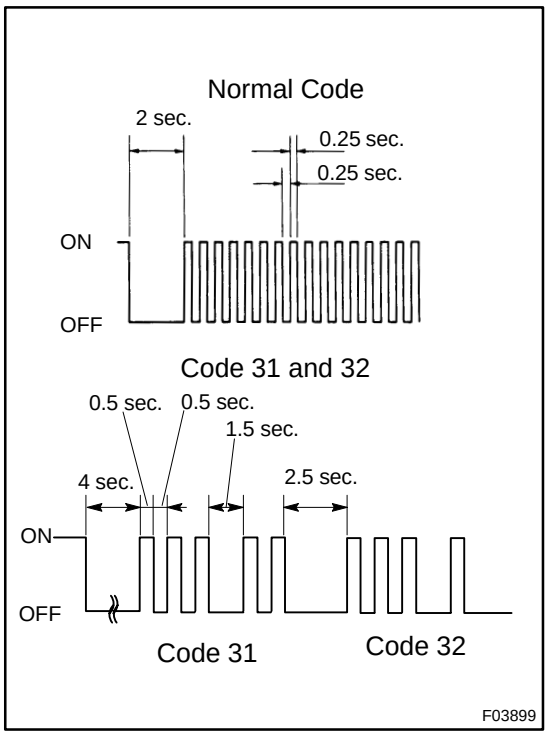
SST 09843–18020 or 09843–18040

(2) Turn the ignition switch ON.

(3) Read the DTC from the VSC warning light on the combination meter.

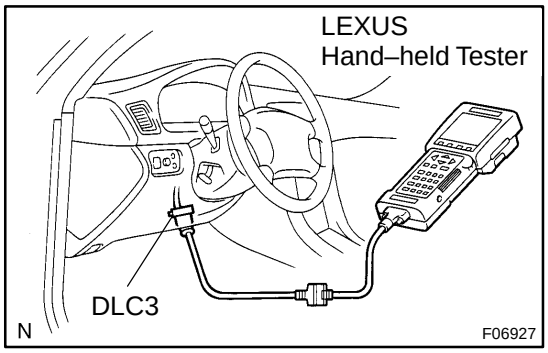
HINT:

- If no code appears, inspect the diagnostic circuit or VSC warning light circuit (See page DI–353 or DI–314).



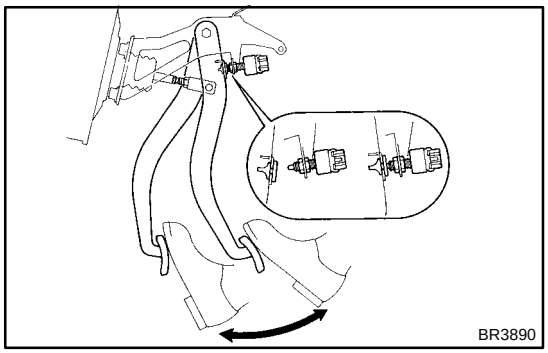
- As an example , the blinking patterns for the normal code and code 31 and 32 are shown in the illustration.
  (4) Codes are explained in the code table on page DI–325.
  (5) After completing the check, disconnect terminals Tc and E_1 of the DLC1 or Tc and CG of the DLC3, and turn OFF the display.

If 2 or more malfunctions are indicated simultaneously, the lowest numbered DTC will be displayed first.

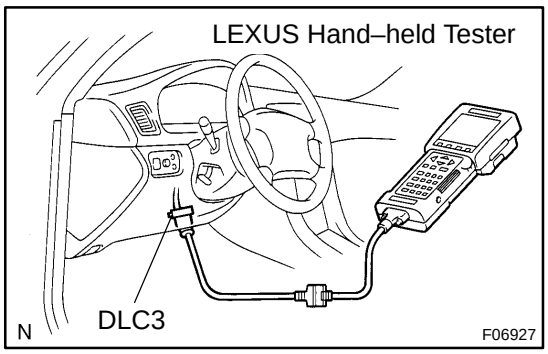


(c) In case of using LEXUS hand–held tester:
Check the DTC.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

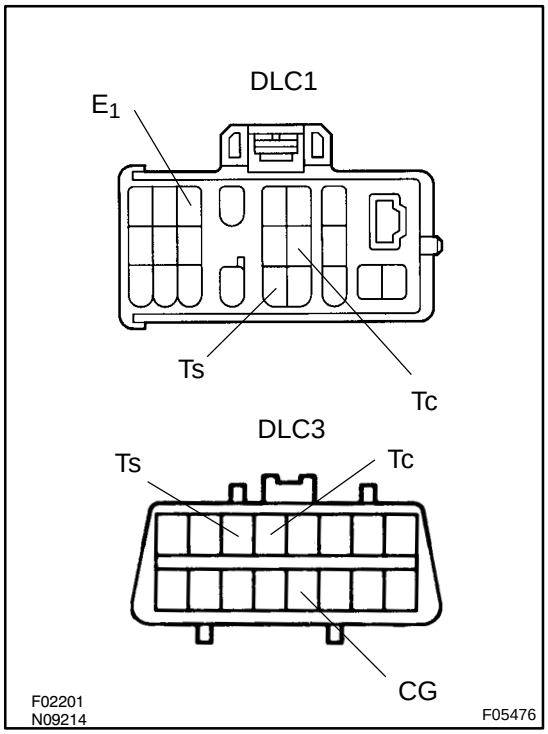
HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.



(d) In case of not using LEXUS 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 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the terminals of the DLC1 or the DLC3.
SST 09843–18020 or 09843–18040



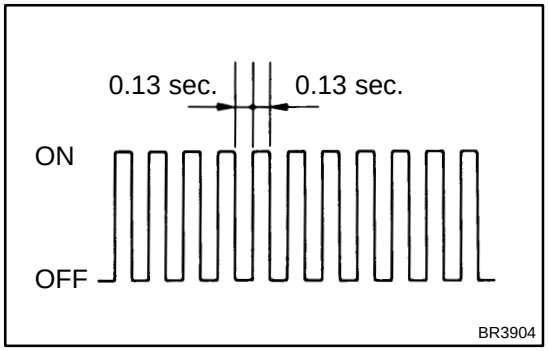
(e) In case of using LEXUS hand–held tester:
Clear the DTC.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Operate the LEXUS hand–held tester to erase the codes.
(See the LEXUS hand–held tester operator's manual.)



2. Test Mode:
VSC SENSOR CHECK

HINT:
If the ignition switch is turned from ON to ACC or LOCK during test mode, DTC will be erased.

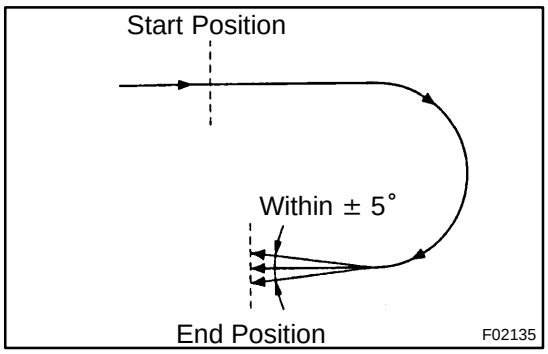
(a) In case of not using LEXUS hand–held tester:
Check the VSC sensor signal.
(1) Turn the ignition switch OFF.
(2) Check that the shift lever position is at P range, turn the steering wheel to the neutral position.
(3) Using SST, connect terminals Ts and E_1 of the DLC1 or terminals Ts and CG of the DLC3.
SST 09843–18020 or 09843–18040
(4) Start the engine.



(5) Check that the VSC warning light blinks.

HINT:
If the VSC warning light does not blink, inspect the VSC warning light circuit and Ts terminal circuit (See page DI–353, DI–316).

(6) After a new ECU installed, the first time only:
Start the engine and keep the vehicle in the stationary condition on the flat place for 3 sec. or more, it's installed the zero point calibration of the yaw rate sensor.
(7) Check the steering angle sensor.
Turn the steering wheel to either left or right to the full lock position, from the vehicle stationary condition, and turn back the steering wheel to the neutral position.



(8) Check the yaw rate sensor.
Shift the shift lever to the D range and drive the vehicle at the vehicle speed of approx. 5 km/h (3 mph), turn the steering wheel either to left or right 90˚ or more, and maintain 180˚ circular drive for the vehicle.
Stop the vehicle and shift the shift lever to the P range, check that the VSC buzzer sounds for 3 sec.

HINT:

- 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 won't sound, there is a malfunction in the VSC sensor, so check the DTC.
- Drive the vehicle in a 180˚ circle. At the end of the turn, the direction of the vehicle should be within 180˚±5˚ of its start position.
- Do not spin the front wheels.

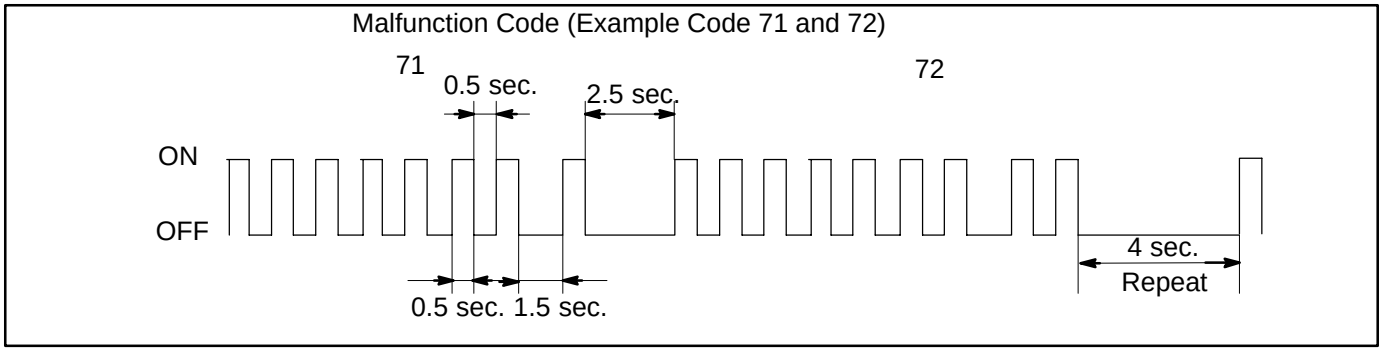
(9) Using SST, connect terminals Tc and E_1 of the DLC1 or terminals Tc and CG of the DLC3.

SST 09843–18020 or 09843–18040

(10) Read the number of blinks of the VSC warning light.

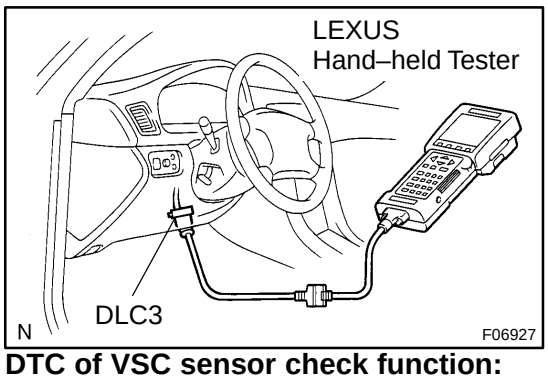
HINT:

- See the DTC list shown at the bottom on this page.
- If every sensor is normal, a normal code is output. (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated.)
- If 2 or more malfunctions are indicated simultaneously, the lowest numbered code will be displayed first.



(11) After doing the check, disconnect the SST from terminals Ts and E_1, Tc and E_1 of the DLC1 or Ts and CG, Tc and CG of the DLC3 and turn the ignition switch OFF.

SST 09843–18020 or 09843–18040



(b) In case of using LEXUS hand–held tester:
Check the VSC sensor signal.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Do steps (2) and (4) to (8) on the previous pages.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.

DTC of VSC sensor check function:

Code No.	Diagnosis	Trouble Area
C0371 / 71	Yaw rate sensor output signal malfunction	●Yaw rate sensor ●Yaw rate sensor circuit
C1208 / 72	Steering angle sensor output signal malfunction	●Steering angle sensor ●Steering angle sensor circuit

3. YAW RATE SENSOR ZERO POINT CALIBRATION

HINT:
When replacing the yaw rate sensor assembly or ECU, make sure to perform yaw rate sensor zero point calibration.

(a) When replacing the ECU:
After replacing ECU, shift the shift lever in P position and turn the ignition switch ON. Do not move the vehicle for 15 sec. or more.

HINT:
At this time, VSC warning light and VSC OFF indicator light are on for 15 seconds and go off.

(b) When replacing the yaw rate sensor assembly:
Shift the shift lever in P position and turn the ignition switch ON, repeat connecting and releasing Ts and E1 terminals of the DLC1 4 times or more for 8 sec. After that do not move the vehicle for 15 sec. or more.

HINT:
When the operation (b) is performed, DTC is deleted.
At this time, ABS warning light flashes. VSC OFF light lights up for 15 sec., then goes off. VSC warning light lights up for approx. 15 sec., then flashes to indicate DTC.

DI1GU–06

DIAGNOSTIC TROUBLE CODE CHART

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 no abnormality is found when inspecting parts, inspect the ECU.
- If a malfunction code is displayed during the DTC check, check the circuit listed by code. 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
C1231 / 31 (DI–343)	Malfunction in steering angle sensor	●Steering angle sensor ●Steering angle sensor circuit
C1233 / 33 (DI–347)	Open or short circuit of yaw rate sensor circuit	●Yaw rate sensor ●Yaw rate sensor circuit
C1234 / 34 (DI–347)	Malfunction in yaw rate sensor	●Yaw rate sensor ●Yaw rate sensor circuit
C1207 / 37 (DI–337)	Malfunction in Park/Neutral position switch	●Park/Neutral position switch ●Park/Neutral position switch (Park/Reverse position circuit)
C1223 / 43 (DI–340)	Malfunction in ABS control system	ABS control system
C1224 / 44 (DI–341)	Open or short circuit of NE signal circuit	●NEO circuit ●ECM
C1201 / 51* (DI–331)	ECM system malfunction	Engine control system
C1202 / 52 (DI–332)	Brake fluid level low Open circuit of brake fluid level warning switch circuit	●Brake fluid level ●Brake fluid level warning switch ●Brake fluid level warning switch circuit
C1203 / 53 (DI–335)	ECM communication circuit malfunction	●TRC+ or TRC– circuit ●ENG+or ENG– circuit ●ECM
Always ON (DI–353)	Malfunction in ABS & BA & TRAC & VSC ECU Open circuit of VSC warning indicator circuit	●Power source circuit ●ABS & BA & TRAC & VSC ECU ●VSC warning indicator circuit ●Charging system

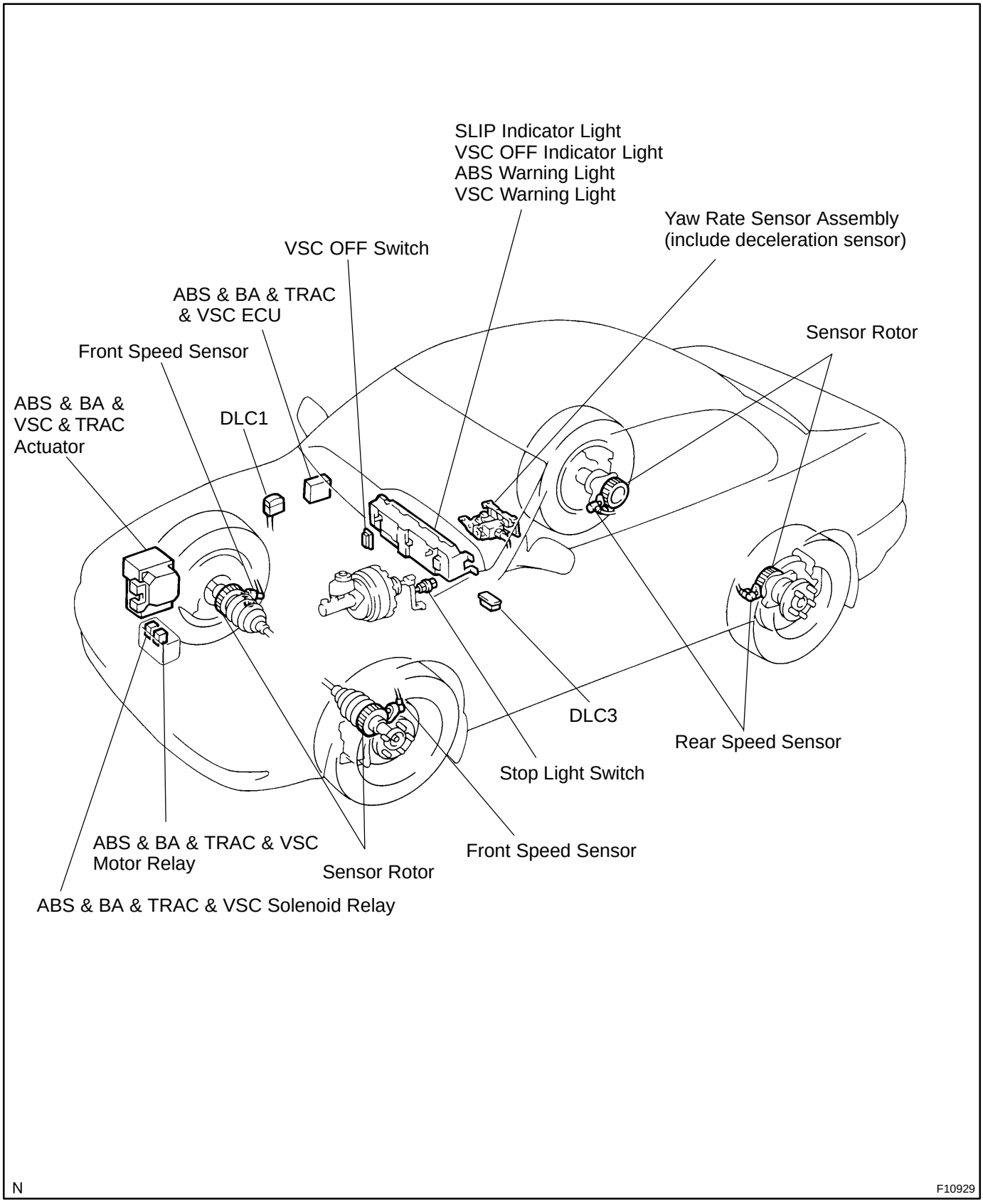
* : At the same time, when the check engine light lights up, there is a malfunction in the engine system.
At the same time, when the check engine light goes off, BA & TRAC & VSC system is normal.

HINT:

There is a case that LEXUS hand–held tester cannot be used when the VSC warning indicator is always on.

DI0BZ–09

PARTS LOCATION

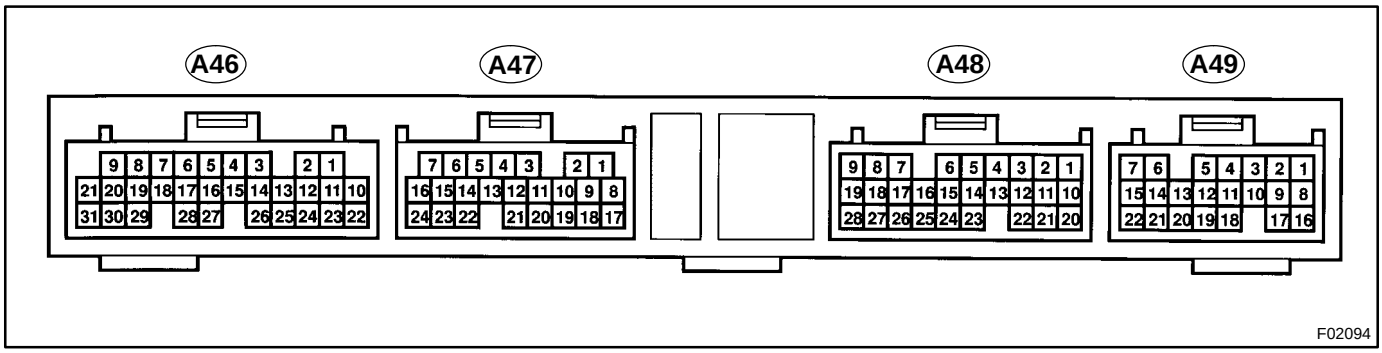


N

F10929

DI1AE–08

TERMINALS OF ECU



Symbols (Terminal No.)	Wiring Color	Condition		STD Voltage (V)
SMC1 (A46 – 2) – GND (A46 – 6, 31, A47 – 8, 17)	Y–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMC2 (A46 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	Y–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRC1 (A46 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	B–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRC2 (A46 – 5) – GND (A46 – 6, 31, A47 – 8, 17)	B–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLR (A46 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	W–L – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRH (A46 – 8) – GND (A46 – 6, 31, A47 – 8, 17)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRR (A46 – 9) – GND (A46 – 6, 31, A47 – 8, 17)	R–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
VCM (A46 – 10) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch ON		4.5 – 5.5
FR+ (A46 – 14) – FR– (A46 – 13)	W – B	IG switch ON	Slowly turn right front wheel	AC generation
FL+ (A46 – 16) – FL– (A46 – 15)	R – G	IG switch ON	Slowly turn left front wheel	AC generation
SR (A46 – 19) – R+ (A46 – 1)	GR – GR–R	IG switch ON	ABS warning light OFF	10 – 14
SFLH (A46 – 21) – GND (A46 – 6, 31, A47 – 8, 17)	L–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
PMC (A46 – 22) – E2 (A46 – 23)	B – W	IG switch ON	Stop light switch OFF	0.3 – 0.7
E2 (A46 – 23) – GND (A46 – 6, 31, A47 – 8, 17)	W – W–B	IG switch OFF		Continuity
FSS (A46 – 24) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF		Continuity
MT (A46 – 28) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON	Motor relay is OFF	Below 1.5
MR (A46 – 29) – GND (A46 – 6, 31, A47 – 8, 17)	GR–L – W–B	IG switch ON	ABS motor stops	10 – 14
VGS (A47 – 1) – GGND (A47 – 10)	W – R	IG switch ON		4.5 – 5.5
GL1 (A47 – 2) – GGND (A47 – 10)	G – R	IG switch ON	Vehicle is placed on the level surface	2 – 3

Tc (A47 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	LG–R – W–B	IG switch ON		10 – 14
Ts (A47 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	R–Y – W–B	IG switch ON		10 – 14
IG1 (A47 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	B–R – W–B	IG switch ON		10 – 14
NEO (A47 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	BR–W – W–B	Engine idling		Pulse generation
GL2 (A47 – 9) – GGND (A47 – 10)	B – R	IG switch ON	Vehicle is placed on the level surface	2.0 – 3.0
GGND (A47 – 10) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch OFF		Continuity
RR+ (A47 – 11) – RR– (A47 – 12)	W – B	IG switch ON	Slowly turn right rear wheel	AC generation
ENG+ (A47 – 14) – ENG– (A47 – 22)	W – B	IG switch ON	Engine idling	Pulse generation
GSS (A47 – 18) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF		Continuity
RL+ (A47 – 19) – RL– (A47 – 20)	R – G	IG switch ON	Slowly turn left rear wheel	AC generation
TRC+ (A47 – 24) – TRC– (A47 – 16)	LG – L	IG switch ON	Engine idling	Pulse generation
LBLO (A48 – 1) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON, fluid in master cylinder reservoir above MIN level and parking brake switch is OFF (Brake warning light is OFF)		10 – 14
FRO (A48 – 2) – GND (A46 – 6, 31, A47 – 8, 17)	GR–R – W–B	Vehicle driving at about 20 km/h (12 mph)		Pulse generation
RRO (A48 – 3) – GND (A46 – 6, 31, A47 – 8, 17)	GR–L – W–B	Vehicle driving at about 20 km/h (12 mph)		Pulse generation
VSCW (A48 – 4) – GND (A46 – 6, 31, A47 – 8, 17)	R–L – W–B	IG switch ON	VSC warning light ON	Below 2.0
		IG switch ON	VSC warning light OFF	10 – 14
WA (A48 – 5) – GND (A46 – 6, 31, A47 – 8, 17)	G–B – W–B	IG switch ON	ABS warning light ON	Below 2.0
		IG switch ON	ABS warning light OFF	10 – 14
IND (A48 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	LG – W–B	IG switch ON	SLIP indicator light ON	Below 2.0
		IG switch ON	SLIP indicator light OFF	10 – 14
STP (A48 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	G–W – W–B	Stop light switch OFF		Below 1.5
		Stop light switch ON		8 – 14
VYS (A48 – 9) – GYAW (A48 – 27)	R – B	IG switch ON		4.5 – 5.5
LBL– (A48 – 11) – GND (A46 – 6, 31, A47 – 8, 17)	R–W – W–B	IG switch ON Fluid in master cylinder reservoir above MIN level		About 4 – 8
WT (A48 – 13) – GND (A46 – 6, 31, A47 – 8, 17)	L – W–B	IG switch ON	VSC OFF indicator light ON	Below 2.0
		IG switch ON	VSC OFF indicator light OFF	10 – 14
SS1+ (A48 – 14) – SS1– (A48 – 23)	P – V	Engine idling	Slowly turn steering wheel	Pulse generation (See page DI–343)
R (A48 – 15) – GND (A46 – 6, 31, A47 – 8, 17)	R–B – W–B	IG switch ON	Shift lever is in R range	8 – 14
		IG switch ON	Shift lever is in other than R range	Below 1.5
SP1 (A48 – 16) – GND (A46 – 6, 31, A47 – 8, 17)	L – W–B	Vehicle driving at about 20 km/h (12 mph)		Pulse generation

YSS (A48 – 18) – GND (A46 – 6, 31, A47 – 8, 17)	Shielded – W–B	IG switch OFF		Continuity
YD (A48 – 19) – GND (A46 – 6, 31, A47 – 8, 17)	B–L – W–B	IG switch ON	VSC warning light OFF	4.5 – 5.5
BZ (A48 – 20) – GND (A46 – 6, 31, A47 – 8, 17)	P–B – W–B	IG switch ON	VSC buzzer sounds	Below 1.0 ↔ 10 – 14
		IG switch ON	VSC buzzer does not sound	10 – 14
P (A48 – 24) – GND (A46 – 6, 31, A47 – 8, 17)	G–W – W–B	IG switch ON	Shift lever is in P range	8 – 14
		IG switch ON	Shift lever is in other than P range	Below 1.5
D/G (A48 – 25) – GND (A46 – 6, 31, A47 – 8, 17)	W – W–B	IG switch ON		10 – 14
CSW (A48 – 26) – GND (A46 – 6, 31, A47 – 8, 17)	LG – W–B	IG switch ON	VSC cut switch pushed in	Below 1.5
		IG switch ON	VSC cut switch released	8 –14
GYAW (A48 – 27) – GND (A46 – 6, 31, A47 – 8, 17)	B – W–B	IG switch OFF		Continuity
YAW (A48 – 28) – GYAW (A48 – 27)	W – B	IG switch ON	Vehicle is in stationary condition	2 – 3
SRLR (A49 – 1) – GND (A46 – 6, 31, A47 – 8, 17)	LG–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
AST (A49 – 6) – GND (A46 – 6, 31, A47 – 8, 17)	R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLH (A49 – 7) – GND (A46 – 6, 31, A47 – 8, 17)	G–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRR (A49 – 8) – GND (A46 – 6, 31, A47 – 8, 17)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMV2 (A49 – 15) – GND (A46 – 6, 31, A47 – 8, 17)	Y–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRH (A49 – 16) – GND (A46 – 6, 31, A47 – 8, 17)	R–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SMV1 (A49 – 22) – GND (A46 – 6, 31, A47 – 8, 17)	L–R – W–B	IG switch ON	ABS warning light OFF	10 – 14

DI1GX–06

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 ABS & BA & TRAC & VSC ECU, sensor or etc., turn the IG switch OFF.

Symptom	Suspected Area	See page
TRAC does not operate	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & BA & TRAC & VCS 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–320 DI–290 DI–365 DI–267
VSC does not operate	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace he ABS & BA & TRAC & VCS 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–320 DI–290 DI–365 DI–267 DI–296 DI–347 DI–343
BA does not operate	Stop light switch circuit	DI–301
SLIP indicator light is abnormal	SLIP indicator light circuit	DI–360
VSC OFF indicator is abnormal	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & BA & TRAC & VCS ECU. 1. VSC OFF indicator light circuit 2. VSC OFF switch circuit	 DI–357 DI–357
DTC check is impossible	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & BA & TRAC & VCS ECU. 1. VSC warning indicator circuit 2. Tc terminal circuit	 DI–353 DI–314
VSC warning light is abnormal	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & BA & TRAC & VCS ECU. 1. VSC warning indicator circuit 2. ABS & BA & TRAC & VCS ECU	 DI–353 DI–353

DI1GY–13

CIRCUIT INSPECTION

DTC	C1201 / 51	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If a trouble has occurred in the engine control system, the ECU prohibits the BA & TRAC & VSC control.

DTC No.	DTC Detecting Condition	Trouble Area
C1201 / 51*	When any of the following 1 or 2 is detected: 1. When the engine rotation is 500 rpm or more and ENG malfunction signal is sent or during TRAC controlling, TRAC control prohibition request from ECM continues for more than 0.048 sec. 2. When ECM has memory of ECM malfunction had occurred, TRAC control prohibition request from ECM continues for more than 1 sec.	Engine control system

* :

At the same time, when the check engine light lights up, there is a malfunction in the engine system.
At the same time, when the check engine light goes off, BA & TRAC & VSC system is normal.

INSPECTION PROCEDURE

1	**Check DTC for engine (See page DI–3).**

*1

Repair engine control system according to code output.

*2

Check for ECM connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DTC	C1202 / 52	Brake Fluid Level Warning Switch Circuit

CIRCUIT DESCRIPTION

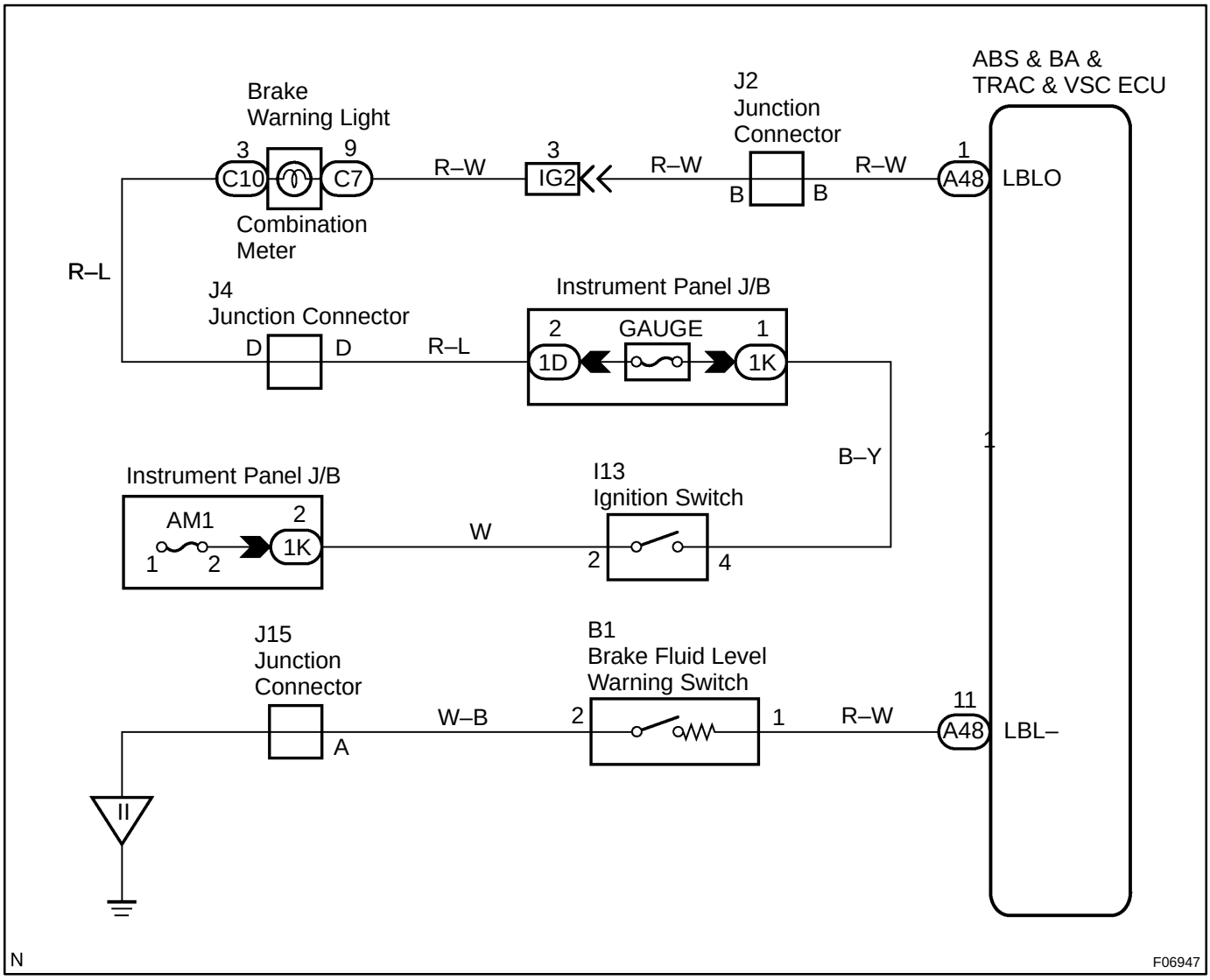
The brake fluid level warning switch sends the appropriate signal to the ECU when the brake fluid level drops.

DTC No.	DTC Detecting Condition	Trouble Area
C1202 / 52	●ECU terminal IG1 voltage is 9.5 V to 17.2 V and open circuit for the brake fluid level warning switch circuit continues for 2 sec. or more. ●While driving, the condition that the brake fluid low level signal is ON and the force compounded by the centrifugal force in lateral and the back and forth direction is 0.28 G or less continues for 60 sec. ●With the vehicle stationary, the condition that the brake fluid low level signal is ON continues for 30 sec.	●Brake fluid level ●Brake fluid level warning switch ●Brake fluid level warning switch circuit

HINT:

Depress the parking brake pedal and also turns on the brake warning light but does not diagnose DTC No. C1202 / 52.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check brake fluid level.**

CHECK:

Check the amount of fluid in the brake reservoir.

NG → **Check and repair brake fluid leakage and add fluid.**

OK ↓

2	**Check brake fluid level warning switch (See page BE–99).**

NG → **Replace brake fluid level warning switch.**

OK ↓

3	**Check for open circuit in all harness and components connected to brake fluid level warning light (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace ABS & BA & TRAC & VSC ECU.

DI1H0–15

DTC	C1203 / 53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

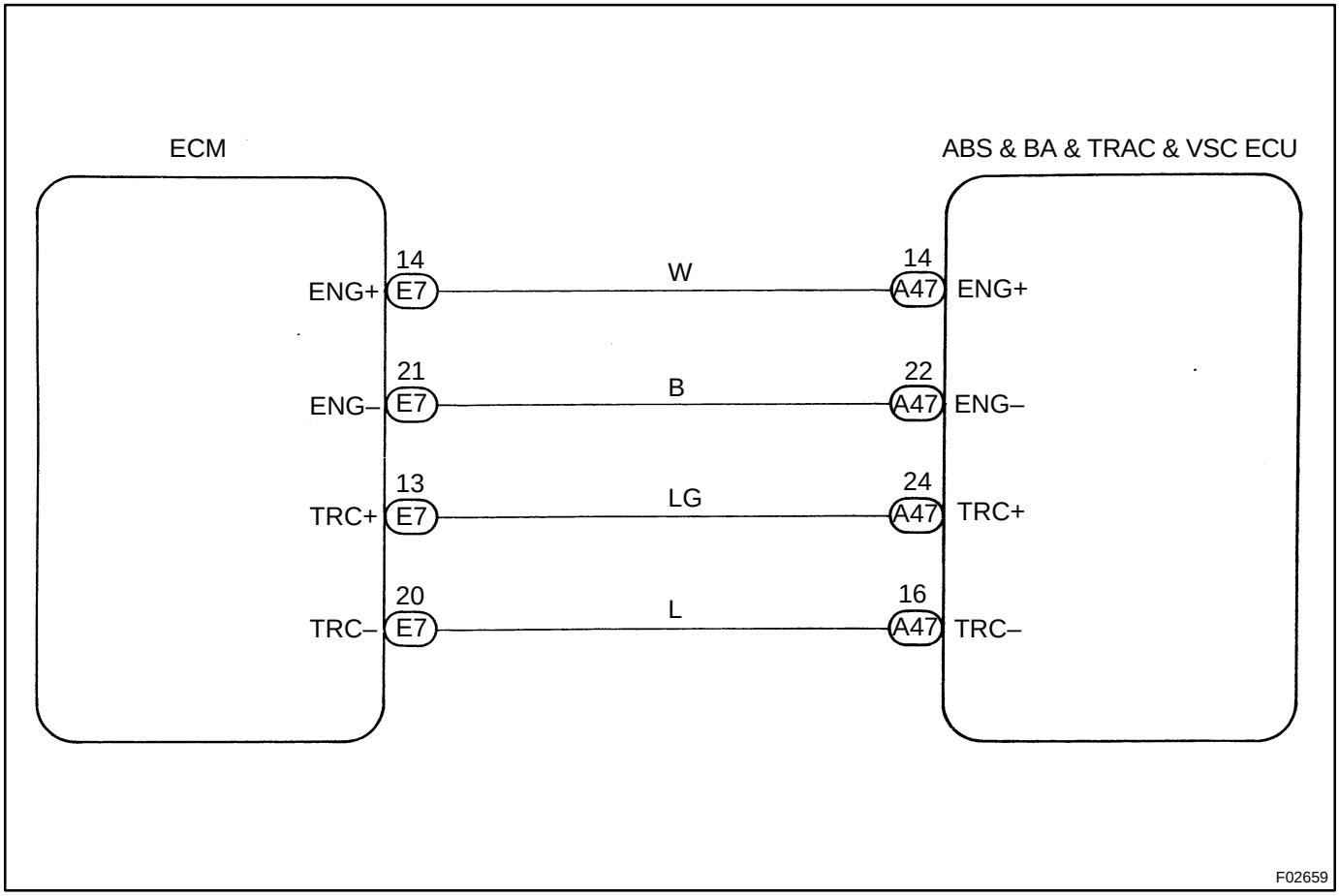
The circuit is used to send TRAC & VSC control information from the ABS & BA & TRAC & VSC ECU to the ECM (TRC+, TRC–), and engine control information from the ECM to the ABS & BA & TRAC & VSC ECU (ENG+, ENG–).

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	Either of the following 1, 2 or 3 continues for 5 sec.: 1. When ECU terminal IG1 voltage is 9.5 V or more, condition that data is not transmitted to ECM continues for more than 5 sec. 2. When ECU terminal IG1 voltage is 9.5 V or more, engine speed is 500rpm or more and data receipt from ECM is impossible. 3. The condition that data sent from ECM becomes repeatedly normal and abnormal occurs 10 times or more for 60 sec.	●TRC+ or TRC– circuit ●ENG+ or ENG– circuit ●ECM

Fail safe function:

If a trouble has occurred in the ECM communication circuit, the ECU prohibits the BA & TRAC & VSC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between each of terminals ENG+, ENG–, TRC+, TRC– of ABS & BA & TRAC & VSC ECU and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

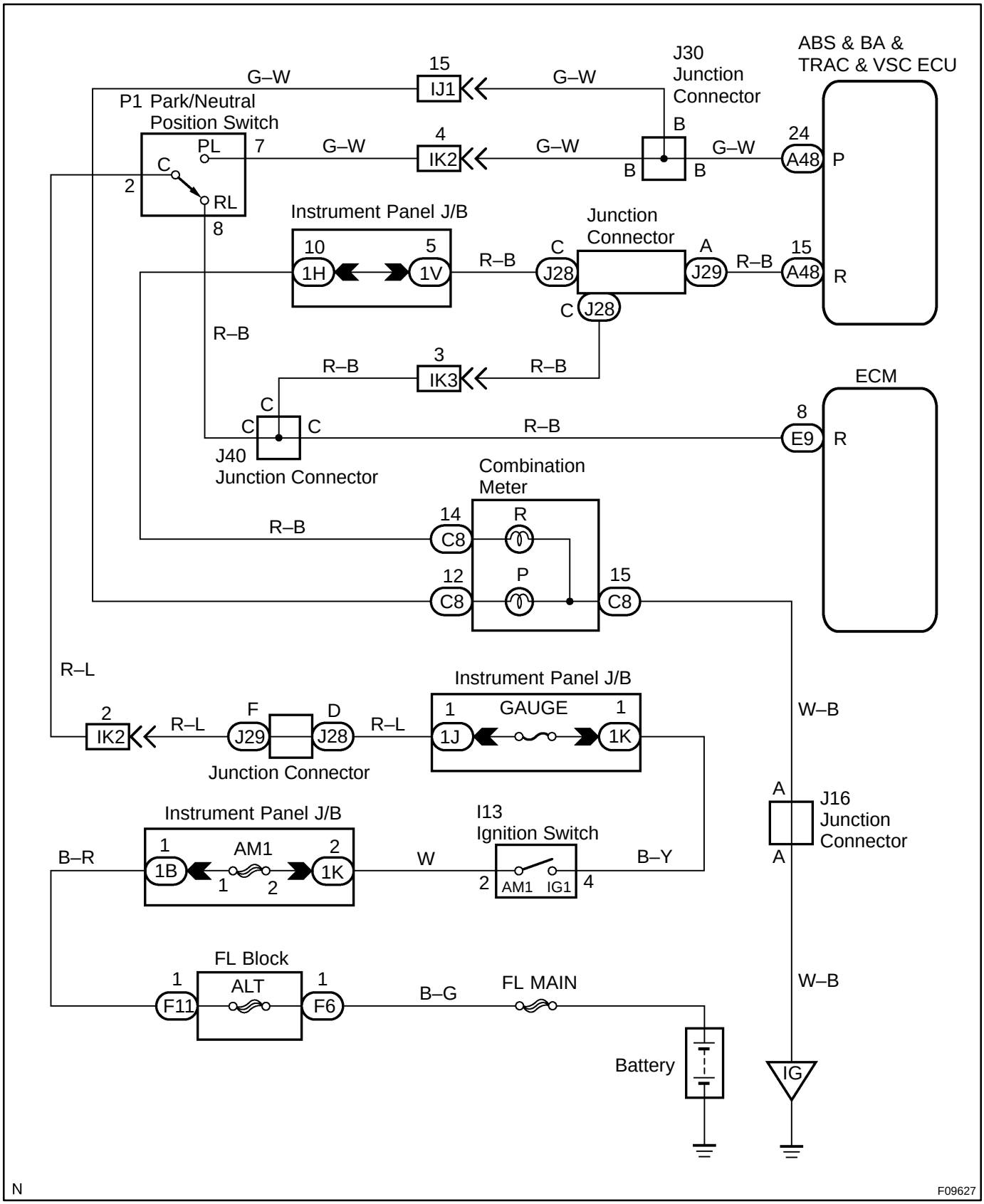
Check and replace ECM or ABS & BA & TRAC & VSC ECU.

DTC	C1207 / 37	Park/Neutral Position Switch (Park/Reverse Position Circuit)

CIRCUIT DESCRIPTION

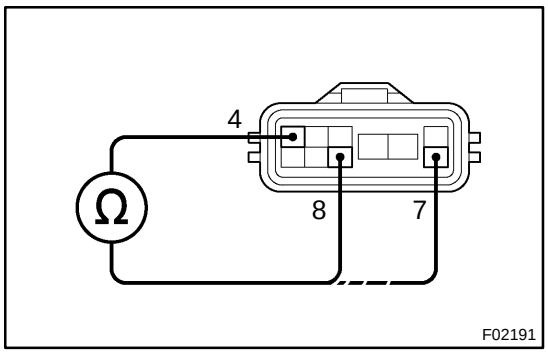
DTC No.	DTC Detection Condition	Trouble Area
C1207 / 37	When any of the following 1 to 3 is detected: 1. At vehicle speed of 15 km/h (9 mph) or less and when the condition that open circuit signal of P signal circuit of park/neutral position switch is ON continues 5 sec. or more. 2. At vehicle speed of 15 km/h (9 mph) or more, P signal from park/neutral position switch is ON, the shift lever position information from the ECM is other than in P or N range condition continues for 60 sec. or more. 3. At vehicle speed of 15 km/h (9 mph) or less and when the condition that open circuit signal of R signal circuit of park/neutral position switch is ON continues 2 sec. or more.	●Park/Neutral position switch ●Park/Neutral position switch (Park/Reverse position circuit)

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check park/neutral position switch (Park/Reverse position switch circuit).**



PREPARATION:

(a) Jack up the vehicle.

(b) Disconnect the connector from the park/neutral position switch.

CHECK:

Check the continuity between each terminal shown below when the shift lever is moved to each position.

OK:

P position switch	Terminals 4 – 7	Continuity
R position switch	Terminals 4 – 8	Continuity

NG → **Replace park/neutral position switch.**

OK

2	**Check for open and short circuit in harness and connector between terminals P and R of ABS & BA & TRAC & VSC ECU and ECM connector and battery (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU or ECM.

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 DTC for ABS (See page DI–253).**

***1** → **Repair ABS control system according to code output.**

***2**

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON

DI1H4–14

DTC	C1224 / 44	NE Signal Circuit

CIRCUIT DESCRIPTION

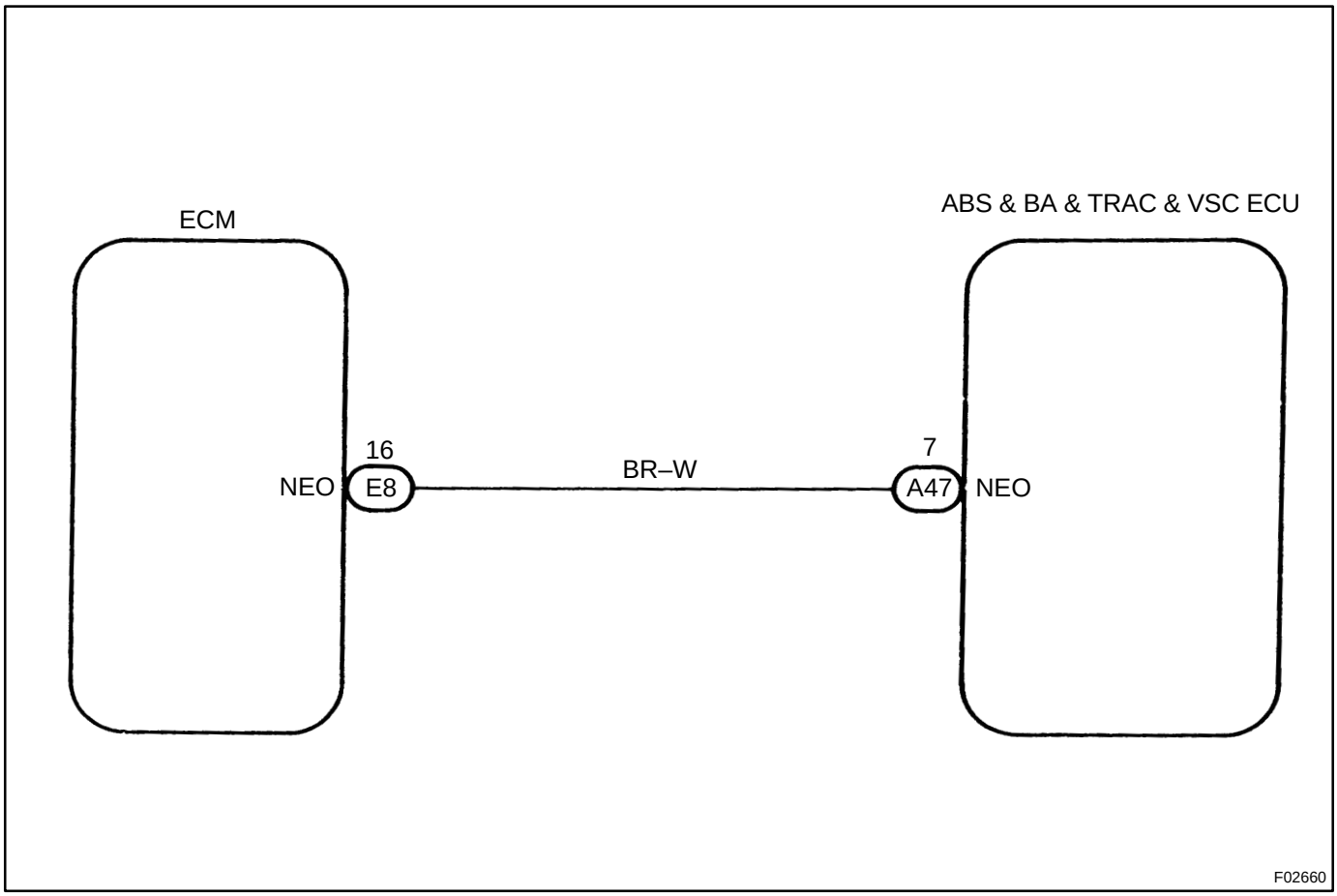
ABS & BA & TRAC & VSC ECU receives engine revolution speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224 / 44	When any of the following 1 to 2 is detected: 1. At vehicle speed of 30 km/h (19 mph) or more, when data receiving 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 and when open or short circuit for engine revolution signal circuit continues for 0.24 sec. or more.	●NEO circuit ●ECM

Fail safe function:

If a trouble has occurred in the NE signal circuit, the ECU prohibits the BA & TRAC & VSC controls.

WIRING DIAGRAM



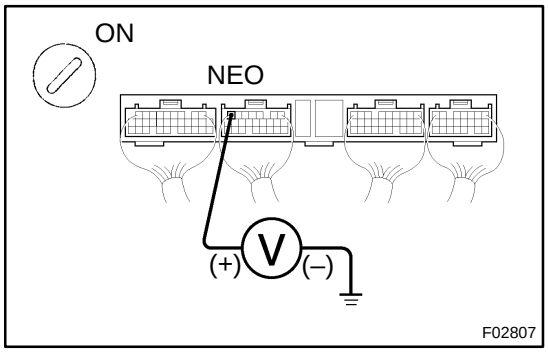
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminal NEO of ABS & BA & TRAC & VSC ECU and terminal NEO of ECM (See page IN–31).**

NG → **Repair or replace harness and connector.**

OK

2	**Check voltage between terminals NEO of ABS & BA & TRAC & VSC ECU and body ground.**



PREPARATION:

(a) Remove the ABS & BA & TRAC & VSC ECU with connectors still connected.

(b) Turn the ignition switch ON.

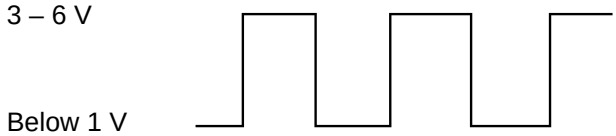
CHECK:

Measure the voltage between terminal NEO of the ABS & BA & TRAC & VSC ECU and the body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 – 6 V or below 1 V
ON (Idling)	3 – 6 V ↔ below 1 V (Pulse)

(Reference)



NG → **Check and replace ABS & BA & TRAC & VSC ECU or ECM.**

OK

If same codes is still output after DTC is deleted, check contact condition of each connection.

DI1H5–10

DTC	C1231 / 31	Steering Angle Sensor Circuit

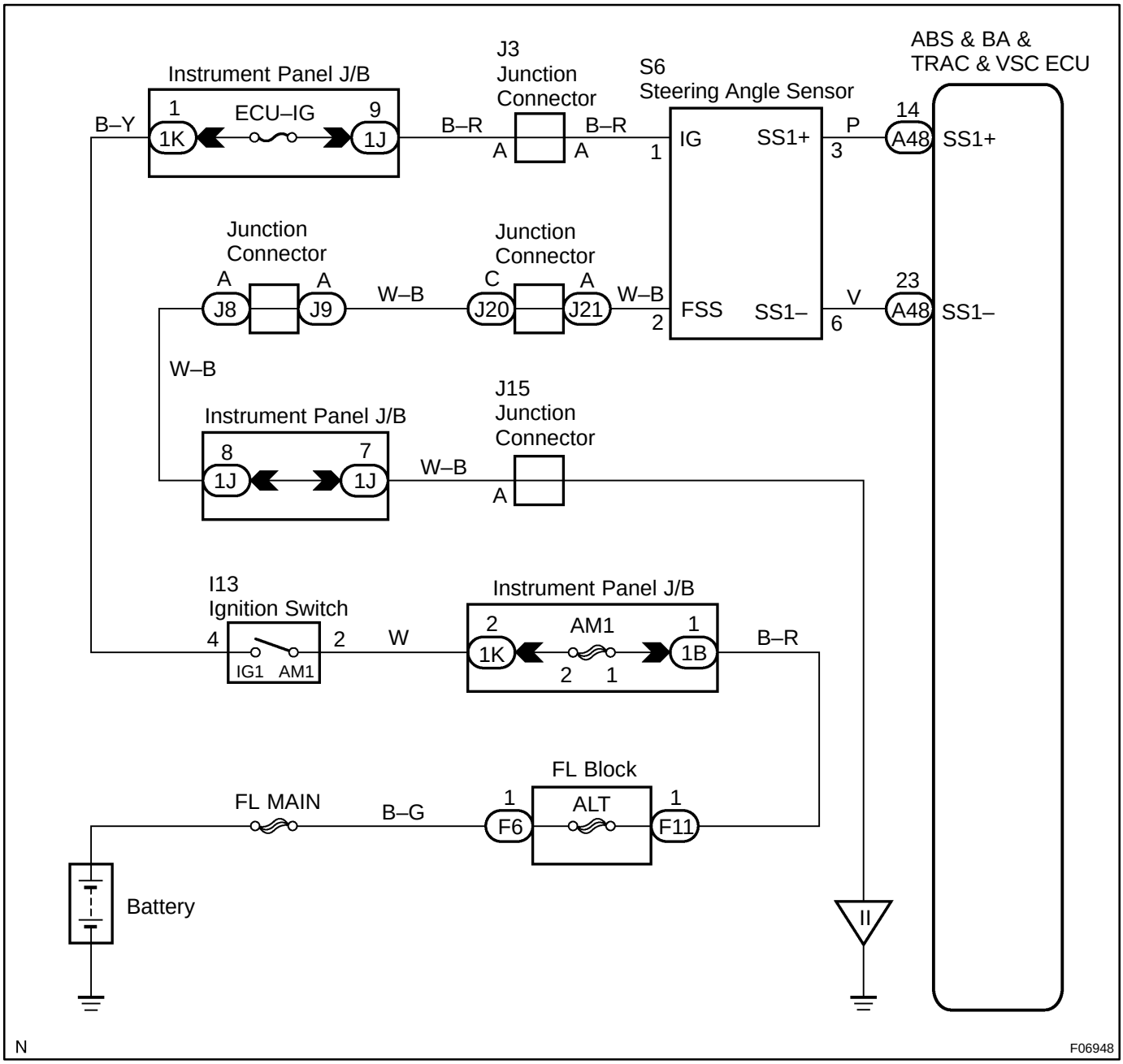
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1231 / 31	●When the condition that ECU terminal IG1 voltage is 9.5 V or more, and ECU does not receive data from steering angle sensor continues for 1 sec. or more. ●Although the presumed wheel angle value obtained from the yaw rate sensor and deceleration sensor value changes, the wheel angle value does not change. ●When SSC signal is ON or OFF, the steering angle sensor value changes by 360˚ or more. ●The difference between the steering angle when SSC signal edge occurs and when the range of 355.5˚ to 364.5˚, which occurs three times or more. ●Reception from the steering sensor is abnormal or steering angle changes by 360˚ or more.	●Steering angle sensor ●Steering angle sensor circuit

Fail safe function:

If a trouble has occurred in the steering angle sensor circuit, the ECU prohibits the BA & TRAC & VSC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 3 in case of not using the LEXUS hand–held tester.

1	**Check output value of steering angle sensor.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.
(c) Select the DATALIST mode on the LEXUS hand–held tester.
(d) Drive the vehicle straight forward at 35 km/h (22 mph) or more for 1 second or longer.

HINT:

- At this time, the zero point calibration of the steering angle sensor was memorized.
- Do not stop the engine.

CHECK:

Check that the steering wheel turning angle value of the steering angle sensor displayed by the LEXUS hand–held tester is changing when turning the steering wheel.

OK:

Steering wheel turning angle value must be changing.

OK → **Go to step 3.**

NG

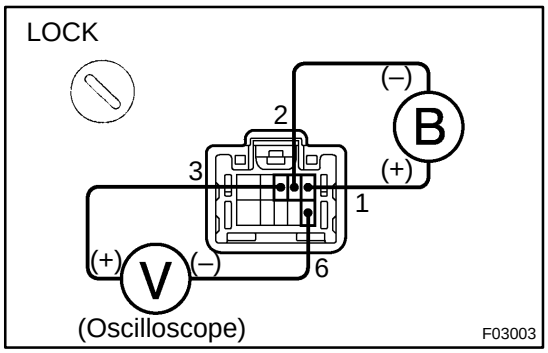
2	**Replace ABS & BA & TRAC & VSC ECU and check whether or not trouble occurs again.**

YES → **Replace steering angle sensor.**

NO

END

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–9).

(b) Disconnect the connector from the steering angle sensor.

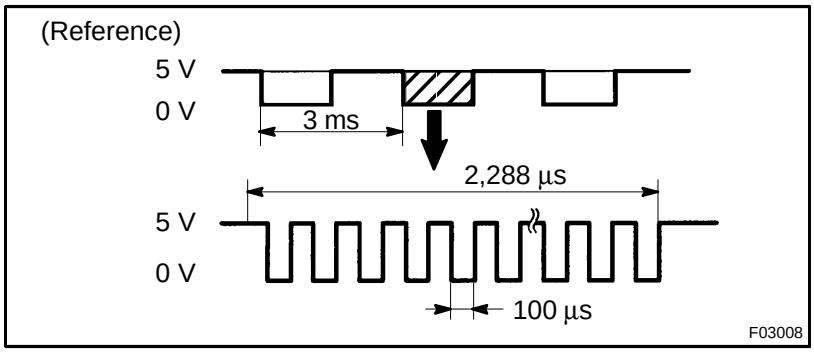
(c) Connect the oscilloscope to the terminals 3 and 6 of the combination switch connector (for steering angle sensor).

(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 for open and short circuit in harness and connector between steering angle sensor and ABS & BA & TRAC & VSC ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DI1H7–05

DTC	C1233 / 33, C1234 / 34	Yaw Rate Sensor Circuit

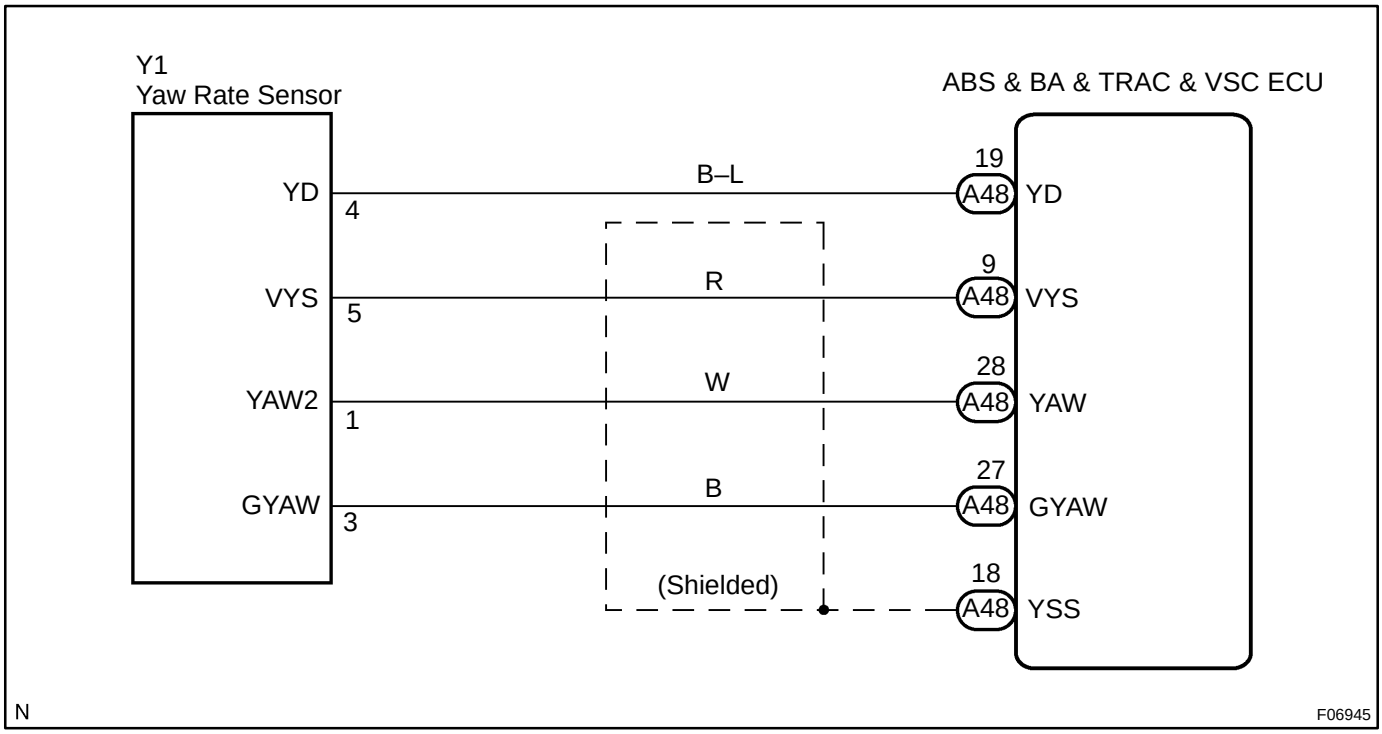
CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1233 / 33	When any of the following 1 to 4 is detected: 1. The condition that ECU terminal IG1 voltage is 9.5 V to 17.2 V, and 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 condition that yaw rate sensor open circuit detect signal is ON continues for 1 sec. or more. 3. The condition that yaw rate sensor power source voltage is out of the range from 4.4 V to 5.6 V continues for 1 sec. or more. 4. The condition that yaw rate sensor signal is momentary open occurs 10 times or more.	●Yaw rate sensor ●Yaw rate sensor circuit
C1234 / 34	When any of the following 1 to 6 is detected: 1. The condition that yaw rate sensor VYS terminal voltage is 4.4 V to 5.6 V and YD malfunction signal of yaw rate sensor is ON continues for 5 sec. or more. 2. With the vehicle speed 15 km/h or more, the difference obtained from the presumed yaw rate value and the wheel speed is larger than the specified value and the presumed yaw rate sensor obtained from the yaw rate sensor value and lateral centrifugal force is larger than the specified value. 3. When there is a large change in yaw rate, the condition that the difference between the yaw rate sensor value and the presumed yaw rate value is large continues for 1.5 sec. or more. 4. When a change in the rate obtained from the steering angle and vehicle is larger than the specified, the yaw rate sensor value does not change. 5. With the vehicle speed 5 km/h or more, when 45 minutes have elapsed since the ignition switch was turned ON, the relearned value of yaw rate zero point is 5 deg/s or more. 6. When the shift position is in P range, the yaw rate output voltage is out of the range of 2.4 to 2.6 V or the condition that the vehicle speed is 15 km/h or more after the difference from the yaw rate zero point compensation voltage has been 0.008 V or more repeats three times or more.	

Fail safe function:

If a trouble has occurred in the yaw rate sensor circuit, the ECU prohibits the BA & TRAC & VSC controls.

WIRING DIAGRAM

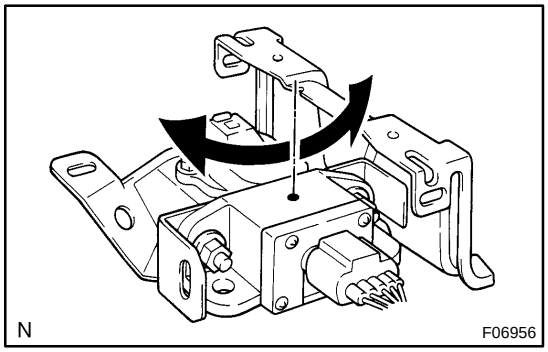


INSPECTION PROCEDURE

HINT:

- Do not remove the yaw rate sensor from the bracket because the accuracy of the yaw rate sensor is secured by the bracket assembly. At the time of inspection, remove it with the bracket together.
- Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 5 in case of not using the LEXUS hand–held tester.

1	**Check output value of yaw rate sensor.**



PREPARATION:

(a) Remove the 3 nuts and yaw rate sensor assembly with connector still connected.
(b) Connect the LEXUS hand–held tester to the DLC3.
(c) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(d) Select the DATALIST mode on the LEXUS hand–held tester.

CHECK:

Check that the yaw rate value of the yaw rate sensor displayed by the LEXUS hand–held tester is changing:
The assembled yaw rate sensor is placed on the ground, and the sensor rotates horizontally.

OK:

Yaw rate value must be changing.

HINT:
(Reference)
When the yaw rate sensor is stationary output value: ± 4 deg/s

NG	**Go to step 5.**

OK

2	**Check whether there is a continuity between terminal YD of yaw rate sensor and terminal YD of ABS & BA & TRAC & VSC ECU.**

NG	**Repair or replace harness or connector.**

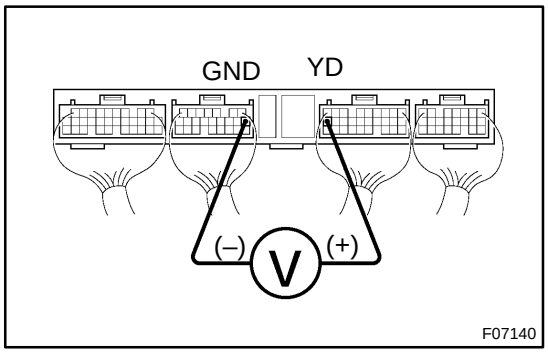
OK

3	**Check yaw rate sensor assembly (See page DI–320).**

NG → **Replace yaw rate sensor assembly.**

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 the voltage between terminals YD and GND of the ABS & BA & TRAC & VSC ECU.

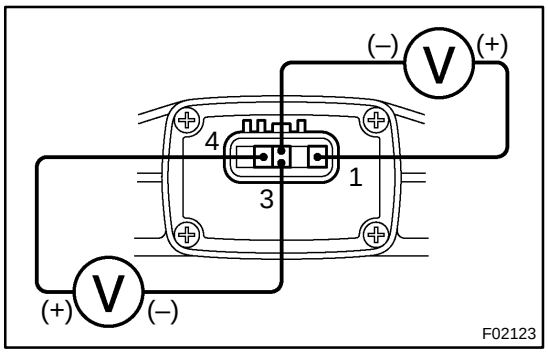
OK:
Voltage: 4.5 – 5.3 V

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

5	Check yaw rate sensor.



CHECK:

(a) Connect the connector to the yaw rate sensor.
(b) Turn the IG switch ON.
(c) Measure the voltage between terminals 1 and 3, 3 and 4 of the yaw rate sensor with connector still connected.

OK:

Terminals 1 and 3 (YAW2 – GYAW)	About 2.42 – 2.58 V
Terminals 3 and 4 (GYAW – YD)	About 4.5 V – 5.3 V

NG → **Replace yaw rate sensor assembly.**

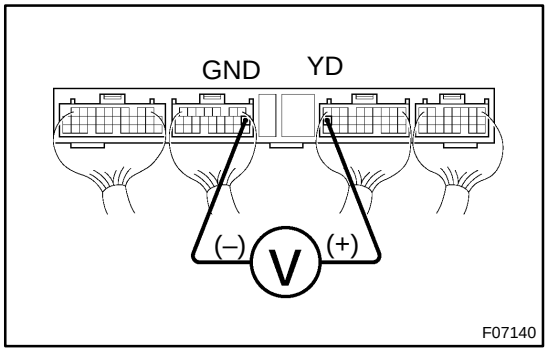
OK

6	Check yaw rate sensor assembly (See page DI–320).

NG → **Replace yaw rate sensor assembly.**

OK

7	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 the voltage between terminals YD and GND of the ABS & BA & TRAC & VSC ECU.

OK:

Voltage: 4.5 – 5.3 V

NG → **Repair or replace harness or connector.**

OK

8	**Check for open and short circuit in harness and connector between yaw rate sensor and ABS & BA & TRAC & VSC ECU (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

DI1H8–10

DTC	Always ON	Malfunction in ECU VSC Warning Light Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	●There is a malfunction in the ECU internal circuit. ●Malfunction in power sauce circuit.	●Power source circuit ●ABS & BA & TRAC & VSC ECU ●VSC warning light circuit ●Charging system

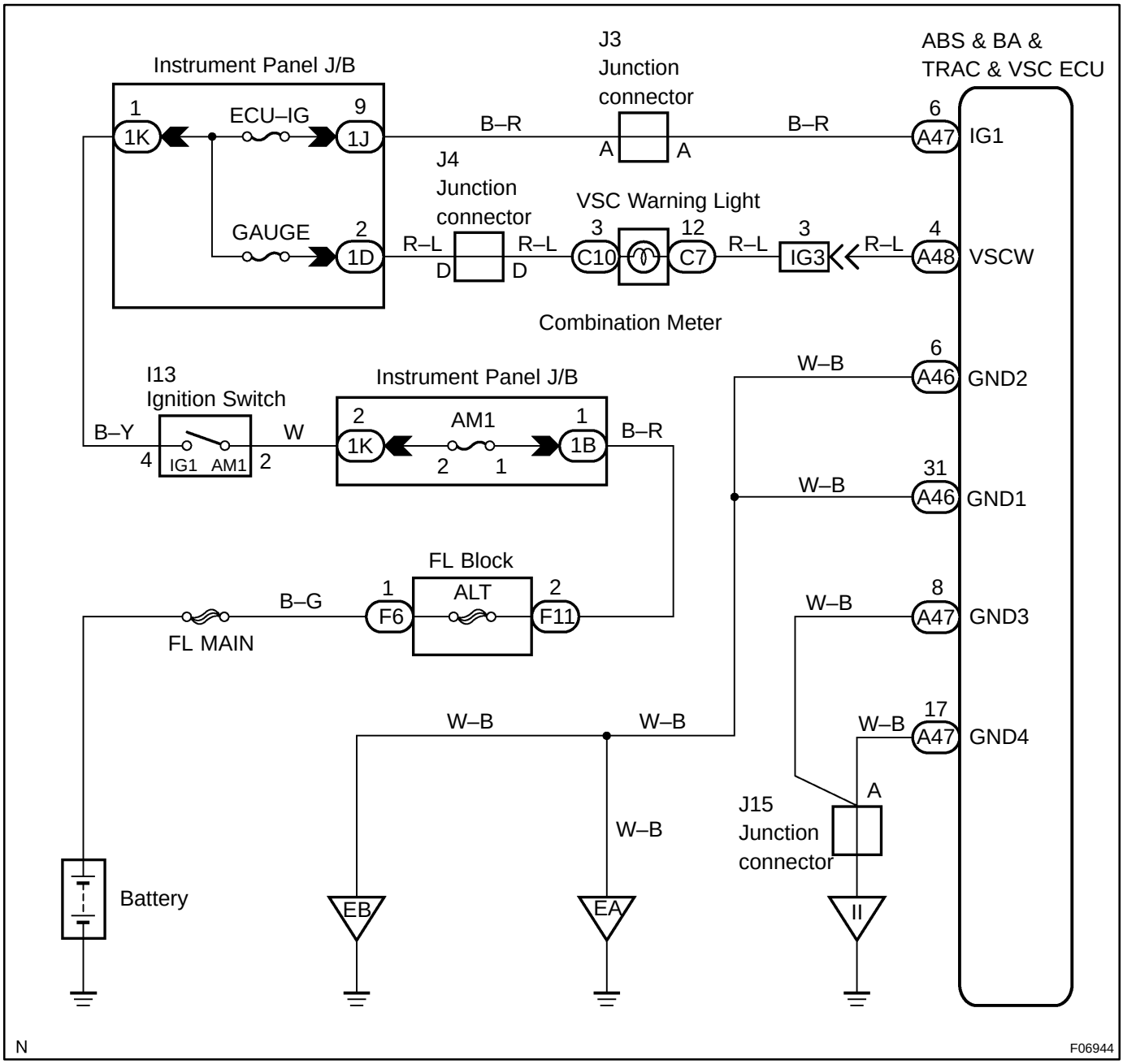
Fail safe function:

If a trouble has occurred in the ECU, the ECU prohibits the ABS & BA & TRAC & VSC controls and the brake system becomes normal.

HINT:

If the fail safe function is activated in VSC system, ”VSC OFF” indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC output for VSC?**

Check the DTC on page DI–320.

YES → **Repair circuit indicated by output code.**

NO

2	**Is normal code displayed?**

YES → **Check ABS solenoid relay. Check for short circuit in harness and connector between ABS solenoid relay and DLC1 (See page IN–31).**

NO

3	**Does VSC warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU–IG fuse and ECU (See page IN–31).**

NO

4	**Check battery positive voltage.**

CHECK:

Check the battery positive voltage.

OK:

Voltage: 10 – 16 V

NG → **Check and repair the charging system (See page CH–2).**

OK

5	**Check operation of VSC warning light.**

In case of using the LEXUS hand–held tester:

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the VSC warning light can be shown on the combination meter on the LEXUS hand–held tester.

In case of not using the LEXUS hand–held tester:

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the ABS & BA & TRAC & VSC ECU.
(c) Turn the ignition switch ON.

CHECK:

Check the VSC warning light goes off.

OK → **Check and replace ABS & BA & TRAC & VSC ECU.**

NG

Check for short circuit in harness and connector between combination meter and ABS & BA & TRAC & VSC ECU, combination meter and DLC1 (See page IN–31).

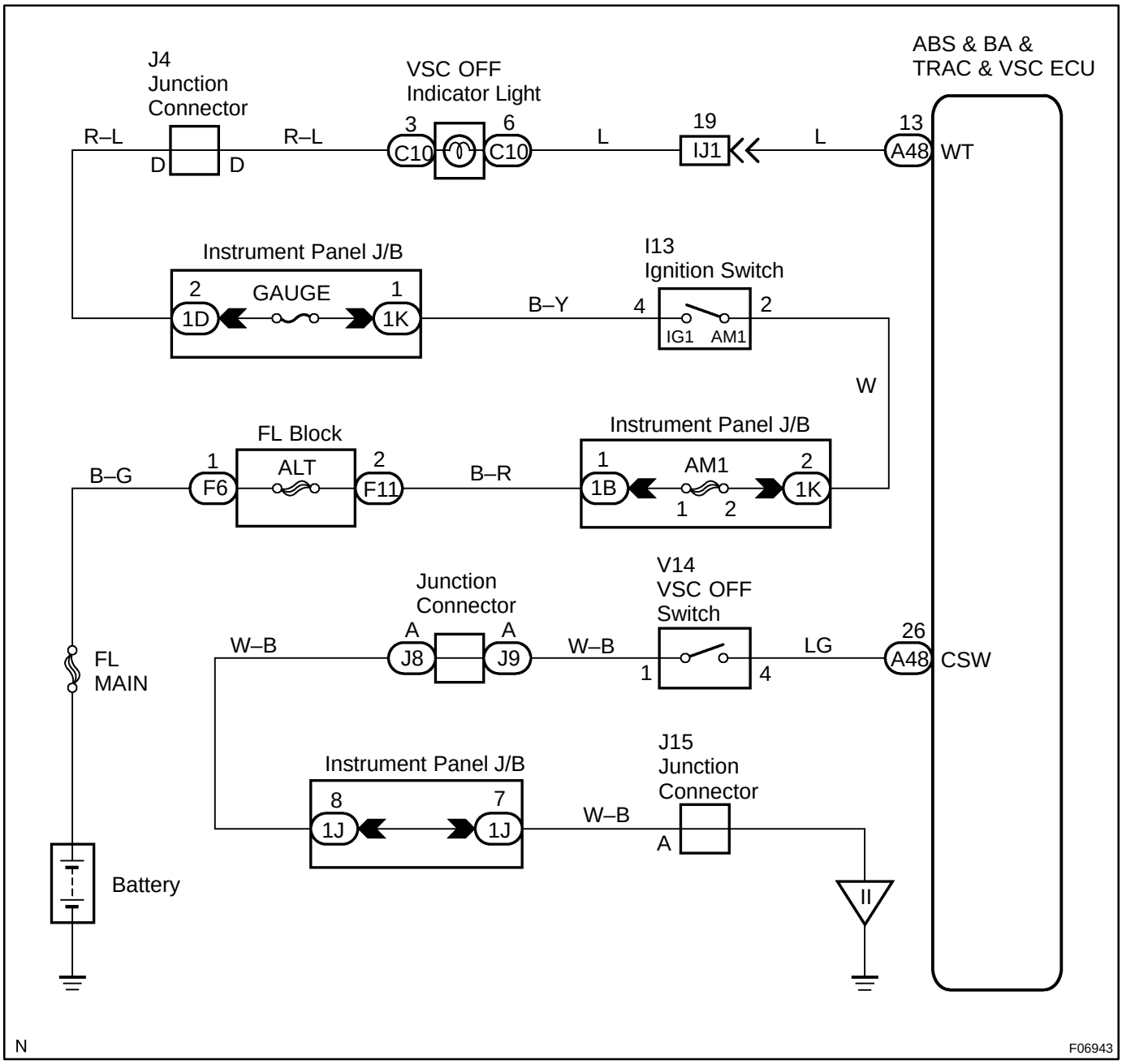
DI1H9–09

VSC OFF Indicator Light, VSC OFF Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC & VSC control main switch. When the VSC OFF switch is pushed, TRAC & VSC control is not activated and VSC OFF indicator light lights up. When the switch is pressed again,VSC OFF indicator light goes off, and the control is actuated. Turn the ignition switch OFF, TRAC & VSC control surely comes on when the ignition switch turns ON next time.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check operation of VSC OFF indicator light.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

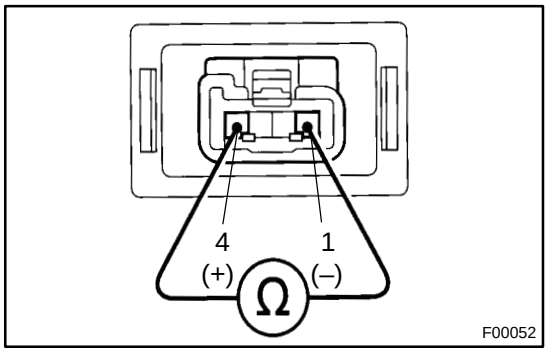
CHECK:

Check that ”ON” and ”OFF” of the VSC OFF indicator light can be shown on the combination meter by the LEXUS hand–held tester.

NG → **Go to step 4.**

OK

2	**Check VSC OFF switch.**



PREPARATION:

(a) Remove the VSC OFF switch.
(b) Disconnect the VSC OFF switch connector.

CHECK:

Measure the resistance between terminals 1 and 4 of the VSC OFF switch when the VSC OFF switch is on and off.

OK:

VSC OFF switch	Resistance
Pushed in	Continuity
Released	1MΩ or higher

NG → **Replace VSC OFF switch.**

OK

3	**Check for open and short circuit in harness and connector between terminal CSW of ABS & BA & TRAC & VSC ECU and VSC OFF switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	**Check VSC OFF indicator light.**

See the combination meter troubleshooting on page BE–65.

NG → **Repair or replace combination meter (See page BE–96).**

OK

5	**Check for open and short circuit in harness and connector between terminal WT of ABS & BA & TRAC & VSC ECU and VSC OFF indicator light (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

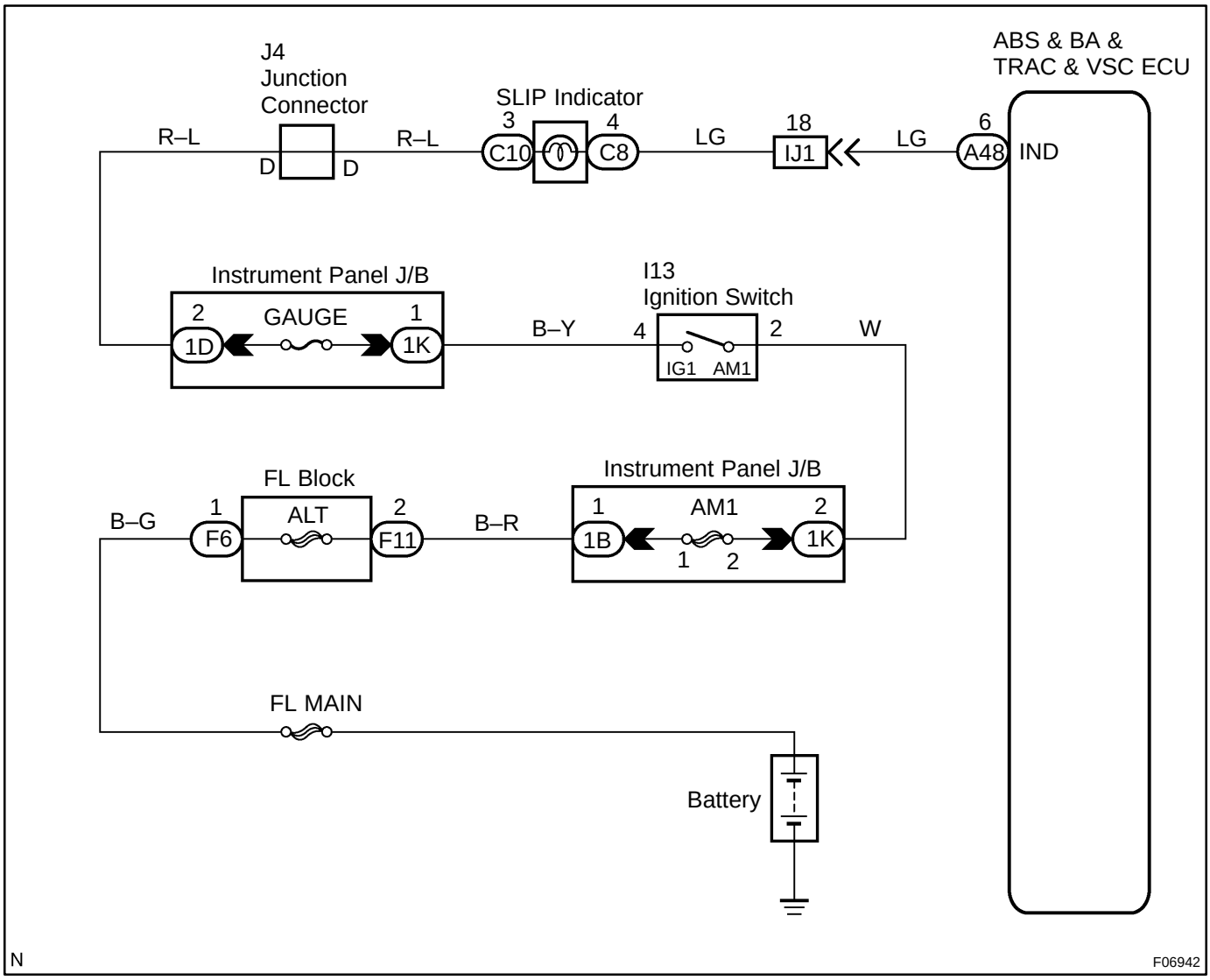
Check and replace ABS & BA & TRAC & VSC ECU.

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during TRAC & VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start the inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check operation of SLIP indicator light.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

CHECK:

Check that ”ON” and ”OFF” of the SLIP indicator light can be shown on the combination meter by the LEXUS hand–held tester.

OK → **Go to step 4.**

NG

2	**Check that SLIP indicator light is on for 3 seconds soon after ignition switch has been turned ON.**

OK → **Check and replace ABS & BA & TRAC & VSC ECU.**

NG

3	**Check SLIP indicator light.**

See the combination meter troubleshooting on page BE–65.

NG → **Repair bulb or combination meter assembly (See page BE–96).**

OK

4	**Check for open and short circuit in harness and connector between ABS & BA & TRAC & VSC ECU and SLIP indicator light (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & BA & TRAC & VSC ECU.

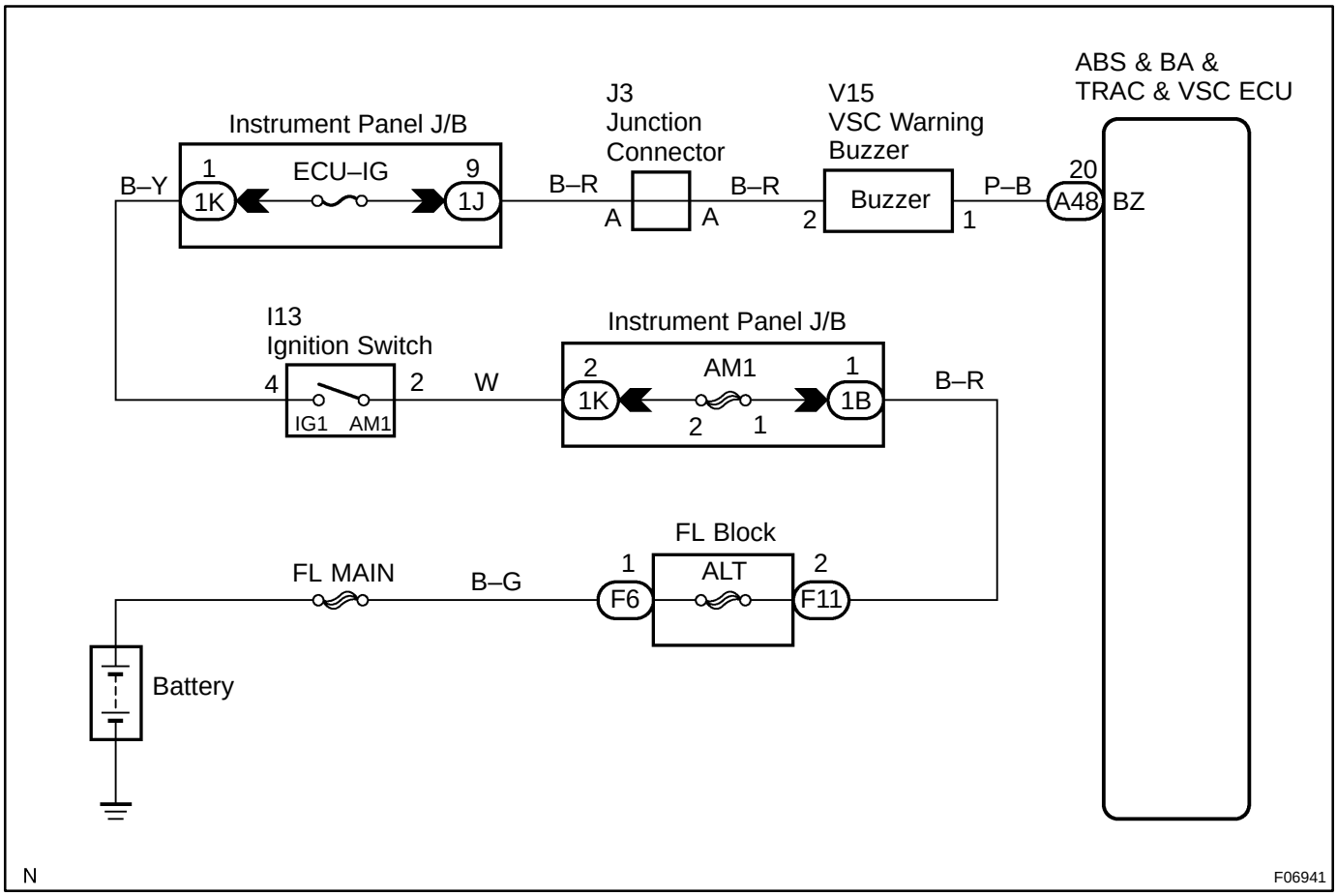
DI1HB–10

VSC Buzzer Circuit

CIRCUIT DESCRIPTION

The VSC buzzer sounds during VSC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

Start inspection from step 1 in case of using the LEXUS hand–held tester and start from step 2 in case of not using the LEXUS hand–held tester.

1	**Check operation of VSC buzzer.**

PREPARATION:

(a) Connect the LEXUS hand–held tester to the DLC3.
(b) Turn the ignition switch ON, and push the LEXUS hand–held tester main switch ON.
(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

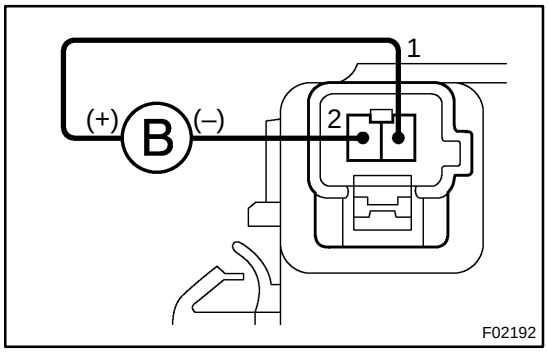
CHECK:

Check that VSC buzzer sounds ”ON” and ”OFF” with the LEXUS hand–held tester.

OK → Check and replace ABS & BA & TRAC & VSC ECU.

NG

2	Check VSC buzzer.



PREPARATION:
Disconnect the VSC buzzer connector.
CHECK:
Apply battery positive voltage to the terminals 1 and 2 of the VSC buzzer connector, check that the VSC buzzer sounds.

NG → Replace VSC buzzer.

OK

3	Check for open and short circuit in harness and connector between ABS & BA & TRAC & VSC ECU and VSC buzzer (See page IN–31).

NG → Repair or replace harness or connector.

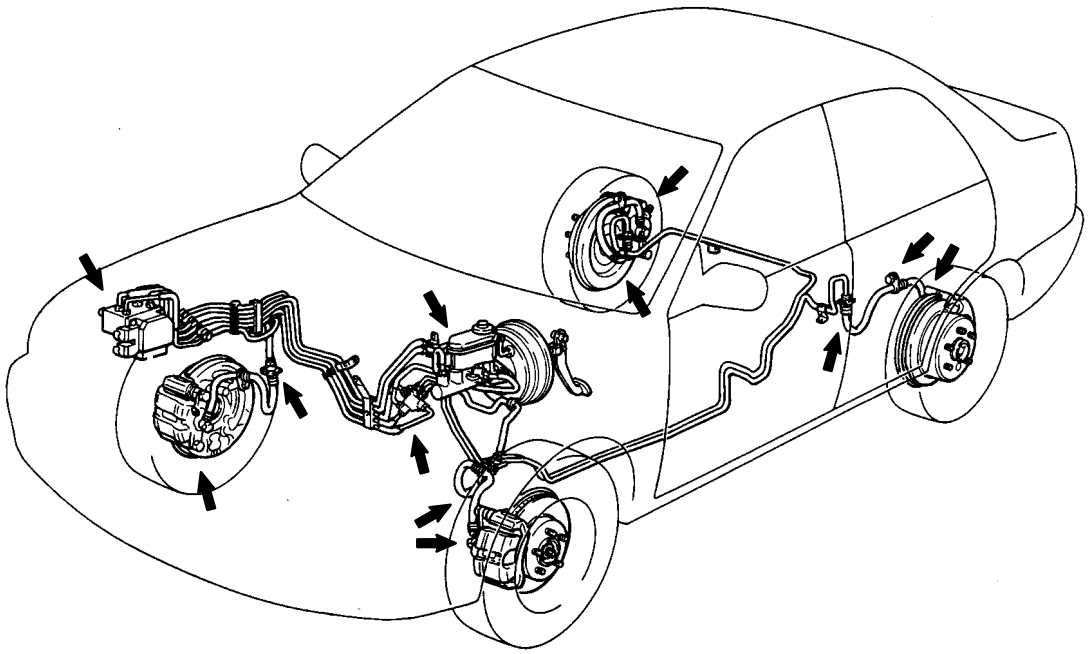
OK

Check and replace ABS & BA & TRAC & VSC ECU.

DI1HC–17

Check for Fluid Leakage

Check fluid leaks from the actuator or hydraulic lines.



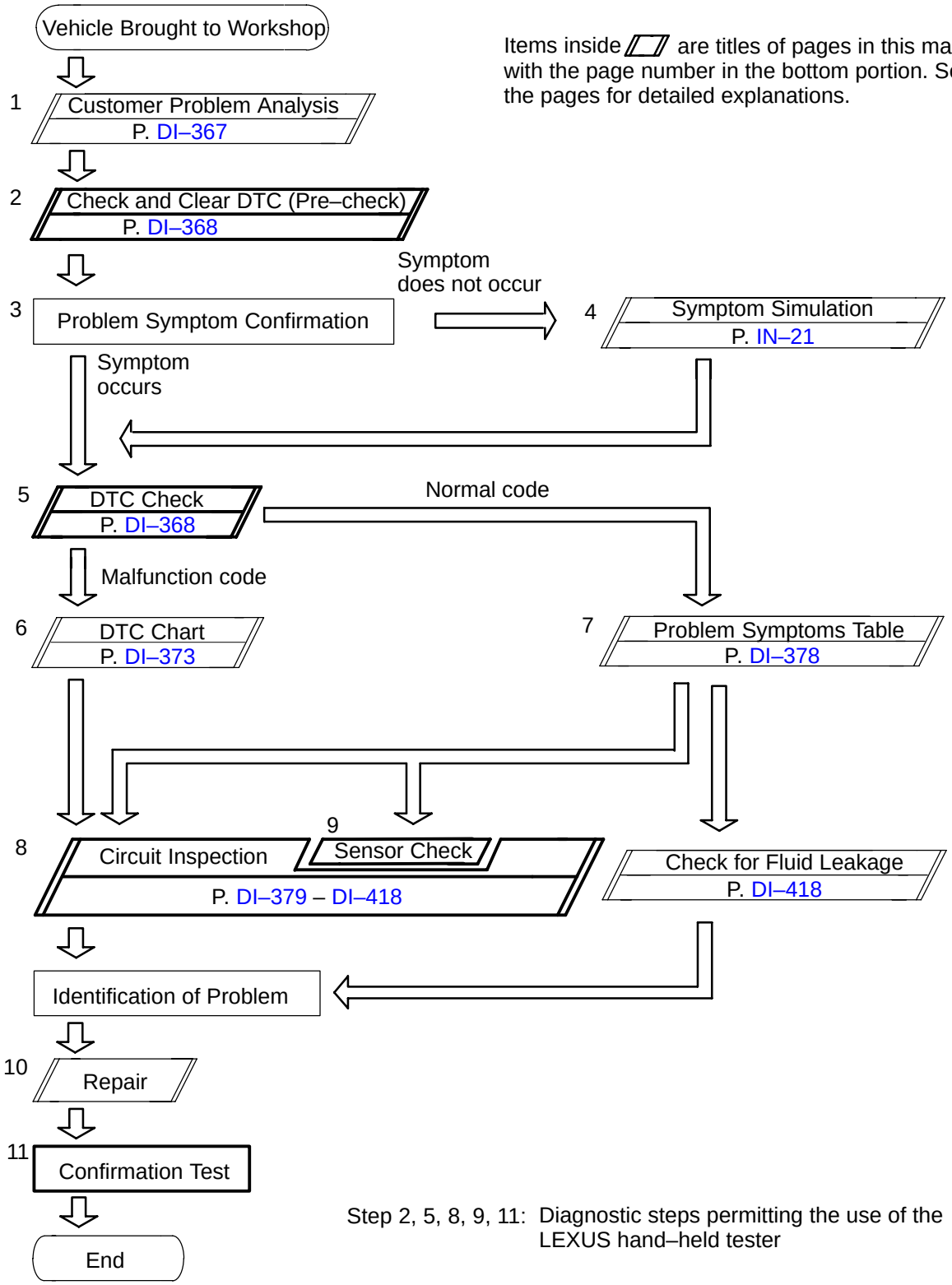
F00070

ABS & TRACTION CONTROL SYSTEM

DI0BV–07

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 LEXUS hand–held tester

DI0BW–05

CUSTOMER PROBLEM ANALYSIS CHECK

ABS & TRAC Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

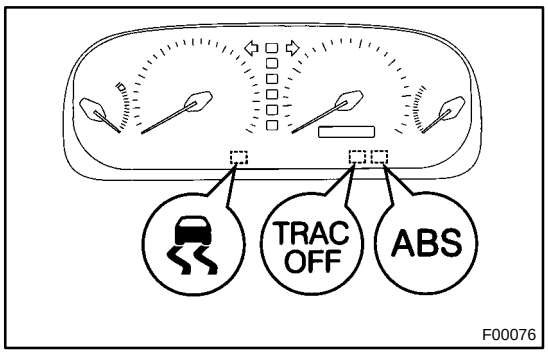
Date Problem First Occurred	/ /
Frequency the Problem Occurs	☐ Continuously ☐ Intermittently (times a day)

Symptoms	☐ ABS does not operate.	
	☐ ABS does not operate efficiently.	
	☐ TRAC does not operate. (Wheels spin when starting rapidly.)	
	ABS Warning Light Abnormal	☐ Remains on ☐ Does not light up
	TRAC OFF Indicator Light Abnormal	☐ Remains on ☐ Blinks ☐ Does not light up
	SLIP Indicator Light Abnormal	☐ Remains on ☐ Does not light up

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)

DI8YN–01

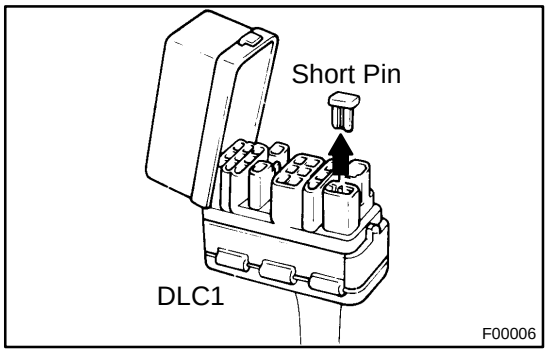


PRE–CHECK

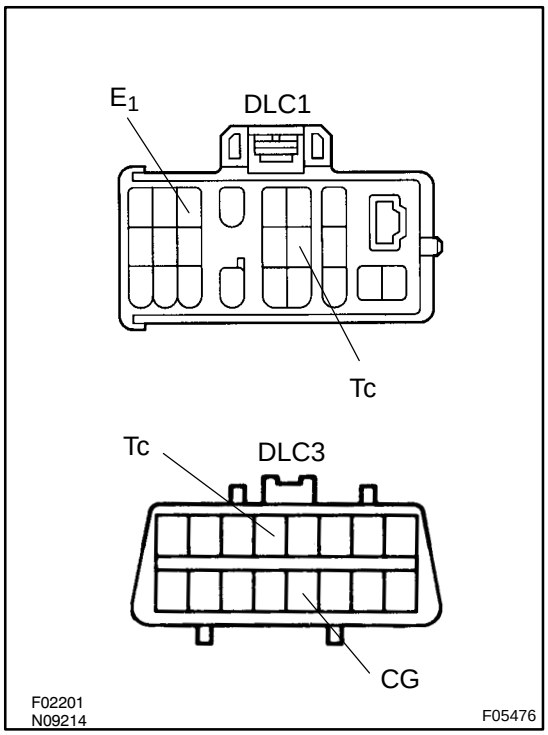
1. DIAGNOSIS SYSTEM

(a) Check the indicator.
When the ignition switch is turned ON, check that the ABS warning light, TRAC OFF indicator light and SLIP indicator light come on for 3 seconds.

HINT:
If the indicator check result is not normal, proceed to the troubleshooting for the ABS warning light circuit, TRAC OFF indicator light circuit and SLIP indicator light circuit (See page DI–407, DI–410, DI–413).

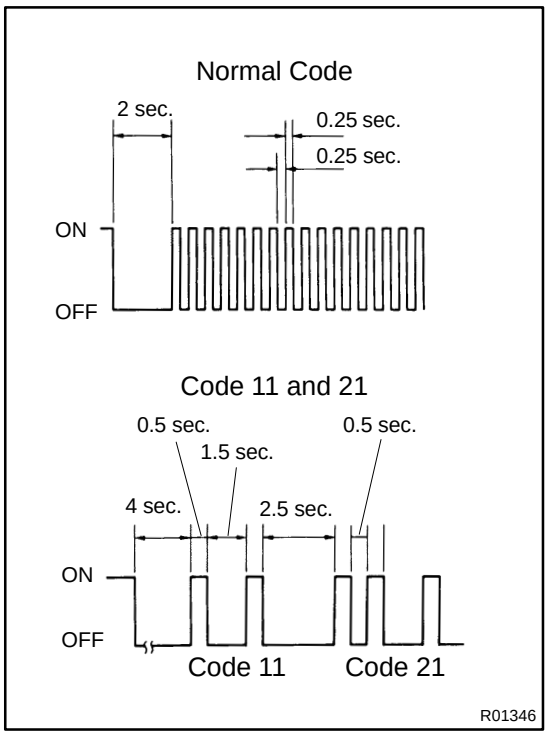


(b) In case of not using LEXUS hand–held tester:
Check the DTC.
(1) Disconnect the short pin from the DLC1.



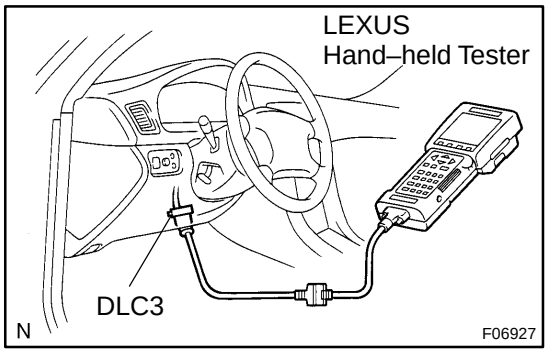
(2) Using SST, connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3.
SST 09843–18020 or 09843–18040
(3) Turn the ignition switch ON.
(4) Read the DTC from the ABS warning light and TRAC OFF indicator light on the combination meter.

HINT:
- If no code appears, inspect the diagnostic circuit, ABS warning light circuit or TRAC OFF indicator light circuit (See page DI–407, DI–410, DI–413).



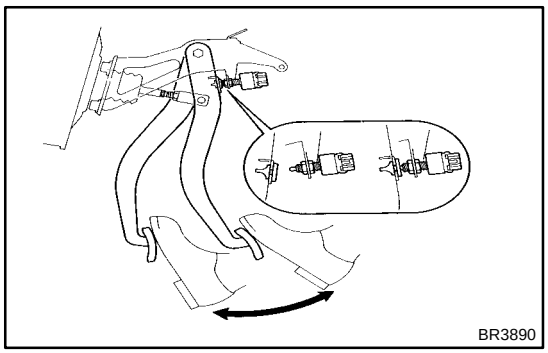
- As an example, the blinking patterns of the normal code and codes 11 and 21 are shown in the illustration.
  (5) Codes are explained in the code table on page DI–373.
  (6) After completing the check, disconnect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3, and turn off the display.

If 2 or more malfunctions are indicated simultaneously the lowest numbered DTC will be displayed 1st.

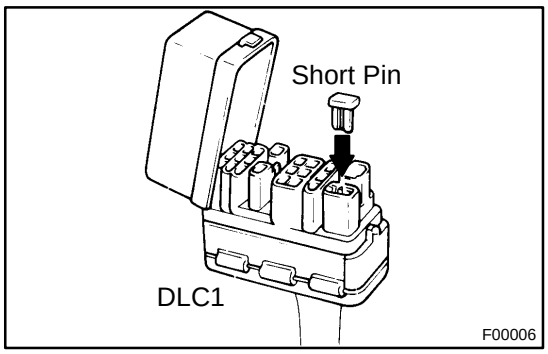


(c) In case of using LEXUS hand–held tester:
Check the DTC.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON.
(3) Read the DTC by following the prompts on the tester screen.

HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.



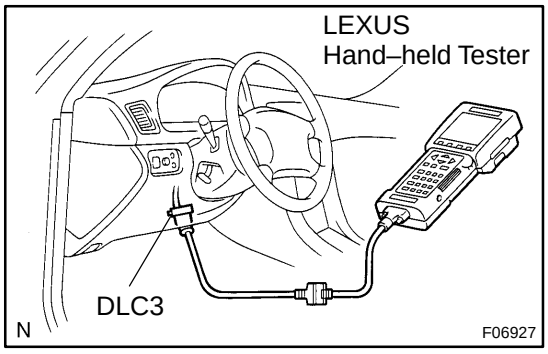
(d) In case of not using LEXUS hand–held tester:
Clear the DTC.
(1) Using SST, connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3 and remove the short pin from DLC1.
SST 09843–18020 or 09843–18040
(2) Turn the ignition switch ON.
(3) Clear the DTC stored in the ECU by depressing the brake pedal 8 or more times within 5 seconds.
(4) Check that the warning light shows the normal code.
(5) Remove the SST from the of the DLC1 or DLC3.
SST 09843–18020 or 09843–18040



(e) Connect the short pin to the DLC1.

HINT:

The DTC stored in the ECU will be erased when the battery terminal is disconnected for the troubleshooting.



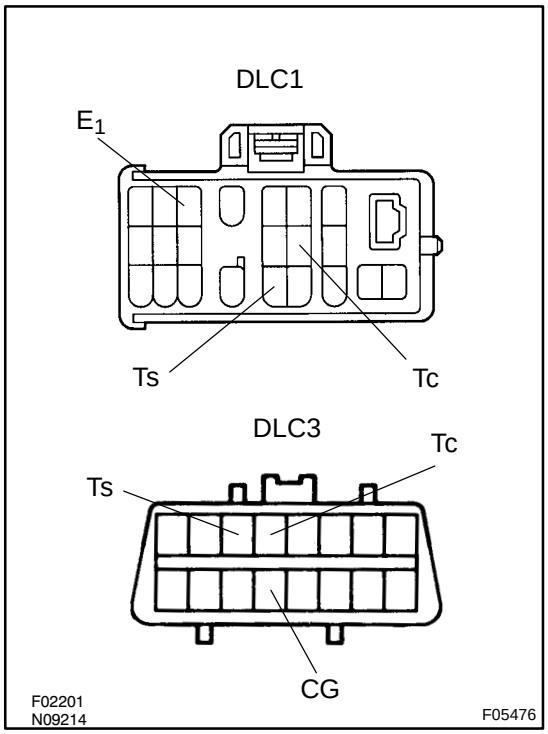
(f) In case of using LEXUS hand–held tester:

Clear the DTC.

(1) Hook up the LEXUS hand–held tester to the DLC3.

(2) Turn the ignition switch ON.

(3) Operate the LEXUS hand–held tester to erase the codes (See LEXUS hand–held tester operator's manual.).



2. SPEED SENSOR SIGNAL CHECK

(a) In case of not using LEXUS hand–held tester:

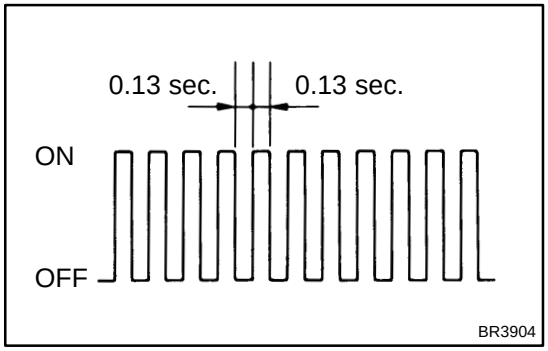
Check the speed sensor signal.

(1) Turn the ignition switch OFF.

(2) Using SST, connect terminals Ts and E_1 of the DLC1 or terminals Ts and CG of the DLC3.

SST 09843–18020 or 09843–18040

(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 (See page DI–407).

(5) Drive the vehicle straight forward.

Drive the vehicle faster than 45 km / h (28 mph) for several seconds.

(6) Stop the vehicle.

(7) Using SST, connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3.

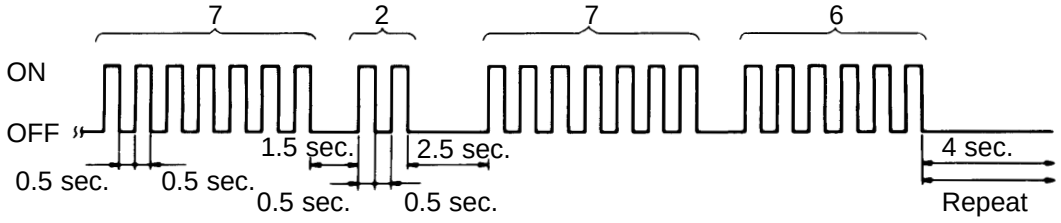
SST 09843–18020 or 09843–18040

(8) Read the number of blinks of the ABS warning light.

HINT:

- See the list of DTC list shown on the next page.
- If every sensor is normal, the normal code is output (A cycle of 0.25 seconds ON and 0.25 seconds OFF is repeated).
- If 2 or more malfunctions are indicated simultaneously, the lowest numbered code will be displayed first.

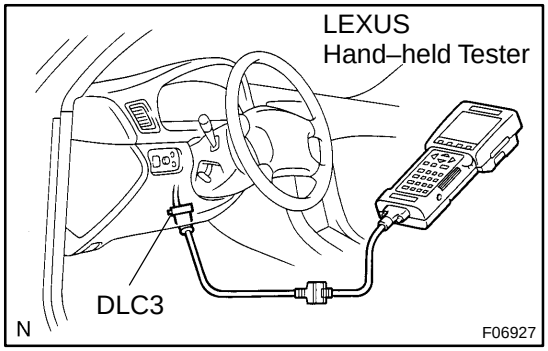
Malfunction Code (Example Code 72 and 76)



BR3893

(9) After doing the check, disconnect the SST from terminals Ts and E_1 Tc and E_1 of the DLC1, or terminals Ts and CG, Tc and CG of the DLC3, and turn the ignition switch OFF.

SST 09843–18020 or 09843–18040



N F06927

(b) In case of using LEXUS hand–held tester:

Check the speed sensor signal.

(1) Connect the LEXUS hand–held tester to the DLC3.

(2) Do step (3) to (6) on the previous page.

(3) Read the DTC by following the prompts on the tester screen.

Please refer to the LEXUS hand–held tester operator's manual for further details.

DTC of speed sensor check function:

Code No.	Diagnosis	Trouble Area
C1271 / 71	Low output voltage of right front speed sensor	●Right front speed sensor ●Sensor installation ●Right front speed sensor rotor
C1272 / 72	Low output voltage of left front speed sensor	●Left front speed sensor ●Sensor installation ●Left front speed sensor rotor
C1273 / 73	Low output voltage of right rear speed sensor	●Right rear speed sensor ●Sensor installation ●Right rear speed sensor rotor
C1274 / 74	Low output voltage of left rear speed sensor	●Left rear speed sensor ●Sensor installation ●Left rear speed 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

DI0BY–07

DIAGNOSTIC TROUBLE CODE CHART

HINT:

- Using SST 09843–18020 or 09843–18040, connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3, and remove the short pin.
- If a malfunction code is displayed during the DTC check, check the circuit listed for the code. For details of each code, refer to the ”See page” under respective ”DTC No.” in the DTC chart.

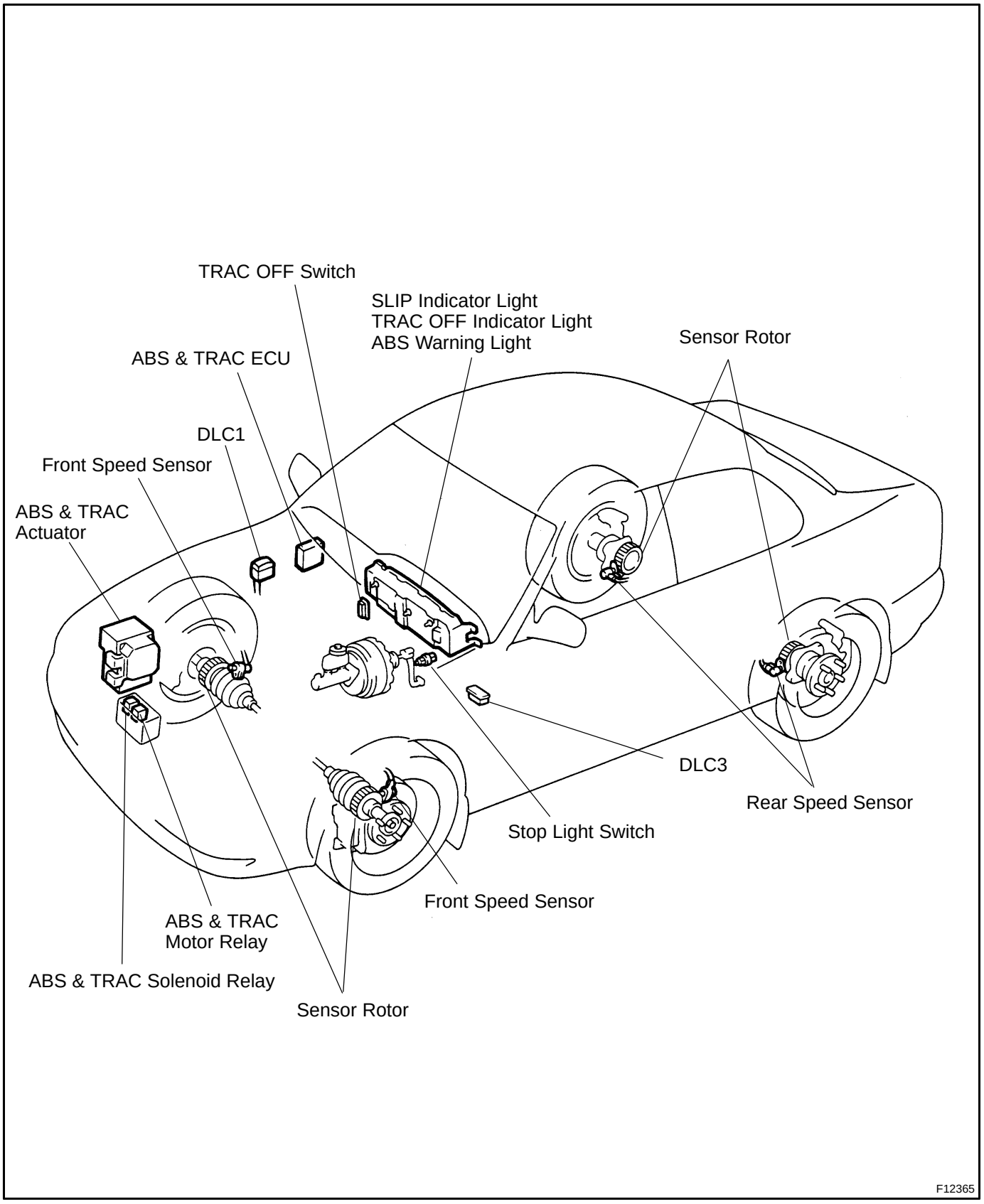
DTC No. (See Page)	Detection Item	Trouble Area
C0278 / 11 (DI–379)	Open circuit of ABS & TRAC solenoid relay circuit	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ECU
C0279 / 12 (DI–379)	Short circuit of ABS & TRAC solenoid relay circuit	
C0273 / 13 (DI–382)	Open circuit of ABS & TRAC motor relay circuit	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ECU
C0274 / 14 (DI–382)	Short circuit of ABS & TRAC motor relay circuit	
C0226 / 21 (DI–385)	Open or short circuit of right front solenoid circuit	●ABS & TRAC actuator ●SFRR or SFRH circuit ●ECU
C0236 / 22 (DI–385)	Open or short circuit of left front solenoid circuit	●ABS & TRAC actuator ●SFLR or SFLH circuit ●ECU
C0246 / 23 (DI–385)	Open or short circuit of right rear solenoid circuit	●ABS & TRAC actuator ●SRRR or SRRH circuit ●ECU
C0256 / 24 (DI–385)	Open or short circuit of left rear solenoid circuit	●ABS & TRAC actuator ●SRLR or SRLH circuit ●ECU
C1225 / 25 (DI–385)	Open or short circuit of SMC1 circuit	●ABS & TRAC actuator ●SMC1 circuit ●ECU
C1226 / 26 (DI–385)	Open or short circuit of SMC2 circuit	●ABS & TRAC actuator ●SMC2 circuit ●ECU
C1227 / 27 (DI–385)	Open or short circuit of SRC1 circuit	●ABS & TRAC actuator ●SRC1 circuit ●ECU
C1228 / 28 (DI–385)	Open or short circuit of SRC2 circuit	●ABS & TRAC actuator ●SRC2 circuit ●ECU
C0200 / 31 (DI–388)	Right front wheel speed sensor signal malfunction	●Right front, left front, right rear and left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor ●ECU
C0205 / 32 (DI–388)	Left front wheel speed sensor signal malfunction	
C0210 / 33 (DI–388)	Right rear wheel speed sensor signal malfunction	
C0215 / 34 (DI–388)	Left rear wheel speed sensor signal malfunction	
C1241 / 41 (DI–393)	Low battery positive voltage or abnormally high battery positive voltage	●Battery ●Charging system ●Power source circuit ●ECU

C1223 / 43* (DI–396)	Malfunction in ABS control system	ABS control system
C1224 / 44* (DI–397)	Open or short circuit of NE signal circuit	●NEO circuit ●ECM ●ECU
C1249 / 49 (DI–399)	Open circuit of stop light switch circuit	●Stop light switch ●Stop light switch circuit ●ECU
C1251 / 51 (DI–401)	Pump motor is locked	ABS pump motor
C1203 / 53* (DI–403)	Malfunction in ECM communication circuit	●TRC+ or TRC– circuit ●EFI+ or EFI– circuit ●ECM ●ECU
C1201 / 61* (DI–404)	Malfunction in engine control system	Engine control system
Always ON (DI–405)	Malfunction in ECU	ECU

*: When the TRAC OFF indicator light lights up or flushes, a malfunction occurs. The code is displayed by flushing of the TRAC OFF indicator light.

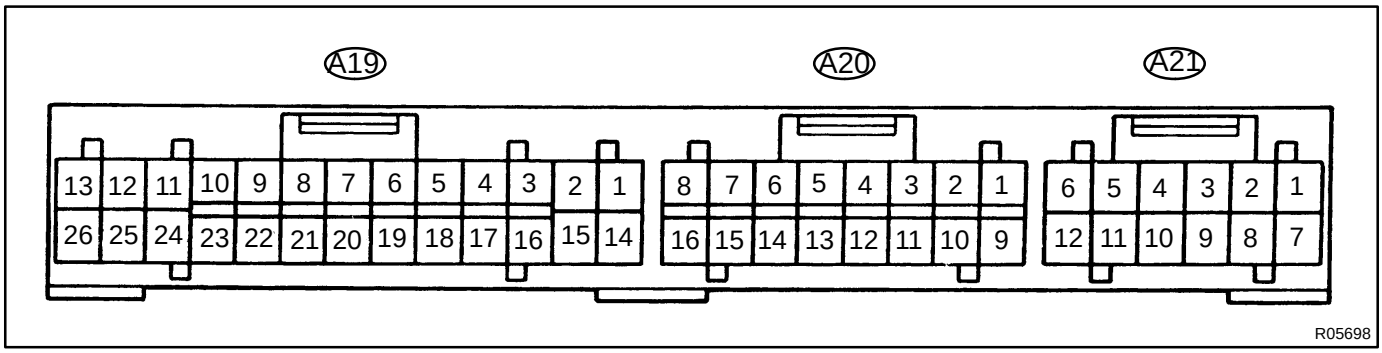
DI0BZ–08

PARTS LOCATION



DI1AE–07

TERMINALS OF ECU



Symbols (Terminal No.)	Wiring Color	Condition		STD Voltage (V)
IG1 (A20–8) – GND (A19–15, A21–9,10)	B–R – W–B	IG switch ON		10 – 14
R+ (A19–1) – SR (A19–11)	GR–R – GR	IG switch ON	ABS warning light OFF	10 – 14
R+ (A19–1) – MR (A19–24)	GR–R – GR–L	IG switch ON		Below 1.0
SFRR (A19–26) – GND (A19–15, A21–9,10)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFRH (A19–13) – GND (A19–15, A21–9,10)	R–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLR (A21–1) – GND (A19–15, A21–9,10)	W–L – W–B	IG switch ON	ABS warning light OFF	10 – 14
SFLH (A21–2) – GND (A19–15, A21–9,10)	L–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRR (A21–7) – GND (A19–15, A21–9,10)	R–G – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRRH (A21–8) – GND (A19–15, A21–9,10)	W–R – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLR (A19–12) – GND (A19–15, A21–9,10)	LG–B – W–B	IG switch ON	ABS warning light OFF	10 – 14
SRLH (A19–25) – GND (A19–15, A21–9,10)	G–Y – W–B	IG switch ON	ABS warning light OFF	10 – 14
AST (A19–10) – GND (A19–15, A21–9,10)	R – W–B	IG switch ON	ABS warning light OFF	10 – 14
WA (A20–4) – GND (A19–15, A21–9,10)	G–B – W–B	IG switch ON	ABS warning light ON	Below 2.0
		IG switch ON	ABS warning light OFF	10 – 14
STP (A20–16) – GND (A19–15, A21–9,10)	G–W – W–B	Stop light switch OFF		Below 1.5
		Stop light switch ON		8 – 14
D/G (A19–22) – GND (A19–15, A21–9,10)	R–L – W–B	IG switch ON	ABS warning light ON	10 – 14
Tc (A19–9) – GND (A19–15, A21–9,10)	LG–R – W–B	IG switch ON		8 – 14
Ts (A19–23) – GND (A19–15, A21–9,10)	R–Y – W–B	IG switch ON		8 – 14
FR+ (A19–17) – FR– (A19–18)	W – B	IG switch ON	Slowly turn right front wheel	AC generation
FL+ (A19–5) – FL– (A19–4)	R – G	IG switch ON	Slowly turn left front wheel	AC generation
RR+ (A20–9) – RR– (A20–10)	W – B	IG switch ON	Slowly turn right rear wheel	AC generation
RL+ (A20–2) – RL– (A20–1)	R – G	IG switch ON	Slowly turn left rear wheel	AC generation

MT (A19–14) – GND (A19–15, A21–9,10)	R–W – W–B	IG switch ON		Below 1.5
SRC1 (A21–5) – GND (A19–15, A21–9,10)	B–R – W–B	IG switch ON	TRAC OFF indicator light OFF	10 – 14
SRC2 (A21–4) – GND (A19–15, A21–9,10)	B–R – W–B	IG switch ON	TRAC OFF indicator light OFF	10 – 14
SMC1 (A21–12) – GND (A19–15, A21–9,10)	Y–R – W–B	IG switch ON	TRAC OFF indicator light OFF	10 – 14
SMC2 (A21–6) – GND (A19–15, A21–9,10)	Y–B – W–B	IG switch ON	TRAC OFF indicator light OFF	10 – 14
NEO (A20–15) – GND (A19–15, A21–9,10)	BR–W – W–B	Idling		Pulse generation
EFI+ (A20–6) – GND (A19–15, A21–9,10)	W – W–B	IG switch ON		Pulse generation
EFI– (A20–14) – GND (A19–15, A21–9,10)	B – W–B	IG switch ON		Pulse generation
TRC+ (A20–13) – GND (A19–15, A21–9,10)	LG – W–B	TRAC control active		Pulse generation
TRC– (A20–5) – GND (A19–15, A21–9,10)	L – W–B	TRAC control active		Pulse generation
IND (A20–3) – GND (A19–15, A21–9,10)	LG – W–B	IG switch ON	SLIP indicator light ON	Below 2.0
		IG switch ON	SLIP indicator light OFF	10 – 14
WT (A20–12) – GND (A19–15, A21–9,10)	L – W–B	IG switch ON	TRAC OFF indicator light ON	Below 2.0
		IG switch ON	TRAC OFF indicator light OFF	10 – 14
CSW (A20–11) – GND (A19–15, A21–9,10)	LG – W–B	IG switch ON	TRAC cut switch pushed in	Below 2.0
		IG switch ON	TRAC cut switch released	8 – 14

DI0C1–07

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.

Symptom	Suspect Area	See page
ABS does not operate	Only when 1 to 4 are all normal but the problem still occurs, replace the ABS & TRAC ECU. 7. Check the DTC reconfirming that the normal code is output 8. IG power source circuit 9. Speed sensor circuit 10. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–418)	 DI–368 DI–393 DI–388 BR–54
ABS does not operate efficiently	Only when 1 to 4 are all normal but the problem still occurs, replace the ABS & TRAC ECU. 1. Check the DTC reconfirming that the normal code is output 2. Speed sensor circuit 3. Stop light switch circuit 4. Check the ABS & TRAC actuator with a checker. If abnormal, check the hydraulic circuit for leakage (See page DI–418)	 DI–368 DI–388 DI–399 BR–54
ABS warning light abnormal	1. ABS warning light circuit 2. ABS & TRAC ECU	DI–407 DI–405
DTC check is impossble	Only when 1 and 2 are all normal but the problem is still occurs, replace the ABS & TRAC ECU. 1. ABS warning light circuit 2. TRAC OFF indicator light circuit 3. Tc terminal circuit	 DI–407 DI–410 DI–414
Speed sensor signal check is impossble	1. Ts terminal circuit 2. ABS & TRAC ECU	DI–416 DI–405
TRAC does not operate	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & TRAC 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–368 DI–393 DI–418 DI–388
SLIP indicator light abnormal	SLIP indicator light circuit	DI–413
TRAC OFF indicator light abnormal	Only when inspection circuits for each problem symptom are all normal but the problem still occurs, replace the ABS & TRAC ECU. 1. TRAC OFF indicator light circuit 2. TRAC cut switch circuit	 DI–410 DI–410

DI0C2–05

CIRCUIT INSPECTION

DTC	C0278 / 11, C0279 / 12	ABS & TRAC Solenoid Relay Circuit

CIRCUIT DESCRIPTION

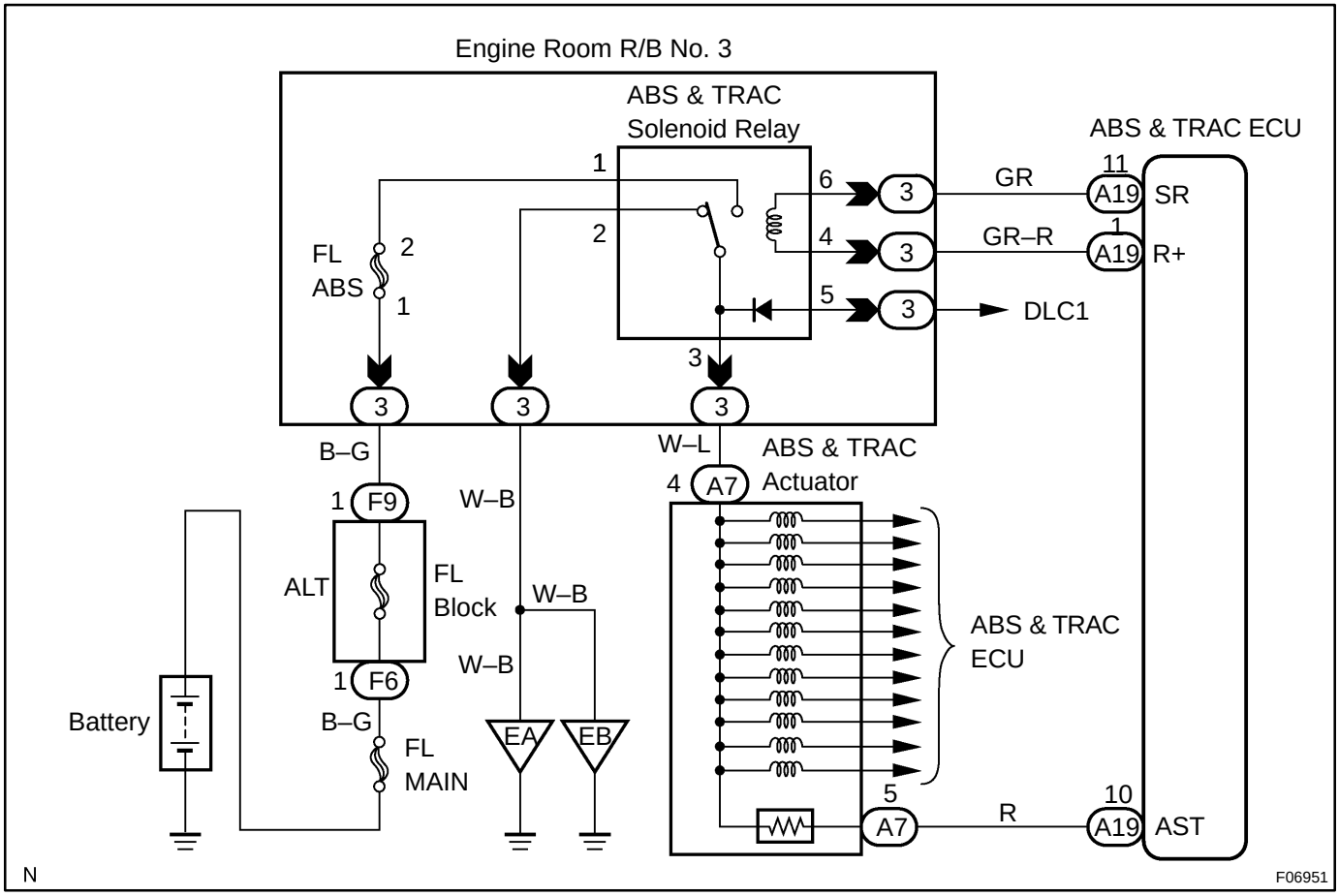
This relay supplies power to each ABS & TRAC solenoid. After the ignition switch is turned ON, if the initial check is OK, the relay goes on.

DTC No.	DTC Detecting Condition	Trouble Area
C0278 / 11	Conditions 1 to 3 are detected: 1. Malfunction of solenoid relay monitor 2. Battery voltage will not be more than 17.0 V within 2.16 sec. 3. Battery voltage will not become less than 9.5 V within 2.16 sec., or after the solenoid relay is on and AST voltage of ECU terminal will not become 8.0 V or more.	●ABS & TRAC solenoid relay ●ABS & TRAC solenoid relay circuit ●ABS & TRAC ECU
C0279 / 12	Solenoid relay is off in the midst of remain routine, and AST voltage of ECU terminal is 8.0 V or more, which continue for 2.04 sec. or more.	

Fail safe function:

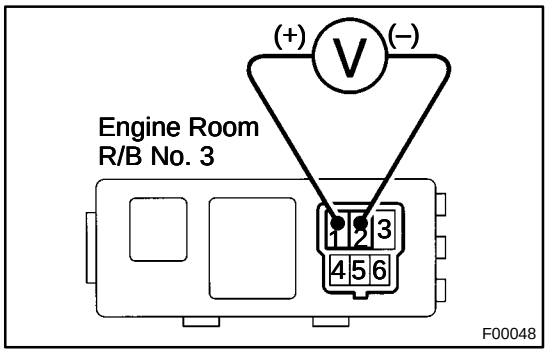
If a trouble has occurred in the ABS & TRAC solenoid relay circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals 1 and 2 of engine room R/B No. 3 (for ABS & TRAC solenoid relay).**



PREPARATION:
Remove the ABS & TRAC solenoid relay from the engine room R/B No. 3.

CHECK:
Measure the voltage between terminals 1 and 2 of the engine room R/B No. 3 (for the ABS & TRAC solenoid relay).

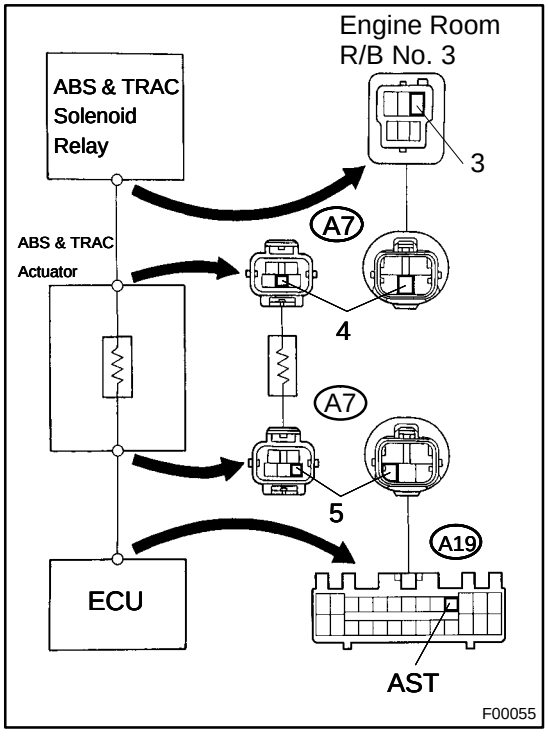
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 3 of ABS & TRAC solenoid relay and terminal AST of ABS & TRAC ECU.**



CHECK:
Check the continuity between terminal 3 of engine room R/B No. 3 (for the ABS & TRAC solenoid relay) and terminal AST of the ABS & TRAC ECU.

OK:

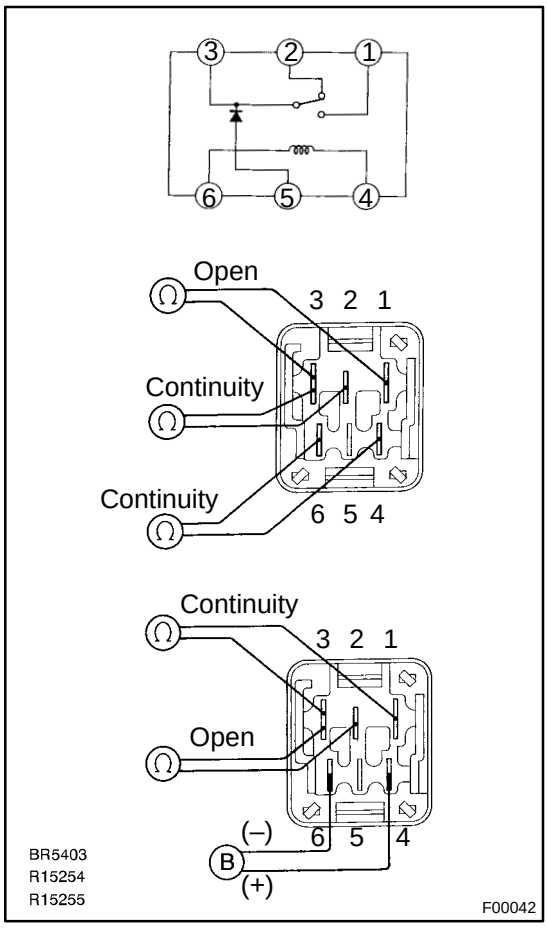
Continuity

HINT:
There is a resistance of 4 ~ 6 Ω between terminals A7 – 4 and A7 – 5 of the ABS actuator.

NG	**Repair or replace harness or ABS & TRAC actuator.**

OK

3	Check ABS & TRAC solenoid relay.



CHECK:

Check the continuity between each terminal of the ABS & TRAC 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 the continuity between each terminal of the ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

NG → **Replace ABS & TRAC solenoid relay.**

OK

4	Check for open and short circuit in harness and connector between ABS & TRAC solenoid relay and ABS & TRAC ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

If same code is still output after DTC is deleted, check contact conditions of each connection. If connections are normal, ECU may be defective.

DI0C3–05

DTC	C0273 / 13, C0274 / 14	ABS & TRAC Motor Relay Circuit

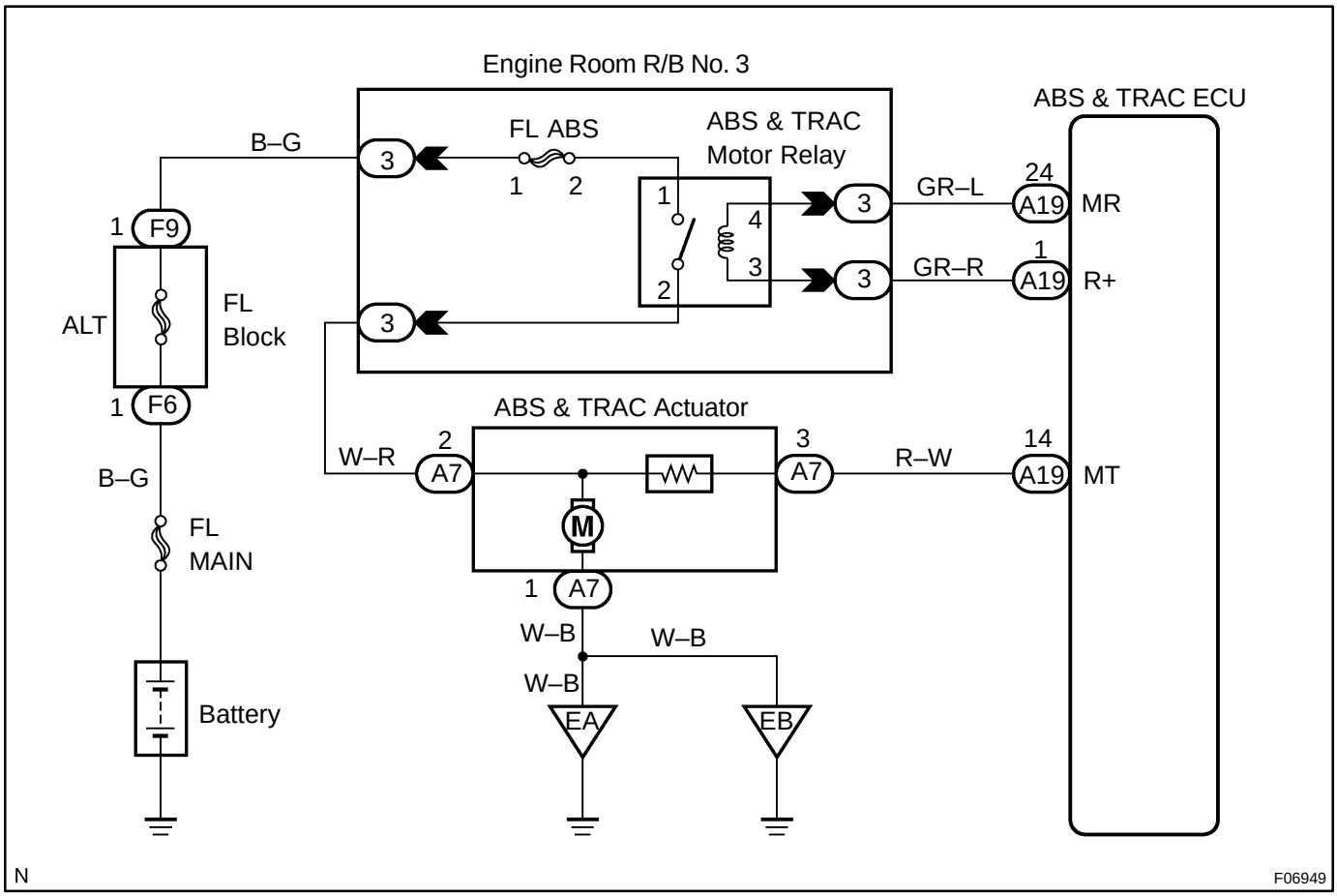
CIRCUIT DESCRIPTION

ABS & TRAC motor relay supplies power to the ABS & TRAC pump motor. While the ABS is activated, the ECU switches the ABS & TRAC motor relay on and operates the ABS & TRAC pump motor.

DTC No.	DTC Detecting Condition	Trouble Area
C0273 / 13	Conditions 1. to 3. are detected: 1. Malfunction of motor relay monitor 2. Battery voltage will not be more than 17.0 V within 2.16 sec. 3. Battery voltage will not become less than 9.5 V within 2.16 sec., or after the motor relay is on and motor relay monitor will not be on.	●ABS & TRAC motor relay ●ABS & TRAC motor relay circuit ●ABS & TRAC ECU
C0274 / 14	Motor relay is off, and motor relay monitor is on, which continues for 20.16 sec. or more.	

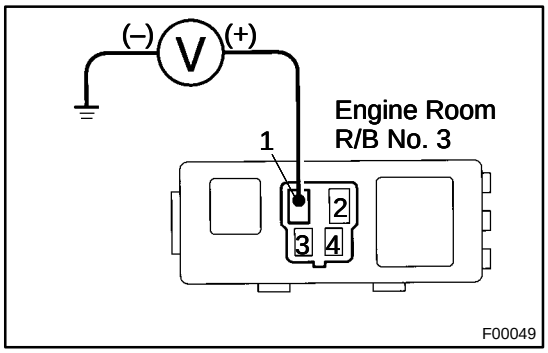
Fail safe function:
If a trouble has occurred in the ABS & TRAC motor relay circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of engine room R/B No. 3 (for ABS & TRAC motor relay) and body ground.**



PREPARATION:
Remove the ABS & TRAC motor relay from the engine room R/B No. 3.

CHECK:
Measure the voltage between terminal 1 of the engine room R/B No. 3 (for the ABS & TRAC motor relay) and the body ground.

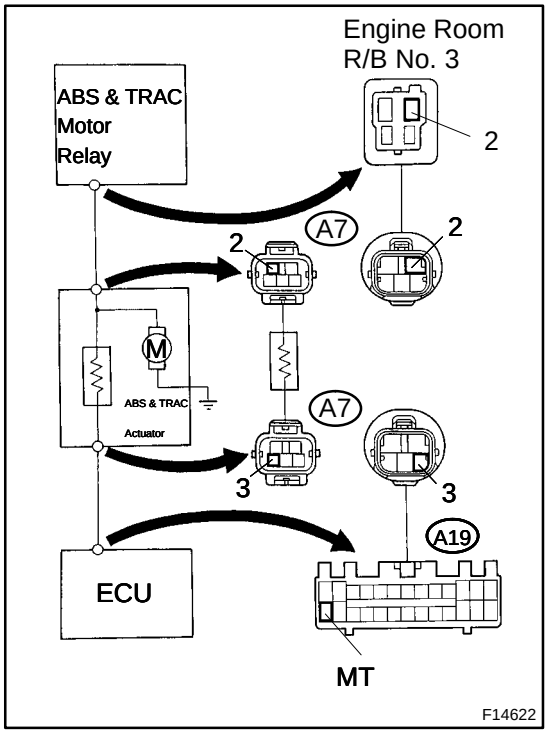
OK:

Voltage: 10 – 14 V

NG	**Check and repair harness or connector.**

OK

2	**Check continuity between terminal 2 of ABS & TRAC motor relay and terminal MT of ABS & TRAC ECU.**



CHECK:
Check the continuity between terminal 2 of the engine room R/B No. 3 (for the ABS & TRAC motor relay) and terminal MT of the ABS & TRAC ECU.

OK:

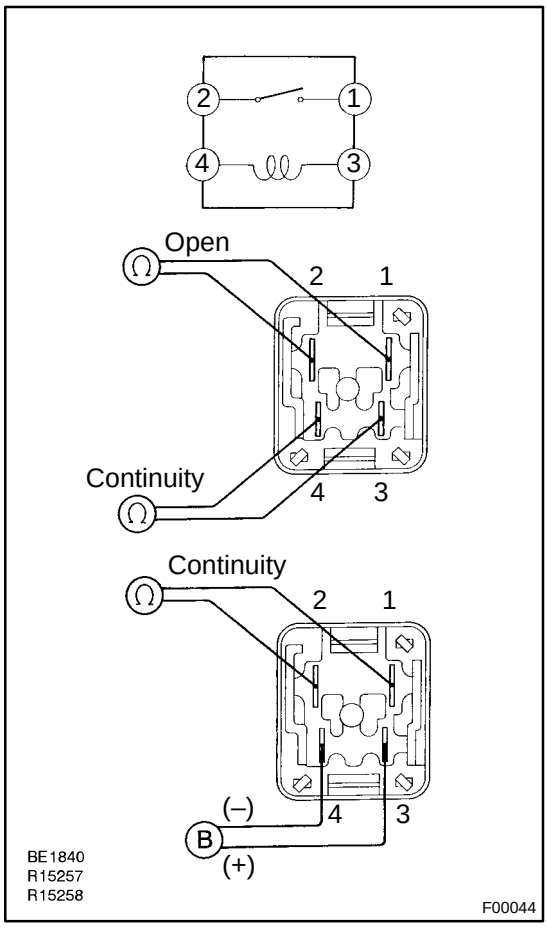
Continuity

HINT:
There is a resistance of 4 ~ 6 Ω between terminals A7 – 2 and A7 – 3 of the ABS & TRAC actuator.

NG	**Repair or replace harness or ABS & TRAC actuator.**

OK

3	Check ABS & TRAC motor relay.



CHECK:

Check the continuity between each terminal of the ABS & TRAC motor relay.

OK:

Terminals 3 and 4	Continuity (Reference value 62 Ω)
Terminals 1 and 2	Open

CHECK:

(a) Apply battery positive voltage between terminals 3 and 4.

(b) Check the continuity between terminals of the ABS & TRAC motor relay.

OK:

Terminals 1 and 2	Continuity

NG → **Replace ABS & TRAC motor relay.**

OK

4	Check for open and short circuit in harness and connector between ABS & TRAC motor relay and ABS & TRAC ECU (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

If same code is still output after DTC is deleted, check contact conditions of each connection. If connections are normal, ECU may be defective.

DI0C4–05

DTC	C0226 / 21 – C1228 / 28	ABS & TRAC Actuator Solenoid Circuit

CIRCUIT DESCRIPTION

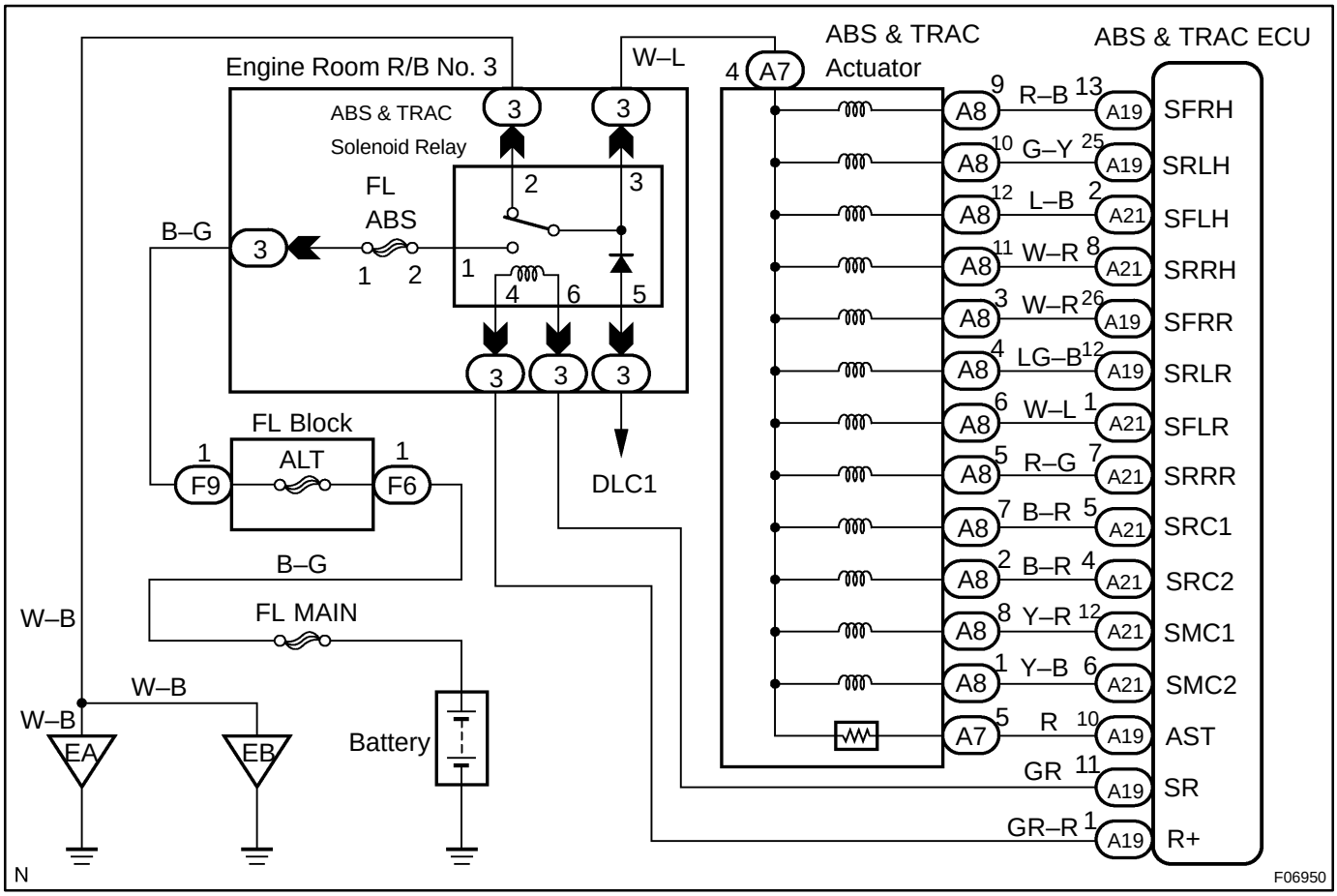
This solenoid goes on when signals are received from the ECU and controls the pressure acting on the wheel cylinders thus controlling the braking force.

DTC No.	DTC Detecting Condition	Trouble Area
C0226 / 21	When solenoid relay is in normal operation and the condition that solenoid output of each wheel and monitor value do not accord with continued for 0.05 sec.	●ABS & TRAC actuator ●SFRR or SFRH circuit ●ECU
C0236 / 22		●ABS & TRAC actuator ●SFLR or SFLH circuit ●ECU
C0246 / 23		●ABS & TRAC actuator ●SRRR or SRRH circuit ●ECU
C0256 / 24		●ABS & TRAC actuator ●SRLR or SRLH circuit ●ECU
C1225 / 25	When solenoid relay is in normal operation and the condition that output of switching solenoid and monitor value do not accord with continued for 0.05 sec.	●ABS & TRAC actuator ●SMC1 circuit ●ECU
C1226 / 26		●ABS & TRAC actuator ●SMC2 circuit ●ECU
C1227 / 27		●ABS & TRAC actuator ●SRC1 circuit ●ECU
C1228 / 28		●ABS & TRAC actuator ●SRC2 circuit ●ECU

Fail safe function:

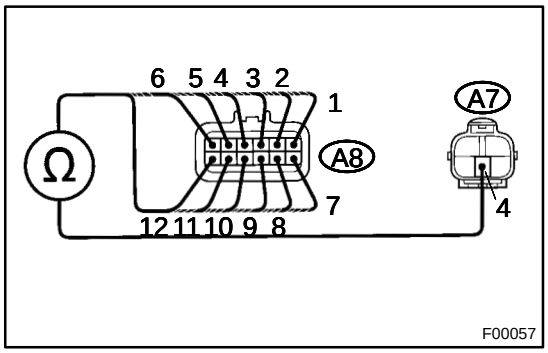
If a trouble has occurred in the actuator solenoid circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check ABS & TRAC actuator solenoid.**



PREPARATION:
Disconnect the 2 connectors from the ABS & TRAC actuator.
CHECK:
Check the continuity between terminals A7 – 4 and each of A8 – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 of the ABS & TRAC actuator connector.
OK:

Continuity

HINT:
Resistance of each solenoid coil is 1.2 Ω.

NG → **Replace ABS & TRAC actuator.**

OK ↓

2	**Check for open and short circuit in harness and connector between ABS & TRAC ECU and actuator (See page IN–31).**

NG → **Repair or replace harness or connector.**

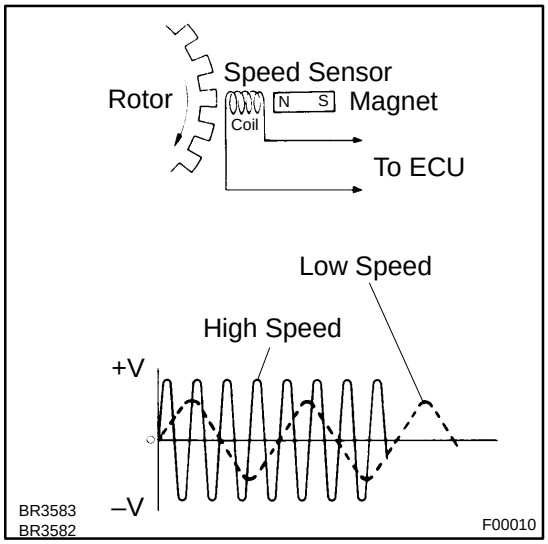
OK ↓

If same code is still output after DTC is deleted, check contact conditions of each connection. If connections are normal, ECU may be defective.

DI1AF–04

DTC	C0200 / 31 – C0215 / 34	Speed Sensor Circuit

CIRCUIT DESCRIPTION



Speed sensor detects the wheel speed and sends the appropriate signals to the ECU. These signals are used to control the ABS and TRAC system. The front and rear rotors each has 48 serrations.

When the rotors rotate, the magnetic field emitted by the permanent magnet in the speed sensor generates an 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 conditions from 1 to 3: 1. The condition that ABS is in non–operation, wheel speed is 10 km/h or more, one eighth of maximum wheel speed is greater than minimum wheel speed is shown continuously for 30 sec. or more. 2. ABS is in non–operation, momentary interruption of speed sensor occurs 7 times or more in mean time of switching ignition switch on and off. 3. ABS non–operation, momentary interruption of speed sensor occurs 7 times or more in mean time of switching ignition switch on and off or vehicle speed is 20 km/h (12 mph) or more and the condition of noise interference or non–noise interference occurs 75 times or more within 5 sec.	●Right front, left front, right rear, left rear speed sensor ●Each speed sensor circuit ●Speed sensor rotor ●ECU

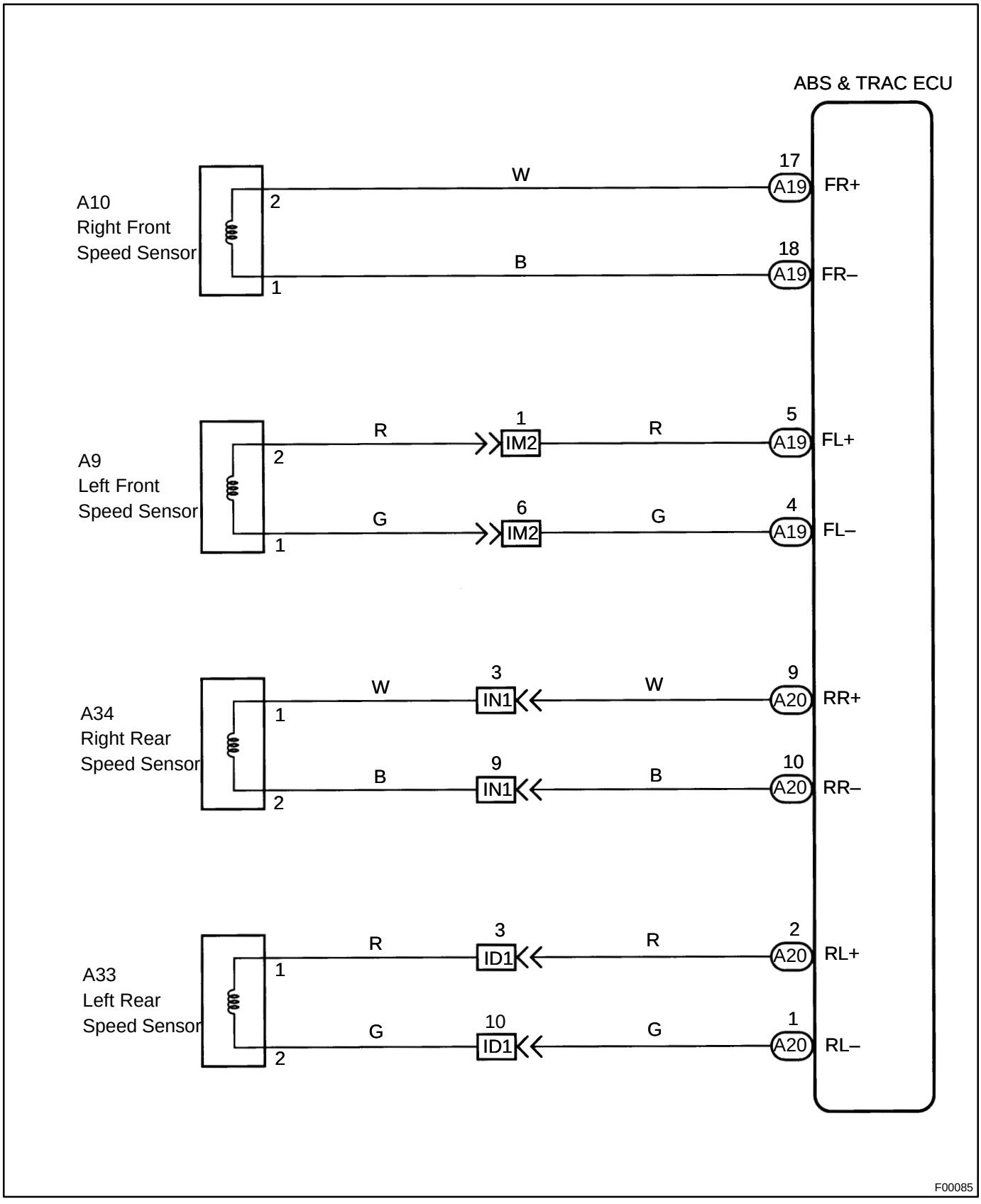
HINT:

- DTC No. C0200 / 31 is for the right front speed sensor.
- DTC No. C0205 / 32 is for the left front speed sensor.
- DTC No. C0210 / 33 is for the right rear speed sensor.
- DTC No. C0215 / 34 is for the left rear speed sensor.

Fail safe function:

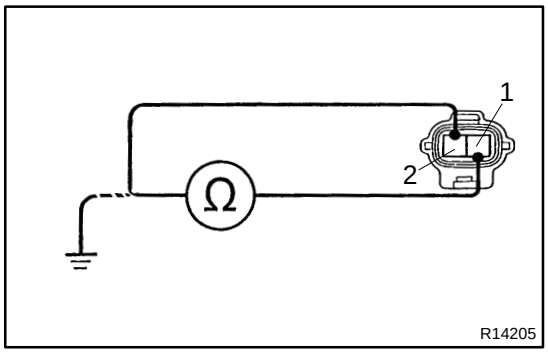
If a trouble has occurred in the speed sensor circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check speed sensor.**



Front:

PREPARATION:

(a) Remove front fender liner.

(b) Disconnect speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

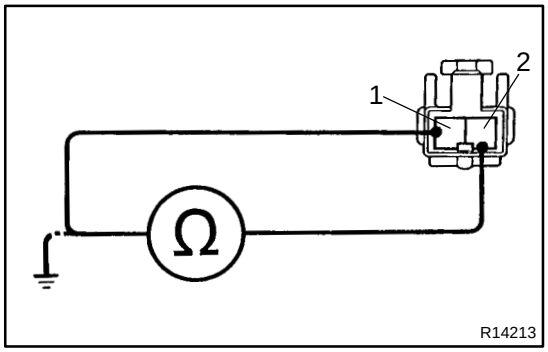
Resistance: 0.6 – 2.5 kΩ

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector and the body ground.

OK:

Resistance: 1 MΩ or higher



Rear:

PREPARATION:

(a) Remove the seat cushion and seat back.

(b) Disconnect speed sensor connector.

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector.

OK:

Resistance: 1.2 – 2.3 kΩ

CHECK:

Measure the resistance between terminals 1 and 2 of the speed sensor connector and the body ground.

OK:

Resistance: 1 MΩ or higher

NG → **Replace speed sensor.**

NOTICE:

Check the speed sensor signal last (See page DI–368).

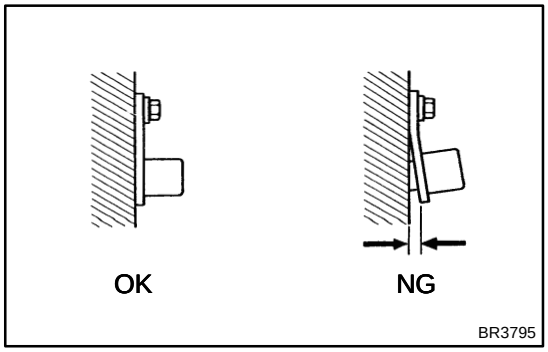
OK

2	**Check for open and short circuit in harness and connector between each speed sensor and ECU (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

3	**Check sensor installation.**



CHECK:
Check the speed sensor installation.
OK:

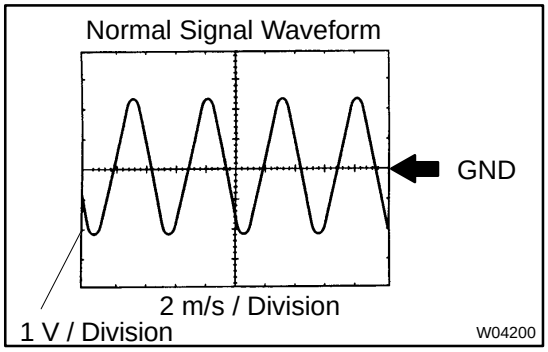
The installation bolt is tightened properly and there is no clearance between the sensor and front steering knuckle or the rear axle carrier.

NG → **Replace speed sensor.**

NOTICE:
Check the speed sensor signal last (See page DI–368).

OK

4	**Check speed sensor and sensor rotor serrations.**



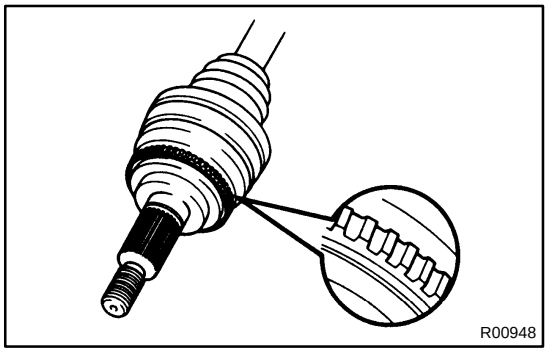
REFERENCE: INSPECTION USING OSCILLOSCOPE
PREPARATION:
(a) Remove the ABS & TRAC ECU.
(b) Connect an oscilloscope to terminals FR+, FL+, RR+ or RL+ and GND of the ABS & TRAC ECU harness side connector.

CHECK:
Drive the vehicle at about 30 km/h (19 mph), and check the signal waveform.

OK → **Check and replace ABS & TRAC ECU.**

NG

5	Check sensor rotor and sensor tip.



Front:

PREPARATION:

Remove the front drive shaft (See page SA–16).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, no missing teeth or no foreign objects.

PREPARATION:

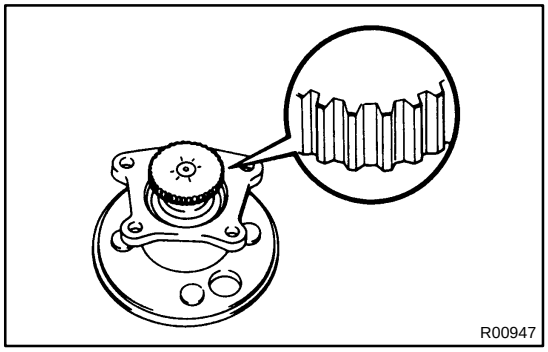
Remove the front speed sensor (See page BR–65).

CHECK:

Check the sensor tip.

OK:

No scratches or no foreign objects on the sensor tip.



Rear:

PREPARATION:

Remove the rear axle hub (See page SA–45).

CHECK:

Check the sensor rotor serrations.

OK:

No scratches, no missing teeth or no foreign objects.

PREPARATION:

Remove the rear speed sensor (See page BR–68).

CHECK:

Check the sensor tip.

OK:

No scratches or no foreign objects on the sensor tip.

NG → **Replace speed sensor or rotor.**

NOTICE:

Check the speed sensor signal last (See page DI–368).

OK

Check and replace ABS & TRAC ECU.

DI0C6–05

DTC	C1241 / 41	IG Power Source Circuit

CIRCUIT DESCRIPTION

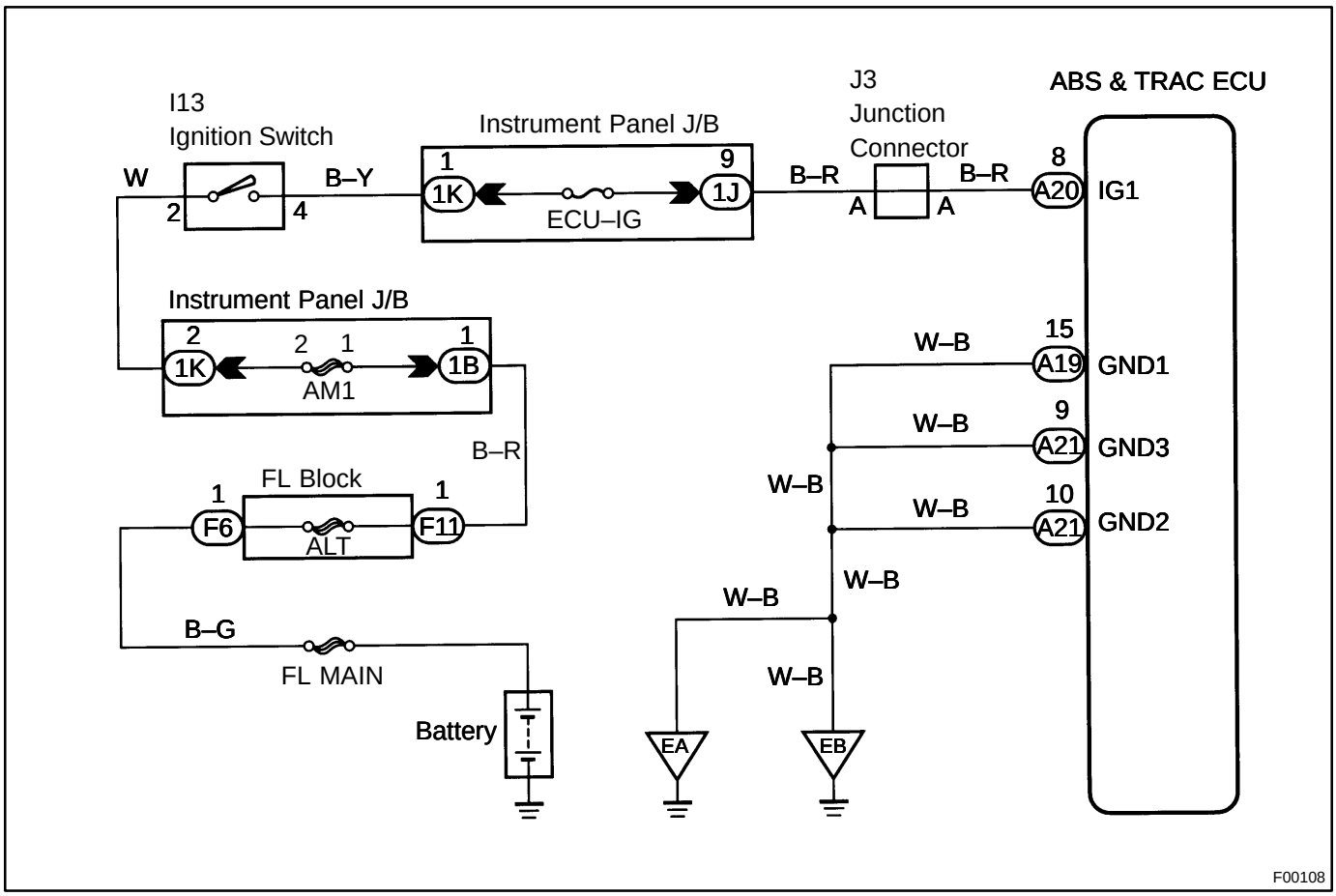
This is the power source for the ECU, and the actuators.

DTC No.	DTC Detecting Condition	Trouble Area
C1241 / 41	Detection of any conditions from 1 to 4: 1. Vehicle speed is 3 km/h (1.9 mph) or more and battery voltage is less than 9.5 V continues for 10 sec. or more. 2. Under the condition that the IG voltage down continued for 0.2 sec. or more and when there was a case that the motor relay turned on in the past and the signals of the motor rely and monitor have no accord for 0.02 sec. 3. Under the condition that the IG voltage down, continued for 0.2 sec. or more and when there was a case that the solenoid relay turned on in the past and the signals of the solenoid rely and monitor have no accord for 0.02 sec. 4. Under the condition that the IG voltage down continued for 0.2 sec. or more, the solenoid output and monitor signal have no accord continued for 0.05 sec. or more.	●Battery ●Charging system ●Power source circuit ●ECU

Fail safe function:

If a trouble has occurred in the power source circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

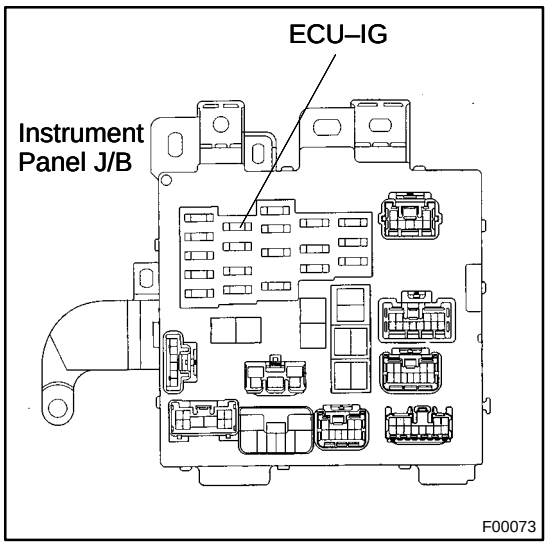
WIRING DIAGRAM



2001 LEXUS ES300 (RM831U)

INSPECTION PROCEDURE

1	**Check ECU–IG fuse.**



PREPARATION:
Remove the ECU–IG fuse from the instrument panel J/B.
CHECK:
Check the continuity of the ECU–IG fuse.
OK:
Continuity

NG → **Check for short circuit in all harness and components connected to ECU–IG fuse (See attached wiring diagram).**

OK

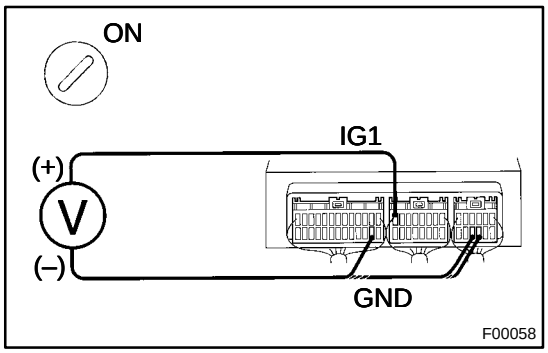
2	**Check battery positive voltage.**

OK:
Voltage: 10 – 14 V

NG → **Check and repair charging system (See page CH–2).**

OK

3	Check voltage between terminals IG1 and GND of ABS & TRAC ECU connector.

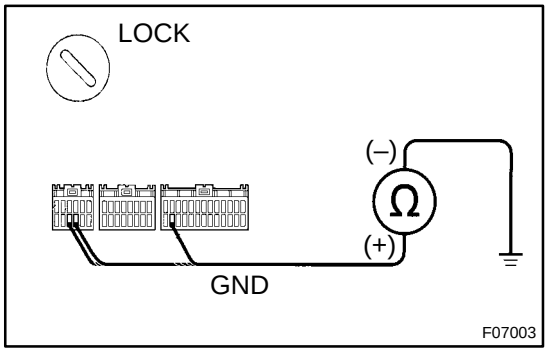


PREPARATION:
Remove the ABS & TRAC ECU with the connectors still connected.
CHECK:
(a) Turn the ignition switch ON.
(b) Measure the voltage between terminals IG1 and GND of the ABS & TRAC ECU connector.
OK:
Voltage: 10 – 14 V

OK	Check and replace ABS & TRAC ECU.

NG

4	Check continuity between terminals GND of ABS & TRAC ECU connector and body ground.



PREPARATION:
Disconnect the connector from the ABS & TRAC ECU.
CHECK:
Measure the resistance between terminal GND of the ABS & TRAC ECU connector and the 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 ABS & TRAC ECU and battery (See page IN–31).

DI0C7–08

DTC	C1223 / 43	ABS Control System Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1223 / 43	Detection of any conditions from 1 to 8: 1. While TRAC is in non–operation and DTC of ABS is output, but TRAC is not during initial light check, terminal WA of ECU is on and engine speed is 500 rpm or more, which continue for 1 sec. or more. 2. Solenoid relay circuit is open or short. 3. Motor relay circuit is open or short. 4. ABS solenoid circuit is open or short. 5. TRAC solenoid circuit is open or short. 6. Speed sensor is under malfunction condition. 7. IG power source is down or raised. 8. Pump motor is locked.	●ABS control system

INSPECTION PROCEDURE

1	Check DTC for ABS (See page DI–368).

*1 → **Repair ABS control system according to code output.**

*2

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains on.

DI0C8–05

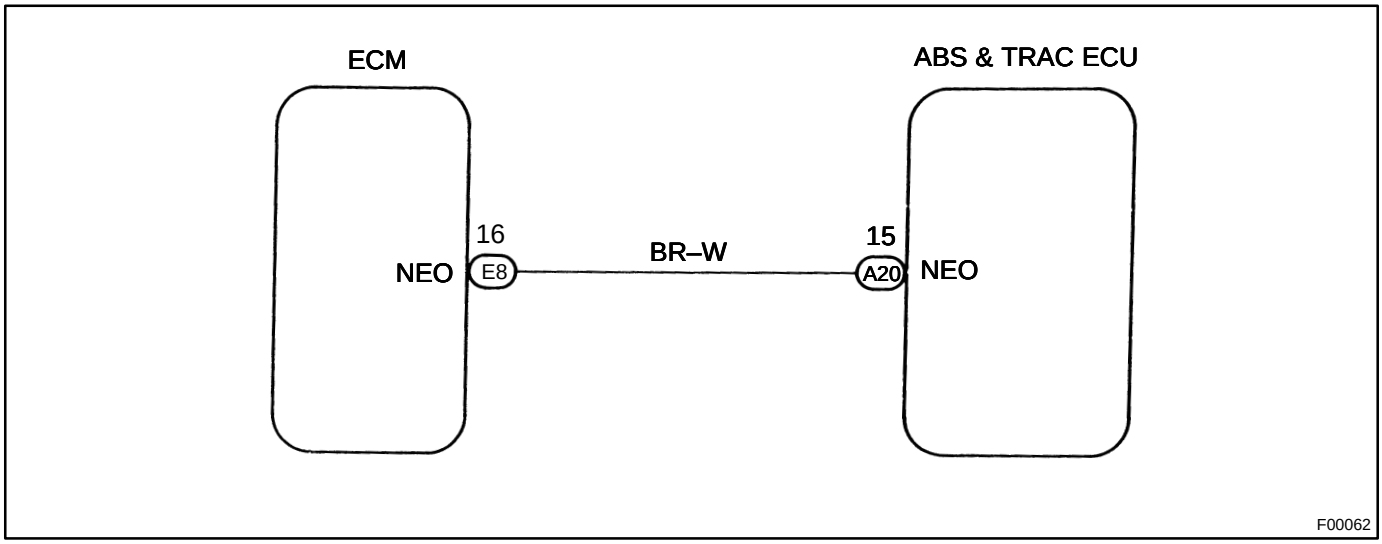
DTC	C1224 / 44	NE Signal Circuit

CIRCUIT DESCRIPTION

ABS & TRAC ECU receives engine speed signals (NE signals) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1224 / 44	Condition 1 or 2 is detected: 1. TRAC is in operation and engine speed is 0 rpm continue for 2.4 sec. or more. 2. TRAC is in non–operation, sift lever is not in P or N position, both the front right and left wheels' speed is 30 km/h (19 mph) or more, engine speed is 0 rpm and does not have communication malfunction, and malfunction information of engine system is off.	●NEO circuit ●ECM ●ABS & TRAC ECU

WIRING DIAGRAM



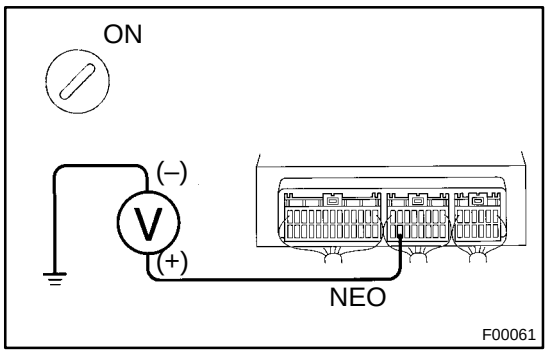
INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminal NEO of ABS & TRAC ECU and terminal NEO of ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

2	**Check voltage between terminal NEO of ABS & TRAC ECU and body ground.**



PREPARATION:

(a) Remove the ABS & TRAC ECU with the connectors still connected.

(b) Turn the ignition switch ON.

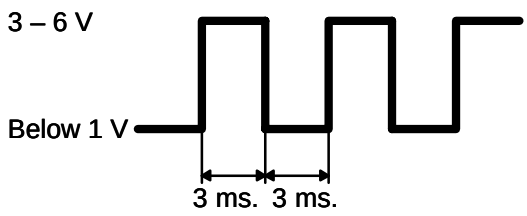
CHECK:

Measure the voltage between terminal NEO of the ABS & TRAC ECU and the body ground for the engine conditions below.

OK:

Engine condition	Voltage
OFF (IG ON)	3 – 6 V or below 1 V
ON (Idling)	2 – 3 V (Pulse)

(Reference)



NG → **Check and replace ABS & TRAC ECU or ECM.**

OK

If same code is still output after DTC is deleted, check contact conditions of each connection.

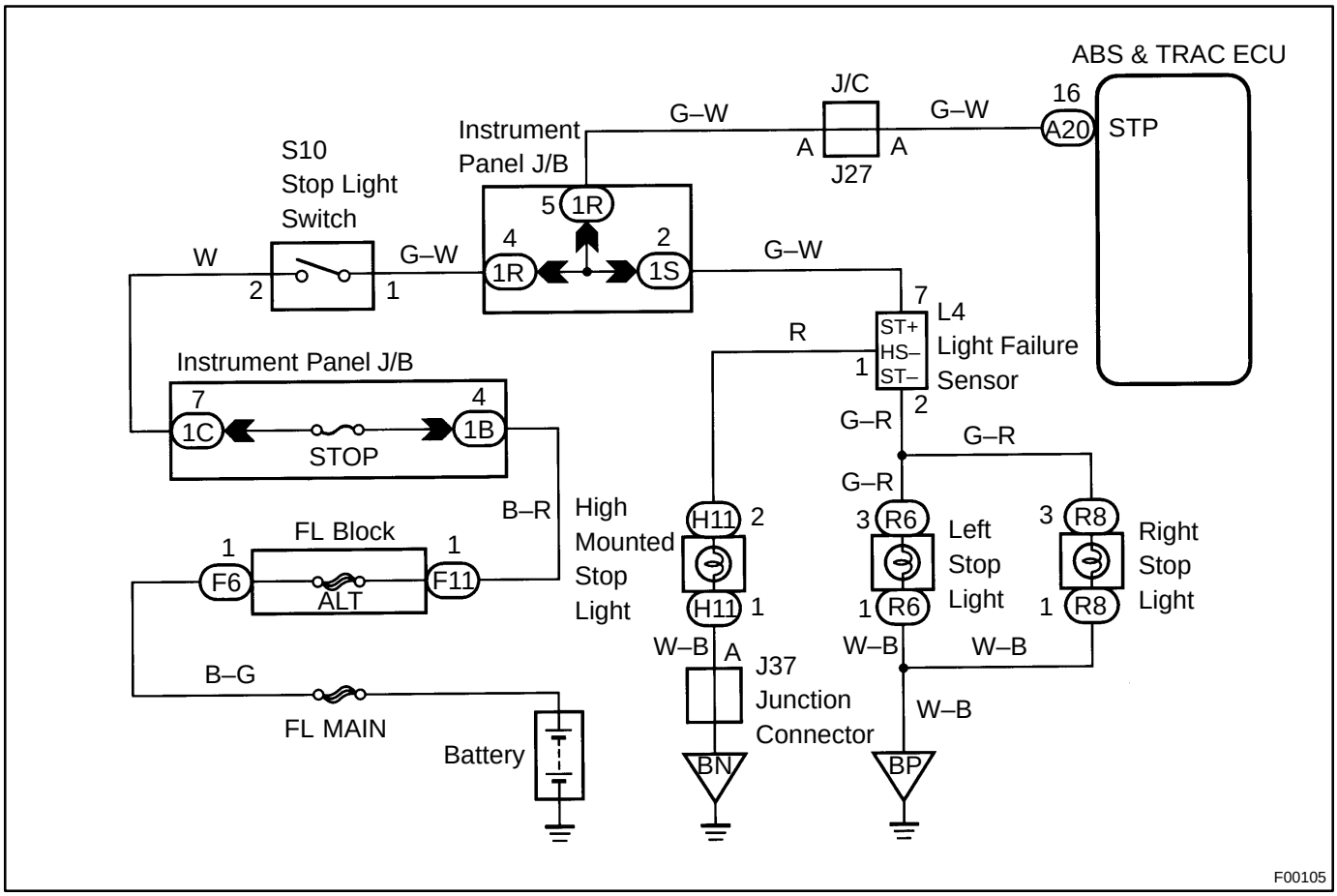
DI0CA–05

DTC	C1249 / 49	Stop Light Switch Circuit

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1249 / 49	The condition that the battery voltage has never been more than 17.0 V and become less than 9.5 V within 2.16 sec. and STP terminal voltage of ECU is under open circuit detection limit continue for 3 sec. or more.	●Stop light switch ●Stop light switch circuit ●ABS & TRAC ECU

WIRING DIAGRAM



F00105

INSPECTION PROCEDURE

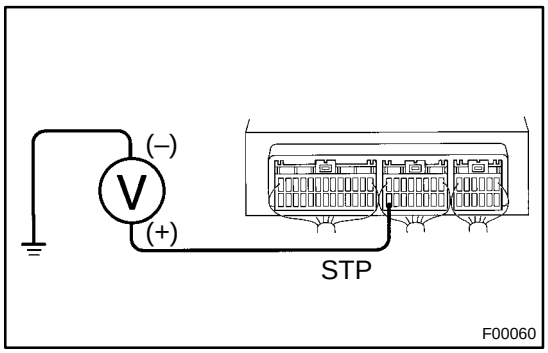
1	**Check operation of stop light.**

CHECK:
Check that stop light lights up when brake pedal is depressed and turns off when brake pedal is released.

NG → **Repair stop light circuit (See page BE–58).**

OK

2	**Check voltage between terminal STP of ABS & TRAC ECU and body ground.**



PREPARATION:
Remove the ABS & TRAC ECU with the connectors still connected.
CHECK:
Measure the voltage between terminal STP of the ABS & TRAC ECU and the body ground when the brake pedal is depressed.
OK:
Voltage: 8 – 14 V

OK → **Check and replace ABS & TRAC ECU.**

NG

3	**Check for open circuit in harness and connector between ABS & TRAC ECU and stop light switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptoms table (See page DI–378).

DI558–03

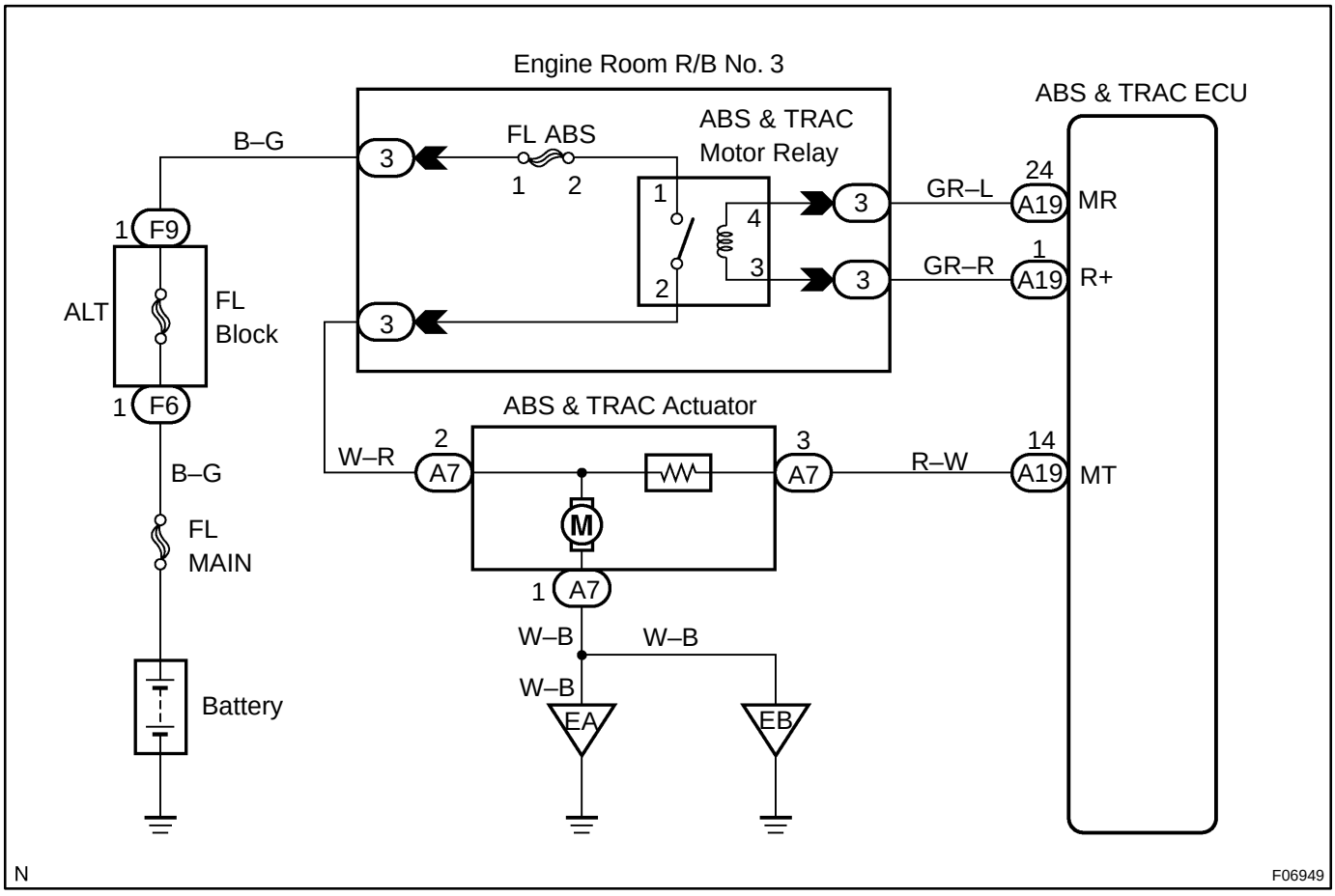
DTC	C1251 / 51	ABS Pump Motor Lock

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
C1251 / 51	In the midst of initial check, after the current flows to the motor for 3 sec. and motor relay is turned off, then within 0.66 sec., the condition that the motor relay monitor is off continues for 0.24 sec. or more.	ABS pump motor

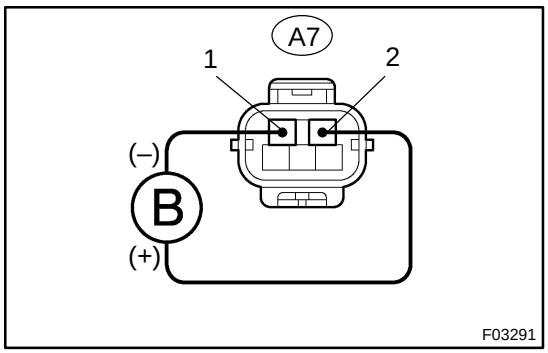
Fail safe function:
If a trouble has occurred in the ABS & TRAC pump motor, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of ABS & TRAC pump motor.**



PREPARATION:

Disconnect the ABS & TRAC actuator connector.

CHECK:

Connect the positive (+) lead to terminal A7 – 2 and the negative (–) lead to terminal A7 – 1 of the ABS & TRAC actuator connector, check that the pump motor operates.

OK:

The running sound of the pump motor should be heard.

OK → **Check for open circuit in harness and connector between ABS & TRAC motor relay, ABS & TRAC actuator and ECU (See page IN–31).**

NG

Replace ABS & TRAC actuator.

DI0CD–05

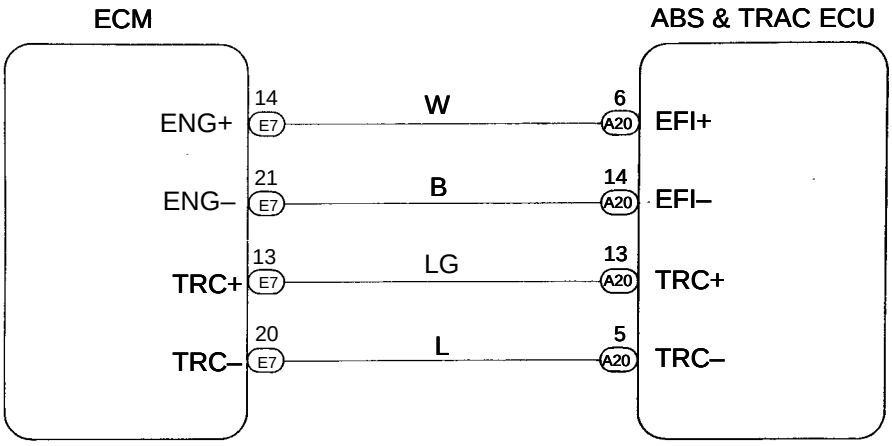
DTC	C1203 / 53	ECM Communication Circuit Malfunction

CIRCUIT DESCRIPTION

This circuit is used to send the TRAC control information to the ECM (TRC+, TRC–) from the ABS & TRAC ECU, and engine control information to the ABS & TRAC ECU (EFI+, EFI–) from the ECM.

DTC No.	DTC Detecting Condition	Trouble Area
C1203 / 53	ECM communication data malfunction is detected.	●TRC+ or TRC– circuit ●EFI+ or EFI– circuit ●ECM ●ABS & TRAC ECU

WIRING DIAGRAM



F00063

INSPECTION PROCEDURE

1	**Check for open and short circuit in harness and connector between terminals EFI+, EFI–, TRC+, TRC– of ABS & TRAC ECU and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ECM or ABS & TRAC ECU.

DI0CE–05

DTC	C1201 / 61	Engine Control System Malfunction

CIRCUIT DESCRIPTION

If a trouble has occurred in the engine control system, the ECU will prohibits the TRAC control.

DTC No.	DTC Detection Condition	Trouble Area
C1201 / 61	Conditions 1 and 2 are detected: 1. ECM communication is normal, malfunction information of engine system is on, and engine speed is 500 rpm or more, which continues for 0.48 sec. or more, and TRAC operation start condition is concluded. 2. ECM communication is normal, malfunction information of engine system is on, engine speed is 500 rpm and more, which continues for 1 sec. or more, and the engine system memorizes DTC.	Engine control system

INSPECTION PROCEDURE

1	**Check DTC for the engine (See page DI–3).**

*1 → **Repair engine control system according to code output.**

*2 →

Check for ECU connected to malfunction indicator light.

*1: Output NG code
*2: Malfunction indicator light remains ON.

DI0CG–06

DTC	Always ON	ABS & TRAC ECU Malfunction

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
Always ON	ABS & TRAC ECU internal malfunction is detected.	ECU

Fail safe function:
If a trouble has occurred in the power source circuit, the ECU cuts off the current to the ABS & TRAC solenoid relay and prohibits the ABS & TRAC controls.

INSPECTION PROCEDURE

1	**Is DTC output?**

Check the DTC on page DI–368.

YES → **Repair circuit indicated by code output.**

NO

2	**Is normal code displayed?**

YES → **Check solenoid relay. Check for short circuit in harness and connector between solenoid relay and DLC1 (See page IN–31).**

NO

3	**Does ABS warning light go off?**

YES → **Check for open or short circuit in harness and connector between ECU–IG fuse and ABS & TRAC ECU (See page IN–31).**

NO

4	**Check battery positive voltage.**

CHECK:

Check the battery positive voltage.

OK:

10 – 14 V

NG → **Check and repair charging system (See page CH–2).**

OK

5	**Check ABS warning light.**

PREPARATION:

(a) Turn the ignition switch OFF.
(b) Disconnect the connector from the ABS & TRAC ECU.
(c) Turn the ignition switch ON.

CHECK:

Check the ABS warning light goes off.

OK → **Check and replace ABS & TRAC ECU.**

NG

Check for short circuit in harness and connector between ABS warning light, DLC1, and ABS & TRAC ECU (See page IN–31).

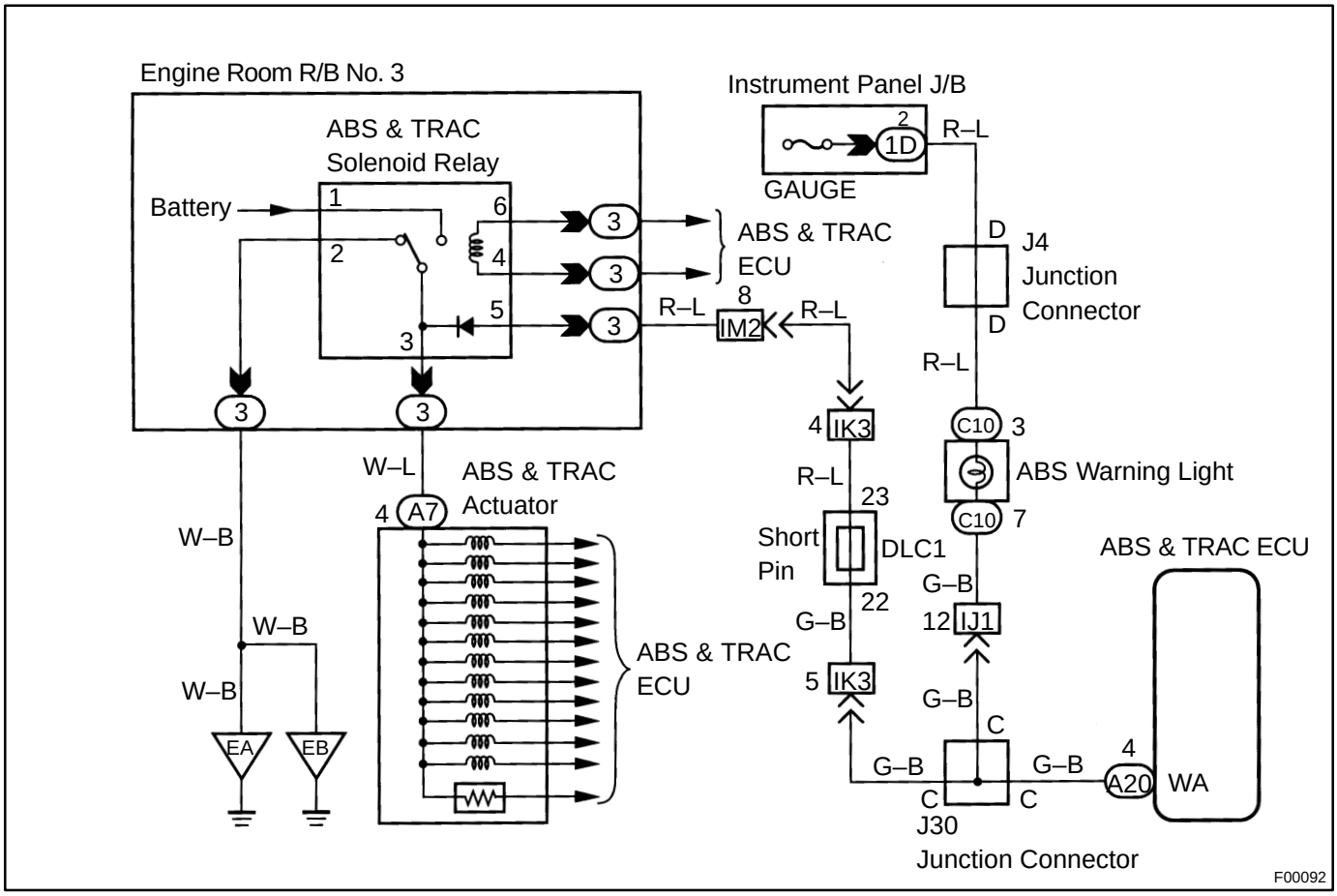
DI0CI–07

ABS Warning Light Circuit

CIRCUIT DESCRIPTION

If the ECU has detected a trouble, it lights the ABS warning light and prohibits the ABS control at the same time. At this time, the ECU records a DTC in the memory.
Connect terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3 to make the ABS warning light blink and output the DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

Troubleshoot in accordance with the chart below for each trouble symptom.

ABS warning light does not light up	Go to step 1
ABS warning light remains on	Go to step 3

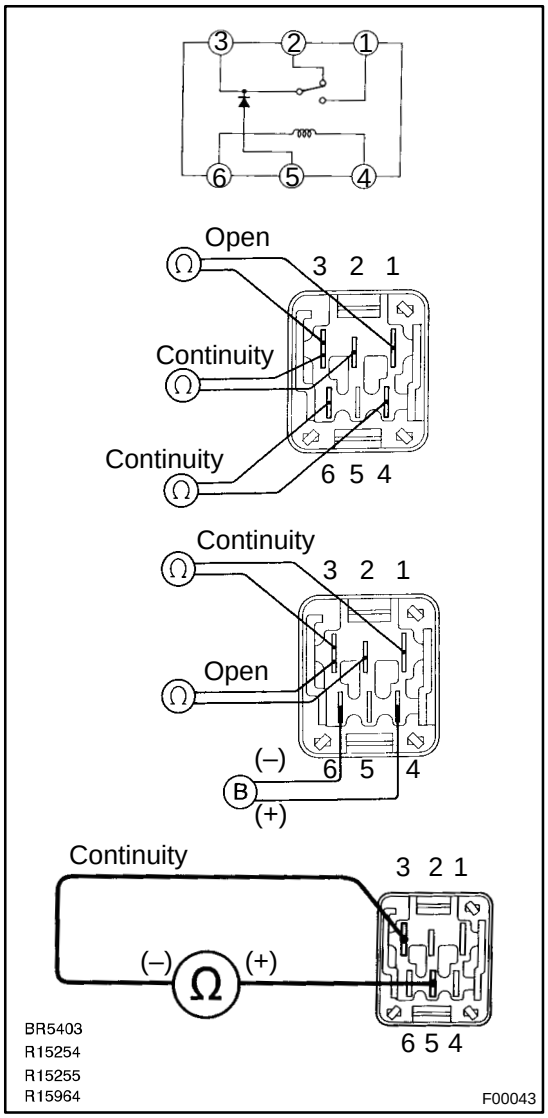
1	**Check ABS warning light.**

See the combination meter troubleshooting on page BE–65.

NG	**Repair bulb or combination meter assembly (See page BE–96).**

OK

2	Check ABS & TRAC solenoid relay.



PREPARATION:

Remove the ABS & TRAC solenoid relay from the engine room R/B No. 3.

CHECK:

Check the continuity between each terminal of the ABS & TRAC 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 the continuity between each terminal of the ABS & TRAC solenoid relay.

OK:

Terminals 2 and 3	Open
Terminals 1 and 3	Continuity

CHECK:

(a) Connect the positive (+) test lead to terminal 5 and the negative (–) lead to terminal 3.

(b) Check continuity between the terminals.

OK:

Continuity

If there is no continuity, connect the negative (–) test lead to terminal 5 and the positive (+) lead to terminal 3. Check continuity between terminals.

NG → **Replace ABS & TRAC solenoid relay.**

OK

Check for open circuit in harness and connector between DLC1, ABS & TRAC solenoid relay and body ground (See page IN–31).

3	**Is DTC output?**

Check the DTC on page DI–368.

YES → **Repair circuit indicated by code output.**

NO

4	**Does ABS warning light go off?**

NO → **Check for short circuit in harness and connector between ABS warning light, DLC1 and ABS & TRAC ECU (See page IN–31).**

YES

5	**Check ABS & TRAC solenoid relay (See step 2).**

NG → **Replace ABS & TRAC solenoid relay.**

OK

Check for short circuit in harness and connector between DLC1 and ABS & TRAC solenoid relay (See page IN–31).

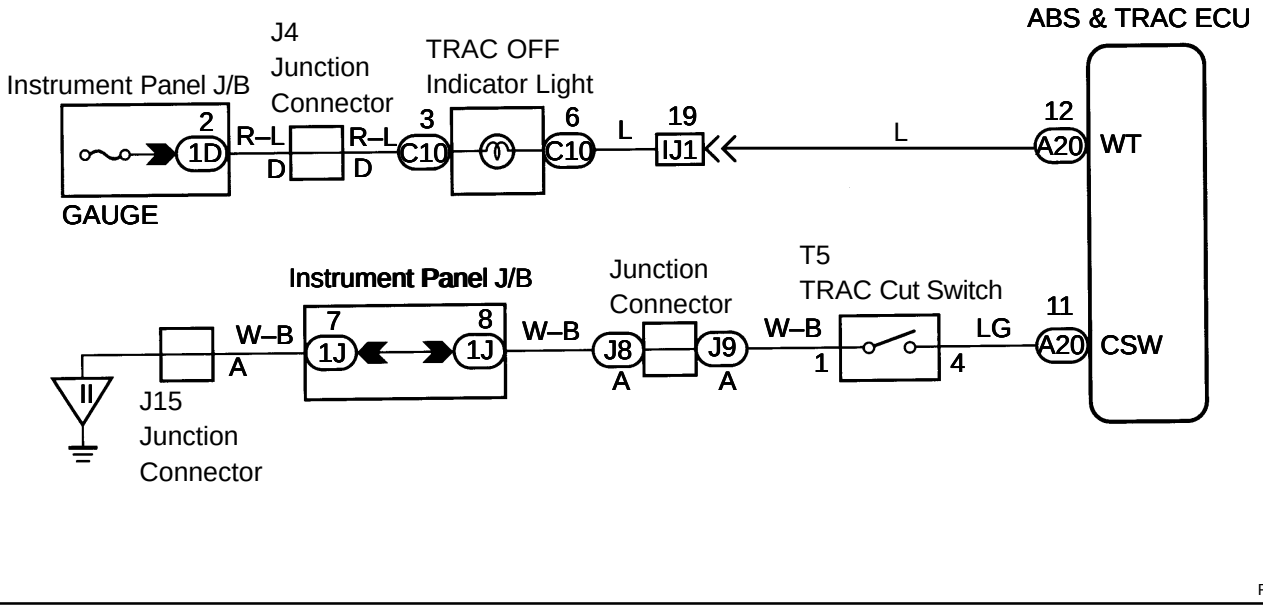
DI559–05

TRAC OFF Indicator, TRAC Cut Switch Circuit

CIRCUIT DESCRIPTION

This is the TRAC control main switch. When the TRAC cut switch is pushed on, TRAC control goes off and the TRAC OFF indicator lights up. This indicator blinks for warnings when the trouble occurs and for displaying DTC.

WIRING DIAGRAM



INSPECTION PROCEDURE

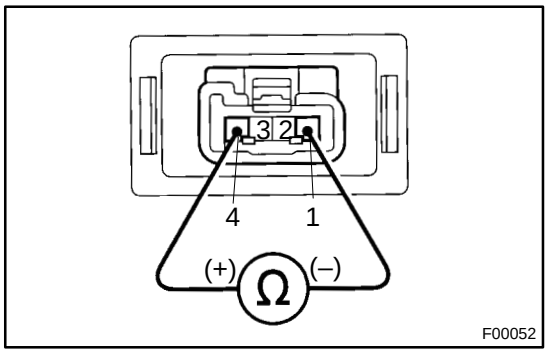
1	**Check DTC.**

Check the DTC on page DI–368.

YES → **Repair circuit indicated by code output.**

NO

2	**Check TRAC cut switch.**



PREPARATION:

(a) Remove the TRAC cut switch.

(b) Disconnect the TRAC cut switch connector.

CHECK:

Measure the resistance between terminals 1 and 4 of the TRAC cut switch when the TRAC cut switch is on and off.

OK:

TRAC cut switch	Resistance
Pushed in	Continuity
Released	1 MΩ or higher

NG → **Replace TRAC cut switch.**

OK

3	**Check for open and short circuit in harness and connector between terminal CSW of ABS & TRAC ECU and TRAC cut switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	**Check TRAC OFF indicator light.**

See the combination meter troubleshooting on page BE–65.

NG → **Repair or replace combination meter (See page BE–96).**

OK

5	**Check for open and short circuit in harness and connector between terminal WT of ABS & TRAC ECU and TRAC OFF indicator light (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & TRAC ECU.

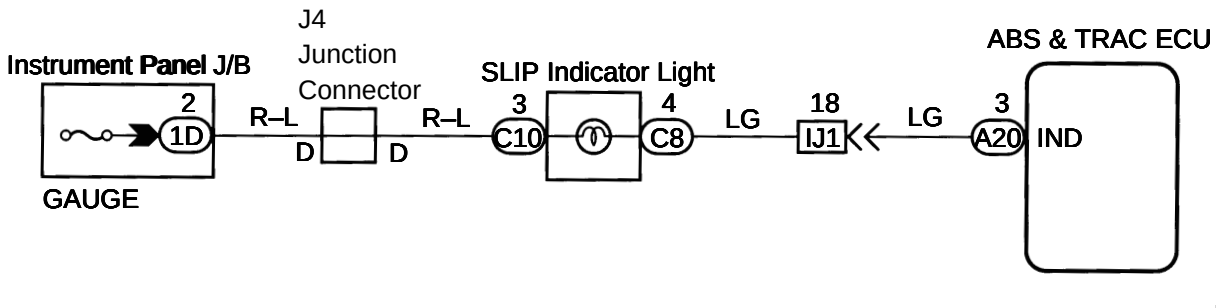
DI55A–03

SLIP Indicator Light Circuit

CIRCUIT DESCRIPTION

The SLIP indicator blinks during the TRAC operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check SLIP indicator light.**

See the combination meter troubleshooting on page BE–65.

NG → **Repair or replace combination meter (See page BE–96).**

OK

2	**Check for short circuit in harness and connector between ABS & TRAC ECU and SLIP indicator light (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace ABS & TRAC ECU.

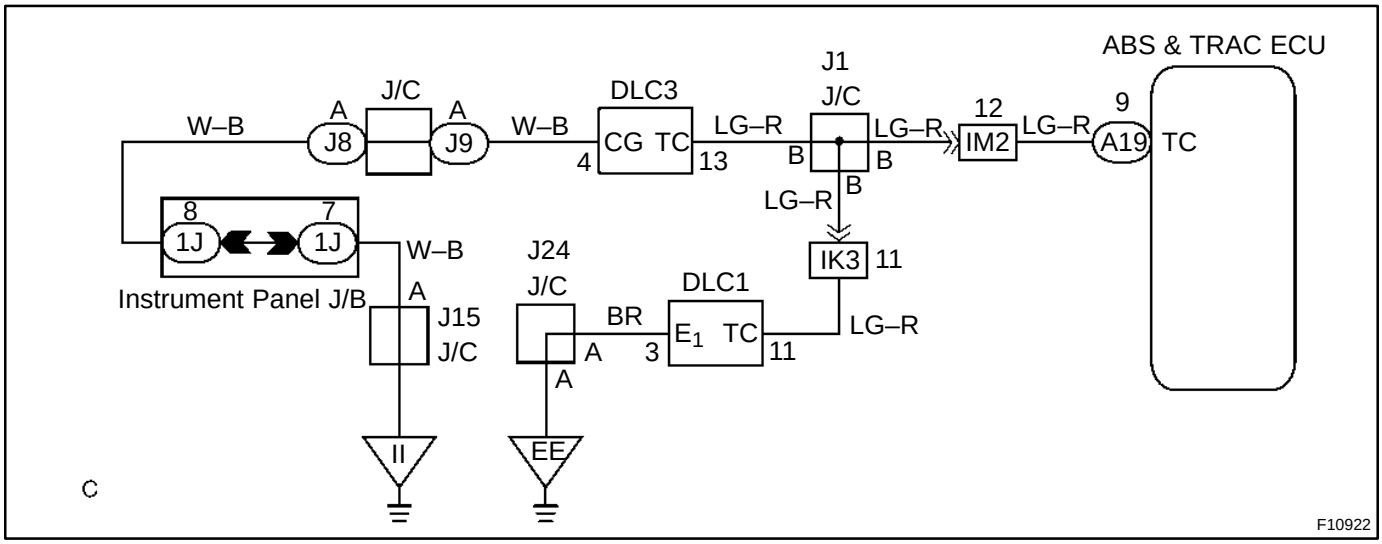
DI0CK–07

Tc Terminal Circuit

CIRCUIT DESCRIPTION

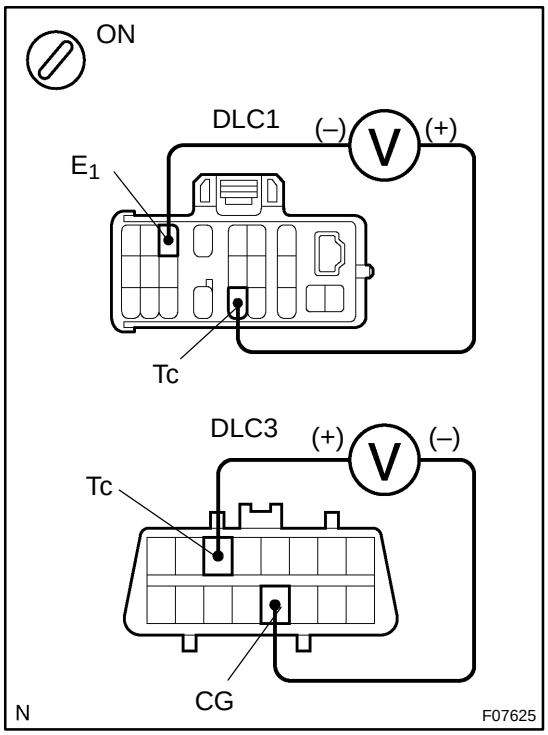
Connecting terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light and TRAC OFF indicator light.

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 the voltage between terminals Tc and E_1 of the DLC1, or terminals Tc and CG of the DLC3.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Tc and E_1 or Tc and CG have been connected, ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS & TRAC ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN–31).**

NG	**Repair or replace harness or connector.**

OK

Check and replace ABS & TRAC ECU.

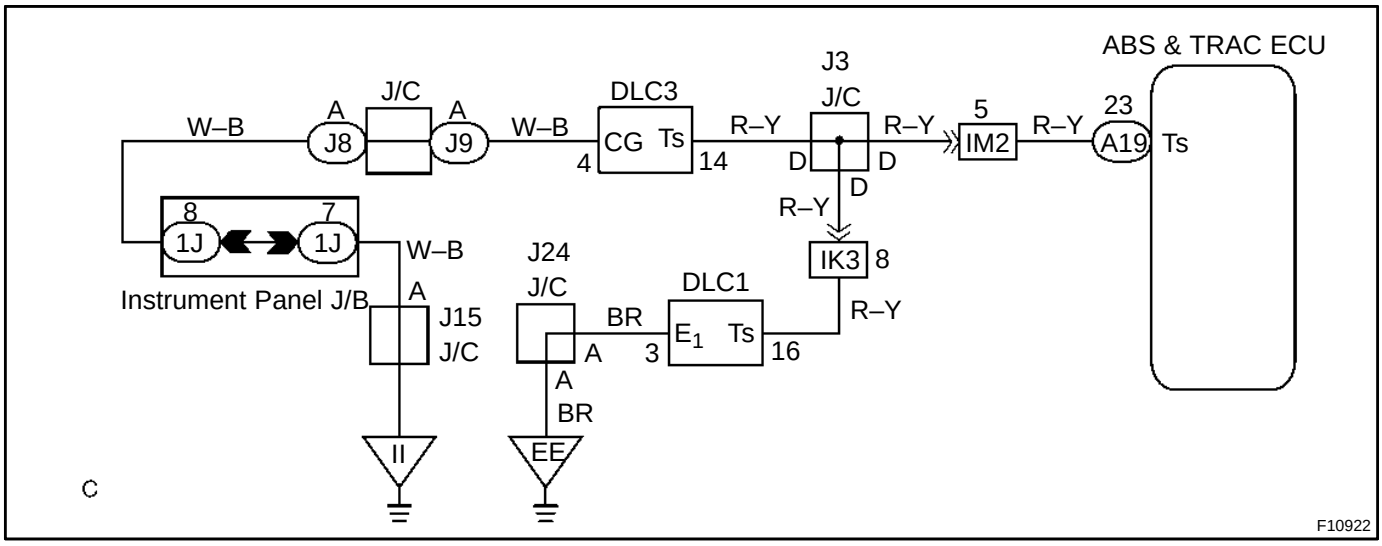
DI0CM–07

Ts Terminal Circuit

CIRCUIT DESCRIPTION

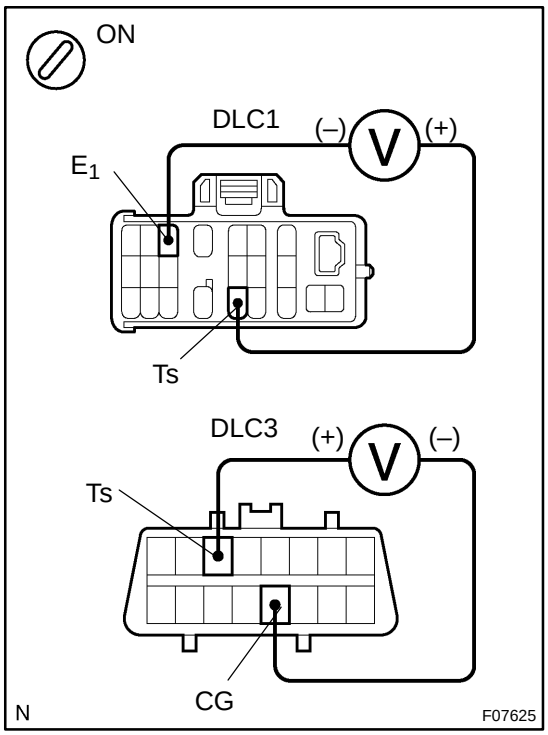
The sensor check circuit detects abnormalities in the speed sensor signal which cannot be detected with the DTC check. Connect terminals Ts and E_1 of the DLC1, or terminals Ts and CG of the DLC3 in the engine compartment starts the check.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Ts and E_1 of DLC1 or Ts and CG of DLC3.**



CHECK:

(a) Turn the ignition switch ON.

(b) Measure the voltage between terminals Ts and E_1 of the DLC1, or terminals Ts and CG of the the DLC3.

OK:

Voltage: 10 – 14 V

OK	**If ABS warning light does not blink even after Ts and E_1 or Ts and CG have been connected, ECU may be defective.**

NG

2	**Check for open and short circuit in harness and connector between ABS & TRAC ECU and DLC1 or DLC3, DLC1 or DLC3 and body ground (See page IN–31).**

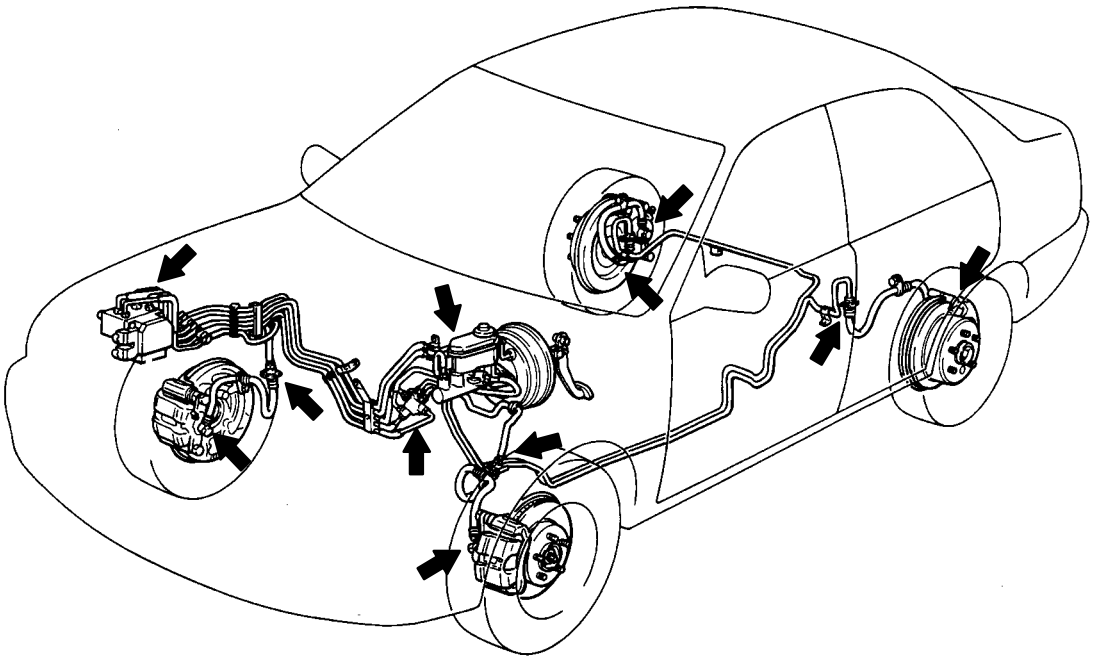
NG	**Repair or replace harness or connector.**

OK

Check and replace ABS & TRAC ECU.

Check for Fluid Leakage

Check fluid leaks from the actuator or hydraulic lines.

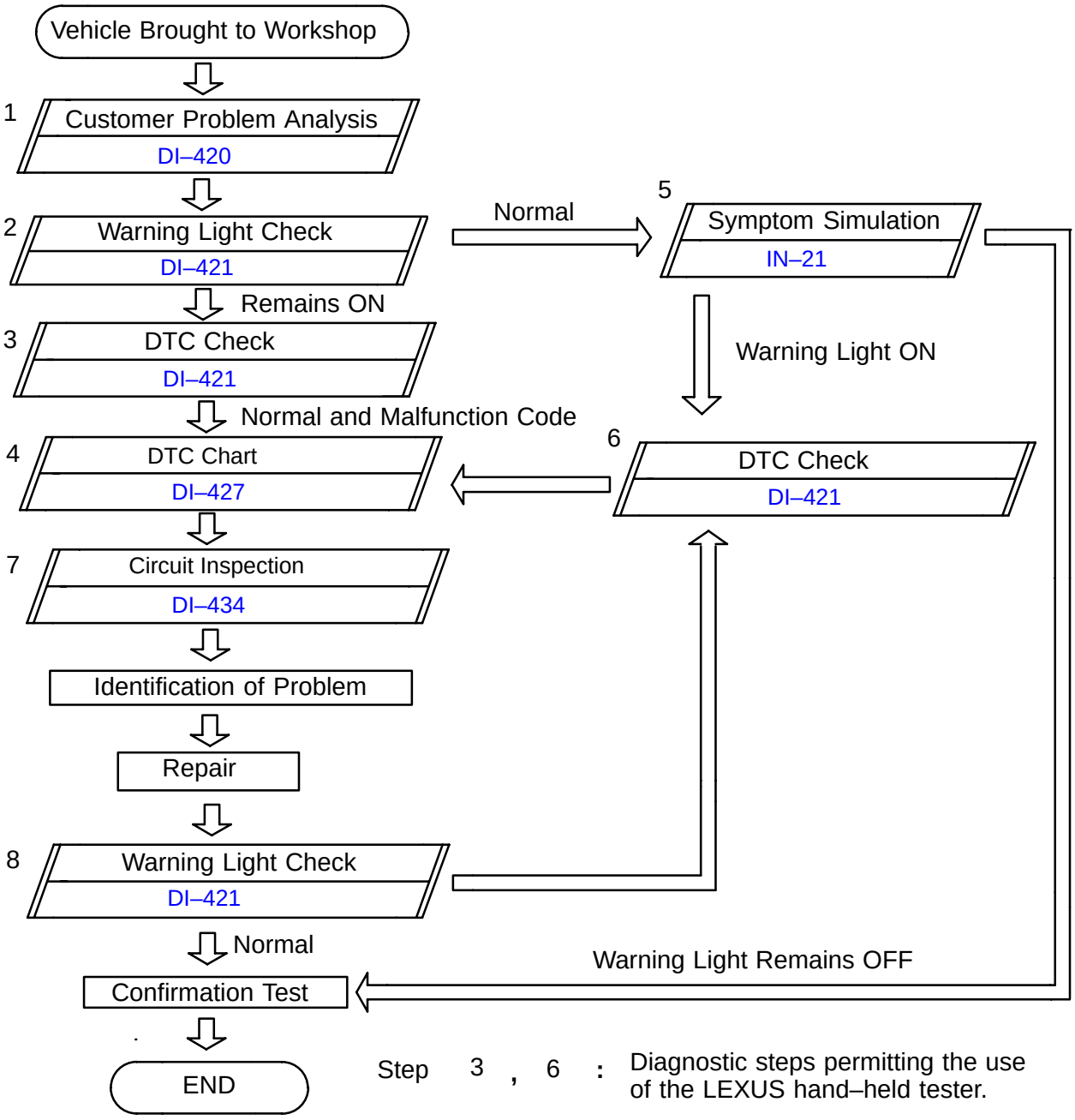


F00070

SUPPLEMENTAL RESTRAINT SYSTEM

DI1AX–18

HOW TO PROCEED WITH TROUBLESHOOTING



Step 3 , 6 : Diagnostic steps permitting the use of the LEXUS hand–held tester.

DI15Z–08

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.**

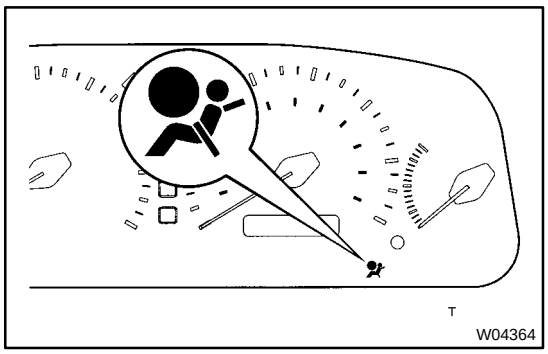
Vehicle Operation	☐ Starting ☐ Idling ☐ Driving [☐ Constant speed ☐ Acceleration ☐ Deceleration ☐ Other]
Road Conditions	
Details Of Problem	

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.]

DI504–01



PRE–CHECK

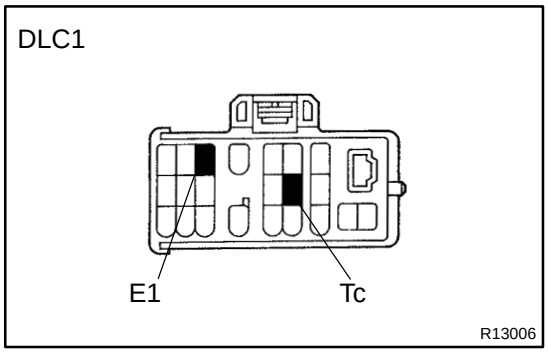
1. SRS WARNING LIGHT CHECK

(a) Turn the ignition switch to the ACC or ON position and check that the SRS warning light lights up.

(b) Check that the SRS warning light goes out after approx. 6 seconds.

HINT:

- When the ignition switch is at ACC or 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 lights up or the SRS warning light lights up even when the ignition switch is OFF, a short in the SRS warning light circuit can be considered likely. Proceed to "SRS warning light circuit malfunction" on pages DI–551, DI–554.



2. DTC CHECK (Using diagnosis check wire)

(a) Present troubles codes:

Output the DTC.

(1) Turn the ignition switch to the ACC or ON position and wait for approx. 20 seconds.

(2) Using SST, connect terminals Tc and E1 of the DLC1.

SST 09843–18020

NOTICE:

Pay due attention to the terminal connecting position to avoid a malfunction.

(b) Past troubles codes:

Output the DTC.

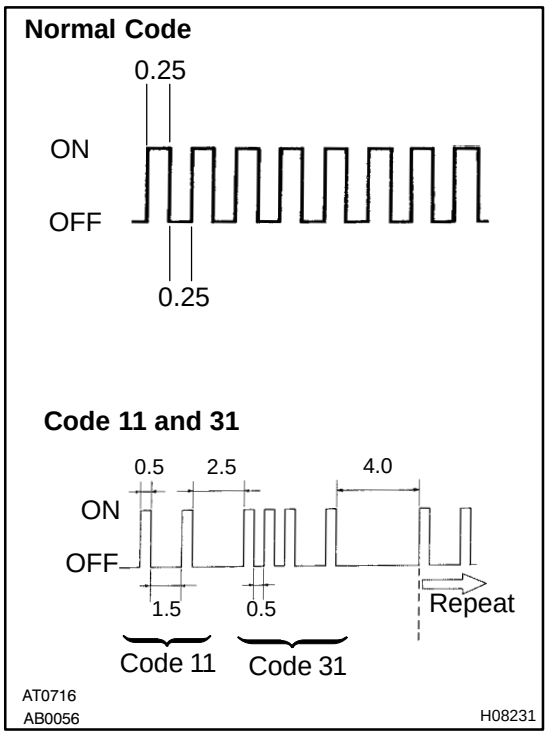
(1) Using a service wire, connect Terminals Tc and E1 of the DLC1.

SST 09843–18020

(2) Turn the ignition switch to the ACC or ON position and wait for approx. 20 seconds.

NOTICE:

Pay due attention to the terminal connecting position to avoid a malfunction.

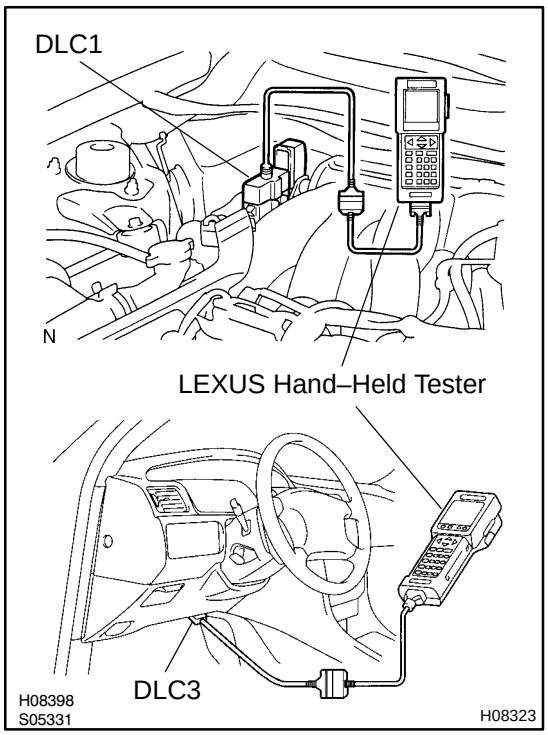


(c) Read the DTC.
Read the 2–digit DTC as indicated by the number of times the SRS warning light blinks. As an example, the blinking patterns, normal, 11 and 31 are shown in the illustration.

- Normal code indication
  The light will blink 2 times per second.
- Malfunction code indication
  The first blinking output indicates the first digit of a 2–digit DTC. After a 1.5–second pause, the second blinking output will indicate the second digit.

If there are 2 or more codes, there will be a 2.5–second pause between each code. After all the codes have been output, there will be a 4.0–second pause and they will all be repeated.
HINT:

- In the event of a number of trouble codes, indication will start from the smallest numbered code.
- If a DTC is not output or a DTC is output without terminal connection, proceed to the Tc terminal circuit inspection on page DI–558.



3. DTC CHECK (Using LEXUS hand–held tester)

(a) Hook up the LEXUS hand–held tester to the DLC1 or the DLC3.
(b) Read the DTCs by following the prompts on the tester screen.

HINT:
Please refer to the LEXUS hand–held tester operator's manual for further details.

4. DTC CLEARANCE (Not using service wire)

When the ignition switch is turned off, the diagnostic trouble code is cleared.
HINT:
DTC might not be cleared by turning the ignition switch OFF. In this case, proceed to the next step.

5. DTC CLEARANCE (Using service wire)

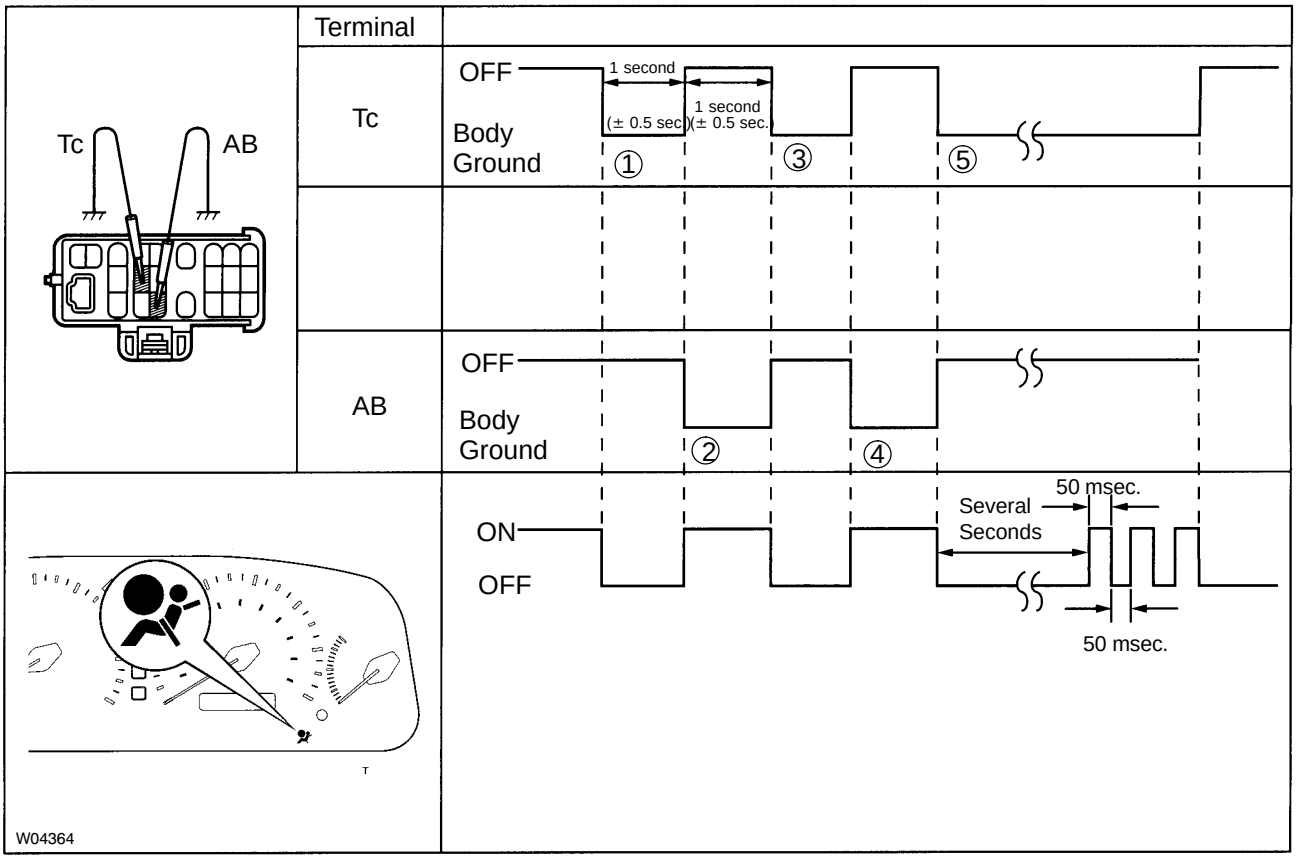
(a) Connect the 2 service wires to terminals Tc and AB of DLC1.
(b) Turn the ignition switch to ACC or ON and wait for approx. 6 seconds.

(c) Starting with the Tc terminal, ground alternately terminal Tc and terminal AB twice each in cycles of 1.0 second. Make sure that the terminals are grounded. Ensure the terminal Tc remains grounded.

HINT:

When alternately grounding terminals Tc and AB, release ground from one terminal and immediately ground the other terminal within an interval of 0.2 seconds.

If DTCs are not cleared, repeat the above procedure until the codes are cleared.



H01461

H01351

(d) Several seconds after doing the clearing procedure, the SRS warning light will blink in a 50–msec. cycle to indicate the codes which have been cleared.

6. Past trouble codes:
DTC CLEARANCE (See step 5.)

7. RELEASE METHOD OF AIRBAG ACTIVATION PREVENTION MECHANISM

An airbag activation prevention mechanism is built into the connector for the squib circuit of the SRS.

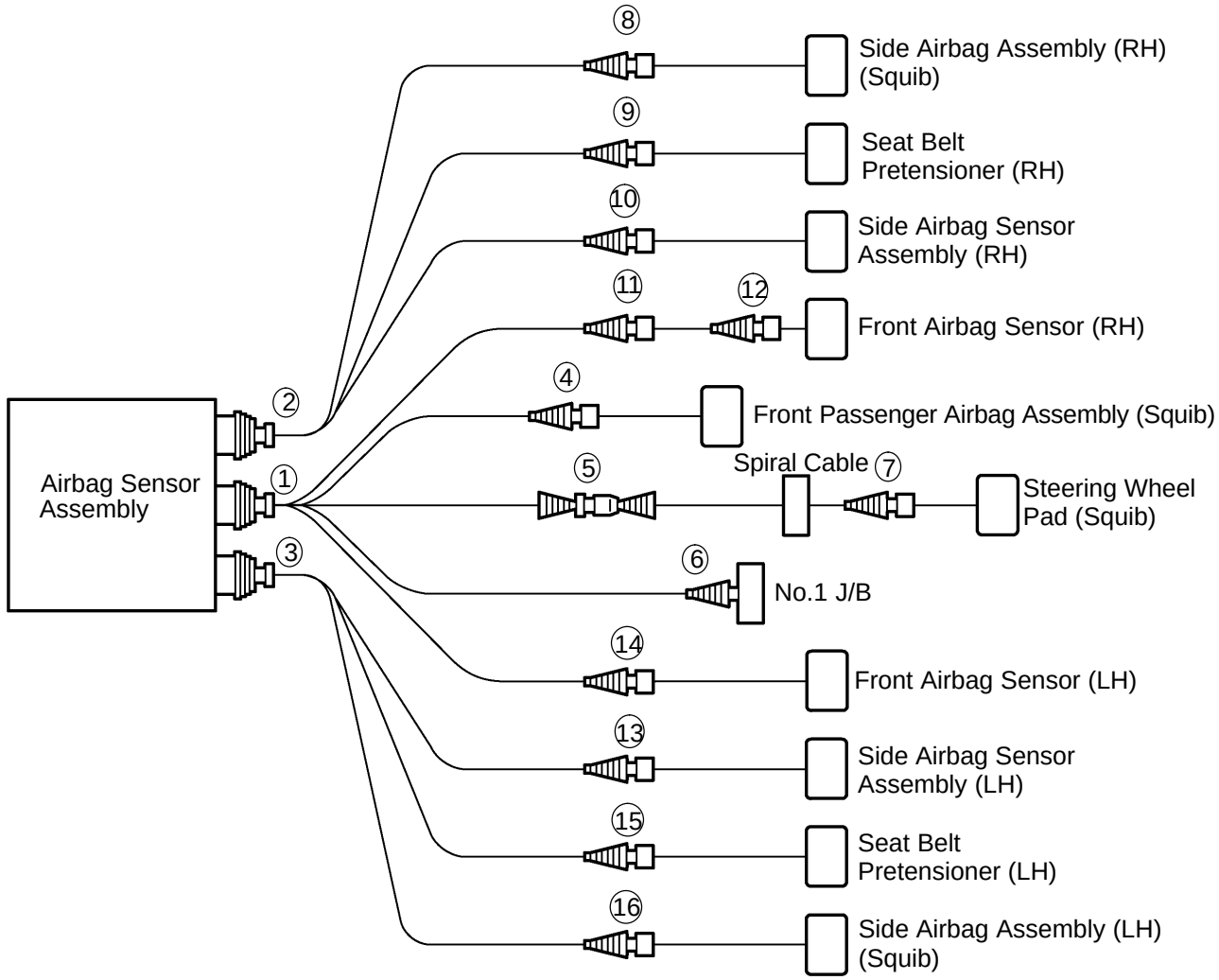
When release of the airbag activation prevention mechanism is directed in the troubleshooting procedure, as shown in the illustrations of the connectors on the next pages, insert paper which has the same thickness as the male terminal between the terminal and the short spring.

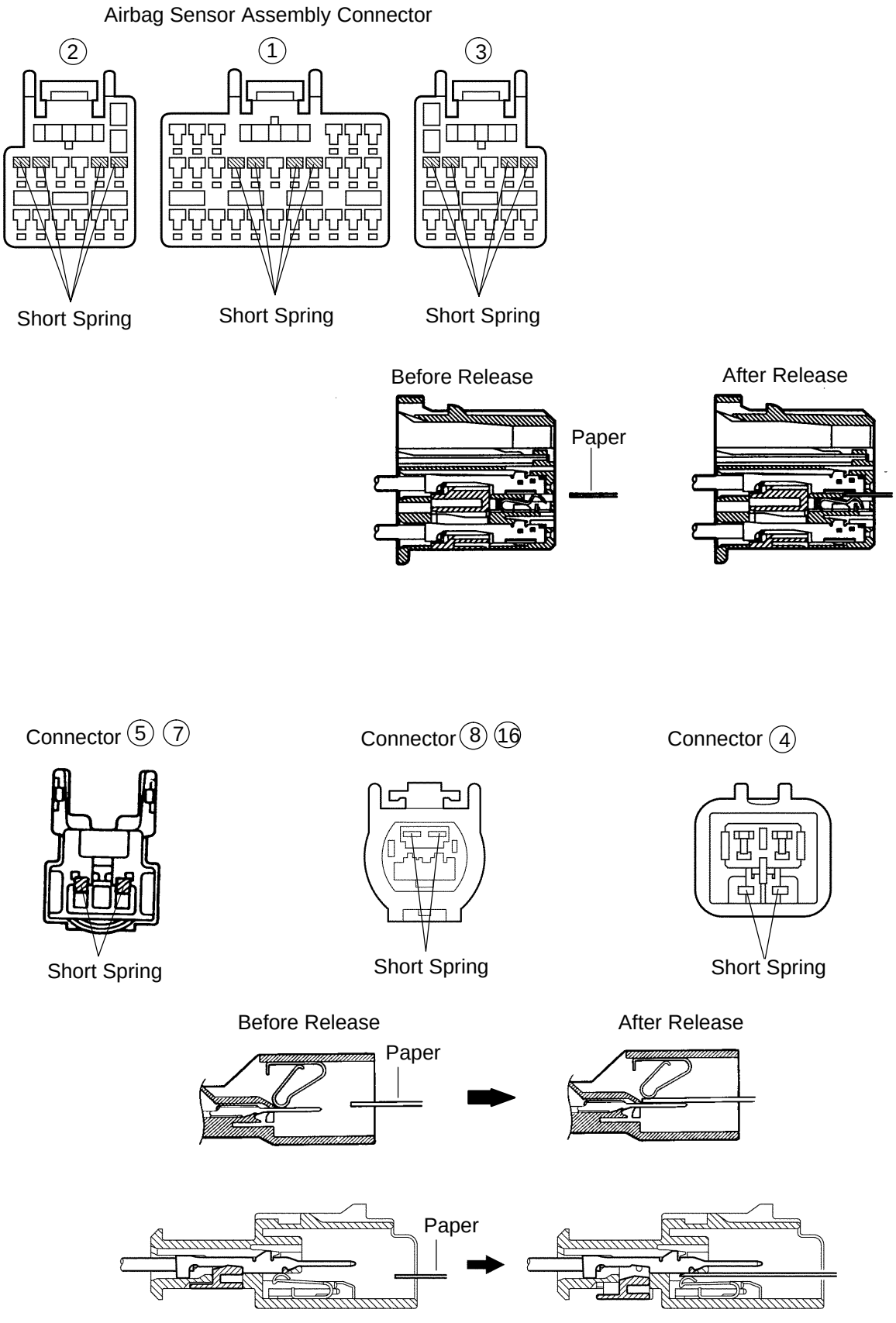
CAUTION:

Never release the airbag activation prevention mechanism unless specifically directed by the troubleshooting procedure.

NOTICE:

If the inserted paper is too thick the terminal and short spring may be damaged, so always use paper with the same thickness as the male terminal.


Airbag Sensor Assembly
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
Side Airbag Assembly (RH) (Squib)
Seat Belt Pretensioner (RH)
Side Airbag Sensor Assembly (RH)
Front Airbag Sensor (RH)
Front Passenger Airbag Assembly (Squib)
Spiral Cable
Steering Wheel Pad (Squib)
No.1 J/B
Front Airbag Sensor (LH)
Side Airbag Sensor Assembly (LH)
Seat Belt Pretensioner (LH)
Side Airbag Assembly (LH) (Squib)
H05063



H01356
H01233
AB0130 H00992
AB0045 AB0046
H02249 H02248

H01358

DI1AZ–05

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–434)	●Short in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0101/14 (DI–439)	●Open in D squib circuit	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0102/11 (DI–443)	●Short in D squib circuit (to Ground)	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0103/12 (DI–447)	●Short in D squib circuit (to B+)	●Steering wheel pad (squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness	ON
B0105/53 (DI–451)	●Short in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0106/54 (DI–455)	●Open in P squib circuit	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0107/51 (DI–458)	●Short in P squib circuit (to Ground)	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0108/52 (DI–461)	●Short in P squib circuit (to B+)	●Front passenger airbag assembly (squib) ●Airbag sensor assembly ●Wire harness	ON
B0110/43 (DI–464)	●Short in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0111/44 (DI–468)	●Open in side squib (RH) circuit	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0112/41 (DI–471)	●Short in side squib (RH) circuit (to Ground)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0113/42 (DI–474)	●Short in side squib (RH) circuit (to B+)	●Side airbag assembly RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0115/47 (DI–477)	●Short in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0116/48 (DI–481)	●Open in side squib (LH) circuit	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink

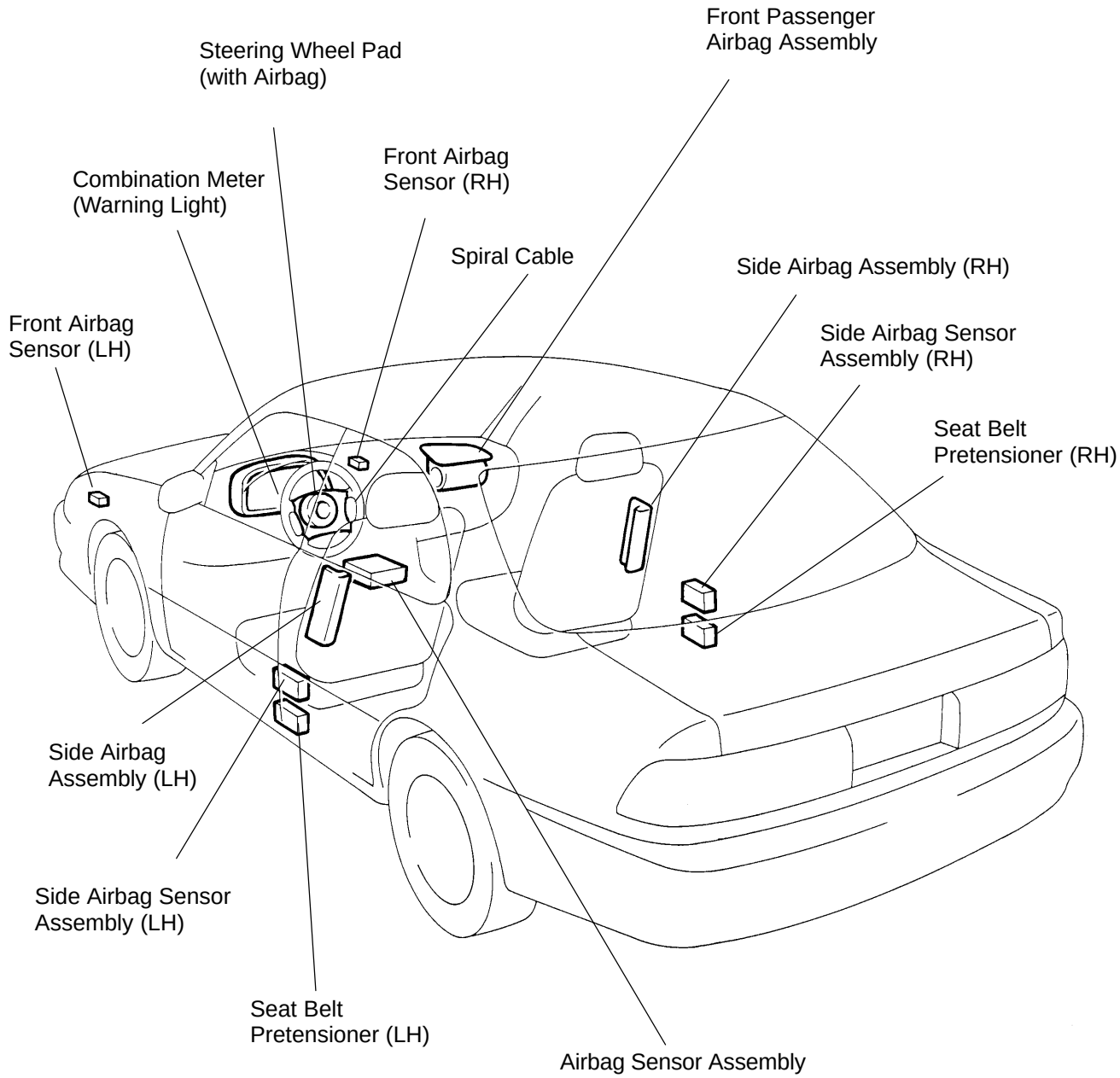
DTC No. (See Page)	Detection Item	Trouble Area	SRS Warning Light
B0117/45 (DI–484)	●Short in side squib (LH) circuit (to Ground)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0118/46 (DI–487)	●Short in side squib (LH) circuit (to B+)	●Side airbag assembly LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0130/63 (DI–490)	●Short in P/T squib (RH) circuit	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0131/64 (DI–494)	●Open in P/T squib (RH) circuit	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0132/61 (DI–497)	●Short in P/T squib (RH) circuit (to Ground)	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0133/62 (DI–500)	●Short in P/T squib (RH) circuit (to B+)	●Seat belt pretensioner RH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0135/73 (DI–503)	●Short in P/T squib (LH) circuit	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0136/74 (DI–507)	●Open in P/T squib (LH) circuit	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0137/71 (DI–510)	●Short in P/T squib (LH) circuit (to Ground)	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B0138/72 (DI–513)	●Short in P/T squib (LH) circuit (to B+)	●Seat belt pretensioner LH (squib) ●Airbag sensor assembly ●Wire harness	Blink
B1100/31 (DI–516)	●Airbag sensor assembly malfunction	●Airbag sensor assembly	ON
B1140/32 (DI–518)	●Side airbag sensor assembly (RH) malfunction	●Side airbag sensor assembly (RH) ●Airbag sensor assembly ●Wire harness	Blink
B1141/33 (DI–526)	●Side airbag sensor assembly (LH) malfunction	●Side airbag sensor assembly (LH) ●Airbag sensor assembly ●Wire harness	Blink
B1156/B1157/15 (DI–534)	●Front airbag sensor (RH) malfunction	●Front airbag sensor (RH) ●Airbag sensor assembly ●Wire harness ●Engine room main wire haness	ON
B1158/B1159/16 (DI–542)	●Front airbag sensor (LH) malfunction	●Front airbag sensor (LH) ●Airbag sensor assembly ●Wire harness	ON
Normal (DI–547)	●System normal	–	OFF
	●Voltage source drop	●Battery ●Airbag sensor assembly	ON

HINT:

- When the SRS warning light remains lit up and the DTC is the normal code, this means a voltage source drops.
  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, the codes will be displayed in numeral order starting from the lowest numbered code.
- If a code not listed on the chart is displayed, the airbag sensor assembly is faulty.

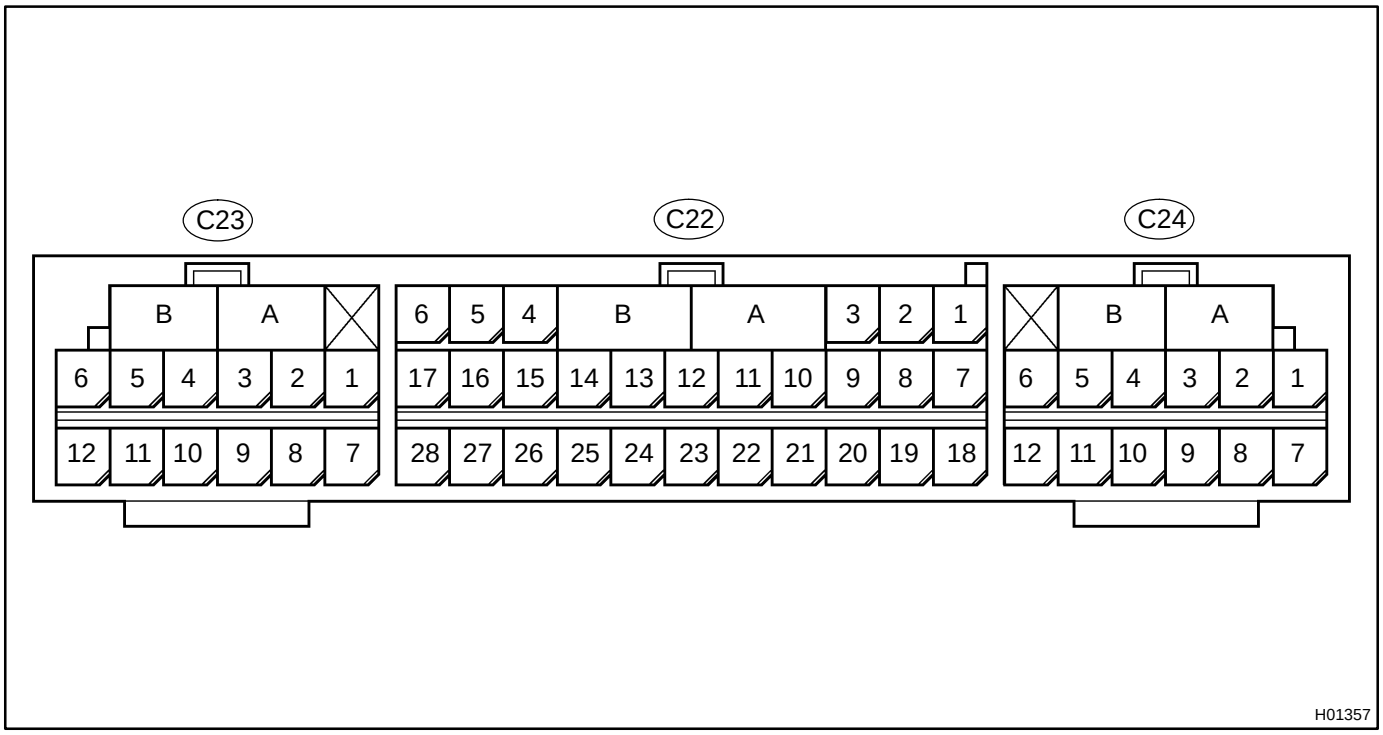
DI1B0–05

PARTS LOCATION



DI1B1–17

TERMINALS OF ECU



No.	Symbol	Terminal Name
A	–	Electrical Connector Check Mechanism
B	–	Electrical Connector Check Mechanism
C22 – 3	LA	SRS Warning Light
C22 – 5	IG2	Power Source (IGN Fuse)
C22 – 6	ACC	Power Source (CIG Fuse)
C22 – 9	SR+	Front Airbag Sensor (RH)
C22 – 10	P+	Squib (Passenger)
C22 – 11	P–	Squib (Passenger)
C22 – 12	SIL	Diagnosis
C22 – 13	D–	Squib (Driver)
C22 – 14	D+	Squib (Driver)
C22 – 15	SL+	Front Airbag Sensor (LH)
C22 – 19	Tc	Diagnosis
C22 – 20	SR–	Front Airbag Sensor (RH)
C22 – 26	SL–	Front Airbag Sensor (LH)
C22 – 27	E1	Ground
C22 – 28	E2	Ground
C23 – 1	PL–	Squib (Seat Belt Pretensioner, LH)
C23 – 2	PL+	Squib (Seat Belt Pretensioner, LH)
C23 – 5	SFL+	Squib (Side, LH)
C23 – 6	SFL–	Squib (Side, LH)
C23 – 7	ESL	Side Airbag Sensor (LH)
C23 – 9	FSL	Side Airbag Sensor (LH)
C23 – 10	SSL+	Side Airbag Sensor (LH)
C23 – 12	VUPL	Side Airbag Sensor (LH)

No.	Symbol	Terminal Name
C24 – 1	SFR–	Squib (Side, RH)
C24 – 2	SFR+	Squib (Side, RH)
C24 – 5	PR+	Squib (Seat Belt Pretensioner, RH)
C24 – 6	PR–	Squib (Seat Belt Pretensioner, RH)
C24 – 7	ESR	Side Airbag Sensor (RH)
C24 – 9	FSR	Side Airbag Sensor (RH)
C24 – 10	SSR+	Side Airbag Sensor (RH)
C24 – 12	VUPR	Side Airbag Sensor (RH)

DI164–19

PROBLEM SYMPTOMS TABLE

Proceed with troubleshooting of each circuit in the table below.

Symptom	Suspect Area	See page
●With the ignition switch at ACC or ON, the SRS warning light sometimes lights up after approx. 6 seconds have elapsed.	●SRS warning light circuit (Always lights up when ignition switch is in LOCK position.)	DI–551
●SRS warning light is always lit up even when ignition switch is in the LOCK position.		
●With the ignition switch at ACC or ON, the SRS warning light does not light up.	●SRS warning light circuit (Does not light up when ignition switch is turned to ACC or ON.)	DI–554
●DTC is not displayed.	●Tc terminal circuit	DI–558
●SRS warning light is always lit up at the time of DTC check procedure.		
●DTC is displayed without Tc and E1 terminals connection.		

DI3VE–04

CIRCUIT INSPECTION

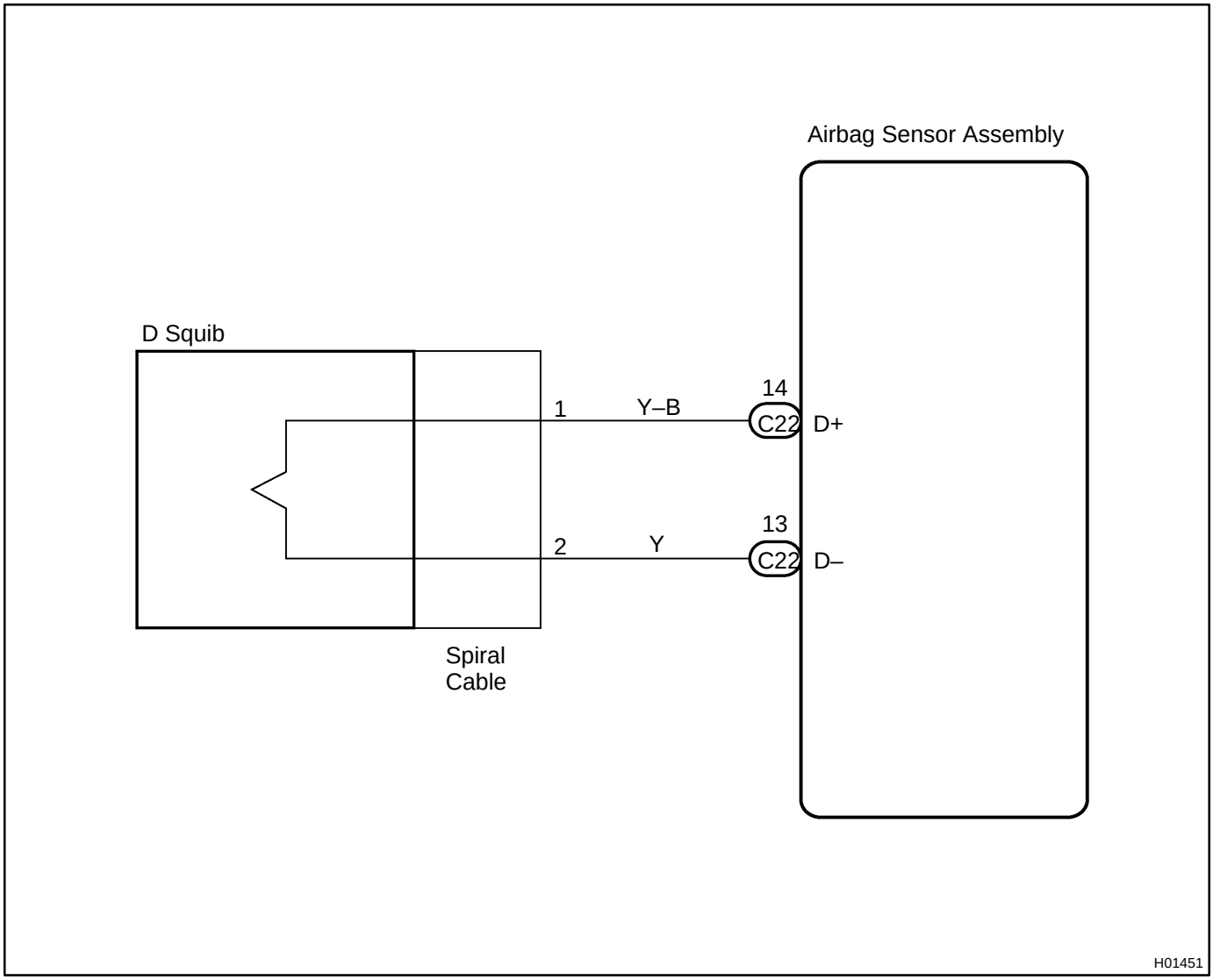
DTC	B0100/13	Short in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and 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–2.
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 circuit between D+ wire harness and D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

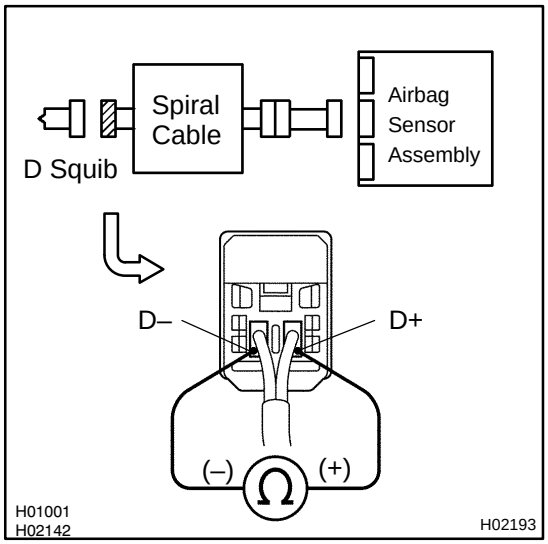
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI–547).**

2	**Check D squib circuit.**



PREPARATION:
Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the spiral cable
(See page DI–421).

CHECK:
For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

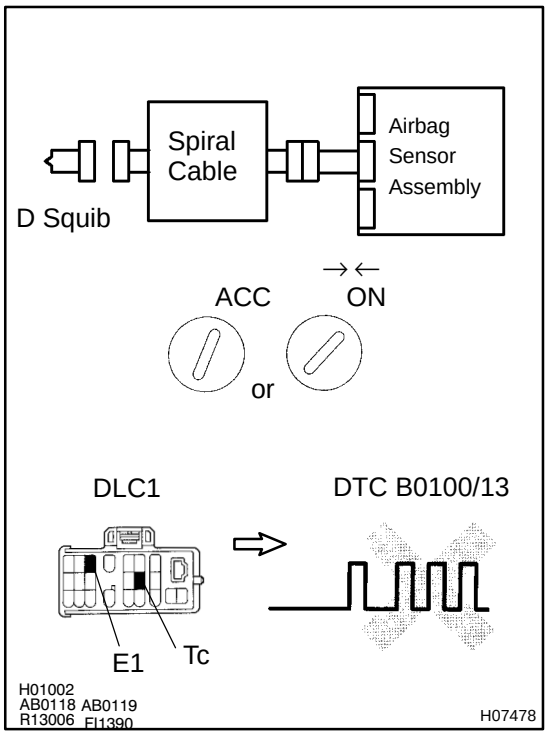
OK:

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) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory (See page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B0100/13 is not output.

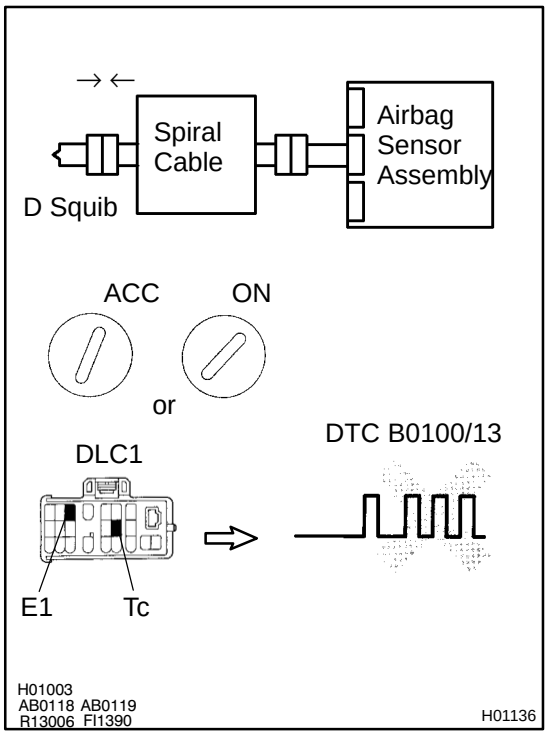
HINT:

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

4	Check D squib.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory (See page DI–421).
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC (See page DI–421).

OK:

DTC B0100/13 is not output.

HINT:

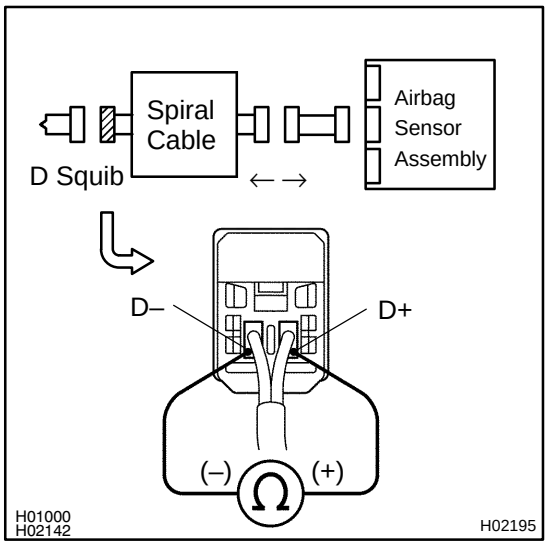
Codes other than code B0100/13 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

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:

(a) Disconnect the connector between the airbag sensor assembly and the spiral cable.

(b) Release the airbag activation prevention mechanism of the spiral cable connector on the airbag sensor assembly side (See page DI–421).

CHECK:

For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

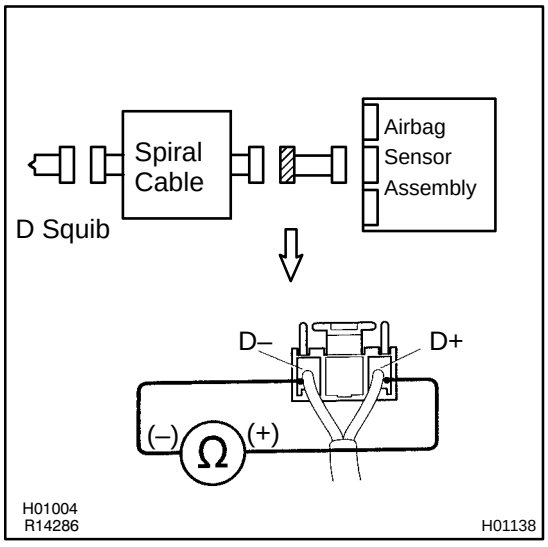
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the spiral cable (See page DI–421).

CHECK:

For the connector (on the spiral cable side) between the airbag sensor assembly and the spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between airbag sensor assembly and spiral cable.**

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.

DI3VF–04

DTC	B0101/14	Open in D Squib Circuit

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and 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–2.
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 circuit in D+ wire harness or D– wire harness of squib ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

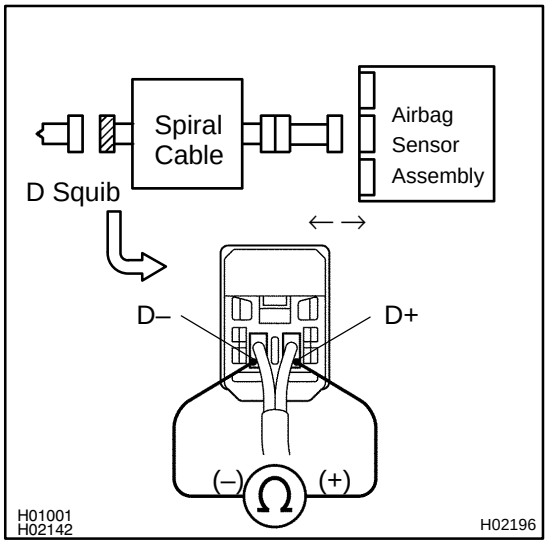
WIRING DIAGRAM

See page DI–434.

INSPECTION PROCEDURE

1	Prepare for inspection (See step 1 on page DI–547).

2	Check D squib circuit.



CHECK:

For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

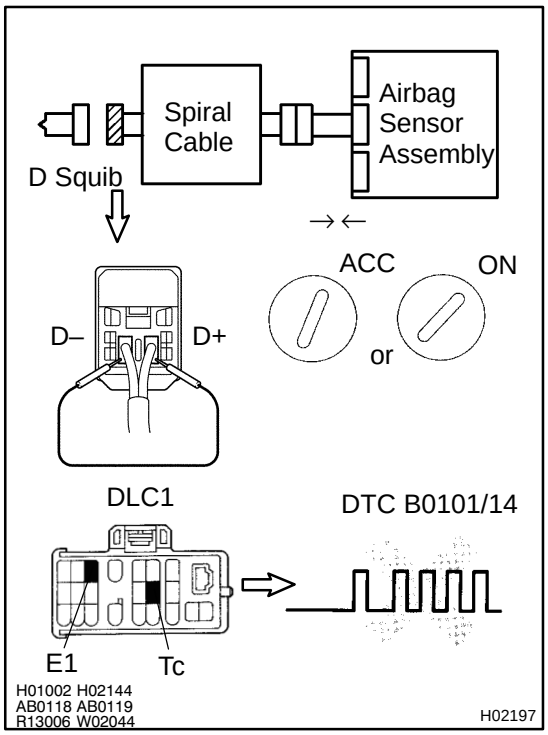
OK:

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 connector (on the spiral cable side) between the spiral cable and the steering wheel pad.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory (See page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B0101/14 is not output.

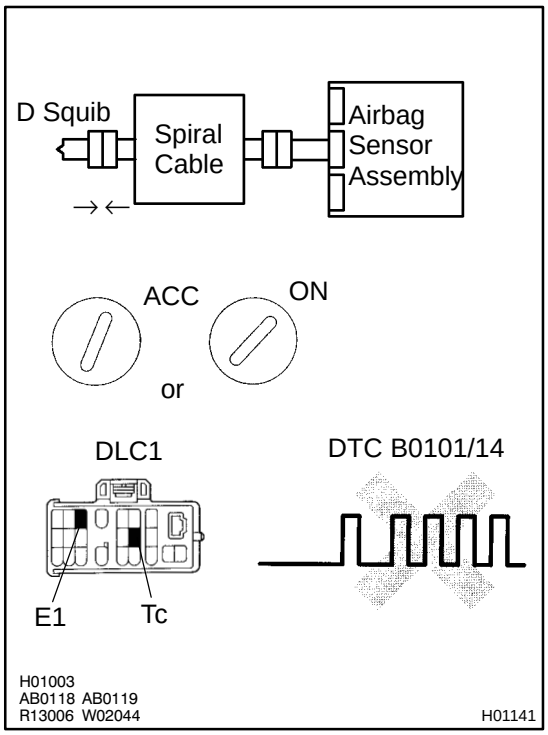
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory (See page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B0101/14 is not output.

HINT:

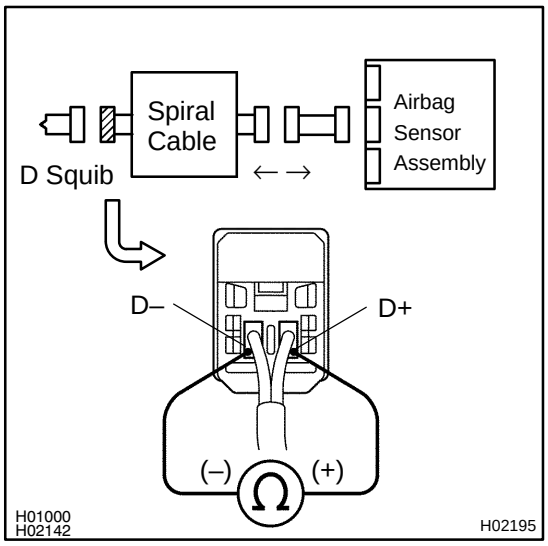
Codes other than code B0101/14 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad.

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 connector between the airbag sensor assembly and the spiral cable.

CHECK:
For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and D–.

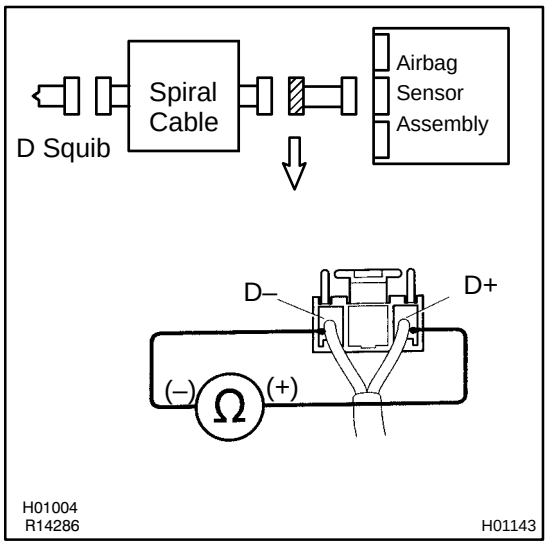
OK:

Resistance: Below 1 Ω

NG	Repair or replace spiral cable.

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:
For the connector (on the spiral cable side) between the airbag sensor assembly and the spiral cable, measure the resistance between D+ and D–.

OK:

Resistance: Below 1 Ω

NG	Repair or replace harness or connector between airbag sensor assembly and spiral cable.

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.

DI3VG–04

DTC	B0102/11	Short in D Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and 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–2.
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 circuit in D squib wire harness (to ground) ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

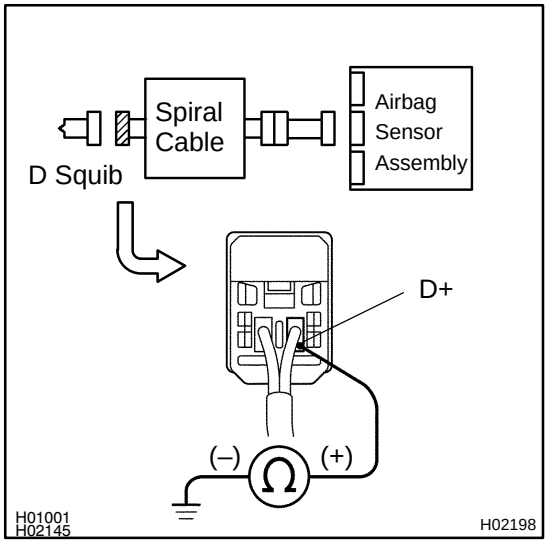
WIRING DIAGRAM

See page DI–434.

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI–547).**

2	**Check D squib circuit.**



CHECK:

For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the resistance between D+ and body ground.

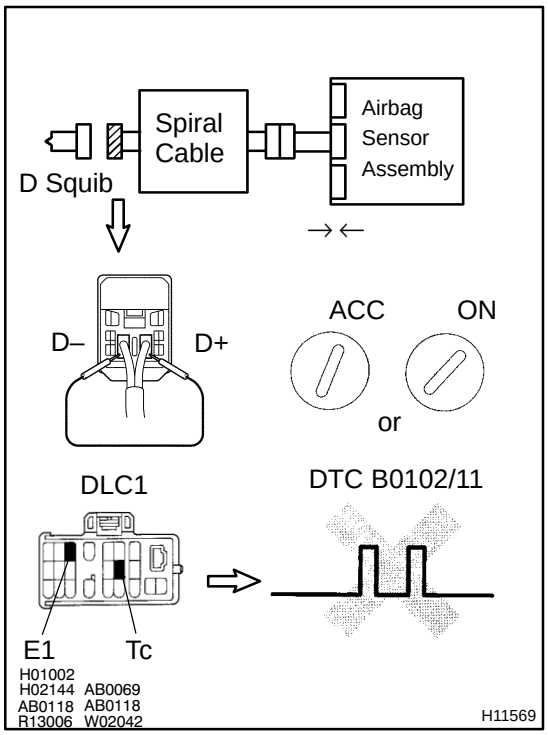
OK:

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 connector (on the spiral cable side) between the spiral cable and the steering wheel pad.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory
(See step 5 on page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

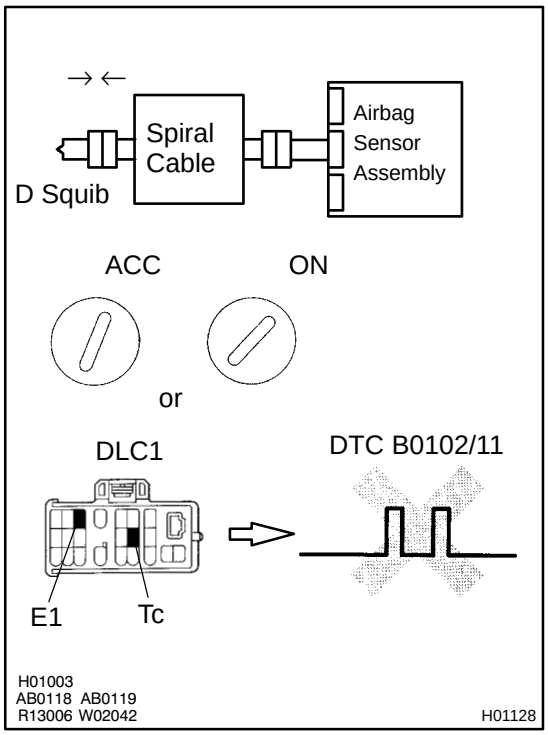
DTC B0102/11 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory
(See step 5 on page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B0102/11 is not output.

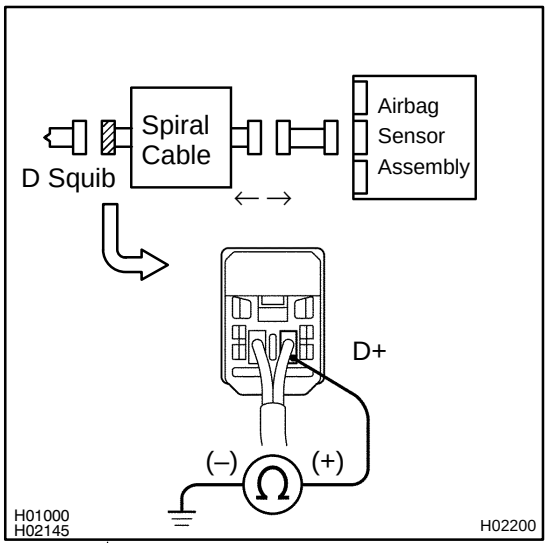
HINT:
Codes other than code B0102/11 may be output at this time, but they are not relevant to this check.

NG → **Replace steering wheel pad.**

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 connector between the airbag sensor assembly and the spiral cable.

CHECK:
For the connector (on the spiral cable side) between the steering wheel pad and the spiral cable, measure the resistance between D+ and body ground.

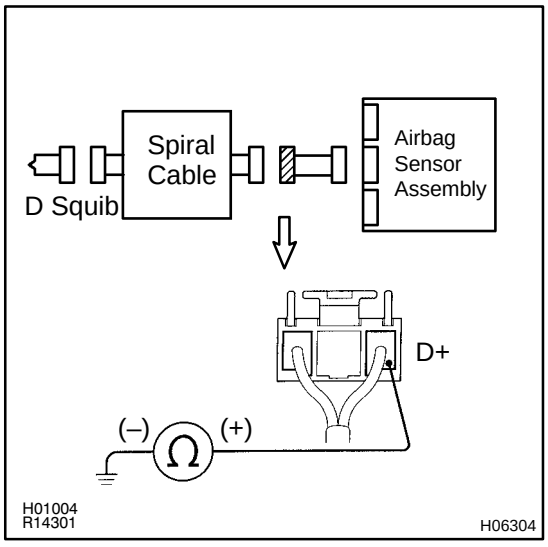
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:
For the connector (on the spiral cable side) between the spiral cable and the airbag sensor assembly, measure the resistance between D+ and body ground.

OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness between airbag sensor assembly and spiral cable.**

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.

DI3VH–04

DTC	B0103/12	Short in D Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The D squib circuit consists of the airbag sensor assembly, spiral cable and 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–2.
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 wire harness (to B+) ●D squib malfunction ●Spiral cable malfunction ●Airbag sensor assembly malfunction	●Steering wheel pad (D squib) ●Spiral cable ●Airbag sensor assembly ●Wire harness

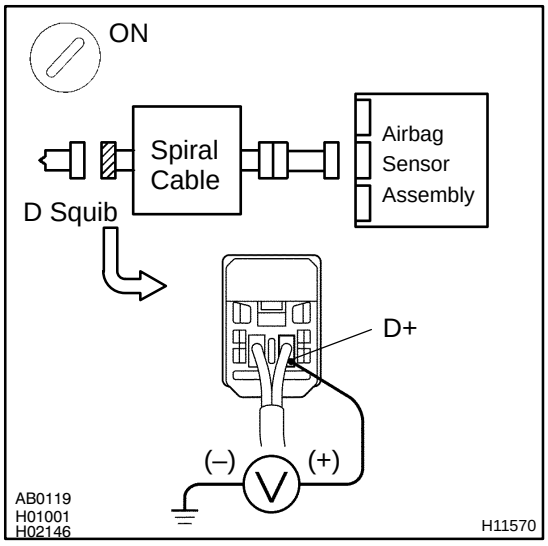
WIRING DIAGRAM

See page DI–434.

INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI–547).**

2	**Check D squib circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the voltage between D+ and body ground.

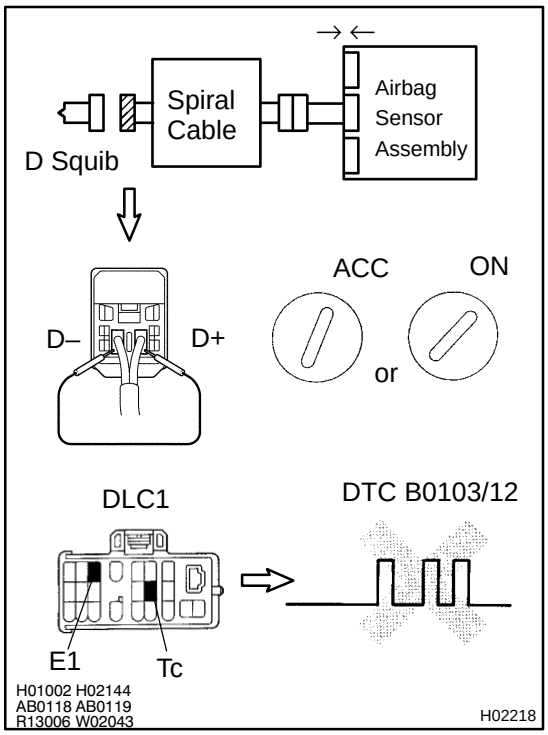
OK:

Voltage: 0 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 D+ and D– of the connector (on the spiral cable side) between the spiral cable and the steering wheel pad.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory
(See step 5 on page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

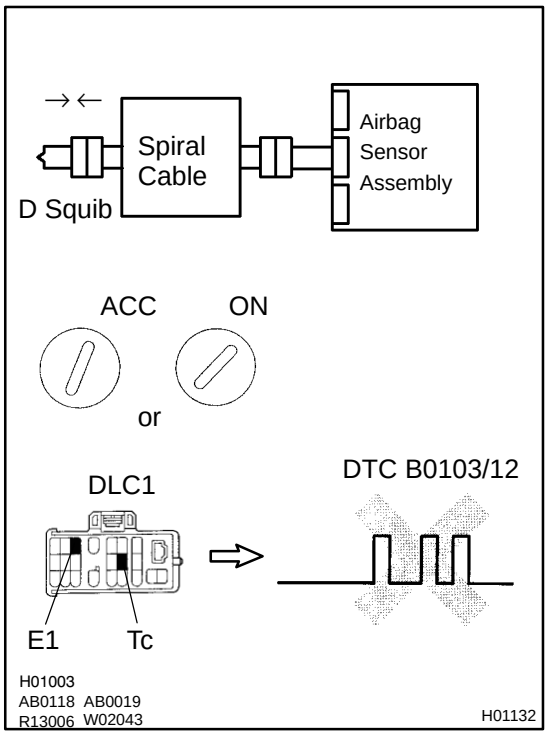
DTC B0103/12 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the steering wheel pad connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory
(See step 5 on page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B0103/12 is not output.

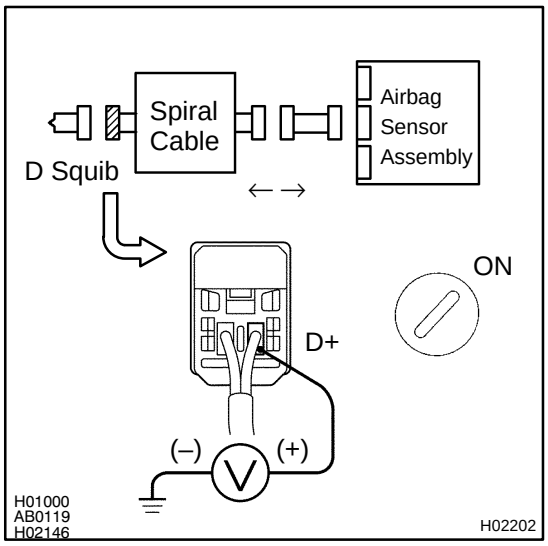
HINT:
Codes other than code B0103/12 may be output at this time, but they are not relevant to this check.

NG	Replace steering wheel pad.

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 ignition switch to LOCK.
(b) Disconnect the connector between the airbag sensor assembly and the spiral cable.

CHECK:

(a) Turn ignition switch to ON.
(b) For the connector (on the spiral cable side) between the spiral cable and the steering wheel pad, measure the voltage between D+ and body ground.

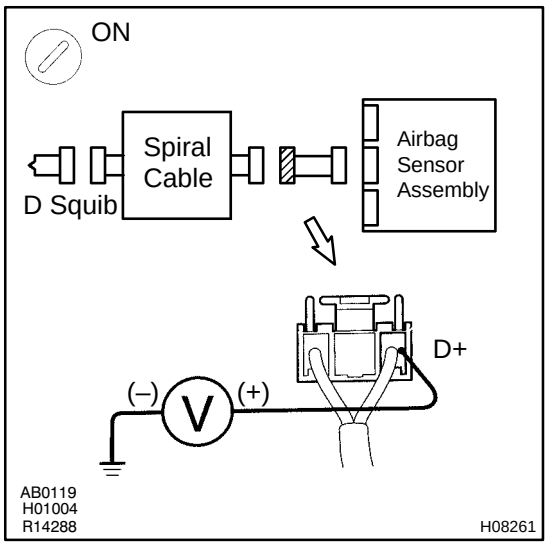
OK:

Voltage: 0 V

NG → **Repair or replace spiral cable.**

OK

6	Check harness between airbag sensor assembly and spiral cable.



CHECK:

(a) Turn ignition switch to ON.
(b) For the connector (on the spiral cable side) between the spiral cable and airbag sensor assembly, measure the voltage between D+ and body ground.

OK:

Voltage: 0 V

NG → **Repair or replace harness between airbag sensor assembly and spiral cable.**

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.

DI1B6–13

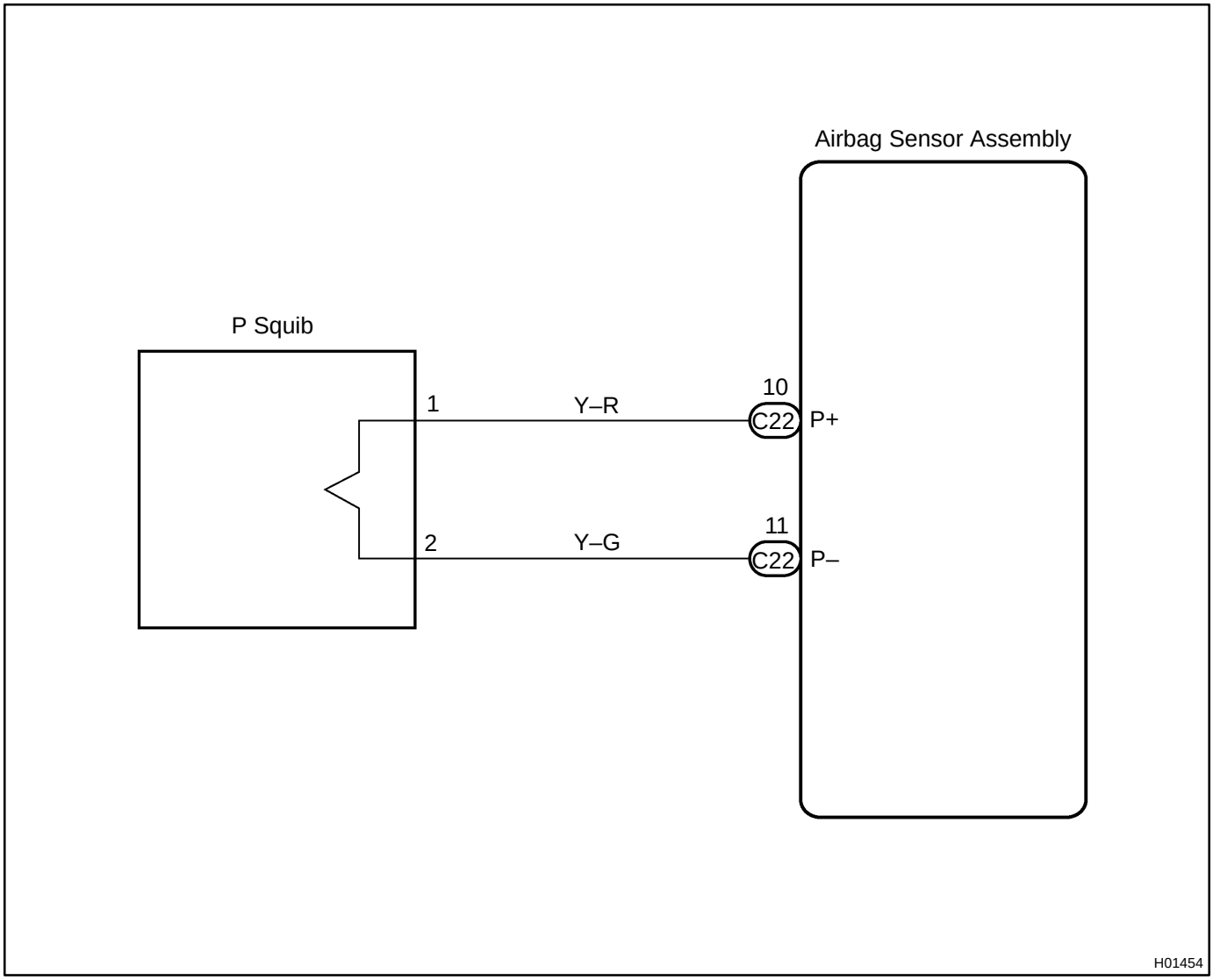
DTC	B0105/53	Short in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in P squib wire harness ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

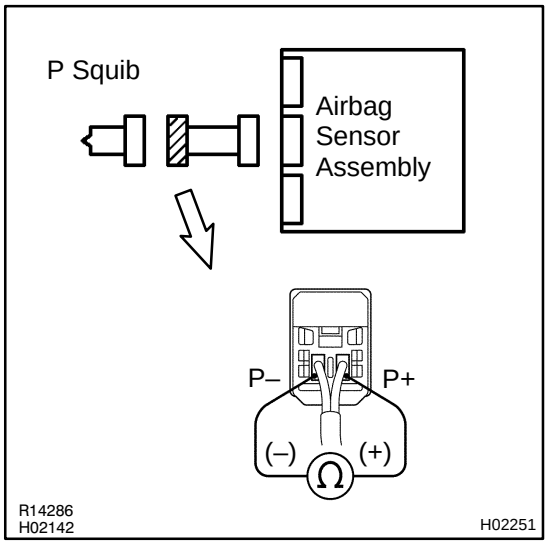
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P squib circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the front passenger airbag assembly and the airbag sensor assembly. (See page DI–421)

CHECK:

For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and P–.

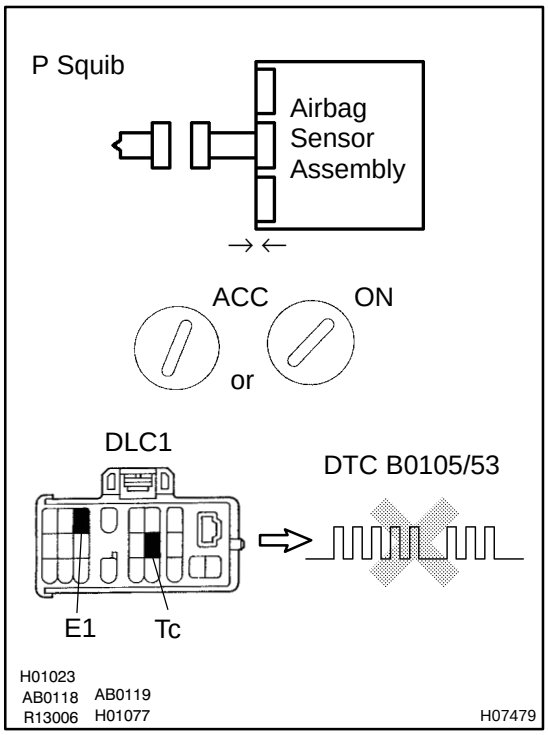
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

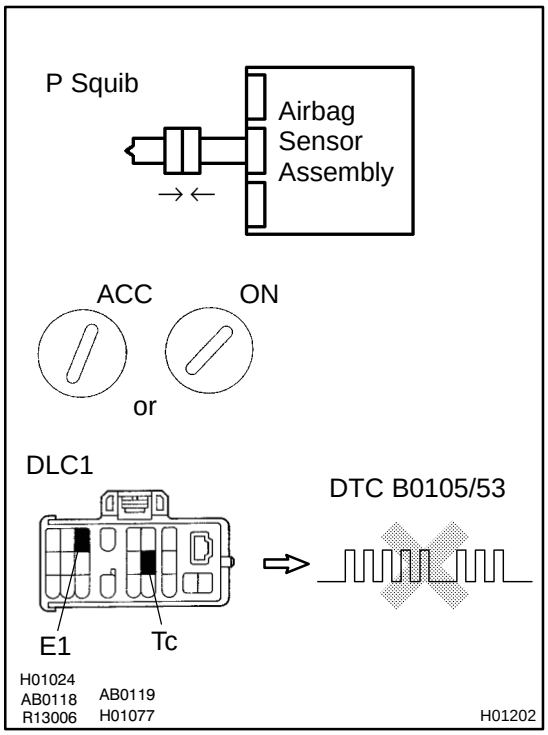
DTC B0105/53 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 seconds.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–421)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–421)

OK:

DTC B0105/53 is not output.

HINT:
Codes other than code B0105/53 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly.**

OK

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.

DI1B7–18

DTC	B0106/54	Open in P Squib Circuit

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in P+ wire harness or P– wire harness of squib ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

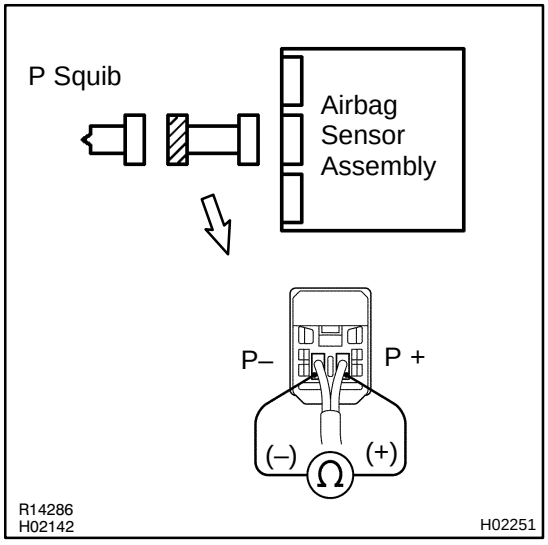
WIRING DIAGRAM

See page DI–451.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P squib circuit.**



CHECK:

For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and P–.

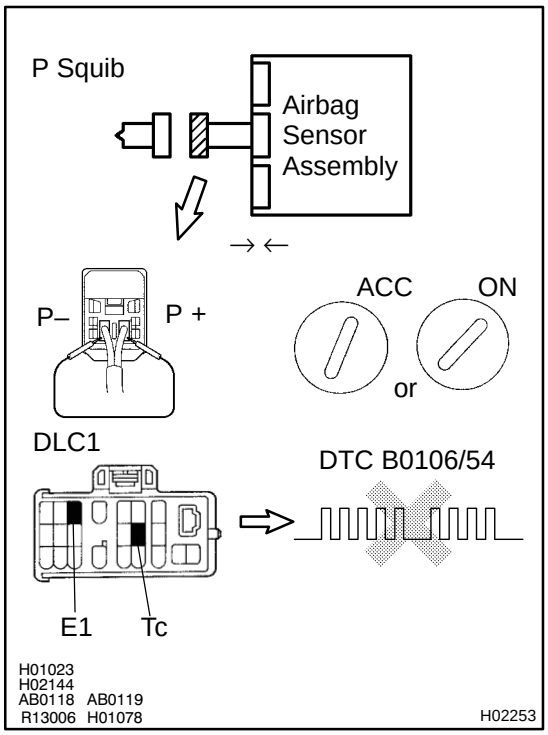
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

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 connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0106/54 is not output.

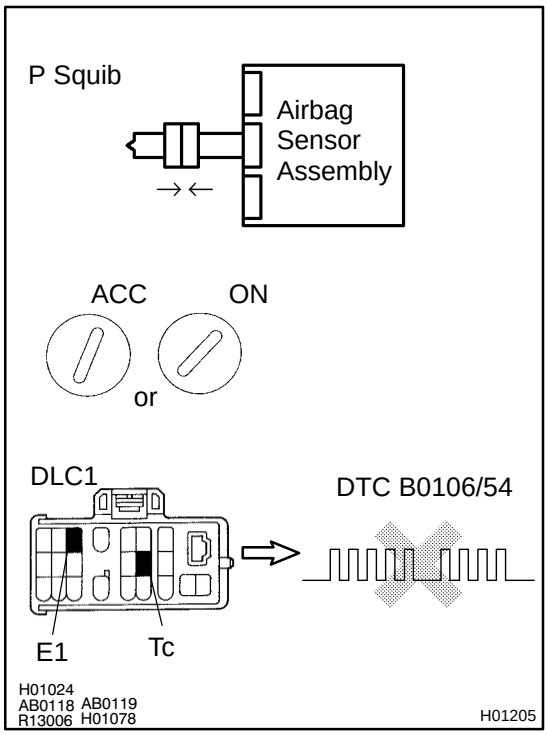
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B0106/54 is not output.

HINT:
Codes other than code B0106/54 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly.**

OK

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	B0107/51	Short in P Squib Circuit (to Ground)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and 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–2.
DTC B0107/51 is recorded when a ground short is detected in the P squib circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0107/51	●Short circuit in P squib wire harness (to ground) ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

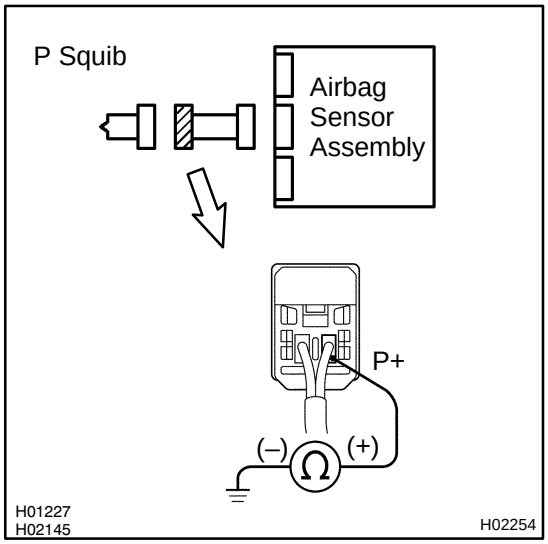
WIRING DIAGRAM

See page DI–451.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P squib circuit.**



CHECK:

For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the resistance between P+ and body ground.

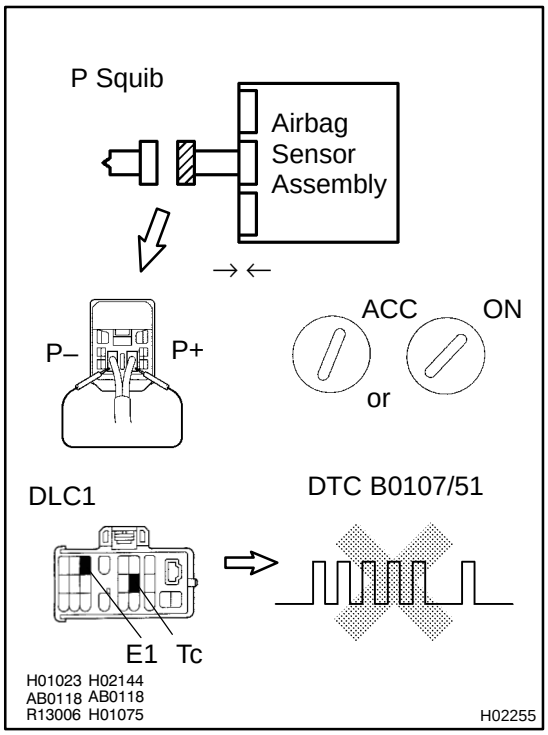
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

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 connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0107/51 is not output.

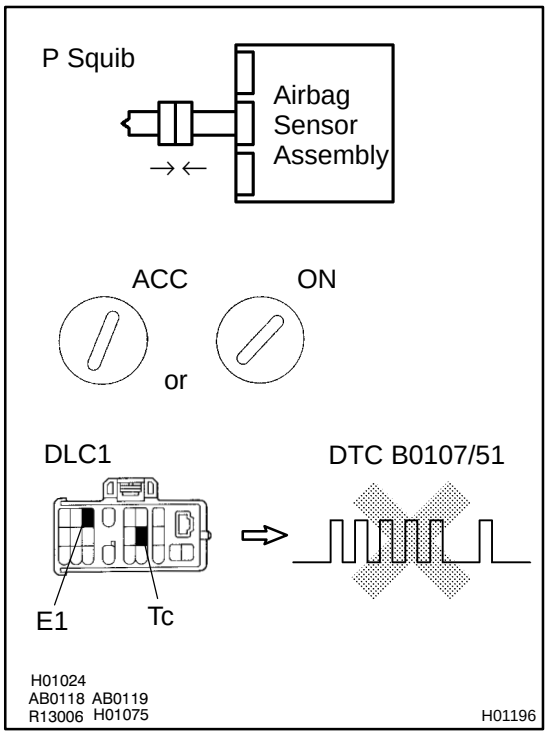
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See stpe 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B0107/51 is not output.

HINT:
Codes other than code B0107/51 may be output at this time, but they are not relevant to this check.

NG → **Replace front passenger airbag assembly.**

OK

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.

DI1B9–17

DTC	B0108/52	Short in P Squib Circuit (to B+)

CIRCUIT DESCRIPTION

The P squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in P squib wire harness (to B+) ●P squib malfunction ●Airbag sensor assembly malfunction	●Front passenger airbag assembly (P squib) ●Airbag sensor assembly ●Wire harness

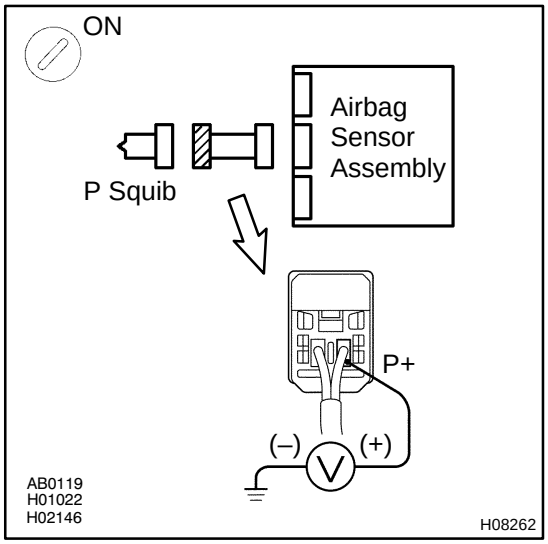
WIRING DIAGRAM

See page DI–451.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P squib circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly, measure the voltage between the P+ and body ground.

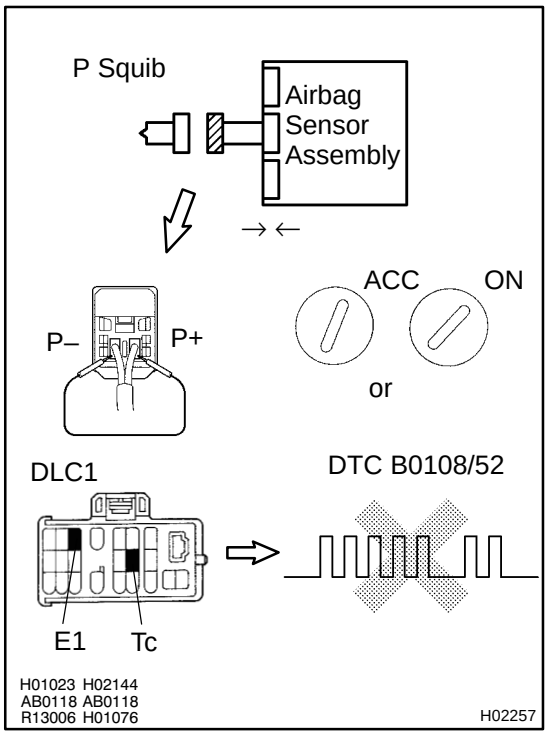
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between front passenger airbag assembly and airbag sensor assembly.**

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 connector (on the front passenger airbag assembly side) between the front passenger airbag assembly and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0108/52 is not output.

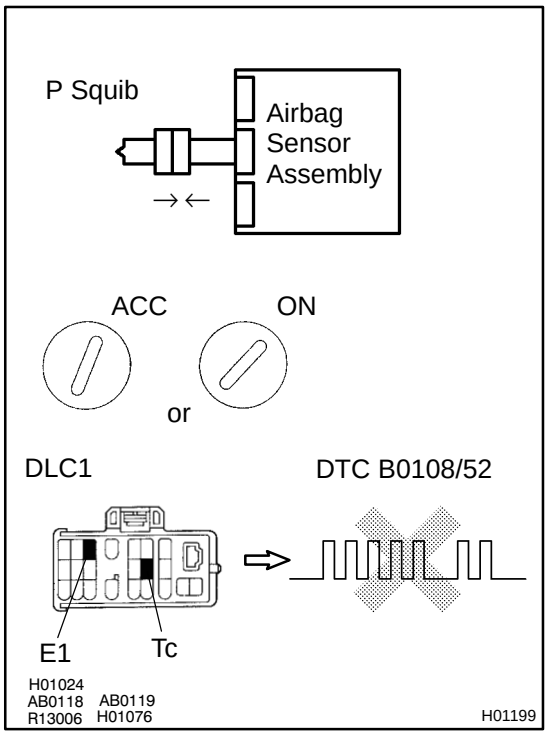
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front passenger airbag assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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.**

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.

DI1NC–07

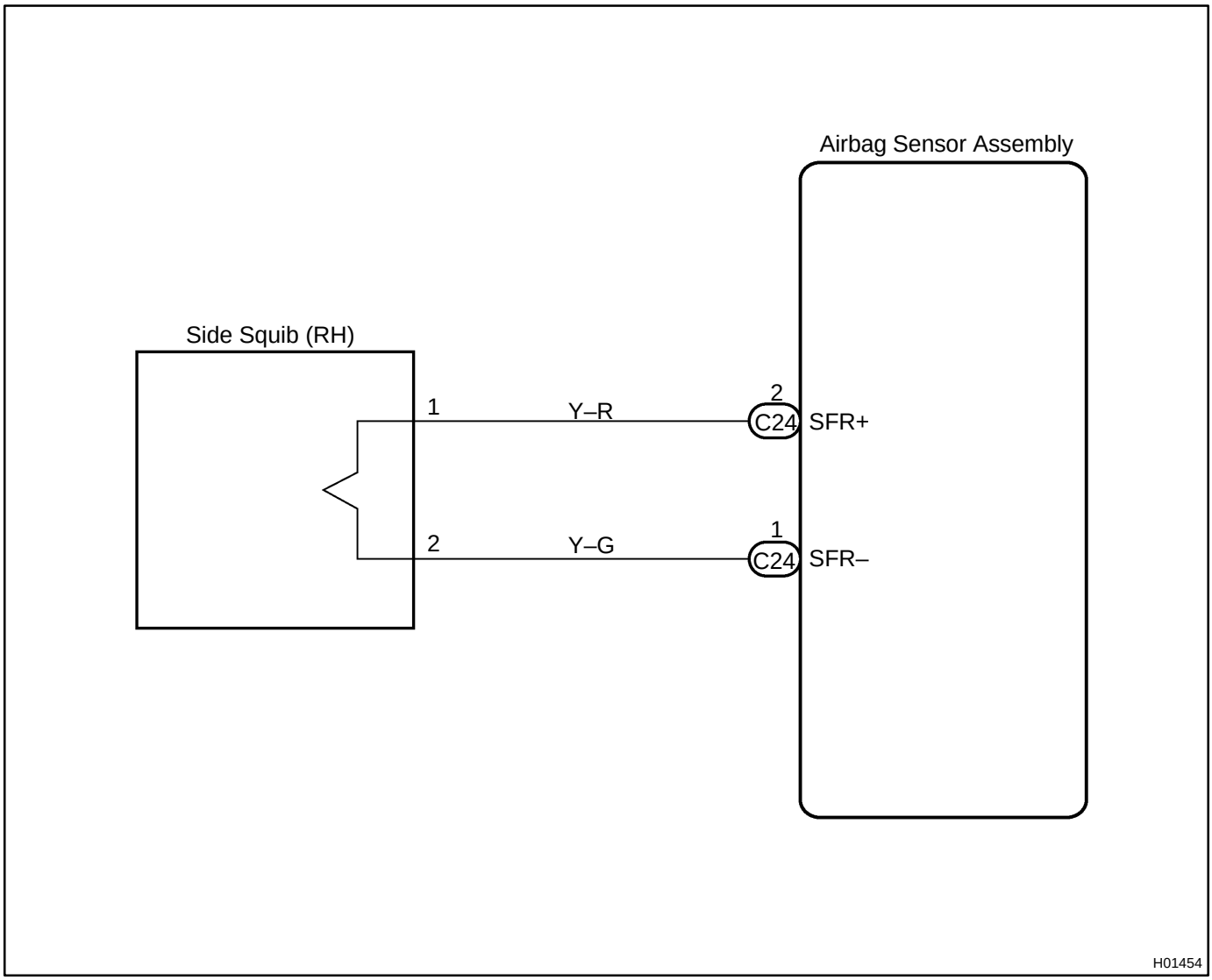
DTC	B0110/43	Short in Side Squib (RH) Circuit

CIRCUIT DESCRIPTION

The side squib (RH) circuit consists of the airbag sensor assembly and 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–2.
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 circuit between SFR+ wire harness and SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

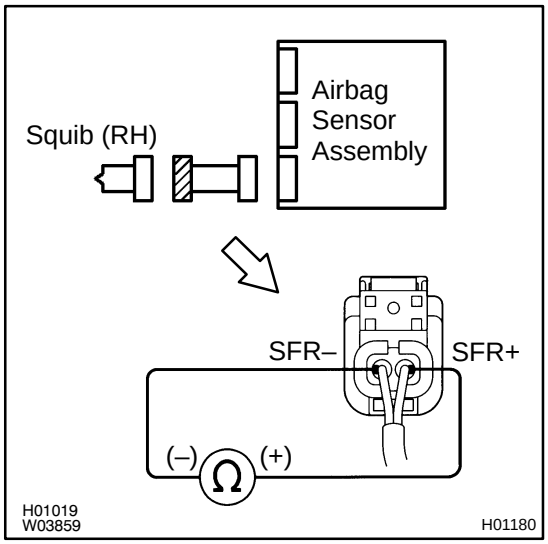
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (RH) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (RH). (See page DI–421)

CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.

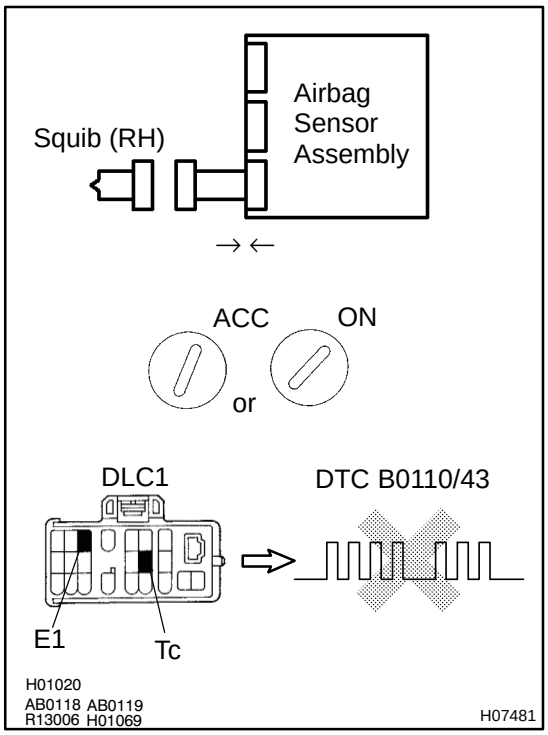
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0110/43 is not output.

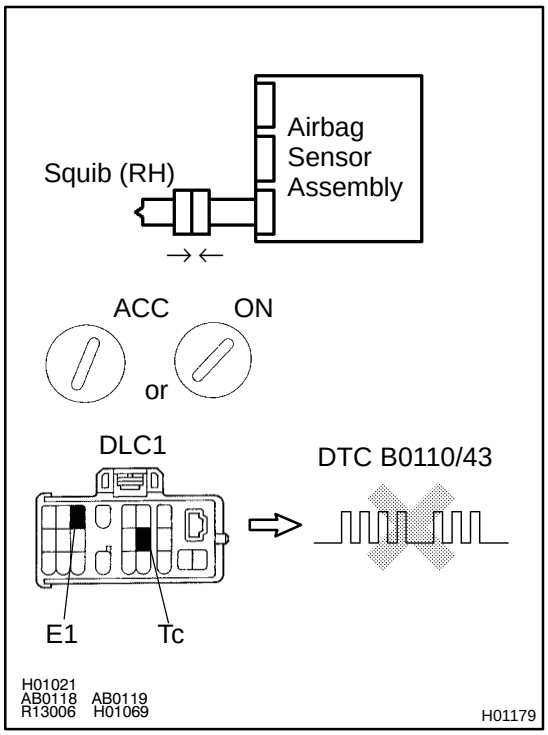
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–421)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–421)

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).**

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	B0111/44	Open in Side Squib (RH) Circuit

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in SFR+ wire harness or SFR– wire harness of squib ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

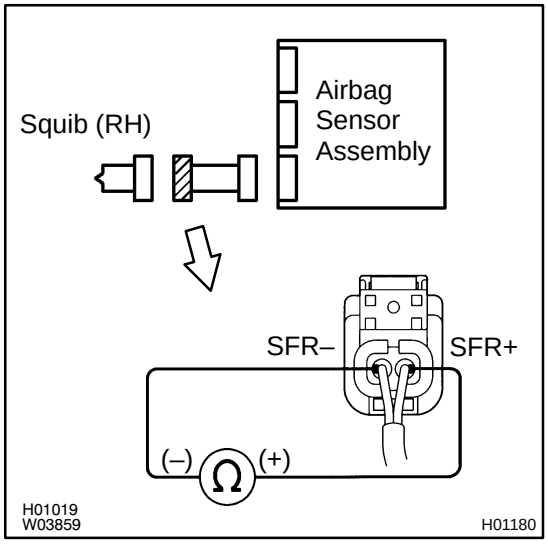
WIRING DIAGRAM

See page DI–464.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (RH) circuit.**



CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and SFR–.

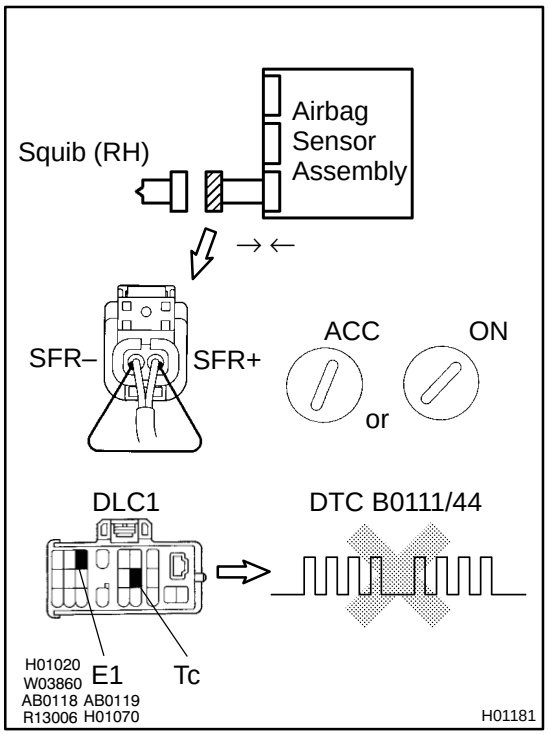
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0111/44 is not output.

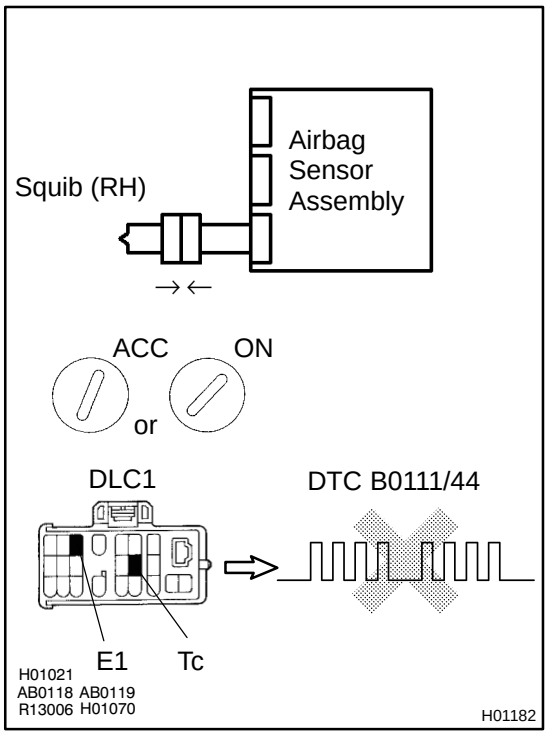
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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 circuit consists of the airbag sensor assembly and 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–2.
DTC B0112/41 is recorded when a ground short is detected in the side squib (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0112/41	●Short circuit in side squib (RH) wire harness (to ground) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

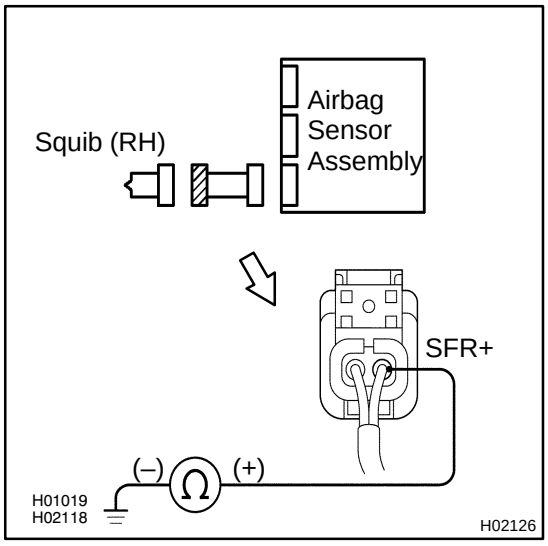
WIRING DIAGRAM

See page DI–464.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (RH) circuit.**



CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the resistance between SFR+ and body ground.

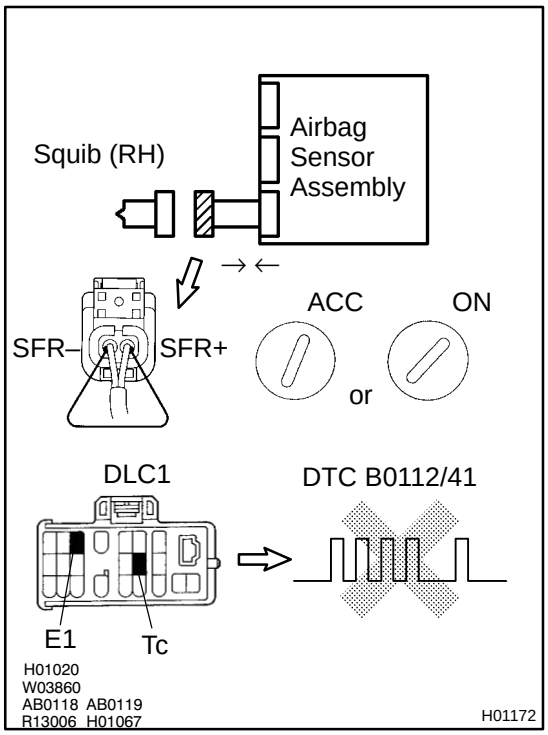
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0112/41 is not output.

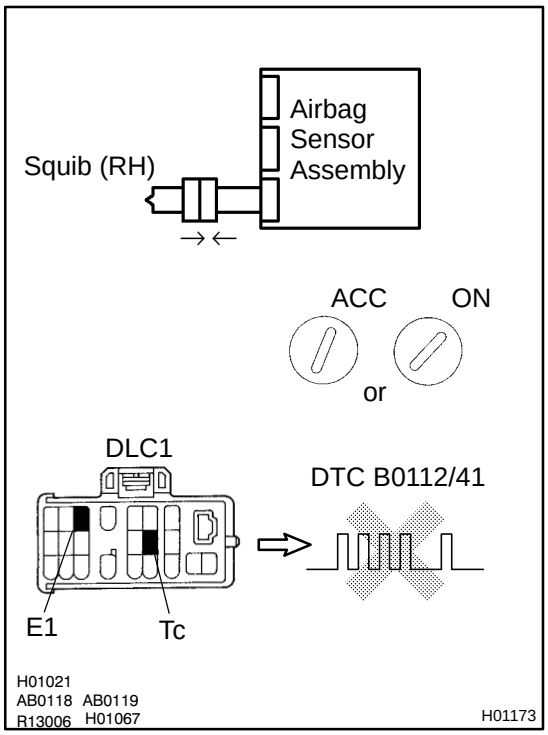
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

DI1NF–07

DTC	B0113/42	Short in Side Squib (RH) Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in side squib (RH) wire harness (to B+) ●Side squib (RH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (RH) ●Airbag sensor assembly ●Wire harness

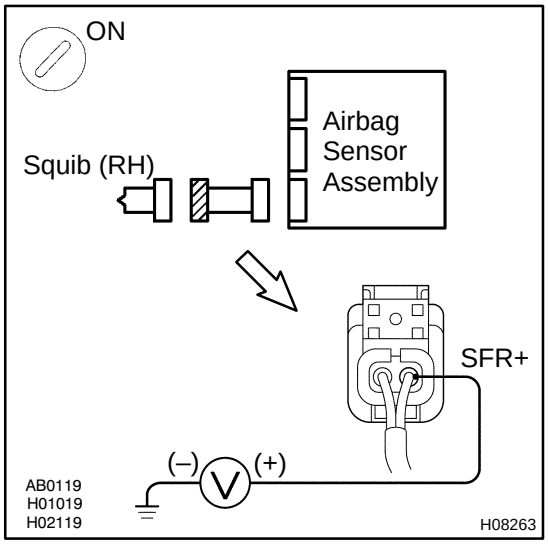
WIRING DIAGRAM

See page DI–464.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (RH) circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag assembly (RH) and the airbag sensor assembly, measure the voltage between SFR+ and body ground.

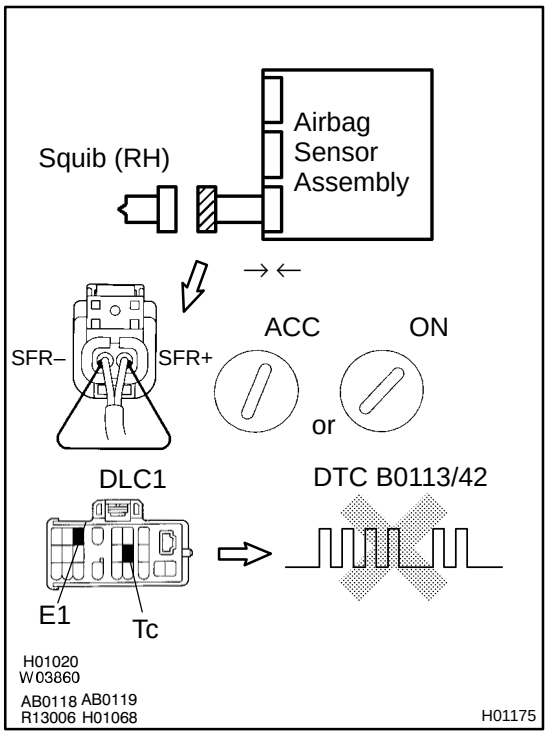
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag assembly (RH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0113/42 is not output.

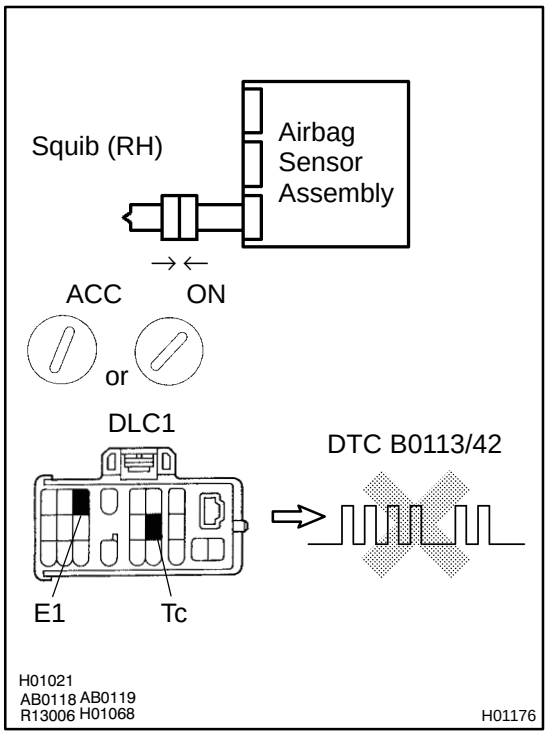
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

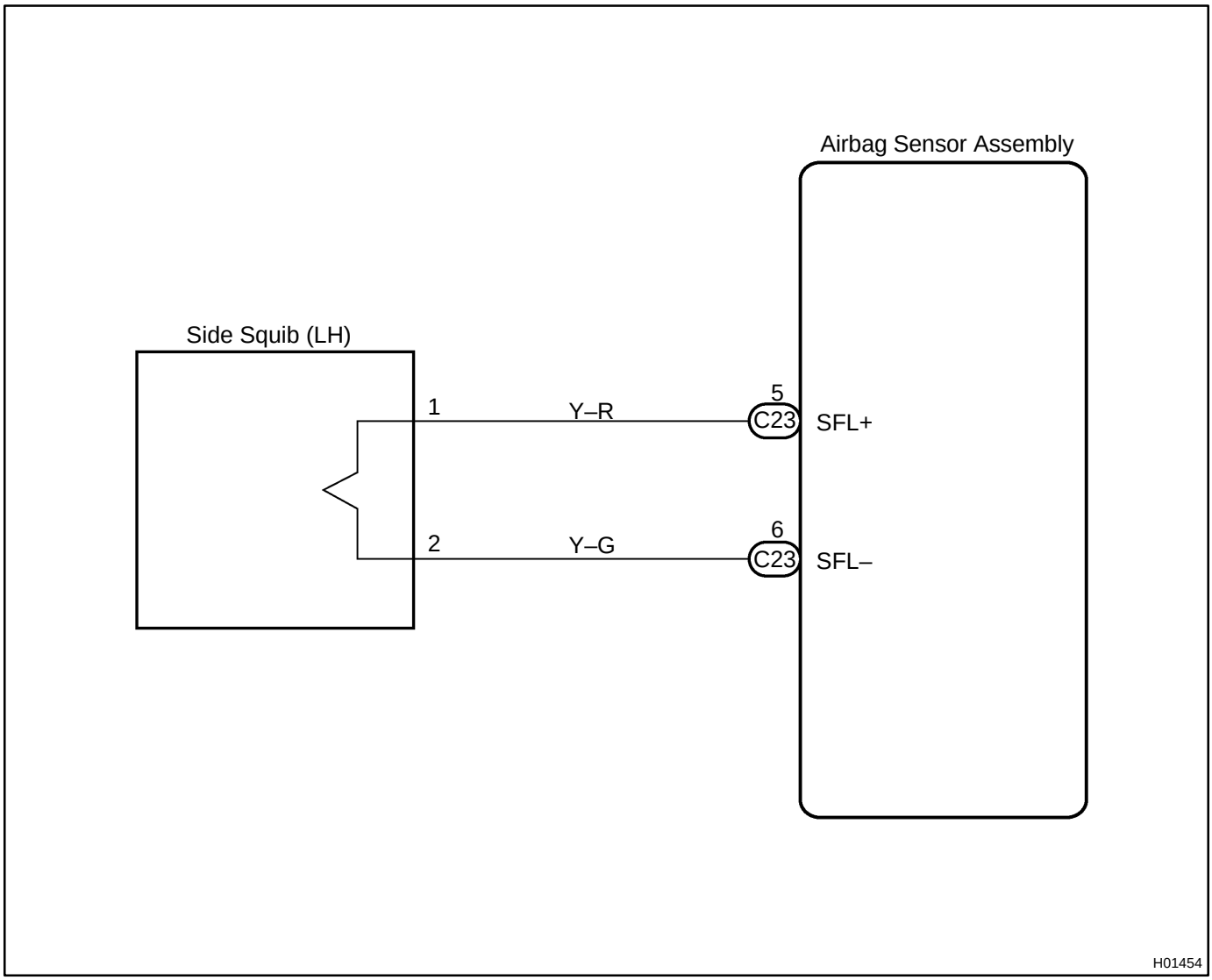
DTC	B0115/47	Short in Side Squib (LH) Circuit

CIRCUIT DESCRIPTION

The side squib (LH) circuit consists of the airbag sensor assembly and 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–2.
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 circuit between SFL+ wire harness and SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

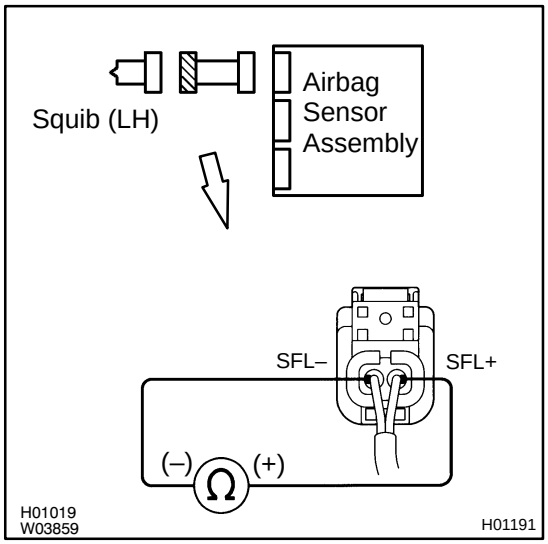
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (LH) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the side airbag assembly (LH). (See page DI–421)

CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.

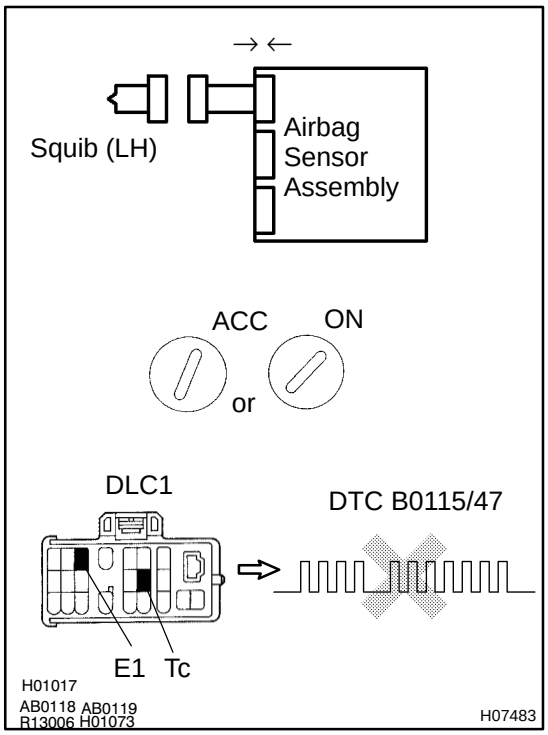
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.

(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0115/47 is not output.

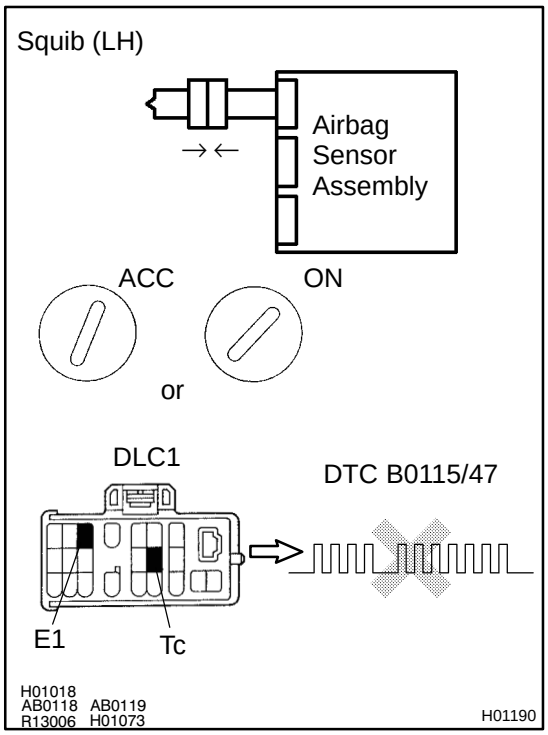
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–421)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–421)

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).**

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.

DI1NH–07

DTC	B0116/48	Open in Side Squib (LH) Circuit

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in SFL+ wire harness or SFL– wire harness of squib ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

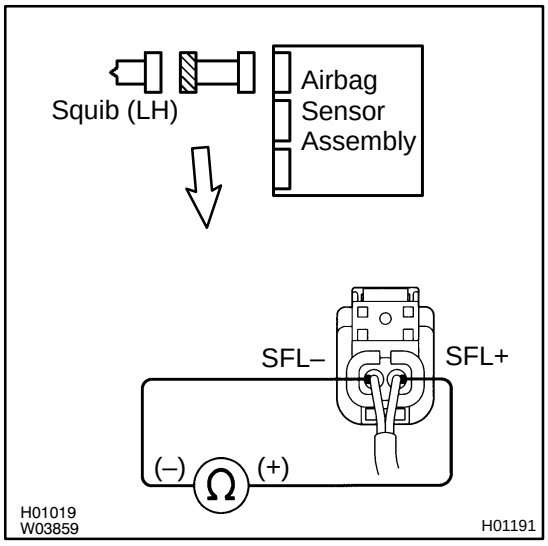
WIRING DIAGRAM

See page DI–477.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (LH) circuit.**



CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and SFL–.

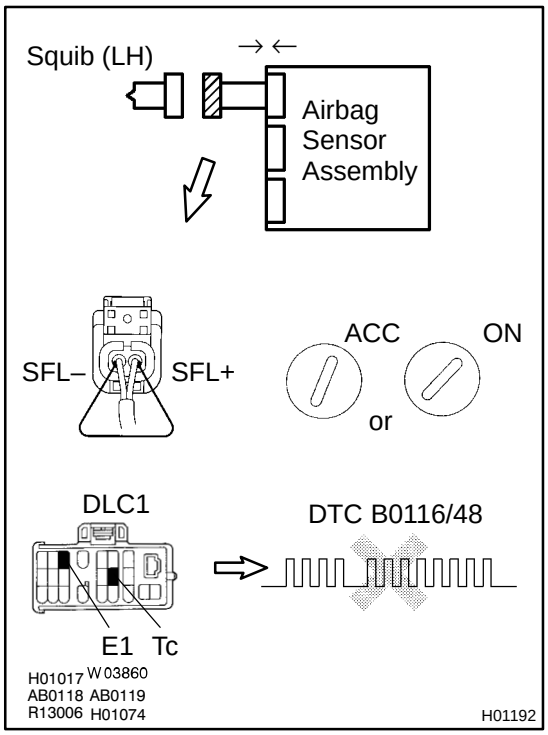
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0116/48 is not output.

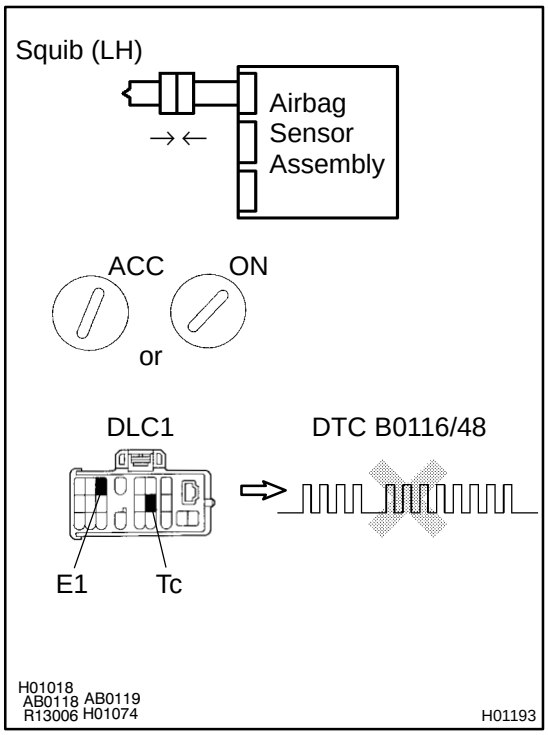
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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	B0117/45	Short in Side Squib (LH) Circuit (to Ground)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and 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–2.
DTC B0117/45 is recorded when a ground short is detected in the side squib (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B0117/45	●Short circuit in side squib (LH) wire harness (to ground) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

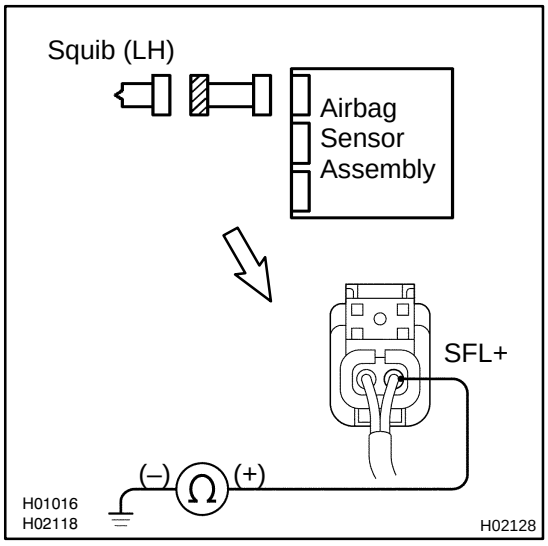
WIRING DIAGRAM

See page DI–477.

INSPECTION PROCEDURE

1	Prepare for inspection. (See step 1 on page DI–547)

2	Check side squib (LH) circuit.



CHECK:

For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the resistance between SFL+ and body ground.

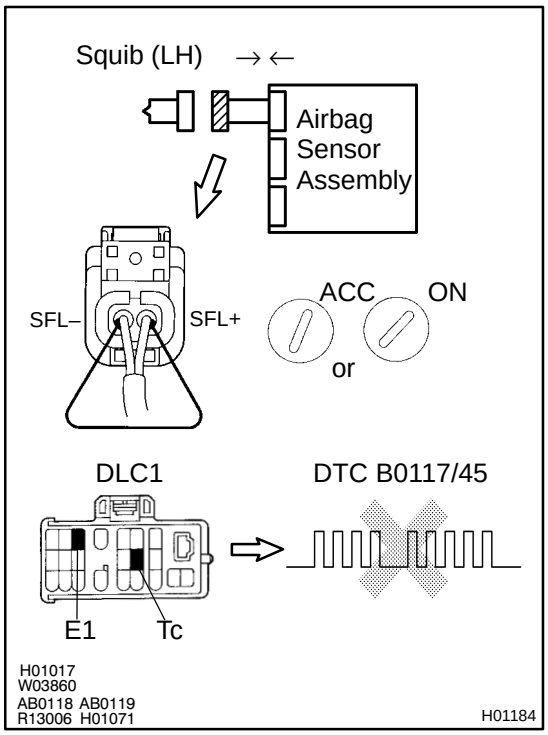
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0117/45 is not output.

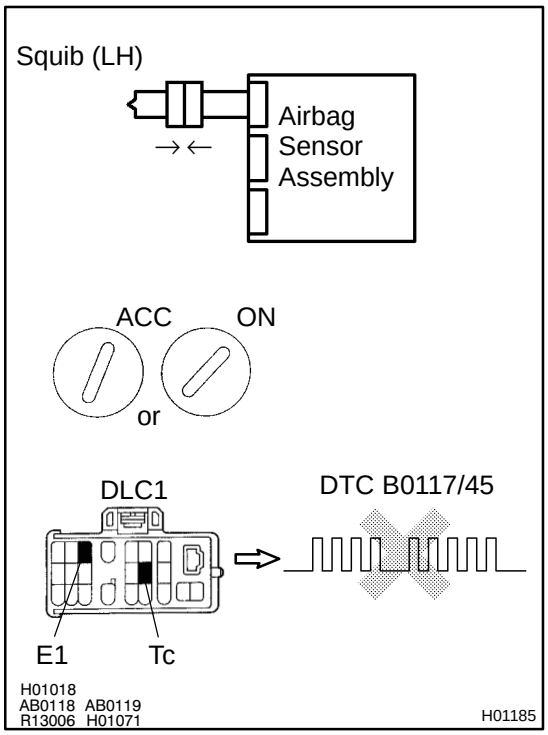
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

DI1NJ–07

DTC	B0118/46	Short in Side Squib (LH) Circuit (to B+)

CIRCUIT DESCRIPTION

The side squib circuit consists of the airbag sensor assembly and 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–2.
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 circuit in side squib (LH) wire harness (to B+) ●Side squib (LH) malfunction ●Airbag sensor assembly malfunction	●Side airbag assembly (LH) ●Airbag sensor assembly ●Wire harness

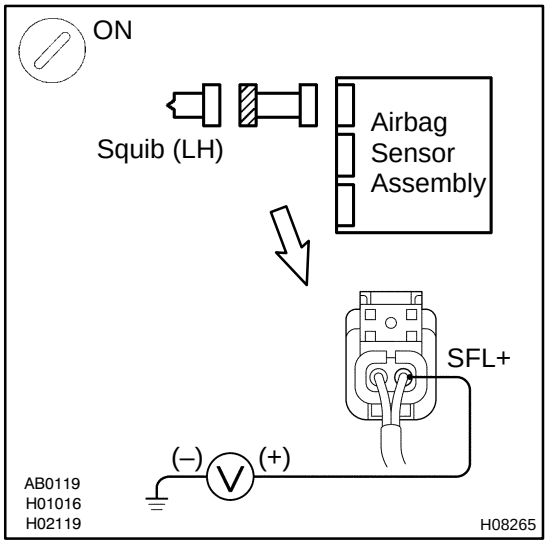
WIRING DIAGRAM

See page DI–477.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check side squib (LH) circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly, measure the voltage between SFL+ and body ground.

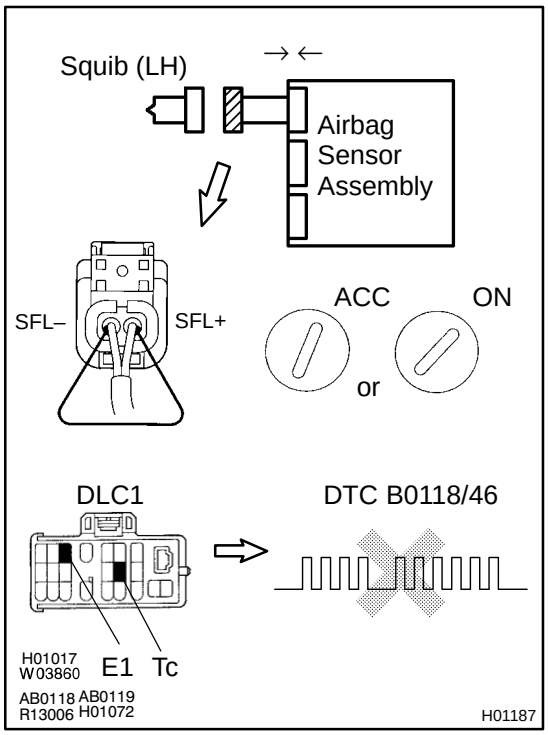
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag assembly (LH) and airbag sensor assembly.**

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 connector (on the side airbag assembly side) between the side airbag assembly (LH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0118/46 is not output.

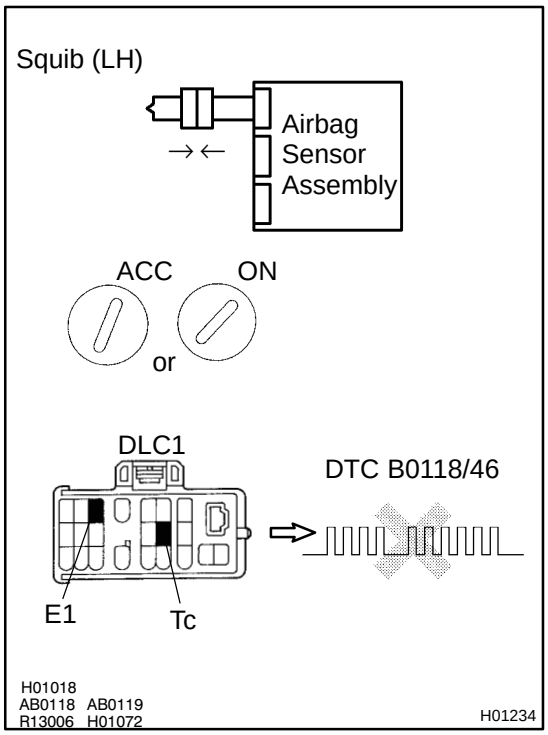
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

DI16S–18

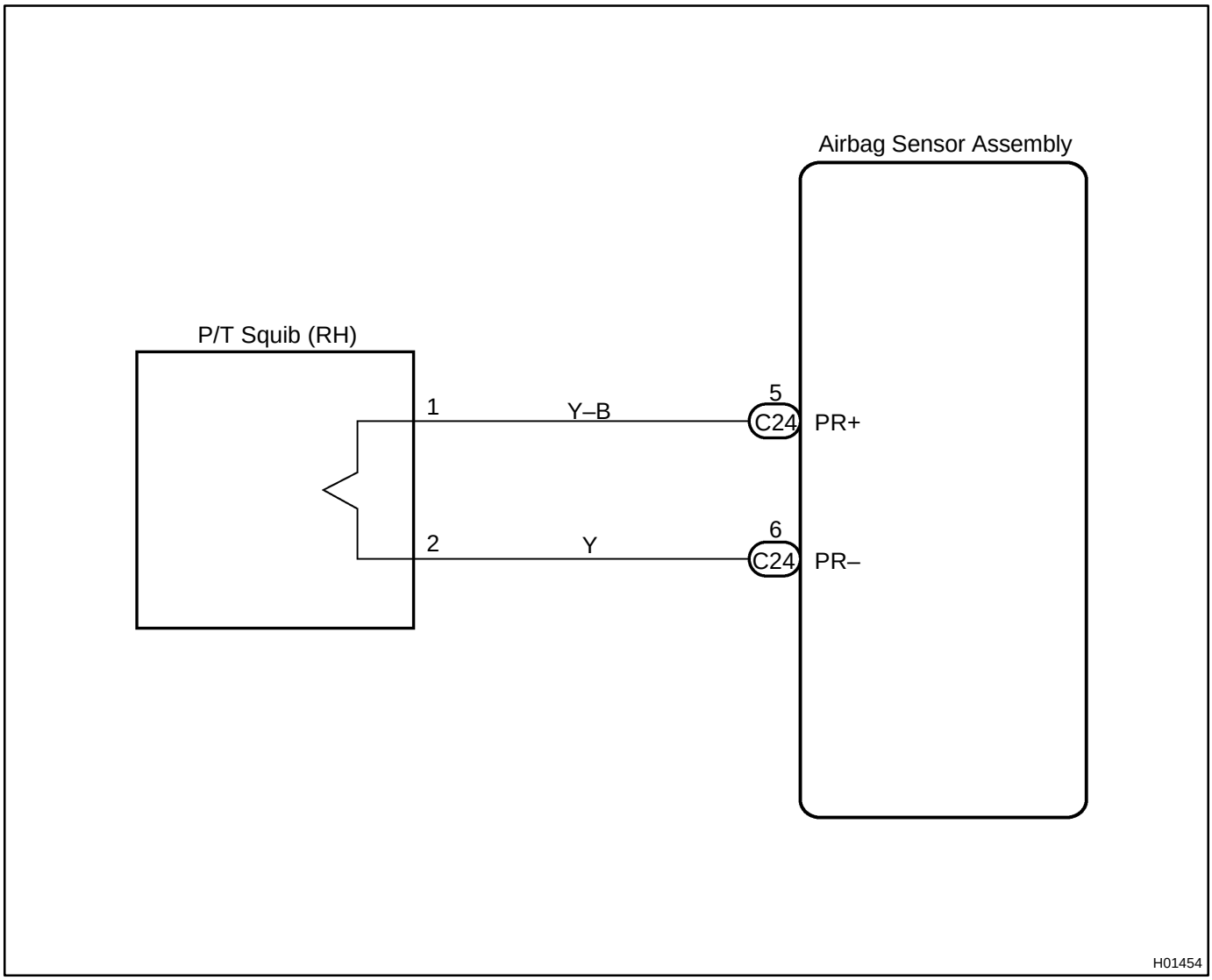
DTC	B0130/63	Short in P/T Squib (RH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (RH) circuit consists of the airbag sensor assembly and 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–2.
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 circuit between PR+ wire harness and PR– wire harness of squib ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

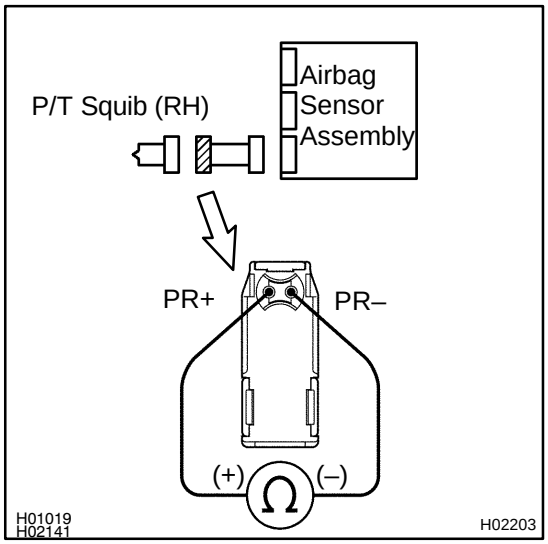
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (RH) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the seat belt pretensioner (RH). (See page DI–421)

CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and PR–.

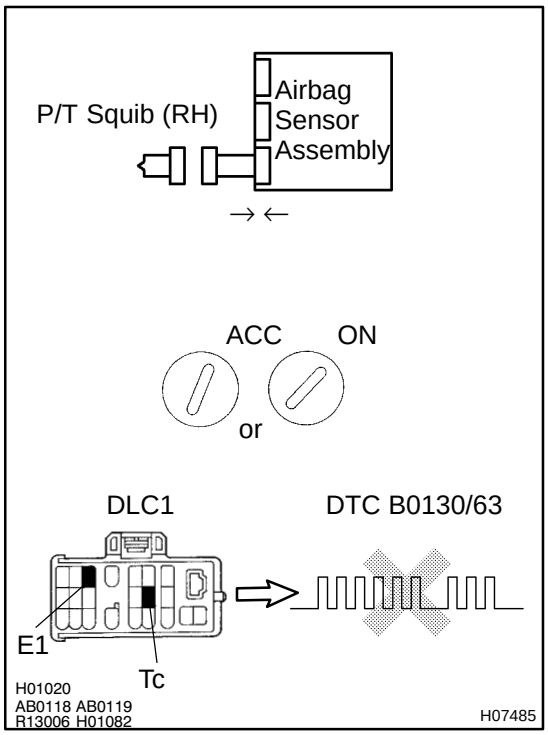
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B0130/63 is not output.

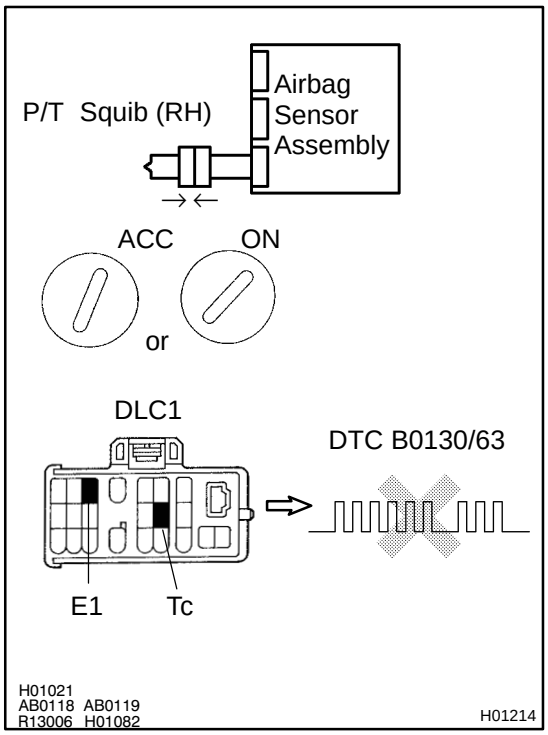
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–421)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–421)

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).**

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.

DI1BG–14

DTC	B0131/64	Open in P/T Squib (RH) Circuit

CIRCUIT DESCRIPTION

The P/T squib circuit (RH) consists of the airbag sensor assembly and 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–2.
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 circuit in PR+ wire harness or PR– wire harness of squib ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

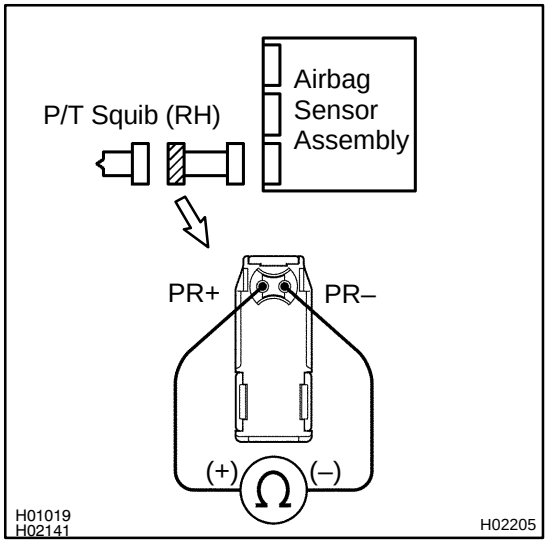
WIRING DIAGRAM

See page DI–490.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (RH) circuit.**



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and PR–.

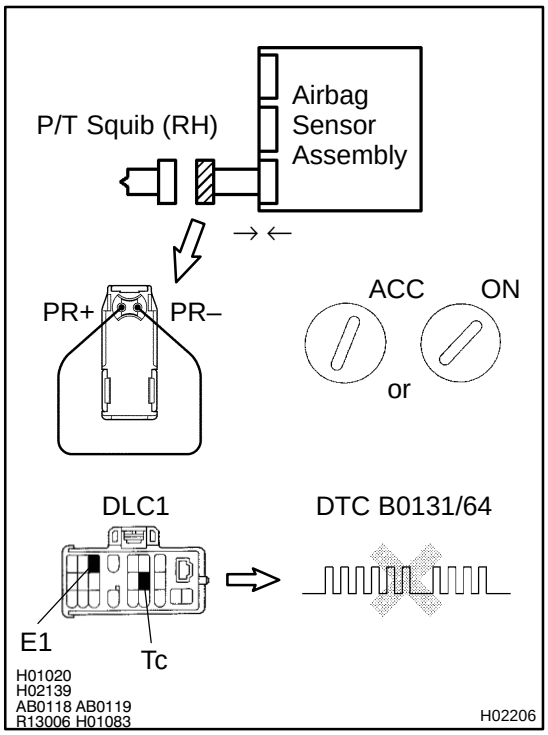
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0131/64 is not output.

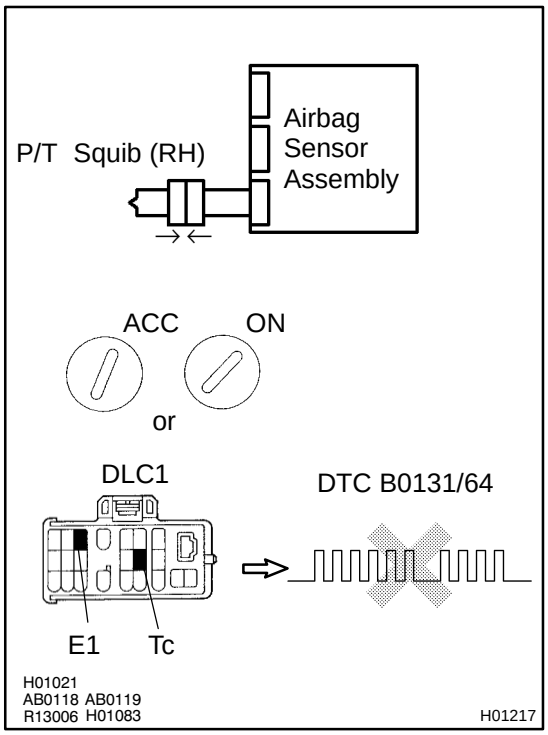
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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 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–2.
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 circuit in P/T squib (RH) wire harness (to ground) ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

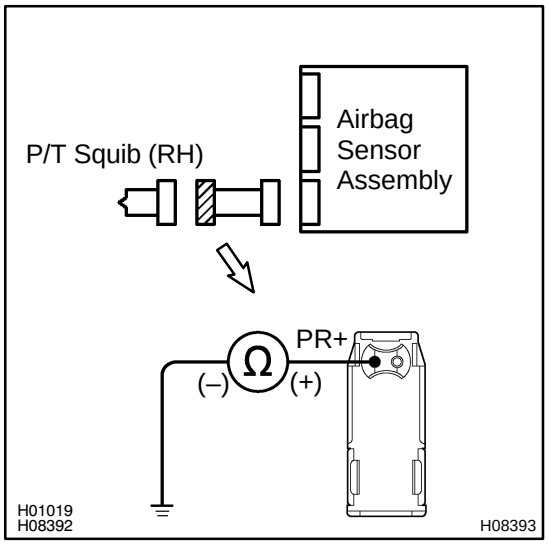
WIRING DIAGRAM

See page DI–490.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (RH) circuit.**



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the resistance between PR+ and body ground.

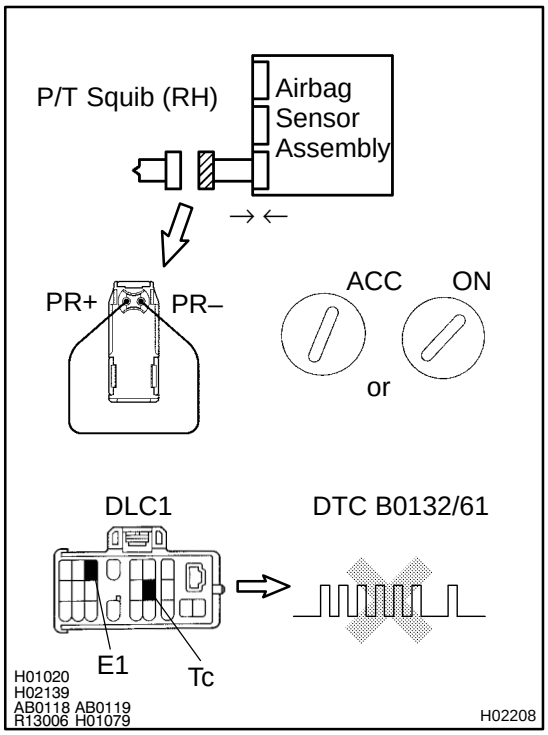
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0132/61 is not output.

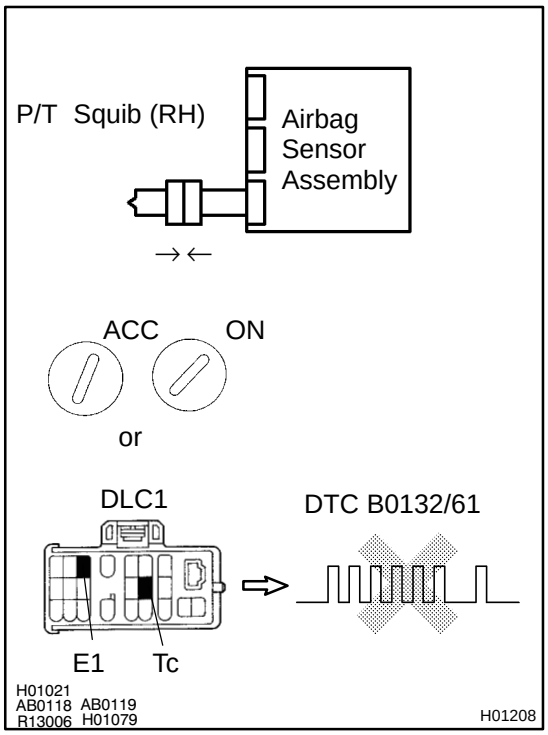
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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	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 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–2.
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 circuit in seat belt pretensioner (RH) wire harness (to B+) ●P/T squib (RH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (RH) ●Airbag sensor assembly ●Wire harness

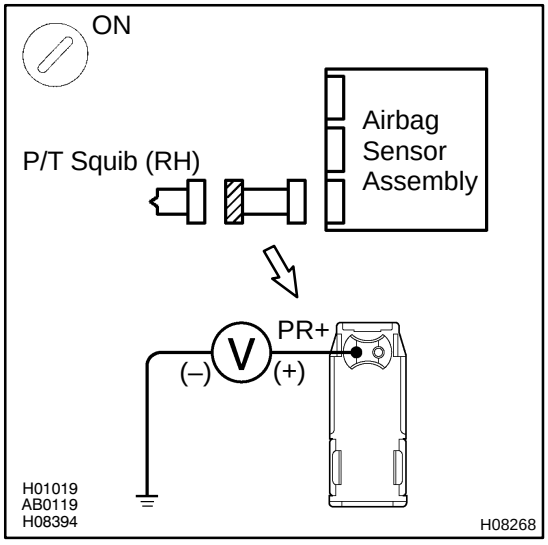
WIRING DIAGRAM

See page DI–490.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (RH) circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly, measure the voltage between PR+ and body ground.

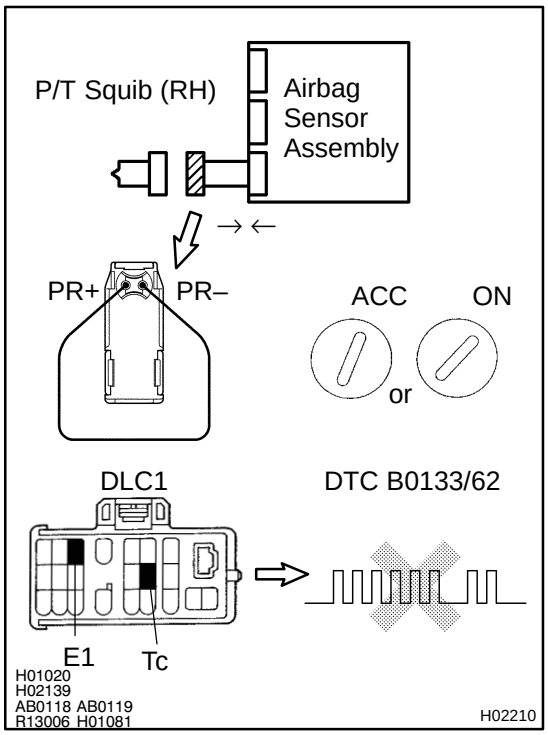
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between seat belt pretensioner (RH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (RH) and the airbag sensor assembly.

(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.

(b) Clear DTC stored in memory.
(See step 5 on page DI–421)

(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(e) Check DTC.
(See page DI–421)

OK:

DTC B0133/62 is not output.

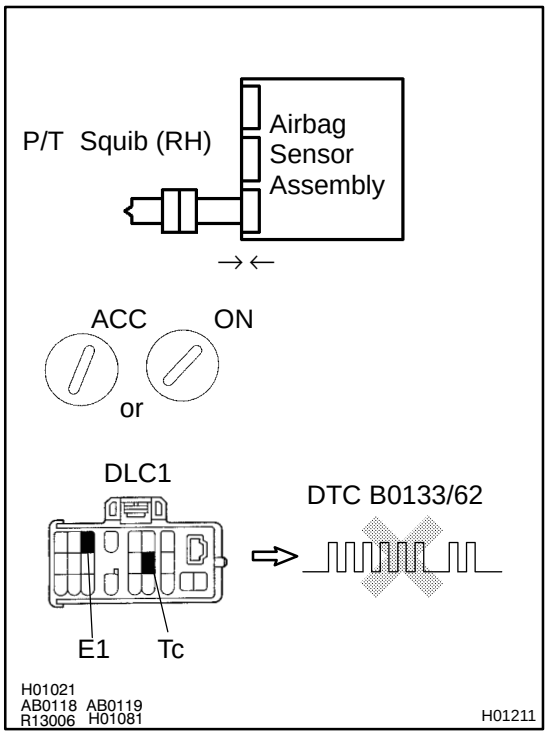
HINT:

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 negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (RH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

DI16W–18

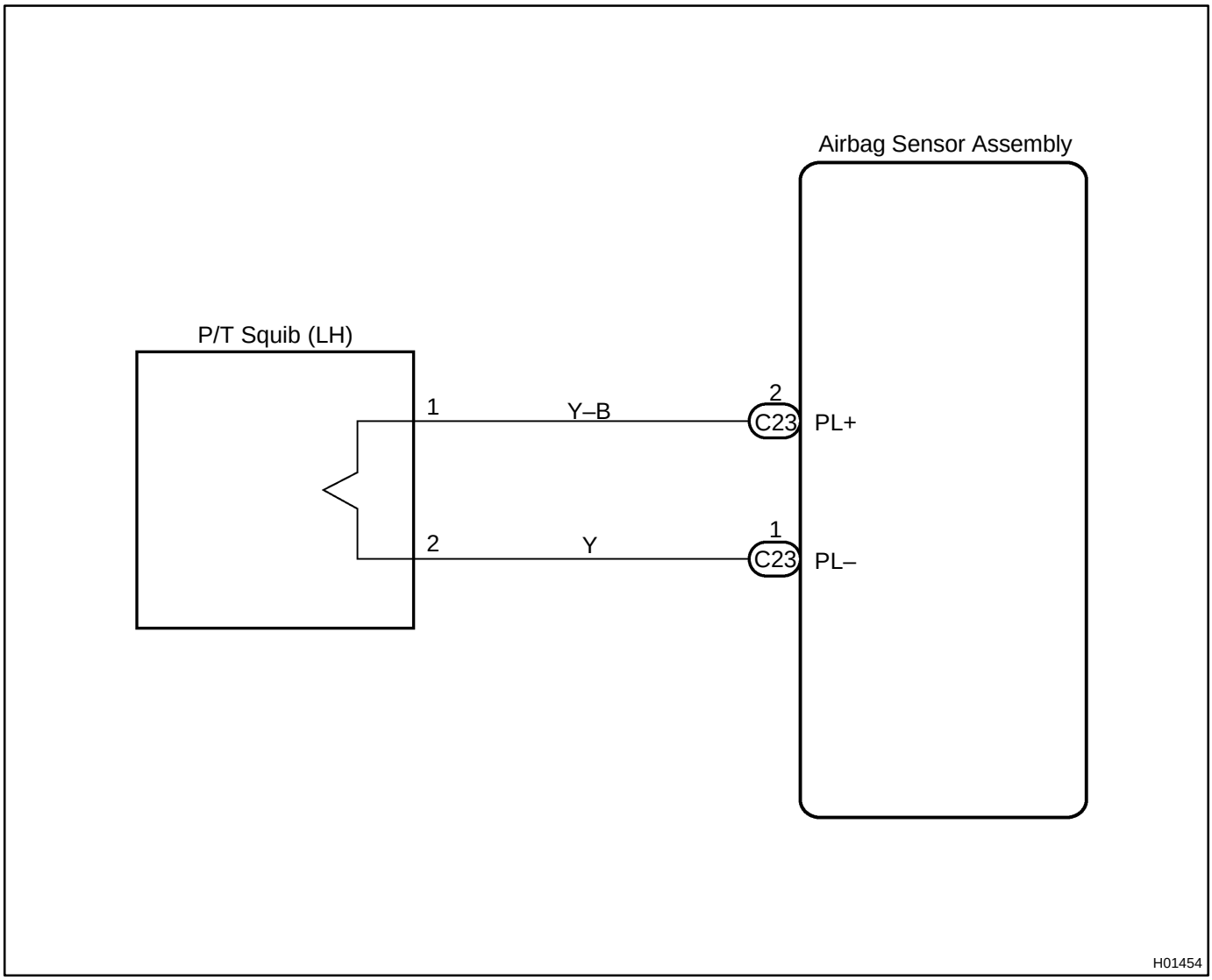
DTC	B0135/73	Short in P/T Squib (LH) Circuit

CIRCUIT DESCRIPTION

The P/T squib (LH) circuit consists of the airbag sensor assembly and 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–2.
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 circuit between PL+ wire harness and PL– wire harness of squib ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

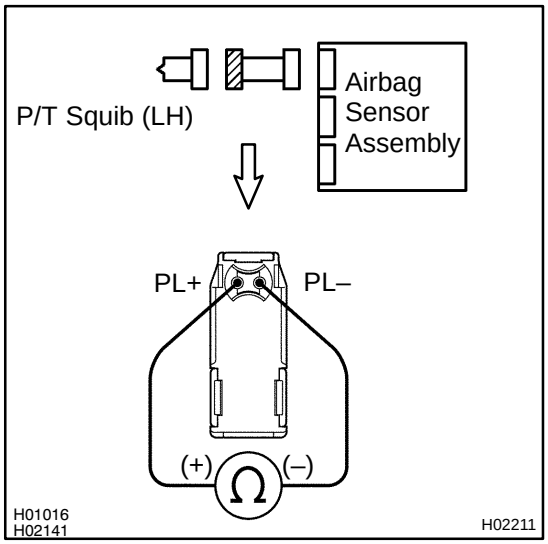
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (LH) circuit.**



PREPARATION:

Release the airbag activation prevention mechanism of the connector (on the airbag sensor assembly side) between the airbag sensor assembly and the seat belt pretensioner (LH). (See page DI–421)

CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and PL–.

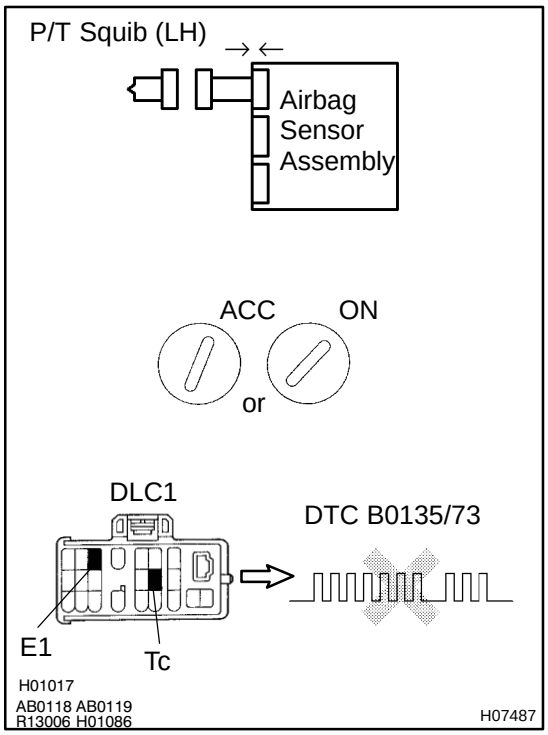
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

OK

3	Check airbag sensor assembly.



PREPARATION:

(a) Connect the connector to the airbag sensor assembly.
(b) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B0135/73 is not output.

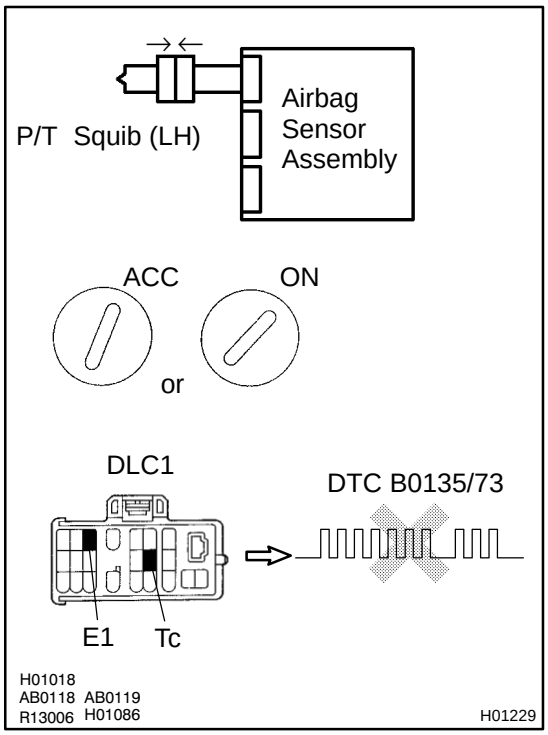
HINT:

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag assembly (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to LOOK, and wait at least for 20 second.
(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(c) Clear DTC stored in memory.
(See page DI–421)
(d) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(e) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(f) Check DTC.
(See page DI–421)

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).**

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.

DI1BJ–15

DTC	B0136/74	Open in P/T Squib (LH) Circuit

CIRCUIT DESCRIPTION

The P/T squib circuit (LH) 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–2.
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 circuit in PL+ wire harness or PL– wire harness of squib ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

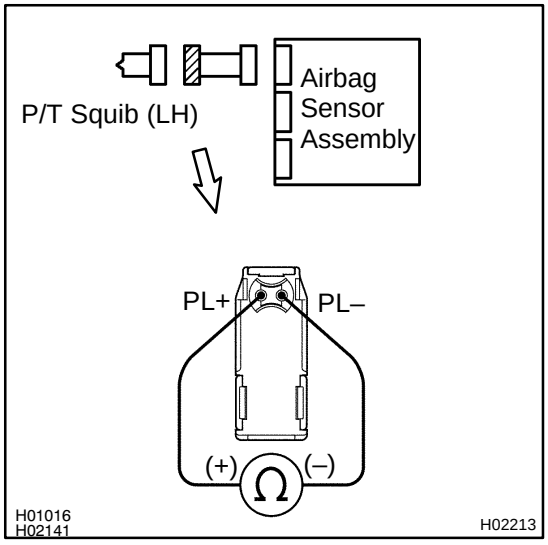
WIRING DIAGRAM

See page DI–503.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (LH) circuit.**



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and PL–.

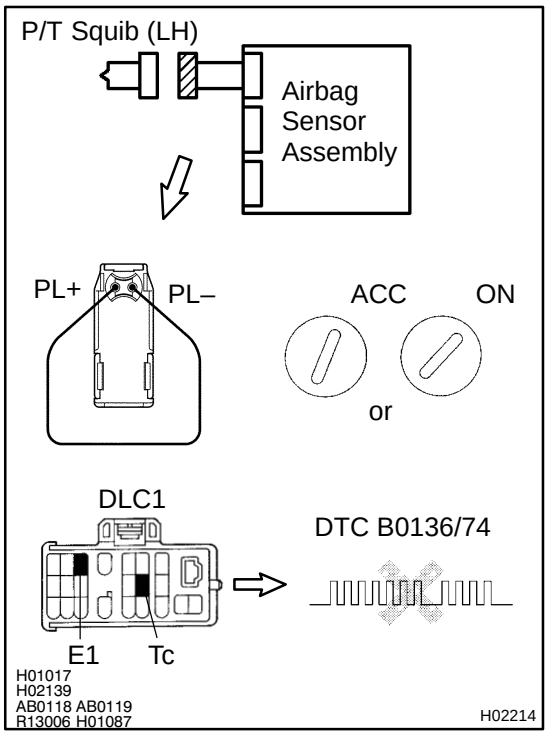
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

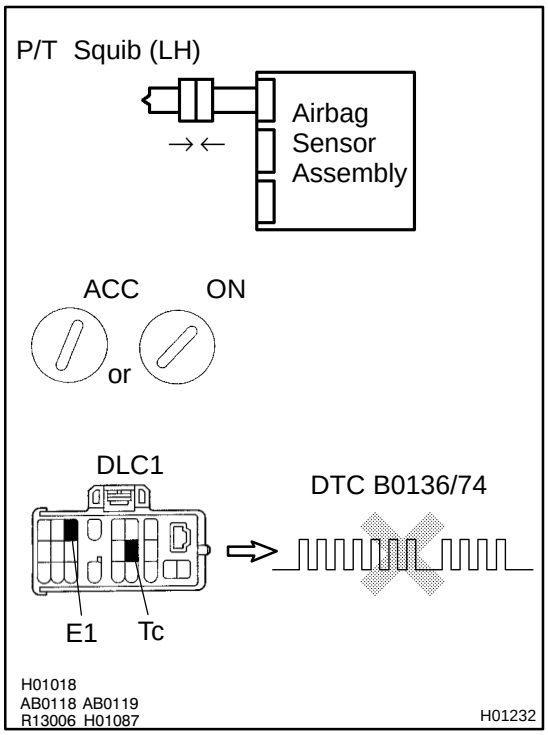
DTC B0136/74 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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 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–2.
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 circuit in P/T squib (LH) wire harness (to ground) ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

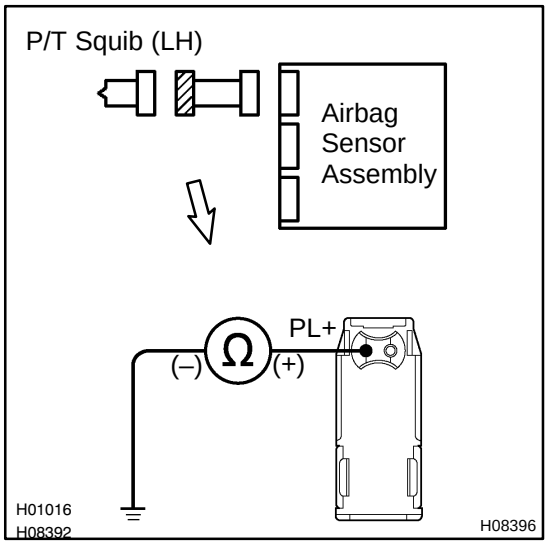
WIRING DIAGRAM

See page DI–503.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (LH) circuit.**



CHECK:

For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the resistance between PL+ and body ground.

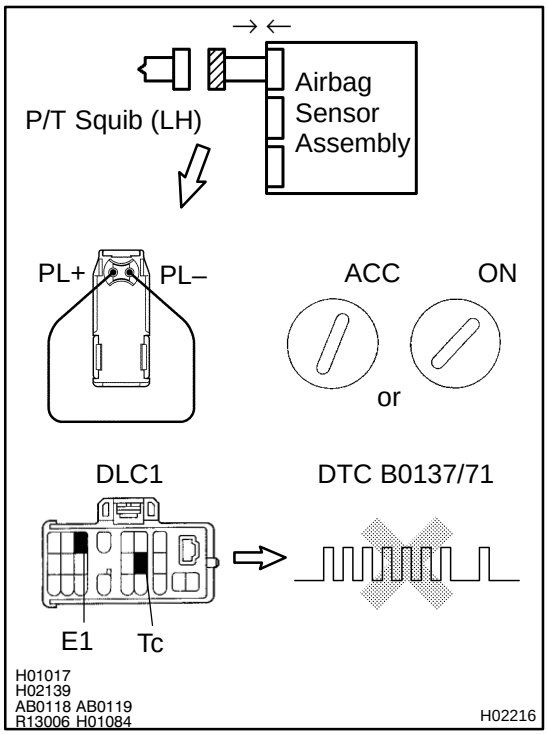
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

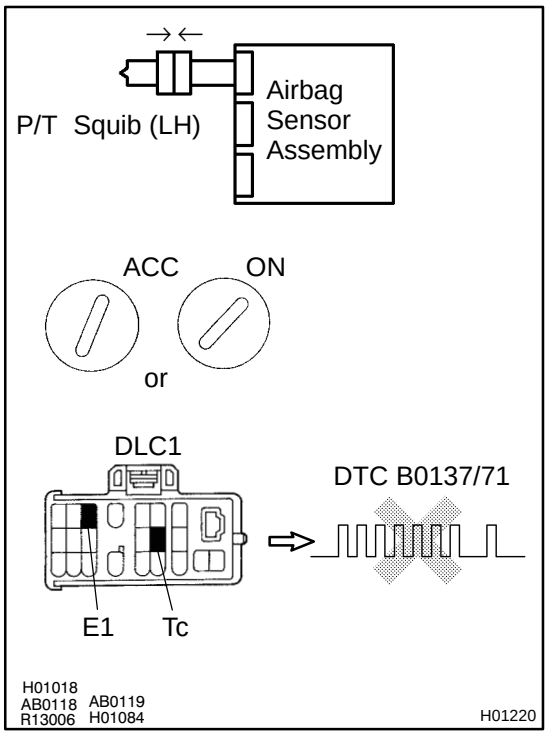
DTC B0137/71 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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.

DI1BL–15

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–2.
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 circuit in seat belt pretensioner (LH) wire harness (to B+) ●P/T squib (LH) malfunction ●Airbag sensor assembly malfunction	●Seat belt pretensioner (LH) ●Airbag sensor assembly ●Wire harness

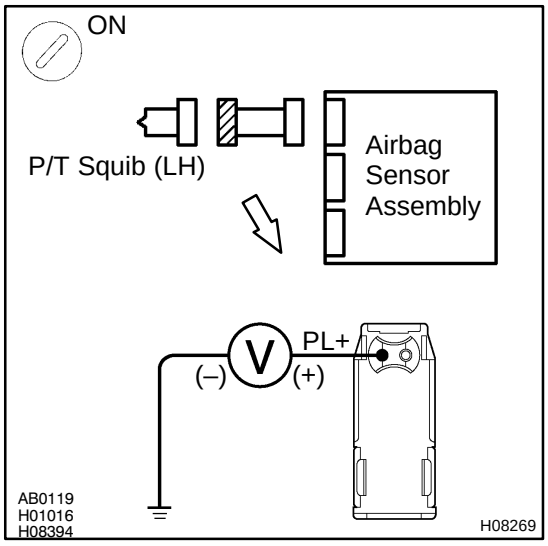
WIRING DIAGRAM

See page DI–503.

INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check P/T squib (LH) circuit.**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly, measure the voltage between PL+ and body ground.

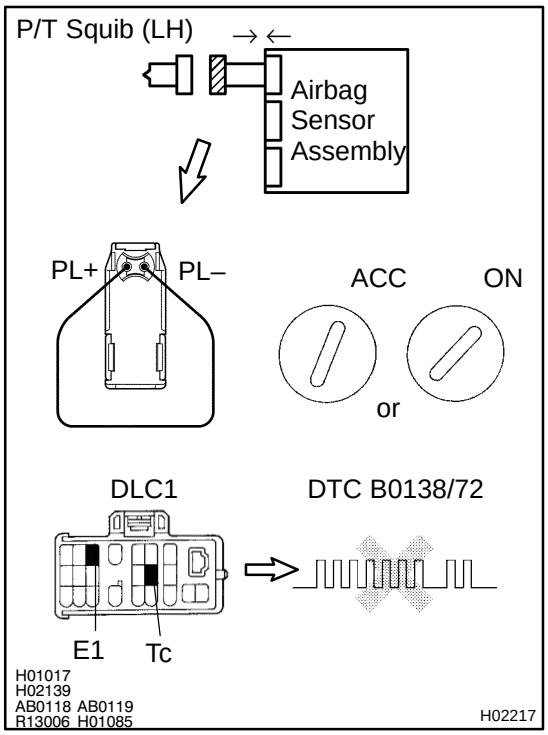
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between seat belt pretensioner (LH) and airbag sensor assembly.**

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 connector (on the seat belt pretensioner side) between the seat belt pretensioner (LH) and the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

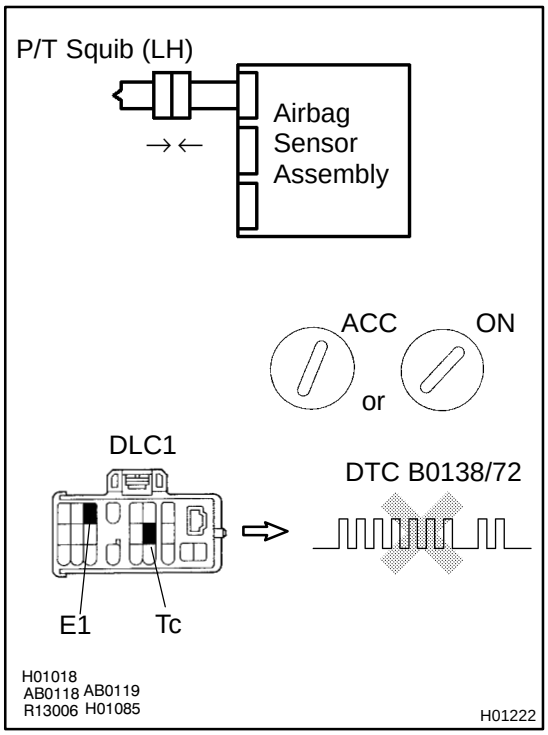
DTC B0138/72 is not output.

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 ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the seat belt pretensioner (LH) connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

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).**

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	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.

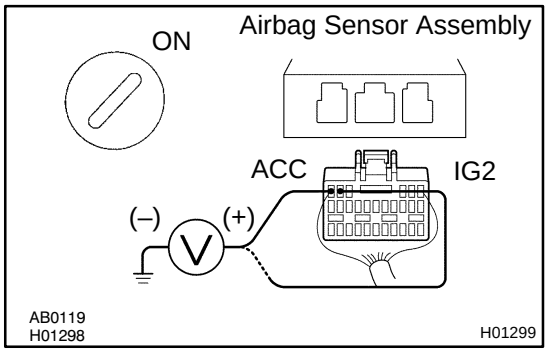
DTC No.	DTC Detecting Condition	Trouble Area
B1100/31	●Airbag sensor assembly malfunction	●Airbag sensor assembly

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–547)**

2	**Check voltage at IG2 and ACC of airbag sensor assembly.**



CHECK:

(a) Turn ignition switch to ON.
(b) Measure the voltage between body ground and each of terminals IG2 and ACC of the airbag sensor assembly connector.

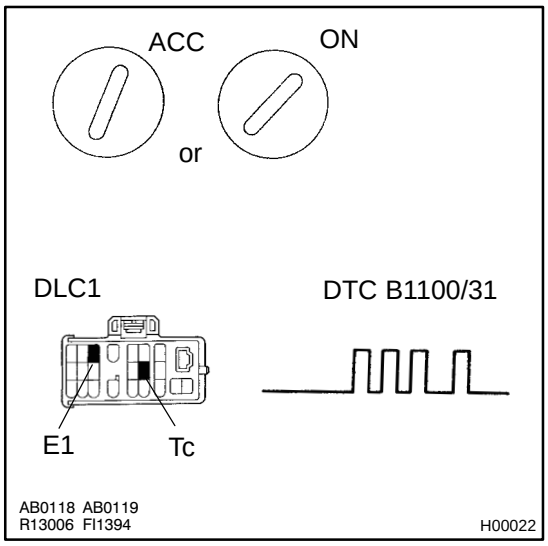
OK:

Voltage: 10 – 14 V

NG → **Check that an abnormality occurs the battery and charging system.**

OK

3	Is DTC B1100/31 output again?



PREPARATION:

Clear DTC.

(See step 5 on page DI–421)

CHECK:

(a) Turn ignition switch to LOCK, and wait at least for 20 seconds.

(b) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.

(c) Repeat operation in step (a) and (b) at least 5 times.

(d) Check DTC.
(See page DI–421)

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–21)**

YES

Replace airbag sensor assembly.

DI505–01

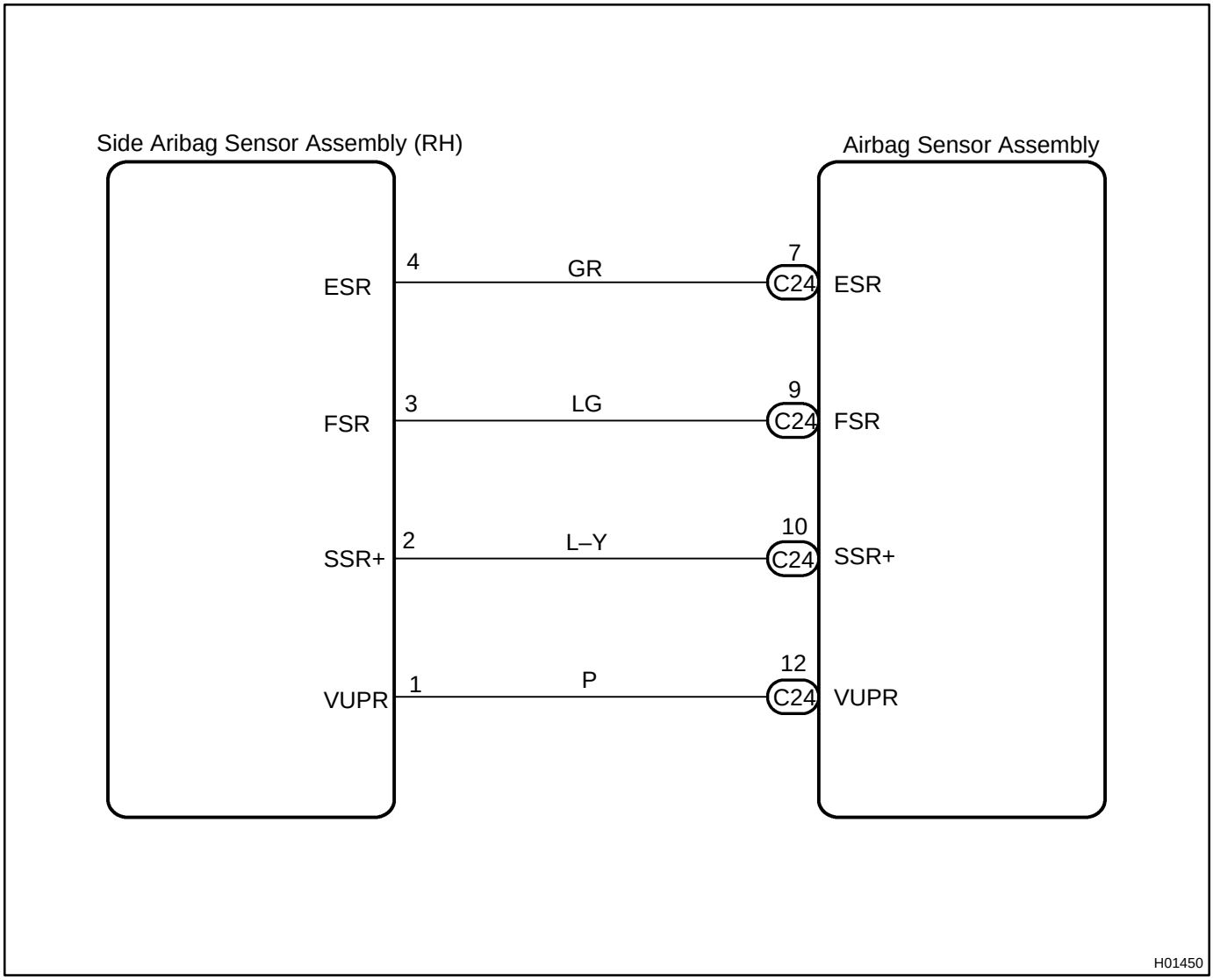
DTC	B1140/32	Side Airbag Sensor Assembly (RH) Malfunction

CIRCUIT DESCRIPTION

The side 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 diagnosis system malfunction.
DTC B1140/32 is recorded when occurrence of a malfunction in the side airbag sensor assembly (RH) is detected.

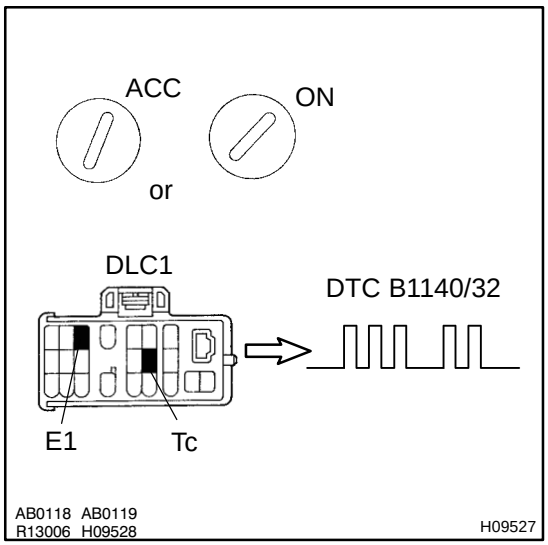
DTC No.	DTC Detecting Condition	Trouble Area
B1140/32	●Side airbag sensor assembly (RH) malfunction	●Side airbag sensor assembly (RH) ●Airbag sensor assembly ●Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1140/32 out put?**



CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

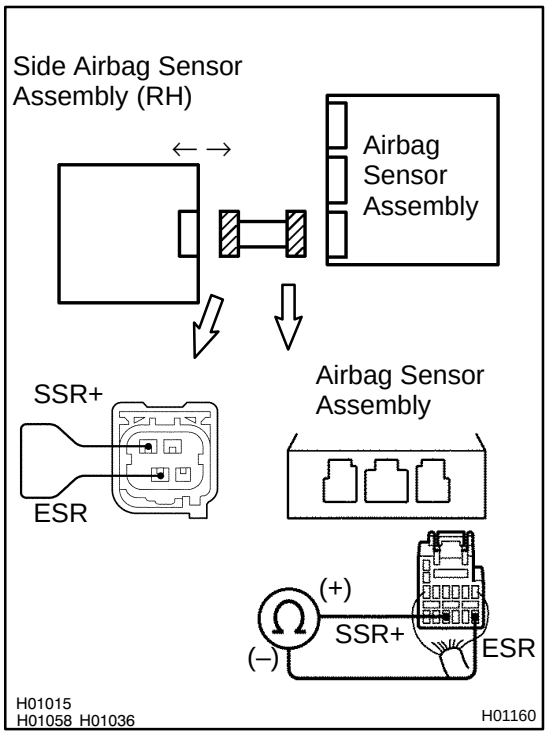
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	**Is connector of side airbag sensor assembly (RH) properly connected?**

3	**Prepare for inspection. (See step 1 on DI–547)**

4	**Check wire harness.**



PREPARATION:

(a) Disconnect the side airbag sensor assembly (RH) connector.

(b) Using a service wire, connect SSR+ and ESR of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (RH) and airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between SSR+ and ESR.

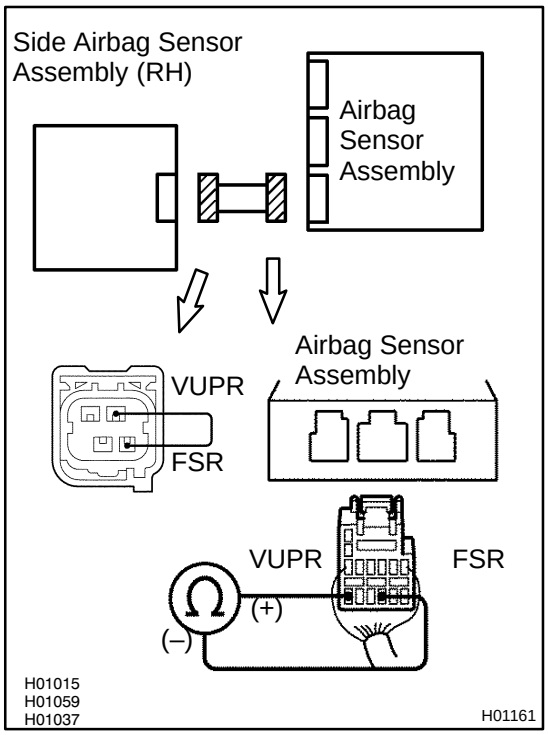
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect VUPR and FSR of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (RH) and airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between VUPR and FSR.

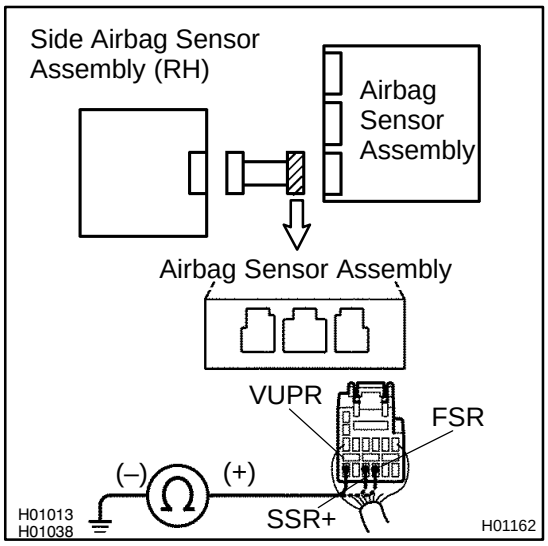
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

6	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the resistance between body ground and each of SSR+, VUPR and FSR.

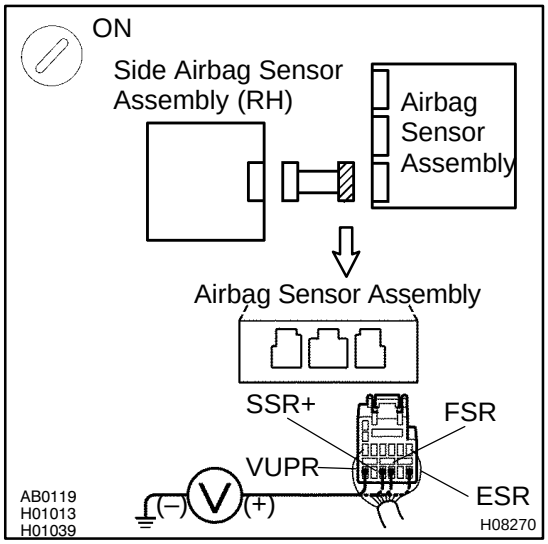
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

7	Check wire harness (to B+).



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (RH) and the airbag sensor assembly, measure the voltage between the body ground and each of SSR+, VUPR, ESR and FSR.

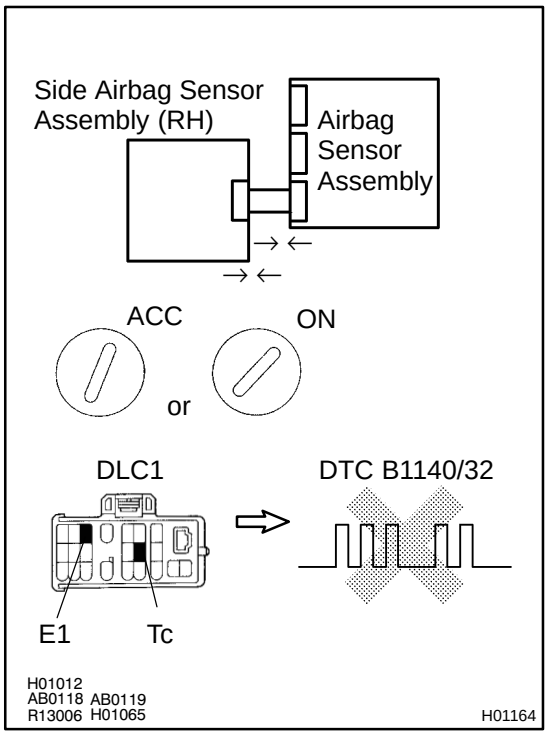
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag sensor assembly (RH) and airbag sensor assembly.**

OK

8	Is DTC B1140/32 out put again?



PREPARATION:

(a) Connect the connector to the side airbag sensor assembly (RH).
(b) Connect the connector to the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1140/32 is not output.

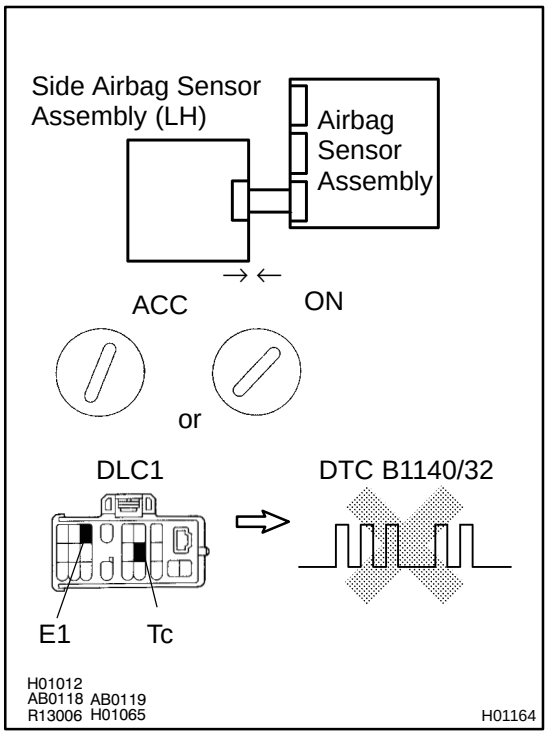
HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG	Go to step 9.

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 airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the side airbag sensor (RH) from the connector and connect the side airbag sensor (LH) to the connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

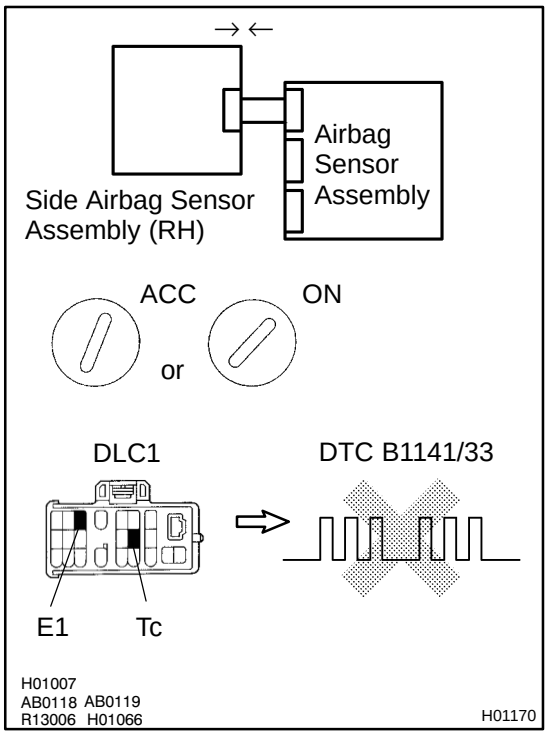
DTC B1140/32 is not output.

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

10	Check side airbag sensor assembly (RH).



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag sensor (RH) to the connector that the side airbag sensor (LH) was connected to.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1141/33 is not output.

HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NG → **Replace side airbag sensor assembly (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.

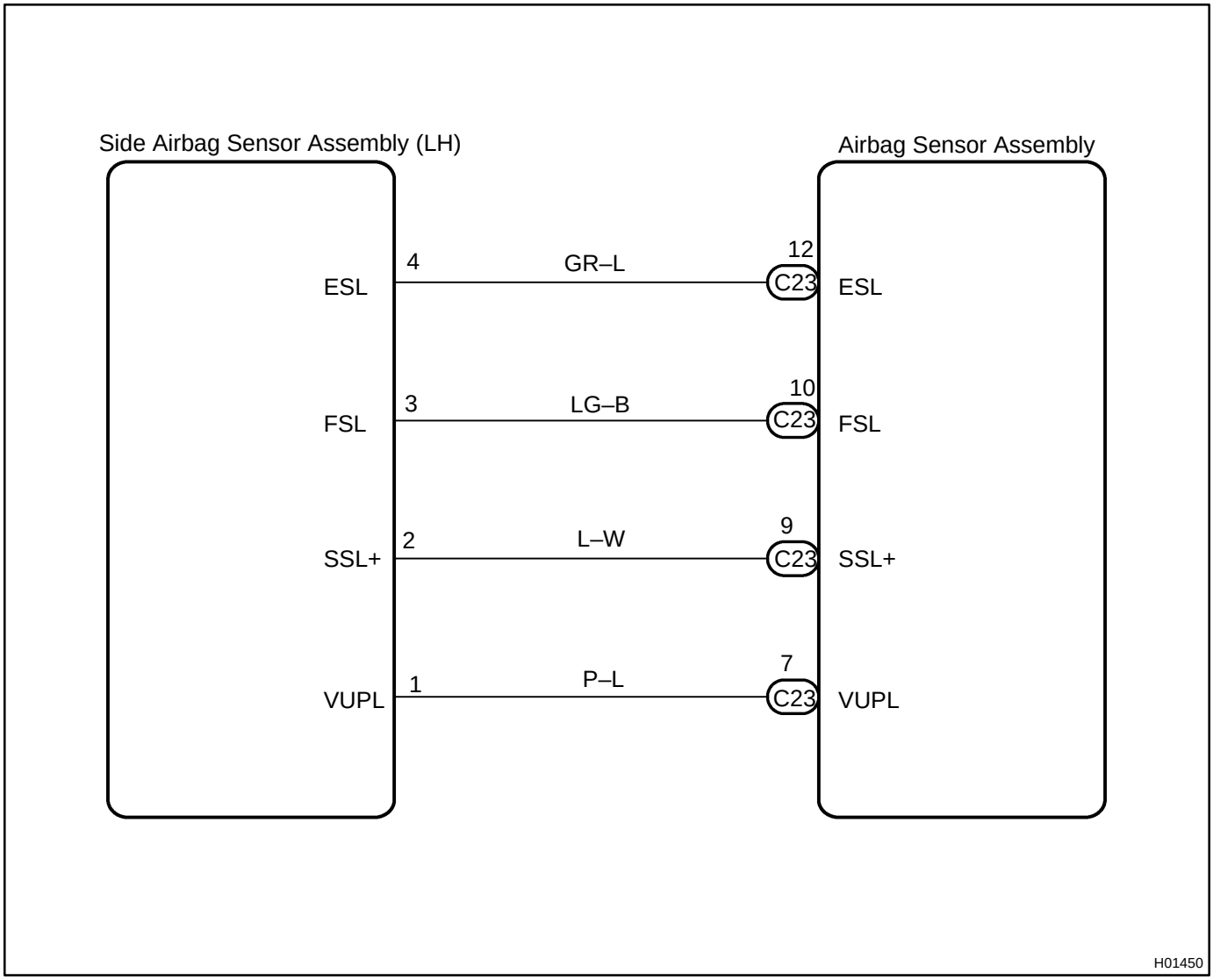
DTC	B1141/33	Side Airbag Sensor Assembly (LH) Malfunction

CIRCUIT DESCRIPTION

The side 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 diagnosis system malfunction.
DTC B1141/33 is recorded when occurrence of a malfunction in the side airbag sensor assembly (LH) is detected.

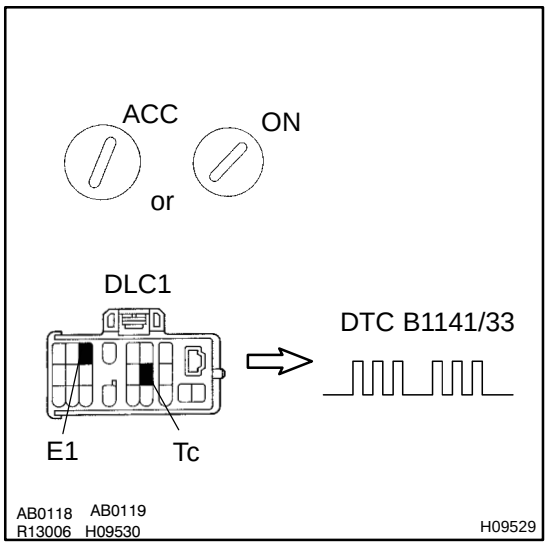
DTC No.	DTC Detecting Condition	Trouble Area
B1141/33	●Side airbag sensor assembly (LH) malfunction	●Side airbag sensor assembly (LH) ●Airbag sensor assembly ●Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Is DTC B1141/33 out put?**



CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

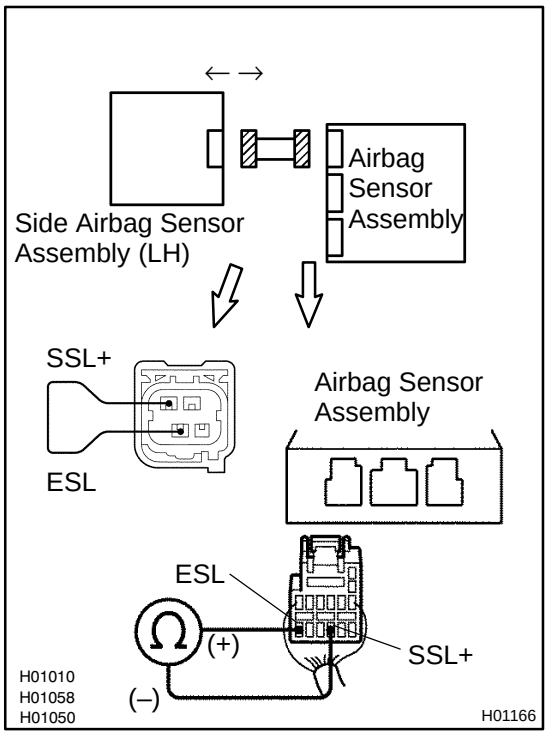
YES → **The malfunctioning part can now be considered normal. To make sure of this, use the simulation method to check.**

NO

2	**Is connector of side airbag sensor assembly (LH) properly connected?**

3	**Prepare for inspection. (See step 1 on page DI–547)**

4	Check wire harness.



PREPARATION:

(a) Disconnect the side airbag sensor assembly (LH).

(b) Using a service wire, connect SSL+ and ESL of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between SSL+ and ESL.

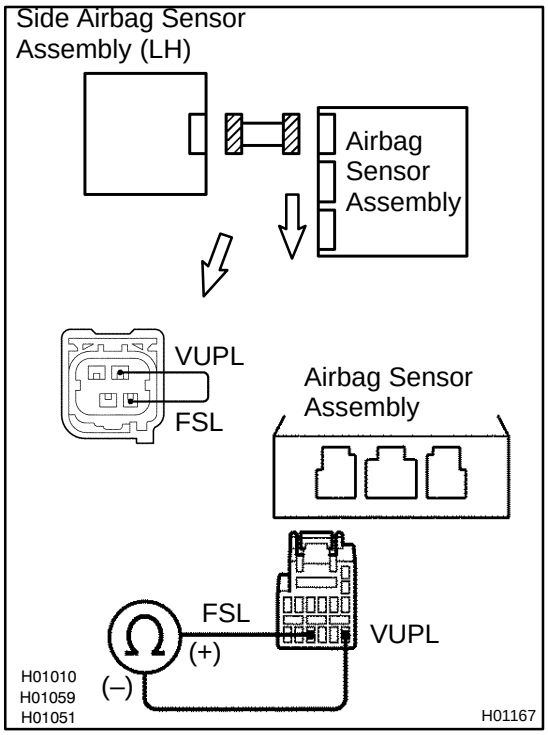
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect VUPL and FSL of the connector (on the side airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly.

CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between VUPL and FSL.

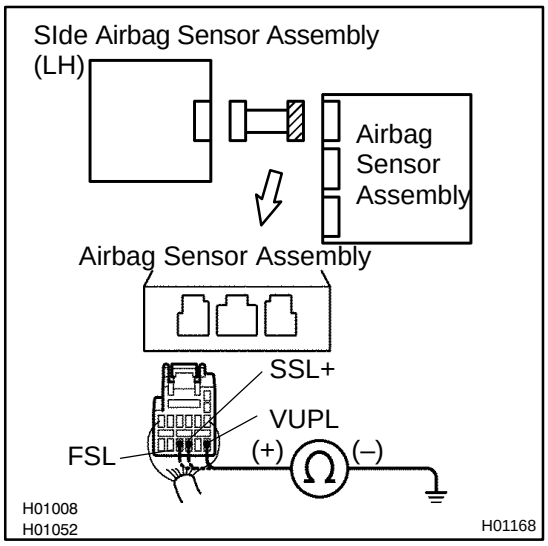
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

6	Check wire harness (to ground).



CHECK:

For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the resistance between body ground and each of SSL+, VUPL and FSL.

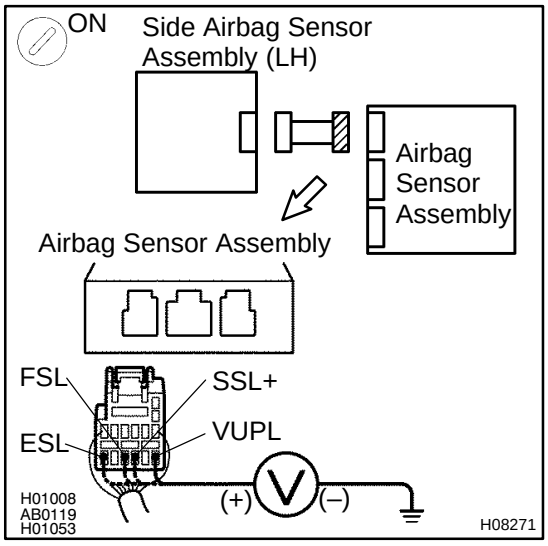
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

7	Check wire harness (to B+).



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the side airbag sensor assembly (LH) and the airbag sensor assembly, measure the voltage between body ground and each of SSL+, ESL, VUPL and FSL.

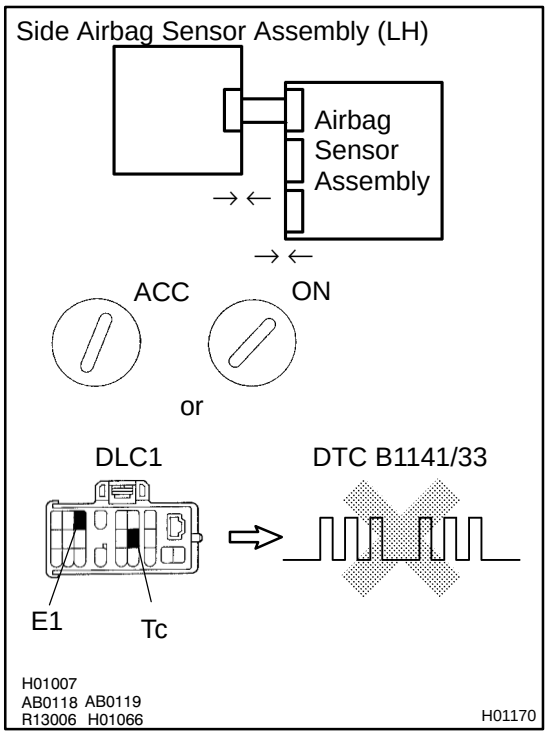
OK:

Voltage: 0 V

NG → **Repair or replace harness or connector between side airbag sensor assembly (LH) and airbag sensor assembly.**

OK

8	Is DTC B1141/33 out put again?



PREPARATION:

(a) Connect the connector to the side airbag sensor assembly (LH).
(b) Connect the connector to the airbag sensor assembly.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1141/33 is not output.

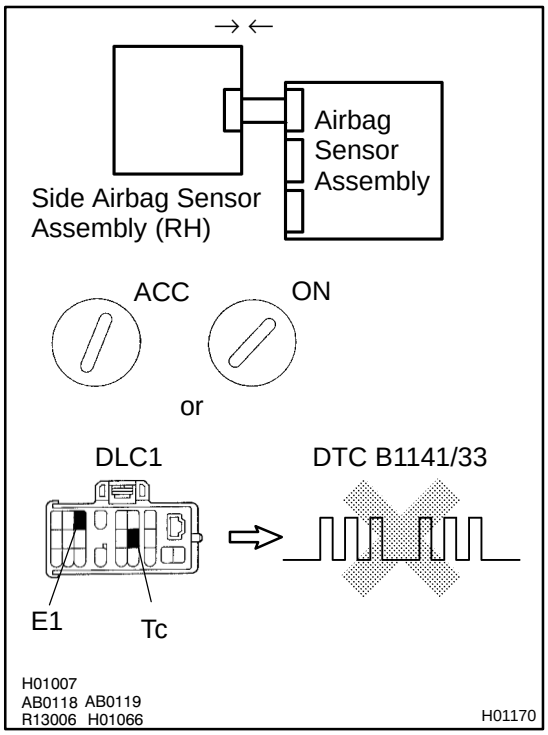
HINT:
Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NO	Go to step 9.

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.

9	Check airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Disconnect the side airbag sensor (LH) from the connector and connect the side airbag sensor (RH) to the connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See step 5 on page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1141/33 is not output.

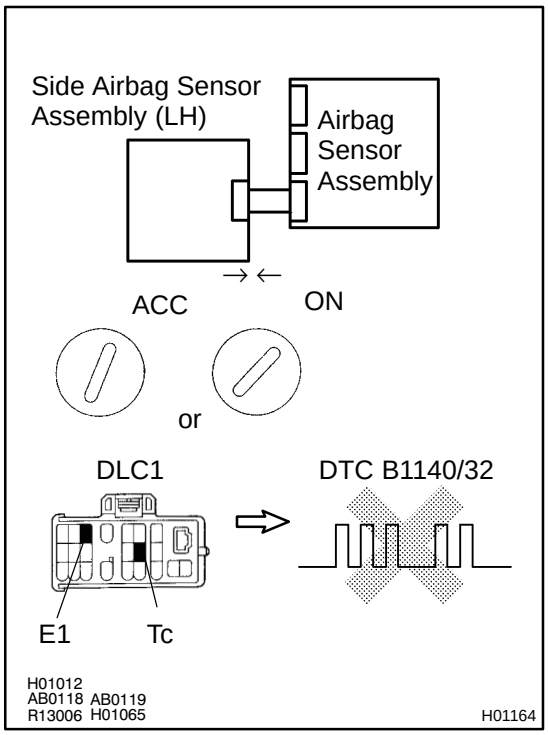
HINT:

Codes other than code B1141/33 may be output at this time, but they are not relevant to this check.

NG → **Replace airbag sensor assembly.**

OK

10	Check side airbag sensor assembly (LH).



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the side airbag sensor (LH) to the connector that the side airbag sensor (RH) was connected to.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1140/32 is not output.

HINT:
Codes other than code B1140/32 may be output at this time, but they are not relevant to this check.

NG	Replace side airbag sensor assembly (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.

DI507–03

DTC	B1156/B1157/15	Front Airbag Sensor (RH) Malfunction

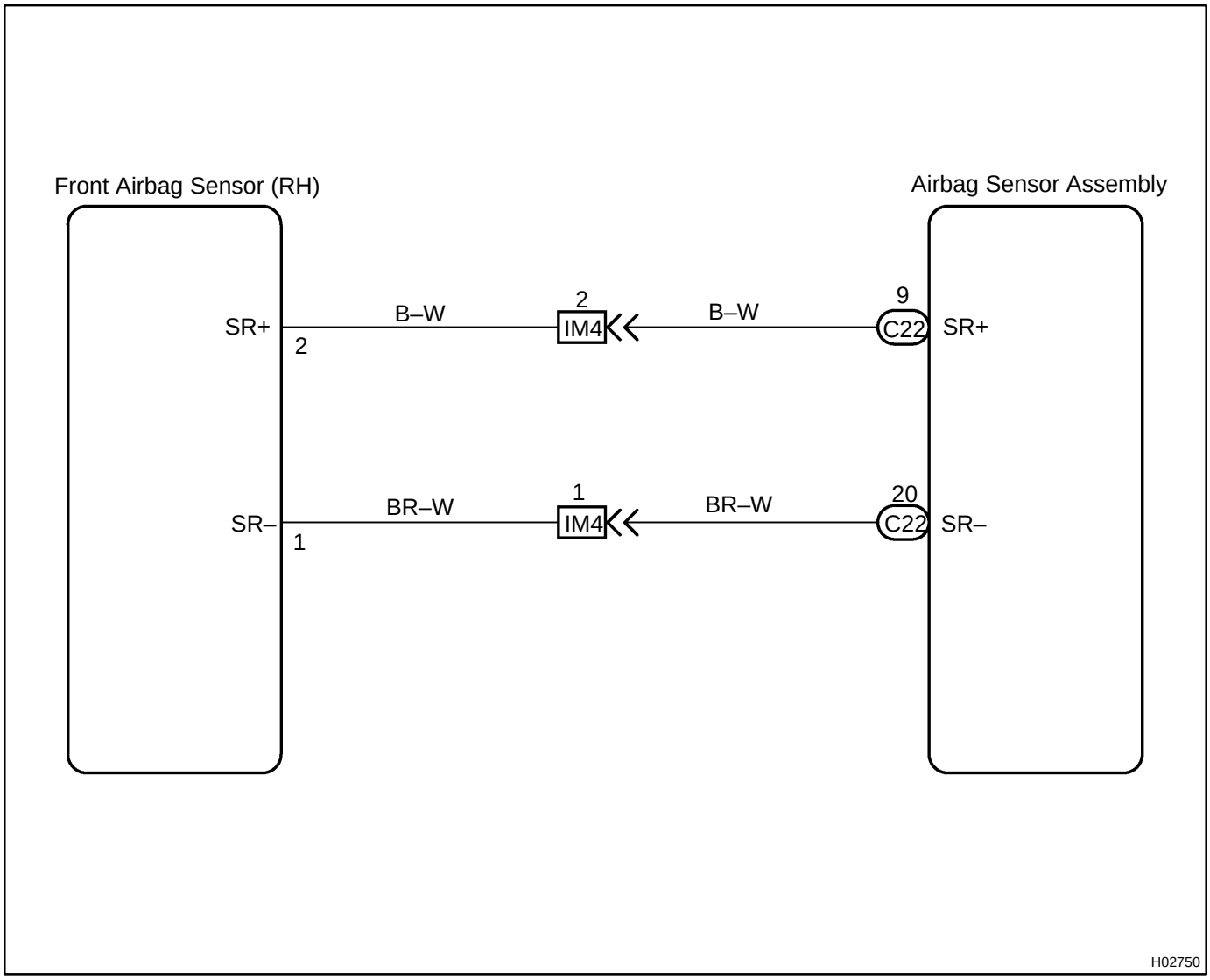
CIRCUIT DESCRIPTION

The front airbag sensor (RH) circuit consists of the airbag sensor assembly and front airbag sensor (RH). For details of the function of each component, see OPERATION on page RS–2.

DTC B1156/B1157/15 is recorded when malfunction is detected in the front airbag sensor (RH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1156/B1157/15	●Front airbag sensor (RH) malfunction	●Front airbag sensor (RH) ●Airbag sensor assembly ●Wire harness ●Engine room main wire harness

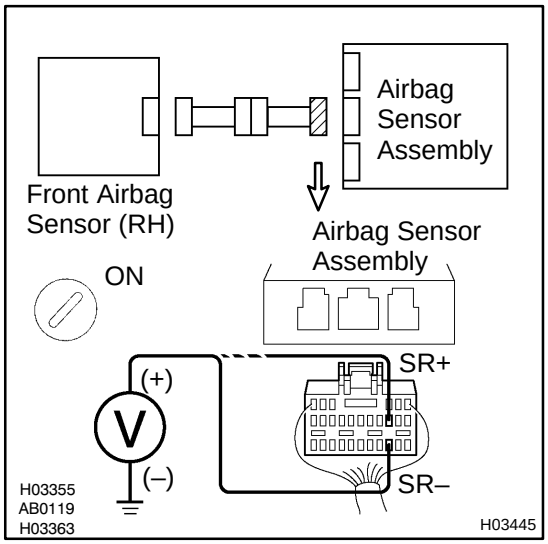
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Check wire harness (to B+).**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the voltage between body ground and each of SR+ and SR–.

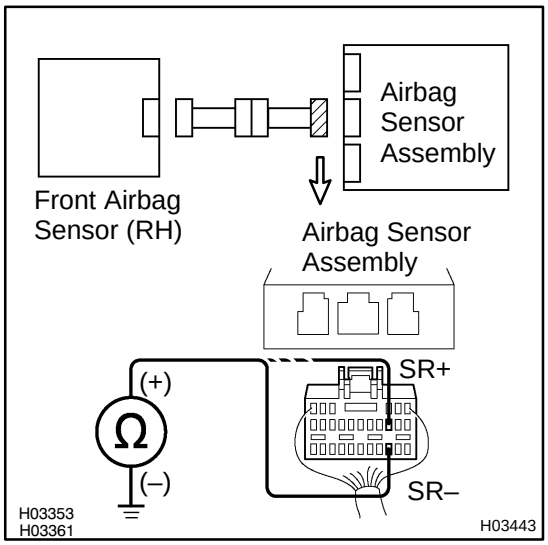
OK:

Voltage: Below 1 V

NG	**Go to step 8.**

OK

3	**Check wire harness (to ground).**



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between body ground and each of SR+ and SR–.

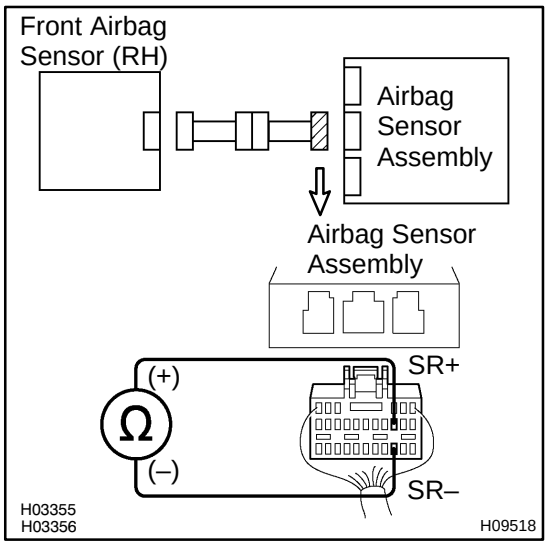
OK:

Resistance: 1 MΩ or Higher

NG	**Go to step 9.**

OK

4	Check wire harness.



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between SR+ and SR–.

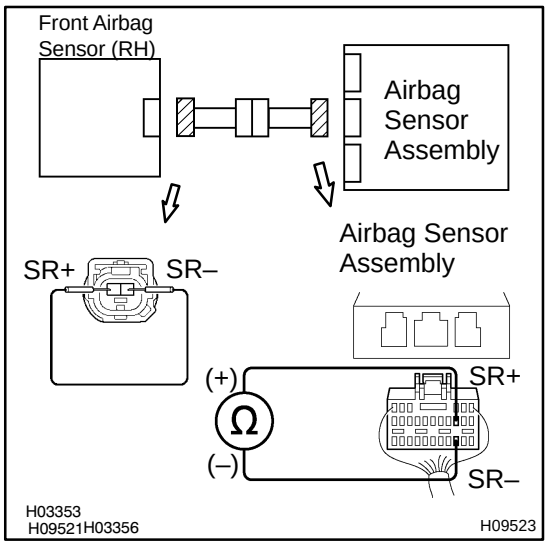
OK:

Resistance: 1 MΩ or Higher

NG → **Go to step 10.**

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect SR+ and SR– of the connector (on the front airbag sensor (RH) side) between the airbag sensor assembly and the front airbag sensor (RH).

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (RH) and the airbag sensor assembly, measure the resistance between SR+ and SR–.

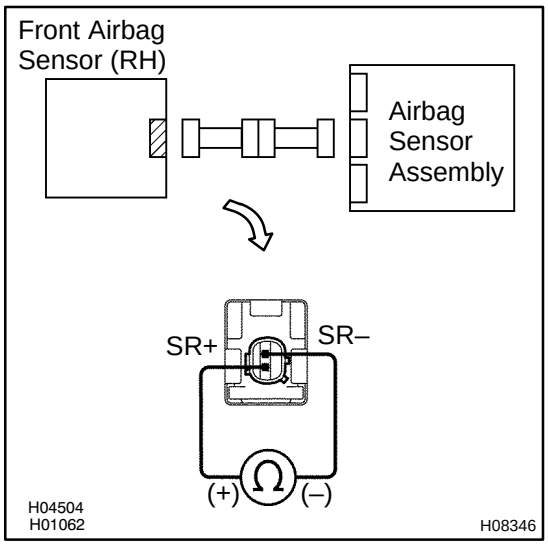
OK:

Resistance: Below 1 Ω

NG → **Go to step 11.**

OK

6	Check front airbag sensor (RH).



CHECK:

For the connector (on the front airbag sensor (RH)), measure the resistance between SR+ and SR–.

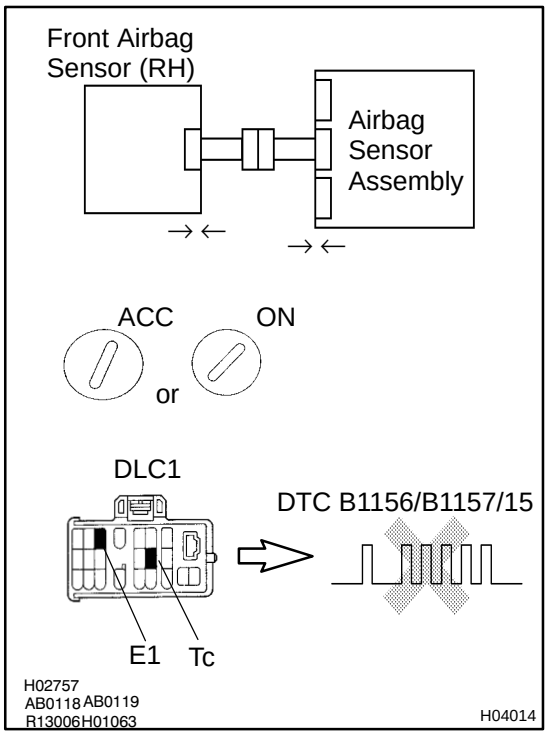
OK:

Resistance: 300 – 1500 Ω

NG → **Replace front airbag sensor (RH).**

OK

7	Check airbag sensor assembly.



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front airbag sensor (RH) connector and airbag sensor assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory.
(See page DI–421)
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC.
(See page DI–421)

OK:

DTC B1156/B1157/15 is not output.

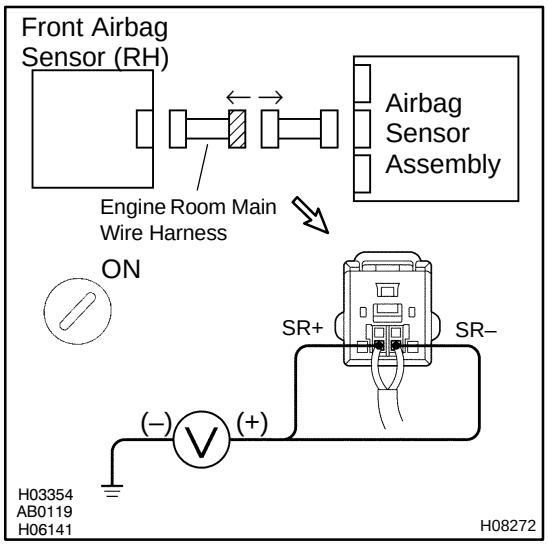
HINT:
Codes other than code B1156/B1157/15 may be output at this time, but they are not relevant to this check.

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.

8	Check engine room main wire harness (to B+).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the RH front door wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the voltage between body ground and each of SR+ and SR–.

OK:

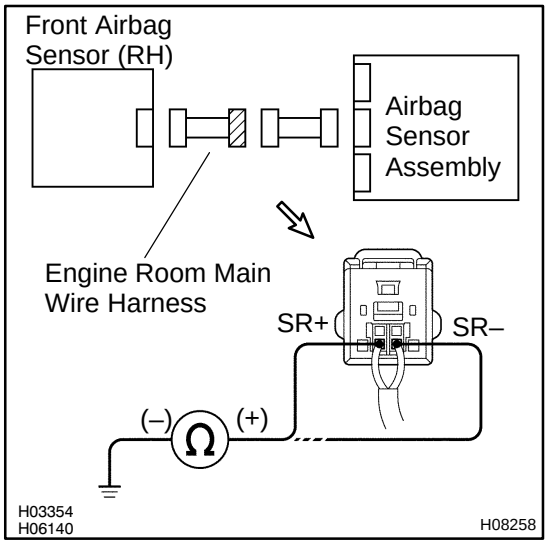
Voltage: Below 1 V

NG	Repair or replace engine room main wire harness.

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

9	Check engine room main wire harness (to ground).



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between body ground and each of SR+ and SR–.

OK:

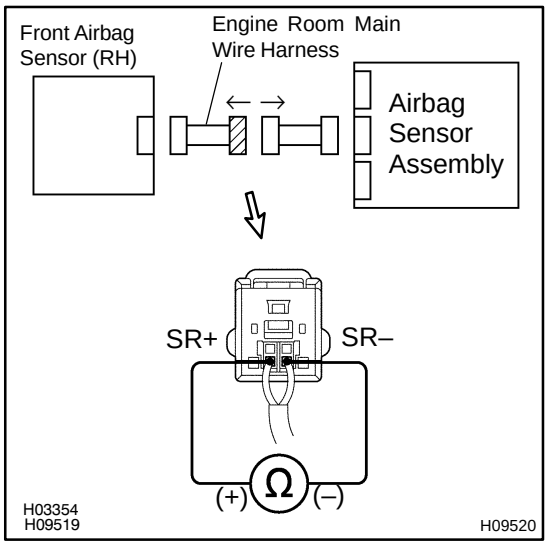
Resistance: 1 MΩ or Higher

NG	Repair or replace engine room main wire harness.

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

10	Check engine room main wire harness.



PREPARATION:

Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between SR+ and SR–.

OK:

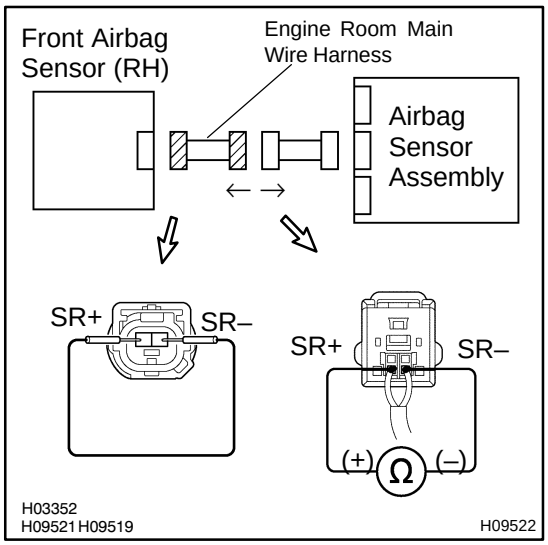
Resistance: 1 MΩ or Higher

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

11	Check engine room main wire harness.



PREPARATION:

(a) Disconnect the engine room main wire harness connector on the airbag sensor assembly side.

(b) Using a service wire, connect SR+ and SR– of the connector (on the engine room main wire harness side) between the engine room main wire harness and the front airbag sensor (RH).

CHECK:

For the connector (on the engine room main wire harness side) between the airbag sensor assembly and the engine room main wire harness, measure the resistance between SR+ and SR–.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace engine room main wire harness.**

OK

Repair or replace harness or connector between airbag sensor assembly and engine room main wire harness.

DI508–03

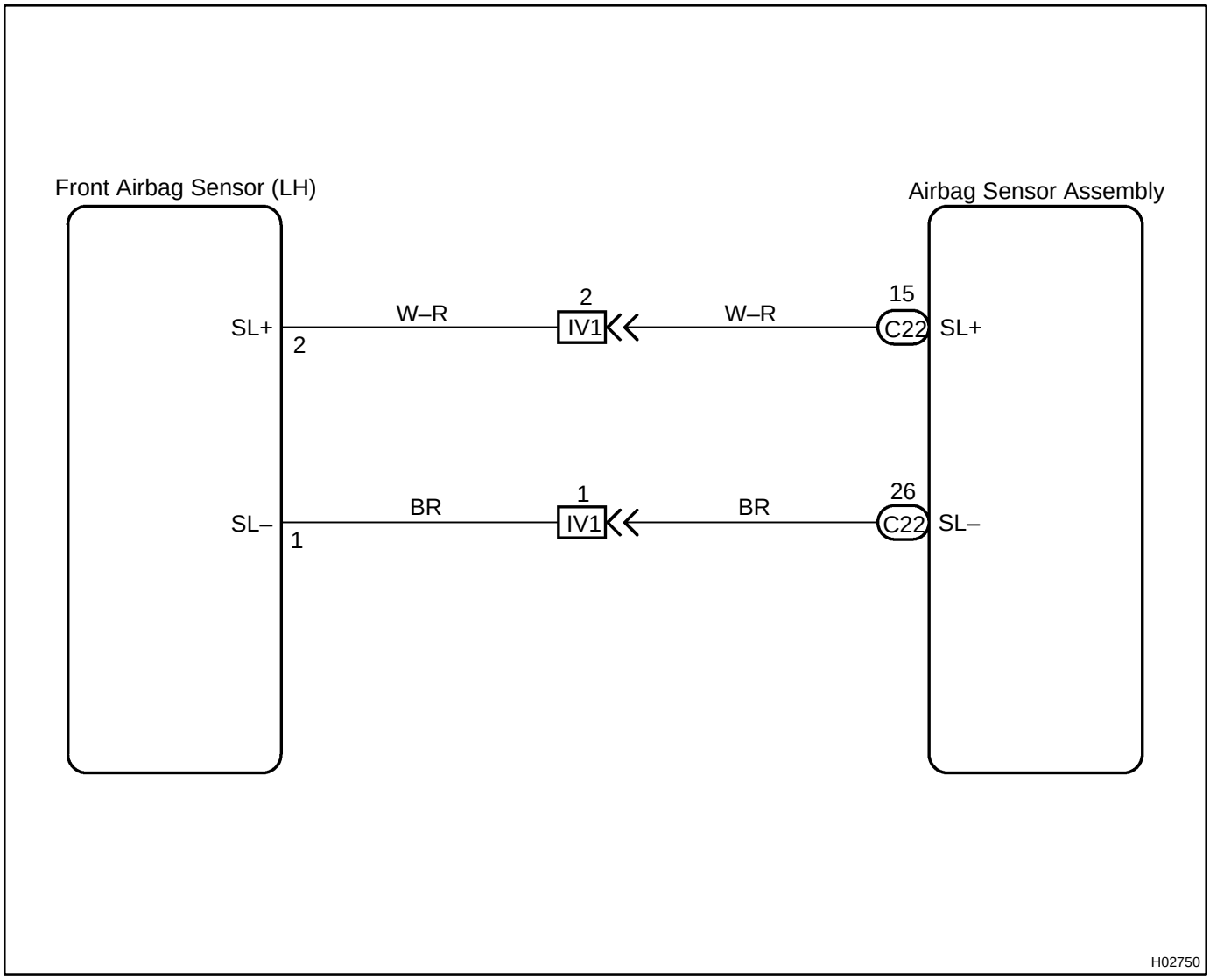
DTC	B1158/B1159/16	Front Airbag Sensor (LH) Malfunction

CIRCUIT DESCRIPTION

The front airbag sensor (LH) circuit consists of the airbag sensor assembly and front airbag sensor (LH).
For details of the function of each component, see OPERATION on page RS–2.
DTC B1158/B1159/16 is recorded when malfunction is detected in the front airbag sensor (LH) circuit.

DTC No.	DTC Detecting Condition	Trouble Area
B1158/B1159/16	●Front airbag sensor (LH) malfunction	●Front airbag sensor (LH) ●Wire harness ●Airbag sensor assembly

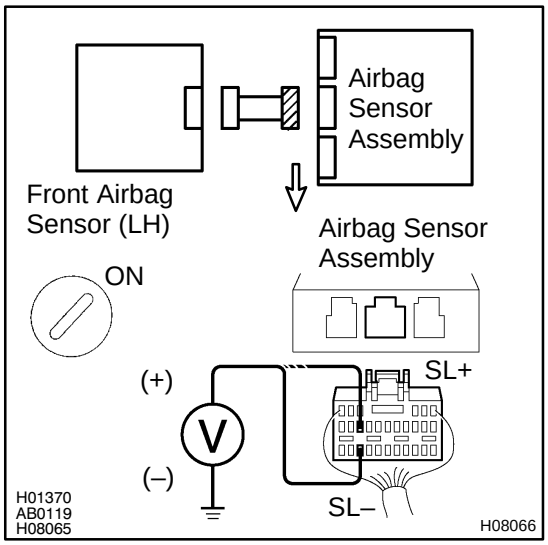
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection (See step 1 on page DI–547).**

2	**Check wire harness (to B+).**



CHECK:

(a) Turn ignition switch to ON.

(b) For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the voltage between body ground and each of SL+ and SL–.

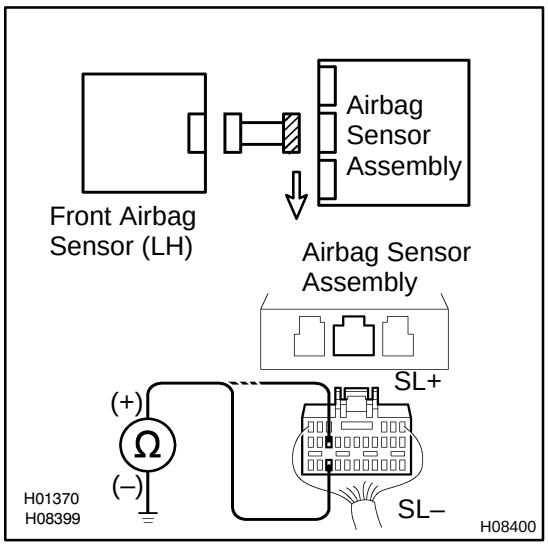
OK:

Voltage: Below 1 V

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

3	**Check wire harness (to ground).**



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between body ground and each of SL+ and SL–.

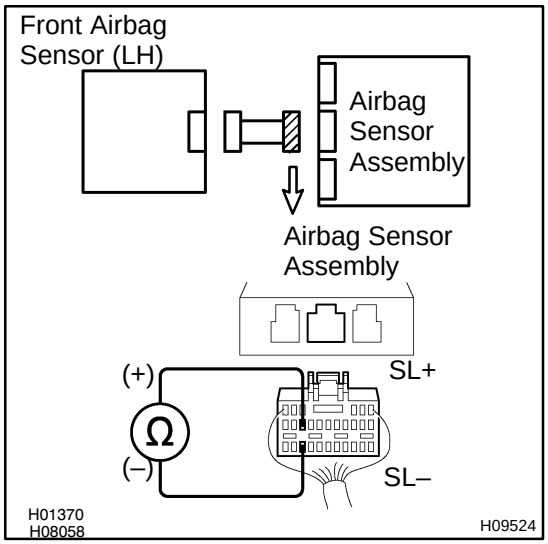
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

4	Check wire harness.



CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between SL+ and SL–.

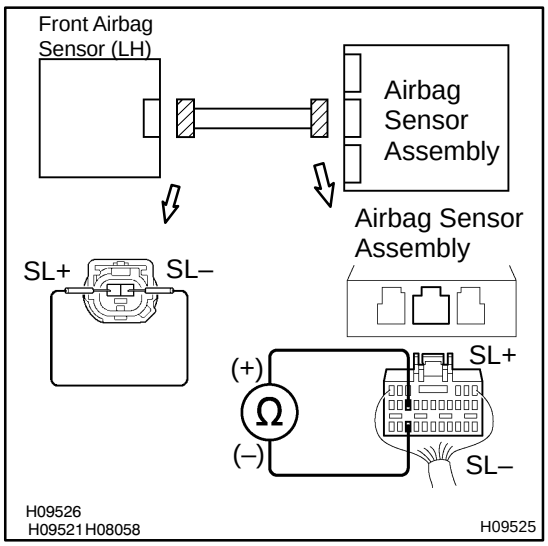
OK:

Resistance: 1 MΩ or Higher

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

5	Check wire harness.



PREPARATION:

Using a service wire, connect SL+ and SL– of the connector (on the front airbag sensor (LH) side) between the airbag sensor assembly and the front airbag sensor (LH).

CHECK:

For the connector (on the airbag sensor assembly side) between the front airbag sensor (LH) and the airbag sensor assembly, measure the resistance between SL+ and SL–.

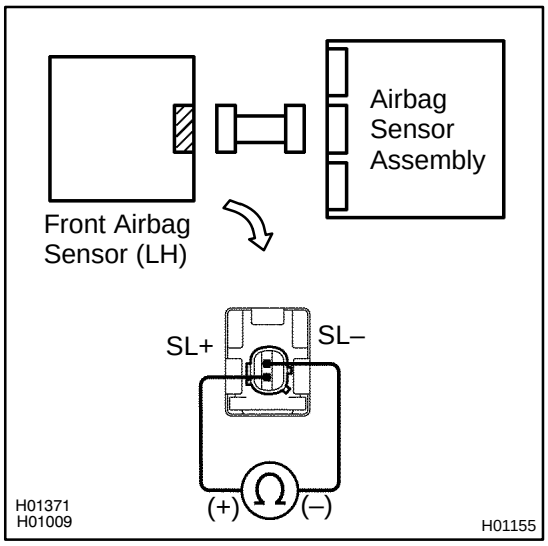
OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector between front airbag sensor (LH) and airbag sensor assembly.**

OK

6	Check front airbag sensor (LH).



CHECK:

For the connector (on the front airbag sensor (LH)), measure the resistance between SL+ and SL–.

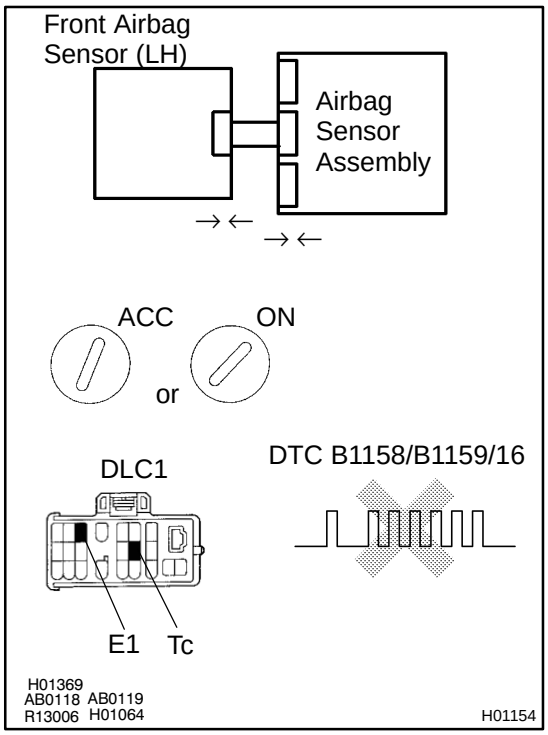
OK:

Resistance: 300 – 1500 Ω

NG → **Replace front airbag sensor (LH).**

OK

7	**Check airbag sensor assembly.**



PREPARATION:

(a) Turn ignition switch to LOCK.
(b) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.
(c) Connect the front airbag sensor (LH) connector and airbag sensor assembly connector.
(d) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.

CHECK:

(a) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(b) Clear DTC stored in memory (See page DI–421).
(c) Turn ignition switch to LOCK, and wait at least for 20 seconds.
(d) Turn ignition switch to ACC or ON, and wait at least for 20 seconds.
(e) Check DTC (See page DI–421).

OK:

DTC B1158/B1159/16 is not output.

HINT:
Codes other than code B1158/B1159/16 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.

DI18Z–28

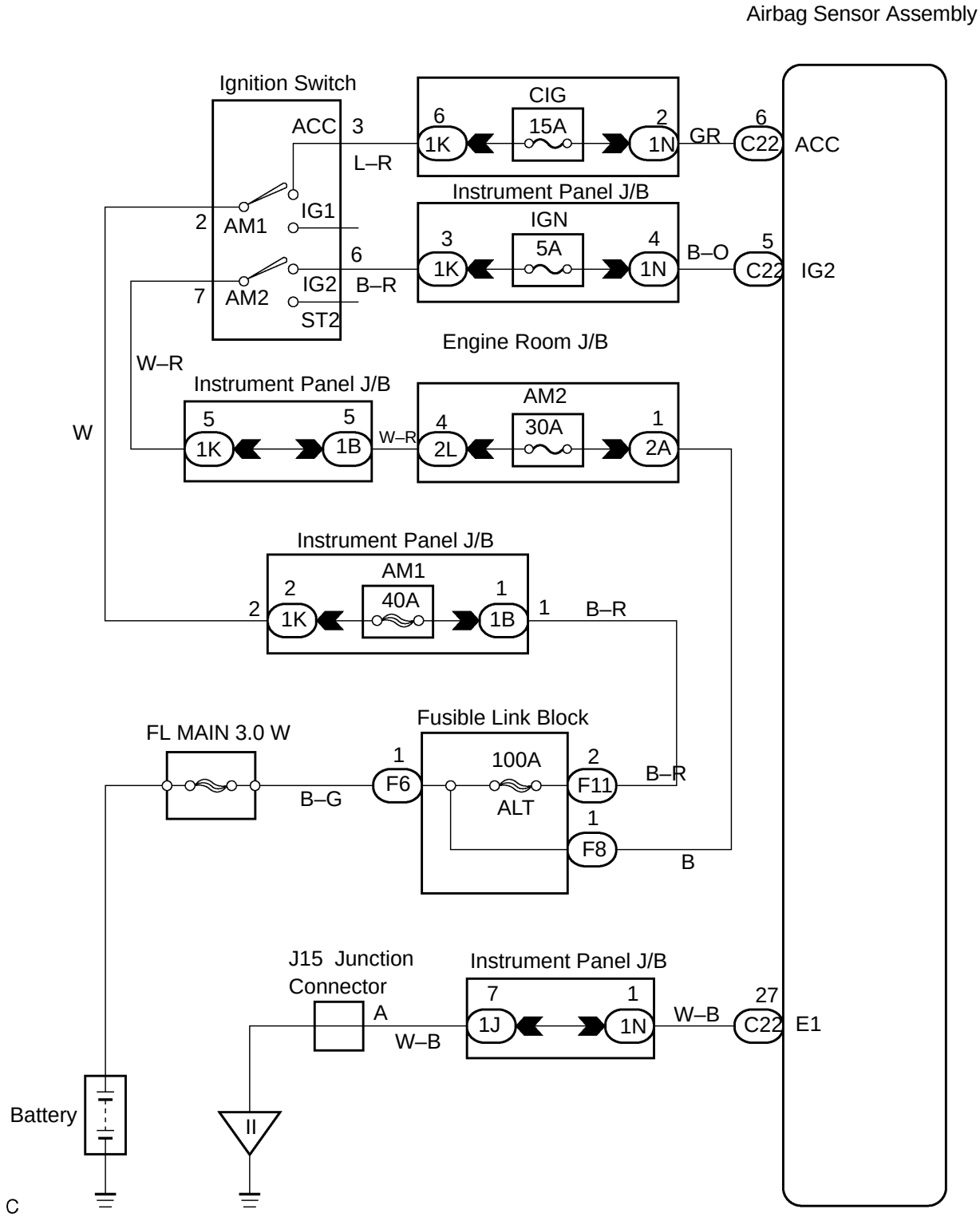
DTC	Normal	Source Voltage Drop

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 different from other circuits that is when the SRS warning light remains lit up and the DTC is a normal code, source voltage drop is indicated.
Malfunction in this circuit is not recorded in the airbag sensor assembly, and the source voltage returns to normal, the SRS warning light automatically goes off.

DTC No.	Diagnosis
(Normal)	Source voltage drop

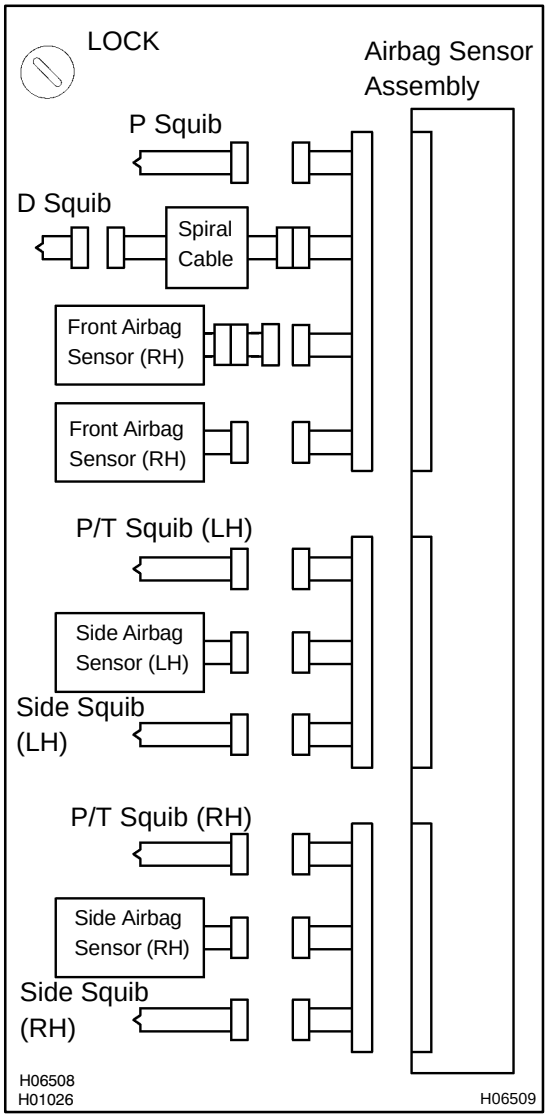
WIRING DIAGRAM



H14685

INSPECTION PROCEDURE

1	**Prepare for inspection.**



PREPARATION:

(a) Disconnect negative (–) terminal cable from the battery, and wait at least for 90 seconds.

(b) Remove the steering wheel pad. (See page SR–11)

(c) Disconnect the connector of the front passenger airbag assembly. (See page RS–28)

(d) Disconnect the connectors of the side airbag assembly RH and LH. (See page RS–40)

(e) Disconnect the connector of the airbag sensor assembly. (See page RS–52)

(f) Disconnect the connectors of the front airbag sensor RH and LH. (See page RS–57)

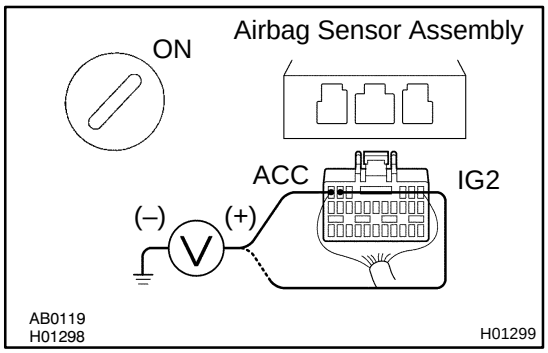
(g) Disconnect the connectors of the seat belt pretensioner RH and LH. (See page BO–119)

(h) Disconnect the connectors of the side airbag sensor assembly RH and LH. (See page RS–62)

CAUTION:

Store the steering wheel pad with the front surface facing upward.

2	Check source voltage.



PREPARATION:

Connect negative (–) terminal cable to the battery.

CHECK:

(a) Turn ignition switch to ON.

(b) Measure the voltage between each of IG2 and ACC and body ground, then operate electric system. (defogger, wiper, headlight, heater blower, etc.)

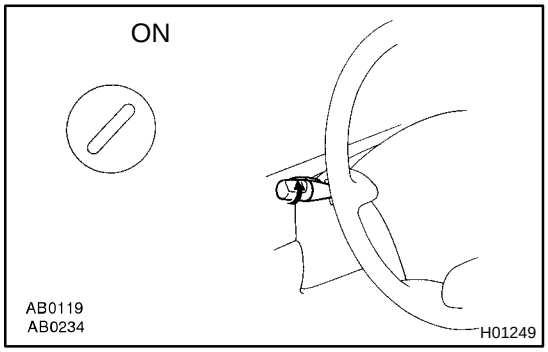
OK:

Voltage: 10 – 14 V

NG → **Check harness between battery and airbag sensor assembly, and check battery and charging system.**

OK

3	Does SRS warning light turn off?



PREPARATION:

(a) Turn ignition switch to LOCK.

(b) Connect the steering wheel pad connector.

(c) Connect the front passenger airbag assembly connector.

(d) Connect the side airbag assembly connectors.

(e) Connect the seat belt pretensioner connectors.

(f) Connect the airbag sensor assembly connector.

(g) Connect the front airbag sensor connectors.

(h) Connect the side airbag sensor assembly connectors.

(i) Turn ignition switch to ON.

CHECK:

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.

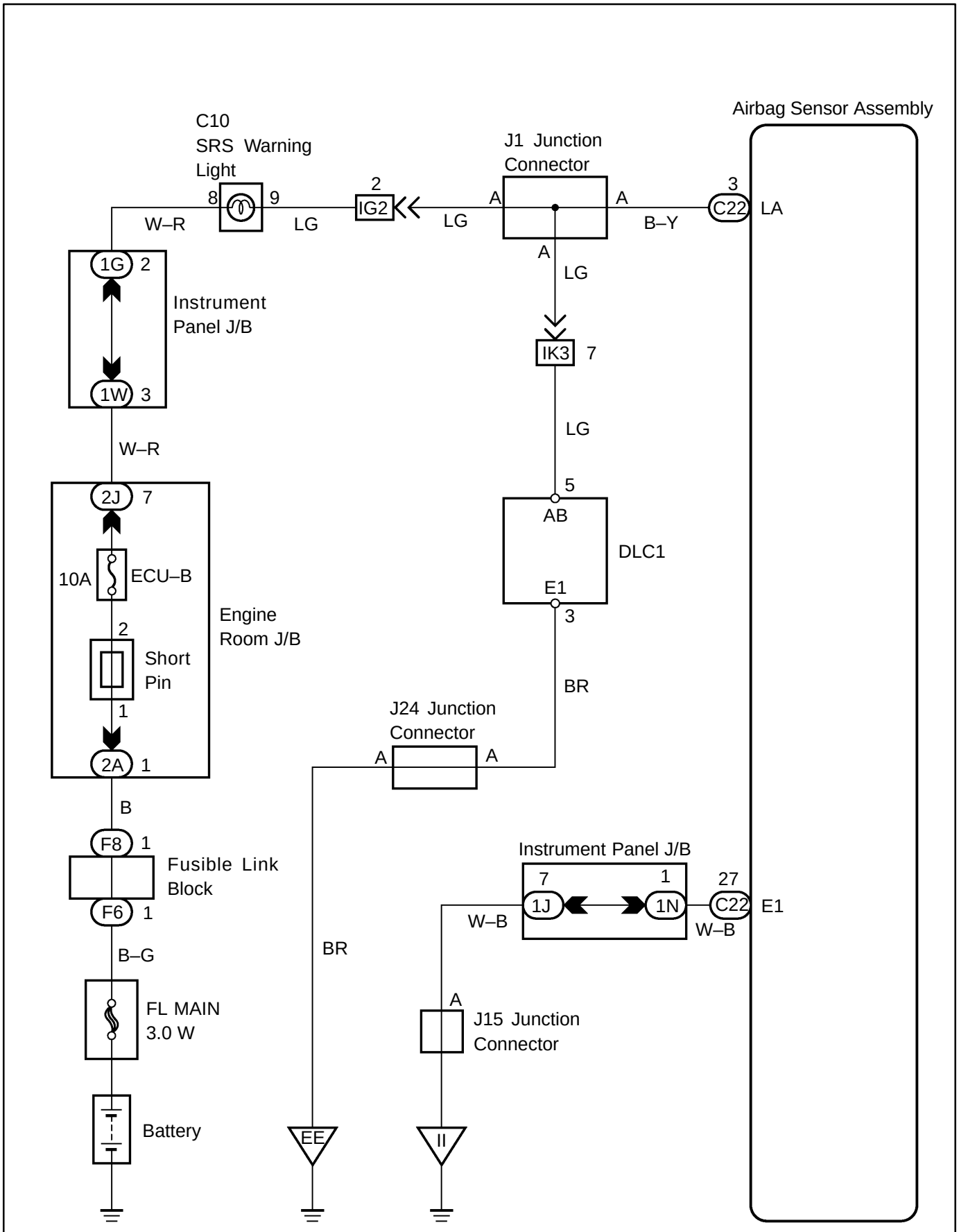
DI2I5–17

SRS Warning Light Circuit Malfunction (Always lights up, when ignition switch is in LOCK position.)

CIRCUIT DESCRIPTION

The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from the LOCK position to ACC or 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 terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by blinking the SRS warning light.

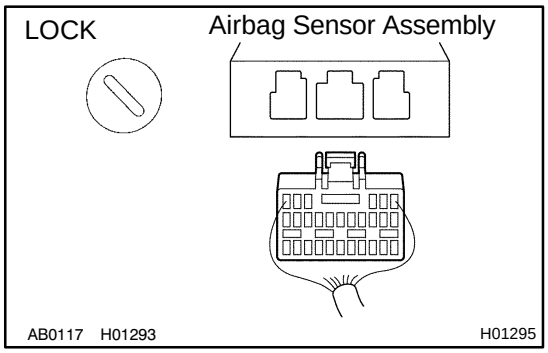
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Prepare for inspection. (See step 1 on page DI–547)**

2	**Does SRS warning light turn off?**



PREPARATION:

(a) Turn 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.
(d) Connect negative (–) terminal cable to the battery.

CHECK:

Check operation of SRS warning light.

NO → **Check SRS warning light circuit or terminal AB circuit of DLC1.**

YES

Replace airbag sensor assembly.

SRS Warning Light Circuit Malfunction (Does not light up, when ignition switch is turned to ACC or ON.)

CIRCUIT DESCRIPTION

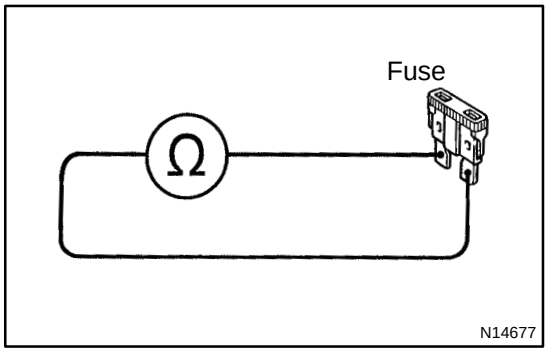
The SRS warning light is located on the combination meter.
When the SRS is normal, the SRS warning light lights up for approx. 6 seconds after the ignition switch is turned from LOCK position to ACC or ON position, and then turns off automatically.
If there is a malfunction in the SRS, the SRS warning light lights up to inform the driver of the abnormality When terminals Tc and E1 of the DLC1 are connected, the DTC is displayed by blinking the SRS warning light.

WIRING DIAGRAM

See page DI–551.

INSPECTION PROCEDURE

1	**Check ECU–B Fuse.**



PREPARATION:
Remove ECU–B fuse.
CHECK:
Check continuity of ECU–B fuse.
OK:

Continuity

HINT:

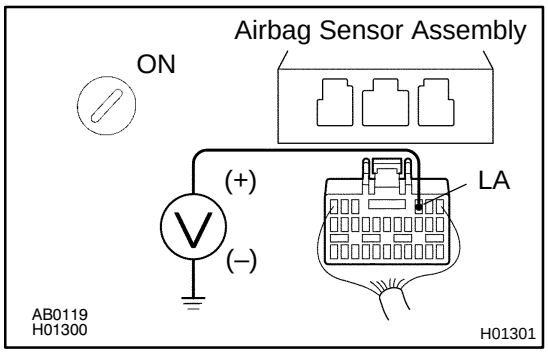
- Fuse may be burnt out even if it appears to be OK during visual inspection.
- If fuse is OK, install it.

NG	**Go to step 5.**

OK

2	**Prepare for inspection. (See step 1 on page DI–547)**

3	Check SRS warning light circuit.



PREPARATION:

(a) Connect negative (–) terminal cable to the battery.

(b) Turn ignition switch to ACC or ON.

CHECK:

Measure the voltage LA terminal of the harness side connector of the airbag sensor assembly.

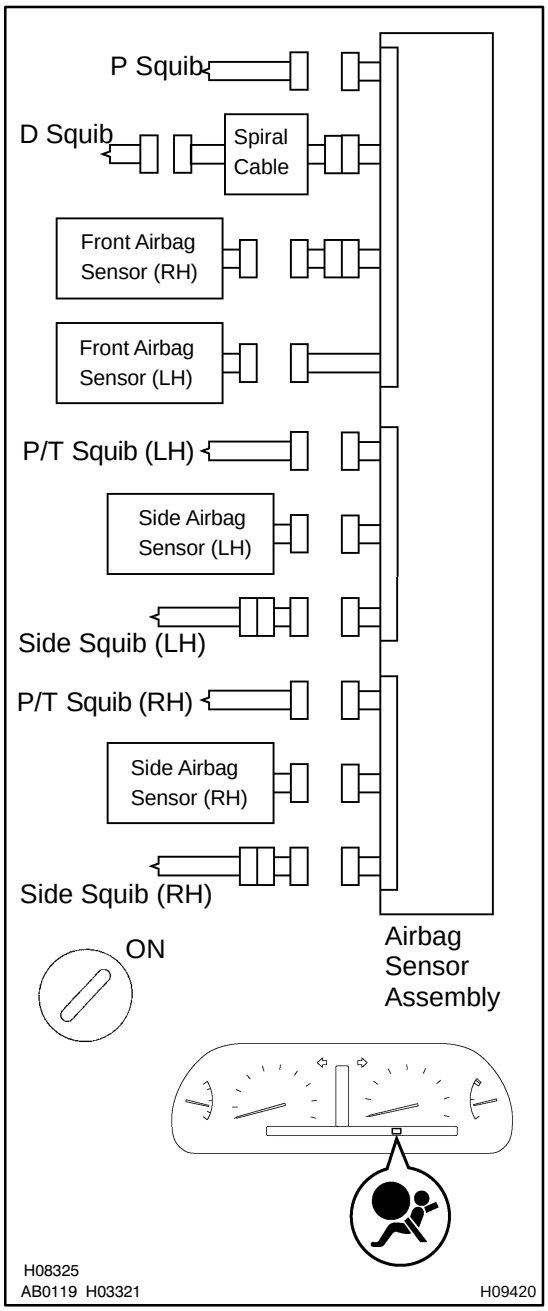
OK:

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 negative (–) terminal cable from the battery.
(b) Connect the airbag sensor assembly connector.
(c) Connect negative (–) terminal cable to the battery, and wait at least for 2 seconds.
(d) Turn ignition switch to ACC or ON.

CHECK:

Check operation of SRS warning light.

NO → **Check terminal LA of airbag sensor assembly. If normal, 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 ECU–B fuse burnt out again?**

NO → **Using simulation method, reproduce malfunction symptoms. (See page IN–21)**

YES

Check harness between ECU–B fuse and SRS warning light.

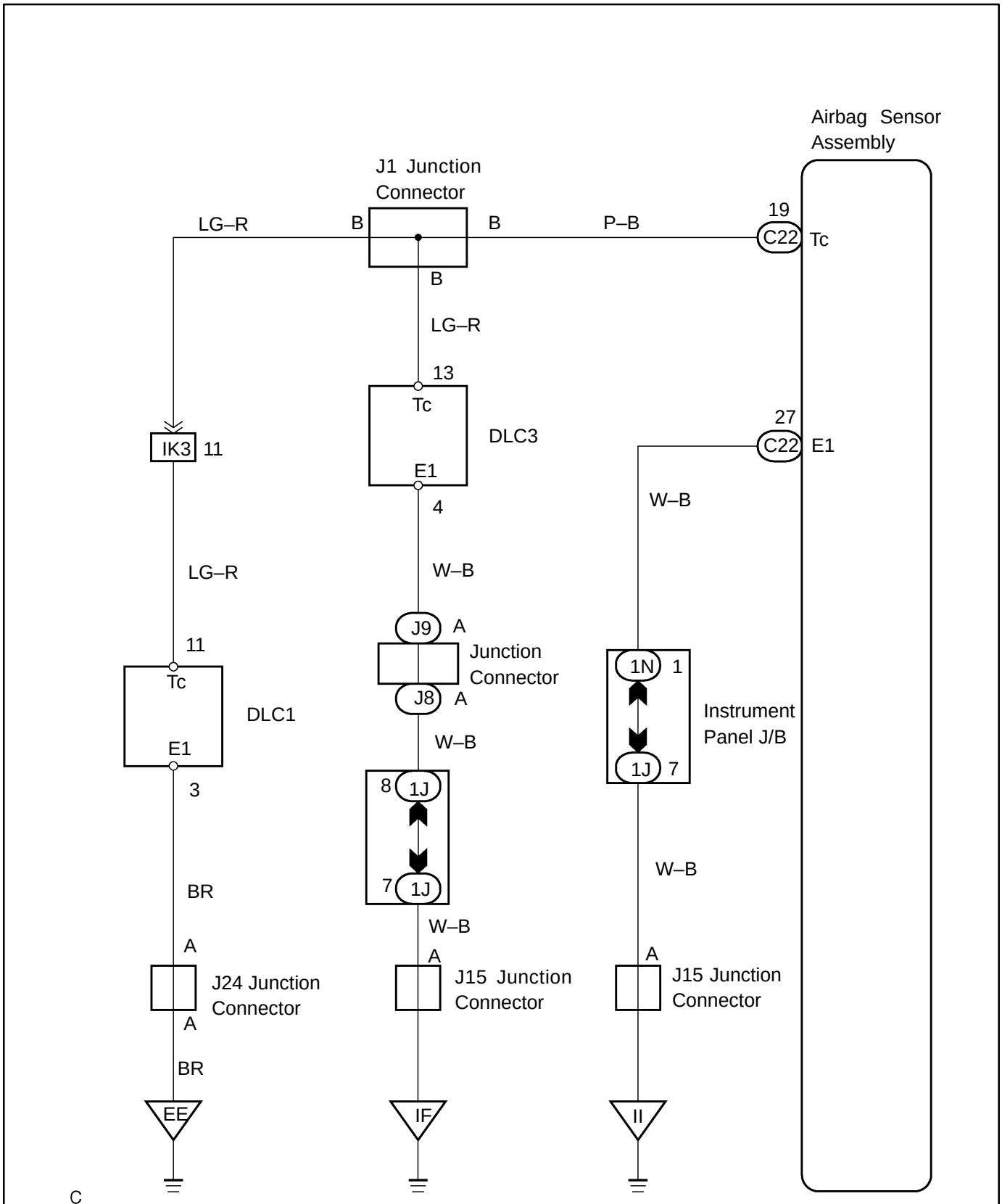
DI192–24

Tc Terminal Circuit

CIRCUIT DESCRIPTION

By connecting terminals Tc and E1 of the DLC1 the airbag sensor assembly is set in the DTC output mode. The DTCs are displayed by blinking the SRS warning light.

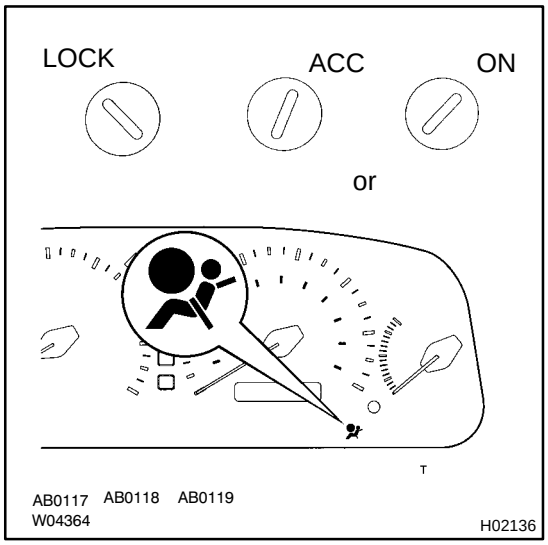
WIRING DIAGRAM



H14686

INSPECTION PROCEDURE
If the DTC is not displayed, do the following troubleshooting.

1	**Does SRS warning light light up for approx. 6 seconds?**

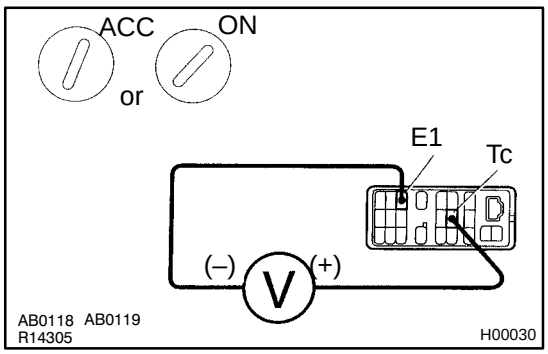


PREPARATION:
Check operation of the SRS warning light after ignition switch has been turned from LOCK position to ACC or ON position.

NO → **Check SRS warning light system. (See page DI–421)**

YES

2	**Check voltage between terminals Tc and E1 of DLC1.**

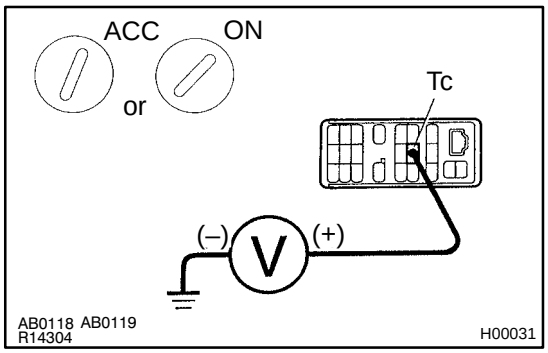


PREPARATION:
Turn ignition switch to ACC or ON.
CHECK:
Measure the voltage between terminals Tc and E1 of DLC1.
OK:
Voltage: 10 – 14 V

OK → **Go to step 4.**

NG

3	Check voltage between terminal Tc of DLC1 and body ground.



CHECK:

Measure the voltage between terminal Tc of DLC1 and body ground.

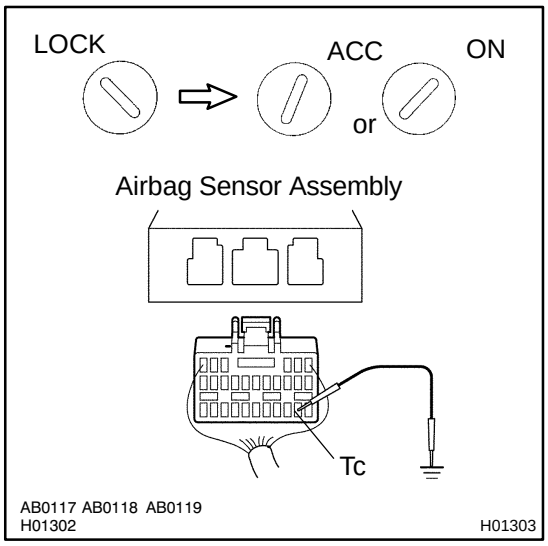
OK:

Voltage: 10 – 14 V

OK	Check harness between terminal E1 of DLC1 and body ground.

NG

4	Check airbag sensor assembly.



PREPARATION:

(a) Turn 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.
(d) Insert a service wire into terminal Tc from back side as shown in the illustration.
(e) Connect the airbag sensor assembly connector with a service wire.
(f) Connect negative (–) terminal cable to the battery.
(g) Turn ignition switch to ACC or ON and wait at least for 20 seconds.
(h) Connect a 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.

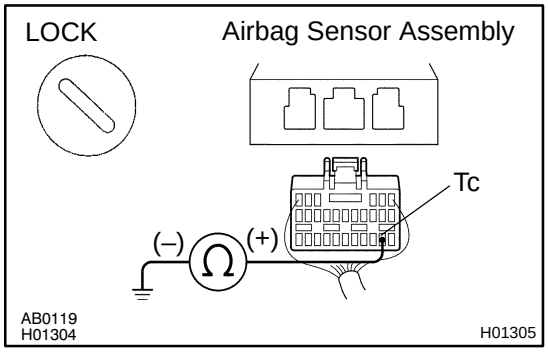
OK → **Check harness between the airbag sensor assembly and DLC1.**

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 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

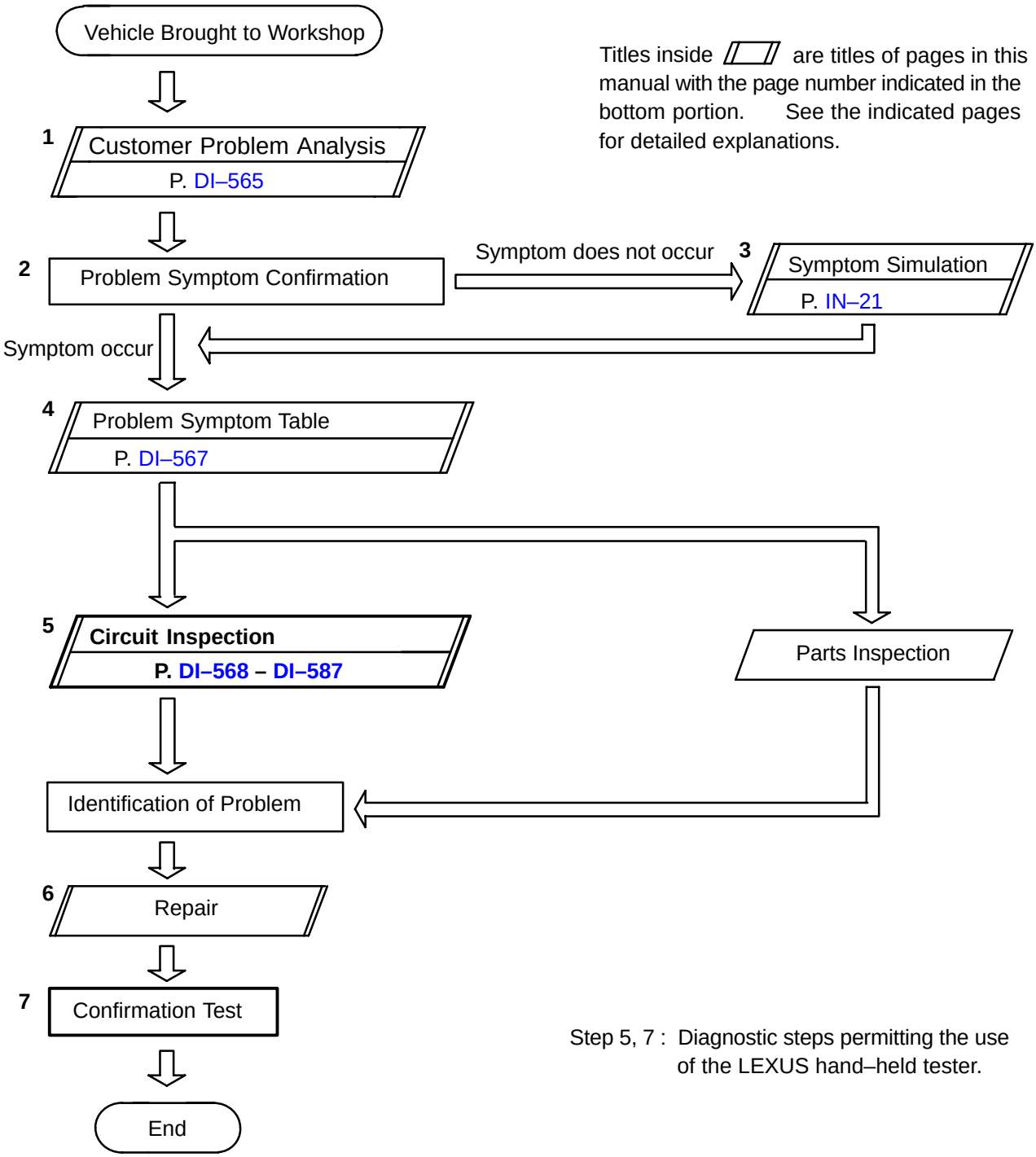
Replace airbag sensor assembly.

POWER SEAT CONTROL SYSTEM

DI0FP–09

HOW TO PROCEED WITH TROUBLESHOOTING

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 LEXUS hand–held tester.

DI0FR–05

CUSTOMER PROBLEM ANALYSIS CHECK

POWER SEAT CONTROL SYSTEM Check Sheet

Inspector's name: _____

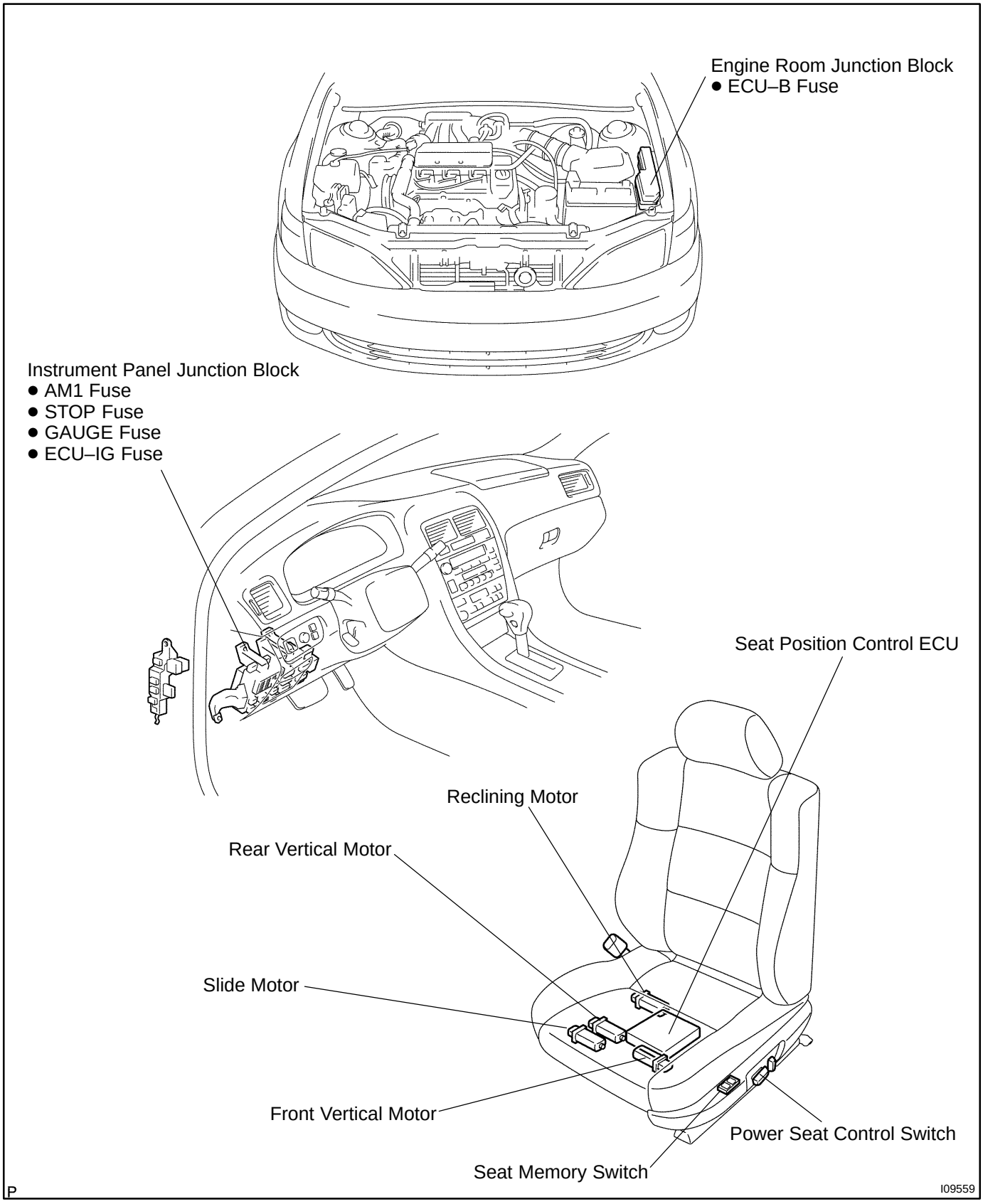
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date of Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Date Problem First Occurred	/ /
How Often Problem Occurs	● Continuous ● Intermittent (Times a day)

Problem Symptom	● Manual Function does not operate.	● Slide ● Front Vertical ● Rear Vertical ● Reclining
	● Return Function does not operate.	● Slide ● Front Vertical ● Rear Vertical ● Does not operate in any conditions ● Only with key inserted ● Only with key not inserted ● Only with memory & return switch 1 or 2
	● Memory function does not operate.	
	● Position return function does not stop when brake pedal is depressed.	

DI0FT–04

PARTS LOCATION



DI0FV–06

PROBLEM SYMPTOMS TABLE

Perform troubleshooting of the circuits for the applicable problem symptom in the order given in the chart below. Proceed to the page located for each circuit.

HINT:

- If the instruction ”Proceed to next circuit inspection shown on problem symptom table” 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 though there are no abnormalities in any of the other circuits, then check and replace the Seat Position Control ECU as the last step.

Symptom	Suspect Area	See page
Both manual & return functions do not operate(All functions).	3. +B power source circuit 4. Power seat control switch circuit 5. Motor circuit 6. Power seat control ECU	DI–568 DI–587 DI–572 IN–31
Both manual & return functions do not operate(One function only).	1. Motor circuit 2. Power seat control ECU	DI–572 IN–31
One or all functions do not operate for manual operation only.	1. Power seat control switch circuit 2. Power seat control ECU	DI–587 IN–31
Memory function does not operate.	1. Power seat memory switch circuit 2. Ignition switch circuit 3. Park/neutral position switch circuit 4. Power seat control ECU	DI–587 DI–583 DI–581 IN–31
Return operation does not stop when brake pedal is depressed.	1. Stop light switch circuit 2. Power seat control ECU	DI–579 IN–31
Only return function does not operate or operates a little, then stops (All return functions).	1. Power seat memory switch circuit 2. ECU power source circuit 3. Position sensor power source circuit 4. Power seat control ECU	DI–587 DI–570 DI–575 IN–31
Only return function does not operate or operates a little, then stops (Only one return function).	1. Position sensor circuit 2. Power seat control ECU	DI–577 IN–31

DI0FY–06

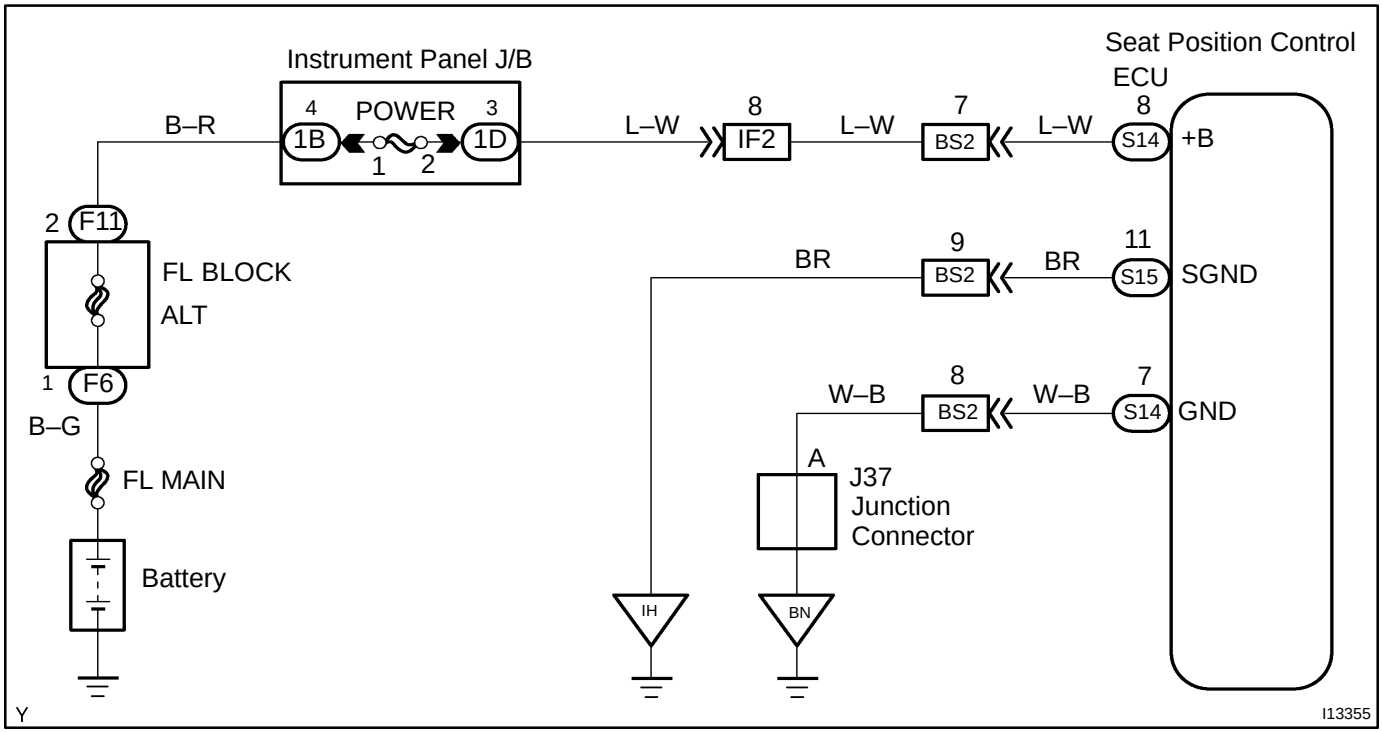
CIRCUIT INSPECTION

+B Power Source Circuit

CIRCUIT DESCRIPTION

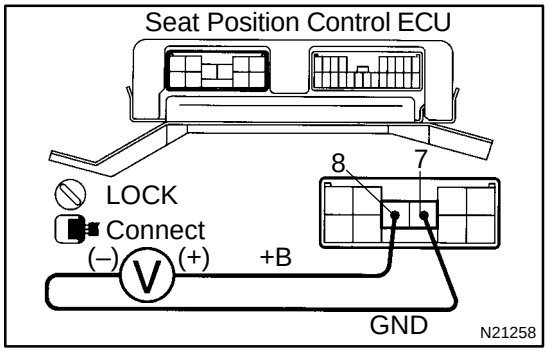
This is the power source for motors such as the slide motor, reclining motor, front vertical motor and rear vertical motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals +B and GND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminals +B and GND of Seat Position Control ECU connector.

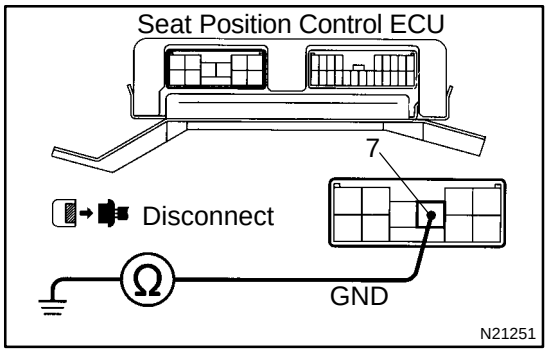
OK:

Voltage: 10 – 14 V

OK	**Proceed to next circuit inspection shown on problem symptom table (See page DI–567).**

NG

2	Check continuity between terminals GND of Seat Position Control ECU connector and body ground.



CHECK:

Measure resistance between terminals GND of Seat Position Control ECU connector and body ground.

OK:

Resistance: Continuity (below 1 Ω)

NG	Repair or replace harness or connector.

OK

3	Check AM1 fuse and POWER fuse.

NG	Check for short in all the harness and components connected to the AM1 and POWER fuse, and repair them (See attached wiring diagram).

OK

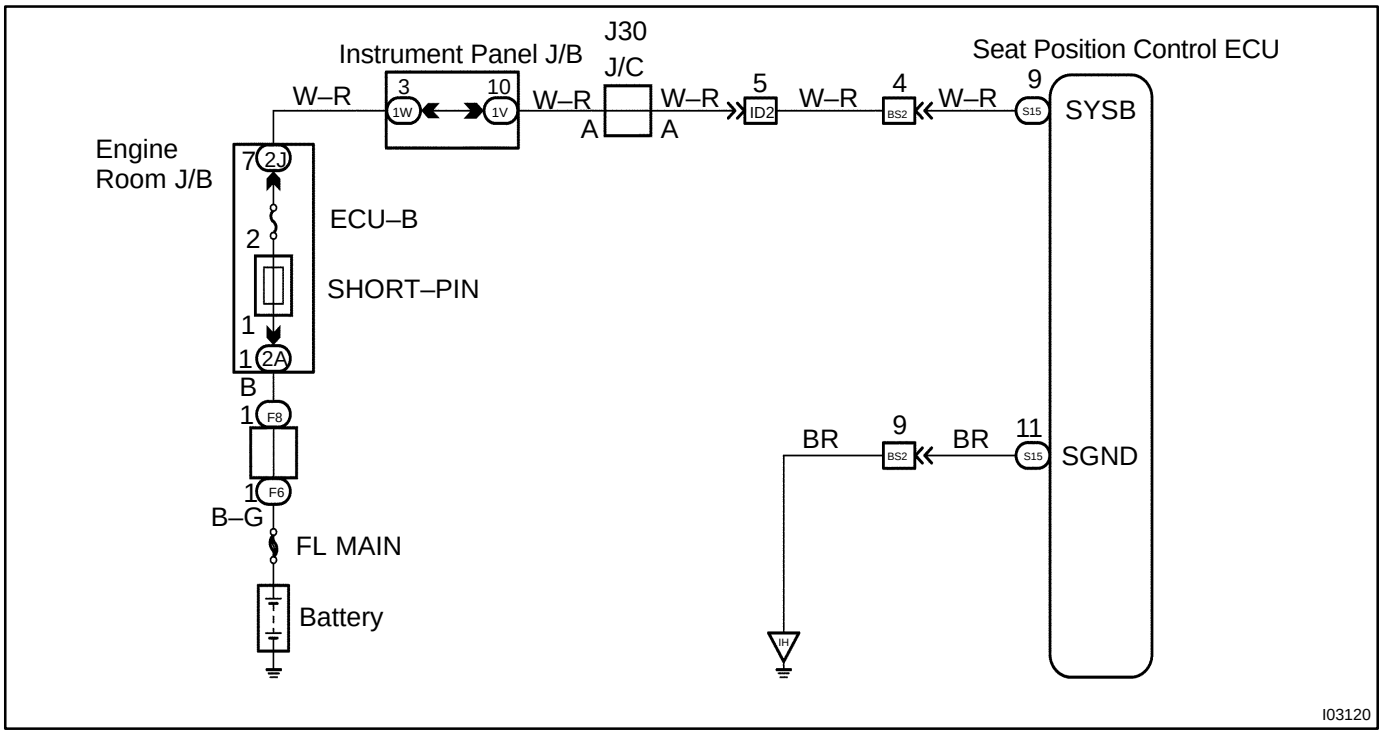
Check and repair harness or connector between Seat Position Control ECU and battery.

ECU Power Source Circuit

CIRCUIT DESCRIPTION

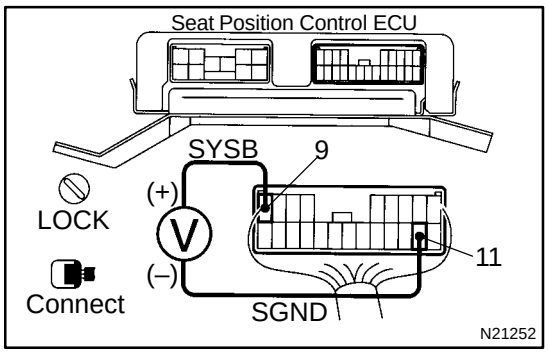
This circuit provides power for ECU operation and is also the power source for the sensor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals SYSB and SGND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminals SYSB and SGND of Seat Position Control ECU connector.

OK:

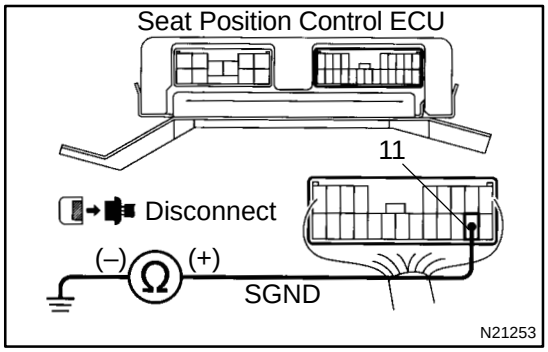
Voltage: 10 – 14 V

OK

Proceed to next circuit inspection shown on problem symptom table (See page DI–567).

NG

2	Check continuity between terminals SGND of Seat Position Control ECU connector and body ground.



CHECK:

Measure resistance between terminal SGND of Seat Position Control ECU connector and body ground.

OK:

Resistance: Continuity (below 1 Ω)

NG → **Repair or replace harness or connector.**

OK

3	Check ECU–B fuse.

NG → **Check for short in all the harness and components connected to ECU–B fuse and repair them (See attached wiring diagram).**

OK

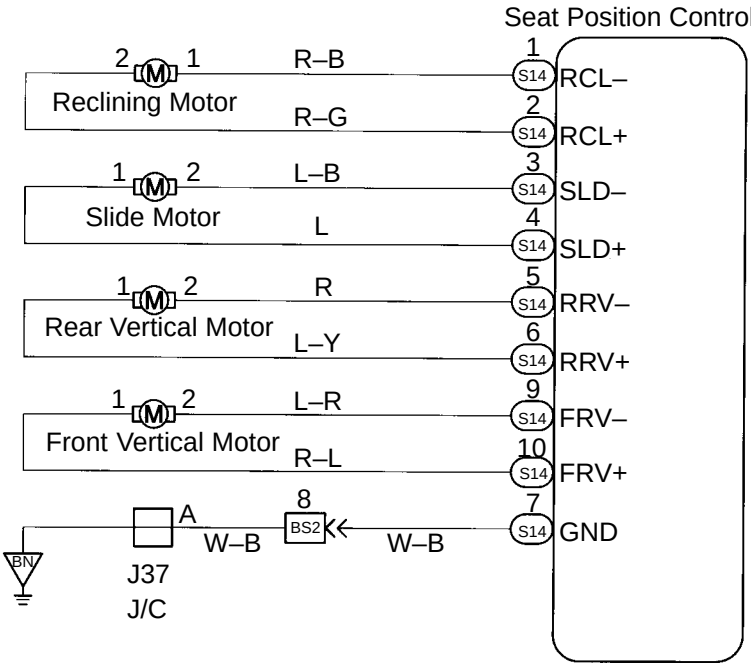
Check and repair harness or connector between Seat Position Control ECU and battery.

Motor Circuit

CIRCUIT DESCRIPTION

The Seat Position Control ECU controls the 4 motors for slide, front vertical, rear vertical and reclining.

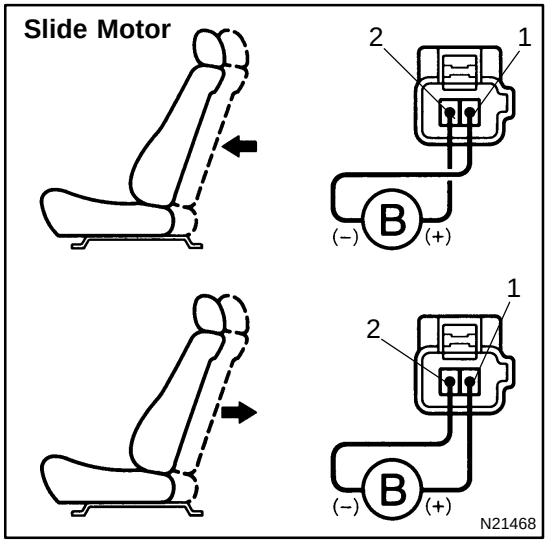
WIRING DIAGRAM



N21261

INSPECTION PROCEDURE

1	**Check motor.**



PREPARATION:

(a) Remove seat.

(b) Disconnect each motor connector.

CHECK:

Check seat movement when battery positive voltage is applied to each motor.

Slide Motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the slide motor connector.

OK:

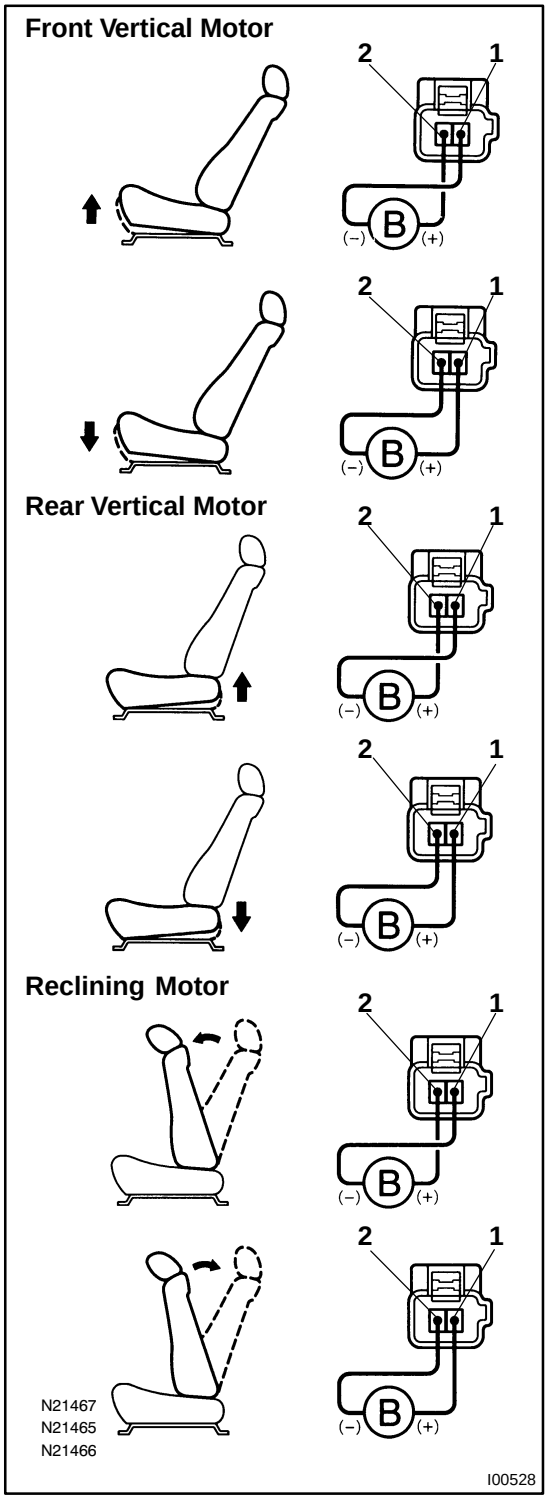
The seat moves forward.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the slide motor connector.

OK:

The seat moves backward.



Front Vertical Motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the front vertical motor connector.

OK:

The front of the seat cushion rises.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the front vertical motor connector.

OK:

The front of the seat cushion lowers.

Rear Vertical Motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the rear vertical motor connector.

OK:

The front of the seat cushion rises.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the rear vertical motor connector.

OK:

The front of the seat cushion lowers.

Reclining Motor

CHECK:

Connect battery ~ to terminal 2 and battery ⊖ to terminal 1 of the reclining motor connector.

OK:

The seat back returns to up right.

CHECK:

Connect battery ⊖ to terminal 2 and battery ~ to terminal 1 of the reclining motor connector.

OK:

The seat back is reclining.

OK

NG → **Replace motor.**

2	**Check harness and connector between Seat Position Control ECU and motor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on problem symptom table (See page DI–567).

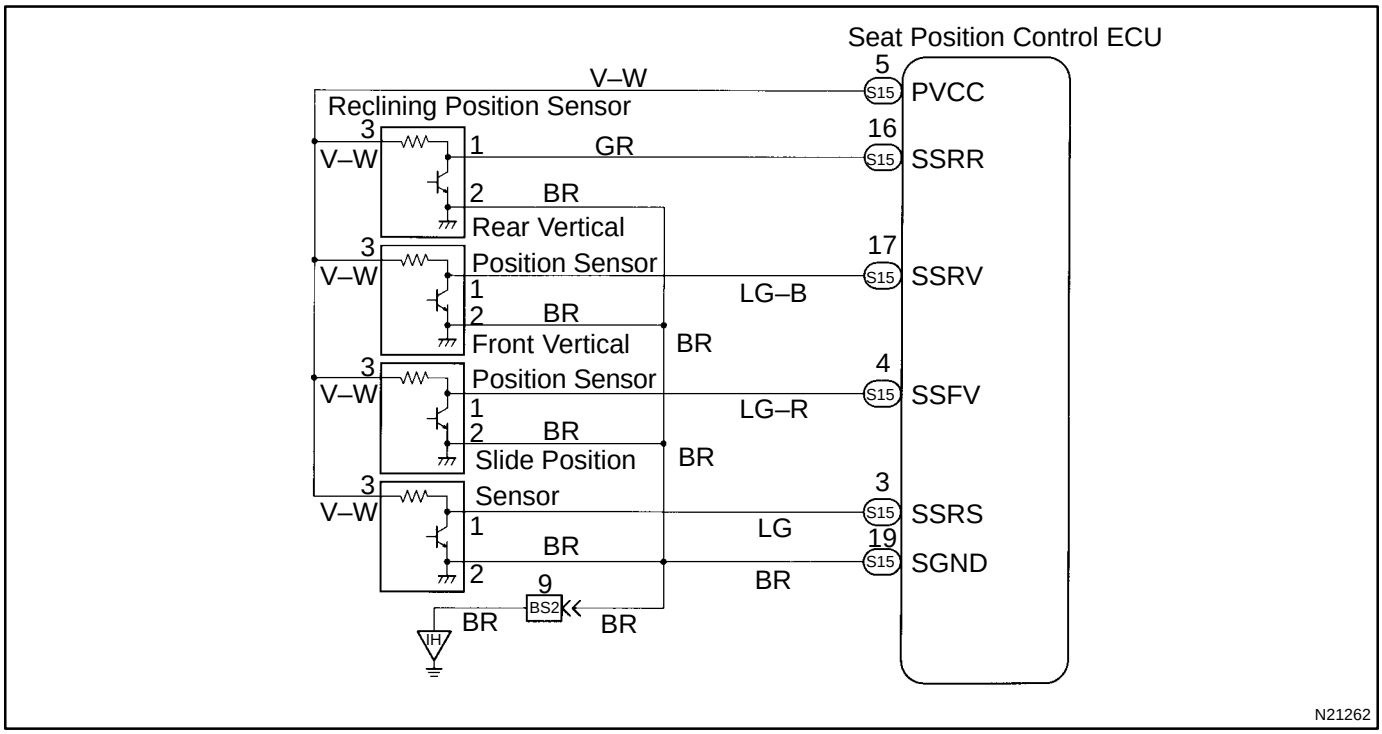
DI0G6–13

Position Sensor Power Source Circuit

CIRCUIT DESCRIPTION

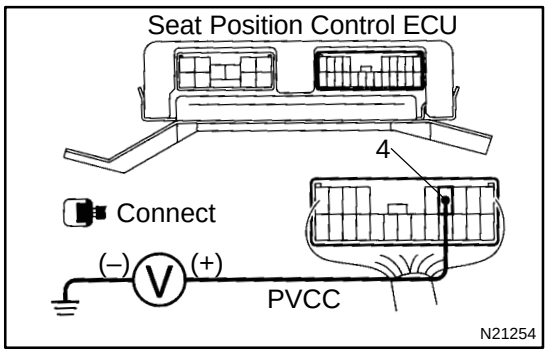
This circuit provides power to the slide, front vertical and reclining position sensors.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal PVCC of Seat Position Control ECU connector and body ground.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

While operating the Power Seat Control Switch and moving the seat, check voltage between terminal PVCC of Seat Position Control ECU connector and body ground.

OK:

Voltage: 7.2 – 8.8 V

OK	**Proceed to next circuit inspection shown on problem symptom table (See page DI–567).**

NG

2	**Check harness and connector connected to terminal PVCC of Seat Position Control ECU (See page IN–31).**

CHECK:

Check for open or short in the harness and check connectors for the position sensor power source circuit outlined in the diagram with a thick line (–).

NG → **Repair or replace harness or connector.**

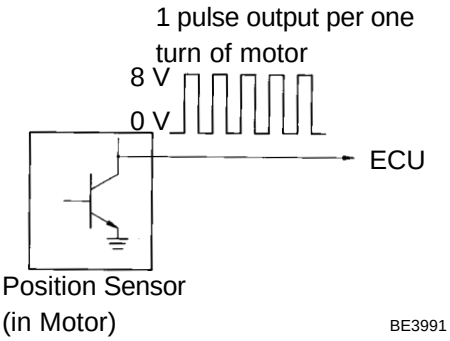
OK

Check and replace Seat Position Control ECU.

DI0G9–06

Position Sensor Circuit

CIRCUIT DESCRIPTION



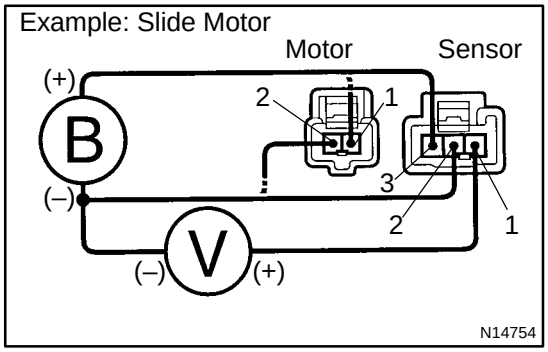
The position sensor senses movement of the seat and send pulse signals to the ECU. The position sensor sends pulse to the ECU in proportion to the amount of seat movement, as shown in the diagram on the left.
The ECU uses the number of pulses to constantly calculate the position relative to the memory position and returns the seat to the memorized position.
If a malfunction occurs in a position sensor and a sensor signal is not input to the ECU even when the motor operates, the ECU prohibits return operation.

WIRING DIAGRAM

See page DI–575.

INSPECTION PROCEDURE

1	**Check position sensor.**



PREPARATION:
Disconnect the connector of the sensor and the connector of the motor leading to the sensor.

CHECK:
(a) Connect positive ~ lead to terminal 3 of sensor and negative ⊖ lead to terminal 2.
(b) Measure voltage between terminal 1 of sensor and body ground when battery positive voltage is applied between terminals 1 and 2 of motor connector.

HINT:
When the battery positive voltage is applied to the motor connector terminals, ~ and ⊖ are interchangeable.

OK:

Condition	Voltage
Motor stopped (Check several times with the motor in a different position each time.)	0 V or battery positive voltage according to stop position.
with motor turning	half of battery positive voltage

NG → **Replace position sensor.**

OK

2	**Check harness and connectors between Seat Position Control ECU and position sensors (See page IN–31).**

NG → **Repair or replace harness or connectors.**

OK

Check and replace Seat Position Control ECU.

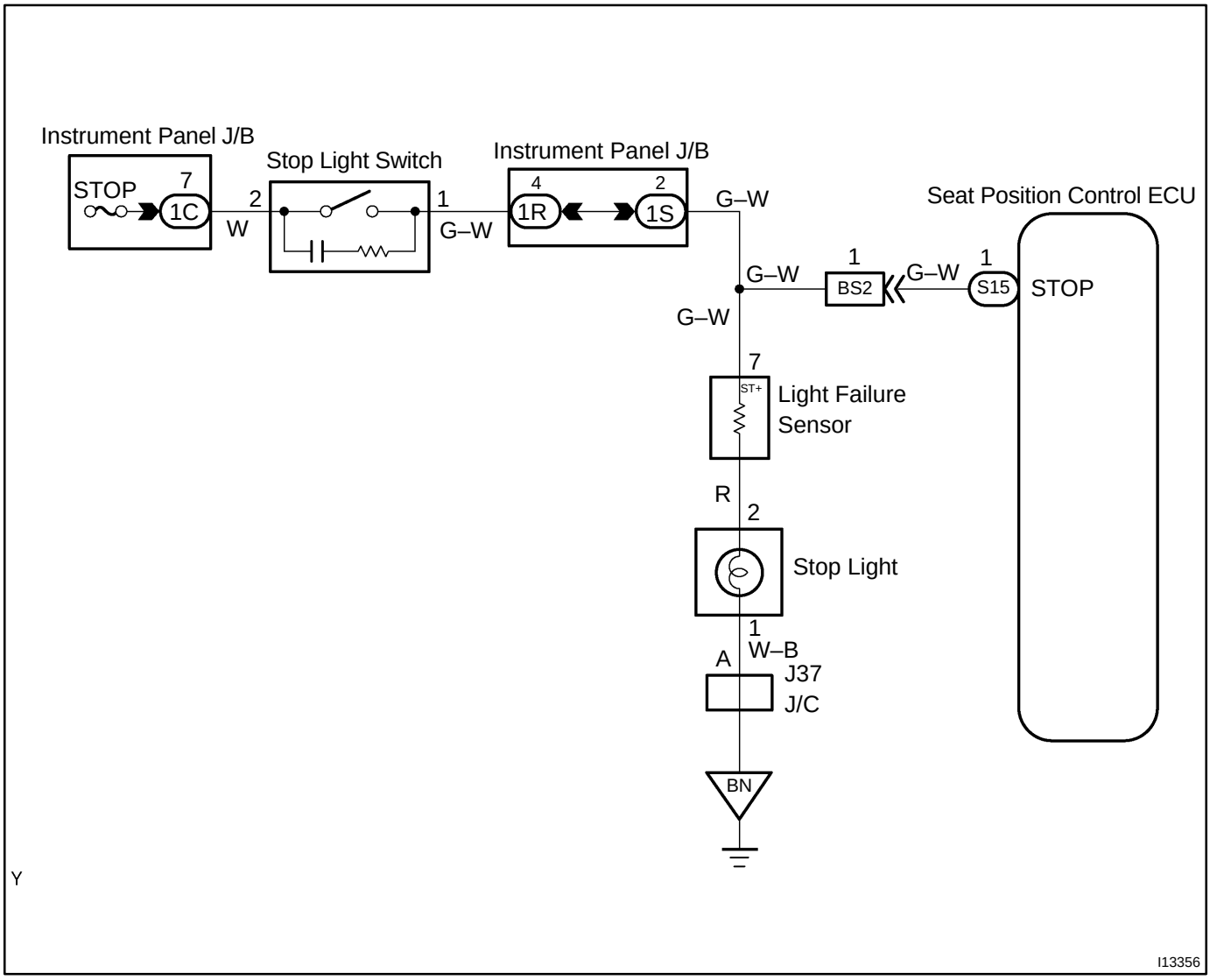
DI0GB–07

Stop Light Switch Circuit

CIRCUIT DESCRIPTION

The stop light switch sends a brake ON or OFF signal to the ECU. When the ECU receives a brake ON signal, it prohibits return operation of the seat.

WIRING DIAGRAM



INSPECTION PROCEDURE

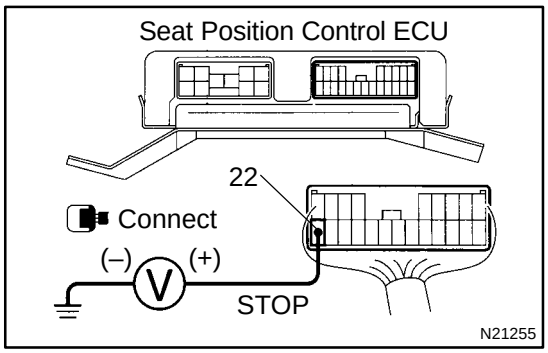
1	**Check stop light operation.**

CHECK:
Check that the stop light comes on when the brake pedal is depressed, and turns off when the pedal is released.

NG → **Check stop light circuit (See page BE–3).**

OK

2	**Check voltage between terminal STOP of Seat Position Control ECU connector and body ground.**



PREPARATION:
Remove Seat Position Control ECU with connectors still connected.

CHECK:
Measure voltage between terminal STOP of Seat Position Control ECU and body ground when the brake pedal is depressed and released.

OK:

Brake pedal	Voltage
Depressed	10 – 14 V
Released	0 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–567).**

NG

Check and repair harness and connector between Seat Position Control ECU and stop light switch.

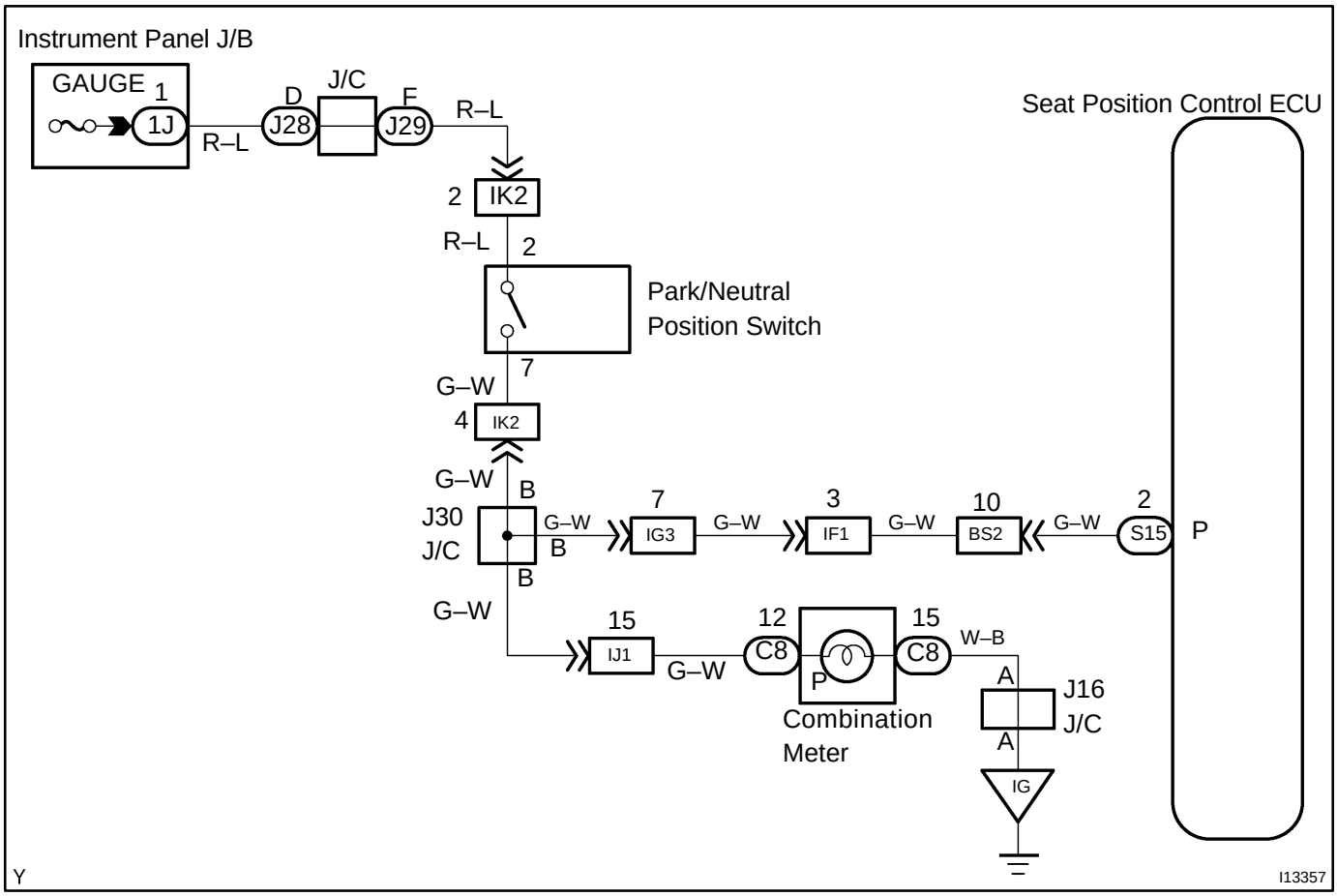
DI0GE–05

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

The park/neutral position switch detects the P position when the lever is shifted into P and sends a signal to the ECU. When the return switch is turned ON with the IG SW ON and the shift in P position, the ECU performs return operation.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check shift position indicator.**

CHECK:

Check that P lights up on the shift indicator when P position is shifted into, and that P is OFF when shifting into another position.

NG	**Check shift position indicator circuit (See page BE–3).**

NG

2	**Check voltage between terminal P of Seat Position Control ECU connector and body ground.**

PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

(a) Turn ignition switch ON.

(b) Measure voltage between terminal P of Seat Position Control ECU connector and body ground when the shift lever is positioned in the following ranges.

OK:

Shift position	Voltage
P	10 ~ 14 V
Other than P	0 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–567).**

NG → **Check and repair harness and connector between Seat Position Control ECU and park/neutral position switch.**

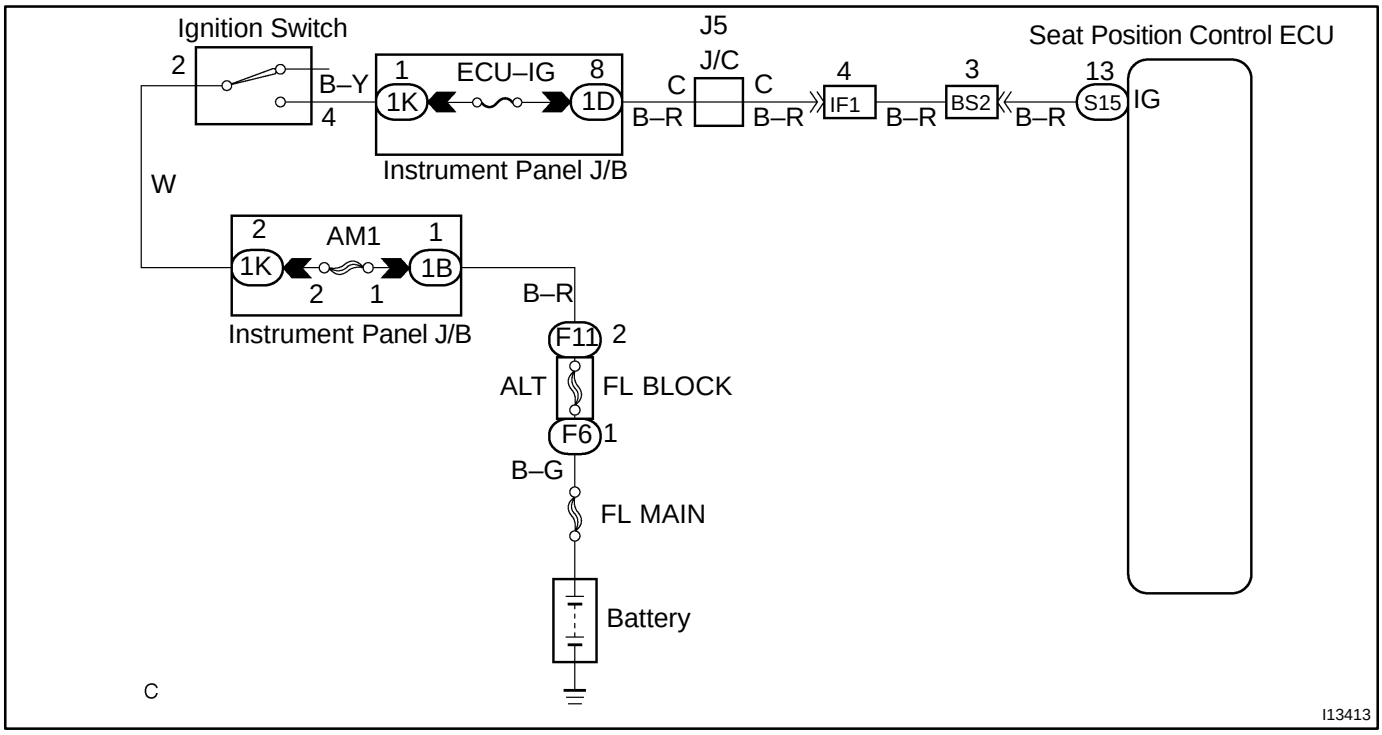
DI0GF–13

Ignition Switch Circuit

CIRCUIT DESCRIPTION

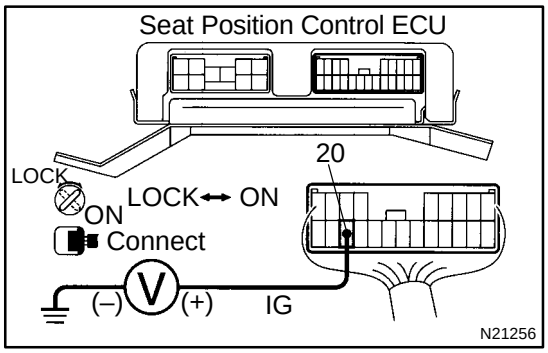
This circuit sends an ignition switch ON or OFF signal to the ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal IG of Seat Position Control ECU connector and body ground.**



PREPARATION:
Remove Seat Position Control ECU with connectors still connected.

CHECK:
Measure voltage between terminal IG of Seat Position Control ECU connector and body ground when ignition switch is ON and OFF.

OK:

Ignition switch	Voltage
ON	10 – 14 V
OFF	0 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–567).**

NG

2	**Check ECU–IG fuse.**

NG → **Check for short in all the harness and components connected to ECU–IG fuse.**

NG

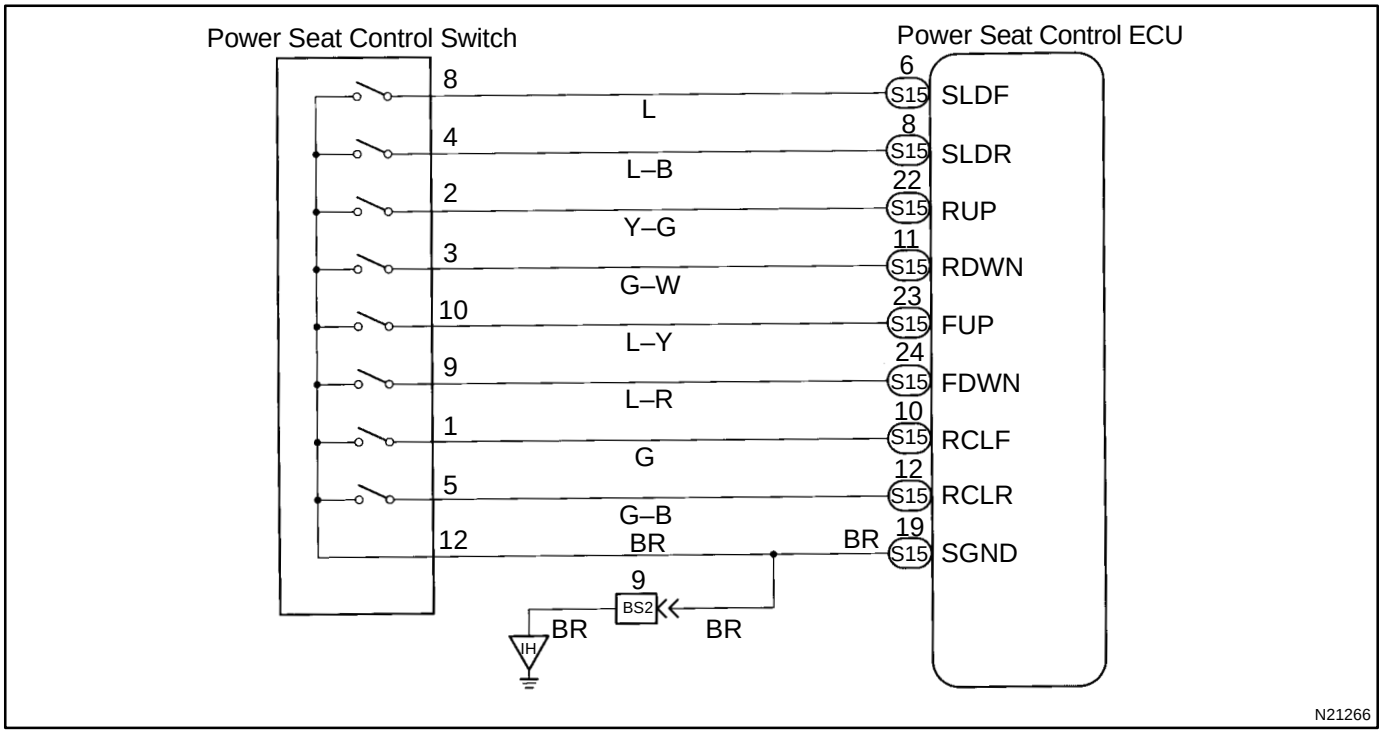
Check and repair harness or connector between Seat Position Control ECU and battery.

Power Seat Control Switch Circuit

CIRCUIT DESCRIPTION

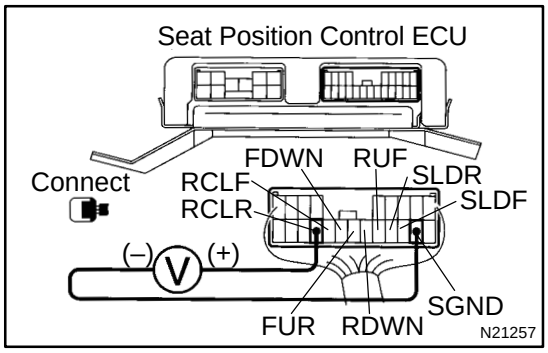
When the power seat control switch is operated, a signal is sent from the power seat control switch to the ECU and the ECU sends a signal to the motor to make it operate.
Even if a malfunction should occur with the position sensor and return operation is prohibited, manual operation will occur as normal.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between each terminal of the Power Seat Control Switch and SGND of Seat Position Control ECU connector.**



PREPARATION:
Remove Seat Position Control ECU with connectors still connected.

CHECK:
Measure voltage between each terminal of the Power Seat Control Switch and SGND of Seat Position Control ECU connector. (The illustration shows inspection of the reclining as an example.)

OK:

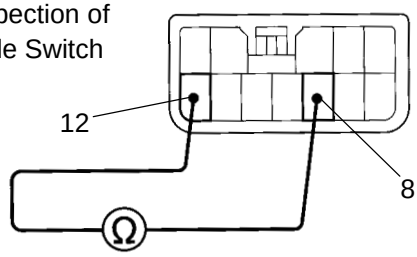
At each terminal with switch ON	0 V
At each terminal with switch OFF	10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–567).**

NG

2	**Check power seat control switch.**

(Example)
Inspection of
Slide Switch



PREPARATION:
Disconnect power seat control switch connector.
CHECK:
Check continuity of each terminal.
OK:

Switch position	Terminal
Neutral	–
Slide switch FRONT	8 – 12
Slide switch BACK	4 – 12
Front vertical switch UP	10 – 12
Front vertical switch DOWN	10 – 12
Rear vertical switch UP	2 – 12
Rear vertical switch DOWN	3 – 12
Reclining switch FORWARD	1 – 12
Reclining switch REARWARD	5 – 12

NG → **Replace power seat control switch.**

OK

3	**Check harness and connectors between Seat Position Control ECU and power seat control switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

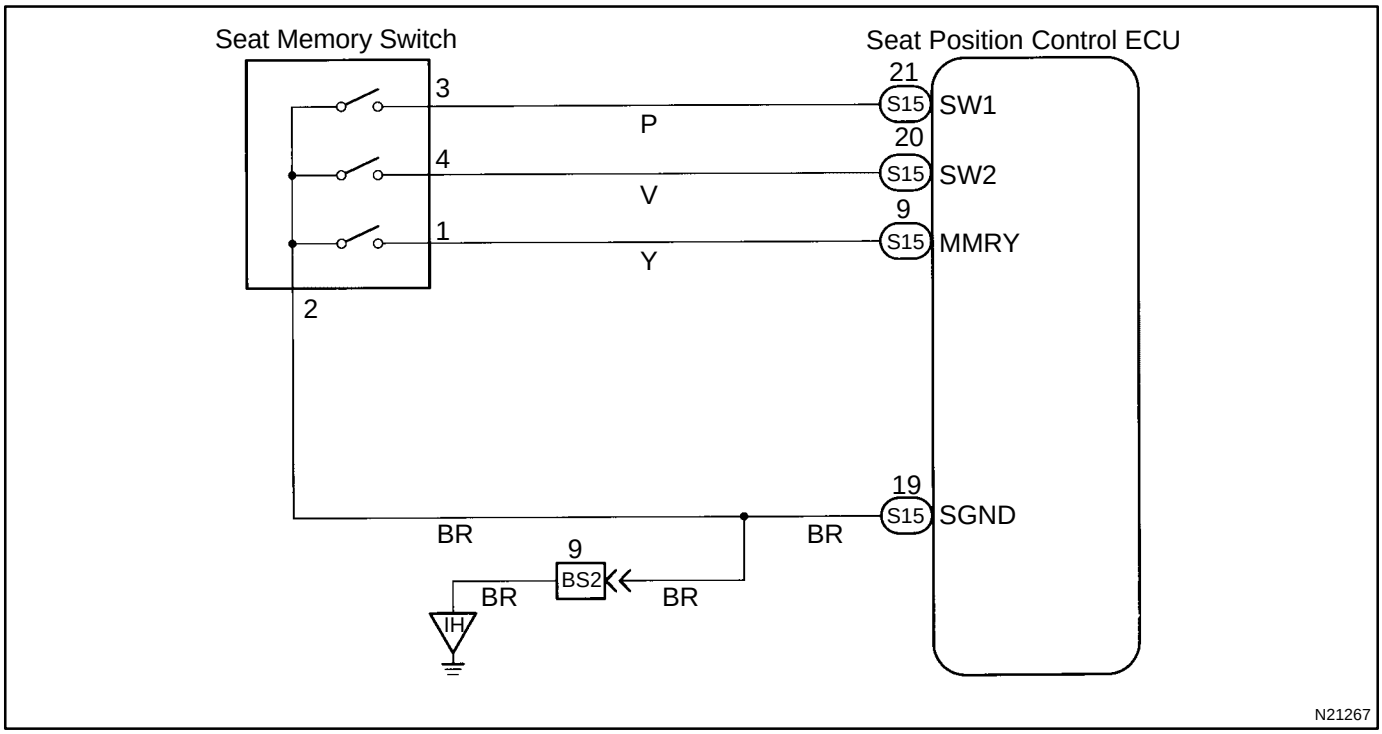
Check and replace Seat Position Control ECU.

Seat Memory Switch

CIRCUIT DESCRIPTION

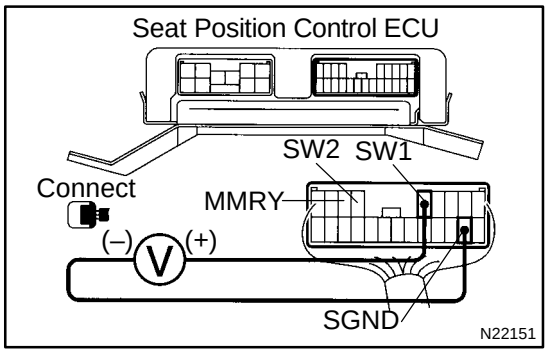
Seat memory switch send memory and return signals to the seat position control ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between each terminal of the seat memory switch and SGND of Seat Position Control ECU connector.**



PREPARATION:

Remove Seat Position Control ECU with connectors still connected.

CHECK:

Measure voltage between terminal of the seat memory switch and SGND of Seat Position Control ECU connector.

(The illustration shows inspection of the Memory 1 as an example.)

OK:

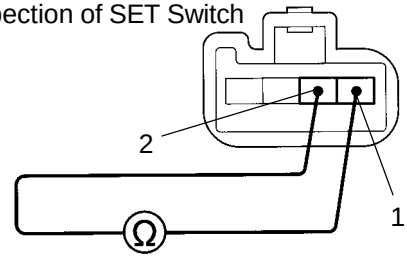
At each terminal with switch ON	0 V
At each terminal with switch OFF	10 – 14 V

OK	**Proceed to next circuit inspection shown in problem symptom table (See page DI–567).**

NG

2	Check seat memory switch.

(Example)
Inspection of SET Switch



PREPARATION:
Disconnect seat memory switch connector.
CHECK:
Check continuity of each terminal.
OK:

Switch position	Terminal
SET switch ON	1 – 2
Memory switch 1	2 – 3
Memory switch 2	2 – 4

NG → Replace seat memory switch.

OK

3	Check harness and connectors between Seat Position Control ECU and seat memory switch (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace Seat Position Control ECU.

THEFT DETERRENT SYSTEM

DI01P–14

HOW TO PROCEED WITH TROUBLESHOOTING

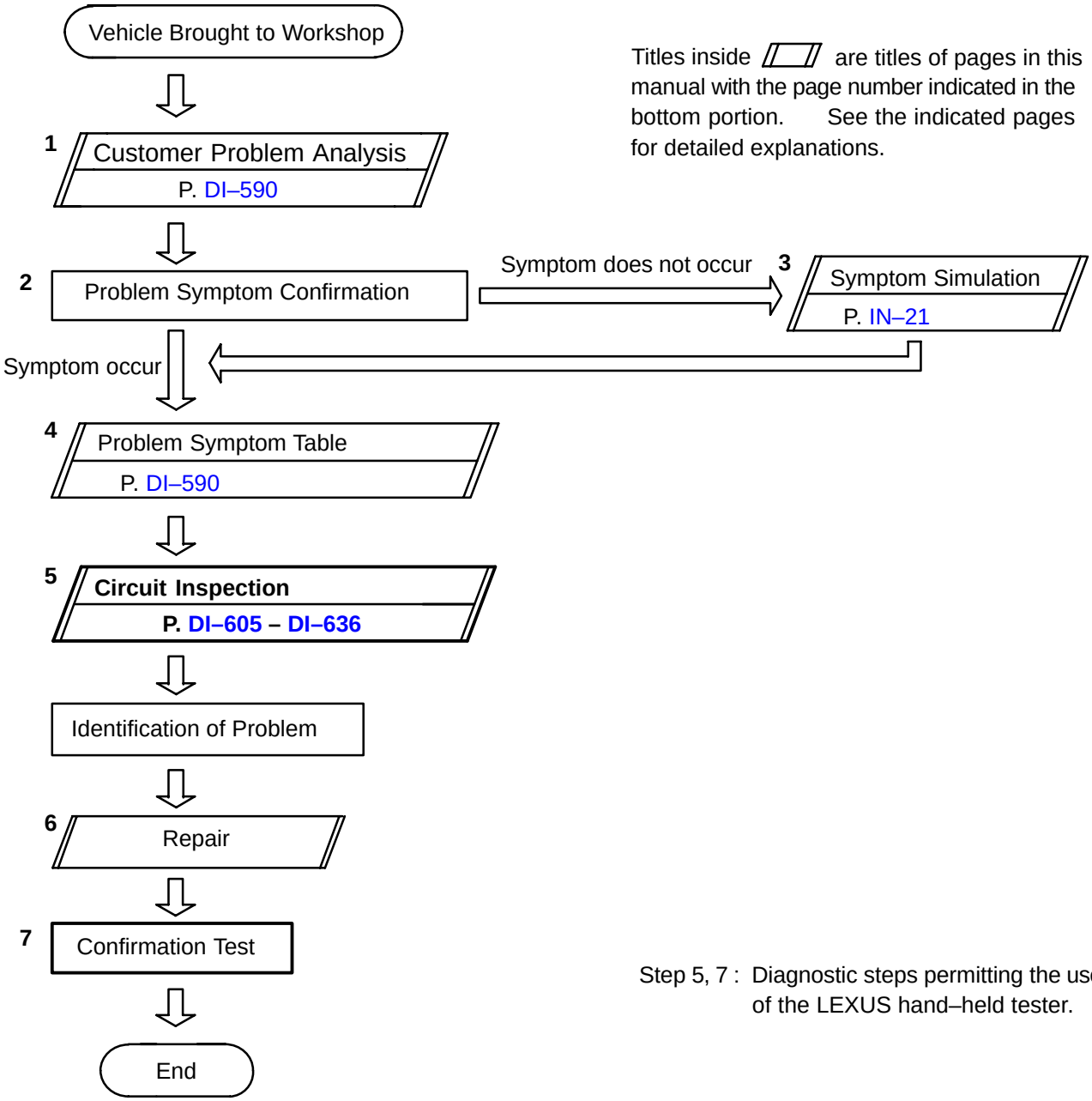
HINT:

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 LEXUS hand–held tester.

DI01Q–08

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		● 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))

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
	● System cannot be canceled once set.	● 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.		

DI8YE–01

PRE–CHECK

1. THEFT DETERRENT SYSTEM

When the system is set to the theft deterrent mode and any of the following conditions are met, the system sounds the horns and flashes the headlights and the taillights for approx. 1 minute.

At the same time the system locks all doors (If all door are not locked at once, the system repeats door locking operation every 6.38 seconds during the one minute alarm time).

There are 2 modes in this system, which are active mode and passive mode.

All initial setting are performed in active mode. It can be switched to passive mode by specified operation. (See step 4. CHANGING METHOD OF PASSIVE MODE)

Condition:

Any of the doors (Including the engine hood and luggage compartment door) is unlocked or opened without the key. *1

The battery terminal is disconnected and reconnected.

The system receives panic signal from remote keyless entry. *2

*1: Only active arming mode.

*2: When the ignition key is not inserted in the key cylinder.

There are 4 conditions in this system which are disarming condition, disarming preparation condition, arming condition and alarming condition.

(a) Disarming condition:
  (1) When a user is near the vehicle.
  (2) When the alarming function does not operate.
  (3) When theft deterrent function is not performed.

(b) Disarming preparation condition:
  (1) Time from a user locks a door to be leaves the vehicle.
  (2) Time until transferring to disarming condition.
  (3) Theft deterrent function is not performed.

(c) Arming condition:
  (1) When a user leaves the vehicle completely.
  (2) When theft deterrent function is possible.

(d) Alarming condition:
Is this condition, once theft is detected, it is informed using light and sound to people around the vehicle.
Refer to the table for alarming method or time.

Alarming method	Horn
	Security horn
	Headlight
	Taillight
Alarming time	60 seconds
Alarming output	Continuous 0.40 secs. (ON) 0.40 secs. (OFF)

In the arming condition when either of doors is unlocked and with not key in the key cylinder, force lock signal is output.

2. ACTIVE ARMING MODE

Disarming condition (Key not inserted in ignition cylinder.)

Any of the following conditions is met
- When all doors and engine hood are closed, lock all the doors using a key.
- When all doors and engine hood are closed, lock all the doors using wireless remote function.
- When all doors and engine hood are closed, open and close either of doors and engine hood then close and lock all doors and engine hood.

Disarming preparation condition

Any of the following conditions is met ● Close and open either of all doors and engine hood. ● Lock and unlock either of doors. ● Insert a key into the ignition key cylinder. ● Reconnect the battery.	Any of the following conditions is met ● 30 seconds elapse when the engine hood is closed and all doors are locked.

Arming condition

Any of the following conditions is met ● Unlock the locked doors using the wireless remote function. ● Unlock the locked doors using the key. ● Insert the key into the ignition key cylinder and turn the ignition key ON.	Any of the following conditions is met ● Either of closed doors opens. ● Either of locked doors is unlocked by any operation other than key or wireless remote function. ● The closed engine hood is opened. ● The battery is reconnected. ● Ignition switch turned to ON.

Alarming condition

In this mode, once theft is detected, it is informed using light and sound to people around the vehicle. The alarming time described above passes.	Any of the following conditions is met ● Unlock the locked doors using the wireless remote function. ● Unlock the locked doors using the key. ● Insert the key into the ignition key cylinder and turn the ignition key ON.

Indicator light output:

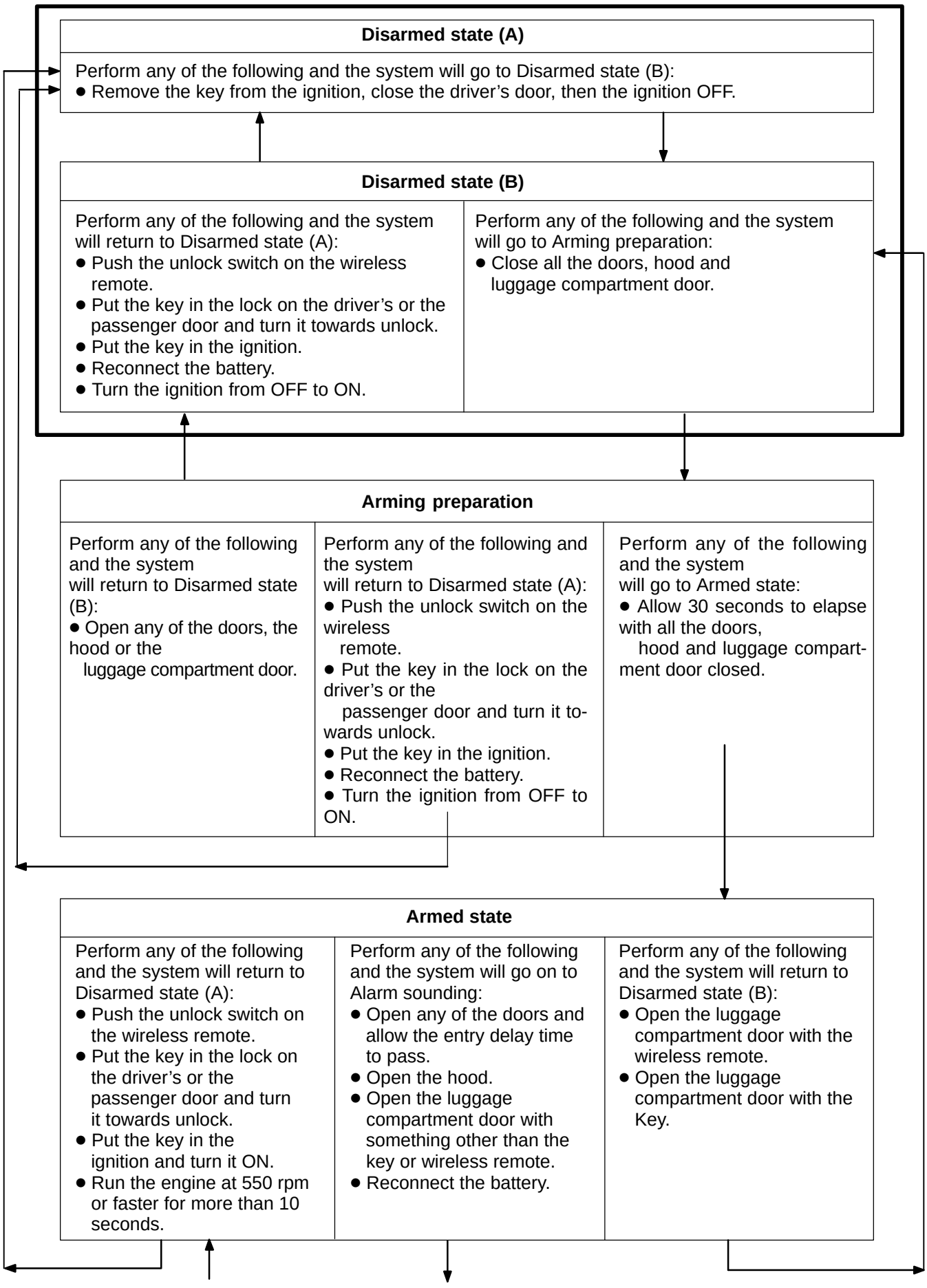
Condition	Indicator light
Disarming condition	OFF
Arming preparation condition	ON
Arming condition	OFF
Alarming condition	ON

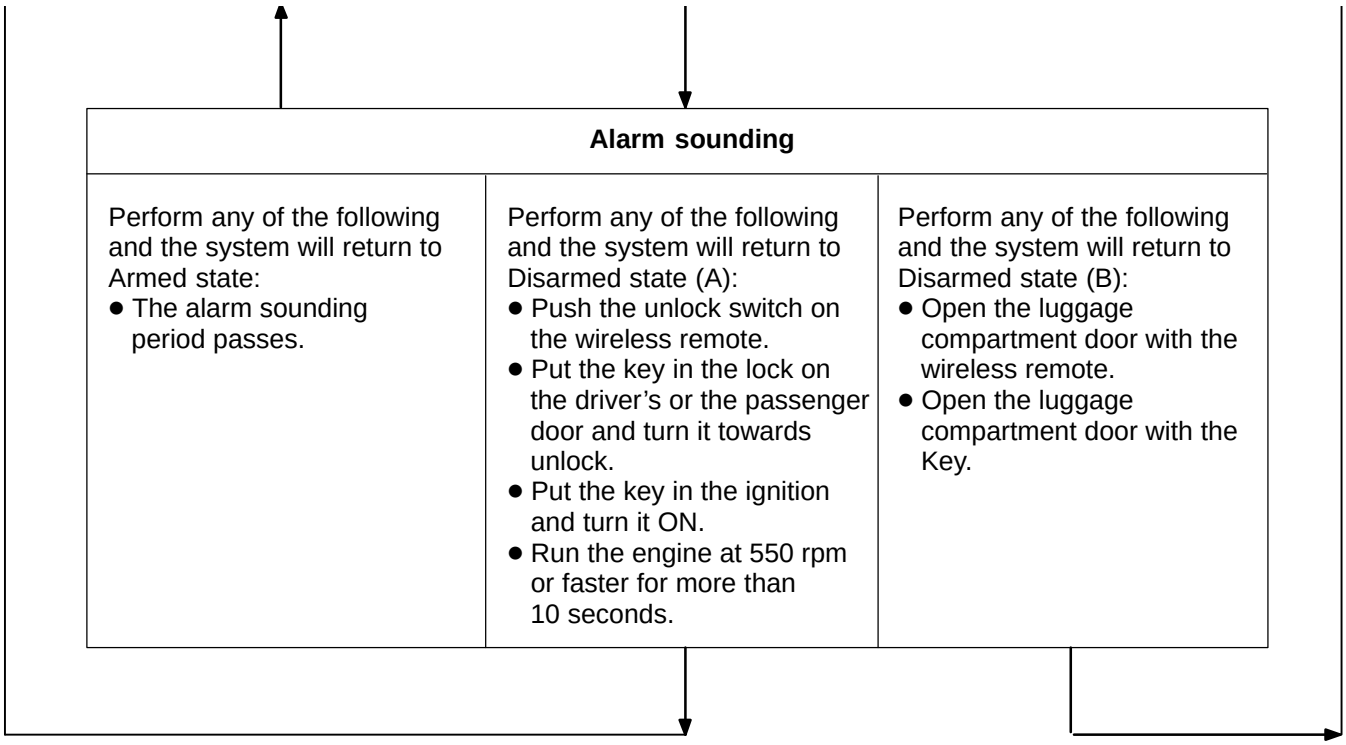
HINT:
Even in disarming condition, the indicator light flash. (Due to the signal output form immobilizer system). The indicator always flashes receiving the signal from the immobilizer system at any time in the arming condition.

Flashing frequency:
0.2 seconds (ON)
1.8 seconds (OFF)

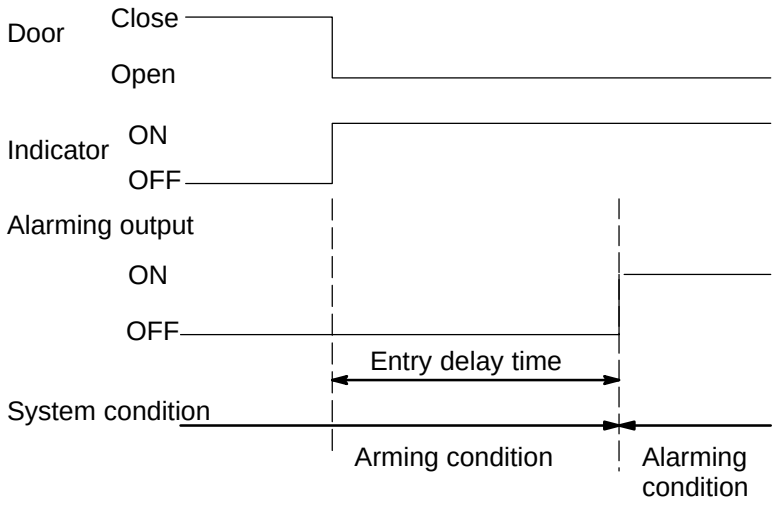
3. PASSIVE ARMING MODE

This mode can be switched according to the specified operation.
All initially set modes (when shipped from factory) are active mode. (No passive mode)


Disarmed state (A)
Perform any of the following and the system will go to Disarmed state (B):
● Remove the key from the ignition, close the driver's door, then the ignition OFF.
Disarmed state (B)
Perform any of the following and the system will return to Disarmed state (A):
● Push the unlock switch on the wireless remote.
● Put the key in the lock on the driver's or the passenger door and turn it towards unlock.
● 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 any of 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 following and the system will return to Disarmed state (A):
● Push the unlock switch on the wireless remote.
● Put the key in the lock on the driver's or the passenger door and turn it towards unlock.
● 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 Armed state:
● Allow 30 seconds to elapse with all the doors, hood and luggage compartment door closed.
Armed state
Perform any of the following and the system will return to Disarmed state (A):
● Push the unlock switch on the wireless remote.
● Put the key in the lock on the driver's or the passenger door and turn it towards unlock.
● Put the key in the ignition and turn it ON.
● Run the engine at 550 rpm or faster for more than 10 seconds.
Perform any of the following 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.
● Open the luggage compartment door with something other than the key or wireless remote.
● Reconnect the battery.
Perform any of the following and the system will return to Disarmed state (B):
● Open the luggage compartment door with the wireless remote.
● Open the luggage compartment door with the Key.


Alarm sounding
Perform any of the following and the system will return to Armed state:
● The alarm sounding period passes.
Perform any of the following and the system will return to Disarmed state (A):
● Push the unlock switch on the wireless remote.
● Put the key in the lock on the driver's or the passenger door and turn it towards unlock.
● Put the key in the ignition and turn it ON.
● Run the engine at 550 rpm or faster for more than 10 seconds.
Perform any of the following and the system will return to Disarmed state (B):
● Open the luggage compartment door with the wireless remote.
● Open the luggage compartment door with the Key.

HINT:
In arming condition either closed door is opened, entry delay occurs. (14 secs.)
During this time, the mode transfers to disarming condition when the condition described above * is met.
When the condition is not met, the system judges theft occurs, the mode transfers to alarming condition.



Indicator light output:

Condition	Indicator light
Disarming condition	OFF
Arming preparation condition	ON
Arming condition (Entry delay time)	OFF (ON)
Alarming condition	ON

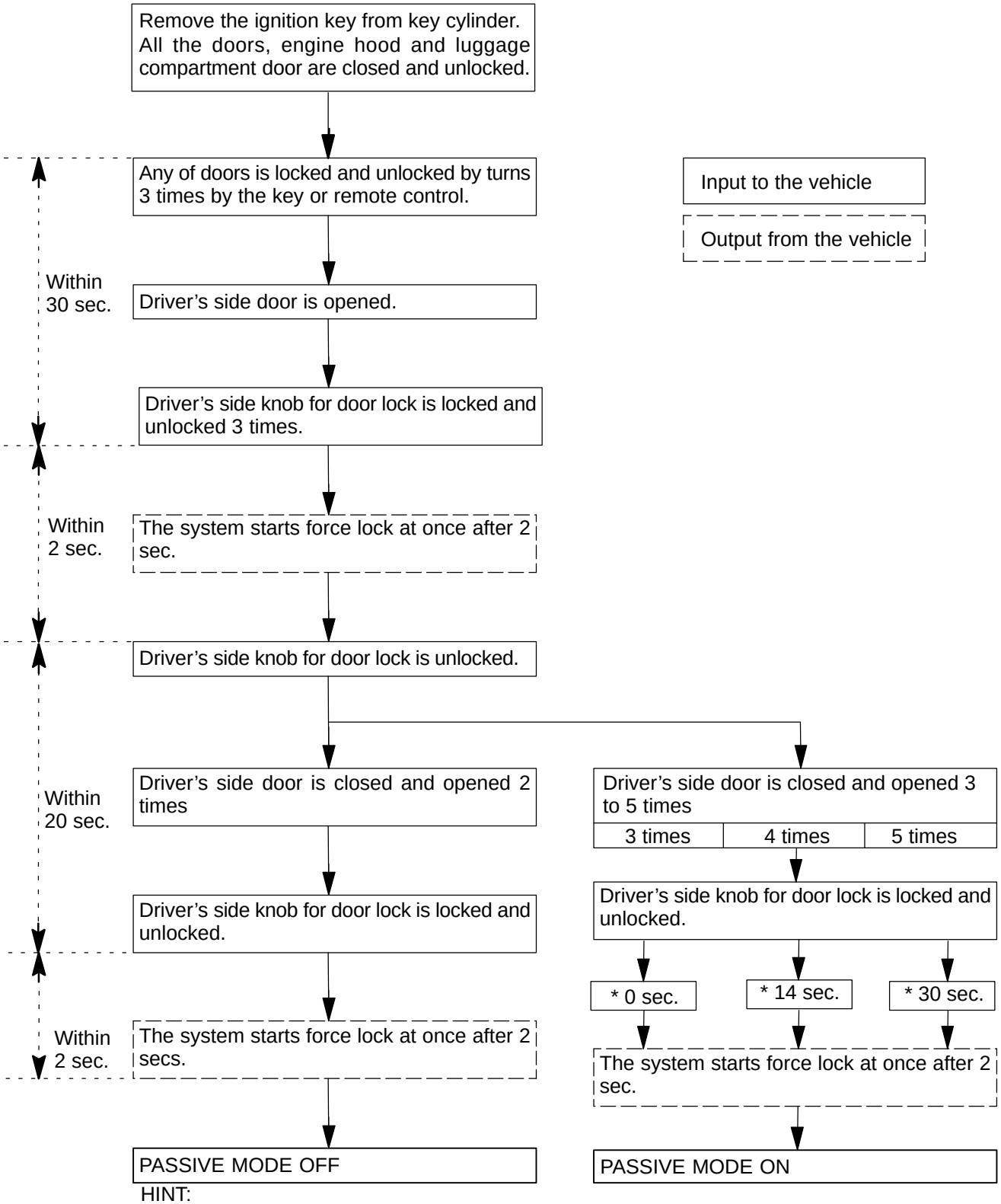
HINT:
Even in disarming condition, the indicator light flash. (Due to the signal output form immobilizer system). The indicator always flashes receiving the signal from the immobilizer system at any time in the arming condition.

Flashing frequency:
0.2 seconds (ON)
1.8 seconds (OFF)

Transfer to active mode:
In each passive mode, when ”disarming condition of active mode → arming preparation transfer condition” is met, the active mode transfers to each condition. In this case, active mode continues till disarming condition.

Passive mode when transfer condition is met.	Active mode transfer condition
Disarming condition	Arming preparation condition
Arming preparation condition	Arming preparation condition
Arming condition (During entry delay time)	Arming condition (After alarming time has elapsed, arming condition)
Alarming condition	After alarming time has elapsed, arming condition

4. CHANGING METHOD OF PASSIVE MODE (ON or OFF)



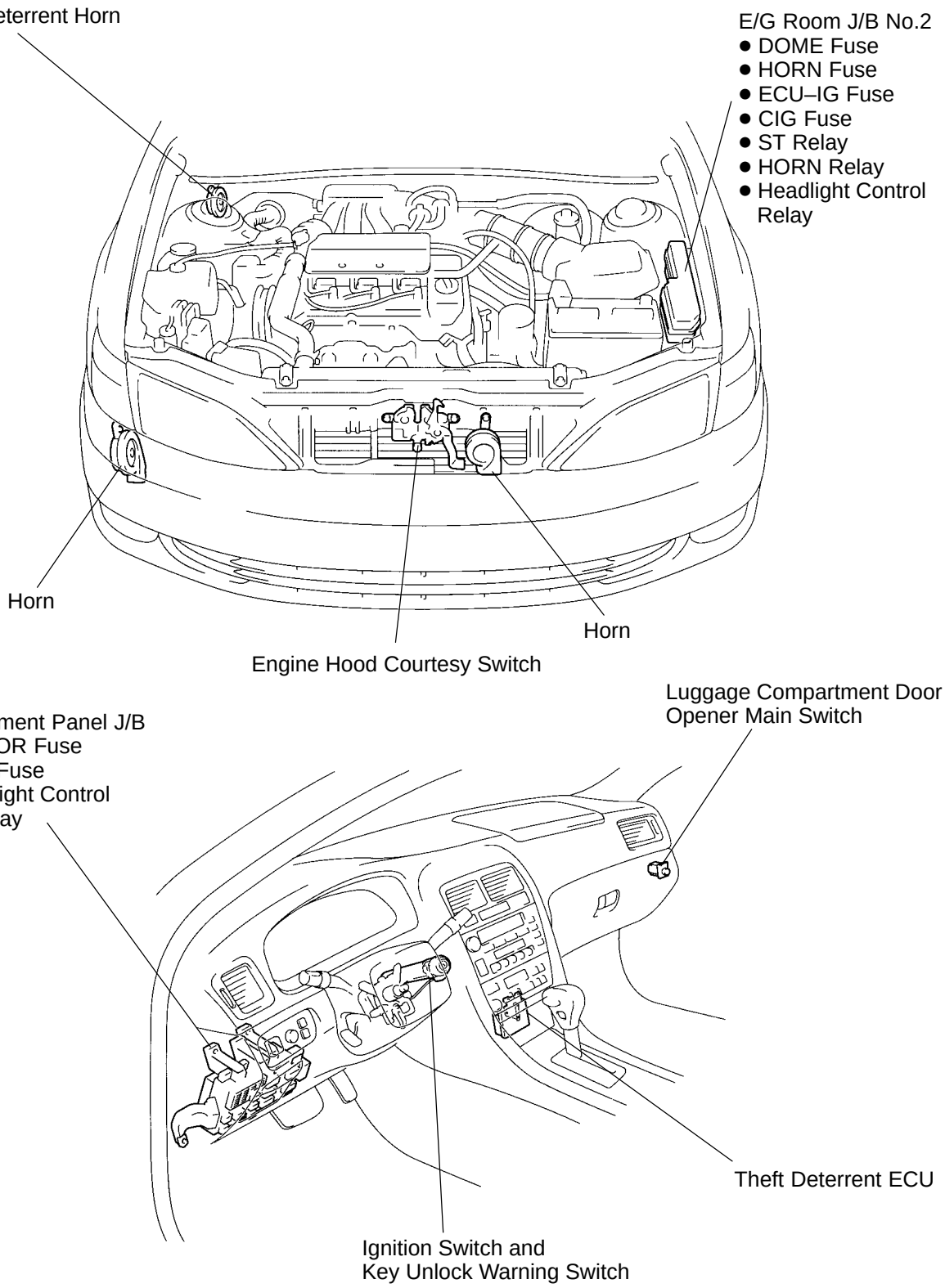
HINT:

- Initial mode is PASSIVE MODE OFF.
- If there is a different signal in the middle of changing. It is invalid.

*: Entry delay time

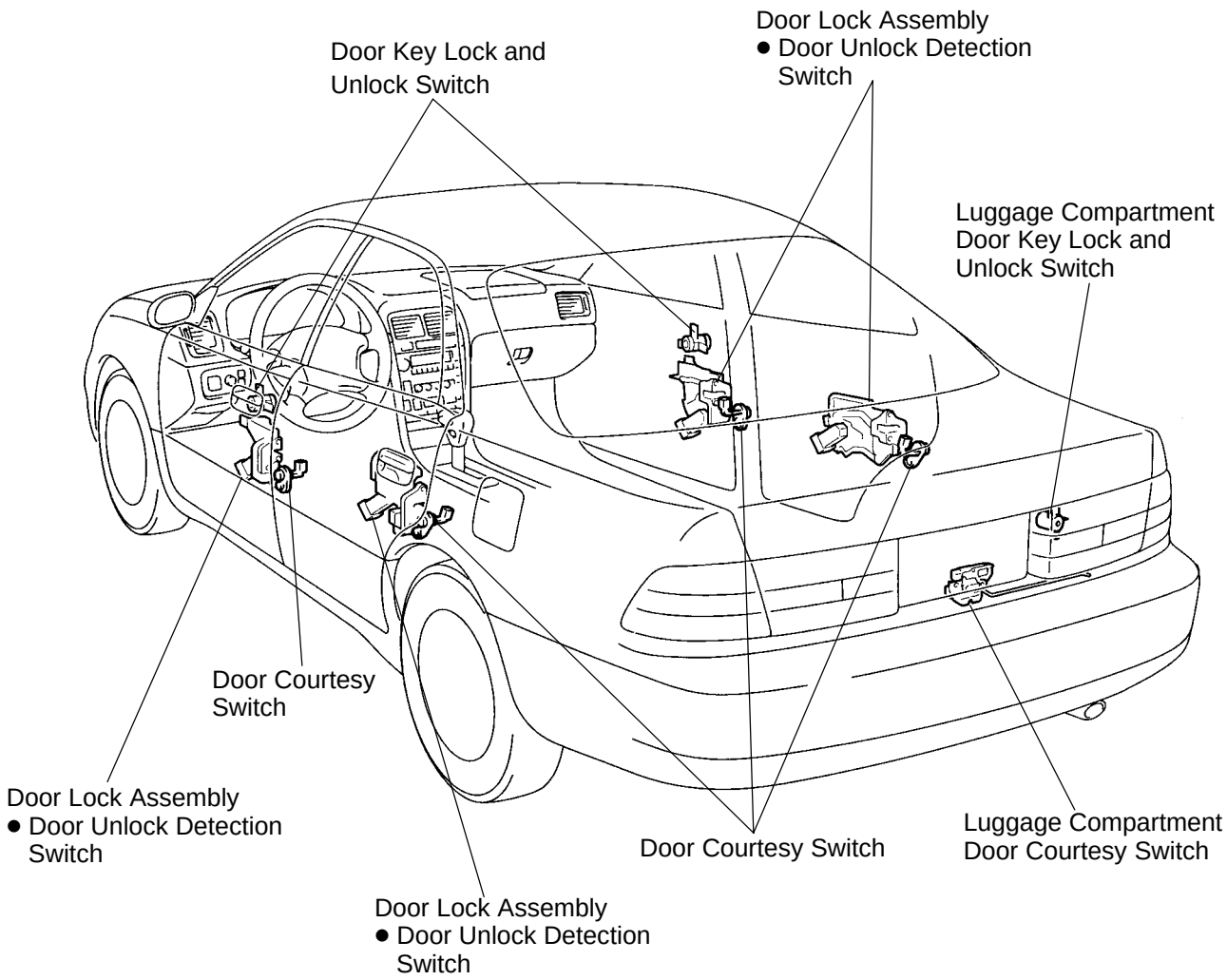
DI01S–05

PARTS LOCATION



N22047
N22048

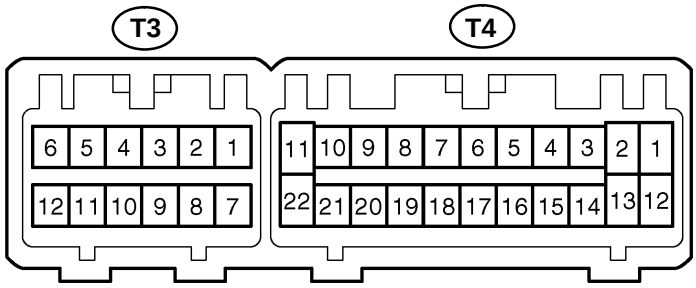
I00635


Door Key Lock and
Unlock Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Luggage Compartment
Door Key Lock and
Unlock Switch
Door Courtesy
Switch
Door Lock Assembly
● Door Unlock Detection
Switch
Door Courtesy Switch
Luggage Compartment
Door Courtesy Switch
Door Lock Assembly
● Door Unlock Detection
Switch

N22049

DI1AH–11

TERMINALS OF ECU



I01920

Symbols (Terminals No.)	Wiring Color	Condition	STD Value
CTY ↔ E (A1 ↔ B7)	R–W ↔ W–B	Door courtesy switch ”ON” (Rear door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Rear door closed)	1 MΩ or higher
DSWL ↔ E (A2 ↔ B7)	R–Y ↔ W–B	Luggage compartment door courtesy switch ”ON” (Luggage compartment door opened)	Below 1 Ω
		Luggage compartment door courtesy switch ”OFF” (Luggage compartment door closed)	1 MΩ or higher
DSWH ↔ E (A3 ↔ B7)	B ↔ 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
DSWD ↔ E (A4 ↔ B7)	R–G ↔ W–B	Door courtesy switch ”ON” (Driver’s door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Driver’s door Closed)	1 MΩ or higher
DSWP ↔ E (A5 ↔ B7)	R–G ↔ W–B	Door courtesy switch ”ON” (Passenger's door opened)	Below 1 Ω
		Door courtesy switch ”OFF” (Passenger’s door closed)	1 MΩ or higher
KSW ↔ E (A6 ↔ B7)	L–B ↔ W–B	Key unlock warning switch ”ON” (Key inserted)	Below 1 Ω
		Key unlock warning switch ”OFF” (Key removed)	1 MΩ or higher
LUG ↔ E (A7 ↔ B7)	G–W ↔ W–B	Luggage compartment door key lock and unlock switch ”ON”	Below 1 Ω
		Luggage compartment door key lock and unlock switch ”OFF”	1 MΩ or higher
L2 ↔ E (A8 ↔ B7)	L–W ↔ W–B	Door key lock and unlock switch ”LOCK” (Driver’s and passenger’s door)	Below 1 Ω
		Door key lock and unlock switch ”UNLOCK” (Driver’s and passenger’s door)	1 MΩ or higher
UL3 ↔ E (A9 ↔ B7)	R–G ↔ W–B	Door key lock and unlock switch ”UNLOCK” (Driver’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (Driver’s door)	1 MΩ or higher
UL2 ↔ E (A10 ↔ B7)	L ↔ W–B	Door key lock and unlock switch ”UNLOCK” (passenger’s door)	Below 1 Ω
		Door key lock and unlock switch ”LOCK” (passenger’s door)	1 MΩ or higher

+B1 ↔ Body ground (A11 ↔ Body ground)	R–Y ↔ Body ground	Always	10 – 14 V
IG ↔ E (A13 ↔ B7)	B–R ↔ W–B	Ignition switch is turned to ”ON” position	10 – 14 V
LSWD ↔ E (A14 ↔ B7)	L–R ↔ W–B	Door unlock detection switch ”ON” (Driver’s door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Driver’s door)	1 MΩ or higher
LSWP ↔ E (A15 ↔ B7)	Y ↔ W–B	Door unlock detection switch ”ON” (Passenger's door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Passenger's door)	1 MΩ or higher
LSWR ↔ E (A16 ↔ B7)	L–Y ↔ W–B	Door unlock detection switch ”ON” (Rear door)	Below 1 Ω
		Door unlock detection switch ”OFF” (Rear door)	1 MΩ or higher
TSW ↔ E (A17 ↔ B7)	L–Y ↔ W–B	Luggage compartment door opener switch ”ON”	Below 1 Ω
		Luggage compartment door opener switch ”OFF”	1 MΩ or higher
+B2 ↔ Body ground (B1 ↔ Body ground)	L–W ↔ Body ground	Always	10 – 14 V
TO ↔ E (B3 ↔ B7)	L ↔ W–B	Luggage compartment door opener switch ”Pulled”	10 – 14 V
		Luggage compartment door opener switch ”Not pulled”	Below 1 V
IND ↔ E (B6 ↔ B7)	R–Y ↔ W–B	During set preparation	3 – 5 V
E ↔ Body ground (B7 ↔ Body ground)	W–B ↔ Body ground	Always	10 – 14 V
SH ↔ E (B9 ↔ B7)	W–L ↔ W–B	Always	10 – 14 V
HEAD ↔ E (B10 ↔ B7)	R–B ↔ W–B	Light control switch ”HEAD”	10 – 14 V
TAIL ↔ E (B11 ↔ B7)	G–R ↔ W–B	Light control switch ”TAIL” or ”HEAD”	10 – 14 V
HORN ↔ E (B12 ↔ B7)	G–B ↔ W–B	Horn switch ”OFF”	10 – 14 V

DI01U–09

PROBLEM SYMPTOMS TABLE

Proceed to the reference page shown in the matrix chart below for each malfunction symptom and troubleshoot for each circuit.

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.

Details of Problem			Inspecting Circuit*1	See page
The theft deterrent system cannot be set			1. Indicator light circuit	DI–605
			2. ECU power source circuit	DI–607
			3. Key unlock warning switch circuit	DI–620
			4. Luggage compartment door key lock and unlock switch circuit	DI–622
			5. Luggage compartment door courtesy switch circuit	DI–624
			6. Door key lock and unlock switch circuit	DI–630
			7. Door courtesy switch circuit	DI–634
			8. Door unlock detection switch circuit	DI–632
			9. Engine hood courtesy switch circuit	DI–636
The indicator light does not blink when system is set			Indicator light circuit	DI–605
When the system is set	When the rear door is unlocked	The system does not operate	Door unlock detection switch circuit	DI–632
	When the luggage compartment door is opened by a method other than the key		Luggage compartment door courtesy switch circuit	DI–624
	When the engine hood is opened		Engine hood courtesy switch circuit	DI–636
While the system is in warning operation	Horns do not sound		Horn relay circuit	DI–612
	Theft deterrent horn does not sound		Theft deterrent horn circuit	DI–610
	Headlights do not flash		Headlight control relay circuit	DI–614
	Taillights do not flash		Taillight control relay circuit	DI–616
	The door lock is not locked		Door unlock detection switch circuit	DI–632
When the system is set	It is not canceled when the ignition key is turned to ACC or ON position		Ignition switch circuit	DI–618
	It still operates when the luggage compartment door is opened with the key		Luggage compartment door key lock and unlock switch circuit	DI–622
System is still set even when a rear door is open			Door courtesy switch circuit	DI–634
Even when the system is not set	Horns sound		Horn relay circuit	DI–612
	Theft deterrent horn sounds		Theft deterrent horn circuit	DI–610
	Headlights stay on		Headlight control relay circuit	DI–614
	Taillights stay on		Taillight control relay circuit	DI–616

*1: If numbers are given to the circuit proceed with troubleshooting in the order indicated by those numbers.

DI01V–10

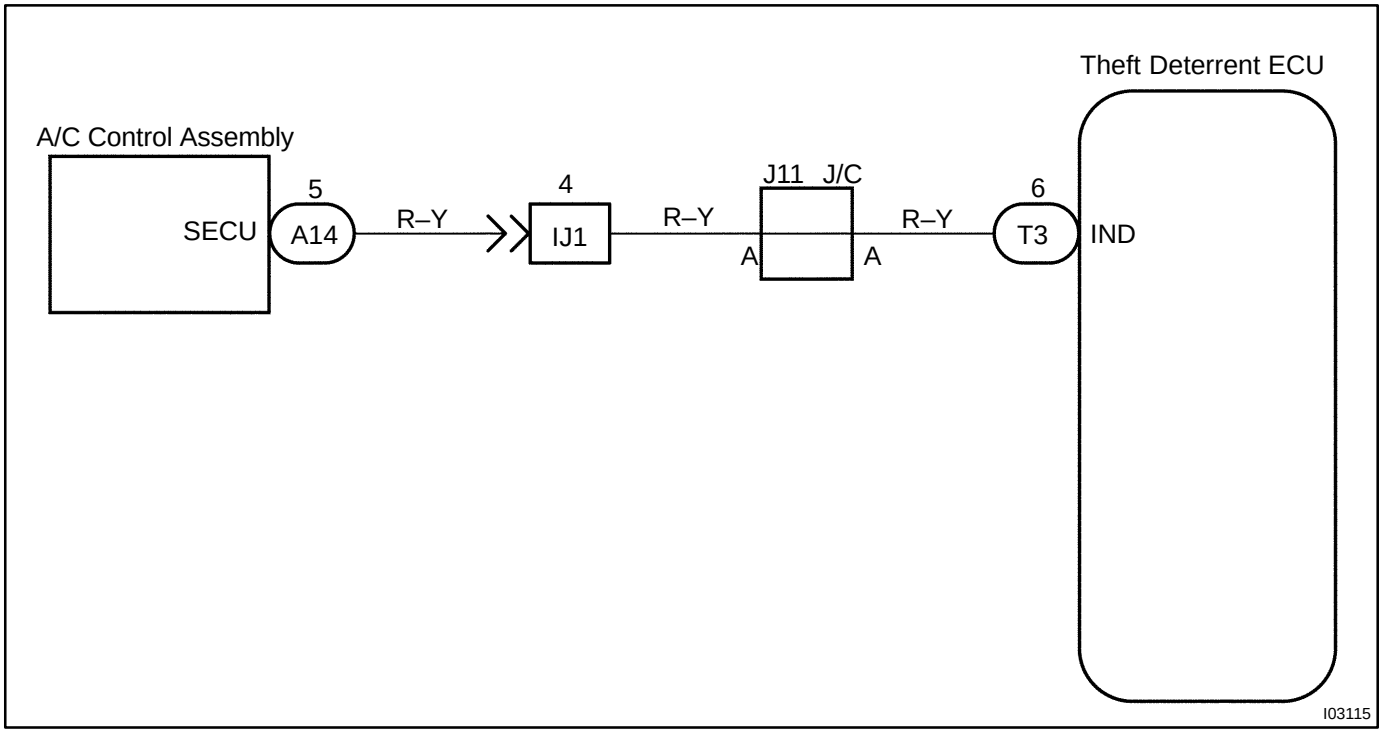
CIRCUIT INSPECTION

Indicator Light Circuit

CIRCUIT DESCRIPTION

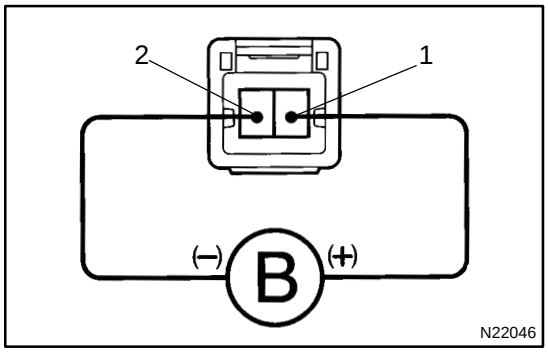
When the theft deterrent system is preparing to set, this circuit lights up the indicator light. When the system has been set, it continually turns the indicator light ON for 1 second and turns it OFF for 1 second, thus blinking the indicator light.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check indicator light.**



PREPARATION:

(a) Remove A/C control assembly.

(b) Disconnect indicator light connector.

CHECK:

Connect the positive (+) lead to terminal 1 and the negative (–) lead to terminal 2 of indicator light connector.

OK:

Indicator light comes on.

NG	**Replace indicator light.**

OK

2	**Check harness and connector between theft deterrent ECU and indicator light, indicator light and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

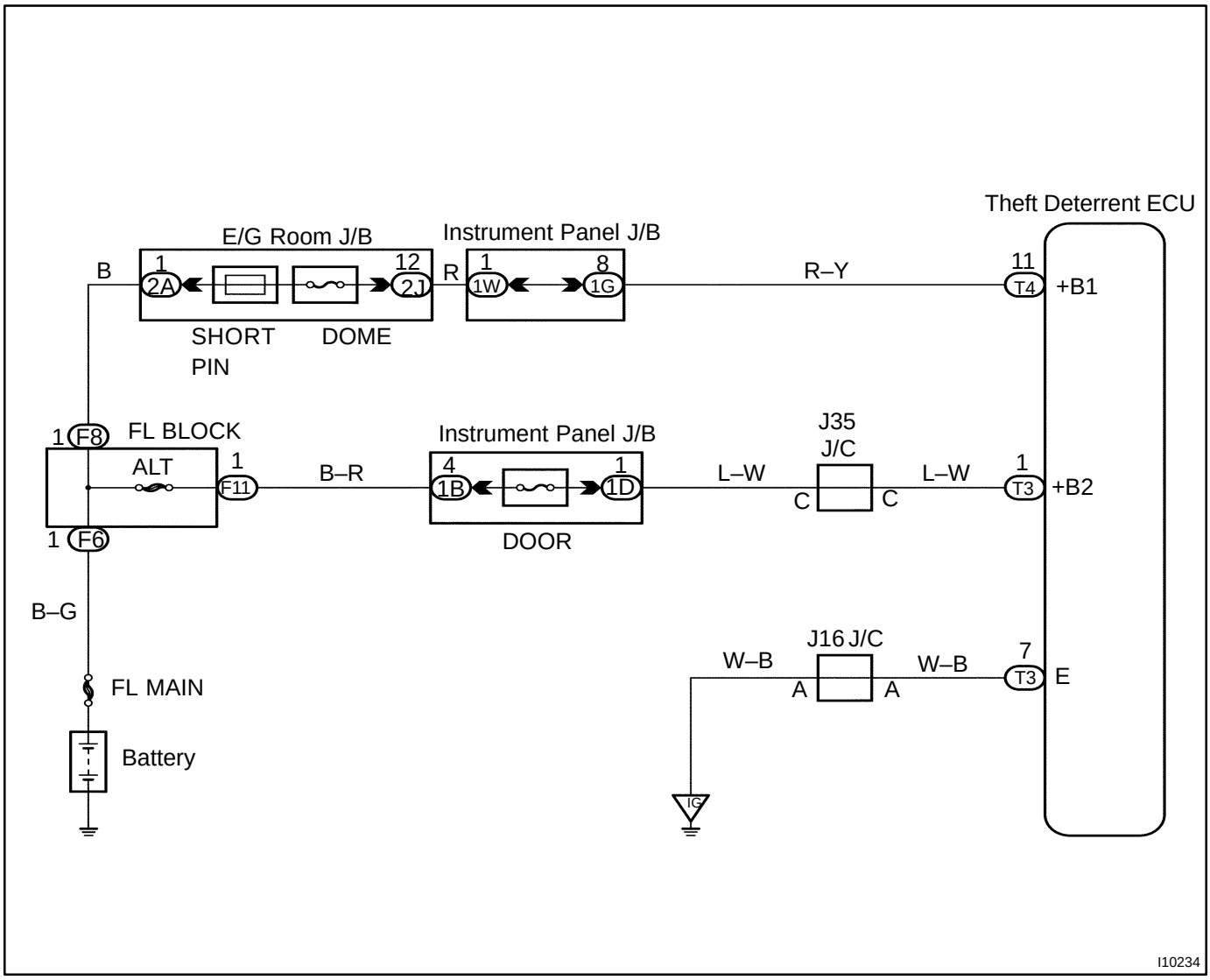
DI01W–10

ECU Power Source Circuit

CIRCUIT DESCRIPTION

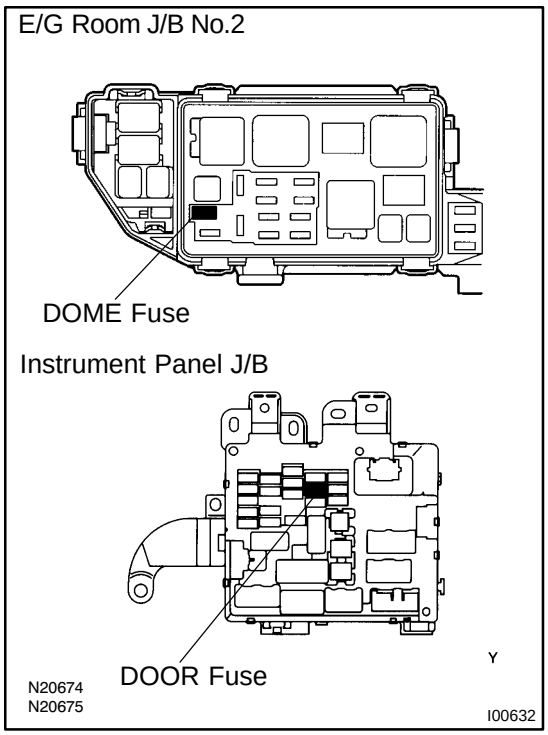
This circuit provides power to operate the theft deterrent ECU.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check DOME and DOOR fuse.**



PREPARATION:

(a) Remove DOME fuse from engine room junction block No.2.

(b) Remove DOOR fuse from instrument panel junction block No.1.

CHECK:

Check continuity of DOME and DOOR fuse.

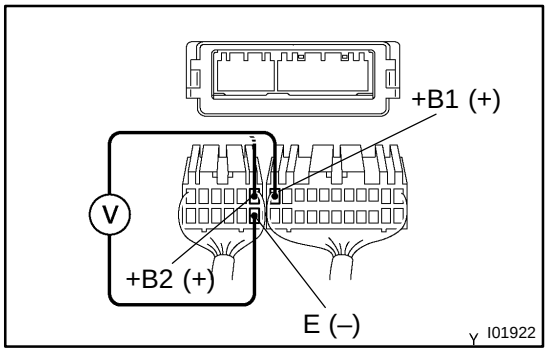
OK:

Continuity

NG → **Check for short in all the harness and components connected to the DOME and DOOR fuse (See attached wiring diagram).**

OK

2	**Check voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.**



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminals +B1, +B2 and E of theft deterrent ECU connector.

OK:

Voltage: 10 – 14V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–604).**

NG

3	**Check for open in harness and connector between ECU and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between ECU and battery.

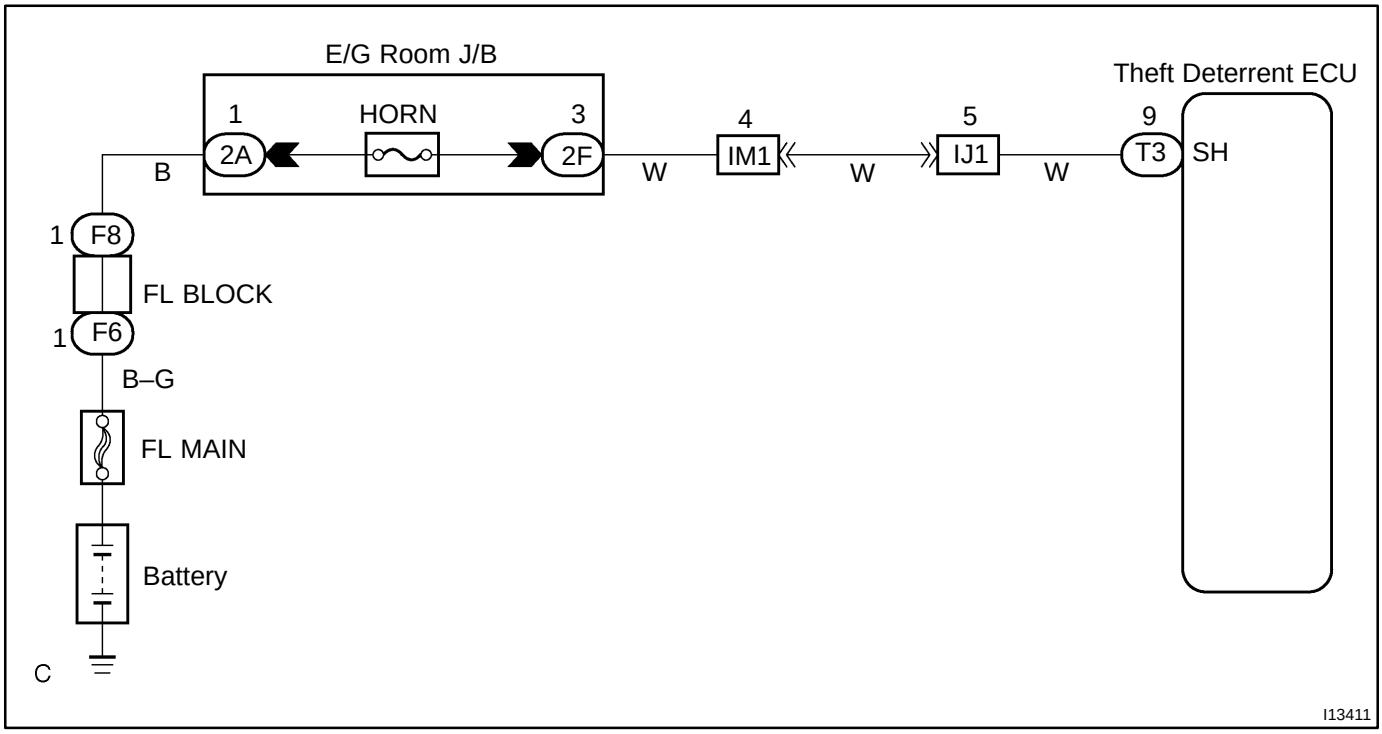
Theft Deterrent Horn Circuit

CIRCUIT DESCRIPTION

When the theft deterrent system is activated, the relay in the ECU turns ON and OFF cycles of approximately 0.2 sec., causing the theft deterrent horn to blow (See the wiring diagram below).
In this condition, if any of the following operations is done, the relay in the ECU turns OFF, thus stopping the theft deterrent horn from blowing:

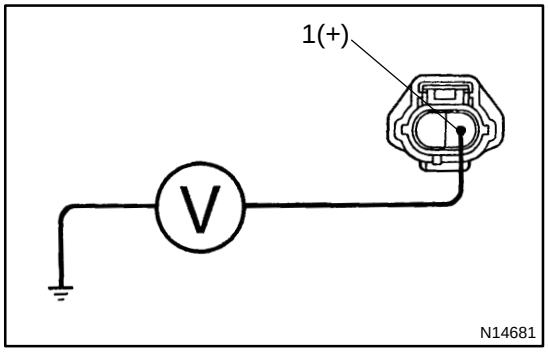
(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of theft deterrent horn connector and body ground.**

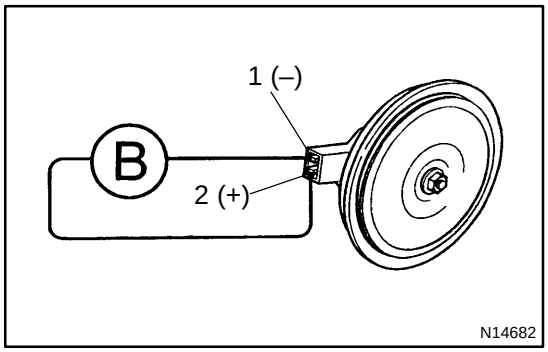


PREPARATION:
Remove the theft deterrent horn and disconnect the connector.
CHECK:
Measure voltage between terminal 1 of theft deterrent horn connector and body ground.
OK:
Voltage: 10 – 14V

NG → **Check and repair harness and connector between HORN fuse and theft deterrent horn.**

OK

2	**Check theft deterrent horn.**



CHECK:
Connect positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2 of theft deterrent horn connector.

OK:

Theft deterrent horn blows.

NG → **Replace theft deterrent horn.**

OK

3	**Check harness and connector between theft deterrent ECU and theft deterrent horn (See page IN–31).**

NG → **Check and repair harness or connector.**

OK

Check and replace theft deterrent ECU.

DI01Z–10

Horn Relay Circuit

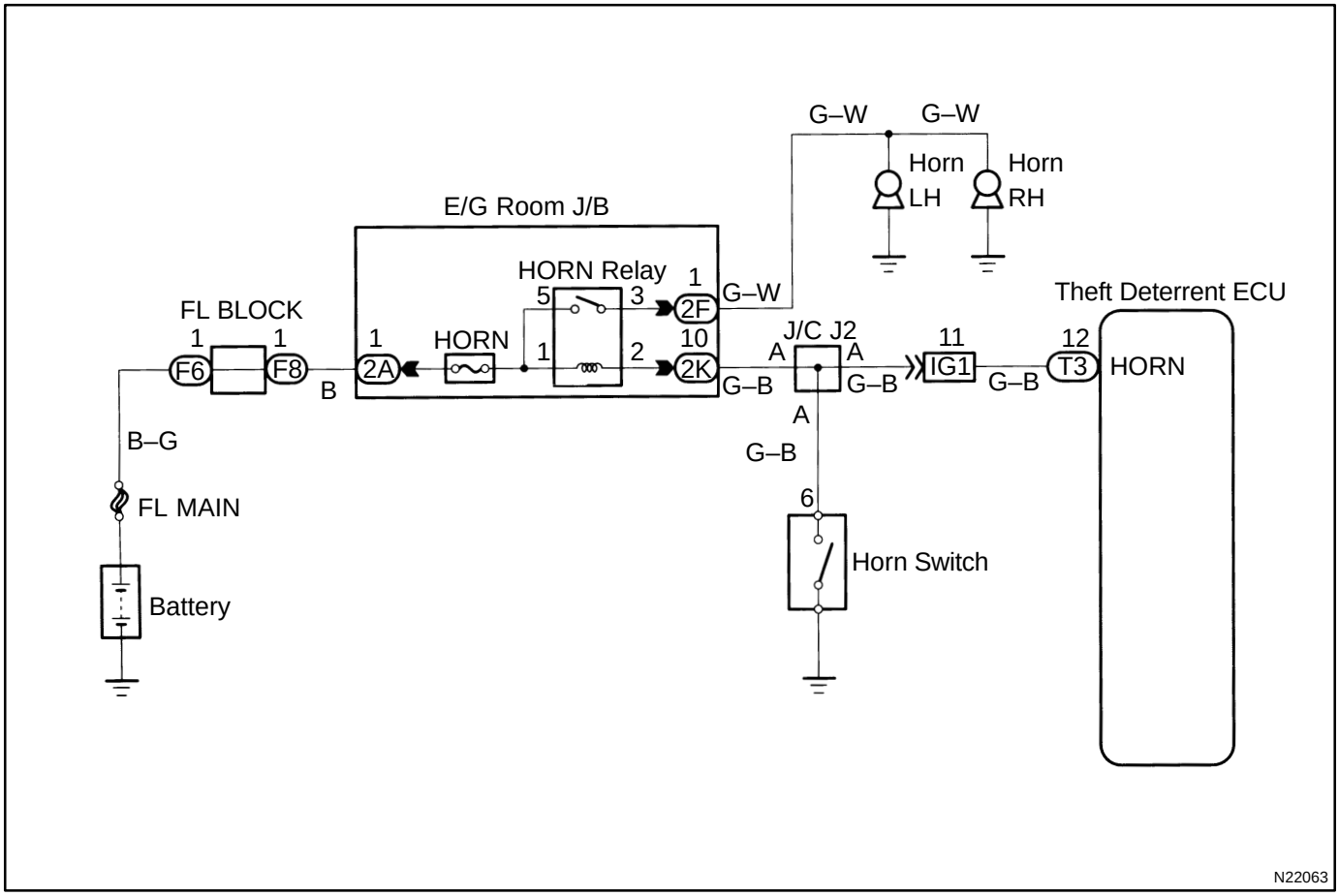
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF in approximately 0.4 sec. cycles. This switches the horn relay ON and OFF, thus the horns blow (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes OFF and the horn relay switches OFF, thus stopping the horns from blowing:

(1) Unlock the front LH or RH door with key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

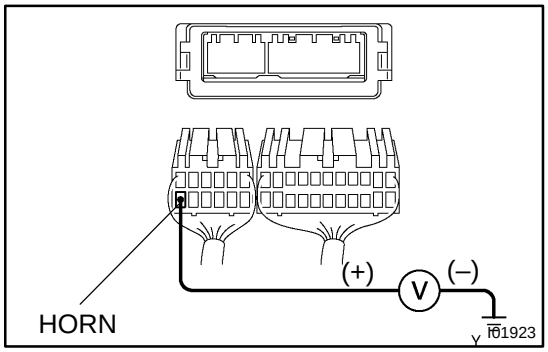


INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the horns blow normally whenever the horn switch is operated. If horn operation is not normal when the horn switch is operated, check the horn switch.

1	**Check voltage between terminal HORN of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connectors.

CHECK:

Measure voltage between terminal HORN of theft deterrent ECU connector and body ground.

OK:

Voltage: 10 – 14V

NG → **Check and repair harness and connector between theft deterrent ECU and horn relay.**

OK

Check and replace theft deterrent ECU.

DI020–12

Headlight Control Relay Circuit

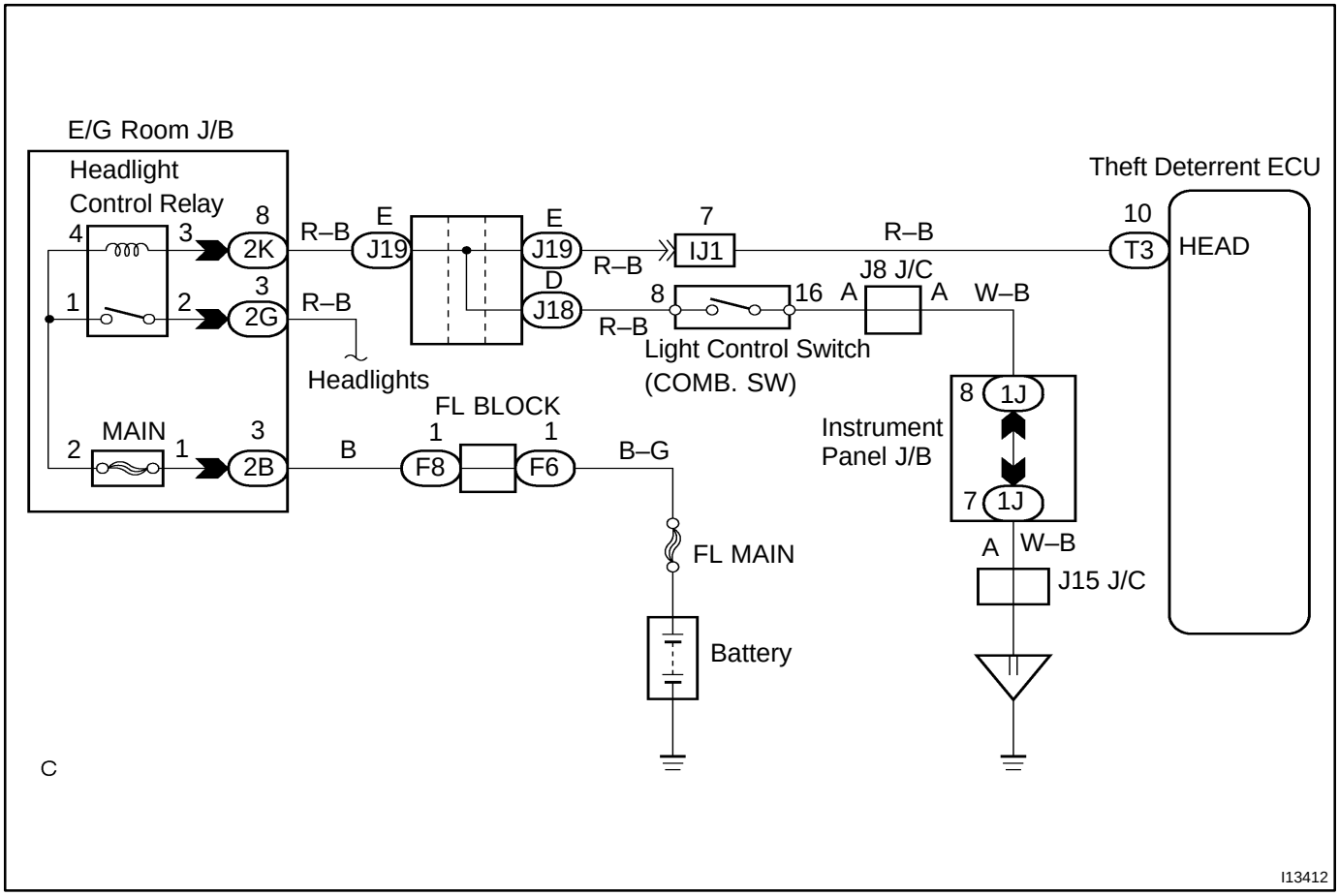
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the headlight control relay ON and OFF, thus flashing the headlights (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes OFF and the headlight control relay switches OFF, thus stopping the headlights flashing:

(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

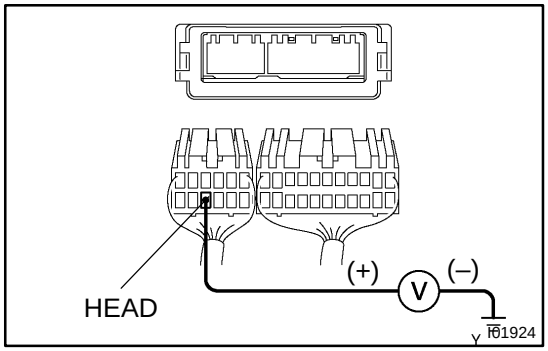


INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the headlights light up normally whenever the light control switch is operated. If headlight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–3.

1	**Check voltage between terminal HEAD of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminal HEAD of theft deterrent ECU connector and body ground.

OK:

Voltage: 10 – 14V

NG → **Check and repair harness and connector between theft deterrent ECU and headlight control relay (See page IN–31).**

OK

Check and replace theft deterrent ECU.

DI021–13

Taillight Control Relay Circuit

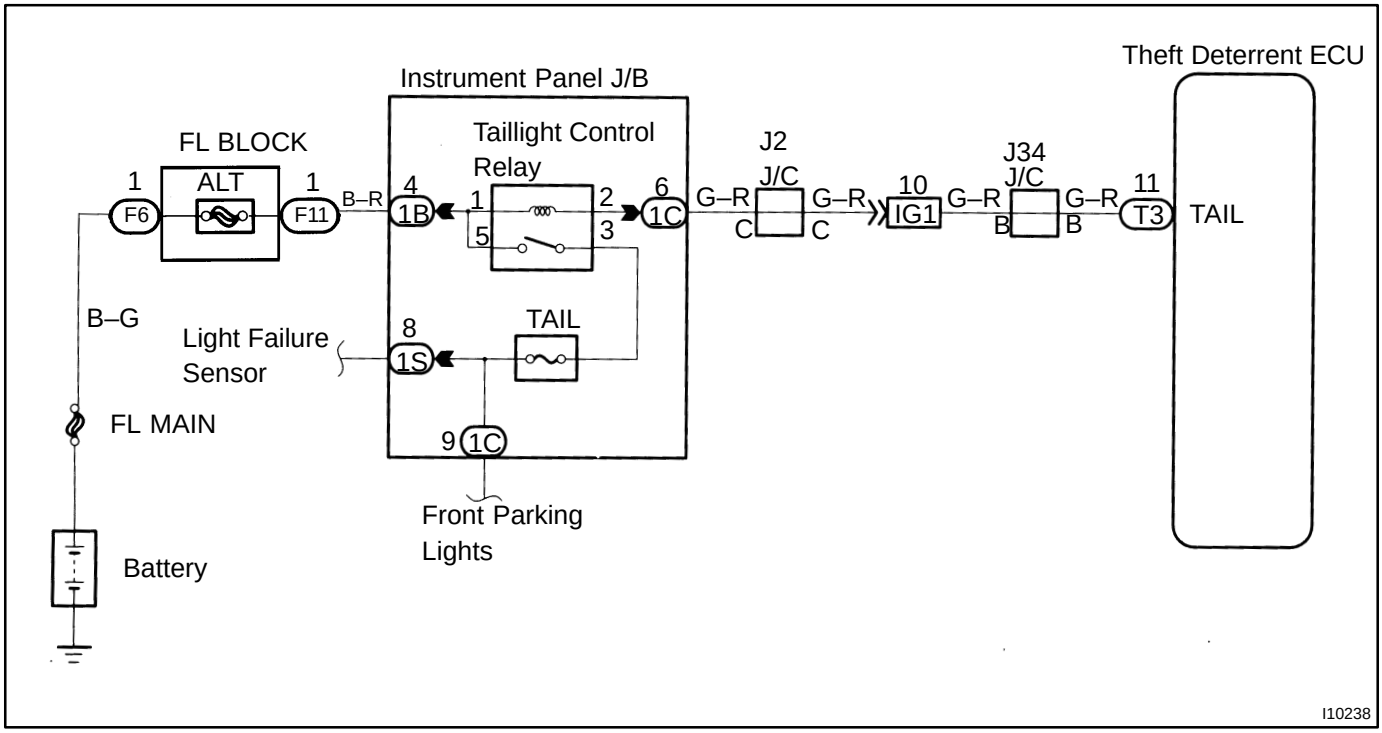
CIRCUIT DESCRIPTION

When the theft deterrent system is activated, it causes the Tr in the ECU to switch ON and OFF at approximately 0.4 sec. intervals. This switches the taillight control relay ON and OFF, thus flashing the taillights (See the wiring diagram below).

In this condition, if any of the following operations is done, the Tr in the ECU goes OFF and the taillight control relay switches OFF, thus stopping the taillights flashing:

(1) Unlock the front LH or RH door with a key.
(2) Turn the ignition switch to ACC or ON position.
(3) Unlock the doors with the wireless door lock control system.
(4) Wait for approximately 60 seconds.

WIRING DIAGRAM

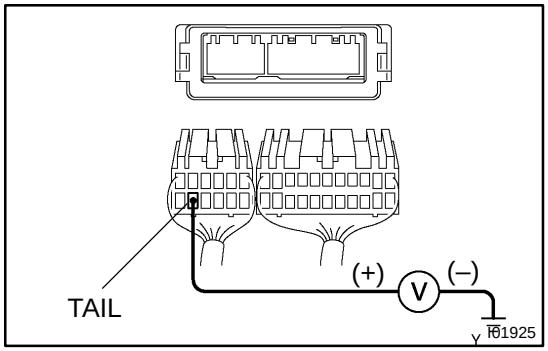


INSPECTION PROCEDURE

HINT:

The flow chart below is based on the premise that the taillights light up normally whenever the light control switch is operated. If taillight operation is not normal when the light control switch is operated, proceed to troubleshooting on page BE–3.

1	**Check voltage between terminal TAIL of theft deterrent ECU connector and body ground.**



PREPARATION:

Disconnect the theft deterrent ECU connector.

CHECK:

Measure voltage between terminal TAIL of theft deterrent ECU connector and body ground.

OK:

Voltage: 10 – 14V

NG → **Check and repair harness and connector between theft deterrent ECU and taillight control relay (See page IN–31).**

OK

Check and replace theft deterrent ECU.

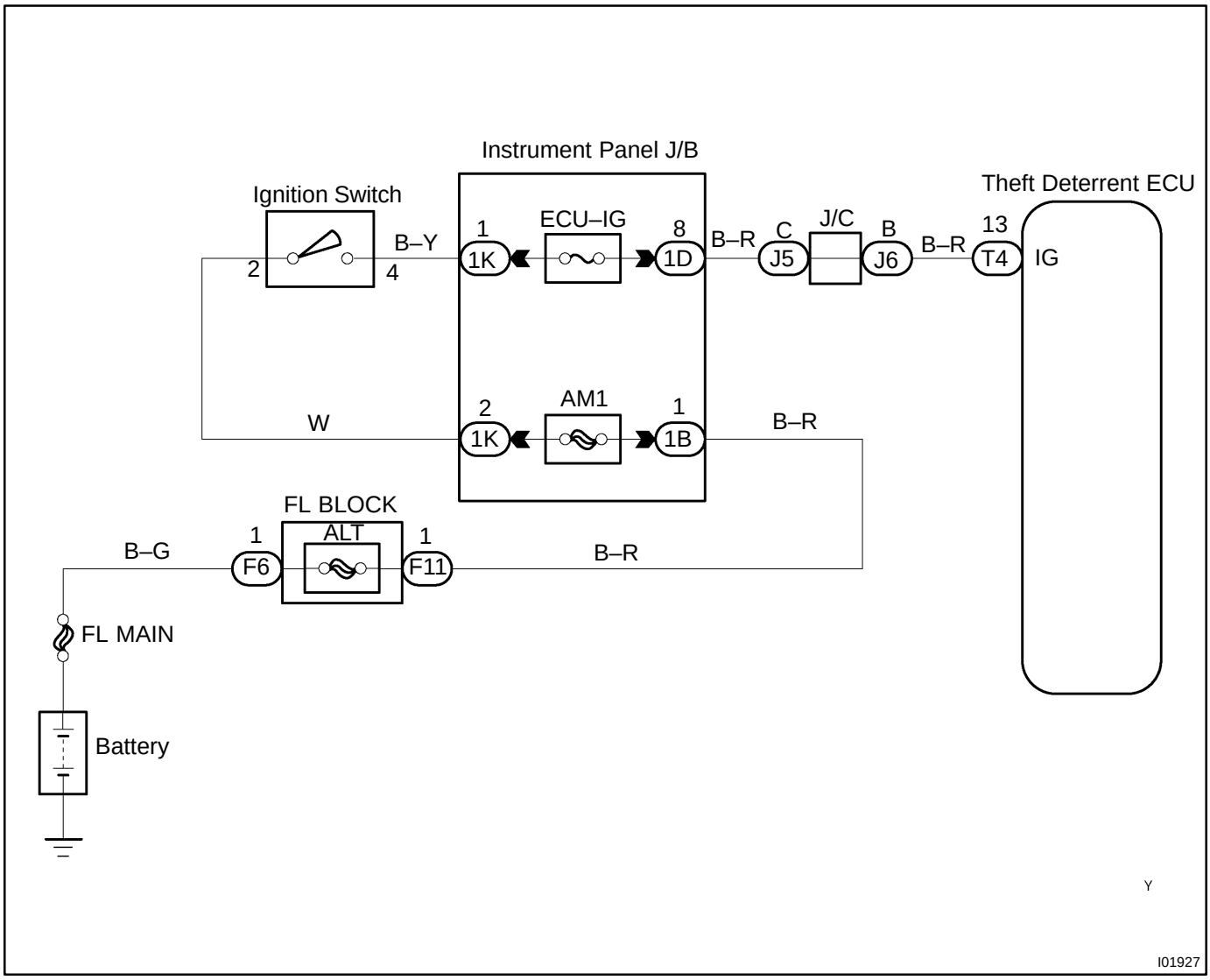
DI022–11

Ignition Switch Circuit

CIRCUIT DESCRIPTION

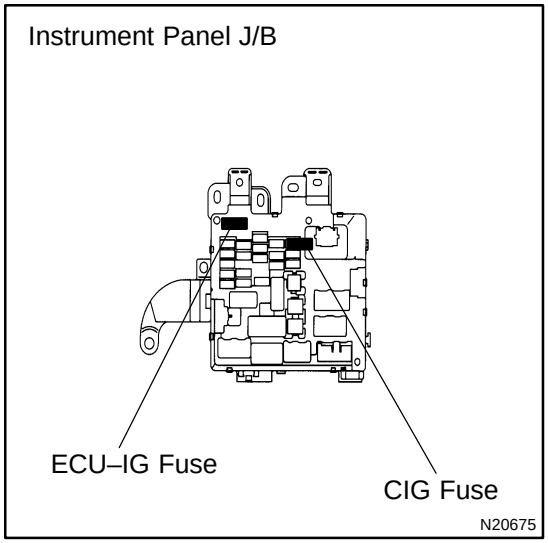
When the ignition switch is turned to the ACC position, battery positive voltage is applied to the terminal ACC of the ECU. Also, if the ignition switch is turned to the ON position, battery positive voltage is applied to the terminals ACC and IG of the ECU. When the battery positive voltage is applied to the terminal ACC 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, and position switch, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check CIG and ECU–IG fuses.



PREPARATION:

(a) Remove the fuse box opening cover.

(b) Remove CIG and ECU–IG fuses from instrument panel junction block.

CHECK:

Check continuity of CIG and ECU–IG fuses.

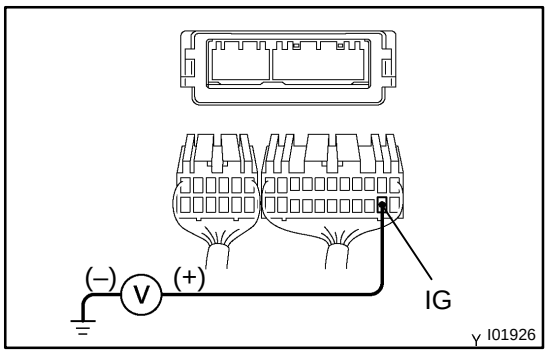
OK:

Continuity

NG → **Check for short in all the harness and components connected to the CIG and ECU–IG fuses (See attached wiring diagram).**

OK

2	Check voltage between terminals IG of theft deterrent ECU and body ground.



PREPARATION:

(a) Disconnect the theft deterrent ECU connectors.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals IG and ACC of theft deterrent ECU connector and body ground.

OK:

Voltage: 10 – 14V

NG → **Check and repair harness and connector between theft deterrent ECU and battery (See page IN–31).**

OK

Check and replace theft deterrent ECU.

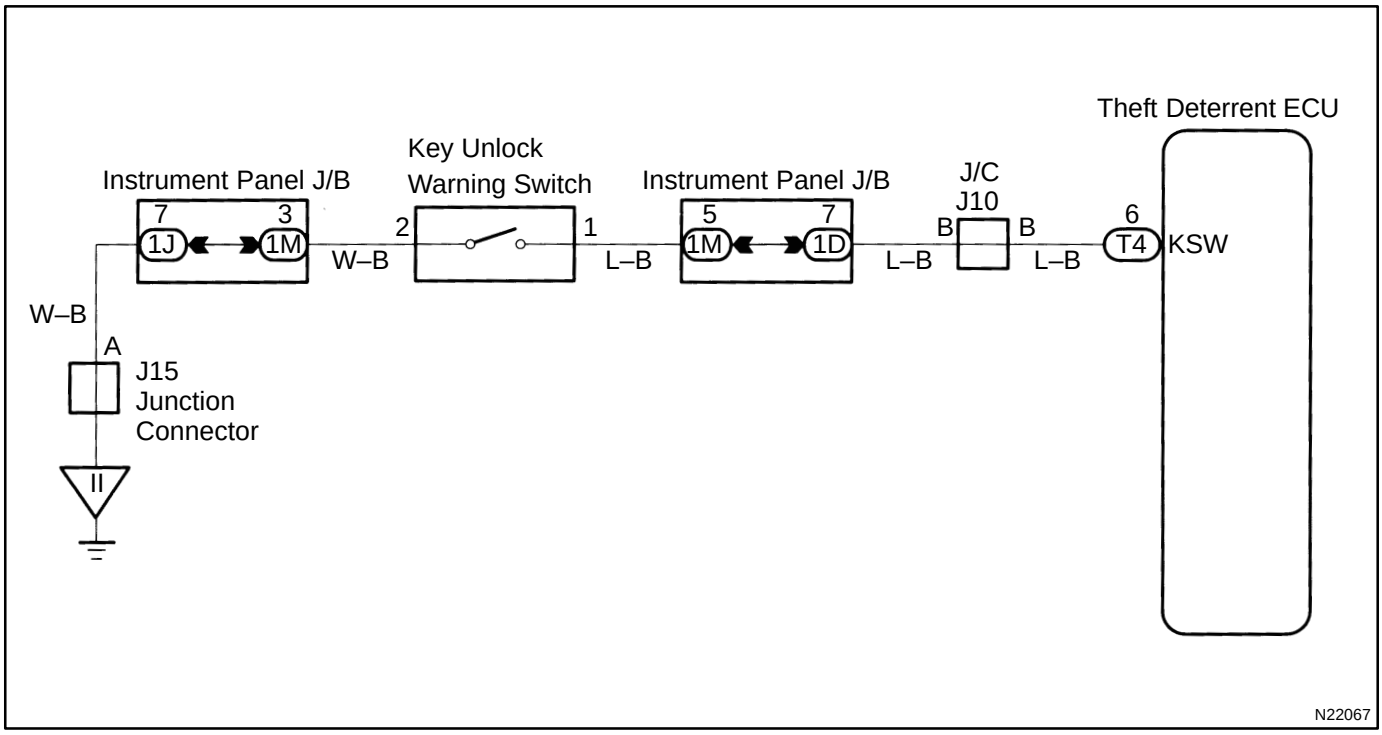
DI023–10

Key Unlock Warning Switch Circuit

CIRCUIT DESCRIPTION

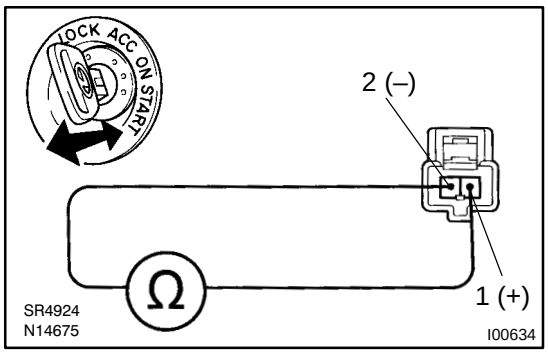
The key unlock warning switch goes ON when the ignition key is inserted in the key cylinder and goes OFF when the ignition key is removed.
The ECU operates the key confinement prevention function while the key unlock warning switch is ON.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check key unlock warning switch.



PREPARATION:

Disconnect key unlock warning switch connector.

CHECK:

Check continuity between terminal 1 and 2 of key unlock warning switch connector, when the key is inserted into the key cylinder or removed.

OK:

Switch position	Tester connection	Specified condition
ON (Key inserted)	1 – 2	Continuity
OFF (Key removed)	–	No continuity

NG → **Replace key unlock warning switch.**

OK ↓

2	Check harness and connectors between ECU and key unlock warning switch, key unlock warning switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

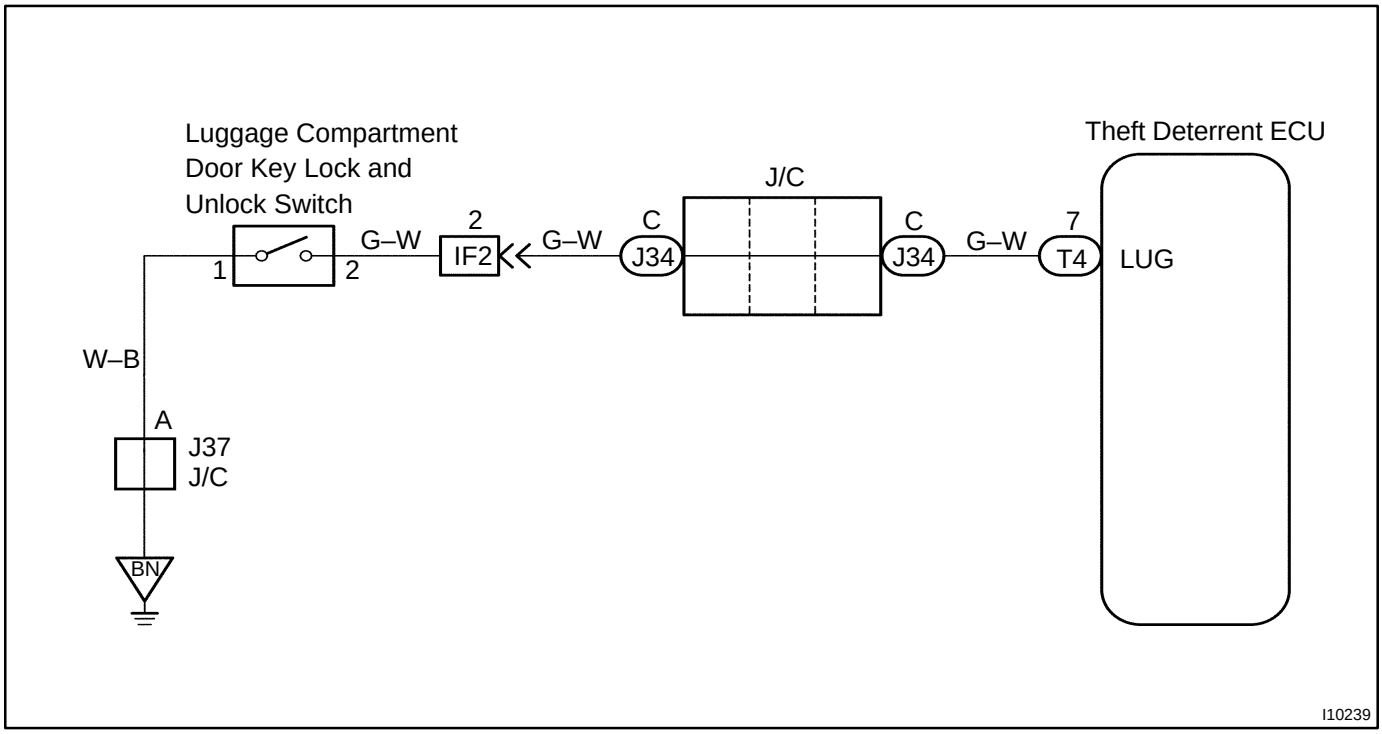
DI024–10

Luggage Compartment Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

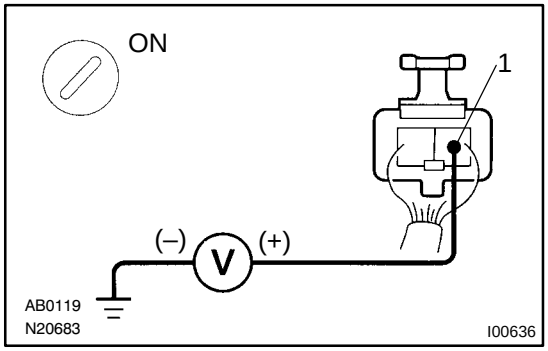
The luggage compartment door key lock and unlock switch goes ON when the luggage compartment door key cylinder is turned to the unlock side with the key.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground.**



PREPARATION:

(a) Remove luggage compartment door trim.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal 1 of luggage compartment door key lock and unlock switch connector and body ground, when the key is turned to the unlock side and not turned.

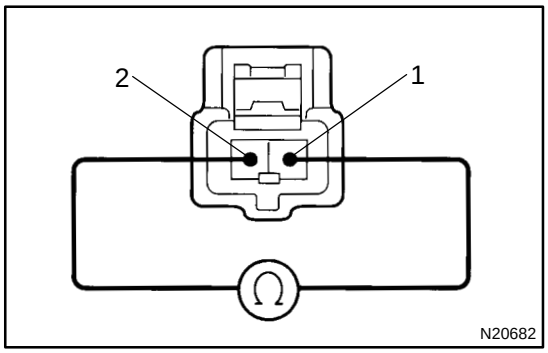
OK:

Key operation	Voltage
Turned to the unlock side	0 V
Not turned	Battery positive voltage

OK	**Check and replace theft deterrent ECU.*1**

NG

2	Check luggage compartment door key lock and unlock switch.



PREPARATION:
Disconnect luggage compartment door key lock and unlock switch connector.

CHECK:
Check continuity between terminals 1 and 2, when the key is turned to the unlock side and not turned.

OK:

Key operation	Tester connection	Specified condition
Turned to unlock	1 – 2	Continuity
Not turned	–	No continuity

NG → **Repair or replace luggage compartment door key lock and unlock switch.**

OK

3	Check harness and connector between theft deterrent ECU and key lock and unlock switch, key lock and unlock switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

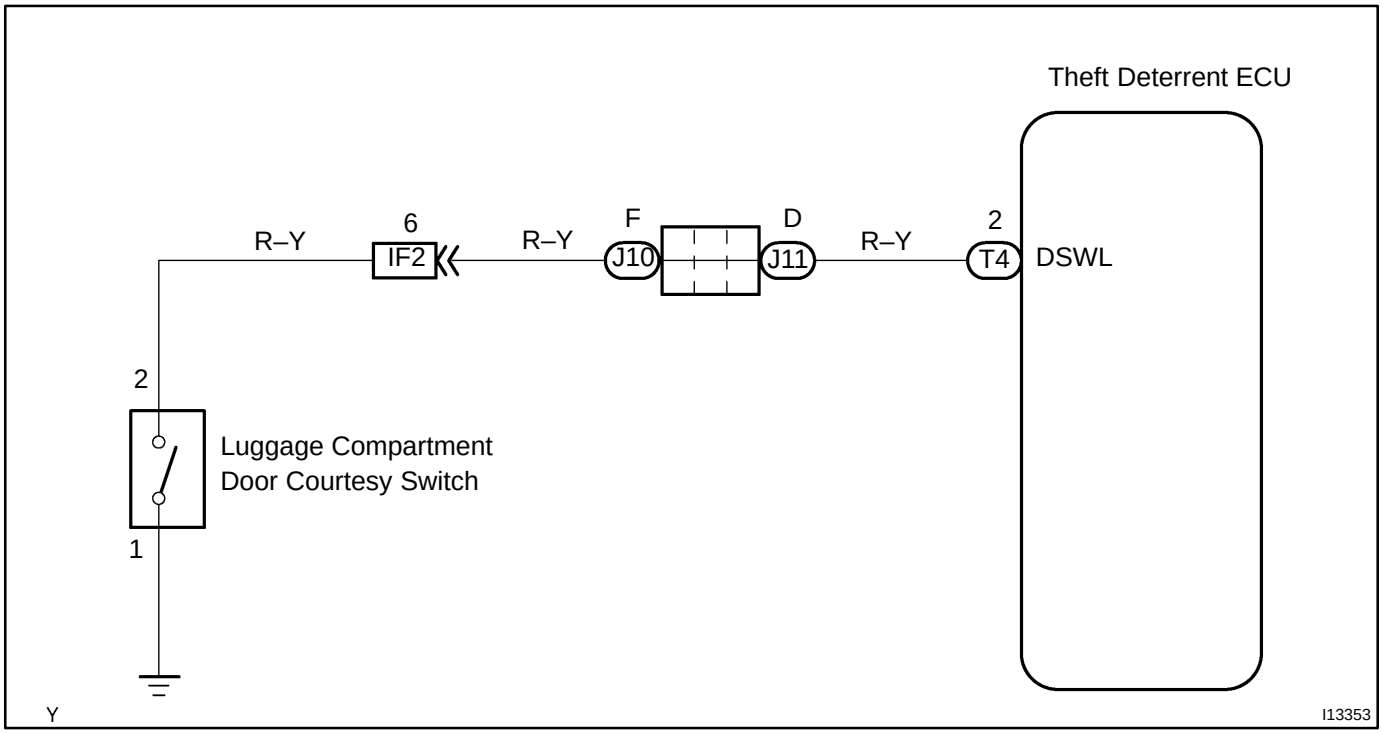
DI025–07

Luggage Compartment Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The luggage compartment door courtesy switch goes ON when luggage compartment door is opened and goes OFF when the luggage compartment door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of luggage compartment door courtesy light.**

CHECK:

Check that luggage compartment door courtesy light goes OFF when luggage compartment door courtesy switch is pushed, and comes ON when switch is not pushed.

NG → **Check and repair luggage compartment door courtesy light circuit (See page BE–53).**

OK

2	**Check for open in harness and connector between theft deterrent ECU and luggage compartment door courtesy switch (See page IN–31).**

NG → **Repair or replace harness or connectors.**

OK

Check and replace theft deterrent ECU.*1

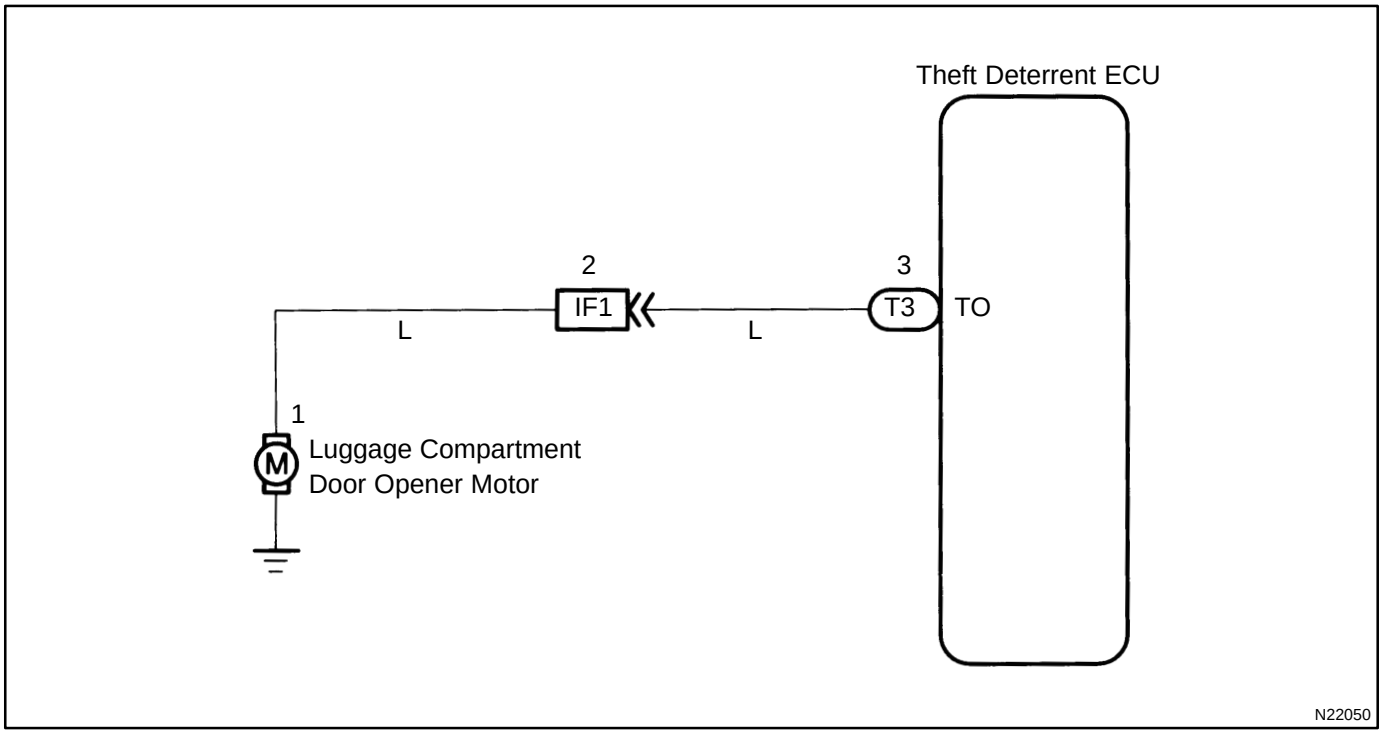
*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

Luggage Compartment Door Opener Motor Circuit

CIRCUIT DESCRIPTION

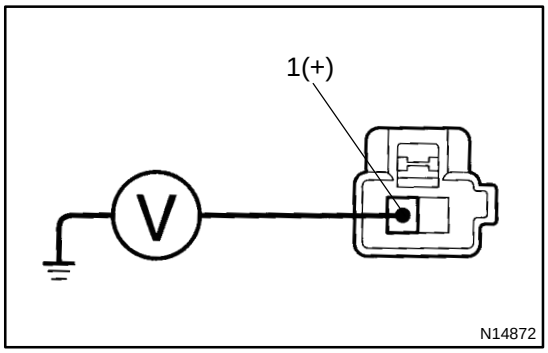
This circuit unlocks the luggage compartment door when the ECU sends signals to the luggage compartment door opener motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal 1 of luggage compartment door opener motor and body ground.**



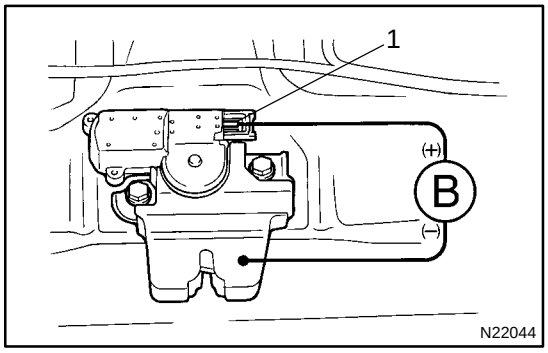
PREPARATION:
Disconnect the courtesy switch and opener motor connector.
CHECK:
Measure voltage between terminal 1 of luggage compartment door opener motor and body ground, when opener switch is pulled and not pulled.
OK:

Opener switch	Voltage
Pulled	5 – 14 V
Not pulled	Below 1 V

NG → **Check harness and connectors between ECU and luggage compartment door opener motor (See page IN–31).**

OK

2	**Check luggage compartment door opener motor.**



PREPARATION:
Disconnect luggage compartment door courtesy switch and opener motor connector.
CHECK:
Connect positive (+) lead from the battery to terminal 1 and the negative (–) lead to the body ground.
OK:

Operated motor shaft and gear.

HINT:
Perform inspection in a short time (within 1 second).

NG → **Replace luggage compartment door opener motor.**

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI–604).

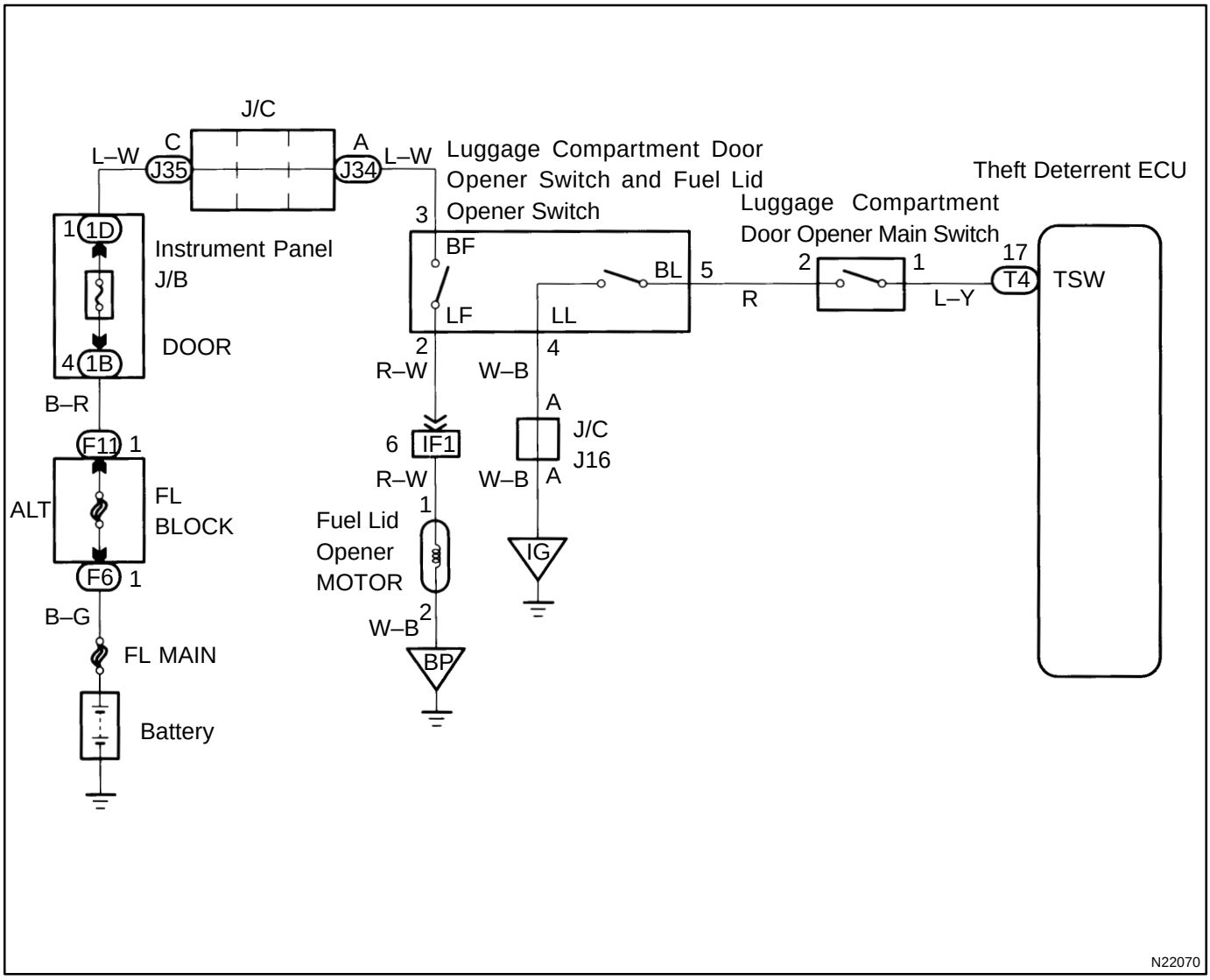
DI027–04

Luggage Compartment Door Opener Main Switch and Opener Switch Circuit

CIRCUIT DESCRIPTION

The luggage compartment door opener main switch is OFF when it is pushed in, and the luggage compartment door opener switch is ON when it is pulled.
The ECU energizes the luggage compartment door opener solenoid only when the main switch and opener switch are ON together.

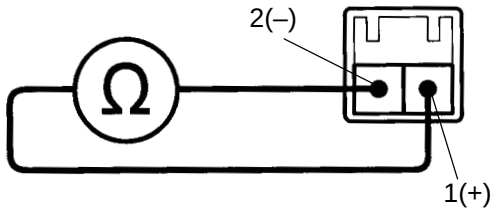
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check luggage compartment door opener main switch and opener switch.**

Luggage Compartment Door Opener Main Switch



PREPARATION:

Disconnect the luggage compartment door opener main switch and opener switch connector.

CHECK:

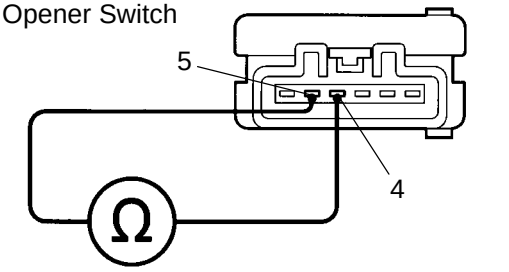
(a) Check luggage compartment door opener main switch.

(b) Check continuity between terminals of main switch connector.

OK:

Switch position	Tester connection	Specified condition
ON	1 – 2	Continuity
OFF	–	No continuity

Luggage Compartment Door Opener Switch



CHECK:

(a) Check luggage compartment door opener switch.

(b) Check continuity between terminals of main switch and opener switch connector.

OK:

Switch position	Tester connection	Specified condition
ON	4 – 5	Continuity
OFF	–	No continuity

NG → **Replace luggage compartment door opener main switch and/or opener switch.**

OK

2	**Check harness and connector between ECU and main switch, opener switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI–604).

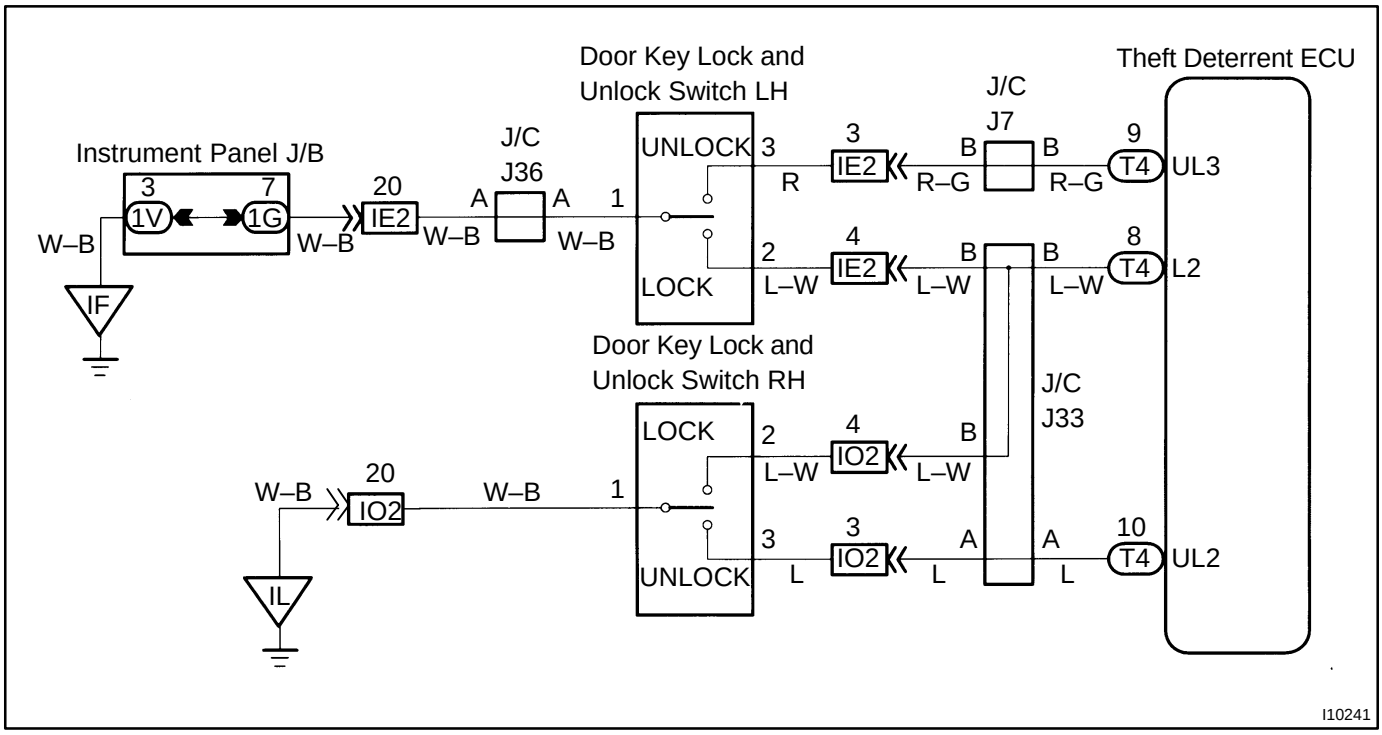
DI028–13

Door Key Lock and Unlock Switch Circuit

CIRCUIT DESCRIPTION

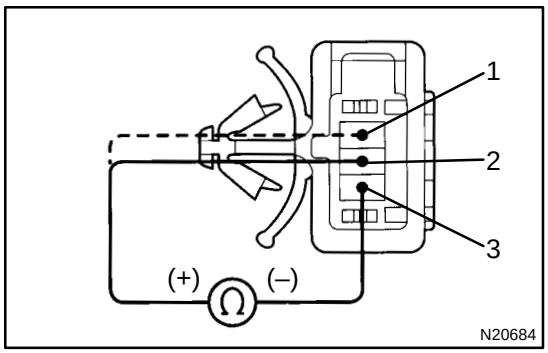
The door key lock and unlock switch is built in the door key cylinder. When the key is turned to the lock side, terminal 1 of the switch is grounded and when the key is turned to the unlock side, terminal 2 of the switch is grounded.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check door key lock and unlock switch.



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect the door key lock and unlock switch connector.

CHECK:

Check continuity between terminals 1, 2 and 3 of door key lock and unlock switch connector, when door key lock and unlock switch is turned to the lock side, unlock side and not turned.

OK:

Switch position	Tester connection	Specified condition
Lock side	2 – 3	Continuity
Unlock side	1 – 3	Continuity
OFF	–	No continuity

NG → **Replace door key lock and unlock switch.**

OK ↓

2	Check harness and connectors between ECU and switch, switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace theft deterrent ECU.*1

*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

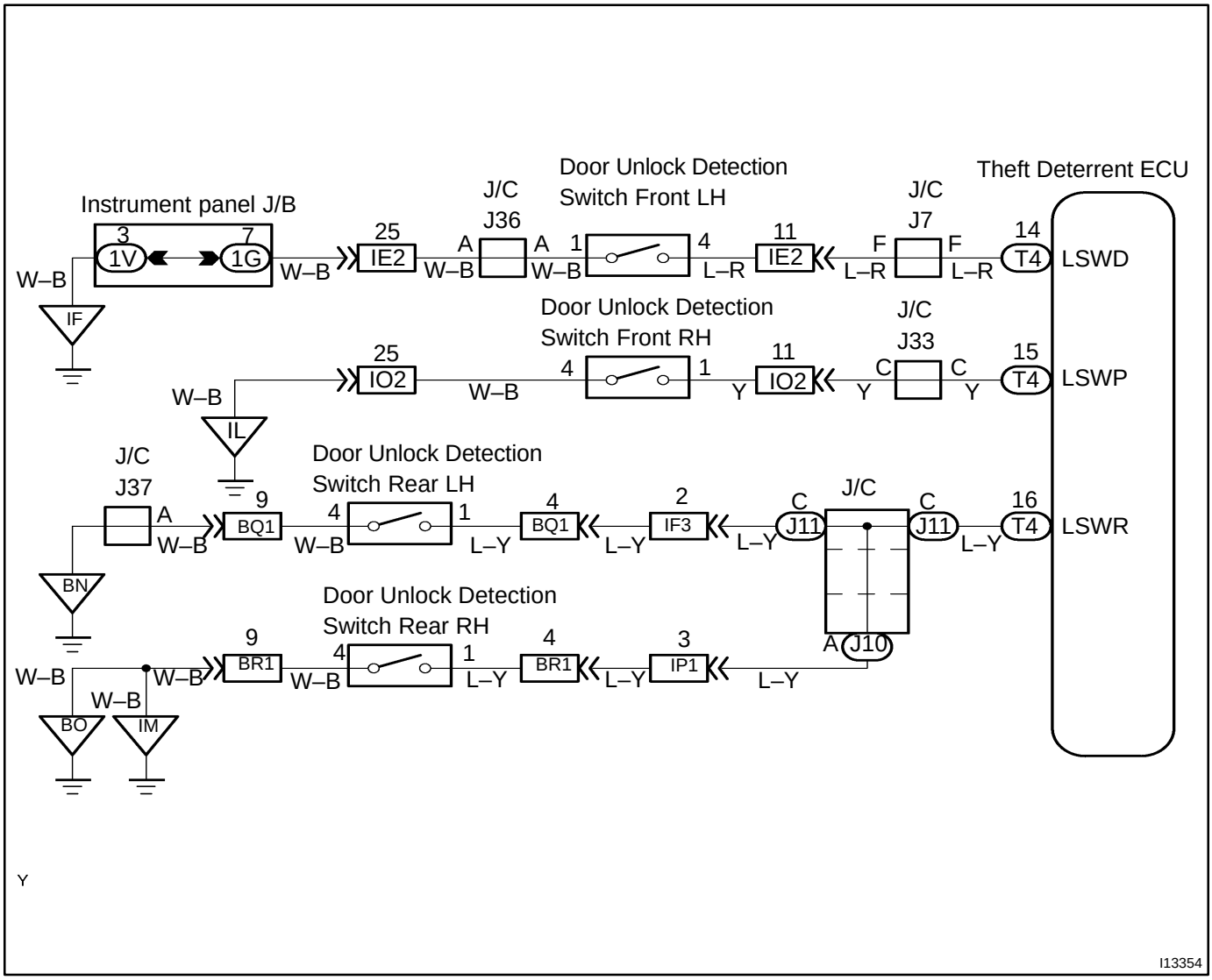
DI029–13

Door Unlock Detection Switch Circuit

CIRCUIT DESCRIPTION

The door unlock detection switch is built in the door lock motor assembly. This switch is ON when the door lock knob is in the unlock position and OFF when the lock knob is in the lock position. The ECU detects the door lock knob conditions from this circuit. It is used as one of the operating conditions for the key confinement prevention function.

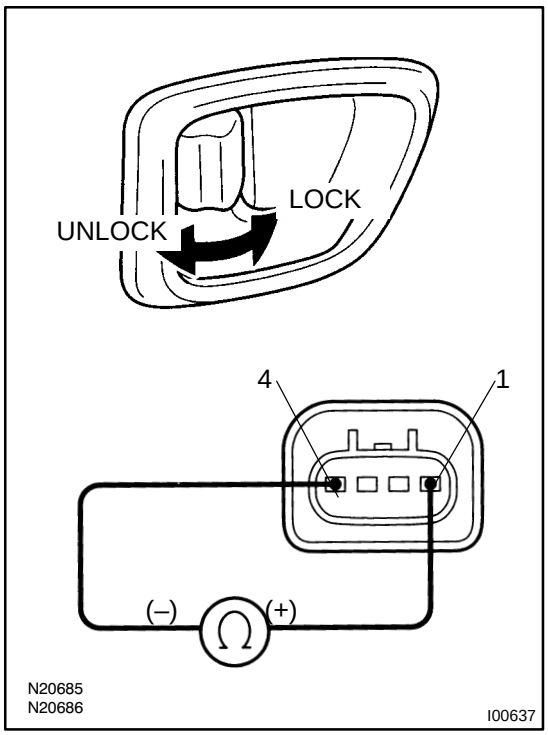
WIRING DIAGRAM



I13354

INSPECTION PROCEDURE

1	**Check Door Unlock Detection Switch.**



PREPARATION:

(a) Remove the door trim and service hole cover.

(b) Disconnect door unlock detection switch connector.

CHECK:

Check continuity between terminals 1 and 4 of door unlock detection switch connector, when the door lock knob is operated to the lock side and unlock side.

OK:

Switch Condition	Tester connection	Specified condition
Door unlock	1 – 4	Continuity
Door lock	–	No continuity

NG → **Replace door unlock detection switch.**

OK ↓

2	**Check harness and connectors between ECU and door unlock detection switch, door unlock detection switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace theft deterrent ECU.*1

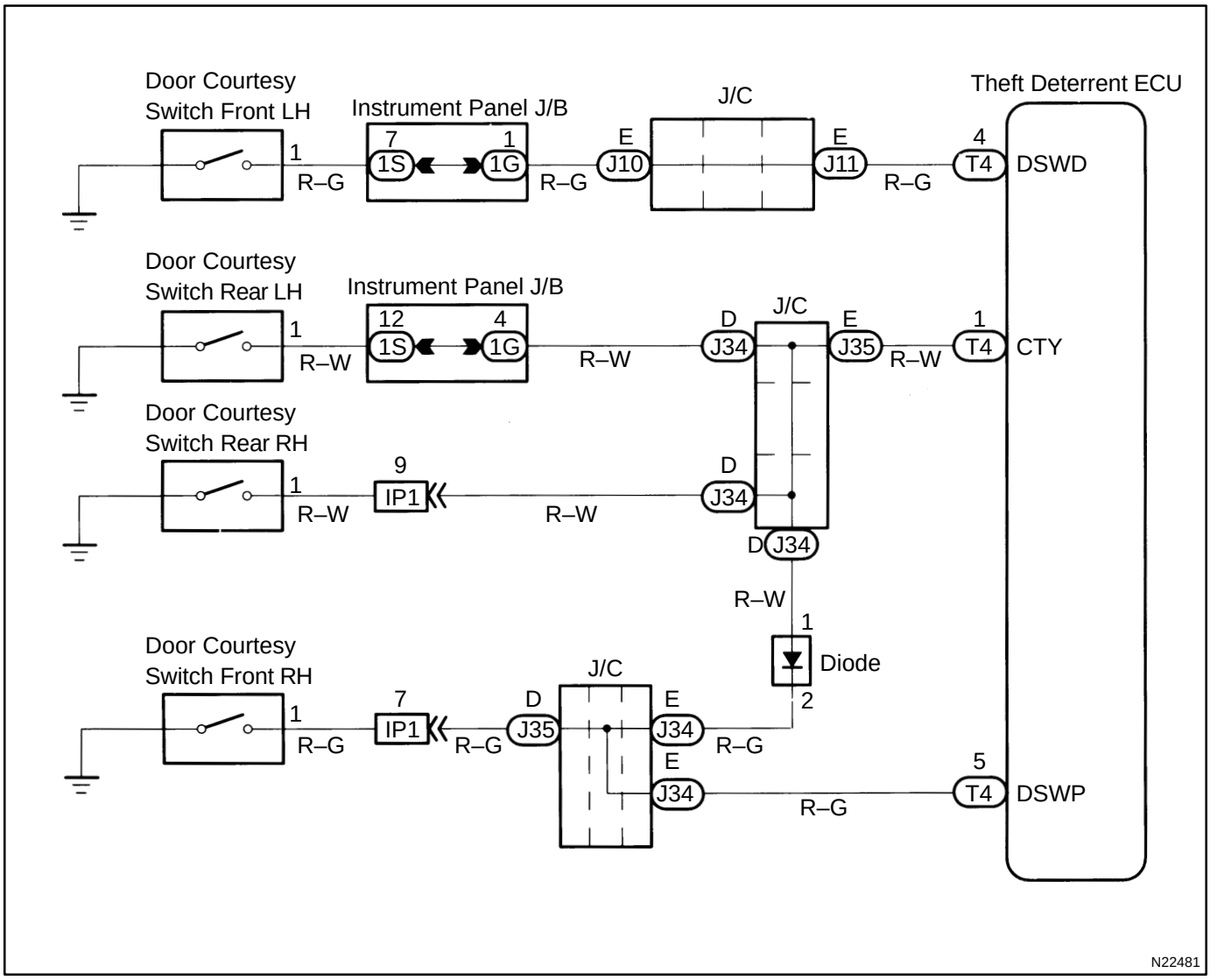
*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

Door Courtesy Switch Circuit

CIRCUIT DESCRIPTION

The door courtesy switch goes ON when the door is opened and goes OFF when the door is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of open door warning light.**

CHECK:

Check that open door warning light comes ON when each door is opened, and goes OFF when all doors are closed.

NG → **Check and repair open door warning light circuit.**

OK

2	**Check for open in harness and connector between theft deterrent ECU and door courtesy switch (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace theft deterrent ECU.*1

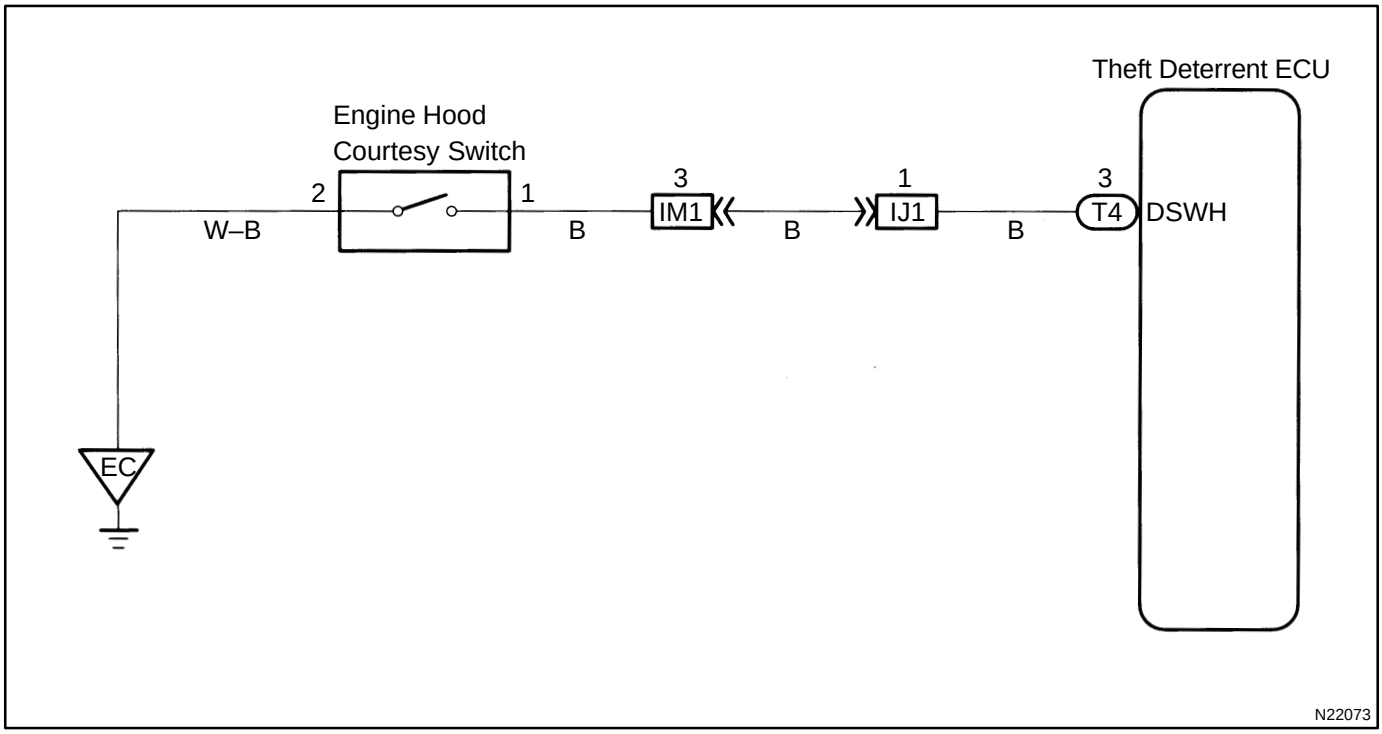
*1: When there is a malfunction that the theft deterrent system cannot be set, proceed to the next numbered circuit inspection shown in problem symptom table (See page DI–604).

Engine Hood Courtesy Switch Circuit

CIRCUIT DESCRIPTION

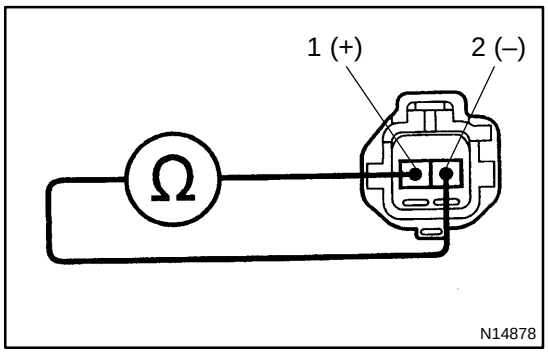
The engine hood courtesy switch is built into the engine hood lock assembly and goes ON when the engine hood is opened and goes OFF when the engine hood is closed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check engine hood courtesy switch.**



PREPARATION:

(a) Remove engine hood lock assembly.

(b) Disconnect engine hood courtesy switch connector.

CHECK:

Check continuity between terminals 1 and 2 when engine hood lock is locked and unlocked.

OK:

Engine hood lock	Tester connection	Specified condition
LOCK	–	No continuity
UNLOCK	1 – 2	Continuity

NG	**Replace engine hood courtesy switch.**

OK

2	Check harness and connector between theft deterrent ECU and switch, switch and body ground (See page IN–31).

NG → Repair or replace harness or connector.

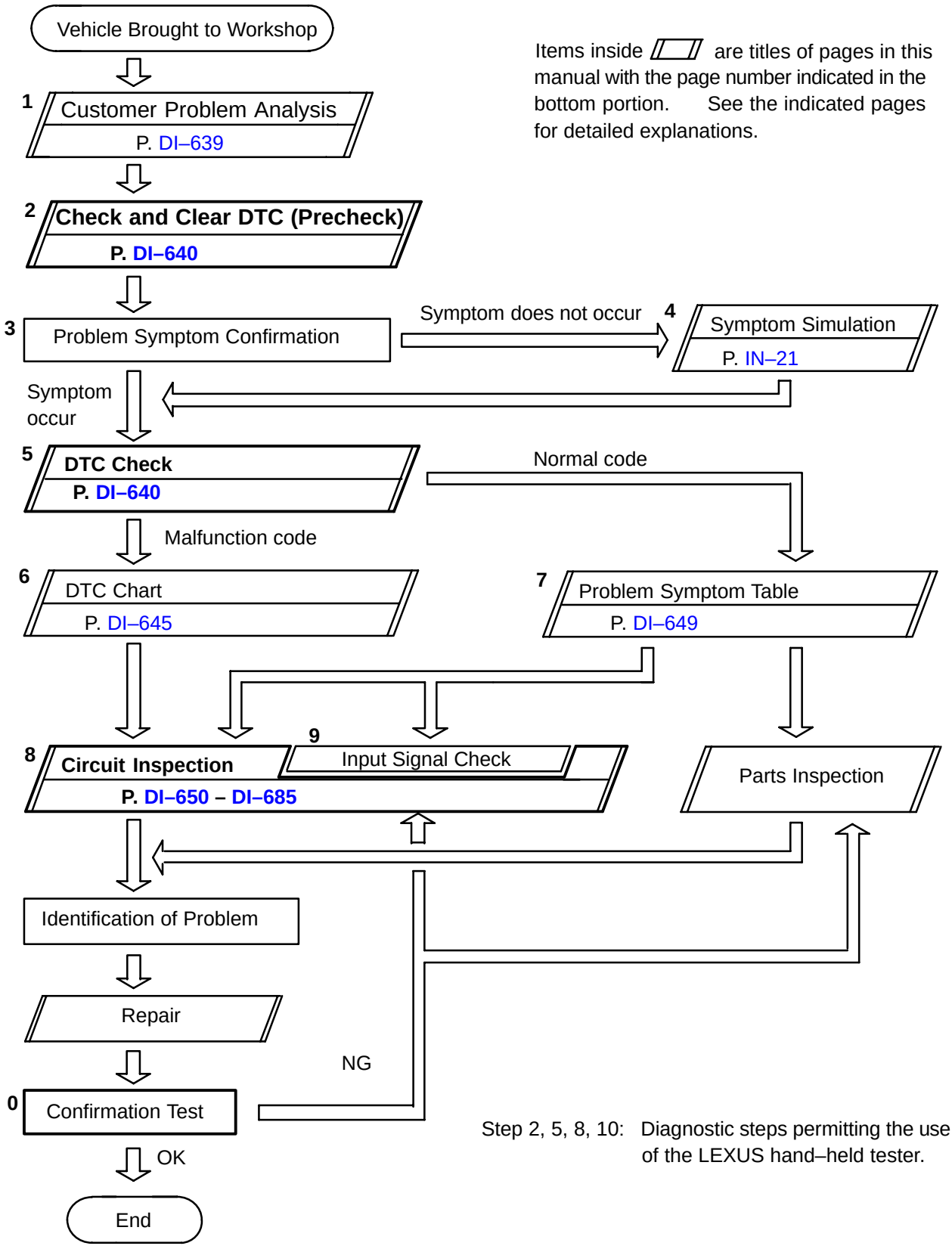
OK

Check and replace theft deterrent ECU (See page IN–31).

CRUISE CONTROL SYSTEM

DI0EF–07

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.

Step 2, 5, 8, 10: Diagnostic steps permitting the use of the LEXUS hand–held tester.

DI0EH–04

CUSTOMER PROBLEM ANALYSIS CHECK

CRUISE CONTROL SYSTEM Check Sheet

Inspector's name: _____

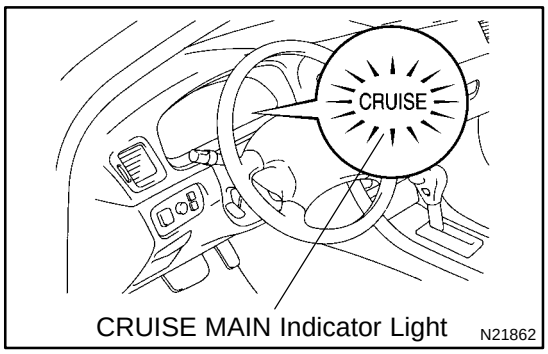
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date Vehicle Brought in	/ /	**Odometer Reading**	**km Mile**

Condition of Problem Occurrence	**Date of Problem Occurrence**	/ /
	How Often does Problem Occur?	☐ 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 At 40 km/h (25 mph) or less 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 Blinking

DTC Check	**1st Time**	Normal Code Malfunction Code (Code)
	2nd Time	Normal Code Malfunction Code (Code)

DI8YG–01



PRE–CHECK

1. DIAGNOSIS SYSTEM

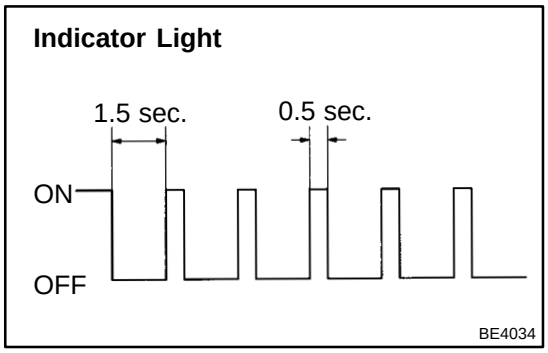
(a) Check the indicator.

(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:

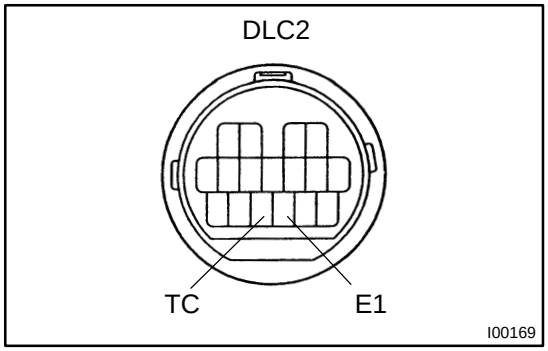
If the indicator check result is not normal, proceed to trouble-shooting (See page BE–3) for the combination meter section.



(b) Check the DTC.

HINT:

If a malfunction occurs in the No. 1 vehicle speed sensors or actuator, etc. during cruise control driving, the ECU 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.



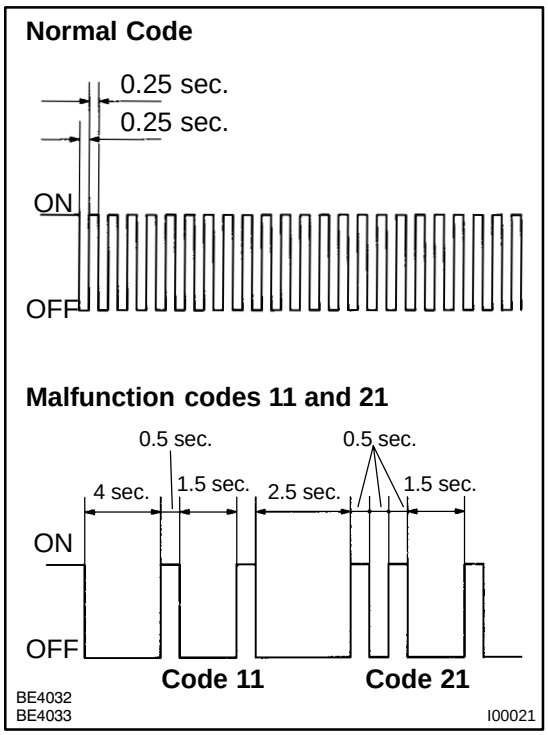
(c) Output DTC using diagnosis check wire.

(1) Turn the ignition switch ON.

(2) Using SST, connect terminals Tc and E_1 of DLC2.

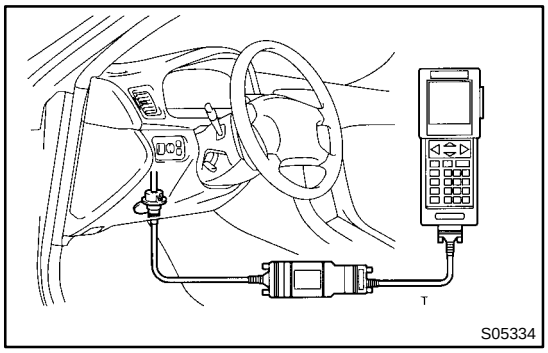
SST 09843–18020

(3) Read the DTC on the CRUISE MAIN indicator light.



HINT:

- If the DTC is not output, inspect the diagnosis circuit (See page DI–683).
- As an example, the blinking patterns for codes; normal, 11 and 21 are shown in the illustration.



2. USING LEXUS HAND–HELD TESTER

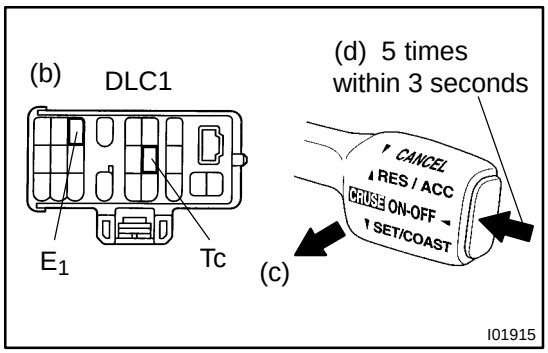
(a) Hook up the LEXUS hand–held tester to the DLC2.

(b) Monitor the ECU data by following the prompts on the tester screen.

HINT:

LEXUS hand–held tester has a ”Snapshot” function which records the monitored data.

Please refer to the LEXUS hand–held tester operator’s manual for further details.



3. DTC CLEARANCE (ERASE MODE)

HINT:

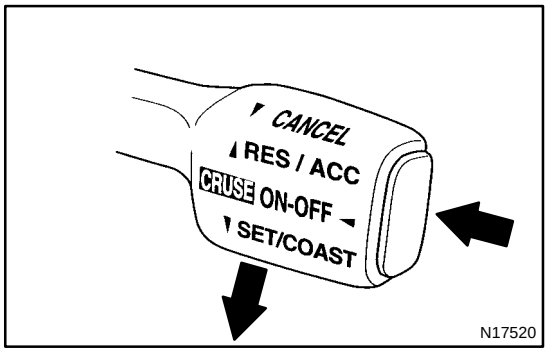
During in the erase mode, diag detection dose not work.

(a) Drive at about 15 km/h or below.

(b) Using SST, connect terminals Tc and E_1 of DLC1
SST 09843–18020

(c) Pull the cruise control switch to CANCEL.

(d) On the above metioned condition, turn on the cruise control main switch 5 times within 3 seconds.



4. PROBLEM SYMPTOM CONFIRMATION (ROAD TEST)

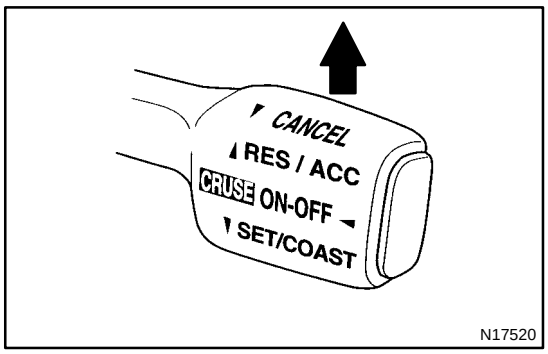
(a) Inspect the SET switch.

(1) Push the main switch ON.

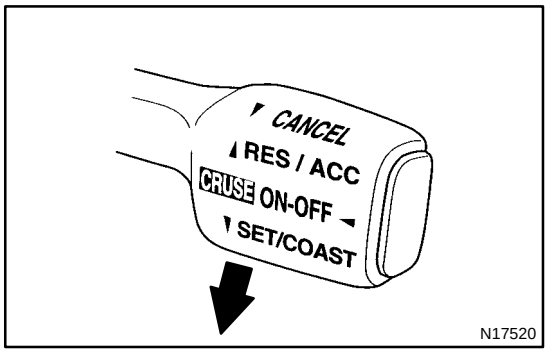
(2) Drive at a desired speed (40 km/h (25 mph) or higher).

(3) Press the control switch to the SET/COAST.

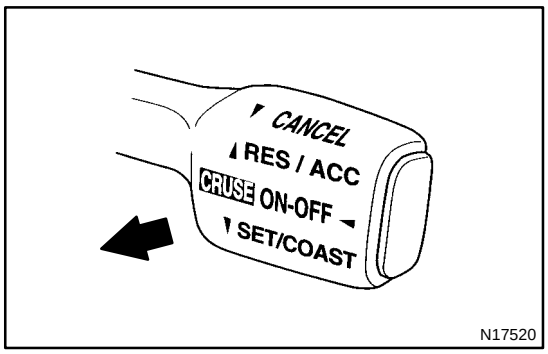
(4) After releasing the switch, check that the vehicle cruises at the desired speed.



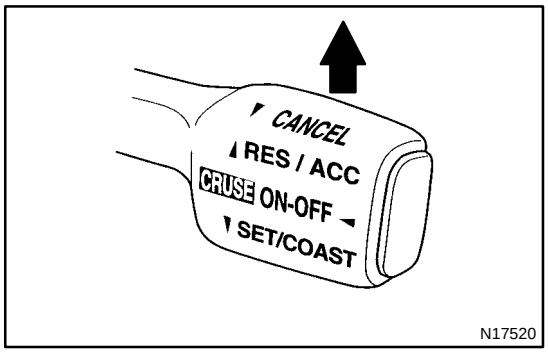
(b) Inspect the ACCEL switch.
(1) Push the main switch ON.
(2) Drive at a desired speed (40 km/h (25 mph) or higher).
(3) Check that the vehicle speed is increases while the control switch is turned to RES/ACC, and that the vehicle cruises at the set speed when the switch is released.
(4) Momentarily press the control switch upward in the RES/ACC 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 ON.
(2) Drive at a desired speed (40 km/h (25 mph) or higher).
(3) Check that the vehicle speed is decreases while the control switch is turned to SET/COAST, and the vehicle cruises at the set speed when the switch is released.
(4) Momentarily press the control switch is turned to SET/COAST, and then immediately release it. Check that the vehicle speed decreases by about 1.5 km/h (Tap–down function).

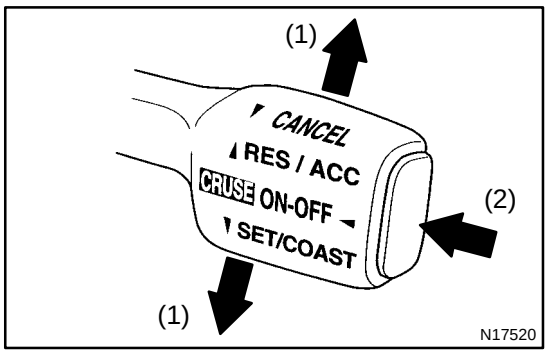


(d) Inspect the CANCEL switch.
(1) Push the main switch ON.
(2) Drive at a desired speed (40 km/h (25 mph) or higher).
(3) When operating one of the followings, check that the cruise control system is cancelled and that the normal driving mode is reset.
- Depress the brake pedal
- Shift to except D position
- Push the main switch OFF
- Pull the cruise control switch to CANCEL



(e) Inspect the RESUME switch.
(1) Push the main switch 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 OFF
- Pull the cruise control switch to CANCEL

(4) After the control switch is turned to RES/ACC at the driving speed of more than 40 km/h (25 mph), check that the vehicle restores the speed prior to the cancellation.



5. INPUT SIGNAL CHECK

HINT:

(1) For check No.1 – No.3:

- Turn ignition switch ON.

(2) For check No.4:

- Jack up the vehicle.
- Start the engine.
- Shift to D position.

(a) Press the control switch to SET/COAST or RES/ACC position and hold it down or hold it up ”1”.

(b) Push the main switch ON ”2”.

(c) Check that the CRUISE MAIN indicator light blinks twice or 3 times repeatedly after 3 seconds.

(d) Turn the SET/COAST or RES/ACC switch OFF.

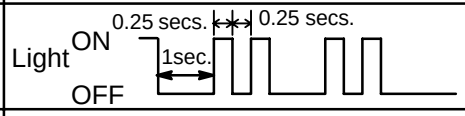
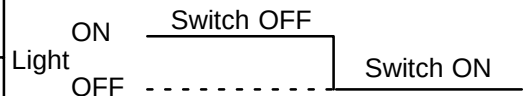
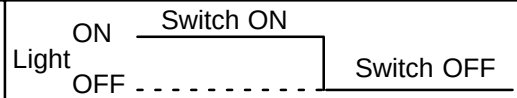
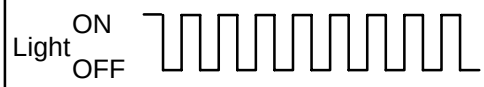
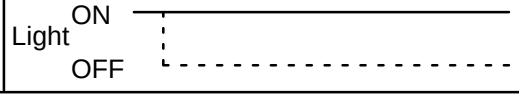
(e) Operate each switch as listed in the table below.

(f) Read the blinking pattern of the CRUISE MAIN indicator light.

(g) After performing the check, turn the main switch OFF.

HINT:

When 2 or more signals are input to the ECU, the lowest numbered code will be displayed first.

No.	Operation Method	CRUISE MAIN Indicator Light Blinking Pattern	Diagnosis
1	Turn SET/COAST switch ON		SET/COAST switch circuit is normal
2	Turn RES/ACC switch ON		RES/ACC switch circuit is normal
3	Turn CANCEL switch ON		CANCEL switch circuit is normal
	Turn stop light switch ON Depress brake pedal		Stop light switch circuit is normal
	Turn PNP switch OFF (Shift to except D position)		PNP switch circuit is normal
4	Drive at about 40 km/h (25 mph)or higher		Vehicle Speed Sensor is normal
	Drive at about 40 km/h (25 mph) or below		

DI0EJ–08

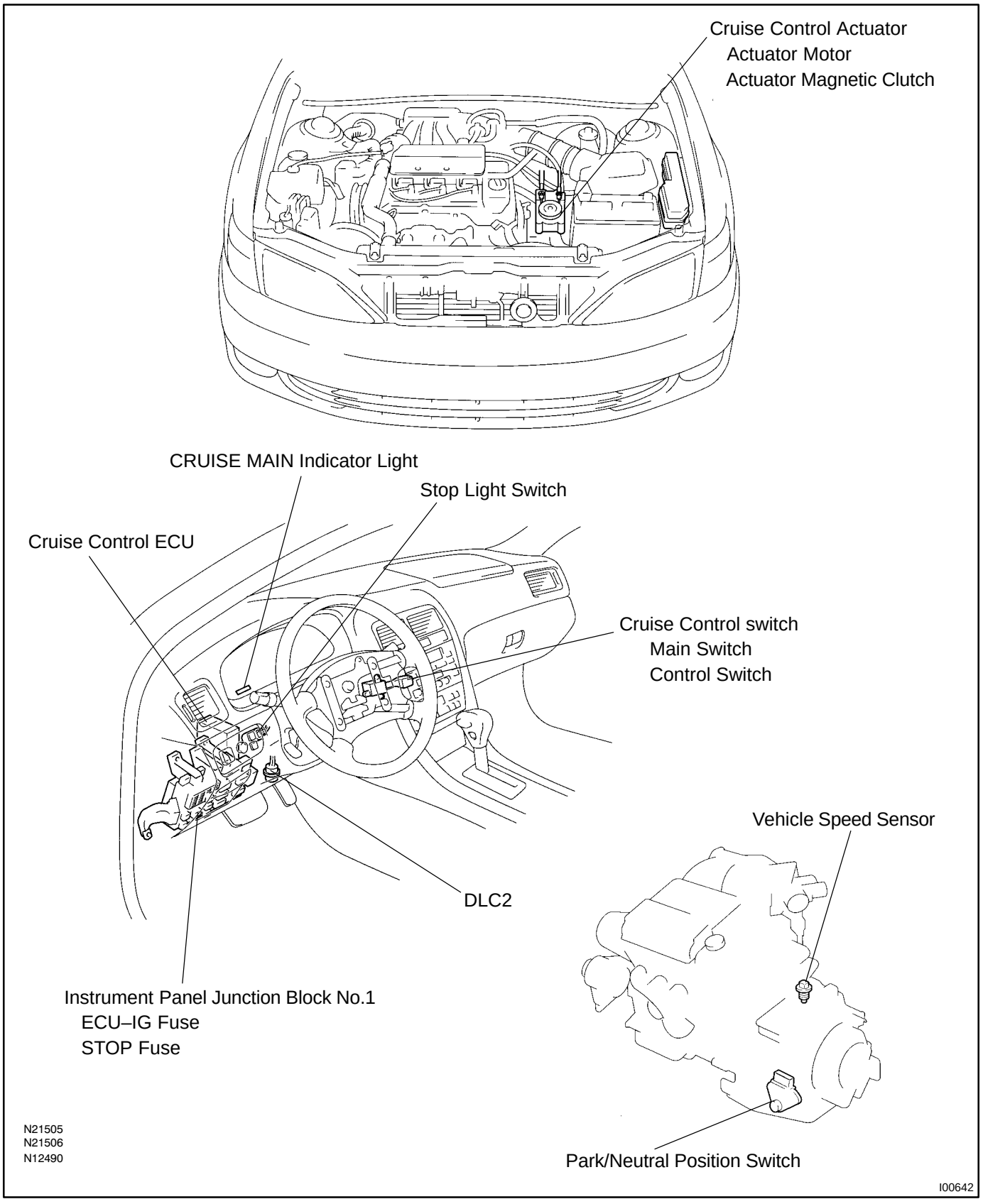
DIAGNOSTIC TROUBLE CODE CHART

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
11, 15 (DI–650)	●Actuator Motor Circuit	●Actuator motor ●Harness or connector between cruise control ECU and actuator motor ●Cruise control ECU
12 (DI–652)	●Actuator Magnetic Clutch Circuit	●STOP Fuse ●Stop light switch ●Actuator magnetic clutch ●Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground ●Cruise control ECU
14 (DI–655)	●Actuator Mechanical Malfunction	●Actuator motor (actuator lock: motor, arm) ●Cruise control ECU
21 (DI–655)	●Open in Vehicle Speed Sensor Circuit	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU
23 (DI–660)	●Vehicle Speed Signal Abnormal	●Vehicle speed sensor ●Cruise control ECU
32 (DI–661)	●Control Switch Circuit	●Cruise control switch ●Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground ●Cruise control ECU
41	●Cruise control ECU	●Cruise control ECU
42	●Source voltage drop	●Power source
51 (DI–664)	●Idle Signal Circuit	●Throttle position sensor ●Harness or connector between ECM and throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

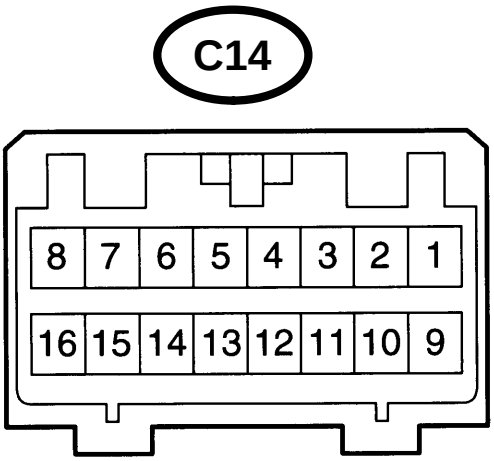
DI0EK–06

PARTS LOCATION



DI1C7–04

TERMINALS OF ECU



I00293

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
STP– ↔ GND (C14–2 ↔ C14–16)	G–W ↔ W–B	Depress brake pedal	10 – 16 V
		Release brake pedal	Below 1 V
D ↔ GND (C14–3 ↔ C14–16)	B–R ↔ W–B	Shift to except D position	Below 1 V
		Shift to D position	10 – 16 V
PI ↔ GND (C14–4 ↔ C14–16)	O ↔ W–B	Ignition switch ON Cruise control main switch ON	Below 1.2 V
		Ignition switch ON Cruise control main switch OFF	10 – 16 V
TC ↔ GND (C14–5 ↔ C14–16)	LG–R ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON Connect terminals TC and E1 of diagnostic check connector	Below 1 V
ECT ↔ GND (C14–6 ↔ C14–16)	L–B ↔ W–B	During driving Gear position 3rd	10 – 16 V
		During driving Gear position O/D	Below 1 V
MC ↔ GND (C14–7 ↔ C14–16)	R–B ↔ W–B	During cruise control driving COAST switch held ON	9 – 15 V
		During cruise control driving ACC switch held ON	Below 1 V
L ↔ GND (C14–8 ↔ C14–16)	G–B ↔ W–B	During cruise control driving	9 – 15 V
		Except during cruise control driving	Below 1 V
B ↔ GND (C14–9 ↔ C14–16)	B–R ↔ W–B	Ignition switch ON	10 – 16 V
CCS ↔ GND (C14–10 ↔ C14–16)	W ↔ W–B	Ignition switch ON	10 – 16 V
		Ignition switch ON CANCEL switch held ON	4.2 – 8.8 V
		Ignition switch ON SET/COAST switch held ON	2.5 – 6.3 V
		Ignition switch ON RES/ACC switch held ON	0.8 – 3.7 V

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CMS ↔ GND (C14–11 ↔ C14–16)	W–L ↔ W–B	Ignition switch ON Main switch OFF	10 – 16 V
		Ignition switch ON Main switch ON	Below 0.5 V
SPD ↔ GND (C14–12 ↔ C14–16)	V–W ↔ W–B	Engine start Car stoppage.	Below 1.5 V or 4.7 – 16 V
		During driving (Pulse generated).	3 – 7 V
IDL ↔ GND (C14–13 ↔ C14–16)	L–R ↔ W–B	Ignition switch ON Throttle valve fully opened.	10 – 16 V
		Ignition switch ON Throttle valve fully closed.	Below 1.5 V
OD ↔ GND (C14–14 ↔ C14–16)	Y–B ↔ W–B	During cruise control driving OD switch ON.	10 – 16 V
		During cruise control driving OD switch OFF (3rd driving)	Below 1 V
MO ↔ GND (C14–15 ↔ C14–16)	R–G ↔ W–B	During cruise control driving ACC switch held ON	9 – 15 V
		During cruise control driving COAST switch held ON	Below 1 V
GND ↔ Body Ground (C14–16 ↔ Body Ground)	W–B ↔ Body Ground	Constant	Below 1 V

DI0EN–06

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
SET not occurring or CANCEL occurring. (DTC is Normal)	1. Main Switch Circuit (Cruise control switch) 2. Vehicle Speed Sensor 3. Control Switch Circuit (Cruise control switch) 4. Stop Light Switch Circuit 5. Park/Neutral Position Switch Circuit 6. Actuator Motor Circuit 7. Cruise Control Cable 8. Cruise Control ECU	DI–679 DI–657 DI–661 DI–667 DI–673 DI–650 DI–685 IN–31
SET not occurring or CANCEL occurring. (DTC dose not output)	1. ECU Power Source Circuit 2. Cruise Control ECU	DI–676 IN–31
Actual vehicle speed deviates above or below the set speed.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Electronically Controlled Transmission Communication Circuit 4. Actuator Motor Circuit 5. Idle Signal Circuit (main throttle position sensor) 6. Cruise Control ECU	DI–685 DI–660 DI–670 DI–650 DI–664 IN–31
Gear shifting frequent between 3rd and O/D when driving on uphill road. (Hurting)	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–670 IN–31
Cruise control not cancelled, even when brake pedal is depressed.	1. Cruise Control Cable 2. Stop Light Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–685 DI–667 DI–650 IN–31
Cruise control not cancelled, even when transmission is shifted to ”N” position.	1. Cruise Control Cable 2. Park/Neutral Position Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–685 DI–673 DI–650 IN–31
Control switch does not operate. (SET/COAST, ACC/RES, CANCEL not possible)	1. Cruise Control Cable 2. Control Switch Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–685 DI–661 DI–650 IN–31
SET possible at 40 km/h (25 mph) or less, or CANCEL does not operate at 40 km/h (25 mph) or less.	1. Cruise Control Cable 2. Vehicle Speed Signal Abnormal 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–685 DI–660 DI–650 IN–31
Poor response is ACCEL and RESUME modes.	1. Cruise Control Cable 2. Electronically Controlled Transmission Communication Circuit 3. Actuator Motor Circuit 4. Cruise Control ECU	DI–685 DI–670 DI–650 IN–31
O/D does not RESUME, even though the road is not uphill.	1. Electronically Controlled Transmission Communication Circuit 2. Cruise Control ECU	DI–670 IN–31
DTC memory is erased.	1. Cruise Control ECU	IN–31
DTC is not output, or is output when it should not be.	1. Diagnosis Circuit 2. Cruise Control ECU	DI–683 IN–31
Cruise MAIN indicator light remains ON or falls to light up.	1. Cruise MAIN Indicator Light Switch Circuit 2. Cruise Control ECU	DI–681 IN–31

DI0EO–06

CIRCUIT INSPECTION

DTC	11, 15	Actuator Motor Circuit

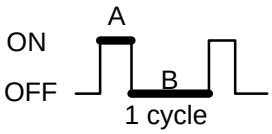
CIRCUIT DESCRIPTION

The actuator motor is operated by signals from the ECU. Acceleration and deceleration signals are transmitted by changes in the Duty Ratio (See below).

Duty Ratio

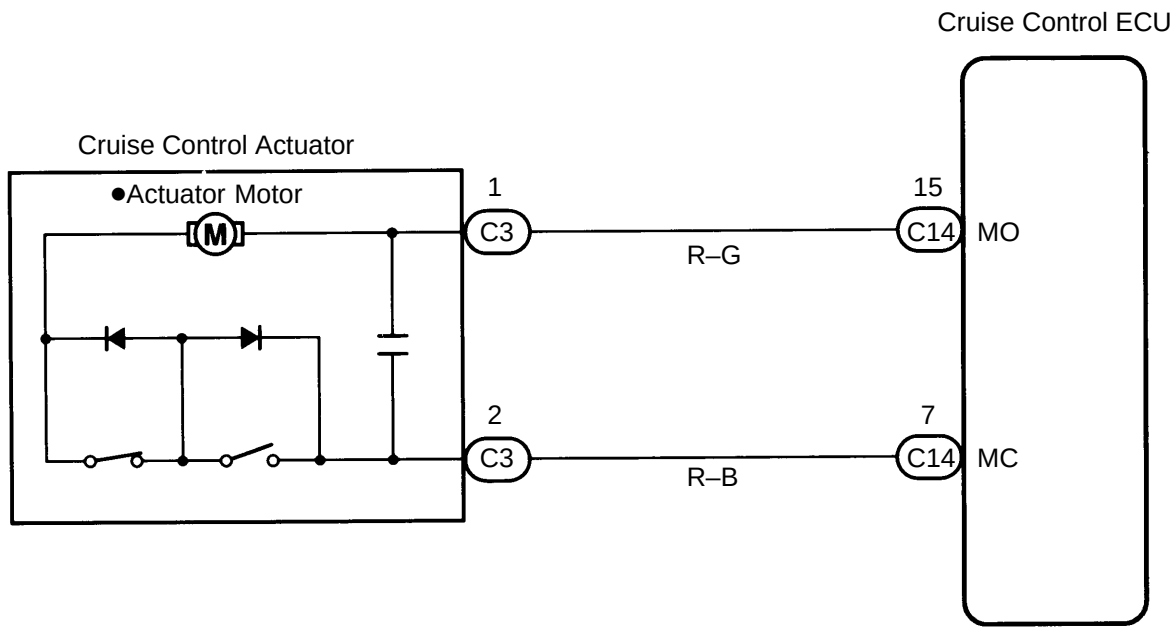
The duty ratio is the ratio of the period of continuity in one cycle. For example, if A is the period of continuity in one cycle, and B is the period of non–continuity, then.

$$\text{Duty Ratio} = \frac{A}{A + B} \times 100\ (\%)$$



DTC No.	Detection Item	Trouble Area
11	Short in actuator motor circuit.	Actuator motor Harness or connector between cruise control ECU and actuator motor Cruise control ECU
15	Open in actuator motor circuit.	Actuator motor

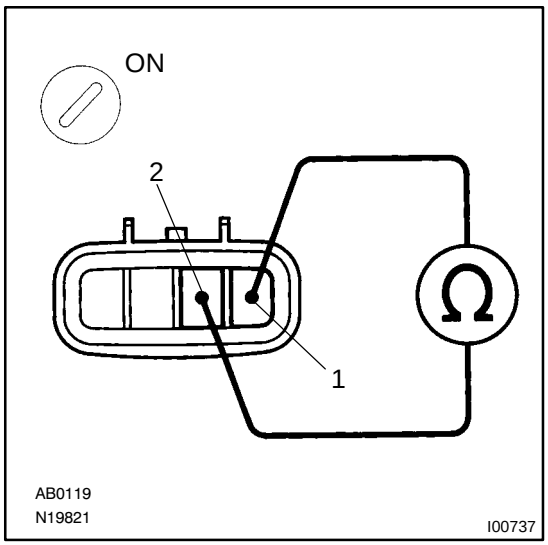
WIRING DIAGRAM



N21216

INSPECTION PROCEDURE

1	**Check resistance between terminals MO and MC of actuator motor.**



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Measure resistance between terminals 1 and 2.

HINT:

If control plate position is fully opened or fully closed, resistance can not be measured.

OK:

Resistance: more than 4.2 Ω

NG → **Replace cruise control actuator.**

OK

2	**Check for open and short in harness and connectors between cruise control ECU and actuator motor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU. (See page IN–31).

DI0EP–06

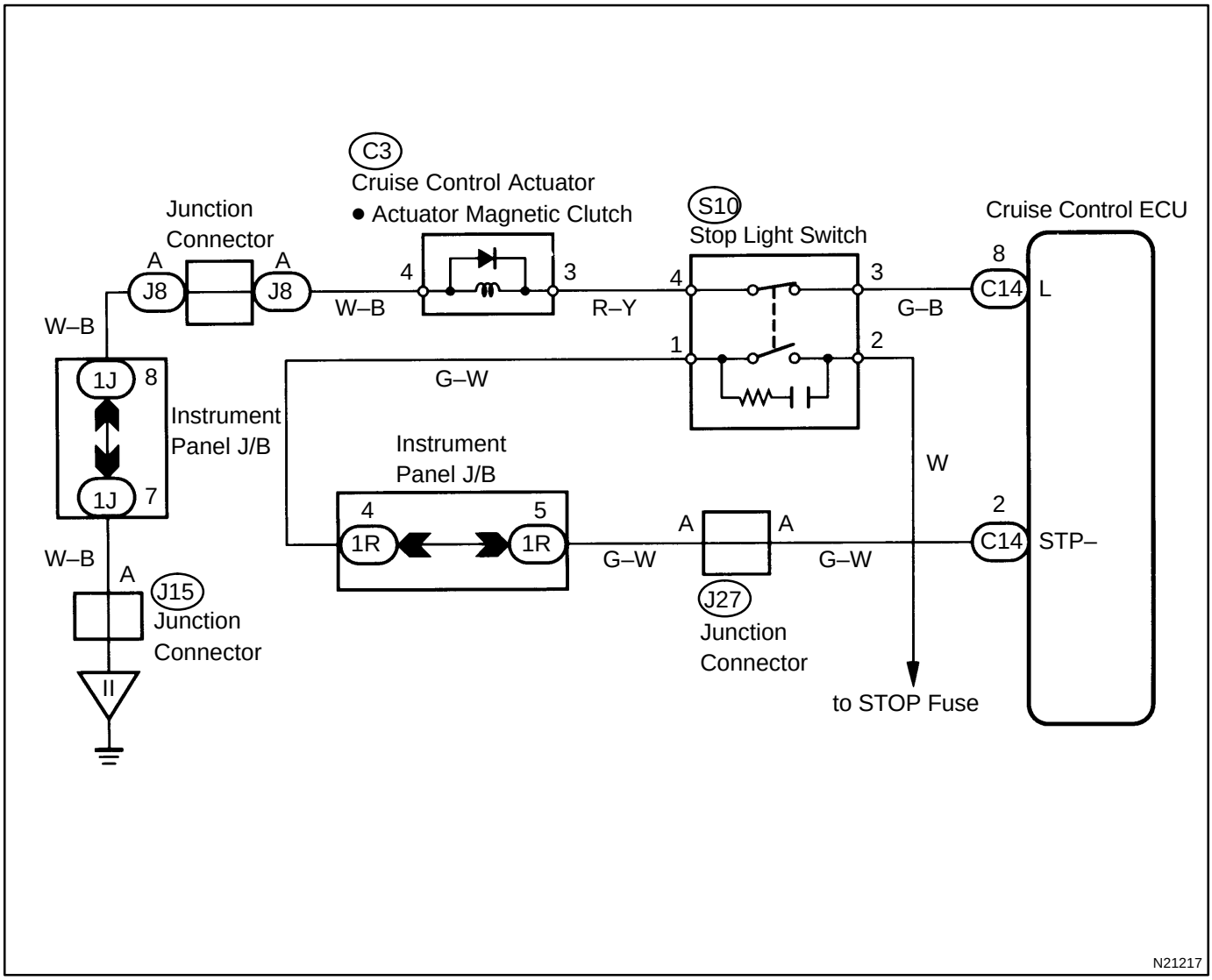
DTC	12	Actuator Magnetic Clutch Circuit

CIRCUIT DESCRIPTION

This circuit turns on the magnetic clutch inside the actuator during cruise control operation according to the signal from the ECU. If a malfunction occurs in the actuator or speed sensor, etc. during cruise control operation, the rotor shaft between the motor and control plate is released.
When the brake pedal is depressed, the stop light switch turns on, supplying electrical power to the stop light. Power supply to the magnetic clutch is mechanically cut and the magnetic clutch is turned OFF.
When driving downhill, if the vehicle speed exceeds the set speed by 15 km/h (9 mph), the ECU turns the safety magnet clutch OFF. If the vehicle speed later drops to within 10 km/h (6 mph) above the set speed, then cruise control at the set speed is resumed.

DTC No.	Detection Item	Trouble Area
12	Short in actuator magnetic clutch circuit. Open (0.8 sec.) in actuator magnetic clutch circuit.	STOP Fuse Stop light switch Actuator magnetic clutch Harness or connector between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground Cruise control ECU

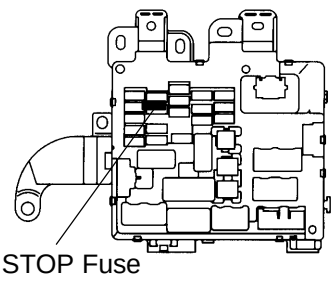
WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check STOP fuse.**

Instrument Panel Junction Block No.1



PREPARATION:

(a) Turn ignition switch OFF.

(b) Remove the STOP fuse from instrument panel junction block No.1.

CHECK:

Check fuse continuity.

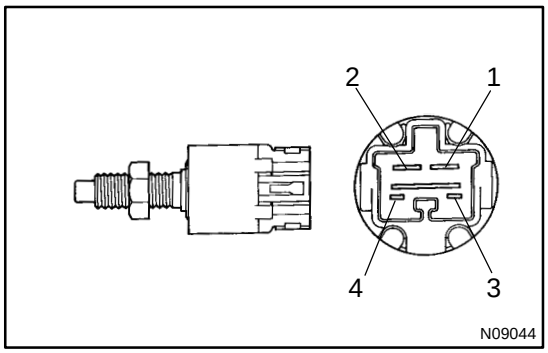
OK:

There is continuity.

NG → **Replace STOP fuse.**

OK

2	Check stop light switch.



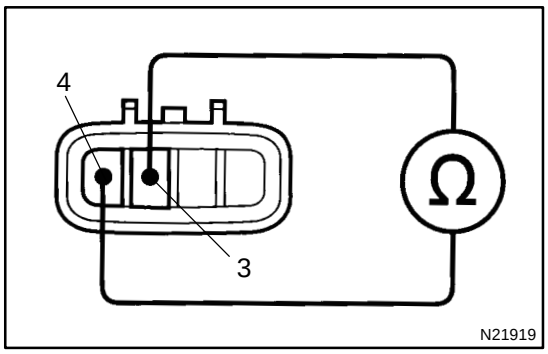
PREPARATION:
Disconnect the stop light switch connector.
CHECK:
Check continuity between terminals.

Switch position	Continuity
Switch pin free (Brake pedal depressed)	1 – 2
Switch pin pushed in (Brake pedal released)	3 – 4

NG → **Replace stop light switch.**

OK

3	Check resistance between terminals L and GND of actuator magnetic clutch.



PREPARATION:
(a) Turn ignition switch OFF.
(b) Disconnect the actuator connector.
CHECK:
Measure resistance between terminals 3 and 4.
OK:
Resistance: 34.65 ~ 42.35 Ω

NG → **Replace cruise control actuator.**

OK

4	Check for open and short in harness and connectors between cruise control ECU and actuator magnetic clutch, actuator magnetic clutch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI0EQ–06

DTC	14	Actuator Mechanical Malfunction

CIRCUIT DESCRIPTION

The circuit detects the rotation position of the actuator control plate and sends a signal to the ECU.

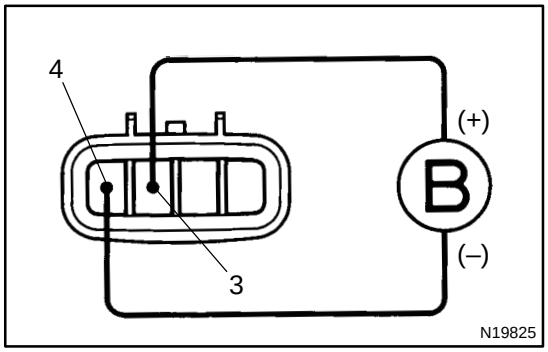
DTC No.	Detection Item	Trouble Area
14	●Cruise control actuator mechanical malfunction.	●Actuator lock: (motor, arm) ●Actuator motor ●Cruise control ECU

WIRING DIAGRAM

See page DI–650.

INSPECTION PROCEDURE

1	Check cruise control actuator arm locking operation



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

(a) Connect the positive (+) lead from the battery to the terminal 3 of actuator and the negative (–) lead to terminal 4.

NOTICE:

Do not connect the high tension cables to the wrong battery terminal. You will damage the cruise control actuator.

(b) Move the control plate by hand.

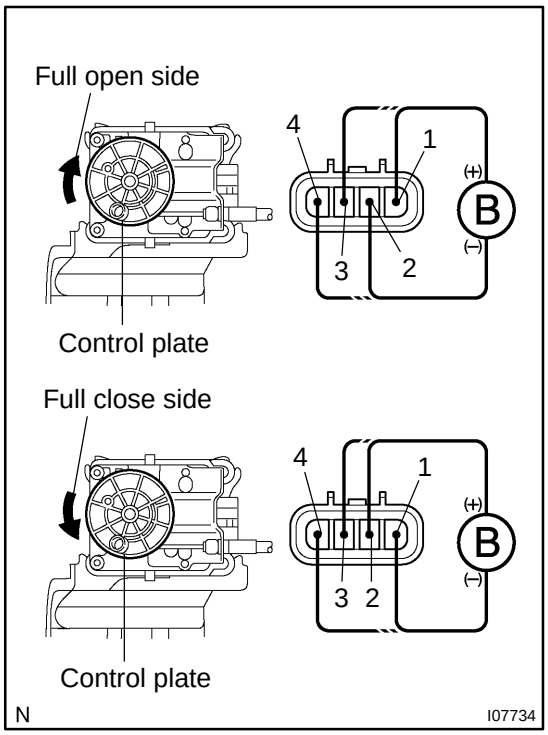
OK:

Control plate doesn't move.

NG → **Replace cruise control actuator.**

OK

2	Check cruise control actuator operation.



PREPARATION:

(a) Turn ignition switch OFF.

(b) Disconnect the actuator connector.

CHECK:

Connect the positive (+) lead from the battery to terminals 1 and 3 of actuator, connect the negative (–) lead to terminals 2 and 4 of actuator.

OK:

Control arm moves to full open side

CHECK:

Connect the positive (+) lead from the battery to terminals 2 and 3 of actuator, connect the negative (–) lead to terminals 1 and 4 of actuator.

OK:

Control arm moves to full close side

NG → **Replace cruise control actuator.**

OK

3	Check harness and connector between cruise control ECU and cruise control actuator (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

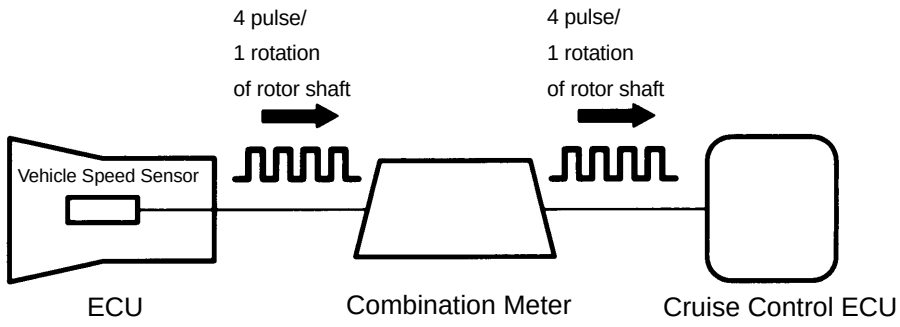
Check and replace cruise control ECU (See page IN–31).

DI0ER–08

DTC	21	Open in Vehicle Speed Sensor Circuit

CIRCUIT DESCRIPTION

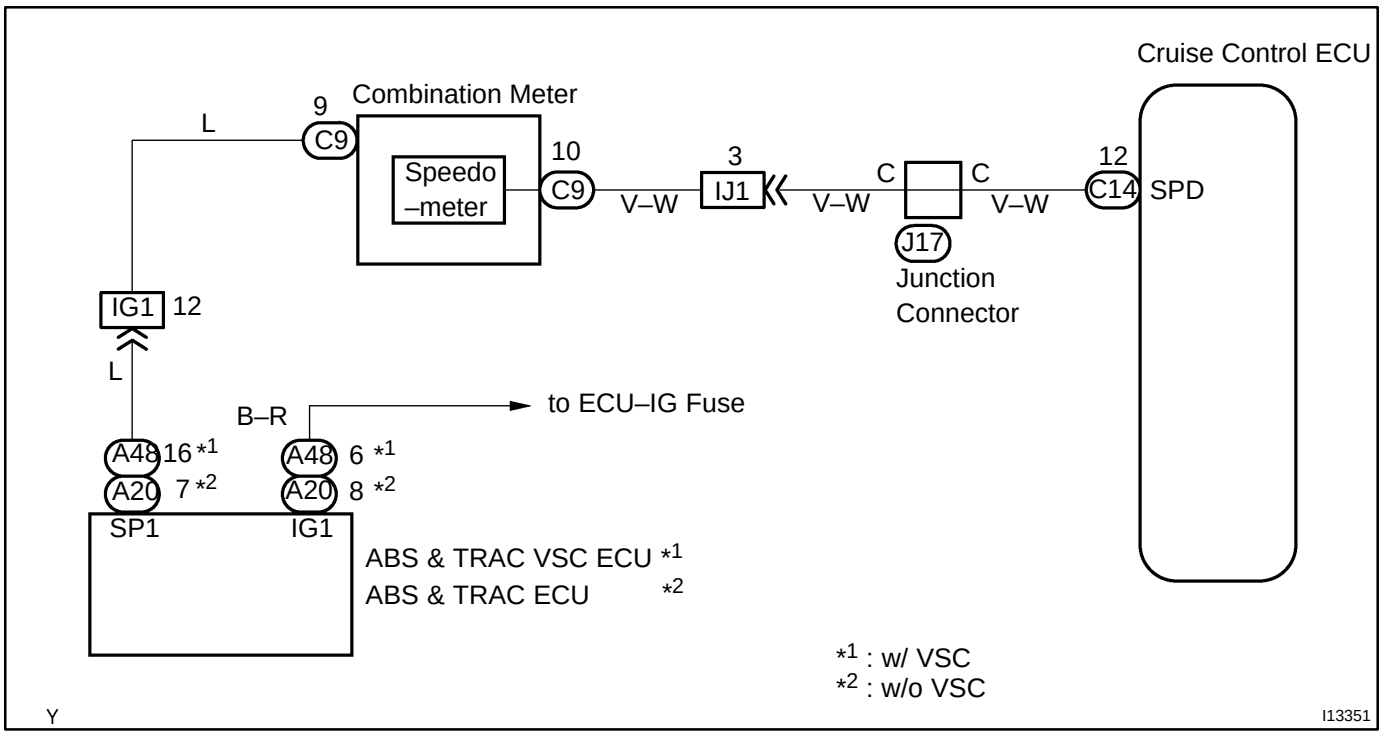
The vehicle speed sensor circuit is sent to cruise control ECU as vehicle speed signal.
The rotor shaft is driven by the gear of the transmission.
For each rotation of the shaft, the vehicle speed sensor sends a 4–pulse signal through the combination meter to the cruise control ECU (See the following chart).
This signal is converted inside the combination meter and sent as a 4–pulse signal to the cruise control ECU.
The ECU calculates the vehicle speed from this pulse frequency.



I00292

DTC No.	Detection Item	Trouble Area
21	●Speed signal is not input to the cruise control ECU while cruise control is set.	●Combination meter ●Harness or connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor ●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM



I13351

INSPECTION PROCEDURE

1	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Drive at about 40 km/h (25 mph) or below	Light: ON — OFF
Drive at about 40 km/h (25 mph) or higher	Light: ON / OFF

CHECK:

(a) See input signal check on page DI–640.

(b) Check indicator light operation when driving with vehicle speed above 40 km/h (25 mph), and with vehicle speed below 40 km/h (25 mph).

OK:

Vehicle speed above 40 km/h (25 mph):
Indicator light blinks

Vehicle speed below 40 km/h (25 mph):
Indicator light stays ON

OK → **Check and replace cruise control ECU (See page IN–31).**

NG

2	**Check speedometer circuit (See Combination meter troubleshooting on page BE–3).**

NG → **Repair or replace harness, connector or combination meter assembly.**

OK

3	**Check harness and connector between cruise control ECU and combination meter, combination meter and vehicle speed sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

4	Check vehicle speed sensor (See page BE–99).

NG → Replace vehicle speed sensor.

OK →

Check and replace cruise control ECU (See page IN–31).

DI0ES–05

DTC	23	Vehicle Speed Signal Abnormal

CIRCUIT DESCRIPTION

See page DI–657.

DTC No.	Detection Item	Trouble Area
23	●Vehicle speed sensor pulse is abnormal.	●Vehicle speed sensor ●Cruise control ECU

WIRING DIAGRAM

See page DI–657.

INSPECTION PROCEDURE

1	**Check vehicle speed sensor (See page BE–99).**

NG → **Replace vehicle speed sensor.**

OK

Check and replace cruise control ECU (See page IN–31).

DI0EU–04

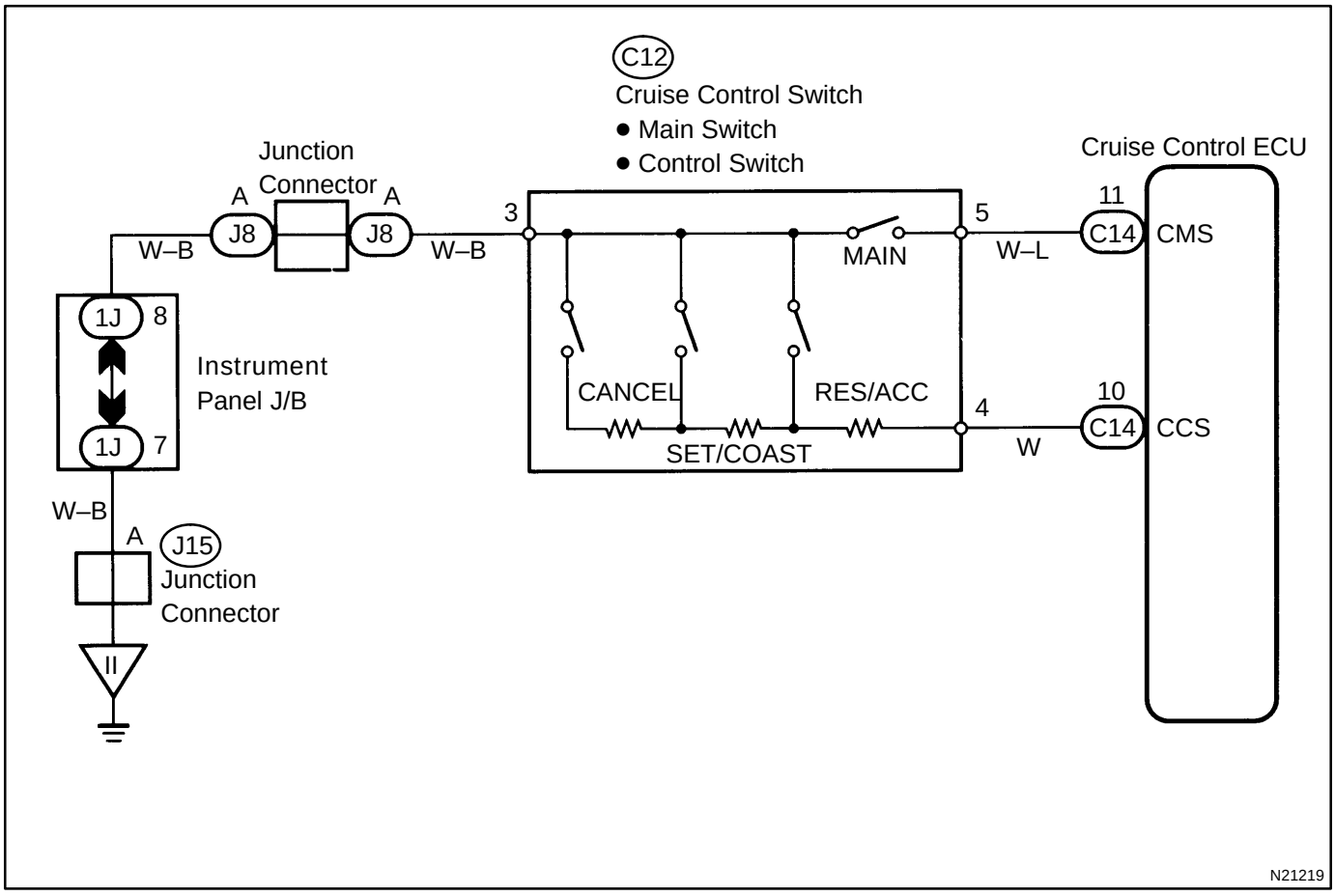
DTC	32	Control Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

This circuit carries the SET/COAST, RESUME/ACCEL and CANCEL signals (each voltage) to the ECU.

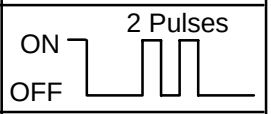
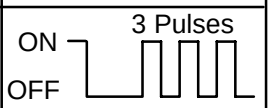
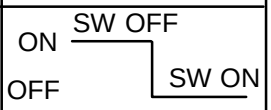
DTC No.	Detection Item	Trouble Area
32	Short in control switch circuit.	Cruise control switch Harness or connector between cruise control ECU and cruise control switch, cruise control switch and body ground Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
SET/COAST switch	
RESUME/ACCEL switch	
CANCEL switch	

PREPARATION:

See input signal check on page DI–640.

CHECK:

Check the indicator light operation when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned on.

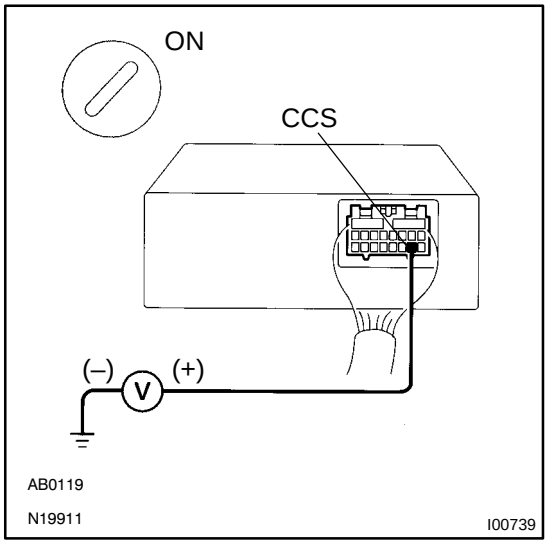
OK:

SET/COAST, RESUME/ACCEL switch
The signals shown in the table on the left should be output when each switch is ON. The signal should disappear when the switch is turned OFF.
CANCEL switch
The indicator light goes off when the cancel switch is turned ON.

OK	**Wait and see.**

NG

2	**Check voltage between terminals CCS of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Turn ignition switch ON.

CHECK:

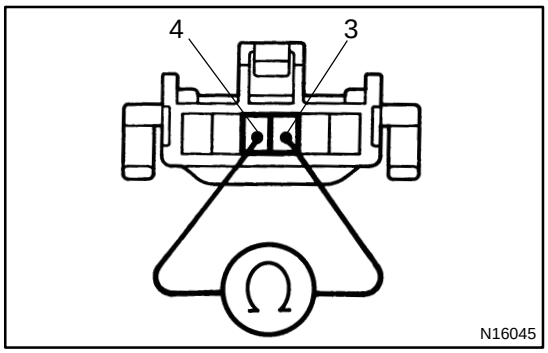
Measure voltage between terminals 18 of ECU connector and body ground, when each of the SET/COAST, RESUME/ACCEL and CANCEL is turned ON.

Switch position	Resistance (V)
Neutral	10 – 16 V
RES/ACC	0.6 – 2.3 V
SET/COAST	1.9 – 4.7 V
CANCEL	3.4 – 7.2 V

NG	**Proceed to next circuit inspection shown on problem symptom table (See page DI–649).**

OK

3	Check control switch.



PREPARATION:

(a) Remove steering wheel center pad.

(b) Disconnect the control switch connector.

CHECK:

Measure resistance between terminals 3 and 4 of control switch connector when control switch is operated.

Switch position	Resistance (Ω)
Neutral	∞ (No continuity)
RES/ACC	50 – 80
SET/COAST	180 – 220
CANCEL	400 – 440

NG → **Replace control switch.**

OK

4	Check harness and connector between cruise control ECU and cruise control switch, cruise control switch and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

5	Input signal check (See step 1).

OK → **Wait and see.**

NG

Check and replace cruise control ECU (See page IN–31).

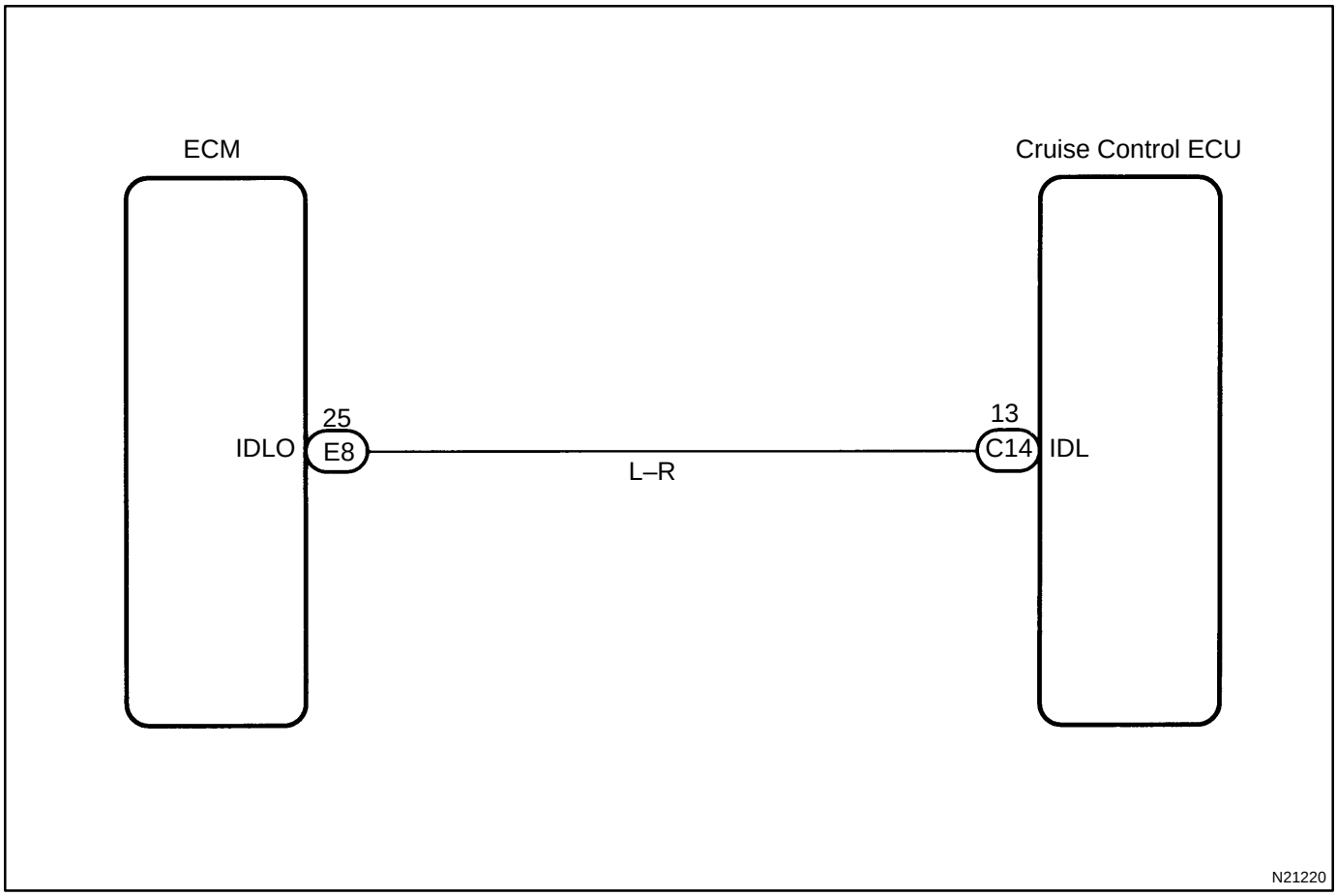
DTC	51	Idle Signal Circuit

CIRCUIT DESCRIPTION

When the idle switch is turned ON, a signal is sent to the ECU. The ECU uses this signal to correct the discrepancy between the throttle valve position and the actuator position sensor values to enable accurate cruise control at the set speed. If the idle switch is malfunctioning, problem symptoms also occur in the engine, so also inspect the engine.

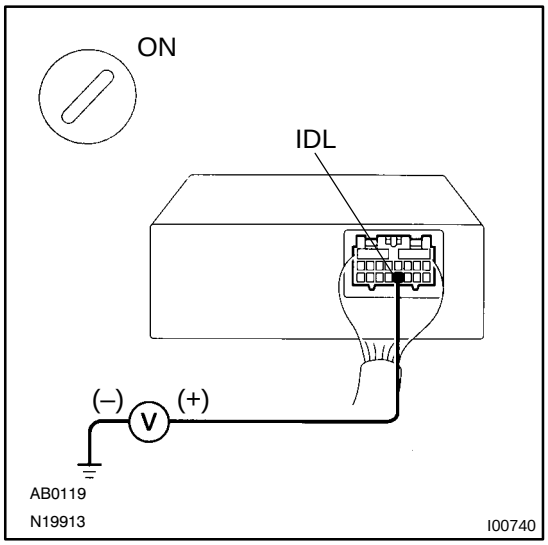
DTC No.	Detection Item	Trouble Area
51	●Short in idle signal circuit.	●Harness or connector between ECM and throttle position sensor ●Throttle position sensor ●Harness or connector between cruise control ECU and ECM ●Cruise control ECU

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal IDL of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.
(b) Disconnect the ECM connector.
(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminal IDL of ECU connector and body ground when the throttle valve is fully closed and fully opened.

OK:

Throttle valve position	Voltage
Fully opened	10 – 14 V
Fully closed	Below 1.5 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

2	**Check harness and connector between ECM and throttle position sensor (See page IN–31).**

NG → **Repair or replace harness or connector.**

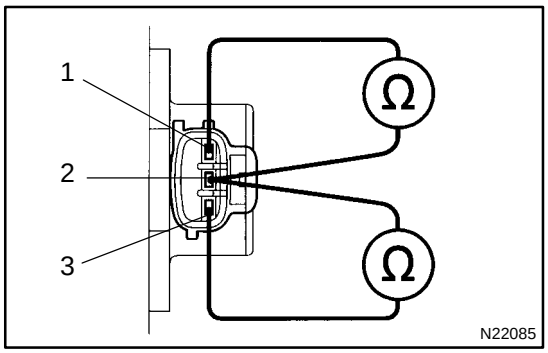
OK

3	**Check throttle position sensor circuit (See page DI–38).**

NG → **Replace throttle position sensor.**

OK

4	Check throttle position sensor.



PREPARATION:

Disconnect the throttle position sensor connector.

CHECK:

Measure resistance between terminals 1, 3 and 2 of throttle position sensor connector.

OK:

Terminals	Throttle valve position	Resistance
1 – 2	–	2.5 ~ 5.9 kΩ
2 – 3	Fully opened	0.2 ~ 6.3 kΩ
2 – 3	Fully closed	2.0 ~ 10.2 kΩ

NG → **Replace throttle position sensor.**

OK

5	Check for open and short in harness and connector between cruise control ECU and ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI0EZ–08

Stop Light Switch Circuit

CIRCUIT DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the ECU. When the ECU receives this signal, it cancels the cruise control.

A fail–safe function is provided so that CANCEL functions normally, even if there is a malfunction in the stop light signal circuit.

The cancel conditions are: Battery positive voltage at terminal STP–

When the brake is ON, battery positive voltage normally is applied through the STOP fuse and stop light switch to terminal STP– of the ECU, and the ECU 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.

Also, when the brake is ON, the magnetic clutch circuit is cut mechanically by the stop light switch, turning the cruise control OFF. (See page DI–652 for operation of the magnetic clutch)

WIRING DIAGRAM

See page DI–652.

INSPECTION PROCEDURE

1	**Check operation of stop light.**

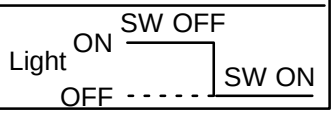
CHECK:

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–3).**

OK

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Stop Light switch ON	

CHECK:

(a) See input signal check on DI–640.

(b) Check the indicator light when the brake pedal is depressed.

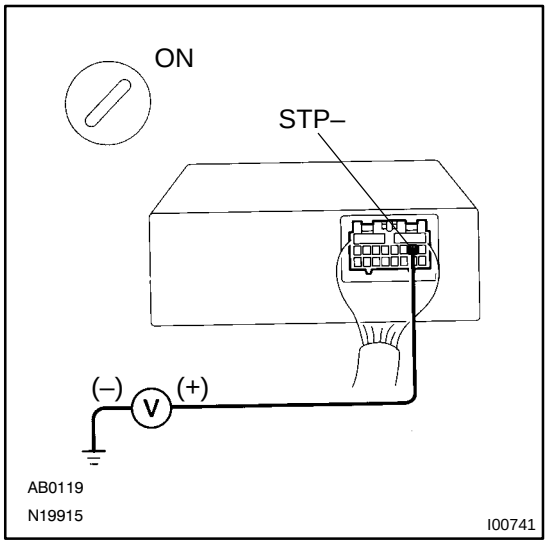
OK:

The indicator light goes off when the brake pedal is depressed.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

3	Check voltage between terminal STP– of cruise control ECU connector and body ground.



PREPARATION:

(a) Remove the ECU with connectors still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal STP– of cruise control ECU 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–649).**

NG

4	Check for open in harness and connectors between terminal STP– of cruise control ECU and stop light switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI0F2–06

Electronically Controlled Transmission Communication Circuit

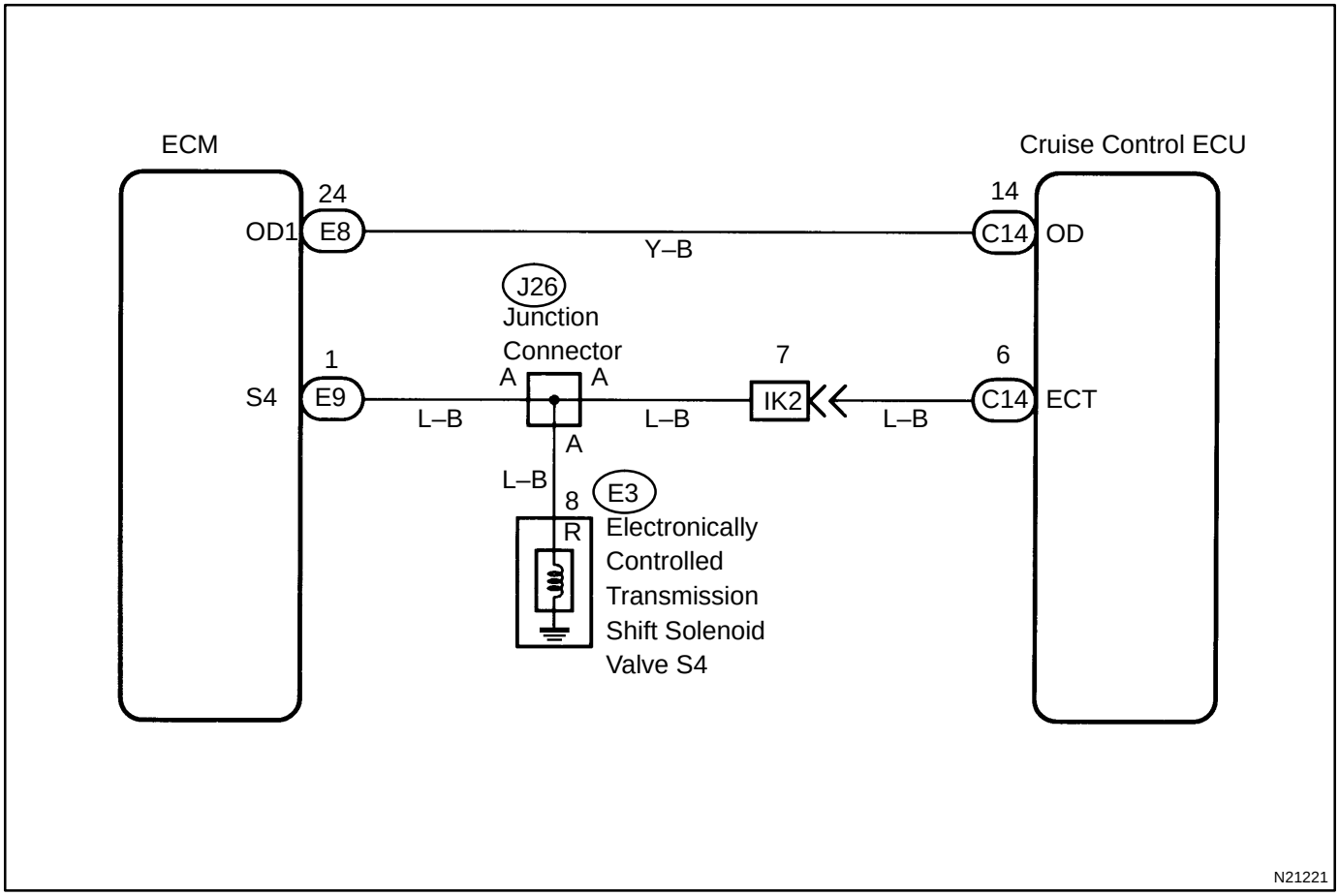
CIRCUIT DESCRIPTION

When driving uphill under cruise control, in order to reduce shifting due to ON–OFF overdrive operation and to provide smooth driving, when down shifting in the electronically controlled transmission occurs, a signal to prevent upshift until the end of the uphill slope is sent from the cruise control ECU to the electronically controlled transmission.

Terminal ECT of the cruise control ECU detects the shift change signal (output to electronically controlled transmission shift solenoid valve S4) from the ECM.

If vehicle speeds down, also when terminal ECT of the cruise control ECU receives down shifting signal, it sends a signal from terminal OD to ECM to cut overdrive until the end of the uphill slope, and the gear shifts are reduced and gear shift points in the electronically controlled transmission are changed.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of overdrive.**

PREPARATION:

Perform the test drive after engine warms up.

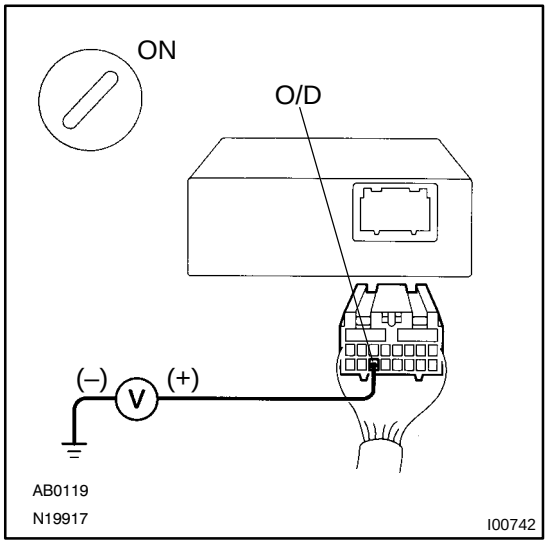
CHECK:

Check that overdrive ON ↔ OFF occurs with operation of OD switch ON–OFF.

NG → **Check and repair electronically controlled transmission (See page DI–163).**

OK

2	**Check voltage between terminal OD of harness side connector of cruise control ECU and body ground.**



PREPARATION:

(a) Remove the ECU with the connector still connected.
(b) Turn ignition switch ON.
(c) Disconnect the ECU connector.

CHECK:

Measure voltage between terminal OD of harness side connector of ECU and body ground.

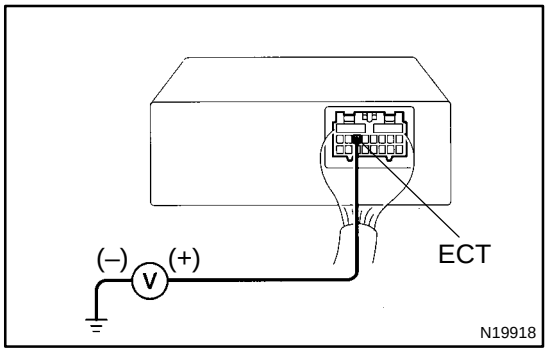
OK:

Voltage: 10 – 14 V

NG → **Go to step 5.**

OK

3	Check voltage between terminal ECT of cruise control ECU connector and body ground (On test drive).



PREPARATION:

(a) Connect the ECU connector.

(b) Perform the test drive after engine warms up.

CHECK:

Check voltage between terminal ECT of ECU connector and body ground when OD switch is ON and OFF.

OK:

OD switch position	Voltage
ON	8 – 14 V
OFF	Below 0.5 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

4	Check harness and connector between terminal ECT of cruise control ECU and electronically controlled transmission solenoid (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU.

5	Check harness and connector between terminal OD of cruise control ECU and terminal OD1 of ECM (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

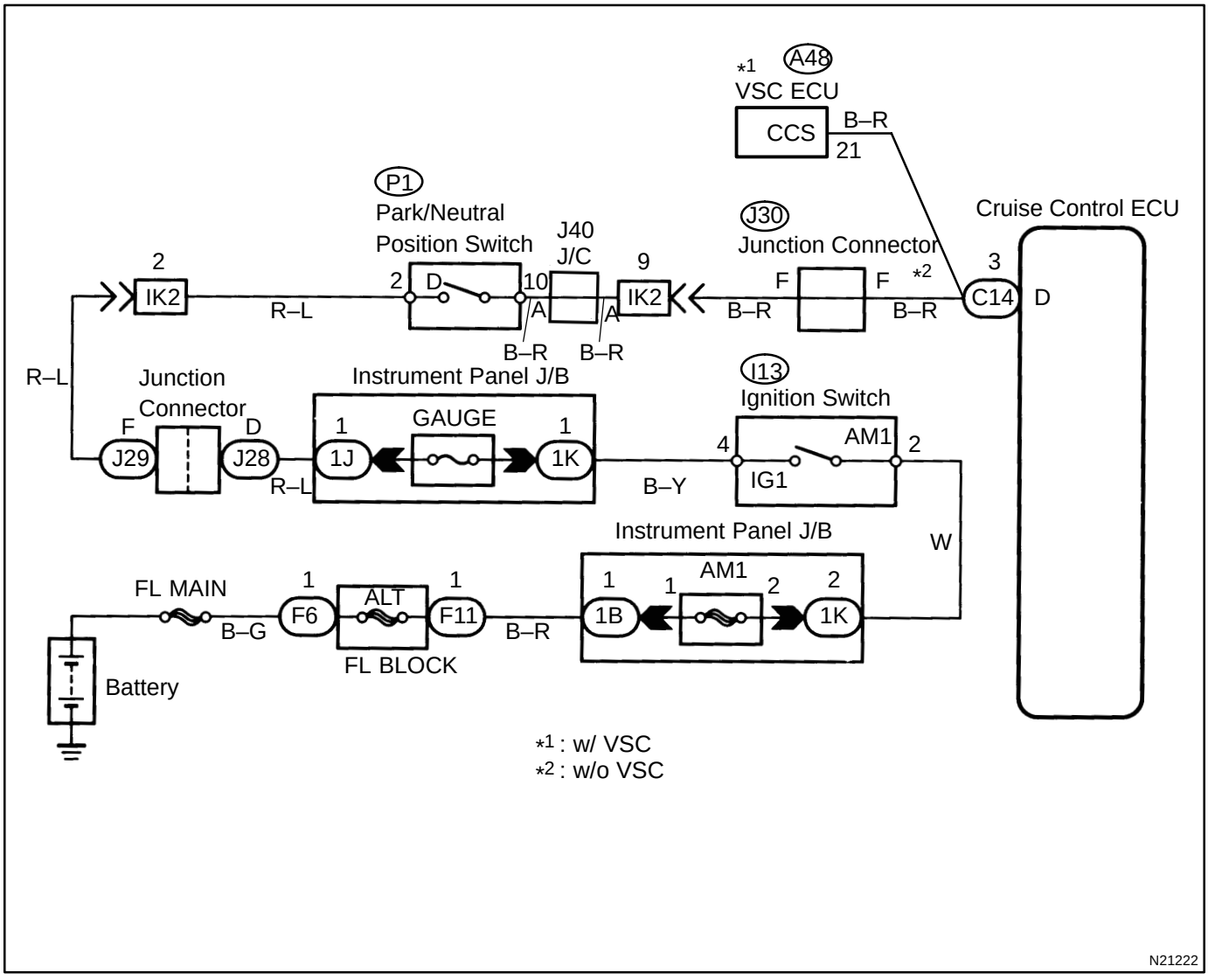
DI0F4–05

Park/Neutral Position Switch Circuit

CIRCUIT DESCRIPTION

When the shift position is put in except D position, a signal is sent from the park/neutral position switch to the ECU. When this signal is input during cruise control driving, the ECU cancels the cruise control.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check starter operation.**

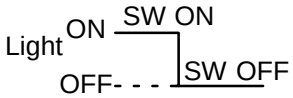
CHECK:

Check that the starter operates normally and that the engine starts.

NG → **Proceed to starting system (See page ST–1).**

OK

2	**Input signal check.**

Input Signal	Indicator Light Blinking Pattern
Turn PNP switch OFF (Shift to except D position)	

PREPARATION:

See input signal check on page DI–640.

CHECK:

Check the indicator light when shifting into except D position.

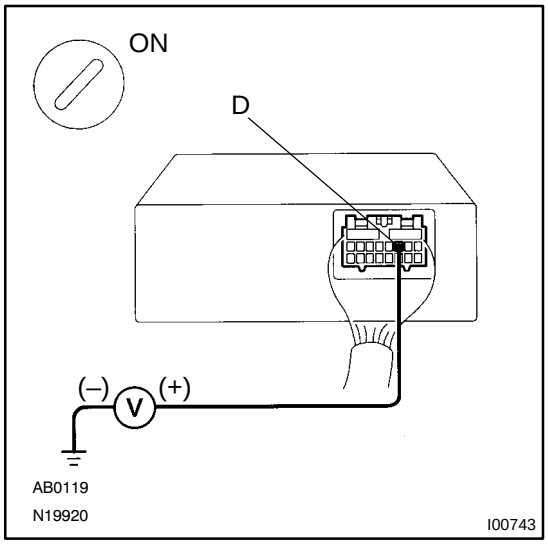
OK:

The indicator light goes off when shifting into except D position.

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

3	Check voltage between terminal D of cruise control ECU connector and body ground.



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminal D of ECU connector and body ground when shifting into D position and other positions.
OK:

Shift Position	Voltage
D position	10 – 14 V
Other positions	Below 1 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

4	Check harness and connector between cruise control ECU and park/neutral position switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

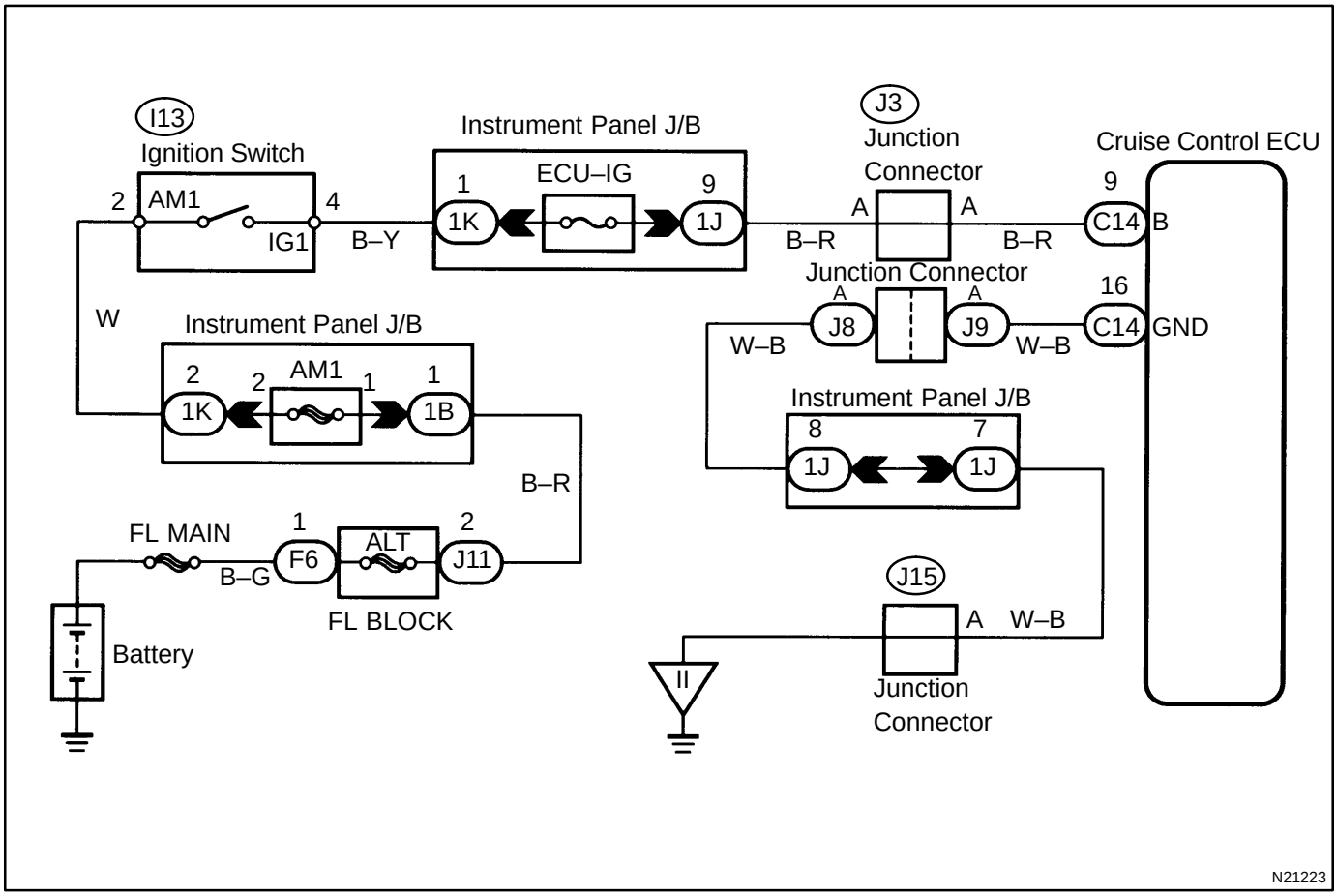
DI0F6–06

ECU Power Source Circuit

CIRCUIT DESCRIPTION

The ECU power source supplies power to the actuator and sensors, etc. When terminal GND and the case of the cruise control ECU are grounded.

WIRING DIAGRAM

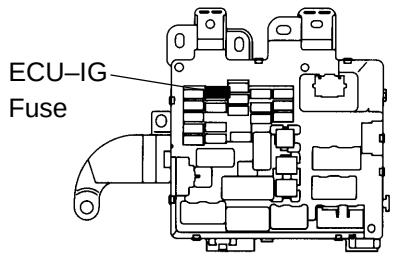


N21223

INSPECTION PROCEDURE

1	Check ECU–IG fuse.

Instrument Panel Junction Block No.1



PREPARATION:

Remove the ECU–IG fuse from instrument panel junction block No.1.

CHECK:

Check continuity of ECU–IG fuse.

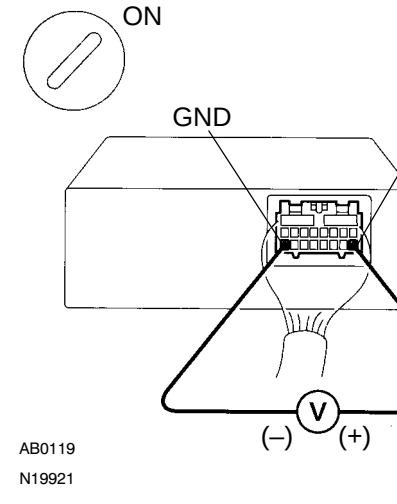
OK:

Continuity

NG → **Check for short in all the harness and components connected to ECU–IG fuse.**

OK

2	Check voltage between terminals B and GND of cruise control ECU connector.



PREPARATION:

(a) Remove the ECU with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminals B and GND of ECU connector.

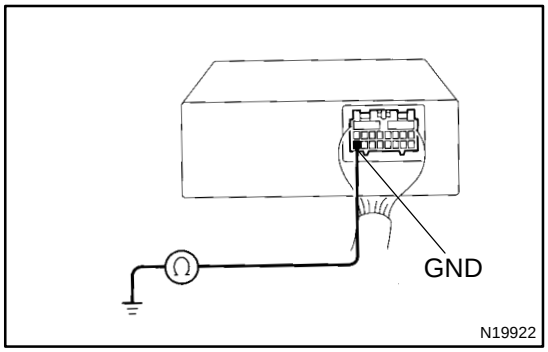
OK:

10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

3	**Check resistance between terminal GND of cruise control ECU connector and body ground.**



CHECK:

Measure resistance between terminal GND of ECU connector and body ground.

OK:

Resistance: Below 1 Ω

NG → **Repair or replace harness or connector.**

OK

Check and repair harness and connector between cruise control ECU and battery (See page IN–31).

DI0FA–04

Main Switch Circuit (Cruise Control Switch)

CIRCUIT DESCRIPTION

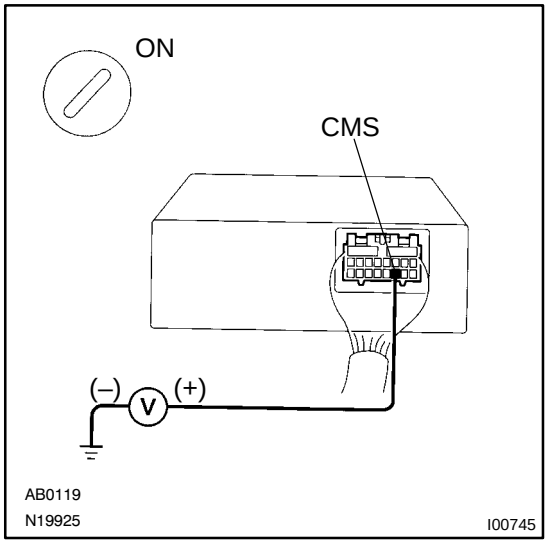
When the cruise control main switch is turned off, the cruise control does not operate.

WIRING DIAGRAM

See page DI–661.

INSPECTION PROCEDURE

1	**Check voltage between terminal CMS of cruise control ECU connector and body ground.**



PREPARATION:

(a) Remove the ECU with connector still connected.

(b) Turn ignition switch ON.

CHECK:

Measure voltage between terminal CMS of cruise control ECU connector when main switch is held ON and OFF.

OK:

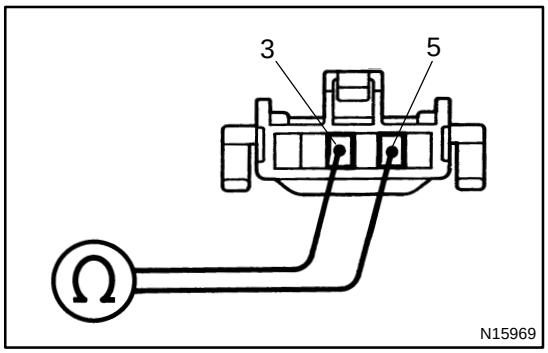
Main switch	Voltage
OFF	10 – 14 V
ON	Below 0.5 V

OK

Proceed to next circuit inspection shown in problem symptom table (See page DI–649).

NG

2	Check main switch continuity.



PREPARATION:

(a) Remove steering wheel center pad (See page SR–11).

(b) Disconnect the control switch connector.

CHECK:

Check continuity between terminals 3 and 5 of control switch connector when main switch is held ON and OFF.

OK:

Switch position	Tester connection	Specified condition
OFF	3 – 5	No continuity
Hold ON	3 – 5	Continuity

NG → **Replace control switch.**

OK ↓

3	Check harness and connector between cruise control ECU and main switch (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace cruise control ECU (See page IN–31).

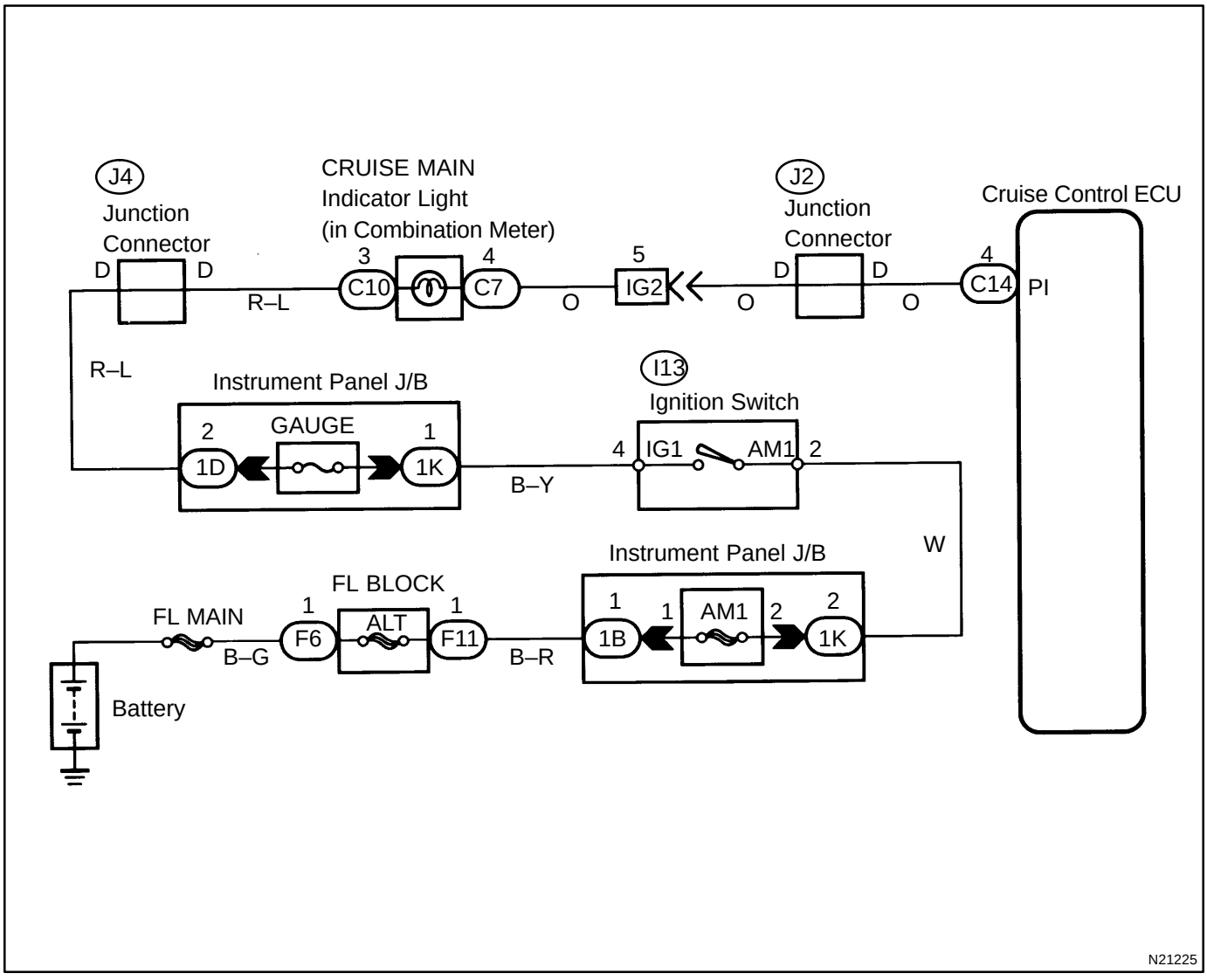
DI0FD–08

CRUISE MAIN Indicator Light Circuit

CIRCUIT DESCRIPTION

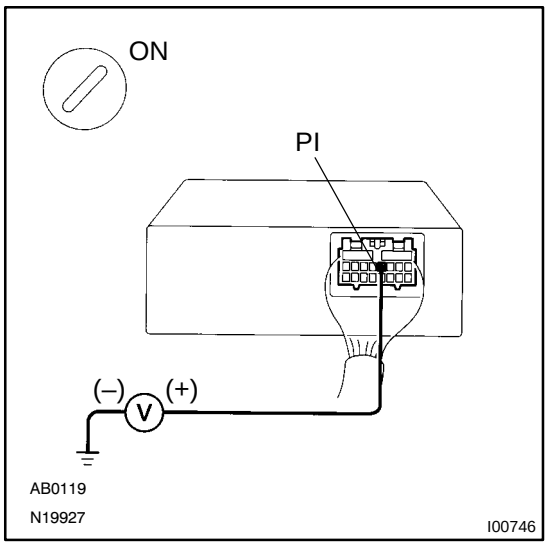
When the cruise control main switch is turned ON, CRUISE MAIN indicator light lights up.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals PI and GND of cruise control ECU connector.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals PI and GND of cruise control ECU connector when main switch ON and OFF.
OK:

Switch position	Voltage
OFF	10 – 16 V
ON	Below 1.2 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

2	**Check combination meter (See page BE–3).**

NG → **Replace combination meter.**

OK

Check and replace cruise control ECU (See page IN–31).

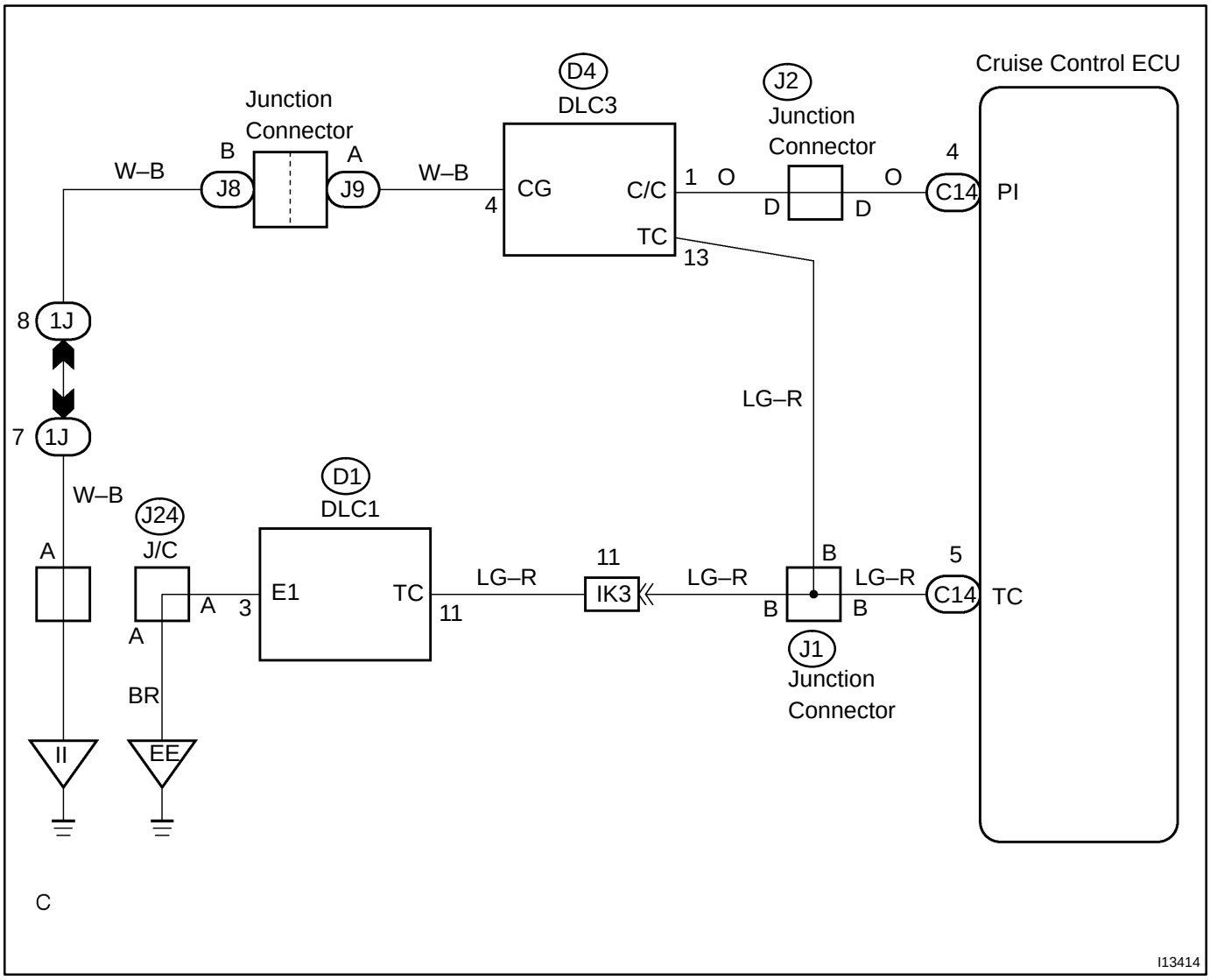
DI0FF–07

Diagnosis Circuit

CIRCUIT DESCRIPTION

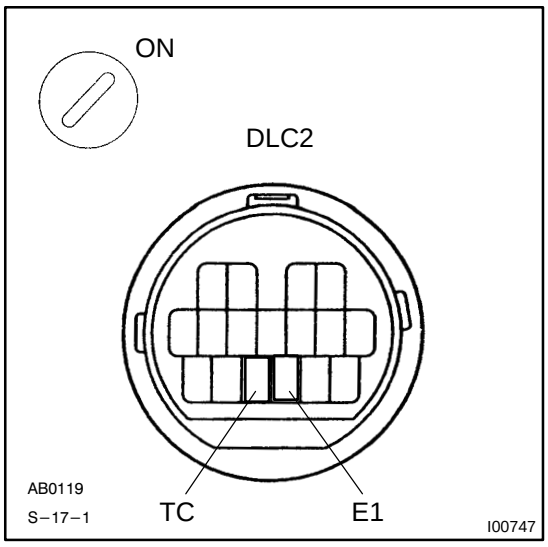
This circuit sends a signal to the ECU that DTC output is required.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals Tc and E_1 of DLC2.**



PREPARATION:
Turn ignition switch ON.
CHECK:
Measure voltage between terminals Tc and E_1 of DLC2.
OK:
Voltage: 10 – 14 V

OK → **Proceed to next circuit inspection shown in problem symptom table (See page DI–649).**

NG

2	**Check harness and connector between cruise control ECU and DLC2, DLC2 and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace cruise control ECU (See page IN–31).

DI0FH–05

Actuator Control Cable

INSPECTION PROCEDURE

1	**Actuator control cable inspection**

OK:

(a) Check that the actuator, control cable throttle link are properly installed and that the cable and link are connected correctly.

(b) Check that the actuator and bell crank are operating smoothly.

(c) Check that the cable is not loose or too tight.

OK:

Freeplay: less than 10 mm

HINT:

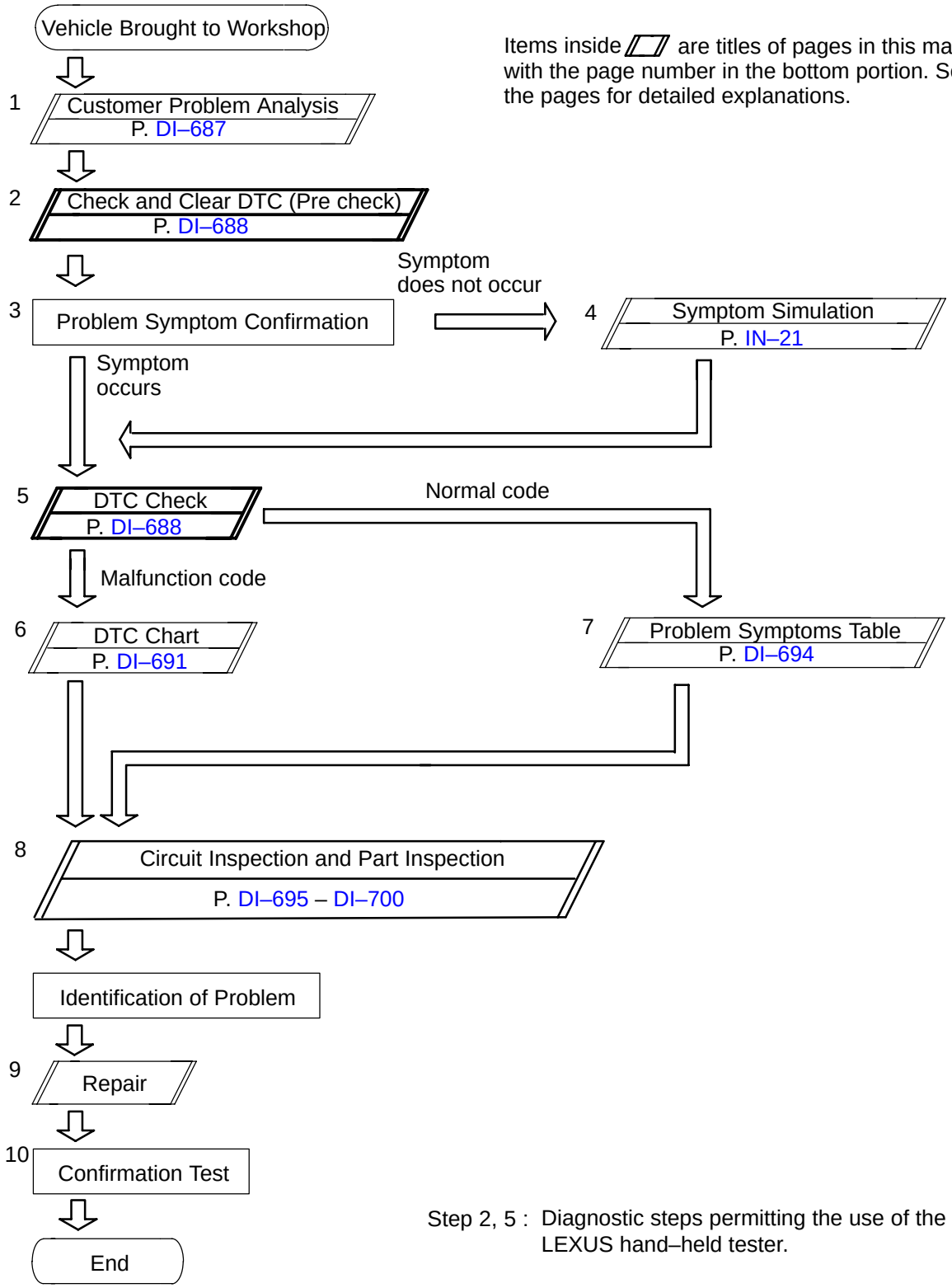
- If the control cable is very loose, the vehicle's loss of speed going uphill will be large.
- If the control cable is too tight, the idle RPM will become high.

ENGINE IMMOBILISER SYSTEM

DI1AJ–28

HOW TO PROCEED WITH TROUBLESHOOTING

Troubleshooting 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 LEXUS hand–held tester.

DI1AK–08

CUSTOMER PROBLEM ANALYSIS CHECK

ENGINE IMMOBLISER Check Sheet

Inspector's Name :

Customer's Name		**Registration No.**	
		Registration Year	/ /
		Frame No.	
Date Vehicle Brought In	/ /	**Odometer Reading**	km miles

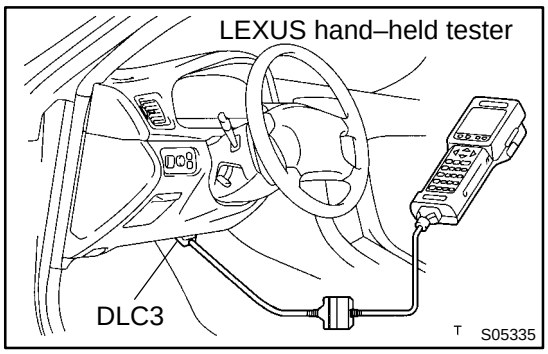
Date Problem First Occurred	/ /
Frequency Problem Occurs	☐ Continuous ☐ Intermittent (times a day)

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)

DI1AL–12



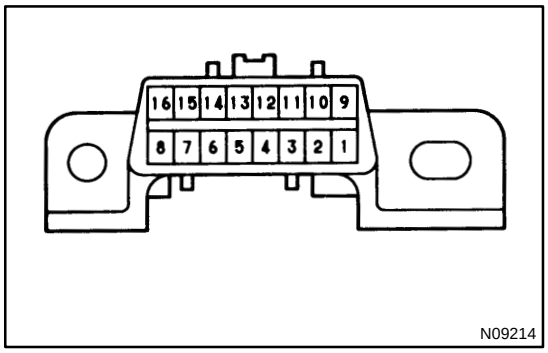
PRE–CHECK

1. DIAGNOSIS SYSTEM

(a) Description

ECM controls the function of immobiliser on this vehicle. Data of the immobiliser or DTC can be read form DLC3 of the vehicle. When a trouble occurs on immobiliser, MIL does not light on but DTC inspection is performed.

Therefore when there seems to be a trouble on immobiliser, use LEXUS 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 OBD ll scan tool or LEXUS hand–held tester to 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 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 LEXUS hand–held tester).

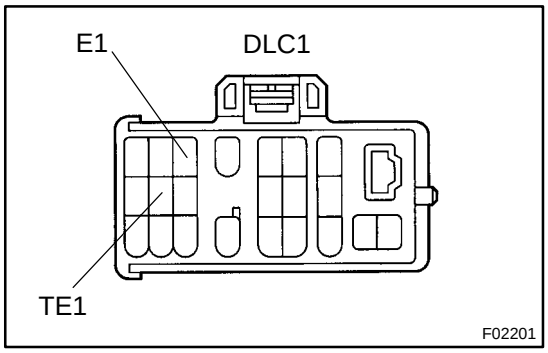
(1) Prepare the OBD ll scan tool (complying with SAEJ 1978) or LEXUS hand–held tester.

(2) Connect the OBD ll scan tool or LEXUS hand–held tester to DLC3 under the instrument panel lower pad.

(3) Turn the ignition switch ON and turn the OBD ll scan tool or LEXUS hand–held tester switch ON.

(4) Use the OBD ll scan tool or LEXUS hand–held tester to check the DTCs and freeze frame data; note them down. (For operating instructions, see the OBD ll scan tool's instruction book.)

(5) See page DI–691 to confirm the details of the DTCs.



(b) Check the DTC (Using diagnosis check wire).

(1) Turn ignition switch ON.

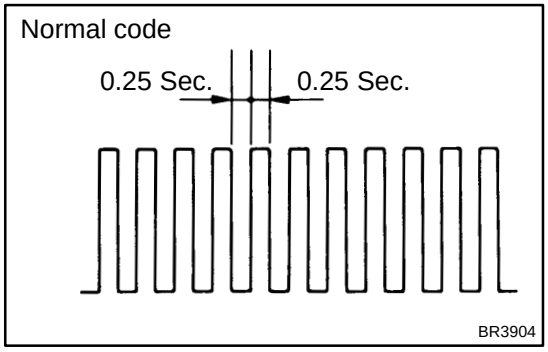
(2) Using SST, connect between terminals 8 (TE1) and 3 (E1) of DLC 1.

SST 09843–18040

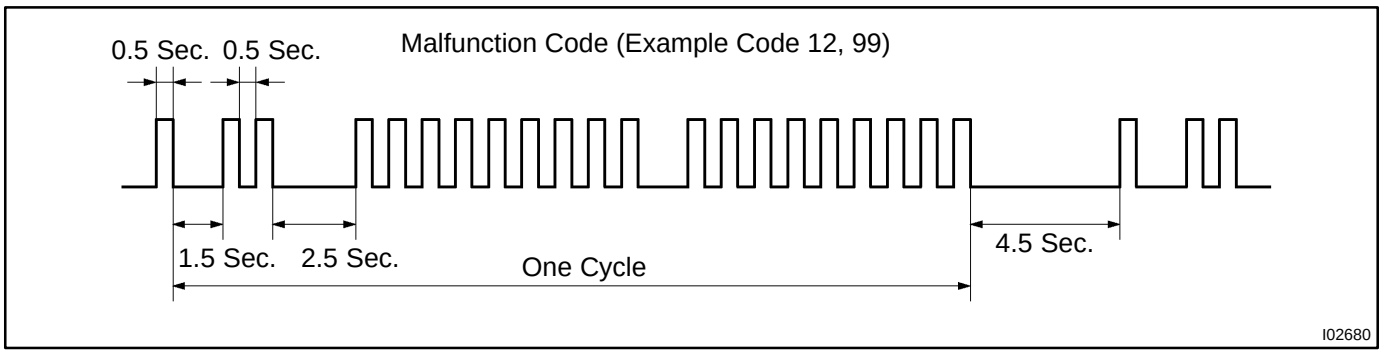
(3) Read the diagnostic trouble code from malfunction indicator lamp.

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 illustration.



(4) When DTC ”99” is output, there is a trouble of immobiliser. Start troubleshooting referring to PROBLEM SYMPTOM TABLE.

(5) After completing the check, disconnect terminals 13 (TC) and 4 (CG) 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 actions will erase the DTCs and freeze frame data.

(1) Operating the OBD ll scam tool (complying with SAEJ1978) or LEXUS hand–held tester to erase the codes. (See the OBD ll scan tool’s instruction book for operating instructions.)

(2) Disconnecting the battery terminals or EFI fuse.

DI1AM–12

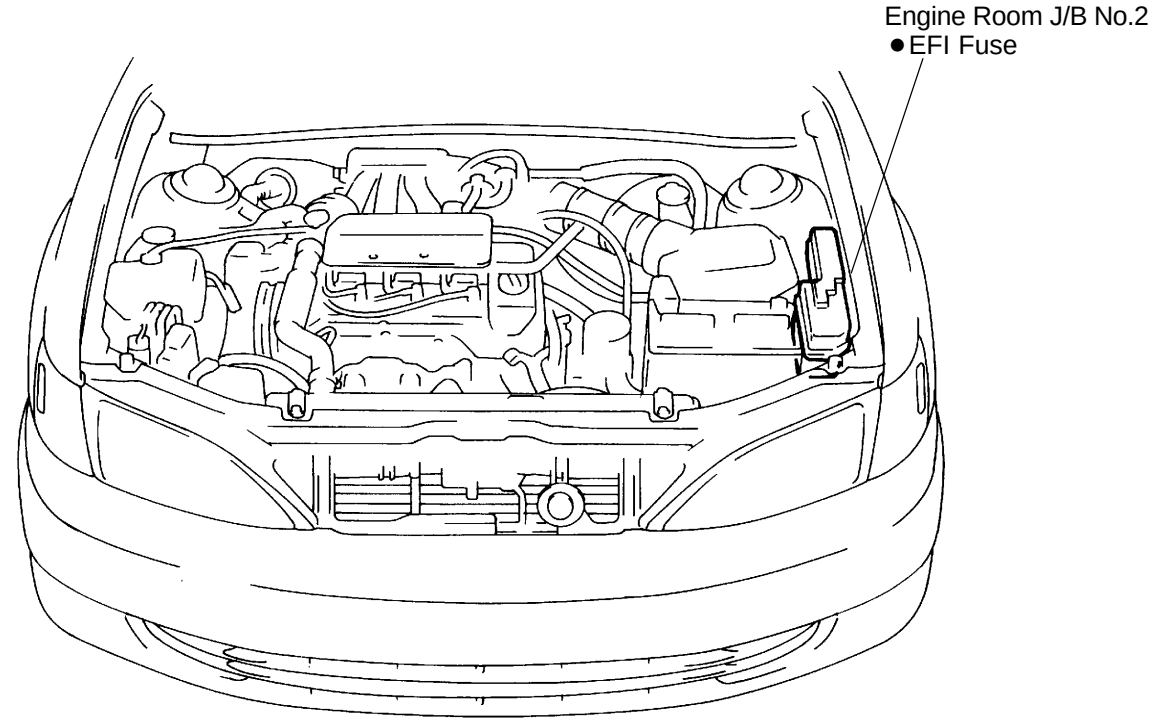
DIAGNOSTIC TROUBLE CODE CHART

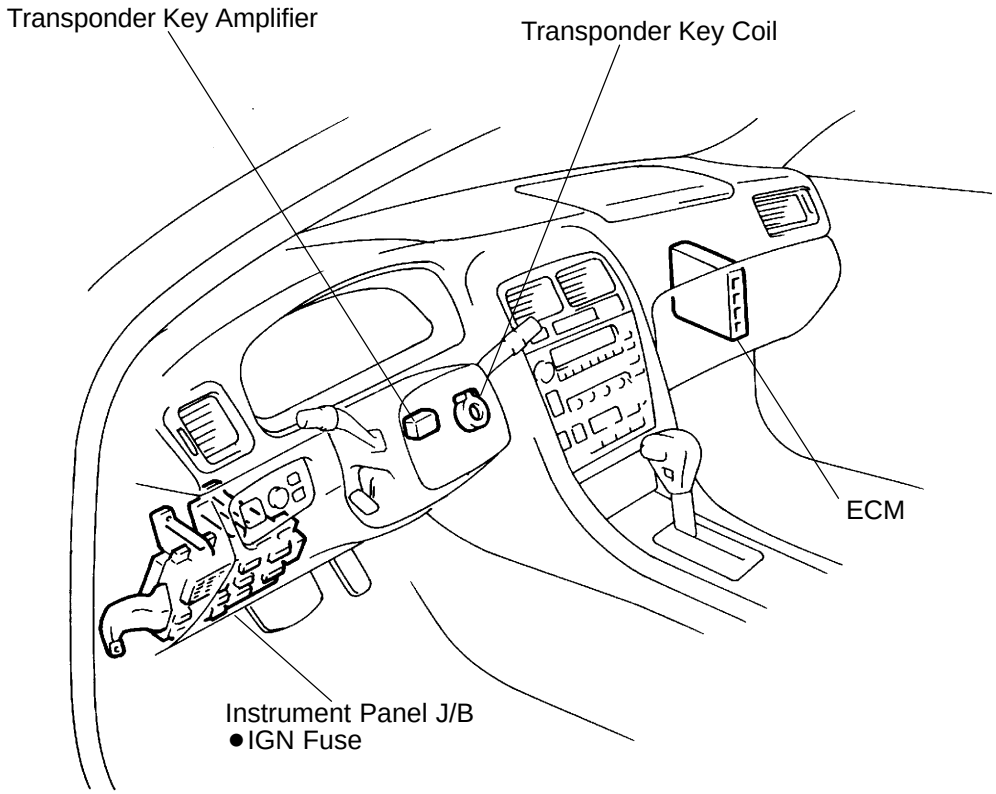
DTC No. (See page)	Detection Item	Trouble Area
B2795 (DI–695)	Unmatched key code	●Key ●Unregistered key inserted before
B2796 (DI–696)	No communication in immobiliser system	●Key ●Transponder key coil ●Amplifier ●Wirehaness ●ECM
B2797 (DI–698)	Communication malfunction No.1	●Communication contests ●Unregistered key inserted before
B2798 (DI–700)	Communication malfunction No.2	●Key ●Transponeder key coil ●Amplifier ●Wirehaness ●ECM

HINT:
To reduce the unnecessary exchange of ECM, check that a trouble occurs with the original ECM at the time of exchanging ECM and the trouble will disappear with a new ECM.

DI1AN–05

PARTS LOCATION

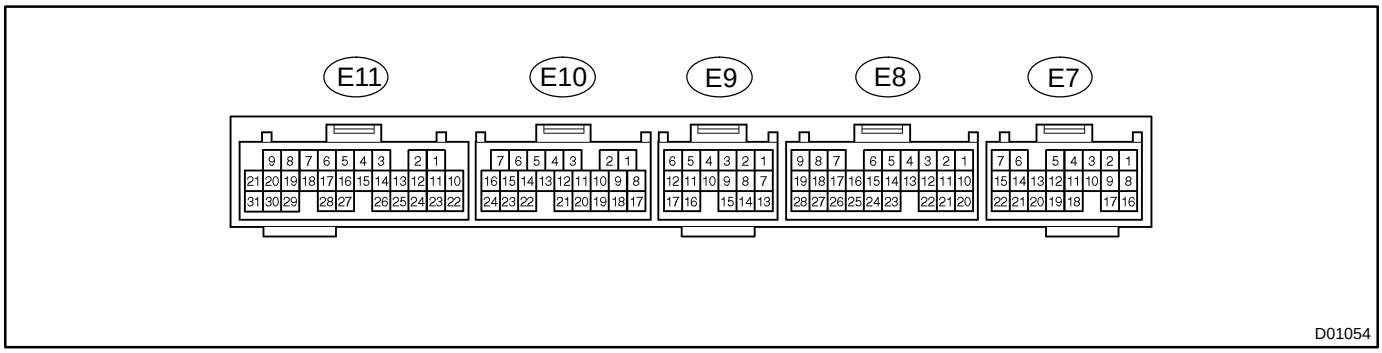




I02683

DI1AO–05

TERMINALS OF ECM



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
CODE – E1 (E8 – 28 ↔ E10–17)	G–W ↔ BR	Ignition Switch ON	10 – 14
TXCT – E1 (E8 – 18 ↔ E10–17)	L–Y ↔ BR	Ignition Switch ON	10 – 14
RXCK – E1 (E8 – 19 ↔ E10–17)	R–L ↔ BR	Ignition Switch ON	10 – 14

DI1AP–10

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Immobiliser is not set. (Engine starts with key codes other than the registered key code.)	1. ECM	IN–31
Engine does not start.	1. Key 2. Wire harness 3. Transponder key coil 4. Amplifier 5. ECM	*1 IN–31 BE–231 IN–31
Security indicator is always ON.	1. Security indicator 2. Wire harness 3. ECM	*2 IN–31 IN–31
Security indicator is always ON. (Although code has been registered in the automatic registration mode, indicator is not OFF.)	1. Wire harness 2. Tranxponder key coil 3. Amplifier 4. ECM	IN–31 BE–231 IN–31
Security indicator is OFF (When DTC of immobiliser is output)	1. Wire harness 2. Tranxponder key coil 3. Amplifier 4. ECM	IN–31 BE–231 IN–31
Security indicator is OFF. (When DTC of immobiliser is not output)	1. Wire harness 2. ECM	IN–31 IN–31
Security indicator is abnormal blinking.	1. Wire harness 2. ECM	IN–31 IN–31

*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 codes.

*2 : Finish the automatic registration mode because the mode might still remain.

DI1AS–11

CIRCUIT INSPECTION

DTC	B2795/99	Unmatched Key Code

This DTC is output when an unregistered key is inserted. When this DTC is output, delete DTC and insert the key that a customer keeps to check that B2795 is output.
When a key that outputs B2795 is found, register this key. when B2795 is not output, there is a possibility that the unregistered key has been inserted before. (ECM is normal.)
Inquire a customer the condition of using the system to find the cause of the trouble.
(Example: Another key has been inserted, etc..)

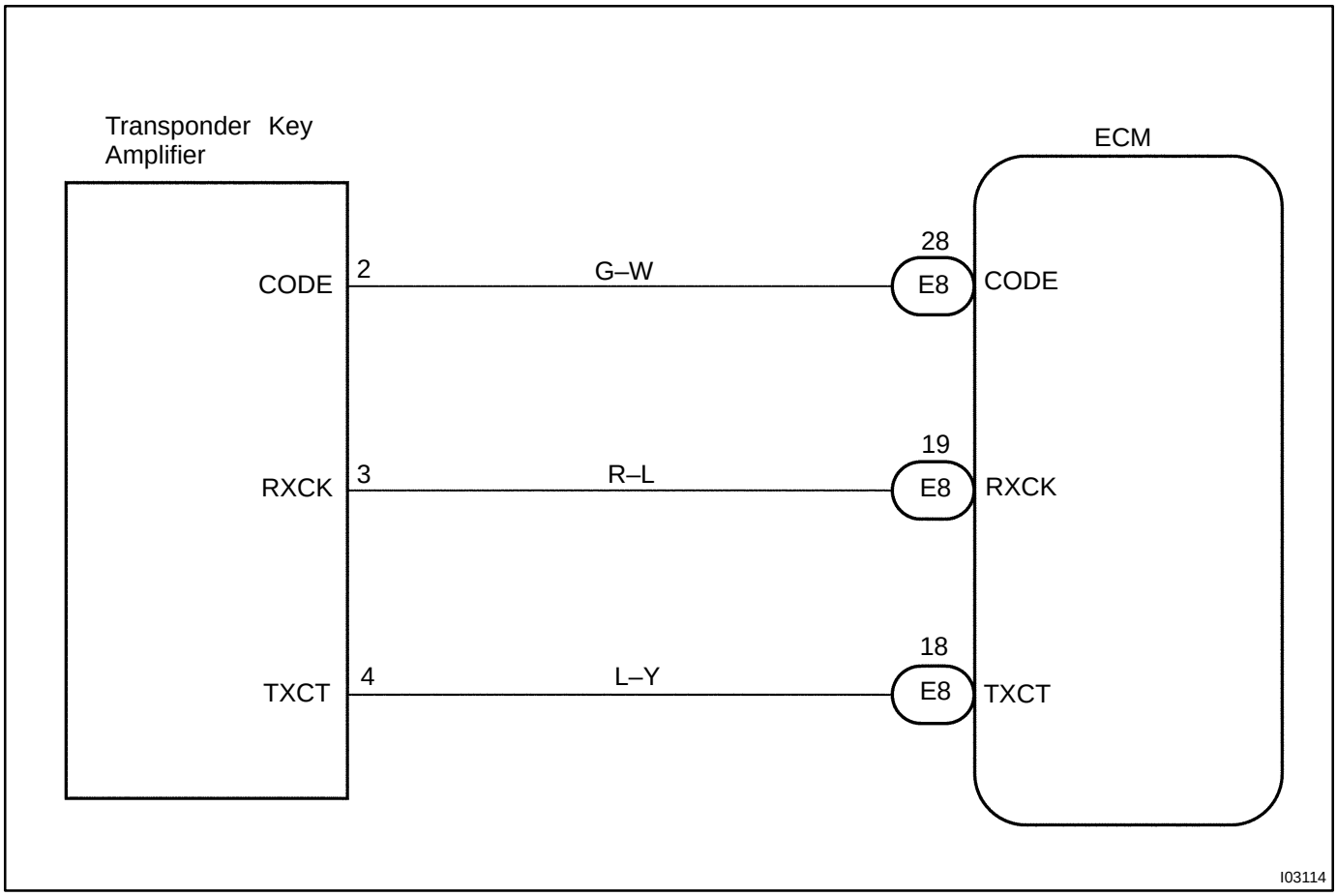
DI1AT–14

DTC	B2796/99	No Communication in Immobiliser system

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2796/99	No communication	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wire harness ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–231).

NG → Replace transponder key coil.

OK

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector.

OK

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No

Replace ECM.

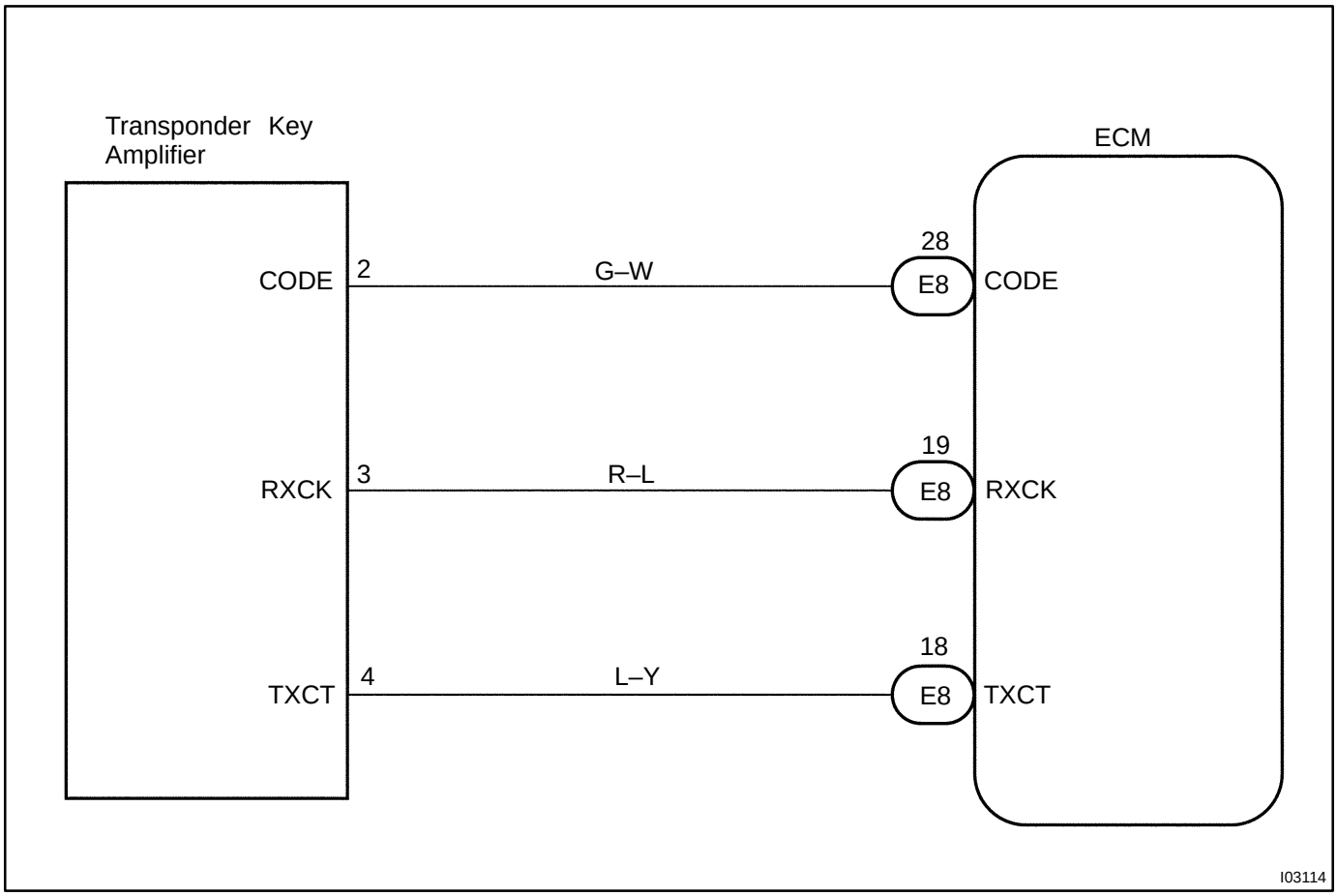
DTC	B2797/99	Communication Malfunction No.1

CIRCUIT DESCRIPTION

This code is detected when although the communication has been performed normally, an error occurs. (Example. Some noise is in cluded in communication line.)

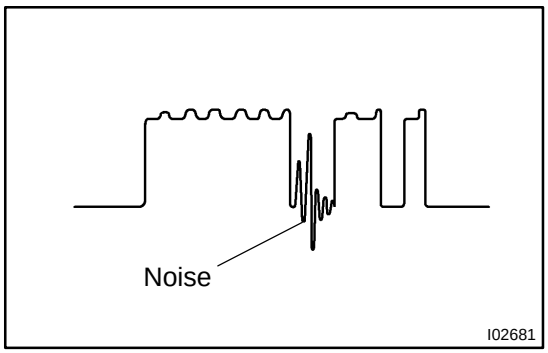
DTC No.	DTC Detecting Condition	Trouble Area
B2797/99	Communication error	●Wire Harness ●Transponder Key Amplifier ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Noise check



PREPARATION:
Insert already registered master key in the key cylinder.
CHECK:
Using an oscilloscope or LEXUS hand–held tester, check that noise is included in the CODE terminal of EMC.
OK:
No noise is detected.

NG → **Try to find the cause of the noise and remove it.**

OK

2	Does it operate normally after replacement of transponder key amplifier?

Yes → **Replace transponder key amplifier.**

No

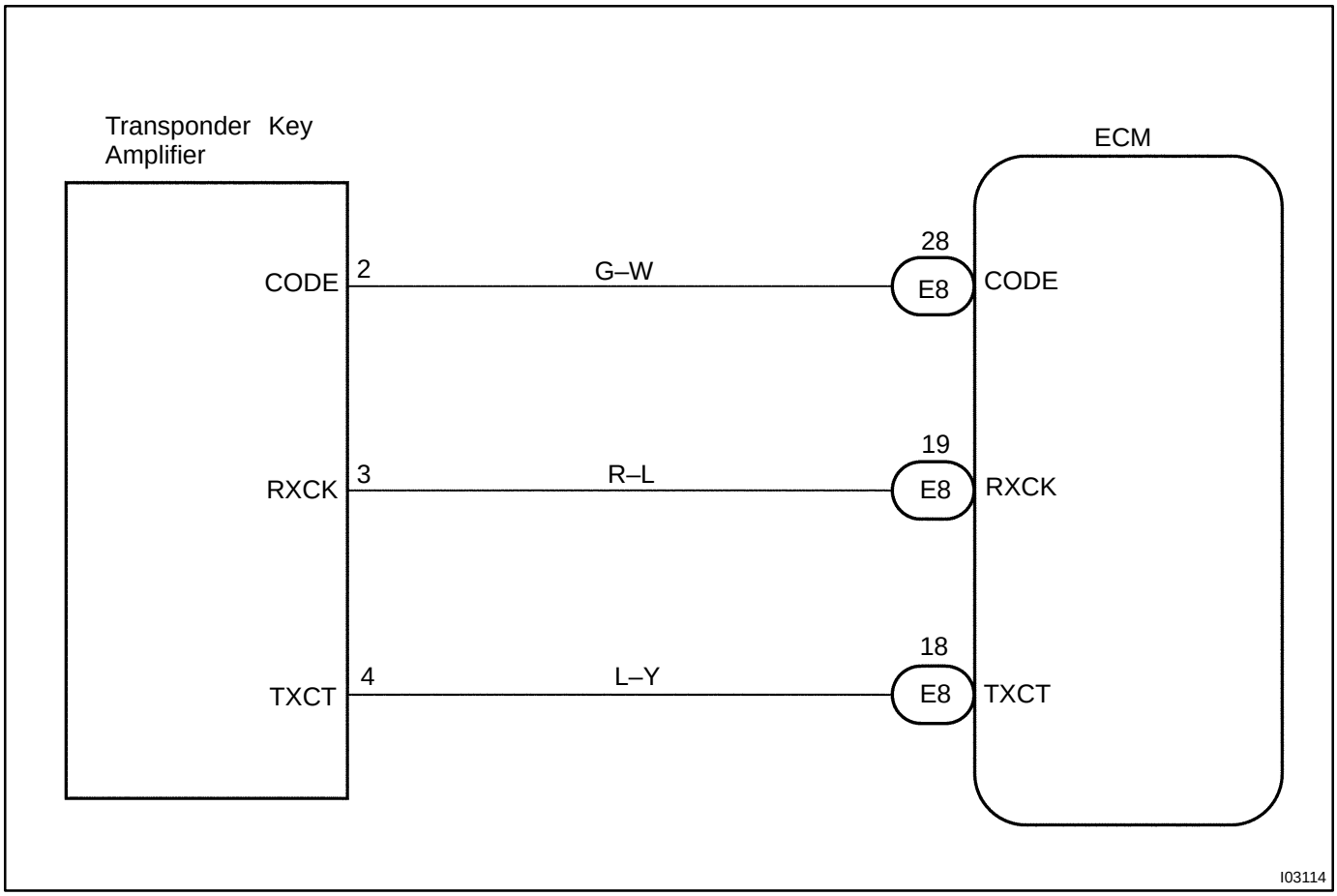
Replace ECM.

DTC	B2798/99	Communication malfunction No.2

CIRCUIT DESCRIPTION

DTC No.	DTC Detecting Condition	Trouble Area
B2798/99	Communication error	●Key ●Transponder Key Coil ●Transponder Key Amplifier ●Wire harness ●ECM

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check transponder key coil (See page BE–231).

NG → Replace transponder key coil.

OK

2	Check harness and connector between transponder key amplifier and ECM.

NG → Repair or replace harness and connector.

OK

3	Does it operate normally after replacement of transponder key amplifier?

Yes → Replace transponder key amplifier.

No

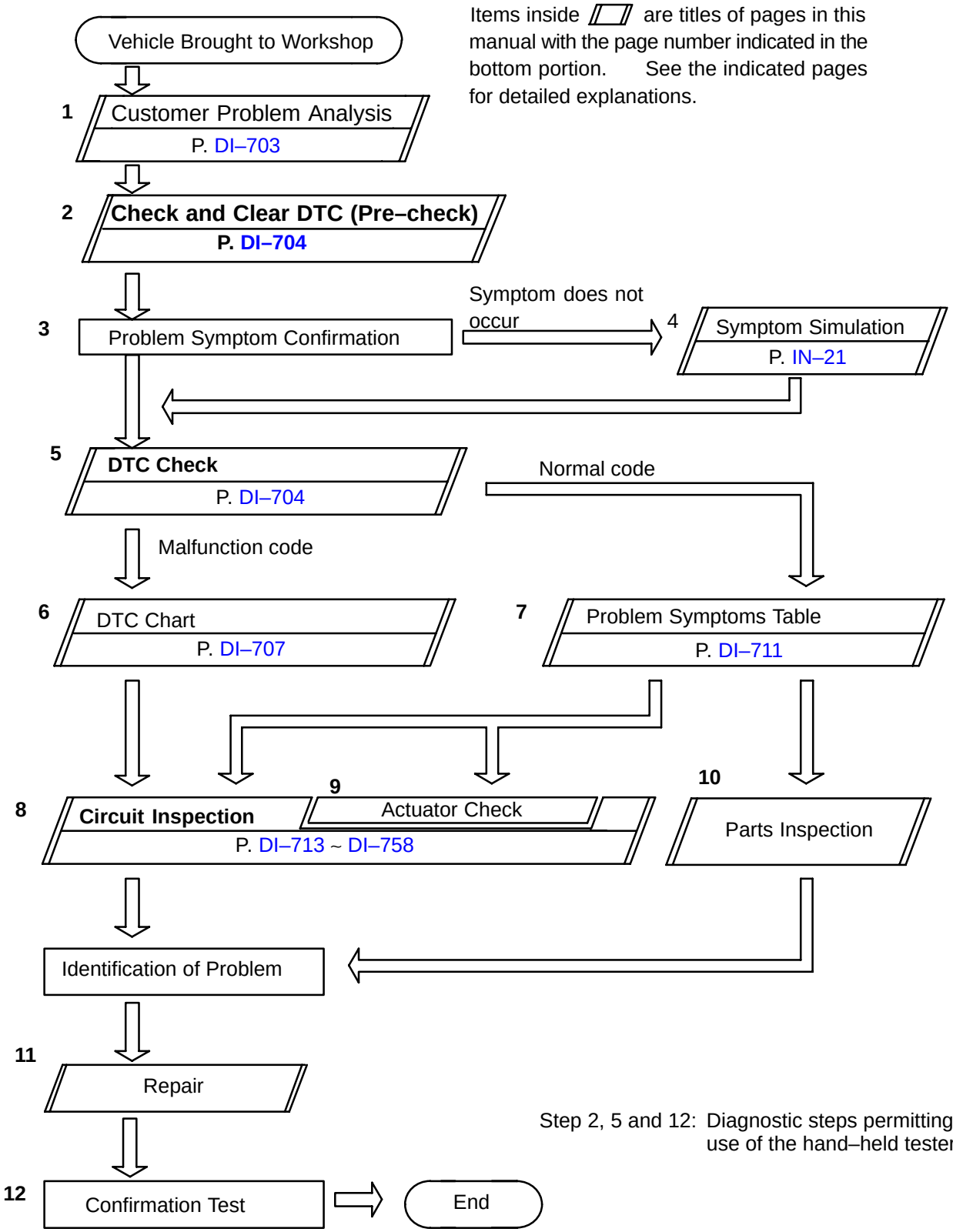
Replace ECM.

AIR CONDITIONING SYSTEM

DI1BX–03

HOW TO PROCEED WITH TROUBLESHOOTING

Perform troubleshooting in accordance with the procedure on the fowling page.



DI1BY–01

CUSTOMER PROBLEM ANALYSIS CHECK

AIR CONDITIONING SYSTEM Check Sheet

Inspector's name:

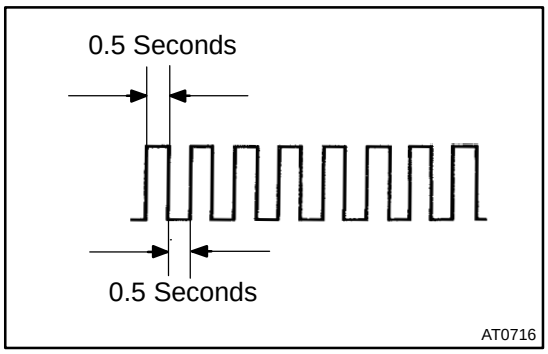
Customer's Name		**Registration No.**	
		Registration Year	
		Frame No.	
Date vehicle Brought In	/ /	**Odometer Reading**	**km Miles**

Date of Problem Occurrence	/ /
How Often does Problem Occur?	● Continuous ● Intermittent (times a day)
Weather	● Fine ● Cloudy ● Snowy ● Various / Other
Outdoor Temperature	● Hot ● Warm ● Cool ● Cold (Approx. °F °C)

Symptoms	**Air Flow Control is Faulty**	● Blower motor does not operation ● Blower motor speed does not change (Always Hi, Always Med, Always Lo)
	Temperature Control is Faulty	● Cabin temperature does not go down ● Cabin temperature does not rise ● Response is slow
	Air Inlet Control is Faulty	● Cannot change between FRS and REC (Always Fresh or always Recirculating)
	Vent Control is Faulty	● Mode will not change ● Will not enter the desired mode

DTC Check	**1st Time**	● Normal Code ● Malfunction Code (Code)
	2nd Time	● Normal Code ● Malfunction Code (Code)

DI6AF–01



PRE–CHECK

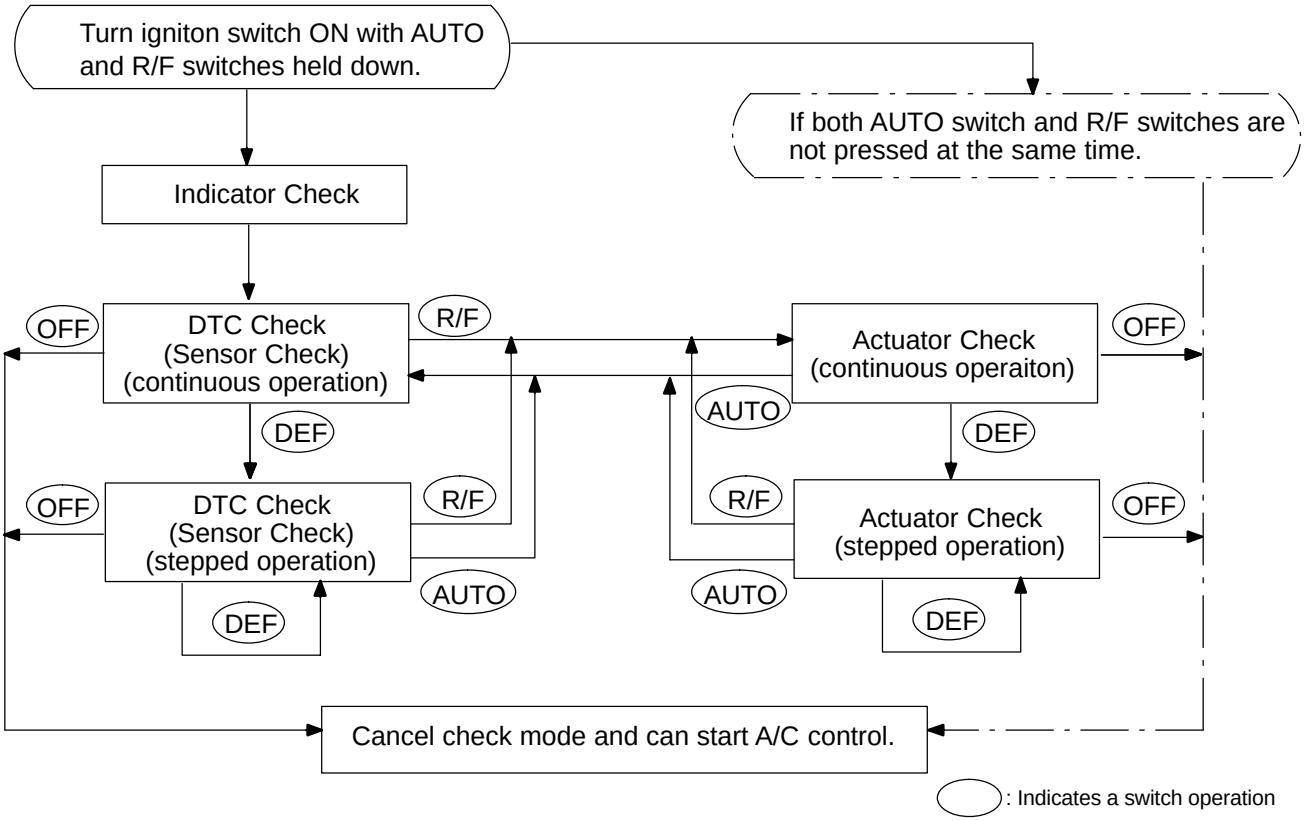
1. WARNING FOR A/C COMPRESSOR LOCK

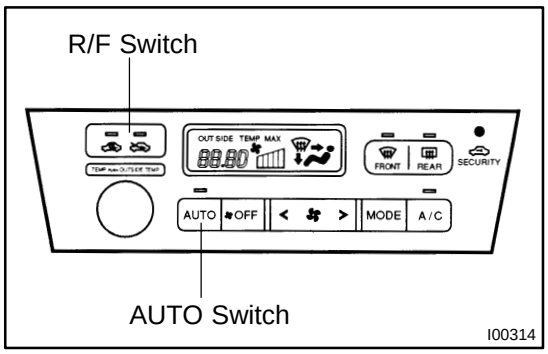
If compressor lock occurs during A/C operation, the A/C switch indicator on the A/C control assembly starts blinking to warn the driver.

When this occurs, check for compressor lock (DTC B1422/22) using DTC check then proceed to inspect the circuit or the component (See page DI–727).

2. LIST OF OPERATION METHODS

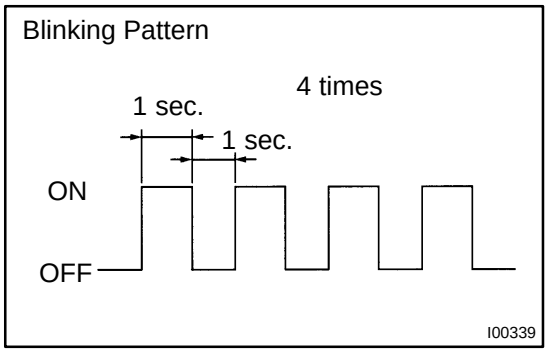
By operating each of the A/C control switches as shown the diagram below, it is possible to enter the diagnosis check mode.





3. INDICATOR CHECK

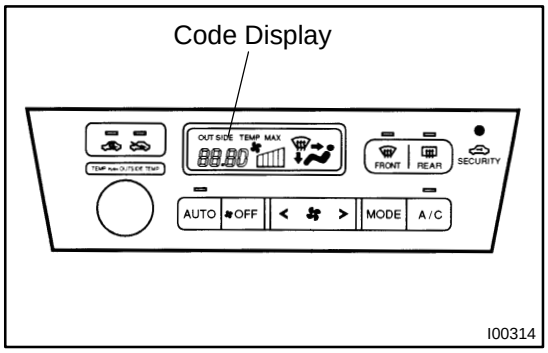
(a) Turn the ignition switch ON while pressing the A/C control AUTO switch and R/F switch simultaneously.



(b) Check that the indicators light up and go off at second intervals 4 times in succession.

HINT:

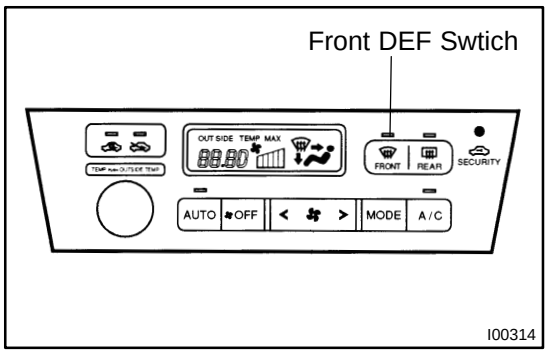
- After the indicator check is completed, the system enters the DTC begins automatically.
- Press the OFF switch when desiring to cancel the check mode.



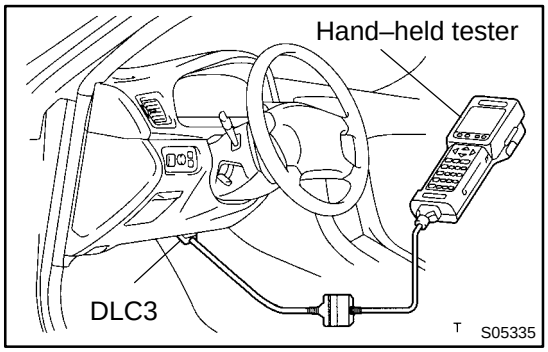
4. DTC CHECK (SENSOR CHECK)

(a) Perform an indicator check. After the indicator check is completed, the system enters the DTC check mode automatically.

(b) Read the code displayed on the panel. Refer to the list of codes on page DI–707 when reading the codes. (Trouble code are output at the temperature display.)



(c) If the slower display is desired, press the front DEF switch and change it to stepped operation. Each time the front DEF switch is pressed, the display changes by 1 step.

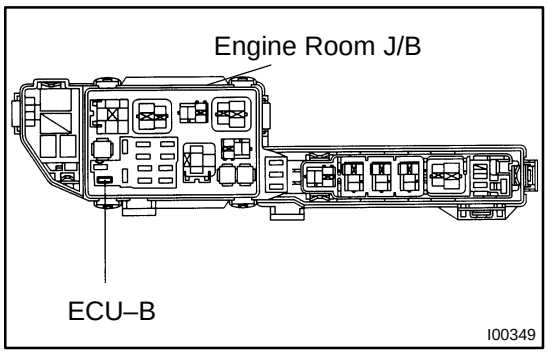


5. DTC CHECK USING HAND–HELD TESTER

(a) Hook up the hand–held tester to the DLC3.

(b) Read the diagnostic trouble codes by following the prompts on the tester screen.

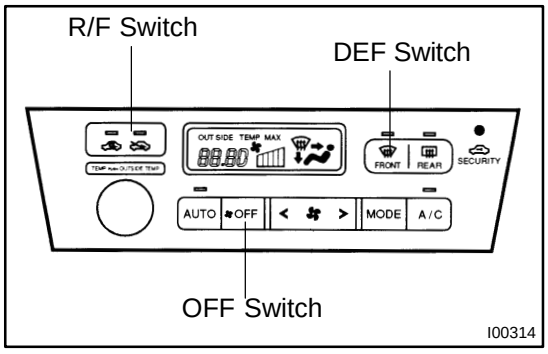
Please refer to the hand–held tester operator's manual for further details.



6. CLEARING DTC

(a) Pull out the ECU–B fuse in engine room J/B for 10 sec. or longer to clear the DTC memory.

(b) After reinserting the fuse, check that the normal code is output.



7. ACTUATOR CHECK

(a) After entering the DTC check mode (Sensor Check Mode) press the R/F switch.

(b) Since each damper, motor and relay automatically operates at 1 sec. intervals beginning in order from 10 in the temperature display, check the temperature and air flow visually and by hand.

If the slower display is desired, press the DEF switch and change it to step operation. Each time the DEF switch is pressed, the display changes by 1 step.

HINT:

- Code are displayed in order from the smaller to the larger numbers.
- To cancel the check mode, press the OFF switch.

Step No.	Display Code	Conditions				
		Blower Motor	Air Flow Vent	Air Inlet Damper	Magnetic Clutch	Air Mix Damper
1	0	OFF	FACE	FRESH	OFF	Cool side (0 % open)
2	1	1	FACE	FRESH	OFF	Cool side (0 % open)
3	2	3	FACE	FRESH	ON	Cool side (0 % open)
4	3	3	FACE	FRS/REC	ON	Cool side (0 % open)
5	4	3	FACE	RECIRC	ON	Cool/Hot (50 % open)
6	5	3	BI–LEVEL	RECIRC	ON	Cool/Hot (50 % open)
7	6	3	FOOT	RECIRC	ON	Hot side (100 % open)
8	7	3	FOOT	RECIRC	ON	Hot side (100 % open)
9	8	3	FOOT/DEF	RECIRC	ON	Hot side (100 % open)
10	9	5	DEF	RECIRC	ON	Hot side (100 % open)

DI1C0–03

DIAGNOSTIC TROUBLE CODE CHART

If malfunction code is displayed during the DTC check (sensor 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	Memory
00	Normal	–	–
B1411/11*1 (DI–713)	Room temperature sensor circuit	●Room temp. sensor ●A/C control assembly ●Harness or connector between room temp. sensor and A/C control assembly	(8.5 min. or more)
B1412/12*2 (DI–716)	Ambient temperature sensor circuit	●Ambient temp. sensor ●Harness or connector between ambient temp. sensor and A/C control assembly ●A/C control assembly	(8.5 min. or more)
B1413/13 (DI–719)	Evaporator temperature sensor circuit	●Evaporator temp. sensor ●Harness or connector between evaporator temp. sensor and A/C control assembly ●A/C control assembly	(8.5 min. or more)
B1414/14 (DI–722)	Engine coolant temperature sensor circuit	●Engine coolant temp. sensor ●Harness or connector between engine coolant temp. sensor and A/C control assembly ●Harness or connector between ECM and A/C control assembly ●A/C control assembly	–
B1421/21*3 (DI–724)	Solar sensor circuit (short)	●Solar sensor ●Harness or connector between solar sensor and A/C control assembly ●A/C control assembly	(8.5 min. or more)
	Solar sensor circuit (open)		–
B1422/22*4 (DI–727)	Compressor lock sensor circuit	●Compressor drive belt ●Compressor lock sensor ●Compressor ●Harness or connector between compressor and A/C control assembly, compressor lock sensor ●A/C control assembly	–
B1423/23 (DI–729)	Pressure sensor circuit	●Pressure switch ●Harness or connector between pressure switch and A/C control assembly ●Refrigerant pipe line ●A/C control assembly	–
B1431/31 (DI–732)	Air mix damper position sensor circuit	●Air mix damper position sensor ●A/C control assembly ●Harness or connector between air mix damper position sensor and A/C control assembly	(1 min. or more)
B1432/32 (DI–735)	Air inlet damper position sensor circuit	●Air inlet damper position sensor ●A/C control assembly ●Harness or connector between air inlet damper position sensor and A/C control assembly	(1 min.or more)

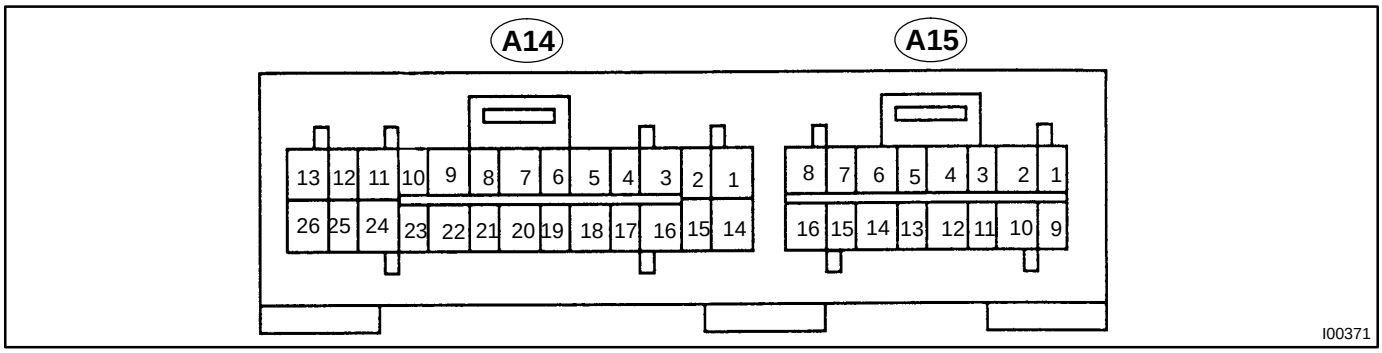
B1441/41 (DI–732, DI–738)	Air mix control servomotor	●Air mix control servomotor ●Air mix damper position sensor ●Harness or connector between air mix damper servomotor and A/C control assembly ●A/C control assembly	(15 sec.)
B1442/42 (DI–735, DI–741)	Air inlet control servomotor	●Air inlet control servomotor ●Air inlet damper position sensor ●Harness or connector between air inlet damper, servomotor and A/C control assembly ●A/C control assembly	(15 sec.)

HINT:

- *1: If the room temp. is approx. –18.6˚C (–3.7˚F) or lower, trouble code 11 may be output even though the system is normal.
- *2: If the ambient temp. is approx. –52.9˚C (–61.4˚F) or lower, a malfunction code may be output even though the system is normal.
- *3: If the check is being performed in a dark place, DTC B1421/21 (solar sensor circuit abnormal) could be displayed.
- *4: Compressor lock (DTC B1422/22) is indicated only for a current occurring malfunction (See page DI–727). To confirm DTC B1422/22, perform the following steps.
  (1) With the engine ON, enter the DTC check mode.
  (2) Press the F/R switch to enter actuator check mode, and set the operation to step No.3.
  (3) Press the AUTO switch to return to DTC check mode.
  (4) The DTC is displayed after approx. 3 secs..
- *5: The A/C control assembly memorizes the DTC of the respective malfunction it has occurred for the period of the time indicated in the brackets.

DI1C1–04

TERMINALS OF ECU



Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
TAM ↔ SG (A15–3 ↔ A14–1)	Y ↔ W–R	IG ON. Ambient Temp. : 25˚C (77˚F)	1.35 – 1.75 V
		IG ON. Ambient Temp. : 40˚C (104˚F)	0.85 – 1.25 V
TR ↔ SG (A15–4 ↔ A14–1)	G–Y ↔ W–R	IG ON. Room Temp. : 25˚C (77˚F)	1.8 – 2.2 V
		IG ON. Room Temp. : 40˚C (104˚F)	1.2 – 1.6 V
TS ↔ SG (A15–5 ↔ A14–1)	W ↔ W–R	IG ON. Solar sensor subjected to electrical light.	1 V or more
		IG ON. Solar sensor covered by cloth	Below 1 V
TE ↔ SG (A15–6 ↔ A14–1)	L–W ↔ W–R	IG ON. Evaporator Temp. : 0˚C (32˚F)	2.0 – 2.4 V
		IG ON. Evaporator Temp. : 15˚C (59˚F)	1.4 – 1.8 V
TPI ↔ SG (A15–7 ↔ A14–1)	P–L ↔ W–R	Push REC switch	3.5 – 4.5 V
		Push FRESH switch	0.5 – 1.8 V
TP ↔ SG (A15–8 ↔ A14–1)	B–Y ↔ W–R	Set Temp. : Max. Cool	3.5 – 4.5 V
		Set Temp. : Max. Hot	0.5 – 1.8 V
PSW ↔ GND (A15–9 ↔ A14–14)	L–B ↔ W–B	IG ON.	Below 1 V
A/CI ↔ GND (A15–10 ↔ A14–14)	LG–B ↔ W–B	Start the Engine (Idling). Operate the Compressor	10 – 14 V
		Start the Engine (Idling). Do not operate Compressor	Below 1.5 V
AC1 ↔ GND (A15–13 ↔ A14–14)	B–Y ↔ W–B	Start the engine. A/C Switch ON.	Below 1 V
		Start the engine. A/C Switch OFF.	More than 1 V
TW2 ↔ SG (A15–14 ↔ A14–1)	V ↔ W–R	IG ON.	Pulse Generation
BLW ↔ GND (A15–16 ↔ A14–14)	B–W ↔ W–B	IG ON. Operate the Blower Motor	Below 1.5 V
SG ↔Body (A14–1 ↔ Body Ground)	W–R ↔ Body Ground	Always	1 Ω or less
ILL ↔ GND (A14–2 ↔ A14–14)	B ↔ W–B	Turn the Light Control Switch to TAIL position.	10 – 14 V
LOCK ↔ GND (A14–3 ↔ A14–14)	W–L ↔ W–B	IG OFF. at 20˚C (68˚F)	65 – 125 Ω
FACE ↔ GND (A14–4 ↔ A14–14)	L–W ↔ W–B	IG ON. Air Flow : FACE	Below 1 V
SECU ↔ GND (A14–5 ↔ A14–14)	R–Y ↔ W–B	IG ON.	Below 1 V
AIF ↔ AIR (A14–6 ↔ A14–7)	L–Y ↔ R	IG ON.	13 – 19 Ω
AMC ↔ AMH (A14–8 ↔ A14–14)	P ↔ W–B	IG ON.	13 – 19 Ω

Symbols (Terminals No.)	Wiring Color	Condition	STD Voltage (V)
HR ↔ GND (A14–10 ↔ A14–14)	L–W ↔ W–B	IG ON. Operate the Blower Motor	Below 1 V
		IG ON. Do not operate the Blower Motor	10 – 14 V
S5 ↔ SG (A14–11 ↔ A14–1)	L ↔ W–R	IG ON.	4 – 6 V
S5 ↔ TS (A14–11 ↔ A15–5)	L ↔ W	IG ON. Sensor Subjected to Electrical Light.	Below 4 V
		IG ON. Sensor Covered by a Cloth.	4 – 4.5 V
ILL+ ↔ GND (A14–12 ↔ A14–14)	G ↔ W–B	Turn the Light Control Switch to TAIL position.	10 – 14 V
B+ ↔ GND (A14–13 ↔ A14–14)	W–R ↔ W–B	IF OFF.	10 – 14 V
GND ↔ Body Ground (A14–14 ↔ Body Ground)	W–B↔ Body Ground	Always	1 Ω or less
IGN ↔ GND (A14–16 ↔ A14–14)	B–O ↔ W–B	Start the Engine	10 – 14 V
B/L ↔ GND (A14–17 ↔ A14–14)	L ↔ W–B	IG ON. Air Flow : BI–LEVEL.	Below 1 V
FOOT ↔ GND (A14–18 ↔ A14–14)	L–R ↔ W–B	IG ON. Air Flow : FOOT.	Below 1 V
F/D ↔ GND (A14–19 ↔ A14–14)	B–L ↔ W–B	IG ON. Air Flow : FOOT/DEF	Below 1 V
DEF ↔ GND (A14–20 ↔ A14–14)	L–O ↔ W–B	IG ON. Air Flow : DEF	Below 1 V
RDFG ↔ GND (A14–23 ↔ A14–14)	L–G ↔ W–B	Rear Defogger Switch ON.	Below 1 V
		Rear Defogger Switch OFF.	10 – 14 V
TELI ↔ GND (A14–24 ↔ A14–14)	L–R ↔ W–B	IG ON. Hand Free Telephone ON.	Below 1 V
TC ↔ GND (A14–25 ↔ A14–14)	B–R ↔ W–B	Light Control Switch Position : TAIL. Rheostat Volume : Most Upward	10 – 14 V
		Light Control Switch Position : TAIL. Rheostat Volume : Most Downward	Below 1 V
IG+ ↔ GND (A14–16 ↔ A14–14)	B–O ↔ W–B	IG ON.	10 – 14 V

DI1C2–03

PROBLEM SYMPTOMS TABLE

Symptom	Suspect Area	See page
Whole functions of the A/C system does not operate.	1. IG power source circuit 2. A/C control assembly	DI–746 IN–31
Air Flow Control : No blower operation	1. Heater main relay circuit 2. Blower motor circuit 3. Engine coolant temperature sensor circuit 4. IG power source circuit 5. A/C control assembly	DI–751 DI–754 DI–722 DI–746 IN–31
Air Flow Control : No blower control	1. Blower motor circuit 2. IG power source circuit 3. Heater main relay circuit	DI–754 DI–746 DI–751
Air Flow Control : Insufficient air out	Blower motor circuit	DI–754
Temperature Control : No cool air comes out	1. Volume of refrigerant 2. Drive belt tension 3. Inspect refrigeration system with manifold gauge set 4. Compressor lock sensor circuit 5. Compressor circuit 6. Pressure switch circuit 7. Igniter circuit 8. Air mix control servomotor circuit 9. Air mix damper position sensor circuit 10. Room temp. sensor circuit 11. Ambient temp. sensor circuit 12. A/C control assembly	AC–3 AC–14 AC–3 DI–727 DI–758 DI–729 DI–756 DI–732, DI–738 DI–735 DI–713 DI–716 IN–31
Temperature Control : No warm air comes out	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. Ambient temp. sensor circuit 4. Room temp. sensor circuit 5. Evaporator temp. sensor circuit 6. A/C control assembly 7. Heater radiator	DI–732, DI–738 DI–735 DI–716 DI–713 DI–719 IN–31 AC–23
Temperature Control : Output air is warmer or cooler than the set temperature or response is slow.	1. Volume of refrigerant 2. Drive belt tension 3. Inspect refrigeration system with manifold gauge set 4. Cooling fan system 5. Ambient temp. sensor circuit 6. Evaporator temp. sensor circuit 7. Solar sensor circuit 8. Air mix damper position sensor circuit 9. Engine coolant temp. sensor 10. Air mix control servomotor circuit 11. Compressor 12. Condenser 13. Receiver 14. Evaporator 15. Heater radiator (in heater unit) 16. Expansion valve 17. A/C control assembly	AC–3 AC–14 AC–3 AC–105 DI–716 DI–719 DI–724 DI–735 DI–722 DI–732, DI–738 AC–35 AC–45 AC–42 AC–49 AC–23 AC–56 IN–31
Temperature Control : No temperature control (only Max. cool or Max. warm)	1. Air mix control servomotor circuit 2. Air mix damper position sensor circuit 3. A/C control assembly	DI–732, DI–738 DI–735 IN–31

Symptom	Suspect Area	See page
No air inlet control	1. Air inlet damper position sensor circuit 2. Air inlet control servomotor circuit 3. A/C control assembly	DI–735 DI–735, DI–741 IN–31
No air outlet control	1. Air outlet control servomotor circuit 2. A/C control assembly	DI–744 IN–31
Engine idle up does not occur, or is continuous	1. Compressor circuit 2. Igniter circuit 3. A/C control assembly	DI–758 DI–756 IN–31
Blinking of A/C switch indicator.	1. Compressor lock sensor circuit 2. A/C control assembly	DI–727 IN–31
Set temperature value displayed does not much up with operation of temperature control switch.	A/C control assembly	IN–31
Brightness does not changes when rheostat volume or light control switch it turned.	1. Illumination light system 2. A/C control assembly	BE–3 IN–31
Unable to access the diagnosis mode.	A/C control seembly	IN–31
DTC not recorded. Set mode is cleared when IG switch is turned off.	1. Back–up power source circuit 2. A/C control assembly	DI–749 IN–31

DI1C3–03

CIRCUIT INSPECTION

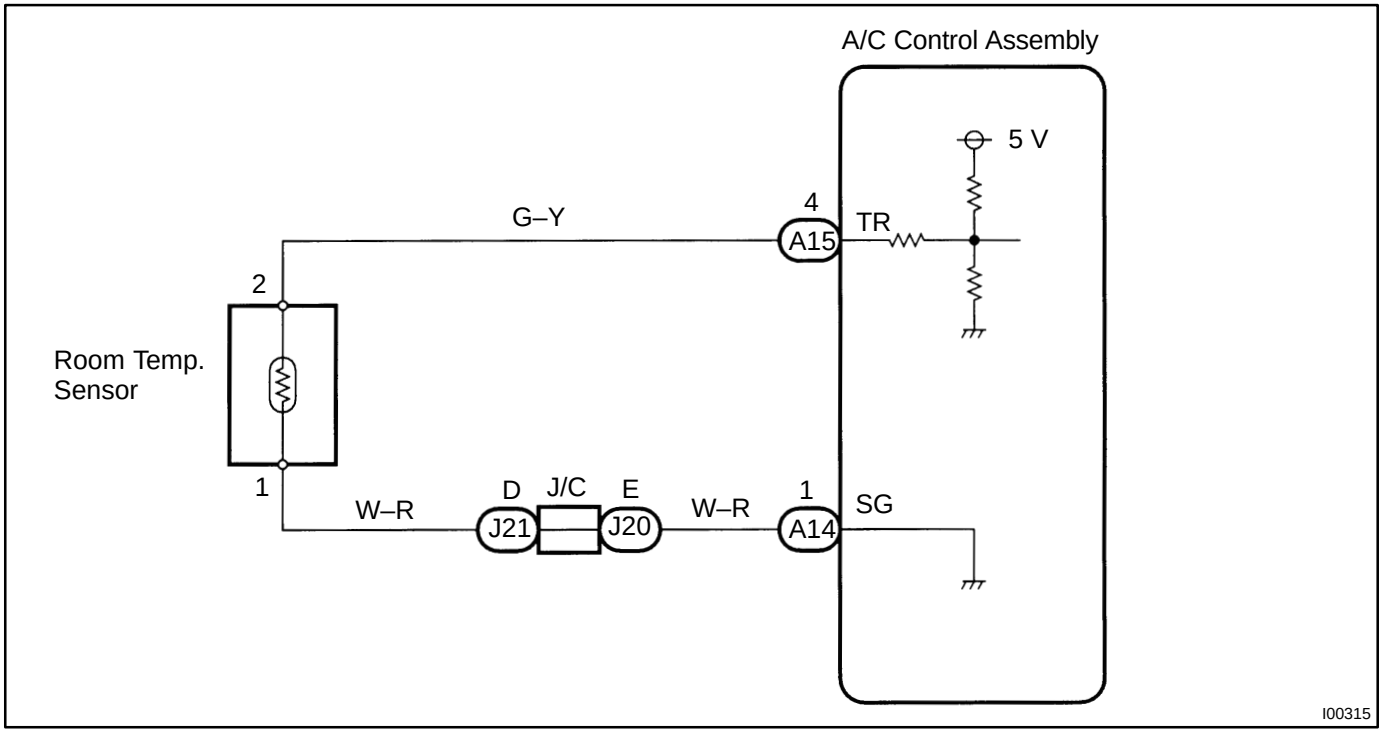
DTC	B1411/11	Room Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cabin and sends the appropriate signals to the A/C control assembly.

DTC No.	Detection Item	Trouble Area
B1411/11	Open or short in room temperature sensor circuit.	●Room temperature sensor. ●Harness or connector between room temp. sensor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand– held tester, start the inspection step 1 and in case of not using the hand–held tester, start from step 2.

1	**Check room temp. sensor using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

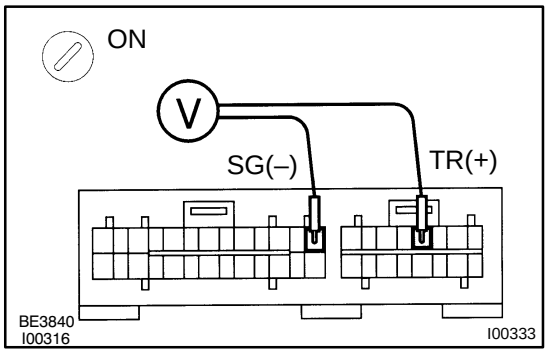
CHECK:

Check the room temp. sensor using DATA LIST.

OK → **Check or replace A/C control assembly.**

NG

2	**Check voltage between terminals TR and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn the ignition switch ON.

CHECK:

Check voltage between terminals TR and SG of A/C control assembly connector at each temperature.

OK:

at 25 °C (77 °F) : 1.8 – 2.2 V

at 40 °C (104 °F) : 1.2 – 1.6 V

HINT:

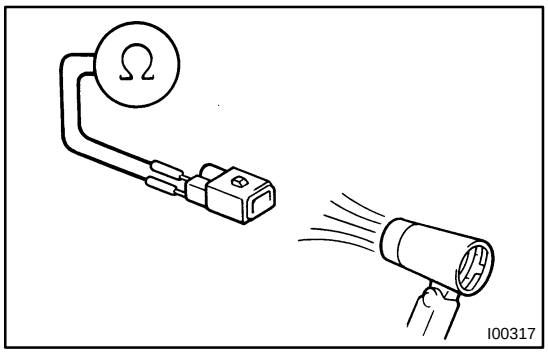
As the temperature increases, the voltage decreases.

NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1411/11 is displayed, check and replace A/C control assembly.

3	Check room temperature sensor.



PREPARATION:

(a) Remove room temperature sensor from safety pad NO.2 (See page BO–79).

(b) Disconnect room temperature sensor connector.

CHECK:

Check resistance between terminals 1 and 2 of room temperature sensor connector at each temperature.

OK:

at 25 °C (77 °F) : 1.6 – 1.8 kΩ

at 40 °C (104 °F) : 0.5 – 1.7 kΩ

HINT:

As the temperature increases, the resistance decreases.

NG → **Replace room temperature sensor.**

OK ↓

4	Check harness and connector between A/C control assembly and room temperature sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C control assembly.

DI1C4–03

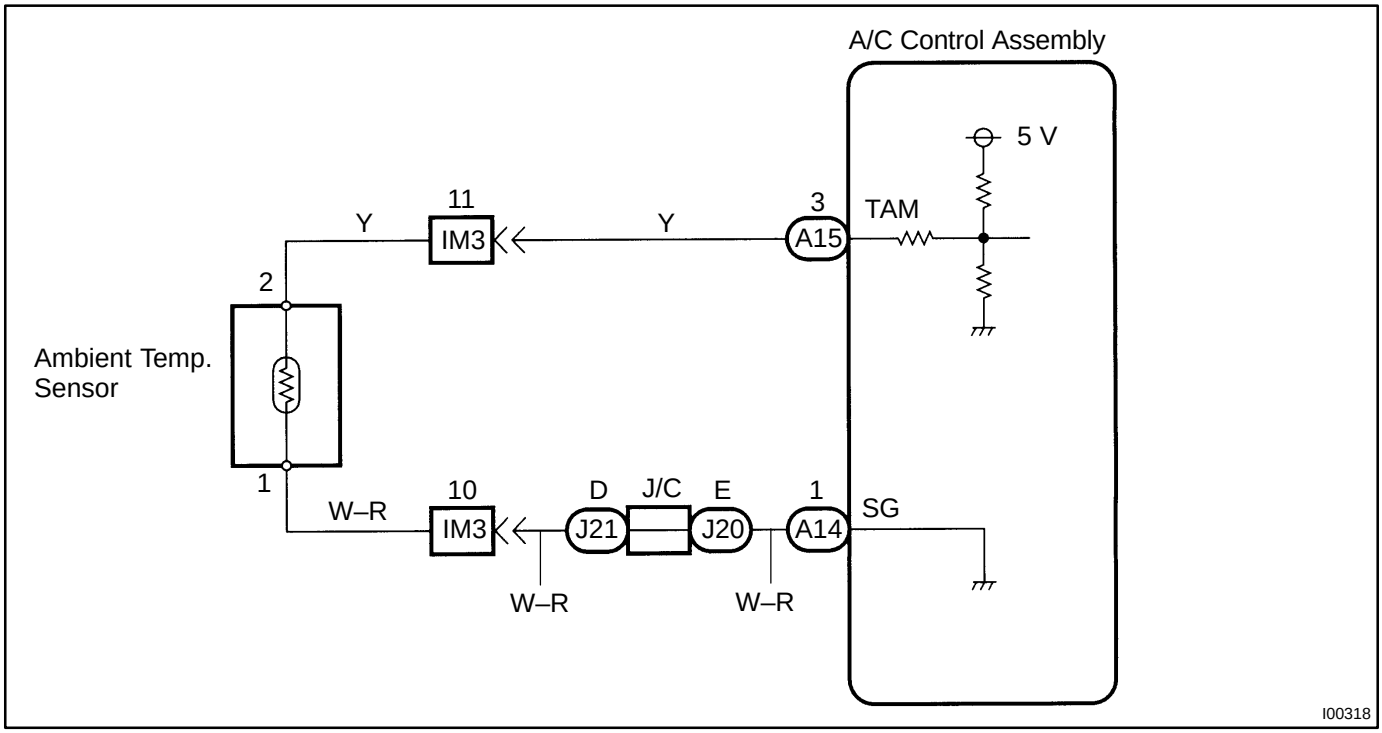
DTC	B1412/12	Ambient Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the ambient temperature and sends the appropriate signals to the A/C control assembly.

DTC No.	Detection Item	Trouble Area
B1412/12	Open or short in ambient temperature sensor circuit.	●Ambient temperature sensor. ●Harness or connector between ambient temperature sensor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand–held tester, start the inspection step 1 and in case of not using the hand–held tester, start form step 2.

1	**Check ambient temp. sensor using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

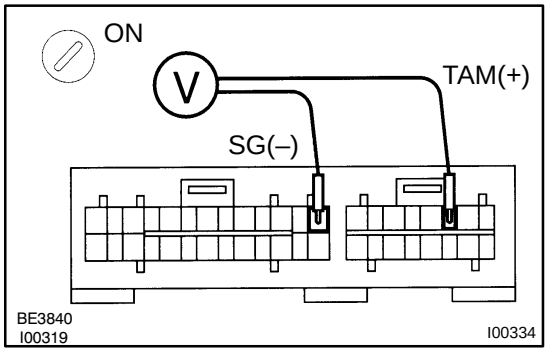
CHECK:

Check the ambient temp. sensor using DATA LIST.

OK → **Check or replace A/C control assembly.**

NG

2	**Check voltage between terminals TAM and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Check voltage between terminals TAM and SG of A/C control assembly connector at each temperature .

OK:

Voltage
at 25 °C (77 °F) : 1.35 – 1.75 V
at 40 °C (104 °F) : 0.85 – 1.25 V

HINT:

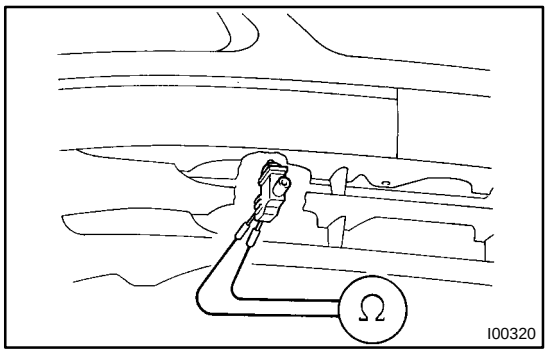
As the temperature increases, the voltage decreases.

NG → **Go to step 3.**

OK

Proceed to the next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1412/12 is displayed, check and replace A/C control assembly.

3	Check ambient temperature sensor.



PREPARATION:
Disconnect ambient temperature sensor connector.
CHECK:
Check resistance between terminals 1 and 2 of ambient temperature sensor connector at each temperature.
OK:

Resistance
at 25 °C (77 °F) : 1.6 – 1.8 kΩ
at 40 °C (104 °F) : 0.5 – 0.7 kΩ

HINT:
As the temperature increases, the resistance decreases.

NG → **Replace ambient temperature sensor.**

OK ↓

4	Check harness and connector between A/C control assembly and ambient temperature sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C control assembly.

DI1C5–03

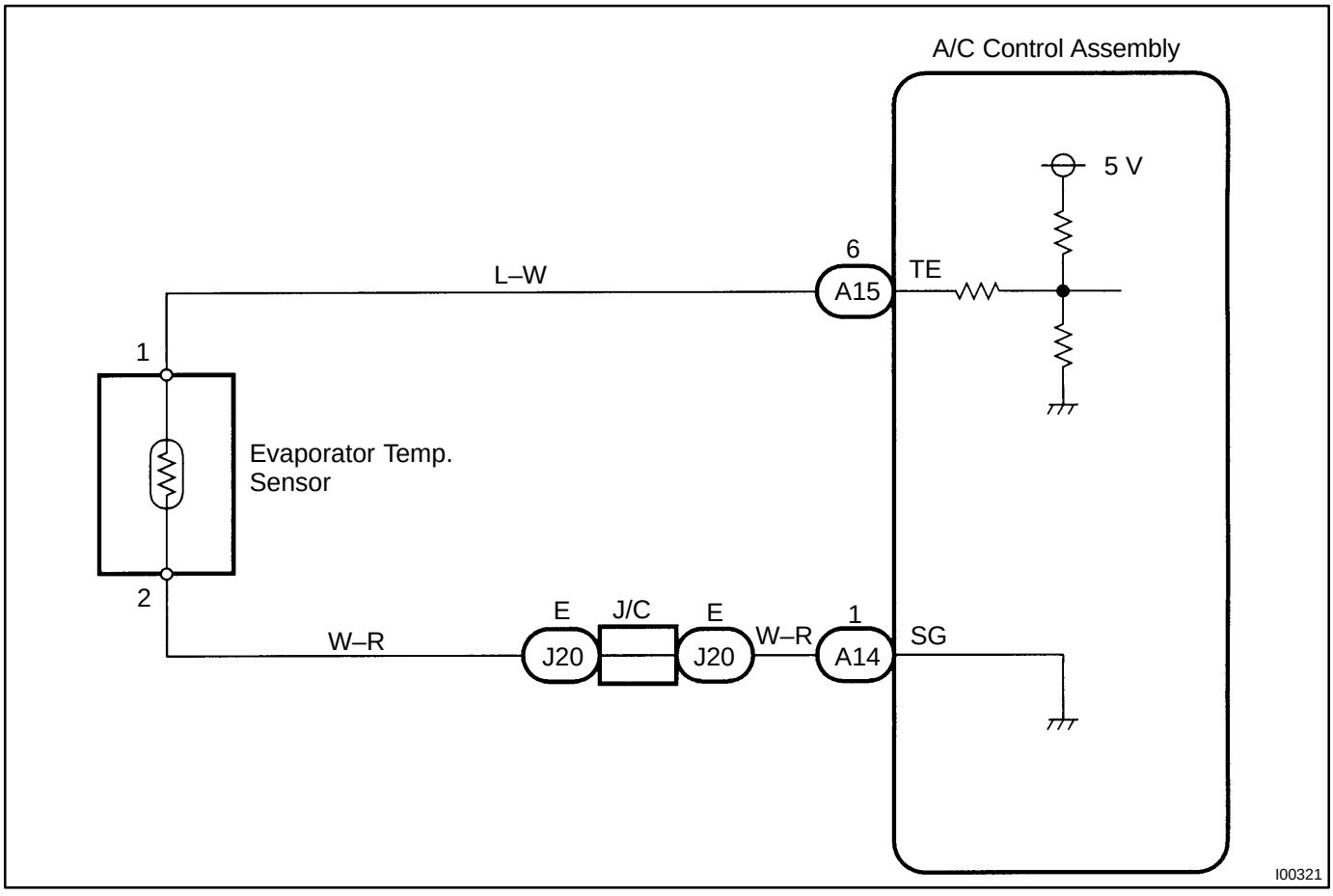
DTC	B1413/13	Evaporator Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the temperature inside the cooling unit and sends the appropriate signals to the A/C control assembly.

DTC No.	Detection Item	Trouble Area
B1413/13	Open or short in evaporator temperature sensor circuit.	●Evaporator temperature sensor. ●Harness or connector between evaporator temperature sensor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand– held tester, start the inspection step 1 and in case of not using the hand–held tester, start from step 2.

1	**Check evaporator temp. sensor using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

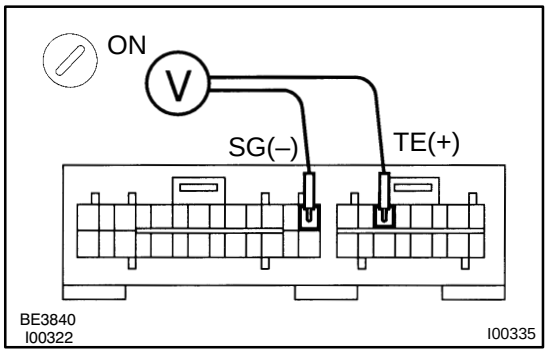
CHECK:

Check the evaporator temp. sensor using DATA LIST.

OK → **Check or replace A/C control assembly.**

NG

2	**Check voltage between terminals TE and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch to ON.

CHECK:

Measure voltage between terminals TE and SG of A/C control assembly connector at each temperature.

OK:

Voltage
at 0 ˚C (32 ˚F) : 2.0 – 2.4 V
at 15 ˚C (59 ˚F) : 1.4 – 1.8 V

HINT:

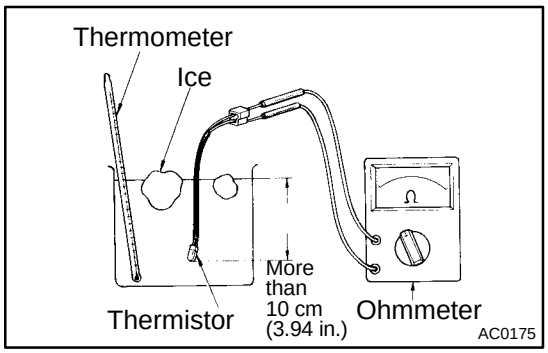
As the temperature increases, the voltage decreases.

NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1413/13 is displayed, check and replace A/C control assembly.

3	Check evaporator temperature sensor.



PREPARATION:
Remove evaporator temperature sensor (See page AC–89).
CHECK:
Check resistance between terminals 1 and 2 of evaporator temperature sensor connector at each temperature.
OK:

Resistance
at 0 °C (32 °F) : 4.6. – 5.1 kΩ
at 15 °C (59 °F) : 2.1 – 2.6 kΩ

HINT:
As the temperature increases, the voltage decreases.

NG → **Replace evaporator temperature sensor.**

OK

4	Check harness and connector between A/C control assembly and evaporator temperature sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C control assembly.

DI8YF–01

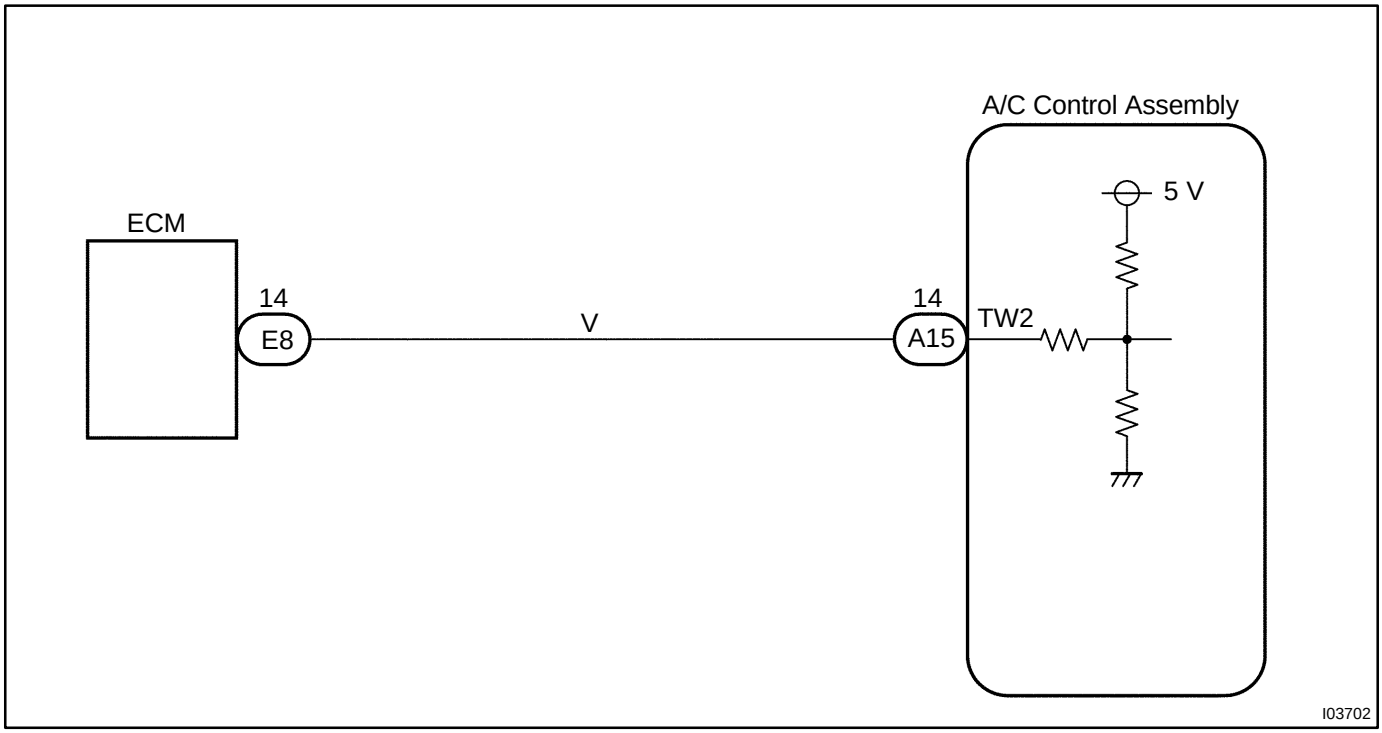
DTC	B1414/14	Engine Coolant Temperature Sensor Circuit

CIRCUIT DESCRIPTION

This sensor detects the engine coolant temperature and sends the appropriate signals to the A/C control assembly. These signals are used for warm up control when the engine is cold.

DTC No.	Detection Item	Trouble Area
B1414/14	Open or short in engine coolant temperature sensor circuit.	●Engine coolant temperature sensor ●Harness or connector between engine coolant temp. sensor and ECM ●Harness or connector between ECM and A/C control assembly ●A/C control assembly

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand– held tester, start the inspection step 1 and in case of not using the hand–held tester, start from step 2.

1	**Check engine coolant temp. sensor using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check the evaporator temp. sensor using DATA LIST.

OK → **Check or replace A/C control assembly.**

NG

2	**Check engine coolant temperature sensor circuit (See page DI–32).**

NG → **Replace engine coolant temperature sensor.**

OK

3	**Check harness and connector between A/C control assembly and ECM (See page IN–31).**

NG → **Repair or replace harness or connector.**

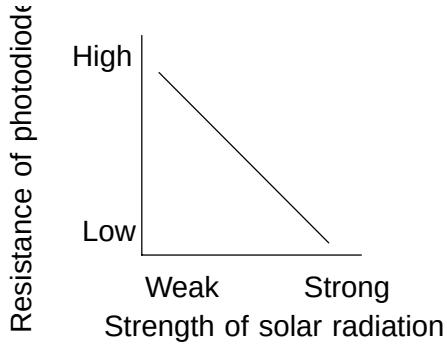
OK

Check and replace A/C control assembly.

DI1C8–03

DTC	B1421/21	Solar Sensor Circuit

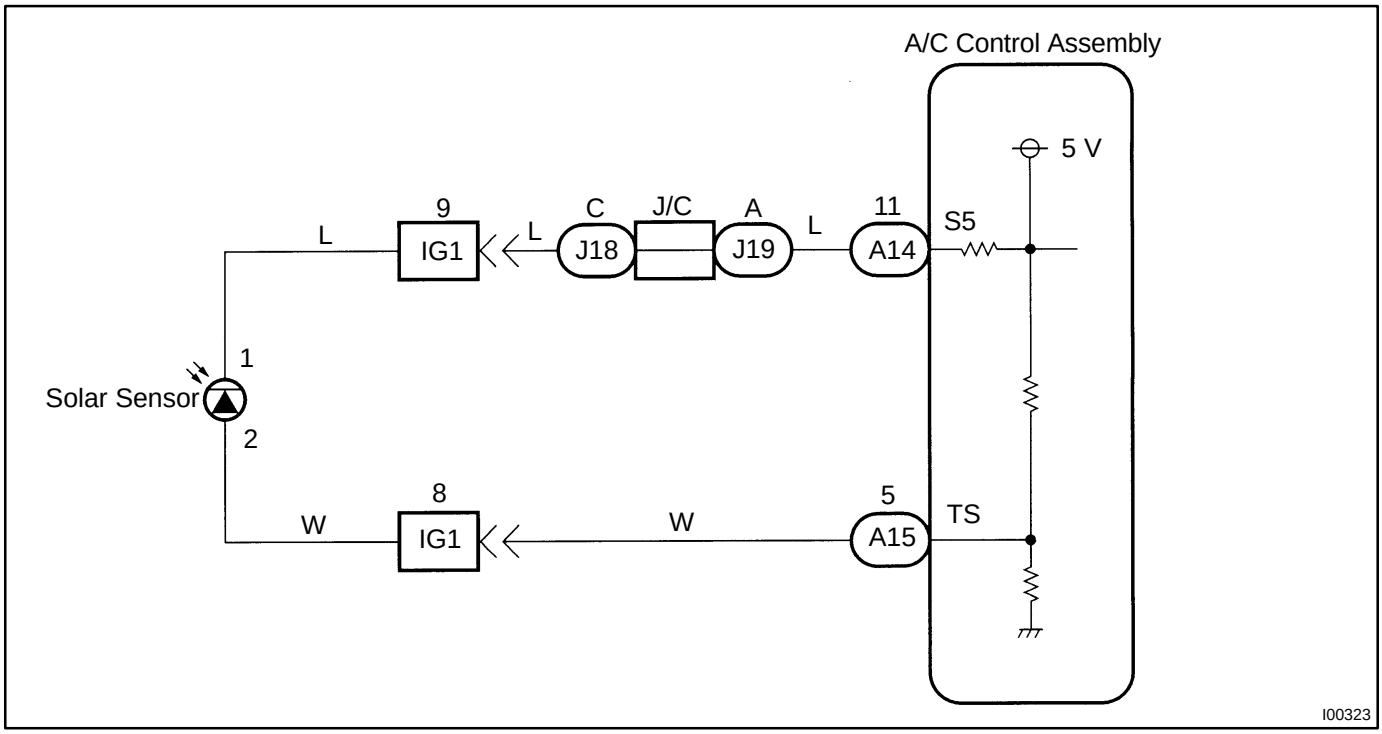
CIRCUIT DESCRIPTION



A photo diode in the solar sensor detects solar radiation and sends signals to the A/C control assembly.

DTC No.	Detection Item	Trouble Area
B1421/21	Open or short in solar sensor circuit. (Please note that display of DTC B1421/21 is not abnormal when the sensor is not receiving solar radiation.)	●Solar sensor ●Harness or connector between solar sensor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand–held tester, start the inspection step 1 and in case of not using the hand–held tester, start from step 2.

1	**Check solar sensor using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

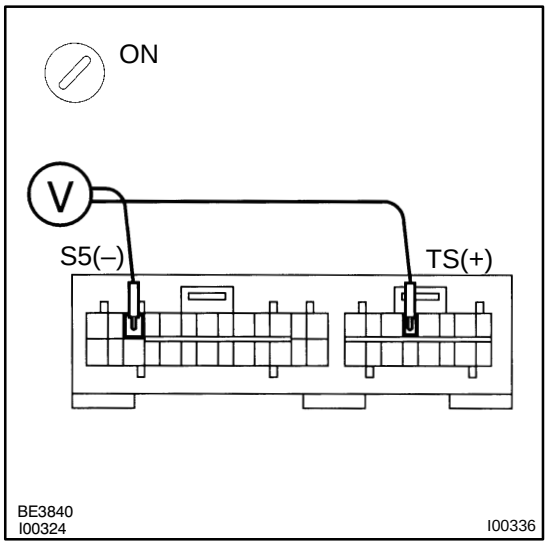
CHECK:

Check the solar sensor using DATA LIST.

OK → **Check and replace A/C control assembly.**

NG

2	**Check voltage between terminals S5 and TS of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch to ON.

CHECK:

Measure voltage between terminals S5 and TS of A/C control assembly connector when the solar sensor is subjected to an electric light, and when the sensor is covered by a cloth.

OK:

Condition	Voltage
Sensor subjected to electric light	Below 4.0 V
Sensor covered by a cloth	4.0 – 4.5 V

HINT:

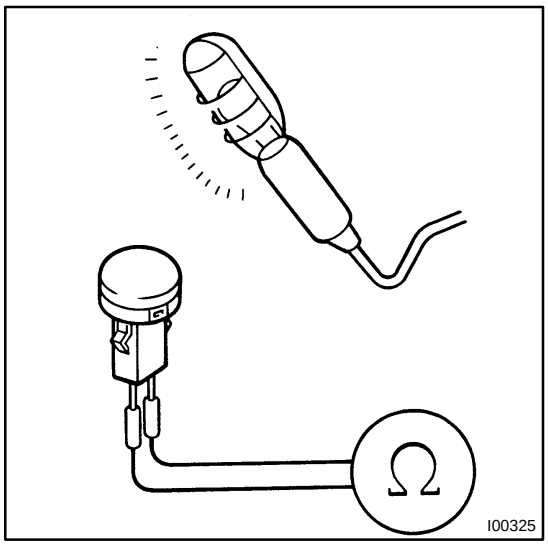
As the inspection light is gradually moved away from the sensor, the voltage increases.

NG → **Go to step 3.**

NG

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1421/21 is displayed, check and replace A/C control assembly.

3	Check solar sensor.



PREPARATION:

(a) Remove instrument panel (See page BO–79).

(b) Disconnect solar sensor connector.

CHECK:

(a) Cover the sensor by a cloth.

(b) Measure resistance between terminals 1 and 2 of solar sensor connector.

HINT:

Connect positive (+) lead of ohmmeter to terminal 2 and negative (–) lead to terminal 1 of the solar sensor.

OK:

Resistance : ∞ Ω (No continuity)

PREPARATION:

Remove the cloth from the solar sensor and subject the sensor to electric light.

CHECK:

Measure resistance.

OK:

Resistance : Below 10 kΩ (Continuity)

HINT:

As the electric light is moved gradually away from the sensor, the resistance increases.

NG → **Replace solar sensor.**

OK ↓

4	Check harness and connector between A/C control assembly and solar sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK ↓

Check and replace A/C control assembly.

DI1C9–03

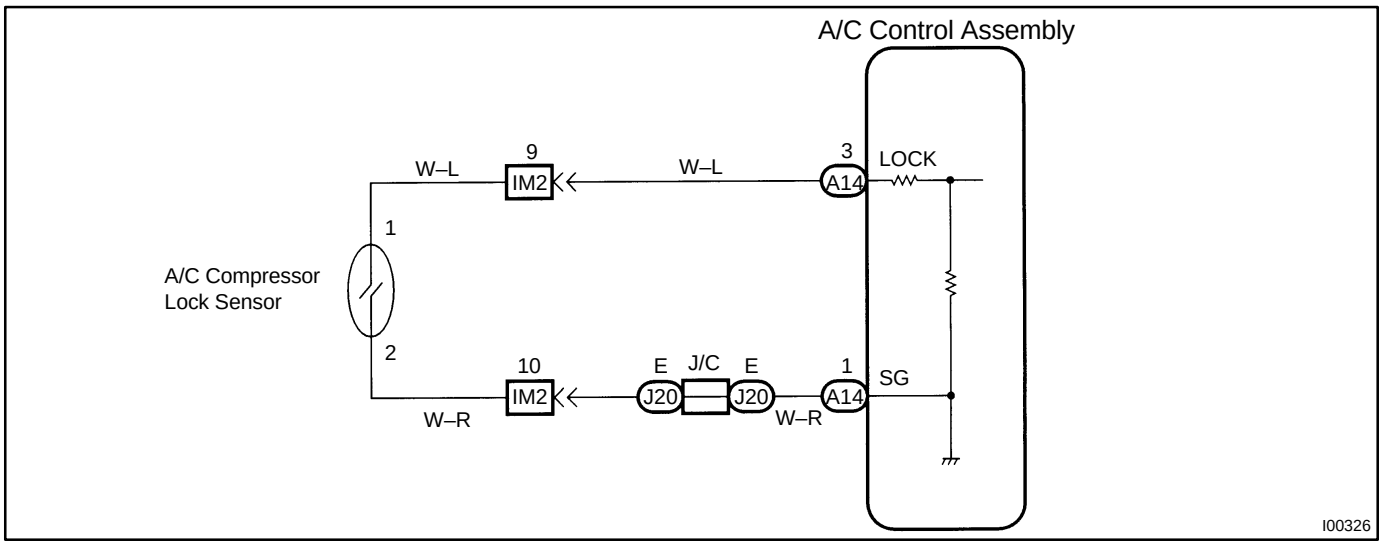
DTC	B1422/22	Compressor Lock Sensor Circuit

CIRCUIT DESCRIPTION

This sensor sends 4 pulses par engine revolution to the A/C control assembly. If the number ratio of the compressor speed divided by the engine speed is smaller than a predetermined value, the A/C control assembly turns the compressor off. And, the indicator flashes at about 1 sec. intervals.

DTC No.	Detection Item	Trouble Area
B1422/22	All conditions below are detected for 3 secs. or more. (a) Engine speed : 450 rpm or more. (b) Ratio between engine and compressor speed deviates 20 % or more in comparison to normal operation.	●Compressor. ●Compressor drive belt. ●Compressor lock sensor. ●Harness and connector between compressor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check compressor.

PREPARATION:

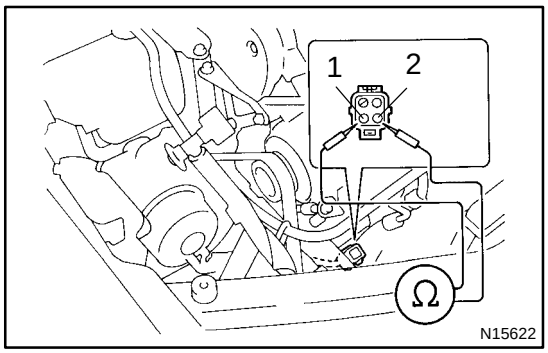
(a) Check compressor drive belt tension (See page AC–14).

(b) Check if the compressor does not lock during operation with engine started and blower switch and A/C switch ON.

NG → **Adjust drive belt tension or check compressor.**

OK

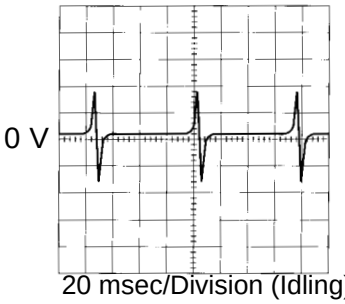
2	Check compressor lock sensor.



PREPARATION:
Disconnect compressor lock sensor connector.
CHECK:
Measure resistance between terminals 1 and 2 of compressor lock sensor connector.
OK:
Resistance : at 20 ˚C (68 ˚F) : 65 – 125 Ω

Reference : Inspection using oscilloscope

LOCK IN signal waveform



During cranking or idling, measure voltage between terminals LOCK IN and SG of A/C control assembly.
HINT:
The correct waveform appears as shown in the illustration on the left.

NG → **Replace compressor lock sensor.**

OK

3	Check harness and connector between A/C control assembly and compressor lock sensor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC 22 is displayed, check and replace A/C control assembly.

DI1CA–03

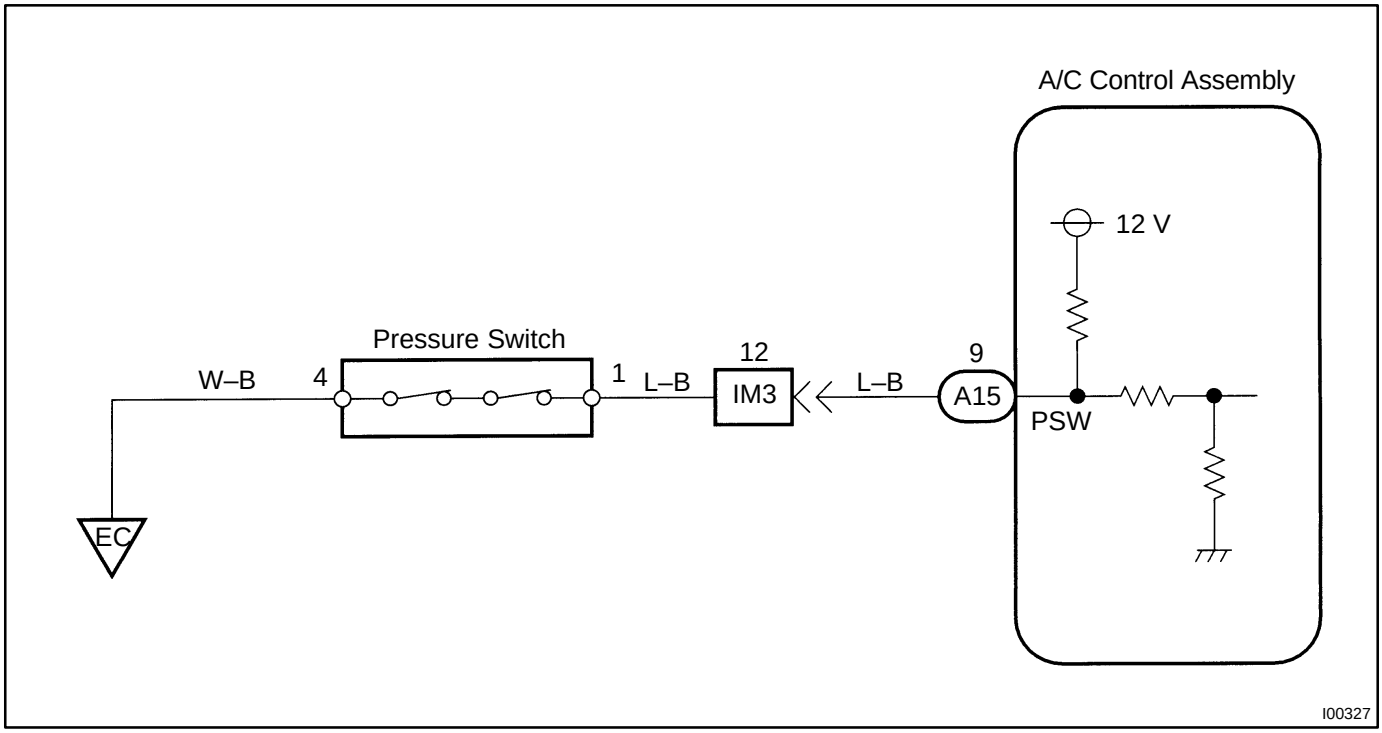
DTC	B1423/23	Pressure Switch Circuit

CIRCUIT DESCRIPTION

This pressure switch sends the appropriate signals to the A/C control assembly when the A/C refrigerant pressure drops too low or rises too high. When the A/C control assembly receives these signals, if outputs signals via the ECM to switch off the compressor relay and turns the magnetic clutch off.

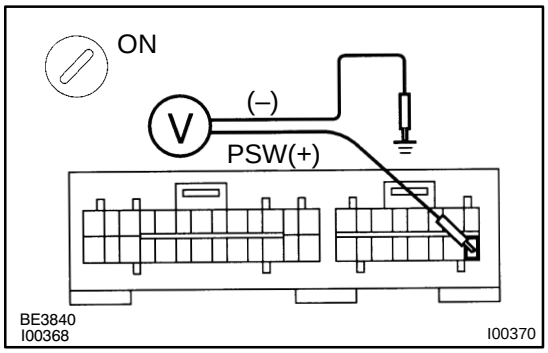
DTC No.	Detection Item	Trouble Area
B1423/23	●Open in pressure sensor circuit. ●Abnormal refrigerant pressure. below 196 kPa (2.0 kgf/cm^2. 28 psi) over 3,140 kPa (32.0 kgf/cm^2. 455 psi)	●Pressure switch. ●Harness or connector between pressure switch and A/C control assembly. ●Refrigerant pipe line. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminals PSW of A/C control assembly and body ground.



PREPARATION:

(a) Install the manifold gauge set (See page AC–10).

(b) Turn ignition switch to ON.

CHECK:

Check voltage between terminals PSW of A/C control assembly connector and body ground when A/C gas pressure is changed.

OK:

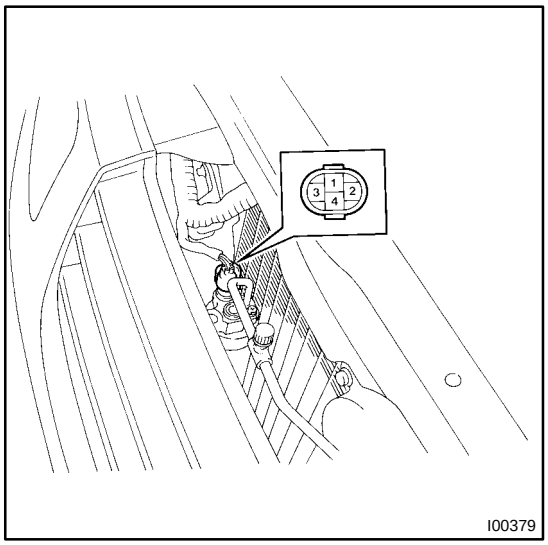
The voltage changes with gas pressure, as shown in the diagram below.

Low Pressure Cut Side	Referaence : High Pressure Cut SIde
ON (0 V) 225 kPa 196 kPa OFF (12V)	ON (0 V) 2,550 kPa 3,140 kPa OFF (12V)

OK	Proceed to next circuit inspection shown on matrix chart (See page DI–711).

NG

2	Check pressure switch.



PREPARATION:

Disconnect pressure switch connector.

CHECK:

Check continuity between terminals 1 and 4 of pressure switch when A/C gas pressure is changed.

OK:

The continuity changes with gas pressure as shown below.

Low Pressure Cut Side	Referaence : High Pressure Cut SIde
ON (continuity) 225 kPa 196 kPa OFF (no continuity)	ON (continuity) 2,550 kPa 3,140 kPa OFF (nocontinuity)

NG	Replace pressure switch.

OK

3	**Check harness and connector between A/C control assembly and pressure switch, pressure switch and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

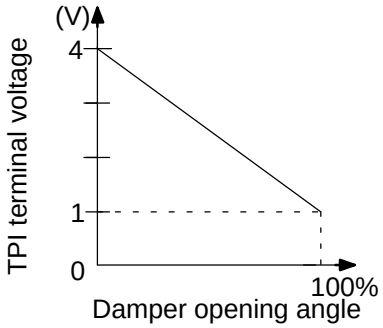
Check and replace A/C control assembly.

DI1CB–03

DTC	B1431/31	Air Mix Damper Position Sensor Circuit

DTC	B1441/41	Air Mix Damper Position Sensor Circuit

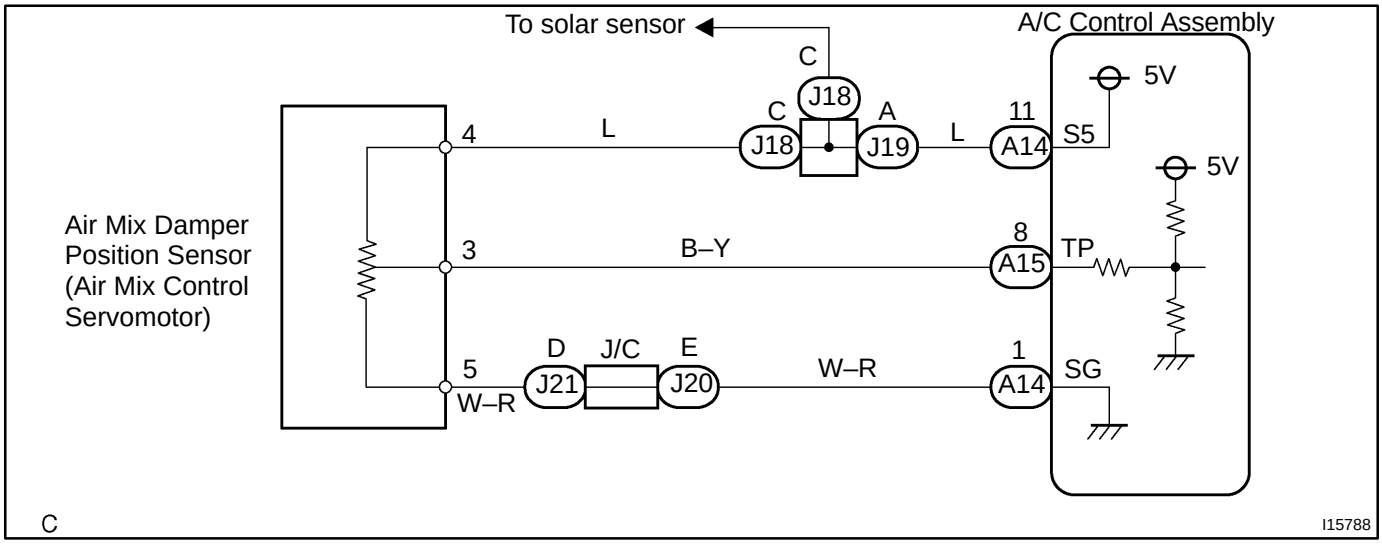
CIRCUIT DESCRIPTION



This sensor detects the position of the air mix damper and sends the appropriate signals to the A/C control assembly. The position sensor is built into the air mix control servomotor.

DTC No.	Detection Item	Trouble Area
B1431/31	Short to ground or power source circuit in air mix damper position sensor circuit.	●Air mix damper position sensor. ●Harness of connector between air mix control servomotor and A/C control assembly. ●A/C control assembly.
B1441/41	Air mix damper position sensor value does not change even if ECM operates air mix control servomotor.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand–held tester, start the inspection from step1 and in case of not using the hand–held tester, start from step2.

1	**Check air mix damper position using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check the current position of air mix damper and the target position of air mix damper.

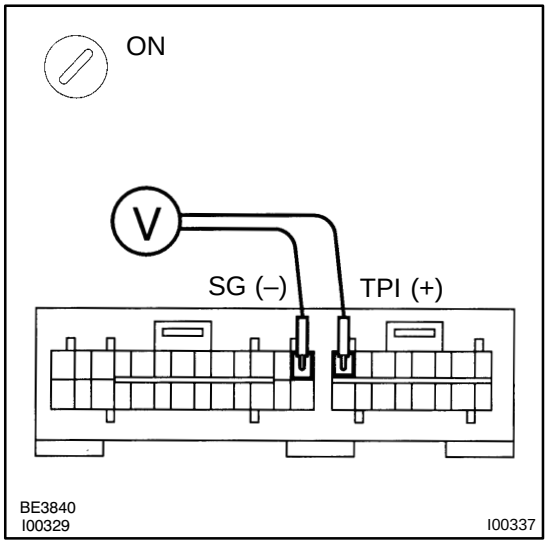
OK:

The current position and target position are almost similar.

OK → **Check and replace A/C control assembly.**

NG

2	**Check voltage between terminals TP and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Change the set temperature to activate the air mix damper, and measure the voltage between terminals TP and SG of A/C control assembly connector each time when the set temperature is changed.

OK:

Set Temperature	Voltage
Max. cool	3.5 – 4.5 V
Max. hot	0.5 – 1.8 V

HINT:

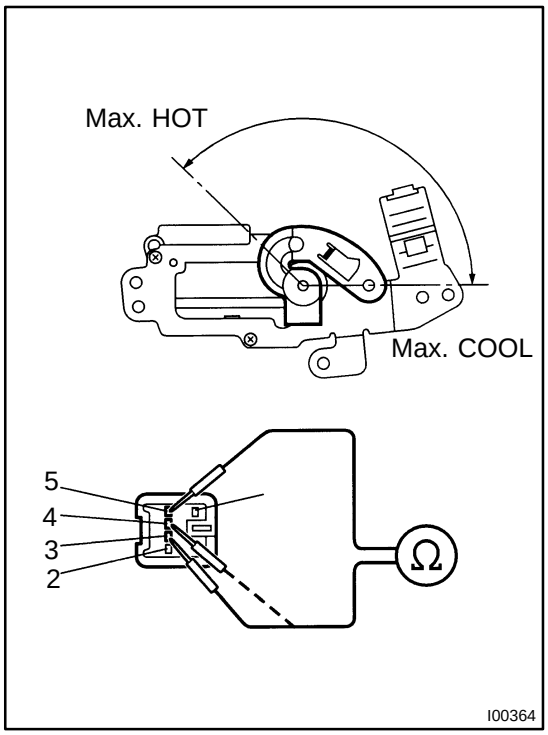
As the set temperature increases, the voltage decreases gradually without interruption.

NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1431/31 or B1441/41 is displayed, check and replace A/C control assembly.

3	Check air mix damper position sensor.



PREPARATION:

(a) Remove air mix control servomotor (See page AC–74).

(b) Disconnect air mix control servomotor connector.

CHECK:

Measure resistance between terminals 4 and 5 of air mix control servomotor connector.

OK:

Resistance : 4.8 – 7.2 kΩ

CHECK:

While operating air mix control servomotor as shown in the procedure on page DI–738, measure resistance between terminals 3 and 5 of air mix control servomotor connector.

OK:

Position	Resistance
Max. cool	3.8 – 5.8 kΩ
Max. hot	0.95 – 1.45 kΩ

HINT:

As the air mix control servomotor moves from cool side to hot side, the resistance decreases gradually without interruption.

NG → **Replace air mix control servomotor.**

OK

4	Check harness and connector between A/C control assembly and air mix control servomotor (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

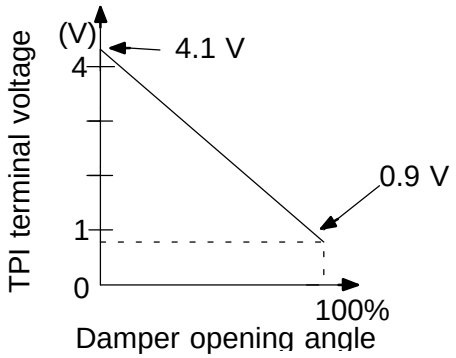
Check and replace A/C control assembly.

DI1CC–03

DTC	B1432/32	Air Inlet Damper Position Sensor Circuit

DTC	B1442/42	Air Inlet Damper Position Sensor Circuit

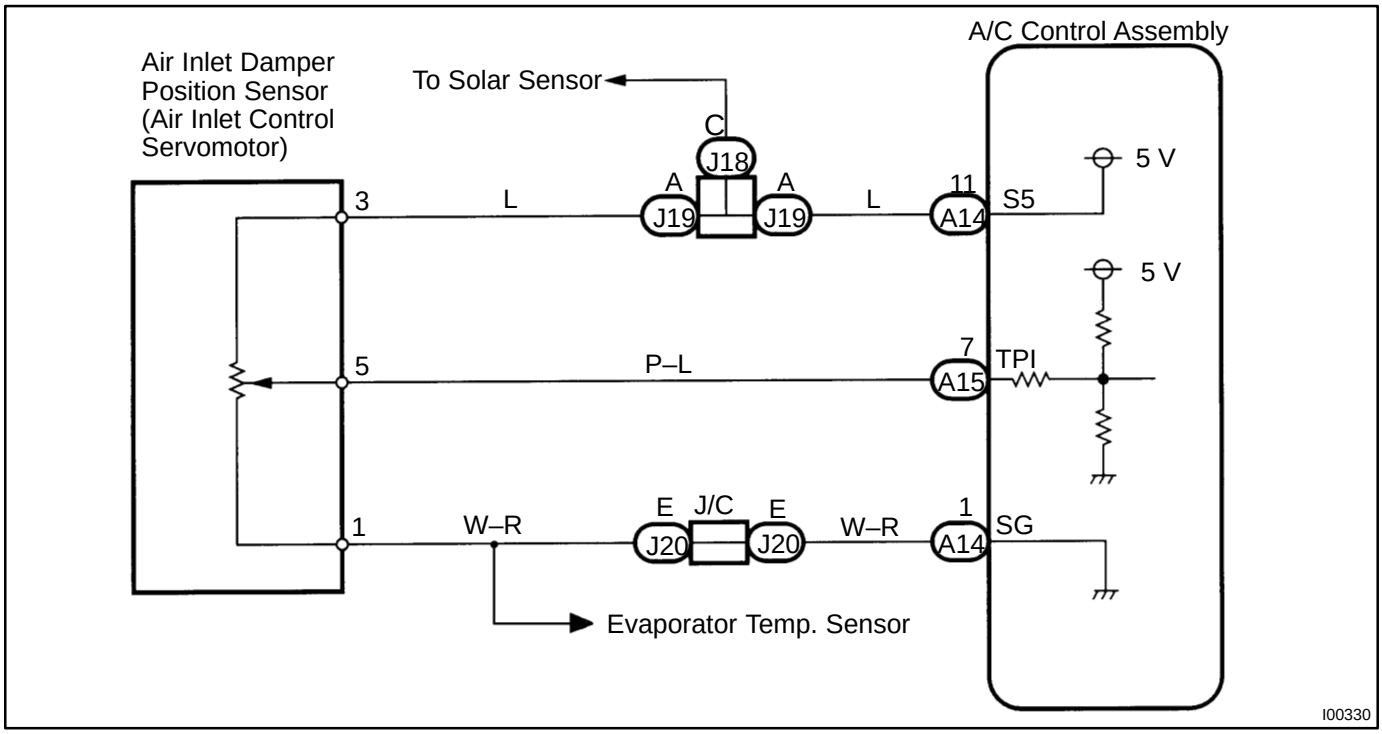
CIRCUIT DESCRIPTION



This sensor detects the position of the air inlet damper and sends the appropriate signals to the A/C control assembly. The position sensor is built into the air inlet control servomotor.

DTC No.	Detection Item	Trouble Area
B1432/32	Short to ground or power source circuit in air inlet damper position sensor circuit.	●Air inlet damper position sensor. ●Harness or connector between air inlet control servomotor and A/C control assembly. ●A/C assembly.
B1442/42	Air inlet damper position sensor value does not change even if A/C control assembly operates air inlet control servomotor.	

WIRING DIAGRAM



INSPECTION PROCEDURE

HINT:

In case of using the hand–held tester, start the inspection from step1 and in case of not using the hand–held tester, start from step2.

1	**Check air inlet damper position using hand–held tester.**

PREPARATION:

Connect the hand–held tester to the DLC3.

CHECK:

Check the current position of air mix damper and the target position of air mix damper.

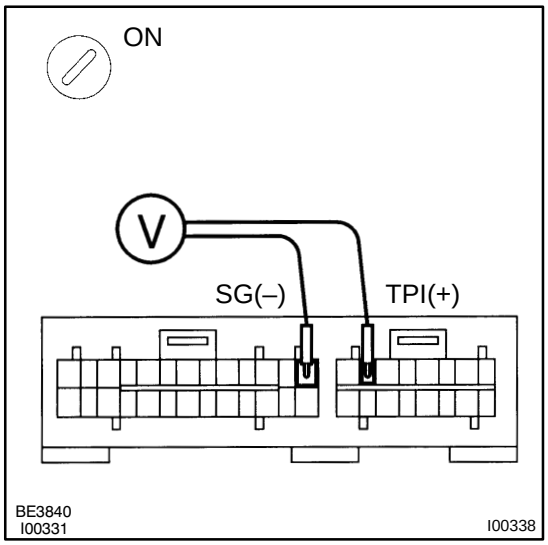
OK:

The current position and target position are almost similar.

OK → **Check or replace A/C control assembly.**

NG

2	**Check voltage between terminals TPI and SG of A/C control assembly connector.**



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Turn ignition switch ON.

CHECK:

Press REC/FRS switch to change air inlet between fresh and recirculation air, and measure voltage between terminals TPI and SG of A/C control assembly when the air inlet servomotor operates.

OK:

REC/FRS Switch	Voltage
REC	3.5 – 4.5 V
FRS	0.5 – 1.8 V

HINT:

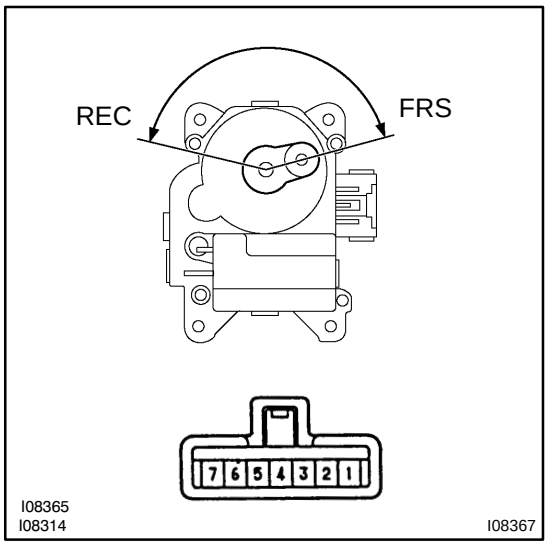
As the air inlet control servomotor is moved from REC side to FRS side, the voltage decreases gradually without interruption.

NG → **Go to step 3.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711). However, if DTC B1432/32 or B1442/42 is displayed, check and replace A/C control assembly.

3	Check air inlet damper position sensor.



PREPARATION:

(a) Remove air inlet control servomotor (See page AC–71).

(b) Disconnect air inlet control servomotor connector.

CHECK:

Measure resistance between terminals 1 and 3 of air inlet control servomotor connector.

OK:

Resistance : 4.2 – 7.8 kΩ

CHECK:

While operating air inlet control servomotor as in the procedure on page, measure resistance between terminals 1 and 5 of air inlet control servomotor connector.

OK:

Resistance :

Damper Position	Resistance
REC side	3.4 – 6.4 kΩ
FRS side	0.76 – 1.4 kΩ

HINT:

As the air inlet control servomotor is moved from REC side to FRS side, the voltage decreases gradually without interruption.

NG → **Replace air mix control servomotor.**

OK

4	Check harness and connector between A/C control assembly and air inlet control servomotor. (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C control assembly.

DI1CD–03

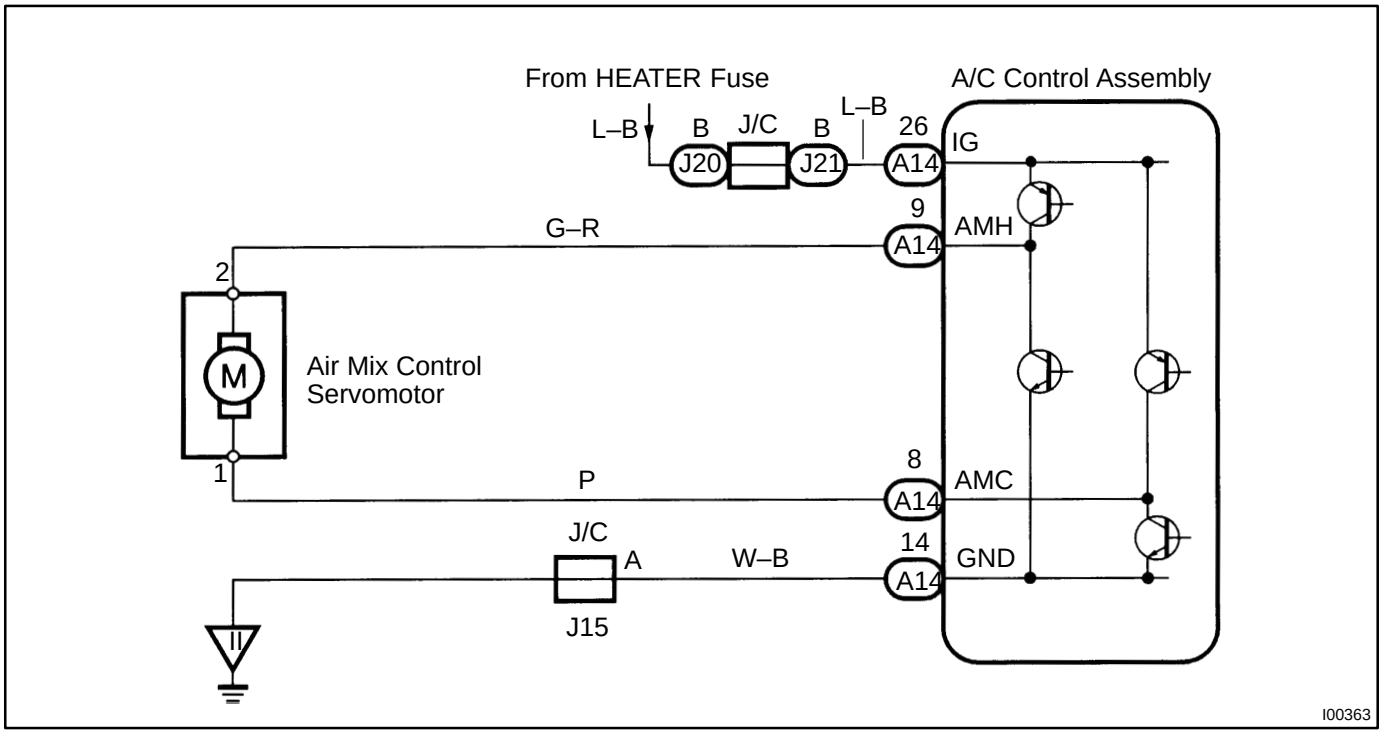
DTC	B1441/41	Air Mix Control Servomotor Circuit

CIRCUIT DESCRIPTION

This air mix control servomotor is controlled by the A/C control assembly and moves the air mix damper to the desired position.

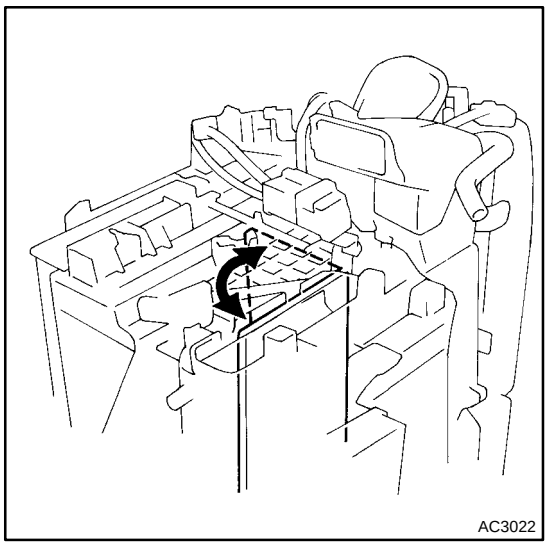
DTC No.	Detection Item	Trouble Area
B1441/41	Air mix damper position sensor value does not change even if A/C control assembly operates air mix control servomotor.	●Air mix control servomotor. ●Air mix damper position sensor. ●Harness or connector between A/C control assembly and air mix control servomotor, air mix damper position sensor. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.



PREPARATION:

(a) Warm up the engine.

(b) Set to the actuator check mode (See page DI–704).

(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation of the air mix damper and the condition of the blower.

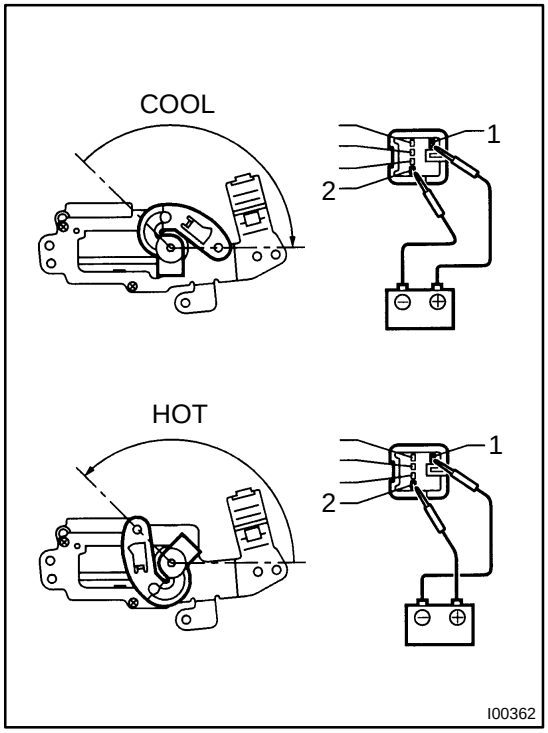
OK:

Display Code	Air Mix Damper	Condition
0 – 3	0 % (Fully closed)	Cool air comes out
4 – 5	50 %	
6 – 9	100 % (Fully opened)	Warm air comes out

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	Check air mix control servomotor.



PREPARATION:

Remove air mix control servomotor (See page AC–74).

CHECK:

Connect positive (+) lead to terminal 1 and the negative (–) lead to terminal 2.

OK:

The lever turns smoothly to COOL side.

CHECK:

Connect negative (–) lead to terminal 1 and positive (+) lead to terminal 2.

OK:

The lever turns smoothly to HOT side.

NG → **Repair or replace harness or connector.**

OK

3	**Check harness and connector between A/C control assembly and air mix control servomotor (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Check and replace A/C control assembly (See page IN–31).

DI1CE–03

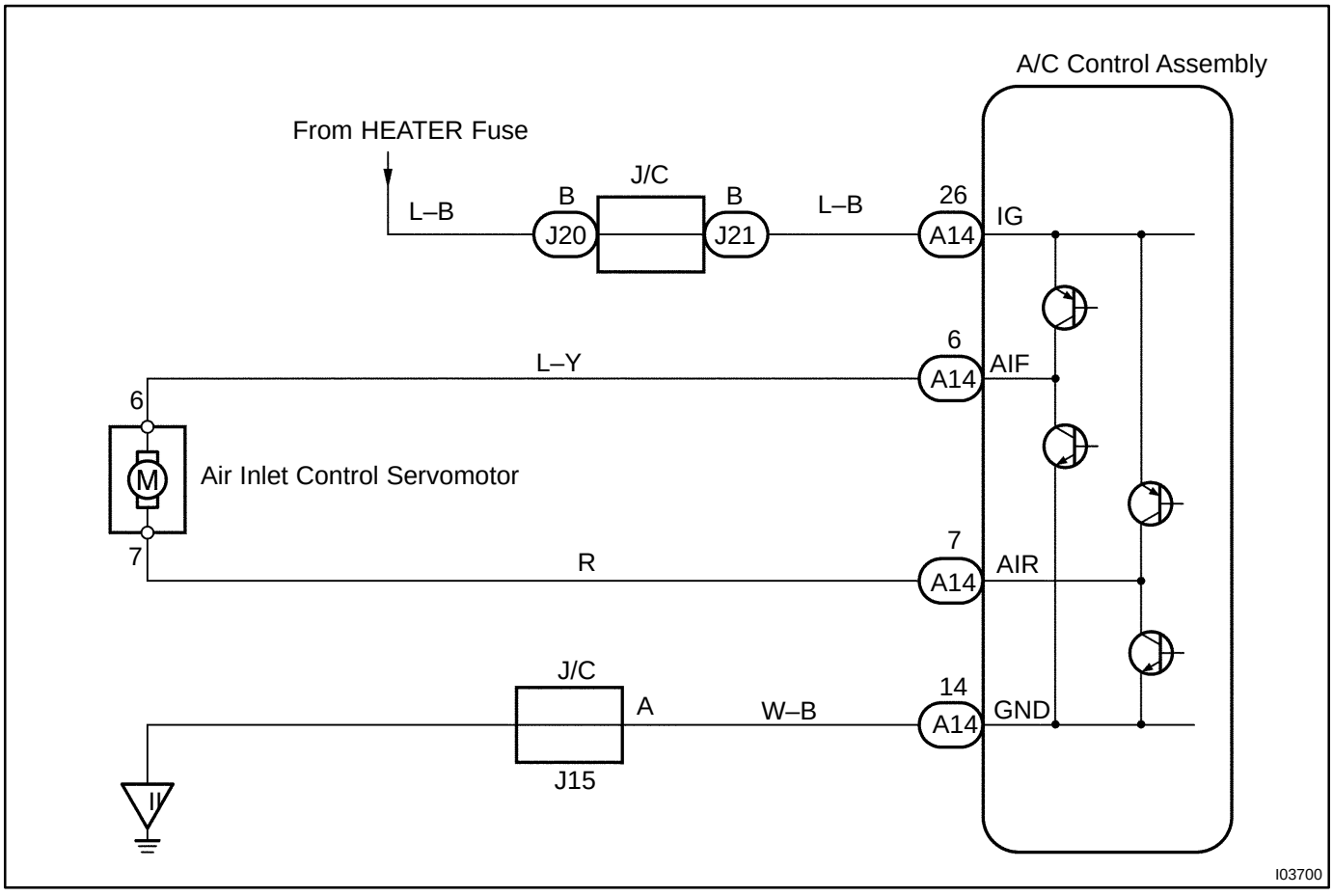
DTC	B1442/42	Air Inlet Control Servomotor Circuit

CIRCUIT DESCRIPTION

The air inlet control servomotor is controlled by the A/C control assembly and moves the air inlet damper to the desired position.

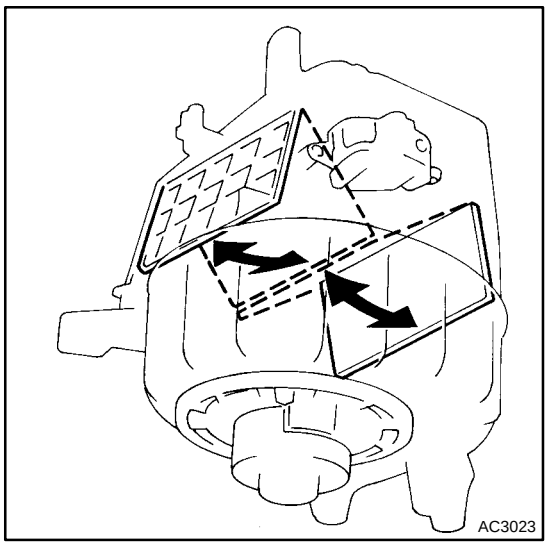
DTC No.	Detection Item	Trouble Area
B1442/42	Air inlet damper position sensor value does not change even if A/C control assembly operates air inlet control servomotor.	●Air inlet damper position sensor. ●Harness or connector between air inlet control servomotor and A/C control assembly. ●A/C control assembly.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Actuator check.



PREPARATION:

(a) Remove glove box to see and check the air inlet damper operation.

(b) Set to the actuator check mode (See page DI–704).

(c) Press the DEF switch and change it to step operation.

CHECK:

Press the DEF switch and check the operation air inlet damper.

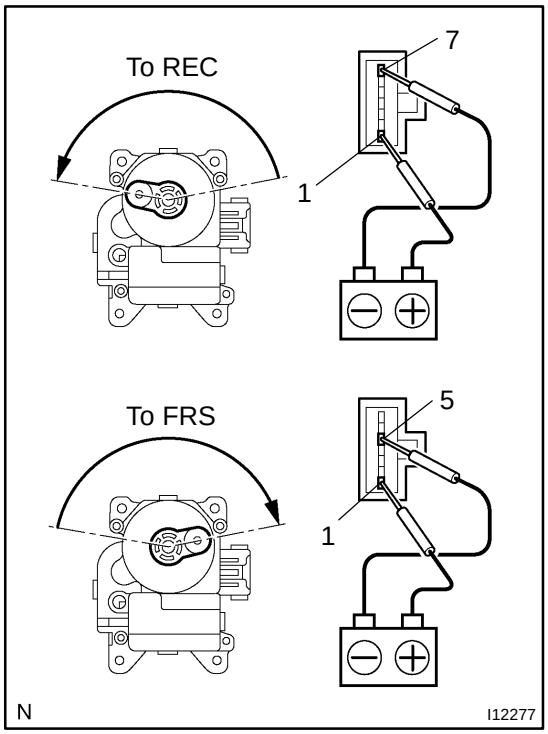
OK:

DIsplay Code	Air Inlet Damper
0 – 2	FRS
3	REC/FRS
4 – 9	REC

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	Check air inlet control servomotor.



PREPARATION:

Remove air inlet control servomotor (See page AC–71).

CHECK:

Connect positive (+) lead to terminal 1 and negative (–) lead to terminal 7.

OK:

The lever moves smoothly to REC position.

CHECK:

Connect negative (–) lead to terminal 5 and positive (+) lead to terminal 1.

OK:

The lever moves smoothly to FRS position.

NG → **Replace air inlet control servomotor assembly.**

OK

3	Check harness and connector between A/C control assembly and air inlet control servomotor. (See page IN–31).

NG → Repair or replace harness or connector.

OK

Check and replace A/C control assembly.

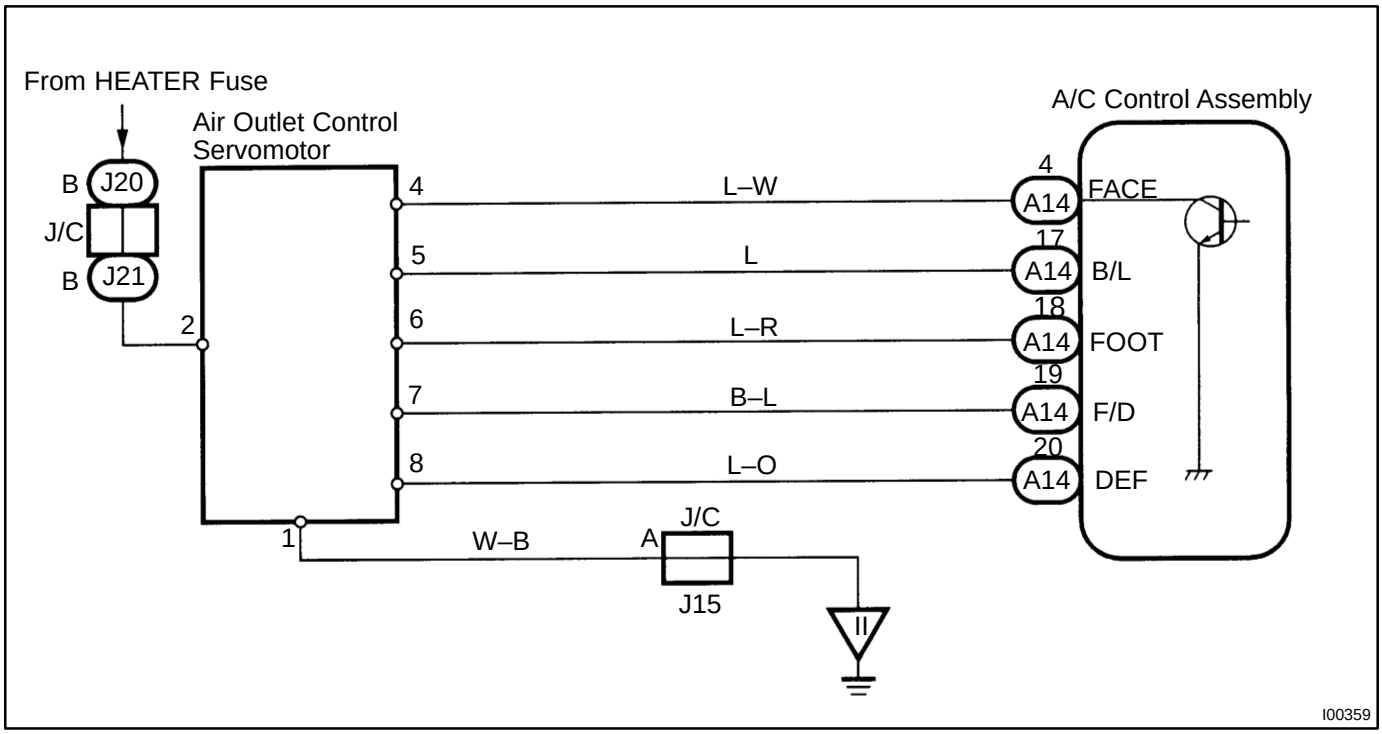
DI1CF–03

Air Outlet Control Servomotor Circuit

CIRCUIT DESCRIPTION

This circuit turns the servomotor and changes each mode damper position by signals from the A/C control assembly. When the AUTO switch is ON, the A/C control assembly changes the mode automatically between FACE, BI–LEVEL and FOOT according to the temperature setting.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Actuator check.**

Display Code	Air Flow Mode
0 – 4	FACE
5	BI–LEVEL
6 – 7	FOOT
8	FOOT DEF
9	DEF

PREPARATION:

(a) Set to the actuator check mode (See page DI–704).

(b) Press the DEF switch and change to step operation.

CHECK:

Press the DEF switch in order and check the condition of air flow mode.

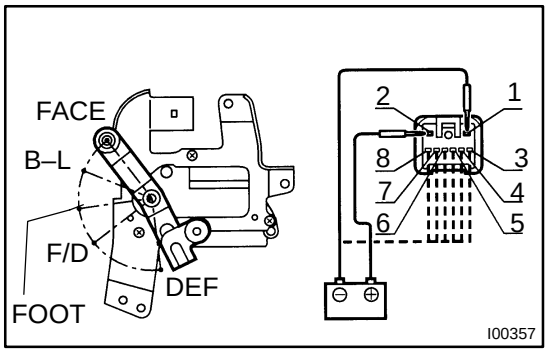
OK:

The mode changes with the change in the temperature display as shown in the table.

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	Check air outlet control servomotor.



PREPARATION:

Remove air outlet control servomotor (See page AC–77).

CHECK:

(a) Connect positive (+) lead to terminal 2 and negative (–) lead to terminal 1.

(b) Check the lever operation when the negative (–) lead is connected to the terminals shown below.

OK:

The lever moves smoothly to the position for each mode.

Ground Terminals	Mode
4	FACE
5	BI–LEVEL
6	FOOT
7	FOOT DEF
8	DEF

NG → **Replace air outlet control servomotor.**

OK

3	Check harness and connector between A/C control assembly and air outlet control servomotor, air outlet control servomotor and battery, air outlet control servomotor and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Repair or replace A/C control assembly.

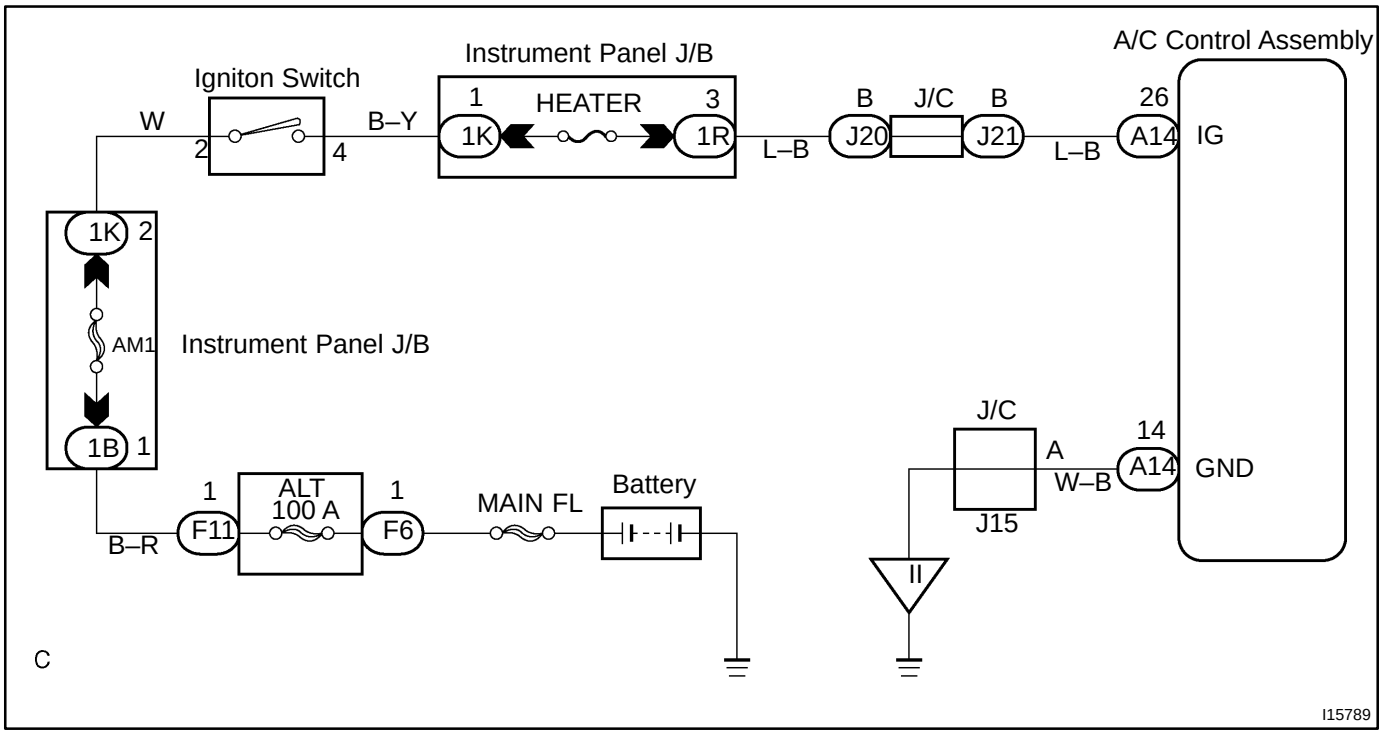
DI1CG–03

IG Power Source Circuit

CIRCUIT DESCRIPTION

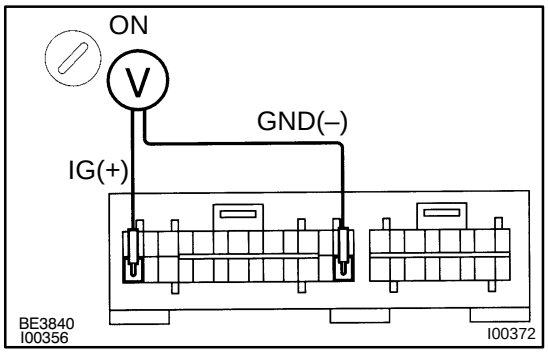
This is the power source for the A/C control assembly (contains the ECU) and servomotors, etc.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminals IG and GND of A/C control assembly connector.**



PREPARATION:

(a) Remove front ash receptacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

(c) Turn ignition switch ON.

CHECK:

Measure voltage between terminals IG and GND of A/C control assembly.

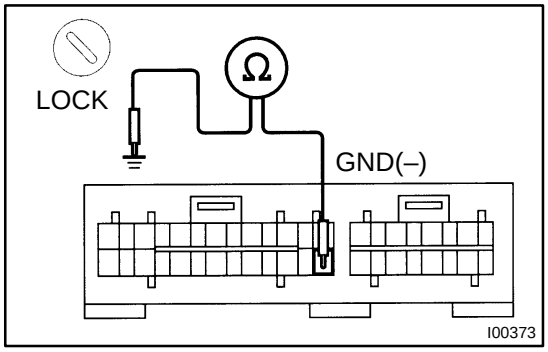
OK:

Voltage : 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	**Check continuity between terminal GND of A/C control assembly and body ground.**



CHECK:

Measure resistance between terminal GND of A/C control assembly and body ground.

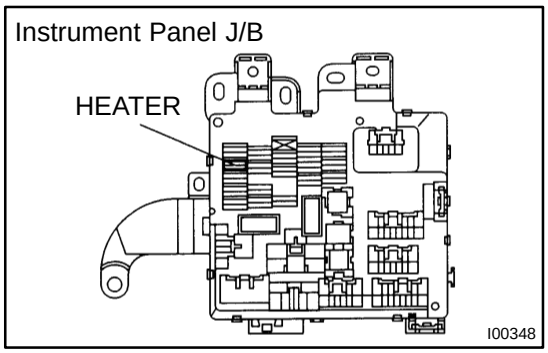
OK:

Resistance : Below 1 Ω

NG	**Repair or replace harness or connector.**

OK

3	Check HTR fuse.



PREPARATION:
Remove HEATER fuse in Instrument Panel J/B.
CHECK:
Check continuity of HEATER fuse.
OK:
Continuity exists.

NG → **Check for shot in all the harness and components connected to the HEATER fuse (See page DI–746).**

OK

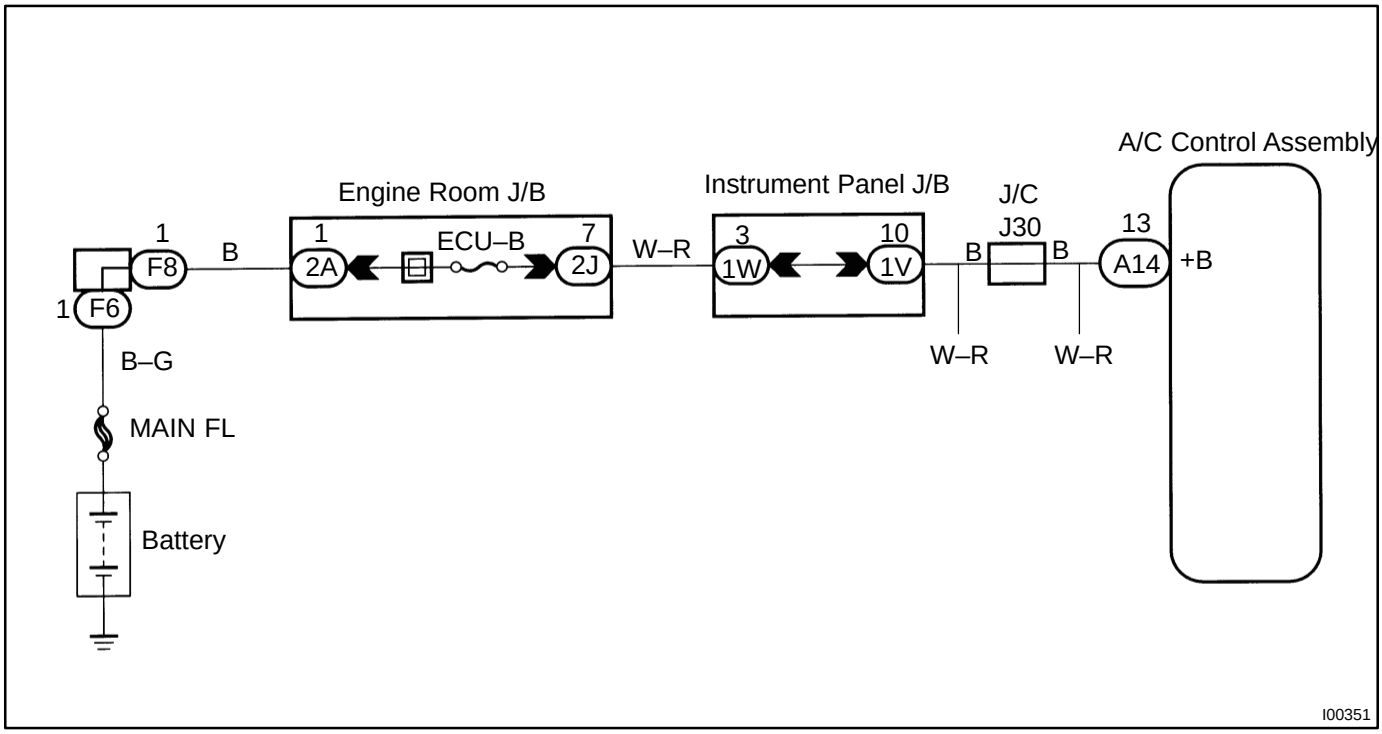
Check and repair harness and connector between A/C control assembly and battery.

Back Up Power Source Circuit

CIRCUIT DESCRIPTION

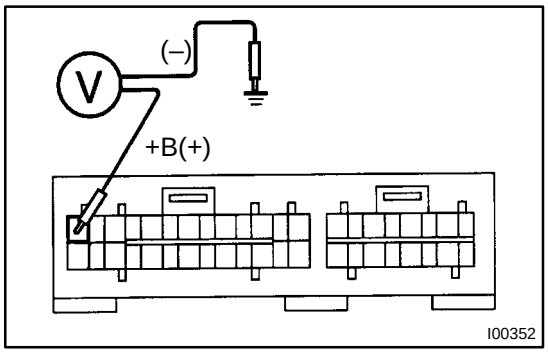
This is the back–up power source for the A/C control assembly. Power is supplied even when the ignition switch is off and is used for DTC memory, etc..

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check voltage between terminal +B of A/C control assembly connector and body ground.**



PREPARATION:

(a) Remove front ash receptacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

CHECK:

Measure voltage between terminal +B of A/C control assembly connector and body ground.

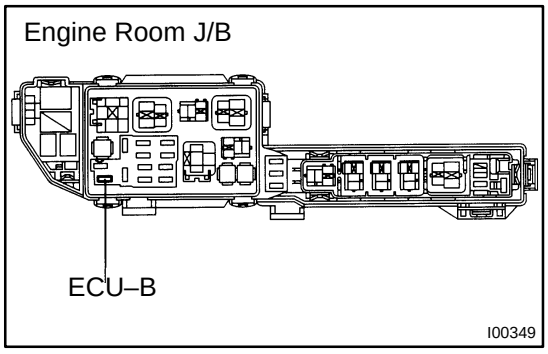
OK:

Voltage : 10 – 14 V

OK	**Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	**Check ECU–B fuse.**



PREPARATION:

Remove ECU–B fuse from Engine Room J/B.

CHECK:

Check continuity of ECU–B fuse.

OK:

There is continuity.

NG	**Check for short in all the harness and components connected to the ECU–B fuse (See page DI–749).**

OK

Check and repair harness and connector between A/C control assembly and battery.

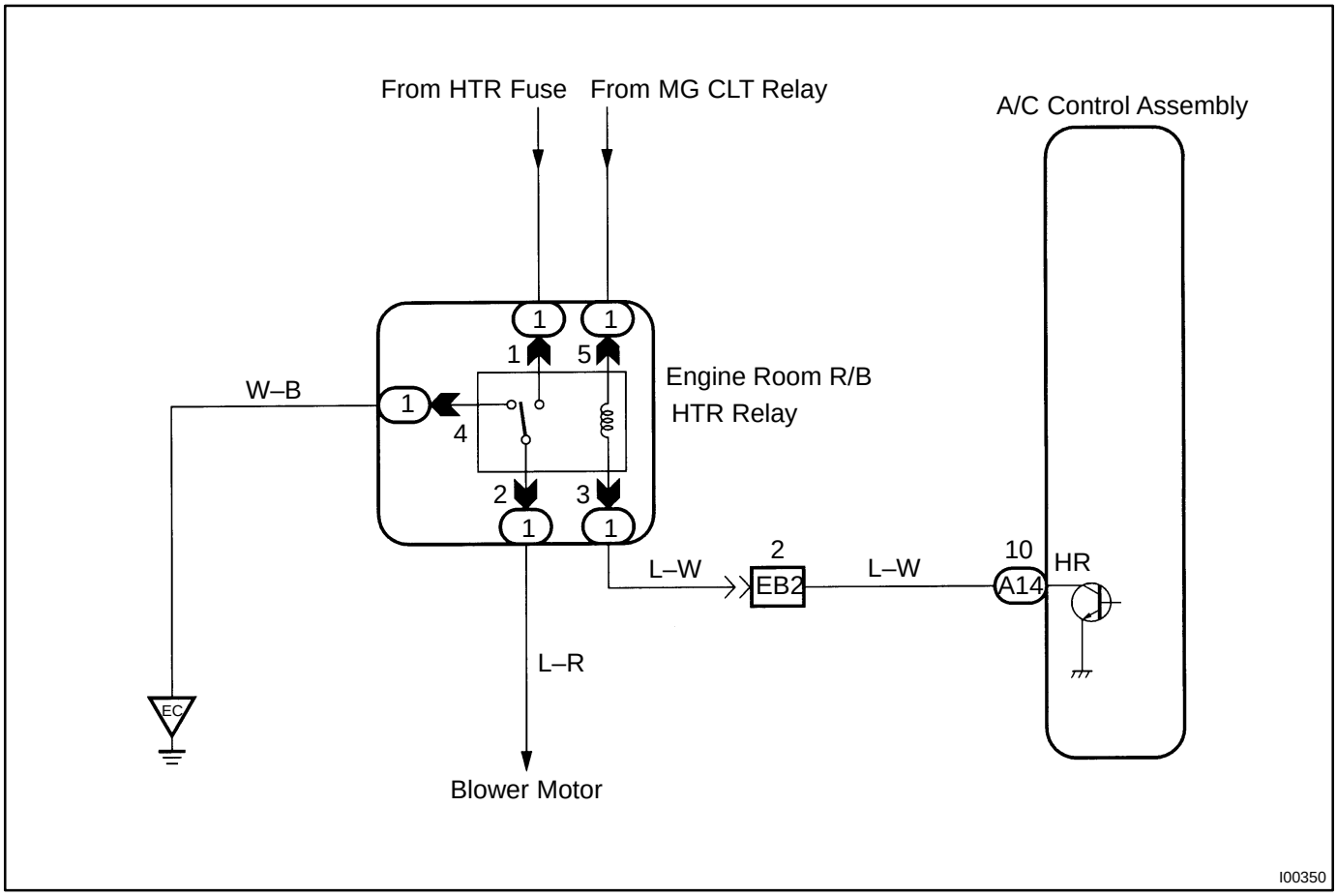
DI1CI–03

Heater Main Relay Circuit

CIRCUIT DESCRIPTION

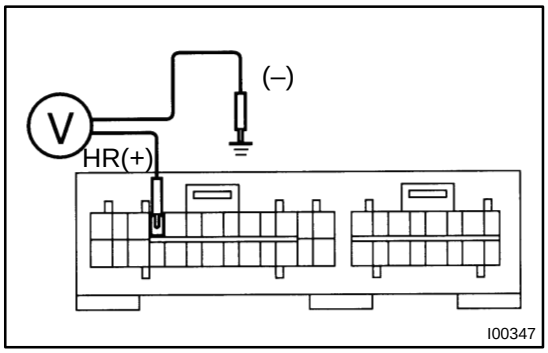
The heater main relay is switched on by signals from the A/C control assembly. It supplies power to the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal HR of A/C control assembly connector and body ground.



PREPARATION:

(a) Remove front ash receptacle (See page BO–79).

(b) Remove A/C control assembly with connectors still connected (See page BO–79).

CHECK:

Measure voltage between terminal HR of A/C control assembly and body ground when ignition switch is ON and OFF.

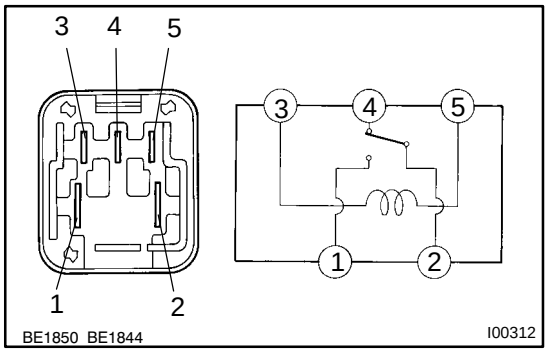
OK:

Ignition Switch	Voltage	
OFF	0 V	
ON	Blower ON	0 V
	Blower OFF	10 – 14 V

OK → **Proceed to next circuit inspection shown on matrix chart (See page DI–711).**

NG

2	Check heater main relay.



PREPARATION:

Remove heater main relay from.

CHECK:

Check continuity between each pair of terminals of heater main relay shown below.

OK:

Tester connection	Specified condition
1 – 4	No continuity
2 – 4	Continuity
3 – 5	62.5 – 90.9 Ω

PREPARATION:

Apply battery positive voltage between terminals 3 and 5.

CHECK:

Check continuity between each pair of terminal shown below.

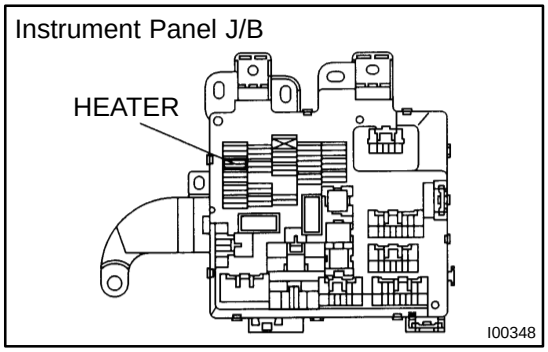
OK:

Tester connection	Specified condition
1 – 2	Continuity
2 – 4	No continuity

NG → **Replace hater main relay.**

OK

3	**Check HEATER fuse.**



PREPARATION:
Remove HEATER fuse from Instrument Panel J/B.
CHECK:
Check continuity of HEATER fuse.
OK:
Continuity exists.

NG → **Check for short in all the harness and components connected to the HEATER fuse (See page DI–751).**

OK

Check and repair harness and connector between A/C control assembly and battery.

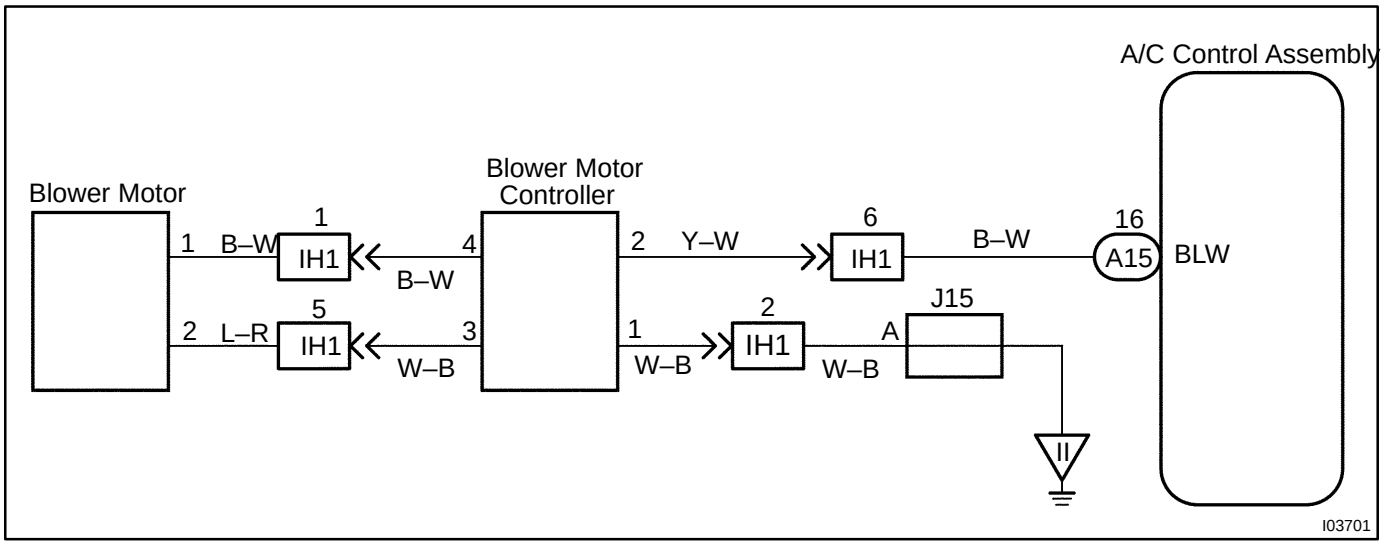
DI1CJ–03

Blower Motor Circuit

CIRCUIT DESCRIPTION

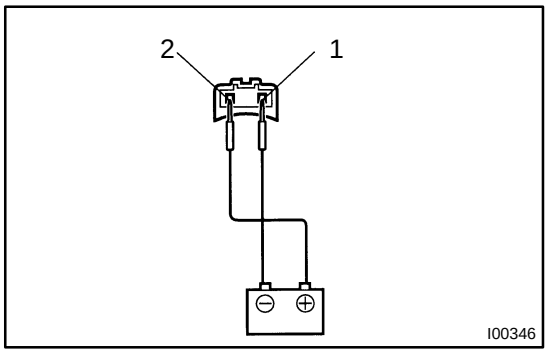
This is the power source for the blower motor.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check blower motor.**



PREPARATION:

Remove blower motor (See page AC–62).

CHECK:

Connect positive (+) lead connected to terminal 2 of blower motor connector, negative (–) lead to terminal 1.

OK:

Blower motor operates smoothly.

NG → **Replace blower motor.**

OK

2	**Check harness and connector between battery and blower motor, blower motor and body ground (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

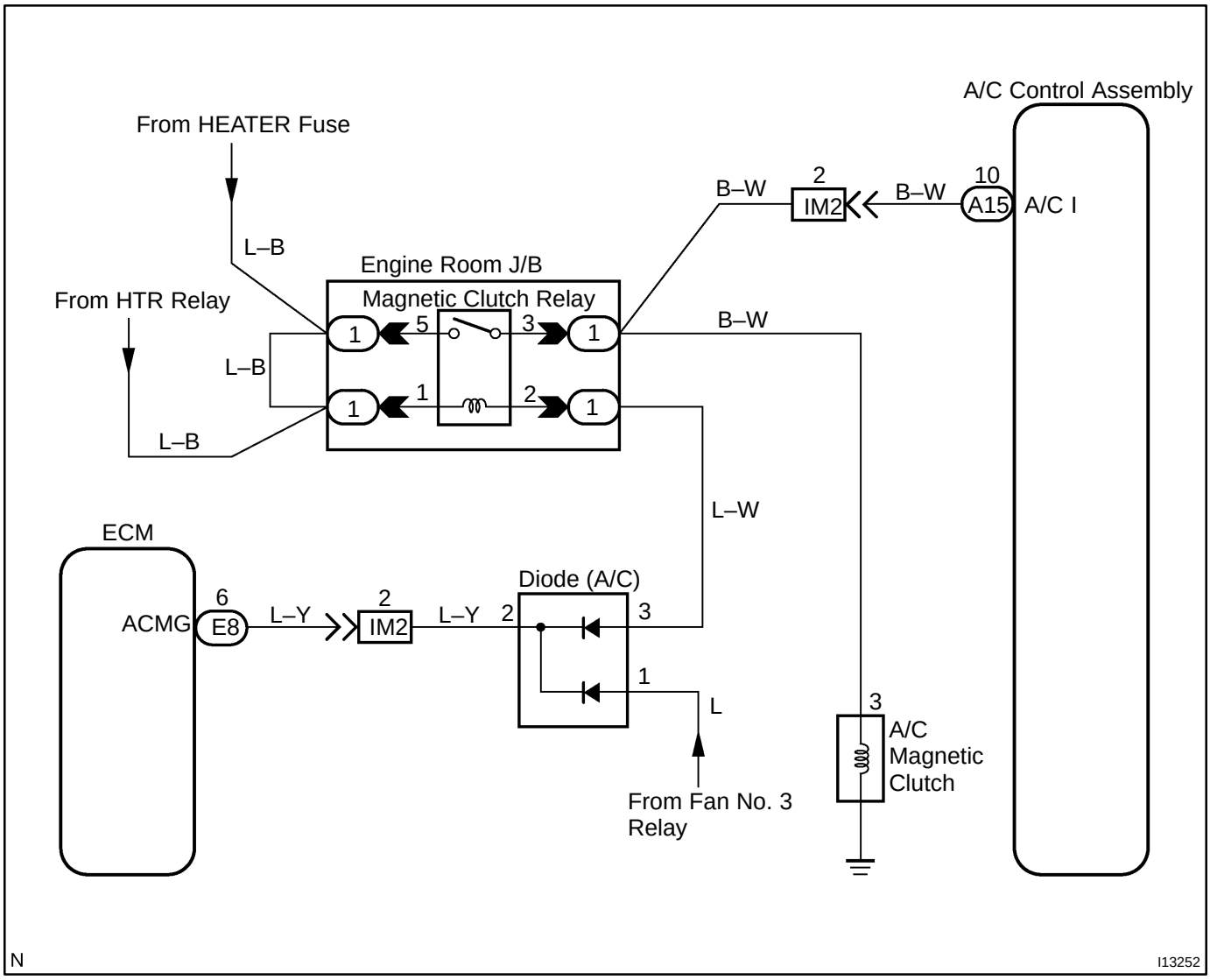
Proceed to next circuit inspection shown on matrix chart (See page DI–711).

Compressor Circuit

CIRCUIT DESCRIPTION

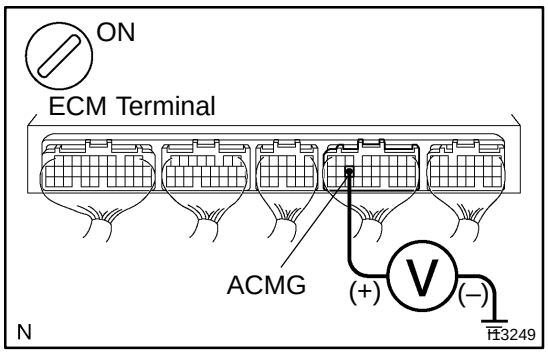
The A/C control assembly outputs the magnetic clutch ON signal from terminal AC1 to the ECM. When the ECM receives this signal, it sends a signal from terminal MGC and switches the A/C magnetic clutch relay ON, thus turning on the A/C magnetic clutch.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	Check voltage between terminal ACMG of ECM



CHECK:

(a) Start engine.
(b) Push AUTO SW.
(c) Measure voltage between terminal ACMG of ECM connector and body ground when A/C switch is On and OFF.

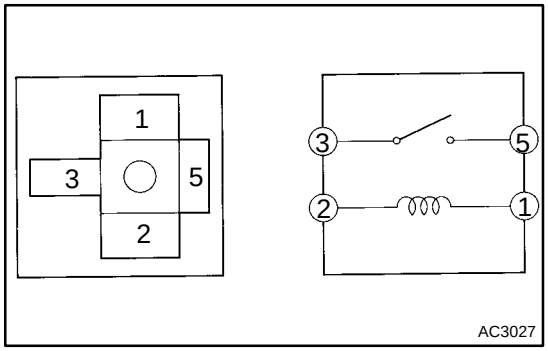
OK:

A/C switch	Voltage
ON	10 – 14 V
OFF	0 V

NG → **Go to step 5.**

OK

2	Check magnetic clutch relay.



PREPARATION:

Remove magnetic clutch relay from R/B No.5.

CHECK:

Check continuity between each pair of terminals shown below of magnetic clutch relay.

OK:

Tester connection	Specified condition
1 – 2	62.5 – 90.9 Ω
3 – 5	No continuity

PREPARATION:

Apply battery positive (+) voltage between terminals 1 and 2.

CHECK:

Check continuity between terminals 3 and 5.

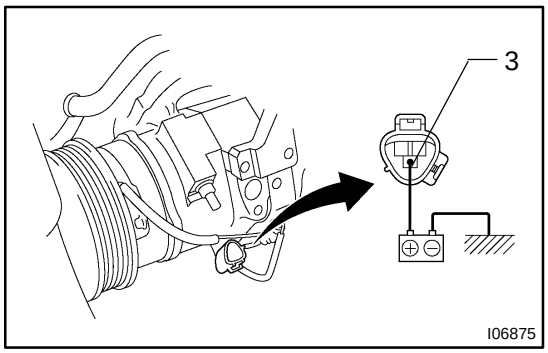
OK:

There is continuity.

NG → **Replace magnetic clutch relay.**

OK

3	Check A/C magnetic clutch.



PREPARATION:
Disconnect magnetic clutch connector.
CHECK:
Connect positive (+) lead connected to battery to magnetic clutch connector terminal 3.
OK:
Magnetic clutch is energized.

NG → **Repair A/C magnetic clutch.**

OK

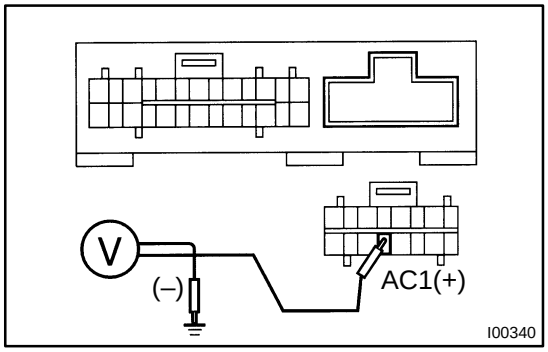
4	Check harness and connector between magnetic clutch relay and ECM, A/C compressor and body ground (See page IN–31).

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711).

5	Check voltage between terminal AC1 of A/C control assembly connector side and body ground.

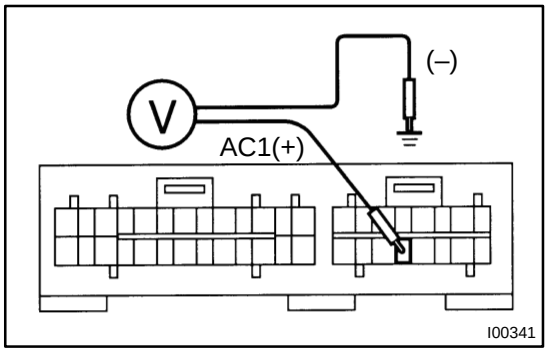


PREPARATION:
(a) Disconnect A/C control connector.
(b) Ignition switch to ON.
CHECK:
Check voltage between terminal AC1 of A/C control assembly harness side connector.
OK:
Voltage : 10 – 14 V

NG → **Check and replace ECM.**

OK

6	Check voltage between terminal AC1 of A/C control assembly connector and body ground.



PREPARATION:

(a) Remove A/C control assembly with connector still connected (See page BO–79).

(b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal AC1 of A/C control assembly connector and body ground when magnetic clutch is ON and OFF by A/C switch.

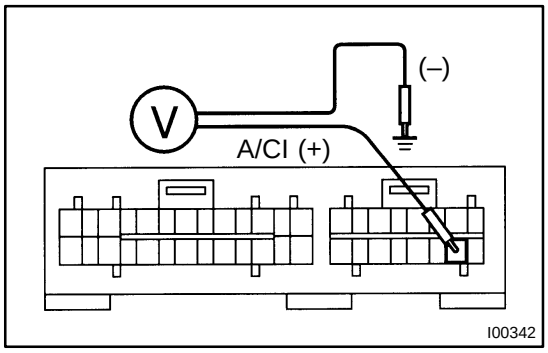
OK:

Magnetic clutch	Voltage
ON	Below 1 V
OFF	10 – 14 V

NG → **Check and replace A/C control assembly.**

OK

7	Check voltage between terminal A/CI of A/C control assembly and body ground.



PREPARATION:

(a) Remove A/C control assembly with connectors still connected (See page BO–79).

(b) Start the engine and push AUTO switch.

CHECK:

Check the voltage between terminal A/CI of A/C control assembly and body ground.

OK:

Magnetic clutch	Voltage
ON	10 – 14 V
OFF	Below 1.5 V

NG → **Check and replace A/C magnetic clutch.**

OK

8	Check voltage between terminal A/CI of A/C control assembly connector and body ground (See page DI–20).

NG → Check and replace A/C control assembly.

OK

9	Check harness and connector between A/C control assembly and ECM (See page IN–31).

NG → Repair or replace harness or connector.

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711).

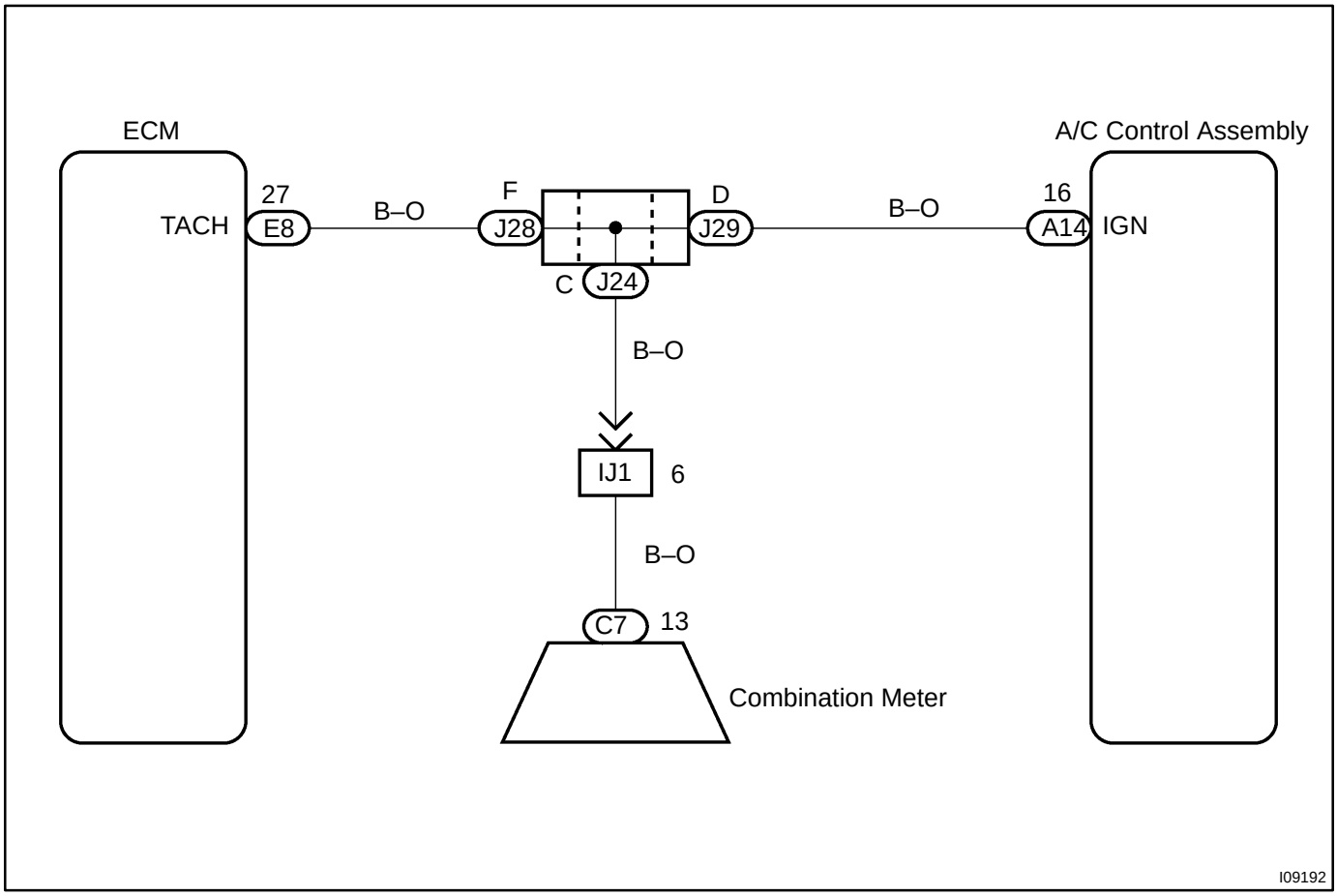
DI1CK–03

Igniter Circuit

CIRCUIT DESCRIPTION

This A/C control assembly monitors the engine speed through signals sent from the igniter. The A/C control assembly uses these signals and compressor speed signals to detect the compressor lock condition.

WIRING DIAGRAM



INSPECTION PROCEDURE

1	**Check operation of tachometer.**

CHECK:

Check that the tachometer operates normally.

NG → **Proceed to combination meter troubleshooting (See page BE–65).**

OK

2	**Check harness and connector between A/C control assembly and igniter (See page IN–31).**

NG → **Repair or replace harness or connector.**

OK

Proceed to next circuit inspection shown on matrix chart (See page DI–711).

EMISSION CONTROL SYSTEM

EC01H–02

PURPOSE

The emission control systems are installed to reduce the amount of CO, HC and NOx exhausted from the engine ((3) (4) and (5)), 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.

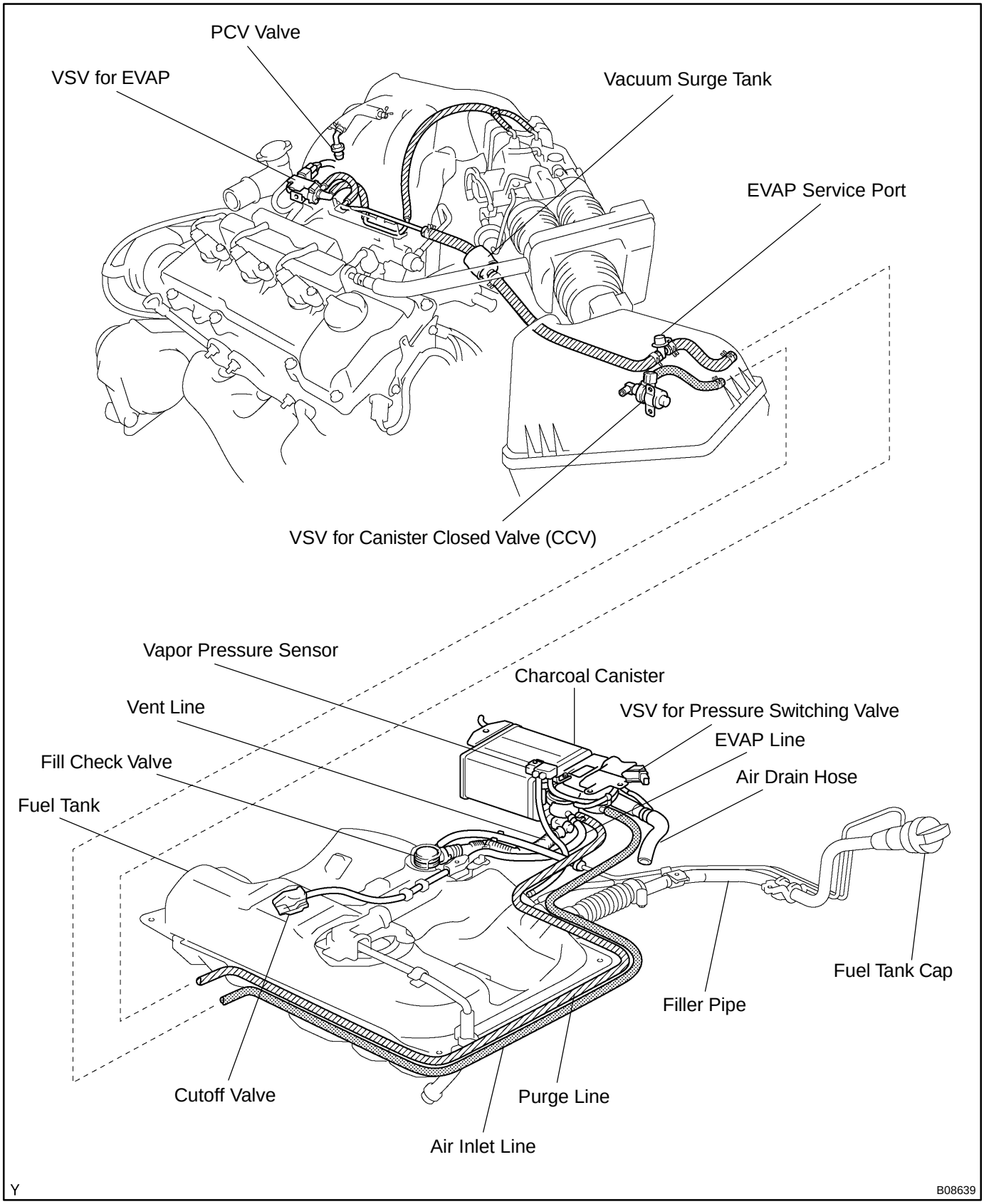
System	Abbreviation	Function
(1) Positive Crankcase Ventilation	PCV	Reduces HC
(2) Evaporative Emission Control	EVAP	Reduces evaporated HC
(3) Warm UP Three–Way Catalytic Converter	WU–TWC	Reduces HC, CO and NOx
(4) Three–Way Catalytic Converter	TWC	Reduces HC, CO and NOx
(5) Sequential Multiport Fuel 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 of this manual.

PARTS LAYOUT AND SCHEMATIC DRAWING

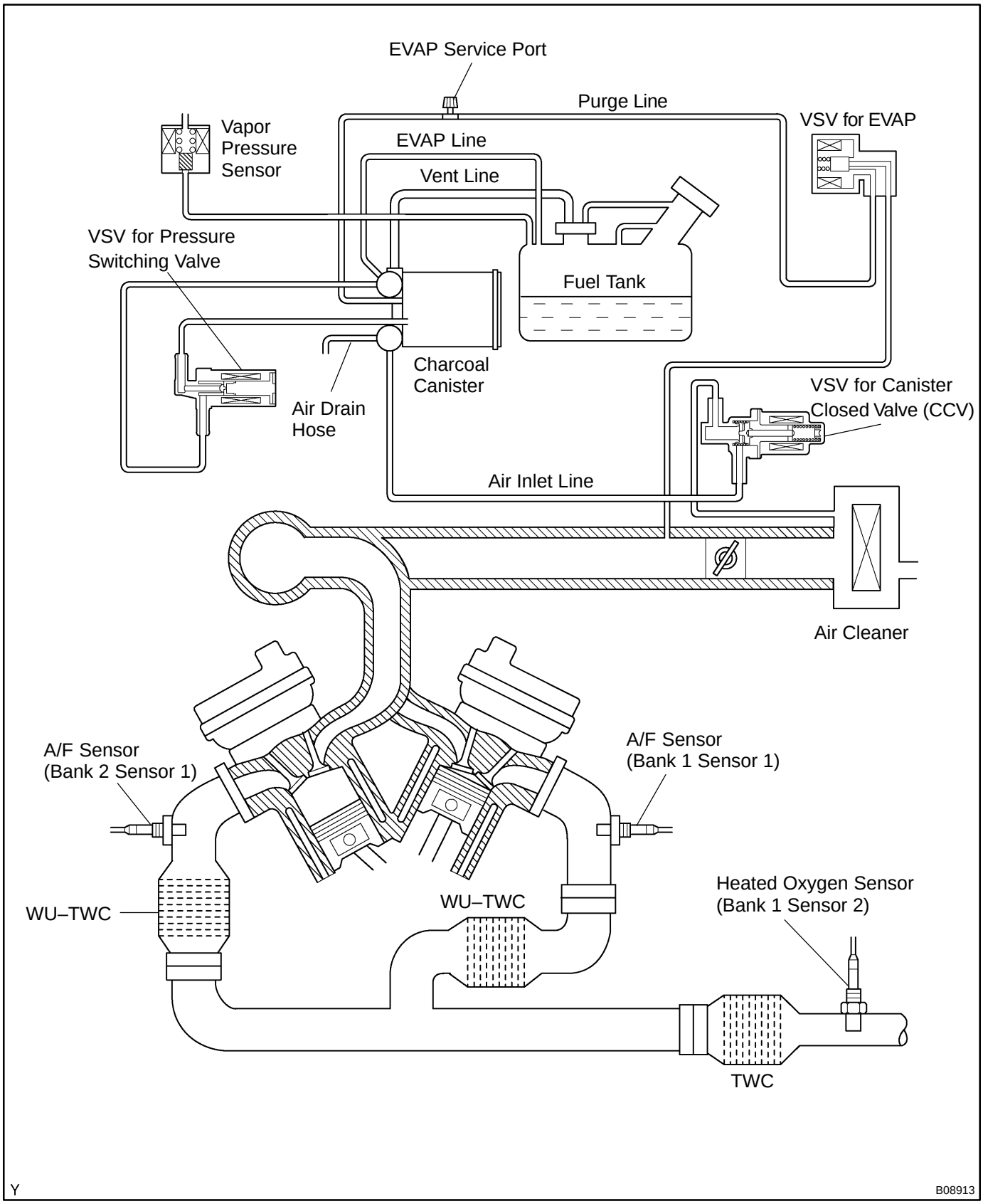
EC01I–03

LOCATION



EC01J–03

DRAWING



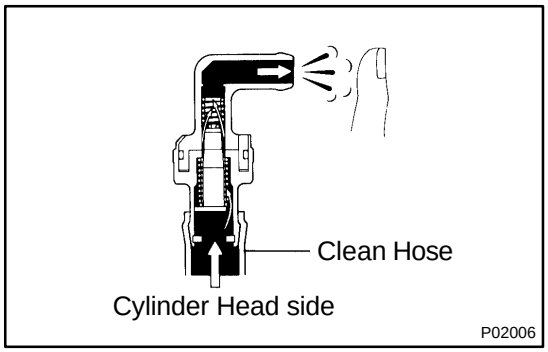
POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

EC0BE–01

INSPECTION

1. INSPECT PCV VALVE

(a) Remove the PCV valve.

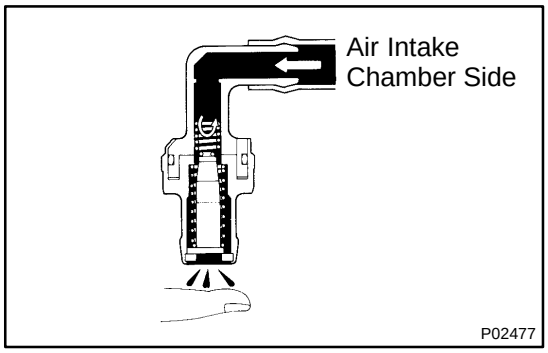


(b) Install clean hose to the PCV valve.

(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.

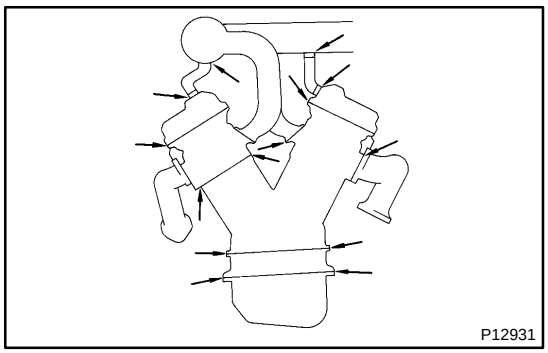


(2) Blow air into the air intake chamber side, and check that air passes through with difficulty.

If operation is not as specified, replace the PCV valve.

(d) Remove clean hose from the PCV valve.

(e) Reinstall the PCV valve.



2. INSPECT HOSES, CONNECTIONS AND GASKETS

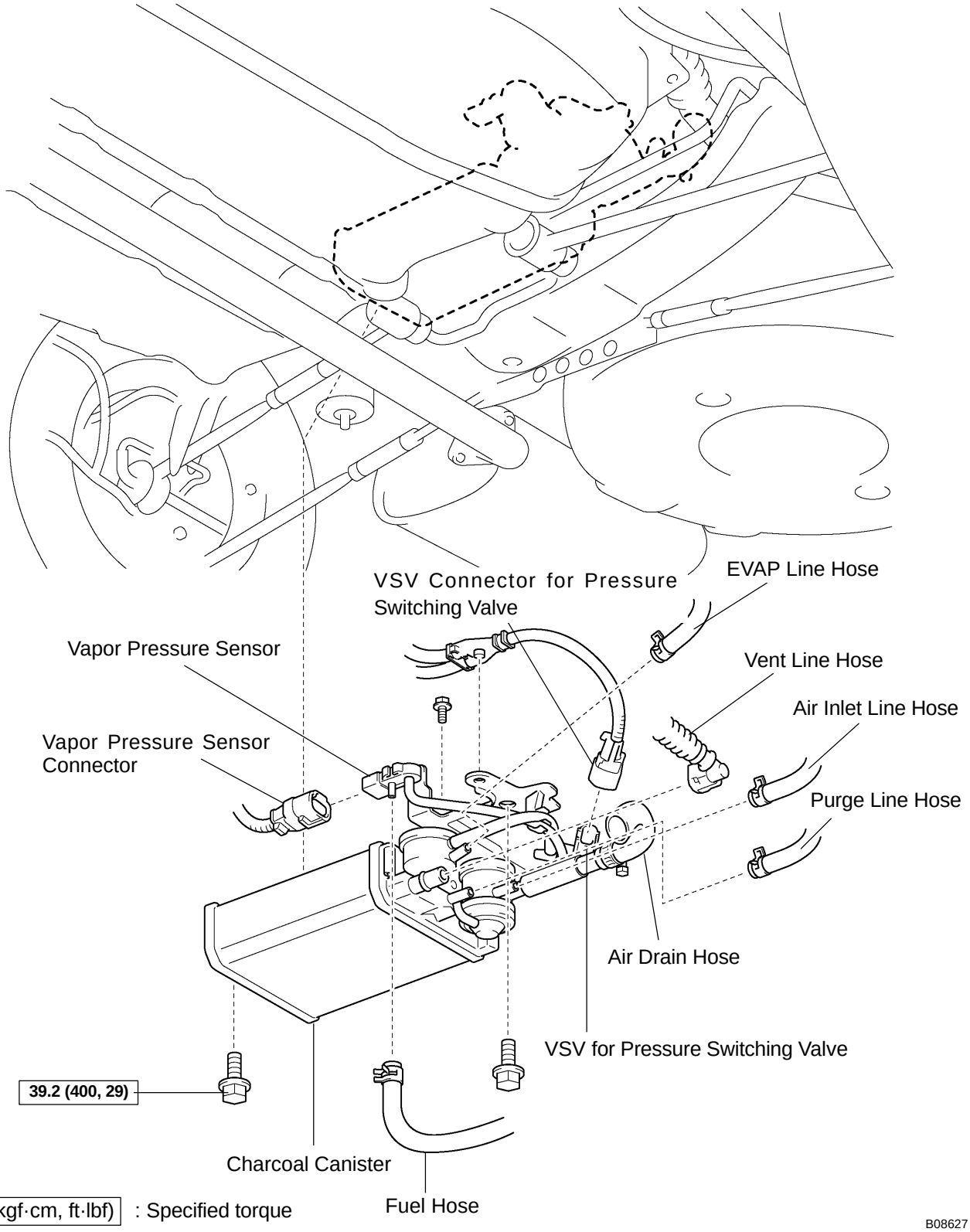
Visually check for cracks, leaks or damage.

EVAPORATIVE EMISSION (EVAP) CONTROL SYSTEM

EC0BF–02

COMPONENTS

Charcoal Canister



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

B08627

EC0BG–02

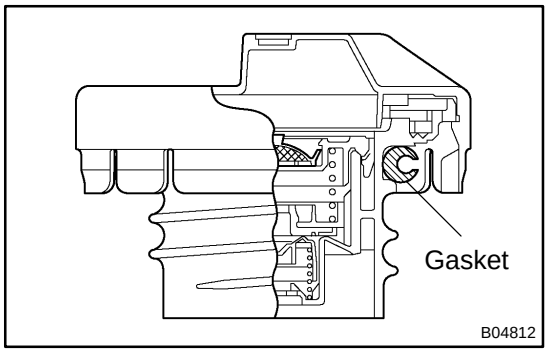
INSPECTION

1. INSPECT LINES AND CONNECTORS

Visually check for loose connections, sharp bends or damage.

2. INSPECT FUEL TANK FILLER PIPE

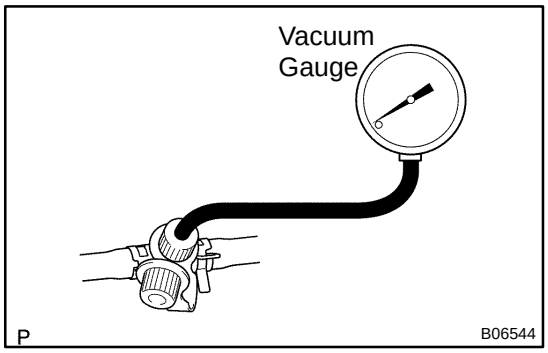
Visually check for deformation, cracks or fuel leakage.



3. INSPECT FUEL TANK CAP

Visually check if the cap and/or gasket are deformed or damaged.

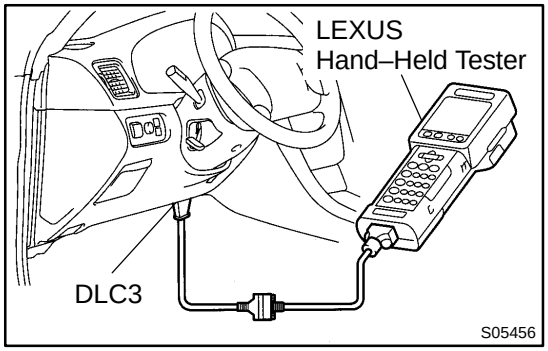
If necessary, repair or replace the cap.



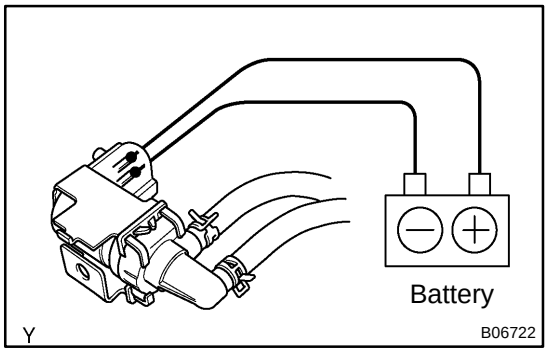
4. INSPECT EVAP SYSTEM LINE

(a) Warm up the engine and stop the engine.
Allow the engine to warm up to normal operating temperature.

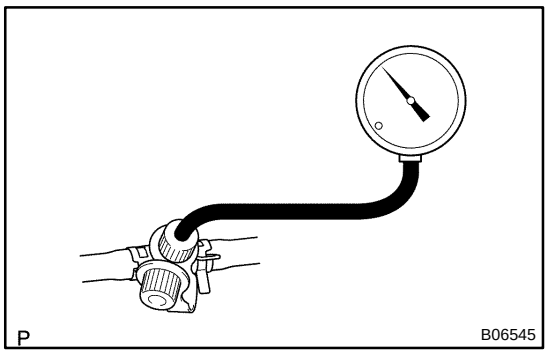
(b) Install a vacuum gauge (EVAP control system test equipment vacuum gauge) to the EVAP service port on the purge line.



(c) LEXUS Hand–Held Tester:
Forced driving of the VSV for the EVAP.
(1) Connect a LEXUS hand–held tester to the DLC3.
(2) Start the engine.
(3) Push the LEXUS hand–held tester main switch ON.
(4) Use the ACTIVE TEST mode on the LEXUS hand–held tester to operate the VSV for the EVAP.



(d) If you have no LEXUS 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

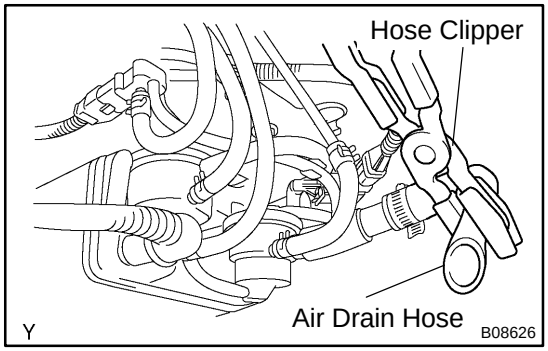
HINT:
If the vacuum does not change, you can conclude that the hose connecting the VSV to the service port has come loose or is blocked, or the VSV is malfunctioning.

(f) LEXUS Hand–Held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the LEXUS hand–held tester from the DLC3.

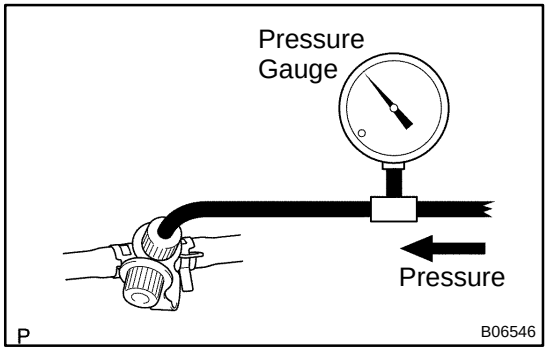
(g) If you have no LEXUS Hand–Held Tester:
Conclude forced driving of the VSV for the EVAP.
(1) Stop the engine.
(2) Disconnect the positive (+) and negative (–) leads from the battery from the VSV terminals for the EVAP.
(3) Connect the VSV connector for the EVAP.

(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.

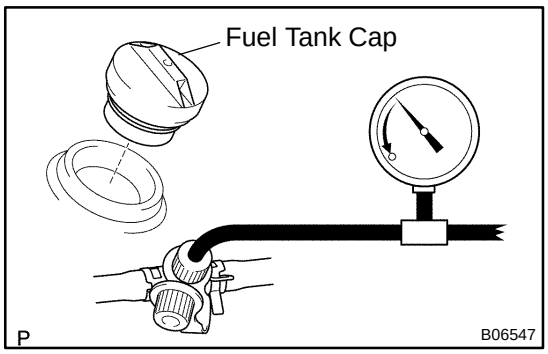


(j) Check the pressure.
(1) Close off the air drain hose at the marked position of the canister with a hose clipper or similar instrument.



(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.

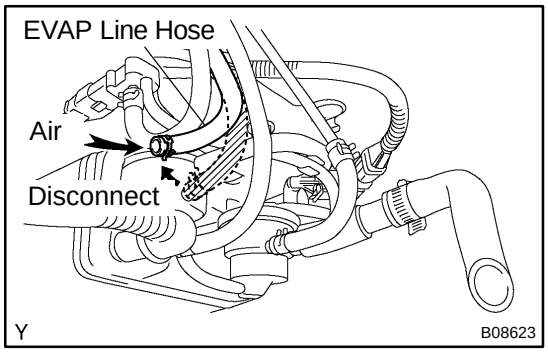


(3) Check if the pressure decreases when the fuel tank cap is removed while adding pressure.

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).

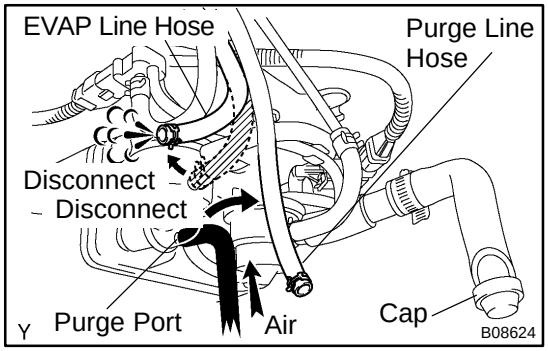
(b) Check that the internal pressure of the fuel tank can be hold for 1 minute.

(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.

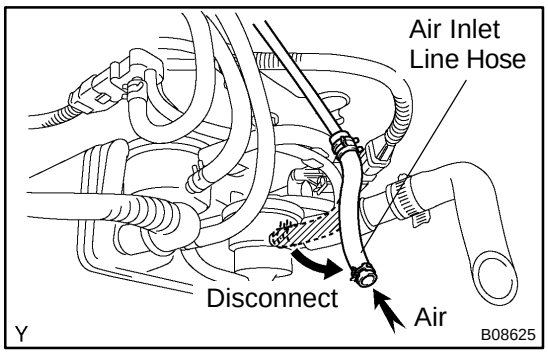
HINT:

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.

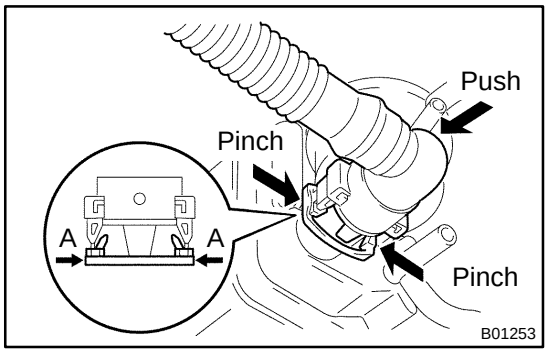
8. REMOVE CHARCOAL CANISTER ASSEMBLY

(a) Disconnect the VSV connector for pressure switching valve.

(b) Disconnect the vapor pressure sensor connector.

(c) Disconnect the fuel hose from the vapor pressure sensor.

(d) Disconnect the purge line hose, EVAP line hose and air inlet line hose from the charcoal canister.

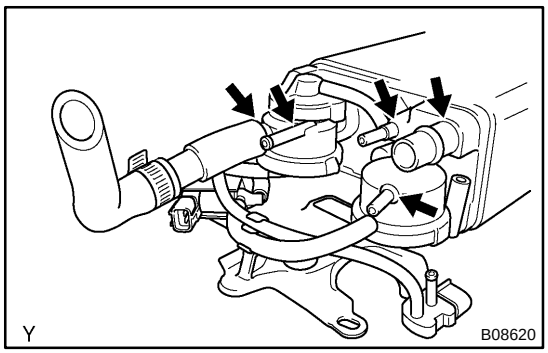


(e) Disconnect the vent line hose from the charcoal canister.
   (1) Push the connector deep inside.
   (2) Pinch portion A.
   (3) Pull out the connector.

(f) Remove the 2 charcoal canister mounting bolts.

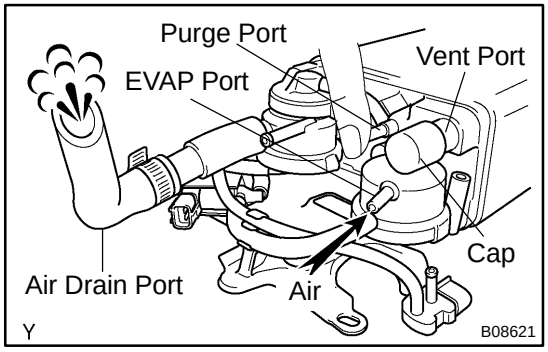
(g) Remove the vapor pressure sensor mounting bolt.

(h) Remove the charcoal canister assembly.

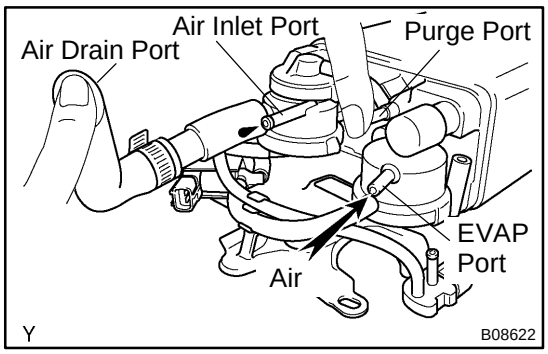


9. INSPECT CHARCOAL CANISTER

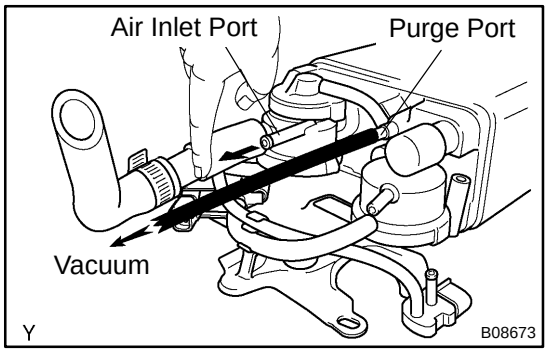
(a) Visually check the charcoal canister for cracks or damage.



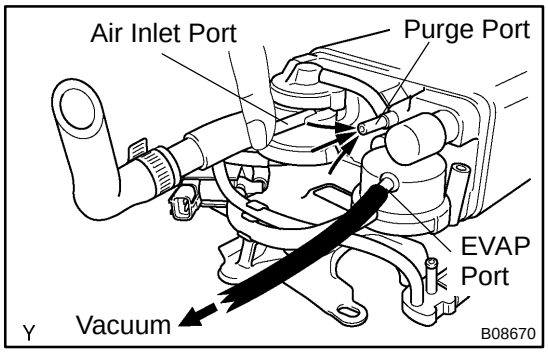
(b) Inspect the charcoal canister operation.
   (1) Plug the vent port with a cap.
   (2) While holding the purge port closed, blow air (1.76 kPa, 18 gf/cm^2, 0.26 psi) into the EVAP port and check that air flows from the air drain port.



(3) 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.



(4) 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.



(5) 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.

(6) Remove the cap from the vent port.

10. INSPECT VSV FOR EVAP (See page SF–62)

11. INSPECT VSV FOR CANISTER CLOSED VALVE (CCV) (See page SF–67)

12. INSPECT VSV FOR PRESSURE SWITCHING VALVE (See page SF–69)

13. INSPECT VAPOR PRESSURE SENSOR (See page SF–72)

14. REINSTALL CHARCOAL CANISTER ASSEMBLY

WARM UP THREE–WAY CATALYTIC CONVERTER (WU–TWC) SYSTEM

EC0BH–01

ON–VEHICLE INSPECTION

1. INSPECT EXHAUST PIPE ASSEMBLY

(a) Check the connections for looseness or damage.

(b) Check the clamps for weakness, cracks or damage.

2. INSPECT WU–TWC

Check for dents or damage.

If any part of the protector is damaged or dented to the extent that it contacts the WU–TWC, repair or replace it.

3. INSPECT WU–TWC HEAT INSULATOR

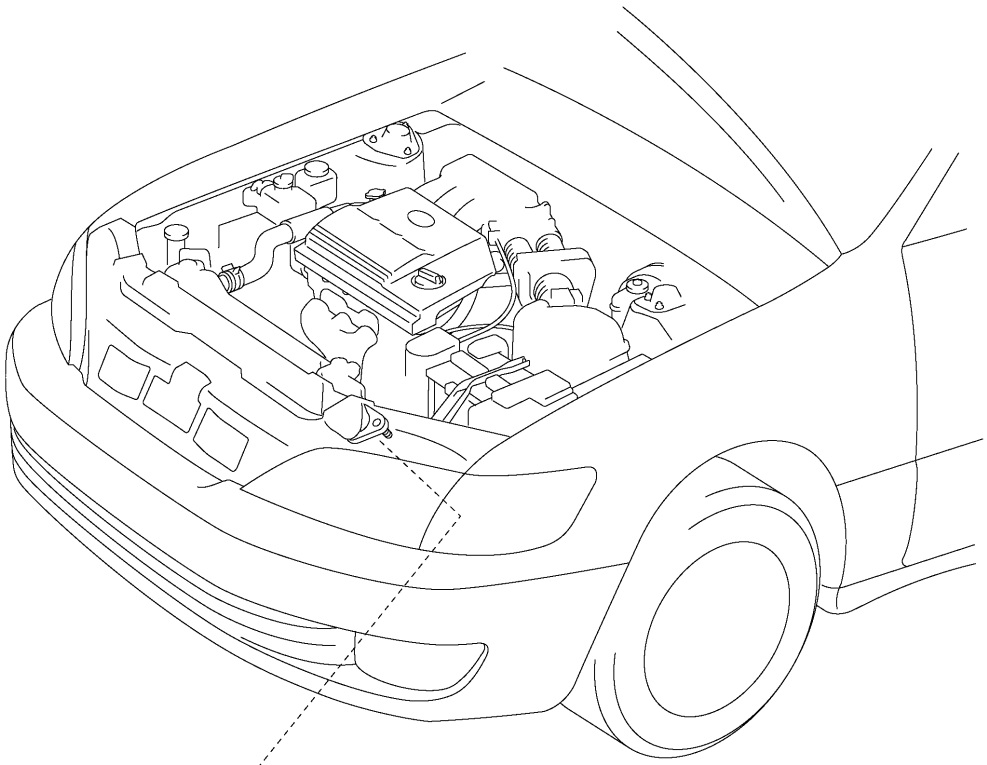
(a) Check the heat insulator for damage.

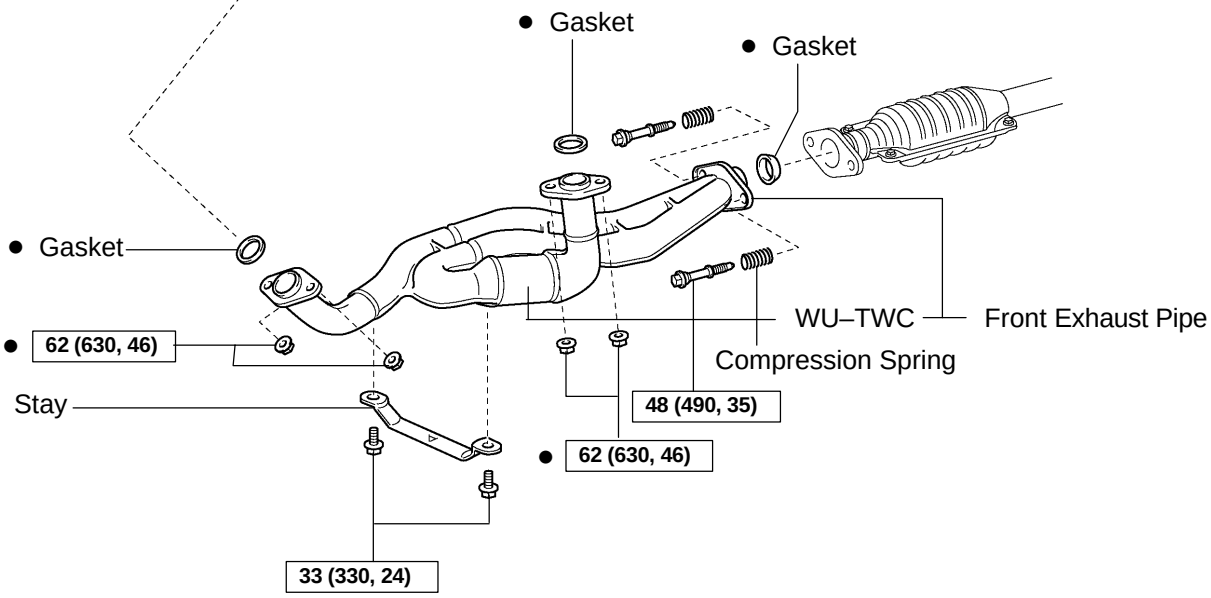
(b) Check for adequate clearance between the catalytic converter and heat insulator.

EC0BI–03

COMPONENTS

WU–TWC for Bank 1



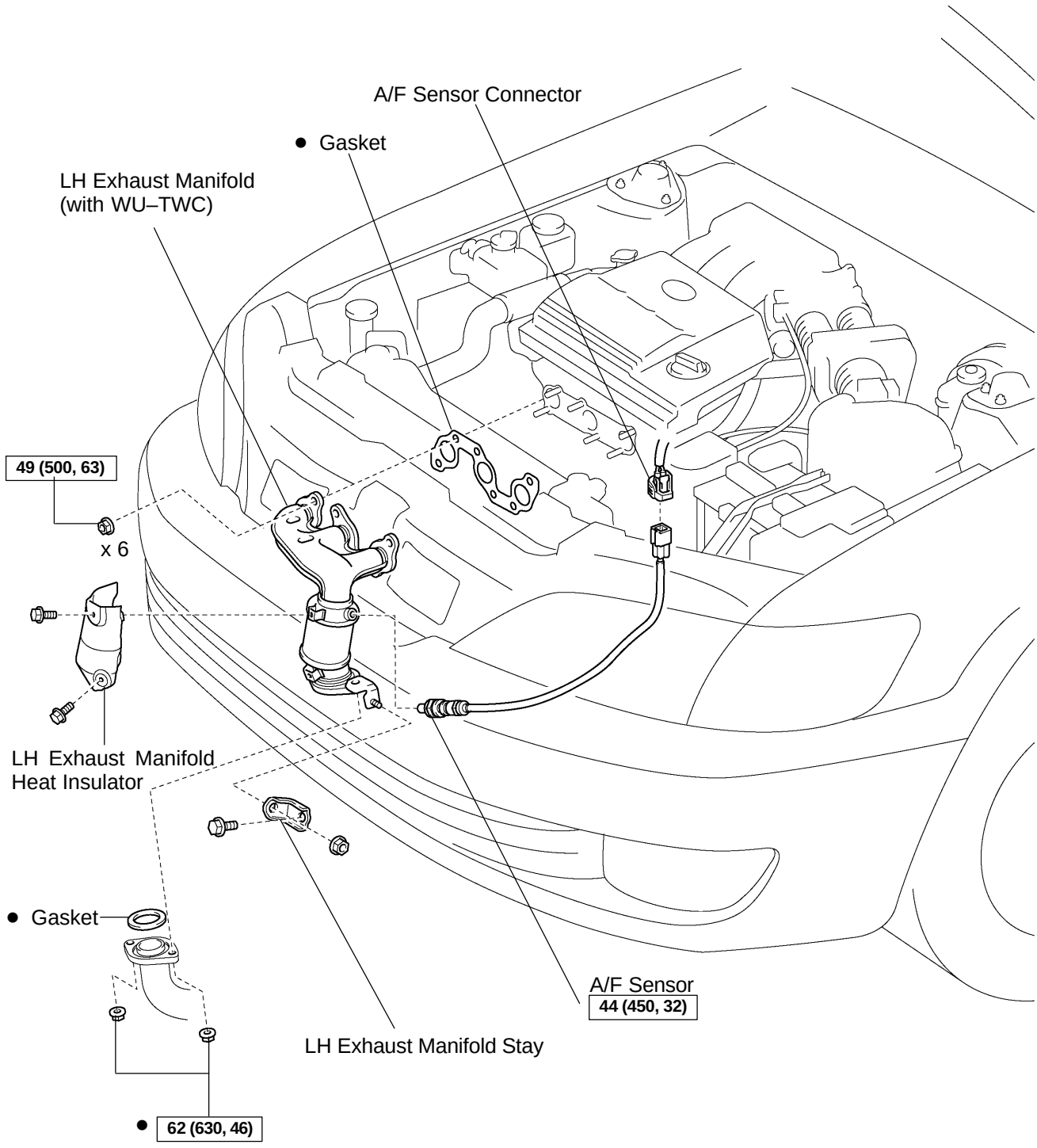


N·m (kgf·cm, ft·lbf) : Specified torque

● Non–reusable part

B06528

WU–TWC for Bank 2



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

● Non–reusable part

B06600

THREE–WAY CATALYTIC CONVERTER (TWC) SYSTEM

EC0BJ–01

ON–VEHICLE INSPECTION

1. INSPECT 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 the protector is damaged or dented to the extent that it contacts the TWC, repair or replace it.

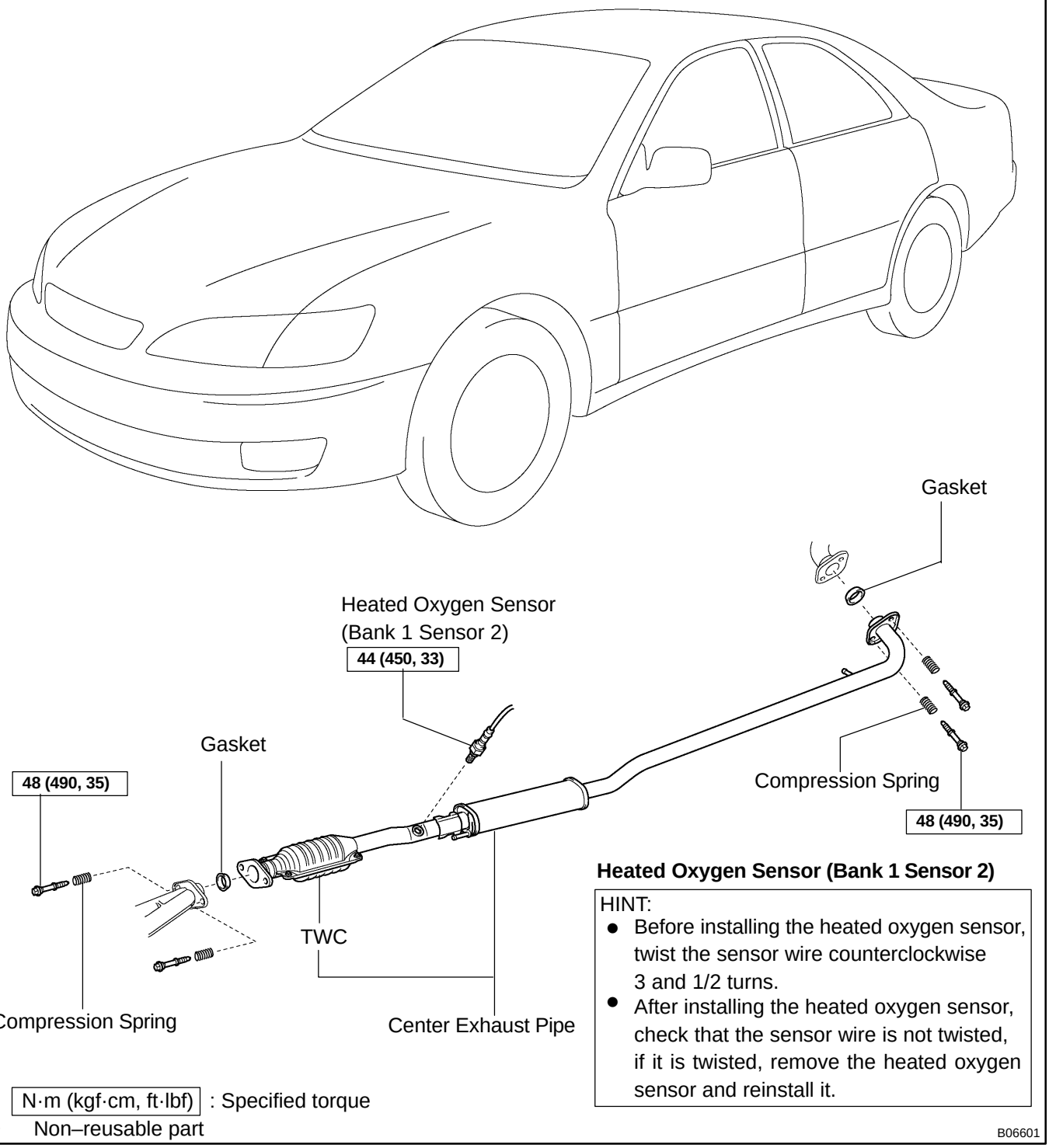
3. INSPECT TWC HEAT INSULATOR

(a) Check the heat insulator for damage.

(b) Check for adequate clearance between the catalytic converter and heat insulator.

EC0BK–03

COMPONENTS



Heated Oxygen Sensor (Bank 1 Sensor 2)

HINT:
- Before installing the heated oxygen sensor, twist the sensor wire counterclockwise 3 and 1/2 turns.
- After installing the heated oxygen sensor, check that the sensor wire is not twisted, if it is twisted, remove the heated oxygen sensor and reinstall it.

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

Y Non–reusable part

B06601

CO/HC

EM03T–02

INSPECTION

HINT:

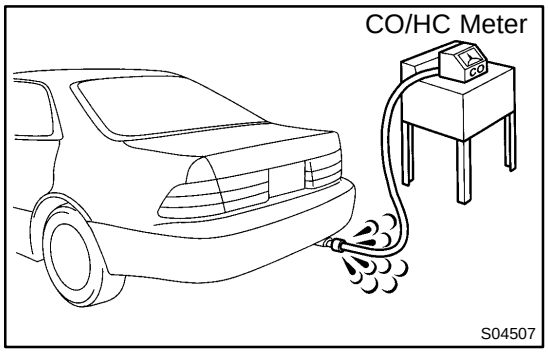
This check is used only to determine whether or not the idle CO/HC complies with regulations.

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) Ignition timing check correctly
(h) Transmission in neutral position
(i) Tachometer and CO/HC meter 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 doing the 2 mode (idle and 2,500 rpm) test, these measurement order prescribed by the applicable local regulations.

If the CO/HC concentration does not comply with regulations, troubleshoot 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 ●Air intake chamber ●Throttle body ●IAC valve ●Break booster line 2. Lean mixture causing misfire
High	High	Rough idle (Black smoke from exhaust)	1. Restricted air filter 2. Plugged PCV valve 3. Faulty SFI systems: ●Faulty pressure regulator ●Defective ECT sensor ●Faulty ECM ●Faulty injectors ●Faulty throttle position sensor ●Faulty MAF meter

COMPRESSION

EM03U–02

INSPECTION

HINT:

If there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

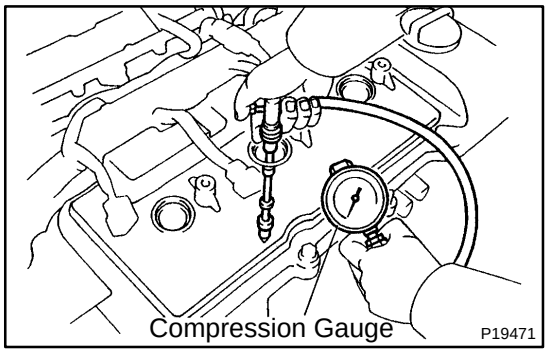
1. WARM UP AND STOP ENGINE

Allow the engine to warm up to normal operating temperature.

2. REMOVE IGNITION COILS (See page IG–5)

3. REMOVE SPARK PLUGS

Using a 16 mm plug wrench, remove the 6 spark plugs.



4. 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 engine speed of 250 rpm or more.

(d) Repeat steps (a) through (c) for each cylinder.

NOTICE:

This measurement must be done in as short a time as possible.

Compression pressure:
1,500 kPa (15.3 kgf/cm^2, 218 psi)
Minimum pressure: 1,000 kPa (10.2 kgf/cm^2, 145 psi)
Difference between each cylinder:
100 kPa (1.0 kgf/cm^2, 15 psi) or less

(e) If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.

- If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
- If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.

5. REINSTALL SPARK PLUGS

6. INSTALL IGNITION COILS (See page IG–5)

VALVE CLEARANCE

INSPECTION

EM03V–02

HINT:

Inspect and adjust the valve clearance when the engine is cold.

1. REMOVE RH FENDER APRON SEAL

2. DRAIN ENGINE COOLANT

3. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

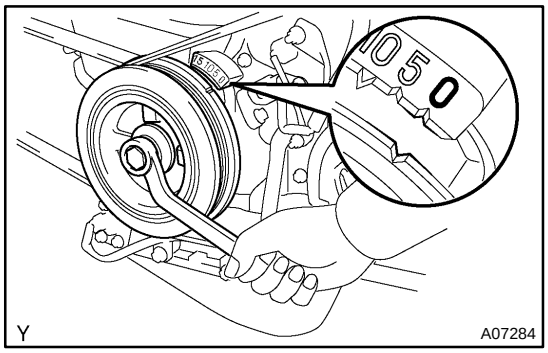
(c) Remove the V–bank cover.

4. REMOVE AIR INTAKE CHAMBER ASSEMBLY (See page EM–31)

5. REMOVE IGNITION COILS

6. DISCONNECT UPPER RADIATOR HOSE FROM WATER OUTLET

7. REMOVE CYLINDER HEAD COVERS (See page EM–31)

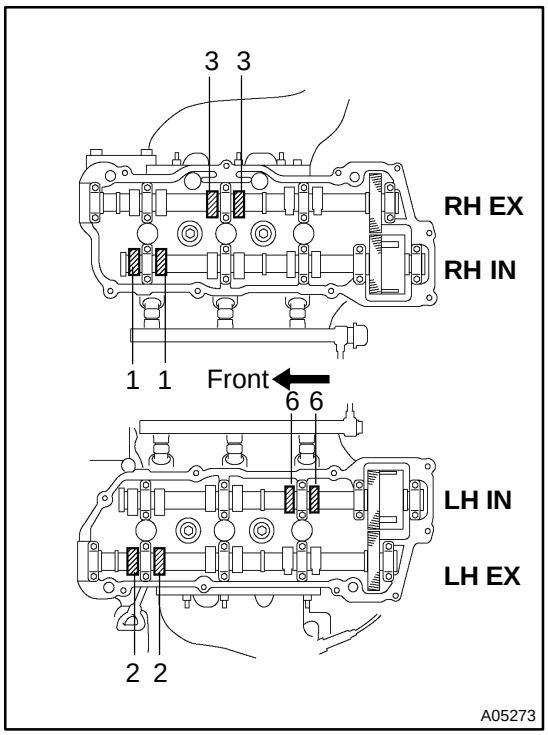


8. SET NO.1 CYLINDER TO TDC/COMPRESSION

(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 valve lifters on the No.1 (IN and EX) are loose.

If not, turn the crankshaft 1 revolution (360˚) and align the mark as above.



9. INSPECT VALVE CLEARANCE

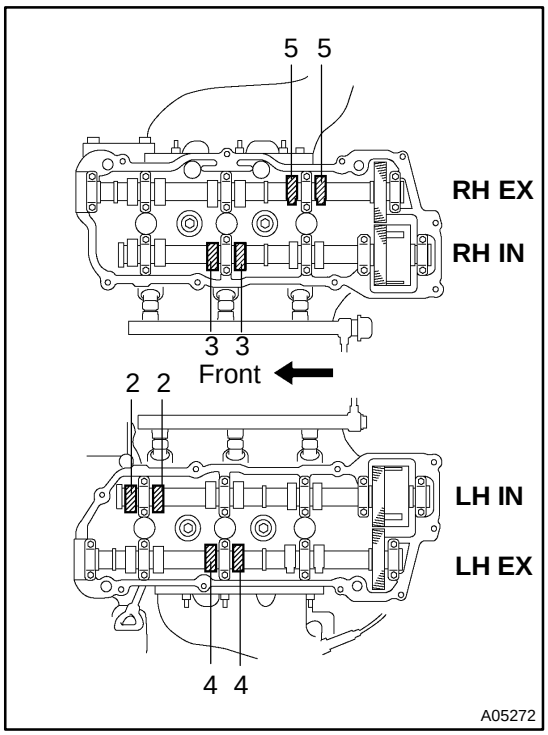
(a) Check only those valves indicated in the illustration.

(1) Using a feeler gauge, measure the clearance between the valve lifter and camshaft.

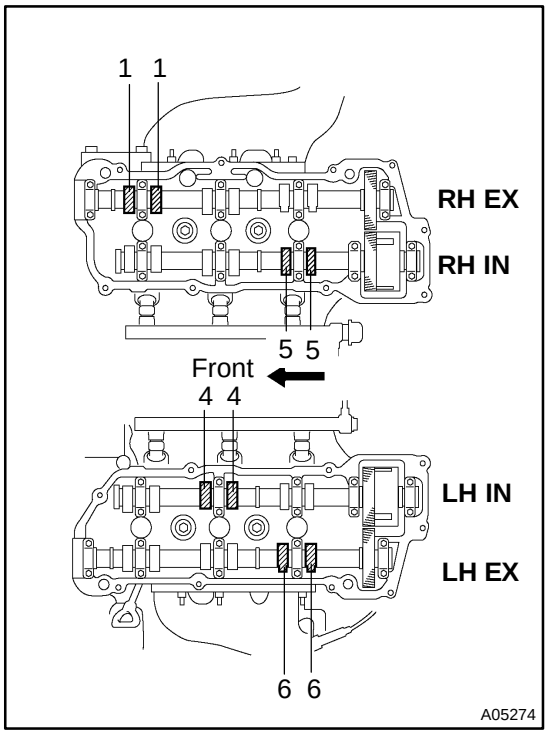
(2) Record out of specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold):

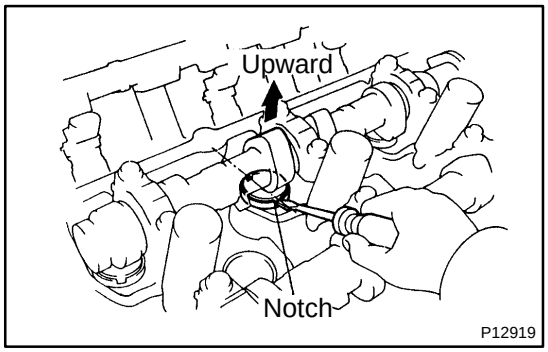
Intake	0.15 – 0.25 mm (0.006 – 0.010 in.)
Exhaust	0.25 – 0.35 mm (0.010 – 0.014 in.)



(b) Turn the crankshaft 2/3 of a revolution (240˚), and check only the valves indicated in the illustration. Measure the valve clearance (See step (a)).



(c) Turn the crankshaft a further 2/3 of a revolution (240˚), and check only the valves indicated in the illustration. Measure the valve clearance (See step (a)).

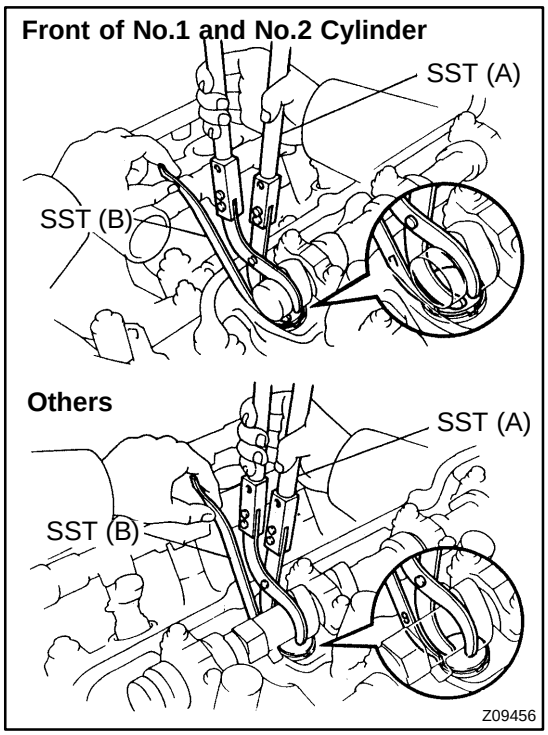


10. ADJUST VALVE CLEARANCE

(a) Remove the adjusting shim.

(1) Turn the camshaft so that the cam lobe for the valve to be adjusted faces up.

(2) Turn the valve lifter with a screwdriver so that the notches are perpendicular to the camshaft.

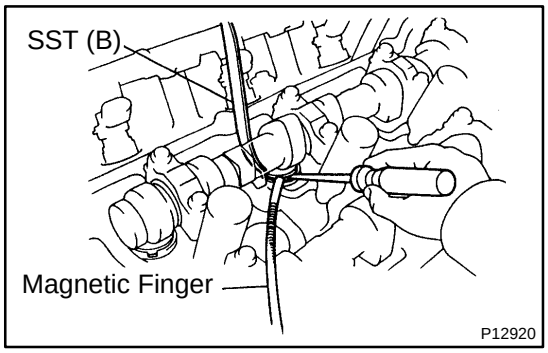


(3) Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

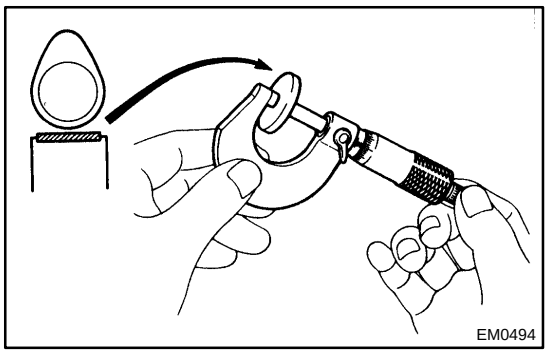
SST 09248–55040 (09248–05410, 09248–05420)

HINT:

- Apply SST (B) at a slight angle on the side marked with ”9” or ”7”, at the position shown in the illustration.
- When SST (B) is inserted too deeply, it will get pinched by the shim. To prevent it from being stuck, insert it gently from the intake side, at a slight angle.



- Using a small screwdriver and magnetic finger, remove the adjusting shim.



(b) Determine the replacement adjusting shim size according to these Formula or Charts:

(1) Using a micrometer, measure the thickness of the removed shim.

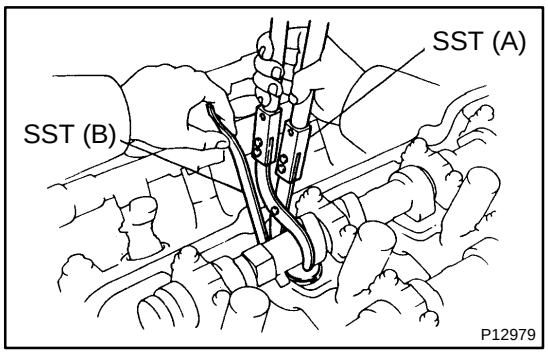
(2) Calculate the thickness of a new shim so the valve clearance comes within the specified value.

T ..... Thickness of used 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.))

(3) Select a new shim with a thickness as close as possible to the calculated values.

HINT:

Shims are available in 17 sizes in increments of 0.050 mm (0.0020 in.), from 2.500 mm (0.0984 in.) to 3.300 mm (0.1299 in.).



(c) Install a new adjusting shim.
(1) Place a new adjusting shim on the valve lifter, with imprinted numbers facing down.
(2) Press down the valve lifter with SST (A), and remove SST (B).

SST 09248–55040 (09248–05410, 09248–05420)

(d) Recheck the valve clearance.

11. REINSTALL CYLINDER HEAD COVERS (See page EM–59)

12. CONNECT UPPER RADIATOR HOSE TO WATER OUTLET

13. REINSTALL IGNITION COILS

14. REINSTALL AIR INTAKE CHAMBER ASSEMBLY (See page EM–59)

15. INSTALL V–BANK COVER

(a) Using a 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

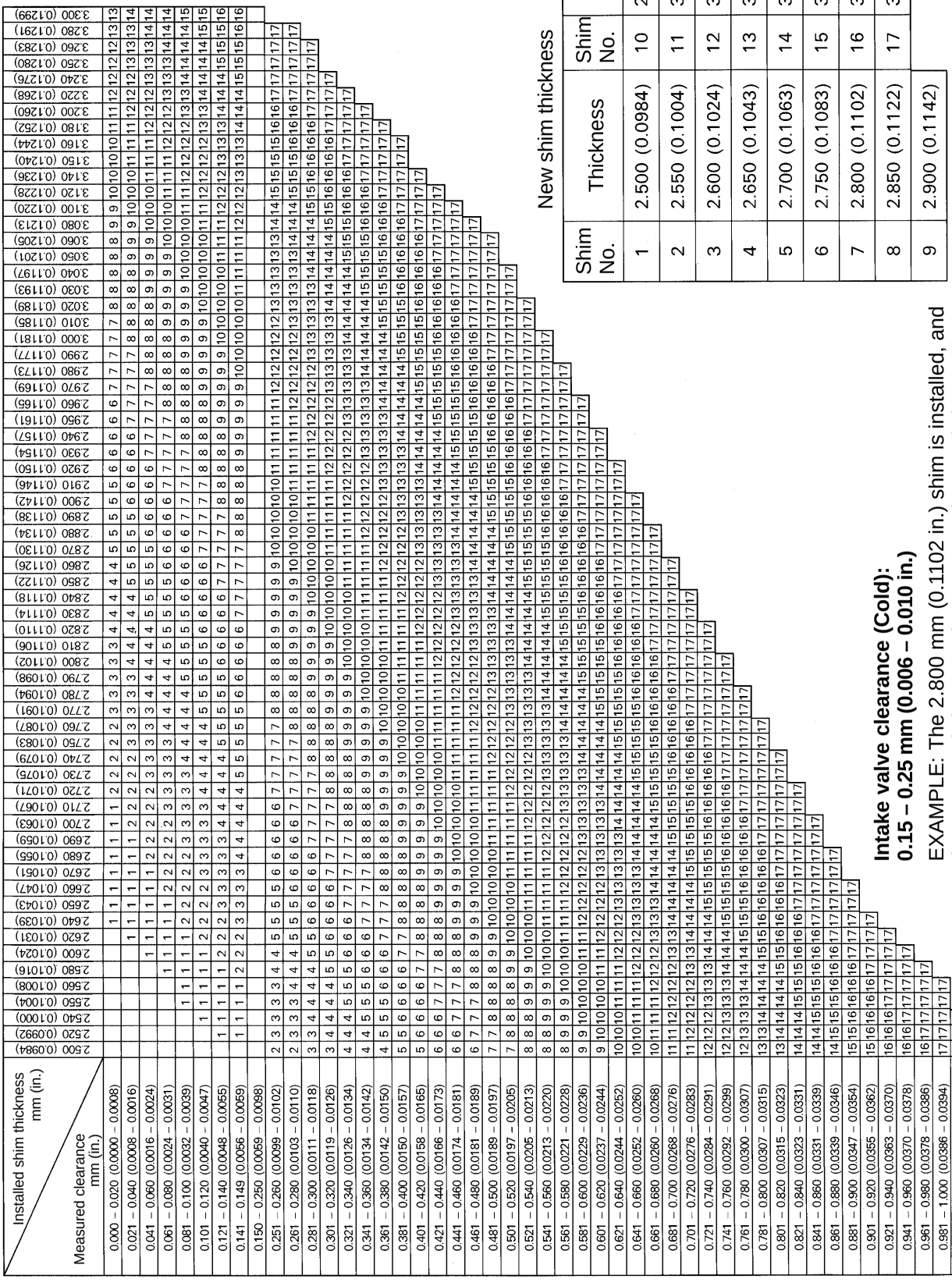
(b) Press down the V–bank cover fastener.

16. REFILL WITH ENGINE COOLANT

17. START ENGINE AND CHECK FOR LEAKS

18. REINSTALL RH FENDER APRON SEAL

Adjusting Shim Selection Chart (Intake)



Intake valve clearance (Cold):
0.15 – 0.25 mm (0.006 – 0.010 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.).
Replace the 2.800 mm (0.1102 in.) shim with a new No.12 shim.

New shim thickness mm (in.)

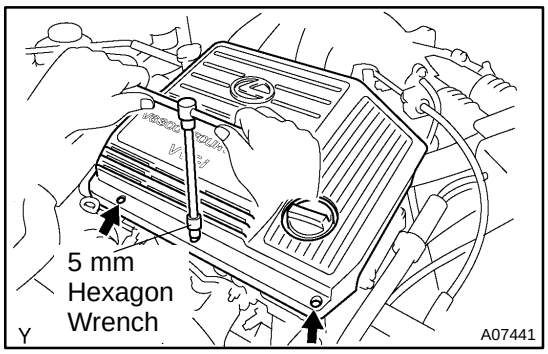
Shim No.	Thickness	Shim No.	Thickness
1	2.500 (0.0984)	10	2.950 (0.1161)
2	2.550 (0.1004)	11	3.000 (0.1181)
3	2.600 (0.1024)	12	3.050 (0.1201)
4	2.650 (0.1043)	13	3.100 (0.1220)
5	2.700 (0.1063)	14	3.150 (0.1240)
6	2.750 (0.1083)	15	3.200 (0.1260)
7	2.800 (0.1102)	16	3.250 (0.1280)
8	2.850 (0.1122)	17	3.300 (0.1299)
9	2.900 (0.1142)		

HINT: New shims have the thickness in millimeters imprinted on the face.

M00063

Adjusting Shim Selection Chart (Exhaust)

| Measured clearance mm (in.) \ Installed shim thickness mm (in.) | 2.500 (0.0984) | 2.520 (0.0992) | 2.540 (0.1000) | 2.550 (0.1004) | 2.560 (0.1008) | 2.580 (0.1016) | 2.600 (0.1024) | 2.620 (0.1031) | 2.640 (0.1039) | 2.650 (0.1043) | 2.660 (0.1047) | 2.670 (0.1051) | 2.680 (0.1055) | 2.690 (0.1059) | 2.700 (0.1063) | 2.710 (0.1067) | 2.720 (0.1071) | 2.730 (0.1075) | 2.740 (0.1079) | 2.750 (0.1083) | 2.760 (0.1087) | 2.770 (0.1091) | 2.780 (0.1094) | 2.790 (0.1098) | 2.800 (0.1102) | 2.810 (0.1106) | 2.820 (0.1110) | 2.830 (0.1114) | 2.840 (0.1118) | 2.850 (0.1122) | 2.860 (0.1126) | 2.870 (0.1130) | 2.880 (0.1134) | 2.890 (0.1138) | 2.900 (0.1142) | 2.910 (0.1146) | 2.920 (0.1150) | 2.930 (0.1154) | 2.940 (0.1157) | 2.950 (0.1161) | 2.960 (0.1165) | 2.970 (0.1169) | 2.980 (0.1173) | 2.990 (0.1177) | 3.000 (0.1181) | 3.010 (0.1185) | 3.020 (0.1189) | 3.030 (0.1193) | 3.040 (0.1197) | 3.050 (0.1201) | 3.060 (0.1205) | 3.070 (0.1213) | 3.080 (0.1213) | 3.100 (0.1220) | 3.120 (0.1228) | 3.140 (0.1236) | 3.150 (0.1240) | 3.160 (0.1244) | 3.180 (0.1252) | 3.200 (0.1260) | 3.220 (0.1268) | 3.240 (0.1276) | 3.250 (0.1280) | 3.260 (0.1283) | 3.280 (0.1291) | 3.300 (0.1299) |
|---|---|---



IGNITION TIMING

EM0ZB–01

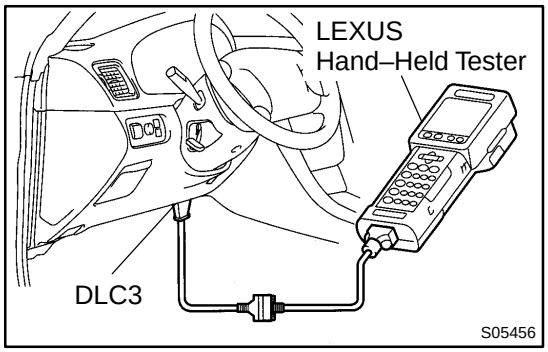
INSPECTION

1. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.
(b) Loosen the V–bank cover fastener counterclockwise.
(c) Remove the V–bank cover.

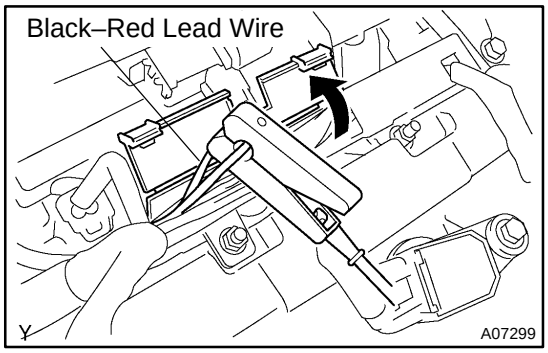
2. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



3. CONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL

(a) Connect the LEXUS hand–held tester or OBDII scan tool to the DLC3.
(b) Please refer to the LEXUS hand–held tester or OBDII scan tool operator's manual for further details.

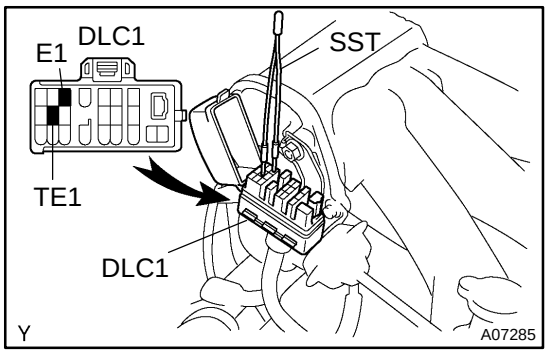


4. CONNECT TIMING LIGHT TO ENGINE

Connect the clip of a timing light to the black–red lead wire as shown.

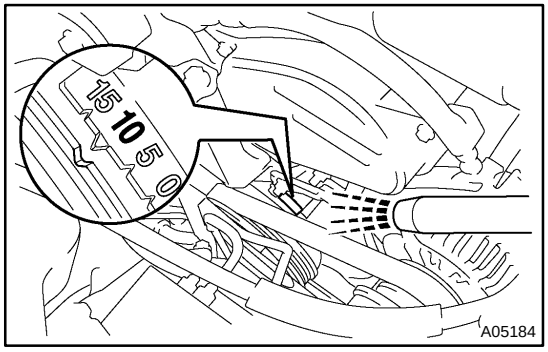
5. CHECK IDLE SPEED

(a) Race the engine speed at 2,500 rpm for approx. 90 seconds.
(b) Check the idle speed.
Idle speed: 700 ± 50 rpm



6. INSPECT IGNITION TIMING

(a) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020



(b) Using a timing light, check the ignition timing.
Ignition timing: 8 – 12˚ BTDC @ idle
(Transmission in neutral position)
(c) Remove the SST from the DLC1.
SST 09843–18020

7. FURTHER CHECK IGNITION TIMING
Ignition timing: 10 – 25° BTDC @ idle
(Transmission in neutral position)

HINT:

The timing mark moves in a range between 10° and 25°.

8. DISCONNECT TIMING LIGHT FROM ENGINE

9. DISCONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL

10. REINSTALL V–BANK COVER

(a) Using a 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

(b) Press down the V–bank cover fastener.

IDLE SPEED

EM03X–02

INSPECTION

1. INITIAL CONDITIONS

(a) Engine at normal operating temperature
(b) Air cleaner installed
(c) All pipes and hoses of air induction system connected
(d) All accessories switched OFF
(e) All vacuum lines properly connected
(f) SFI system wiring connectors fully plugged
(g) Ignition timing check correctly
(h) Transmission in neutral position

2. CONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL (See page EM–10)

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

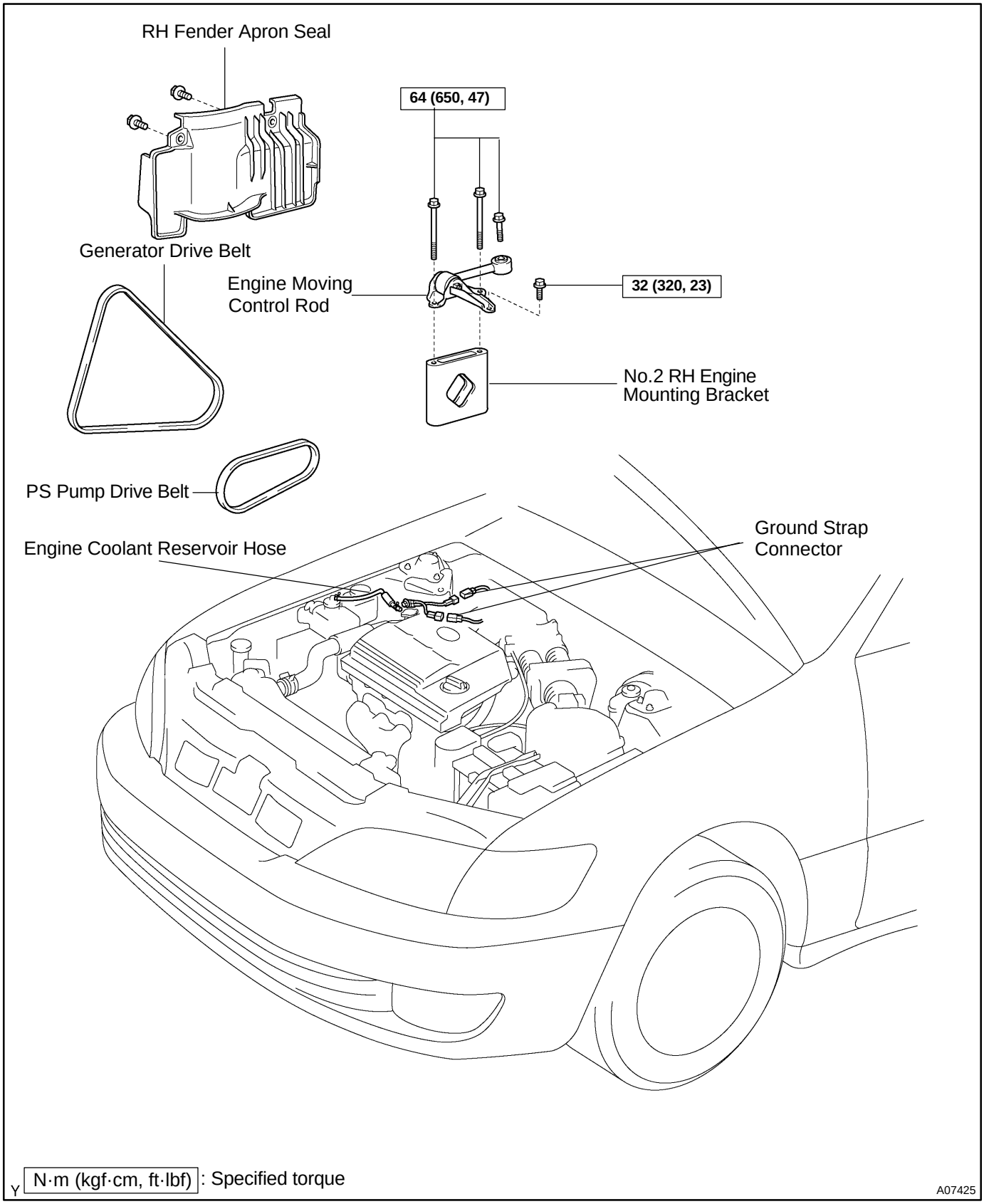
If the idle speed is not as specified, check the IAC valve and air intake system.

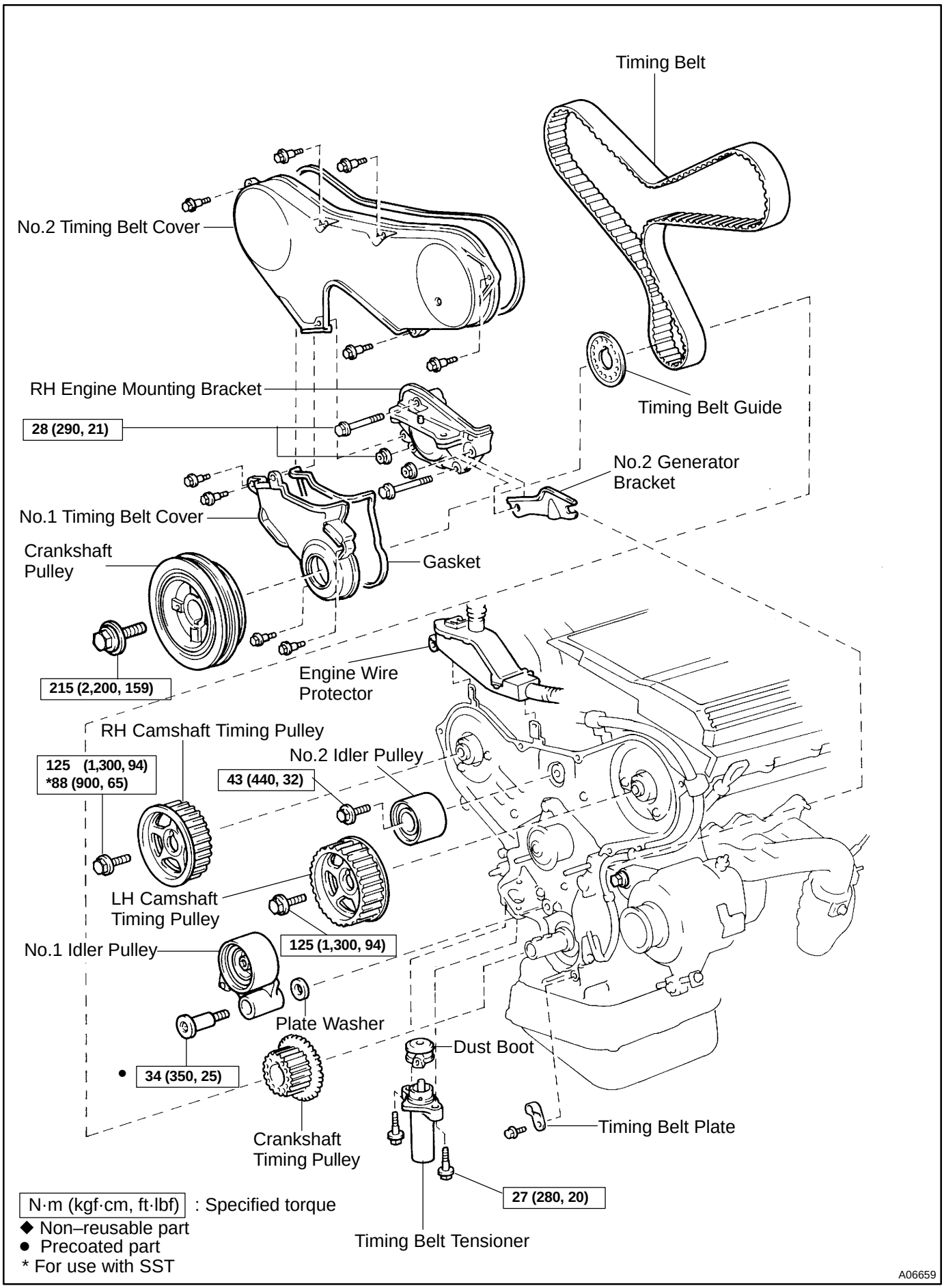
4. DISCONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL

TIMING BELT

EM03Y–02

COMPONENTS

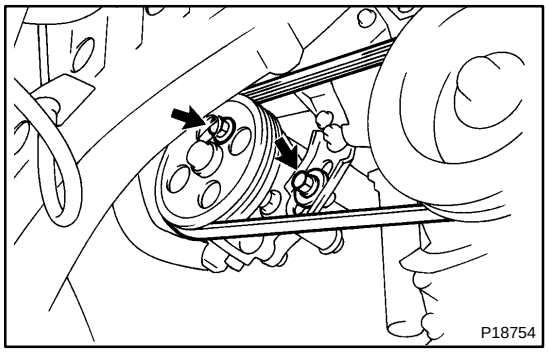



Timing Belt
No.2 Timing Belt Cover
RH Engine Mounting Bracket
28 (290, 21)
Timing Belt Guide
No.2 Generator Bracket
No.1 Timing Belt Cover
Crankshaft Pulley
Gasket
215 (2,200, 159)
Engine Wire Protector
RH Camshaft Timing Pulley
125 (1,300, 94)
*88 (900, 65)
No.2 Idler Pulley
43 (440, 32)
LH Camshaft Timing Pulley
125 (1,300, 94)
No.1 Idler Pulley
Plate Washer
Dust Boot
34 (350, 25)
Timing Belt Plate
Crankshaft Timing Pulley
27 (280, 20)
Timing Belt Tensioner
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
● Precoated part
* For use with SST
A06659

EM03Z–02

REMOVAL

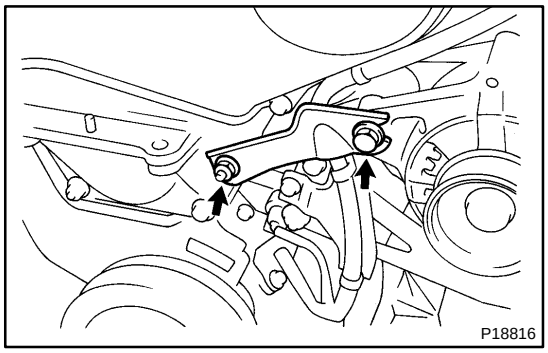
1. **REMOVE RH FRONT WHEEL**
2. **REMOVE RH FENDER APRON SEAL**
3. **REMOVE GENERATOR DRIVE BELT**
   (See page CH–6)



4. **REMOVE PS PUMP DRIVE BELT**

Loosen the 2 bolts, and remove the drive belt.

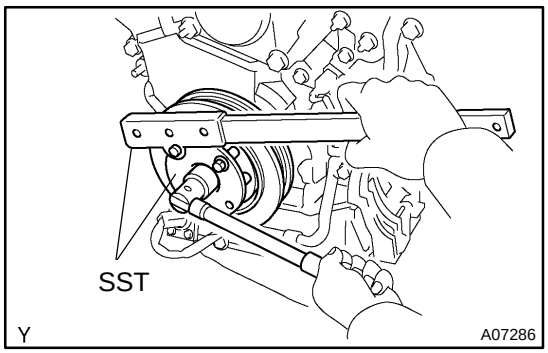
5. **DISCONNECT ENGINE COOLANT RESERVOIR HOSE FROM WATER OUTLET**
6. **DISCONNECT GROUND STRAP CONNECTORS**
7. **REMOVE ENGINE MOVING CONTROL ROD AND NO.2 RH ENGINE MOUNTING BRACKET**
   (See page EM–72)



8. **REMOVE NO.2 GENERATOR BRACKET**

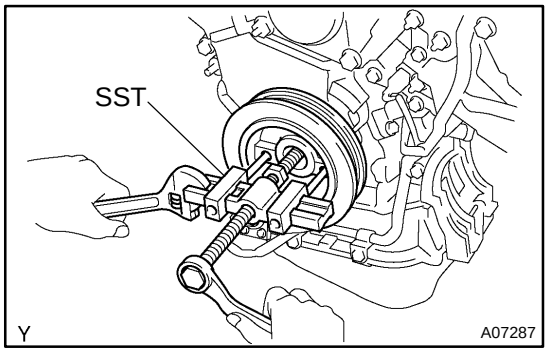
(a) Loosen the generator pivot bolt.

(b) Remove the nut and bracket.

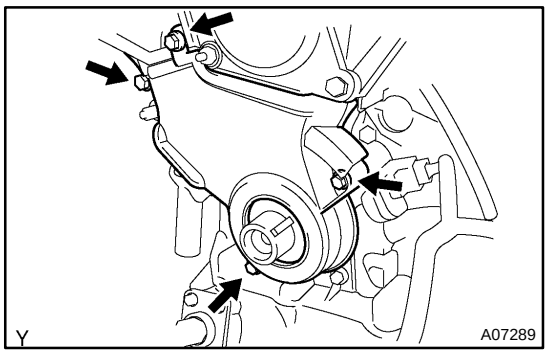


9. **REMOVE CRANKSHAFT PULLEY**

(a) Using SST, remove the pulley bolt.
SST 09213–54015 (91651–60855), 09330–00021



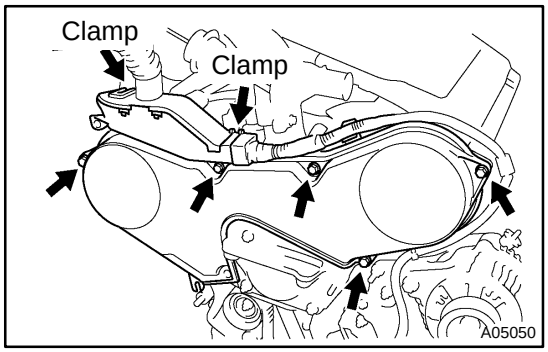
(b) Using SST, remove the pulley.
SST 09950–50012 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05020)



10. REMOVE NO.1 TIMING BELT COVER

Remove the 4 bolts and timing belt cover.

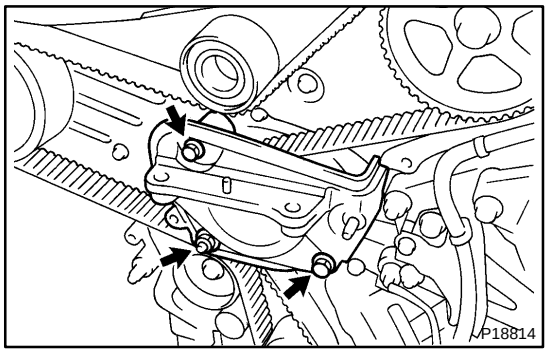
11. REMOVE TIMING BELT GUIDE



12. REMOVE NO.2 TIMING BELT COVER

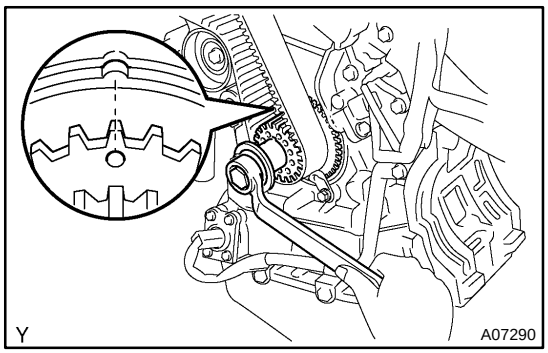
(a) Disconnect the engine wire protector clamps from the No.3 timing belt cover.

(b) Remove the 5 bolts and timing belt cover.



13. REMOVE RH ENGINE MOUNTING BRACKET

Remove the 2 bolts, nut and mounting bracket.



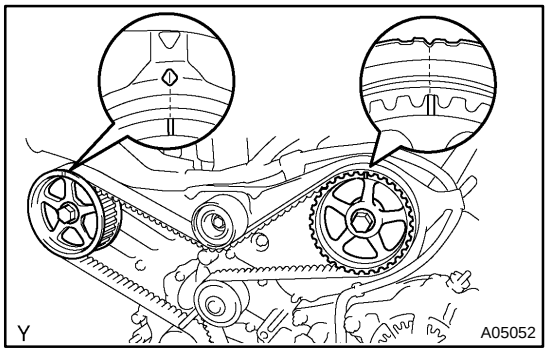
14. SET NO.1 CYLINDER TO TDC/COMPRESSION

(a) Temporarily install the crankshaft pulley bolt to the crankshaft.

(b) Turn the crankshaft, and align the timing marks of the crankshaft timing pulley and oil pump body.

NOTICE:

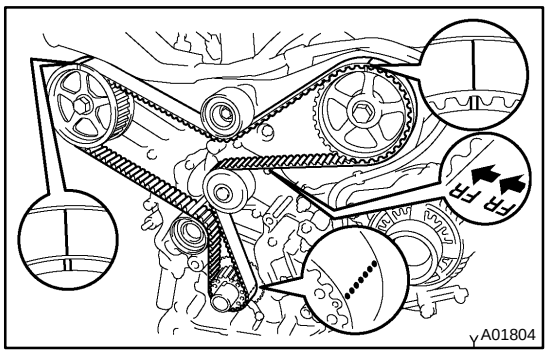
Always turn the crankshaft clockwise.



(c) Check that timing marks of the camshaft timing pulleys and No.3 timing belt cover are aligned.

If not, turn the crankshaft 1 revolution (360˚).

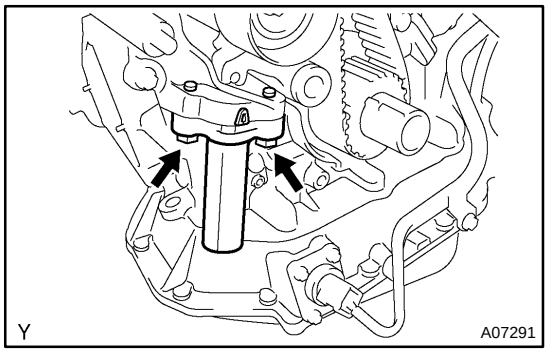
(d) Remove the crankshaft pulley bolt.



15. IF REUSING TIMING BELT, CHECK INSTALLATION MARKS ON TIMING BELT

Check that there are 3 installation marks and front mark on the timing belt.

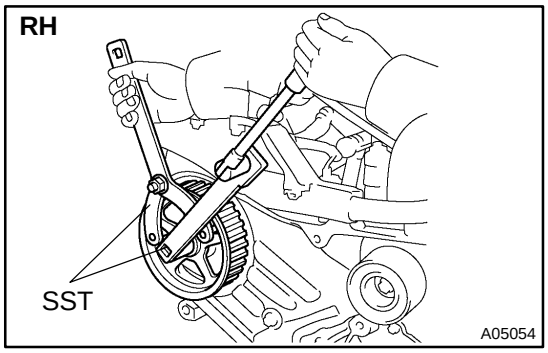
If the installation and front marks have disappeared, before removing the timing belt, place 3 new installation marks on the timing belt to match the timing marks of the timing pulleys, and place a new front mark on the timing belt.



16. REMOVE TIMING BELT TENSIONER

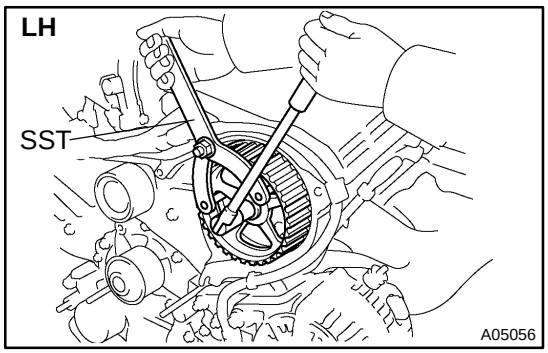
Alternately loosen the 2 bolts, and remove them, the tensioner and dust boot.

17. REMOVE TIMING BELT



18. REMOVE CAMSHAFT TIMING PULLEYS

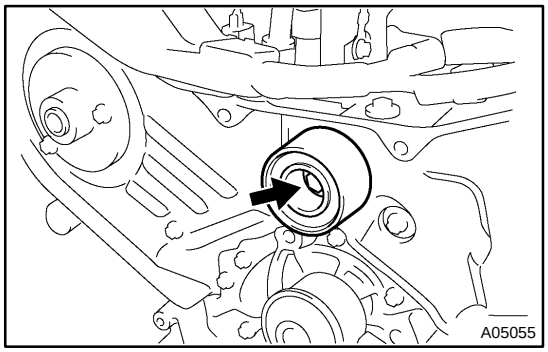
(a) Using SST, remove the bolt and RH timing pulley.
SST 09249–63010, 09960–10010 (09962–01000, 09963–01000)



(b) Using SST, remove the LH timing pulley.
SST 09960–10010 (09962–01000, 09963–01000)

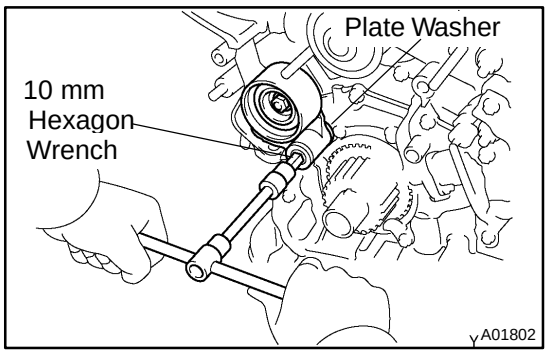
HINT:

Arrange the camshaft timing pulleys (RH and LH sides).



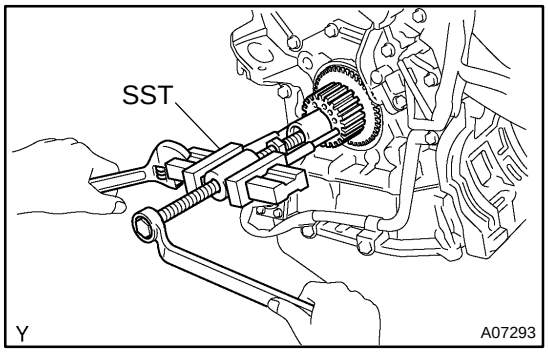
19. REMOVE NO.2 IDLER PULLEY

Remove the bolt and idler pulley.



20. REMOVE NO.1 IDLER PULLEY

Using a 10 mm hexagon wrench, remove the bolt, idler pulley and plate washer.



21. REMOVE CRANKSHAFT TIMING PULLEY

(a) Remove the bolt and timing belt plate.

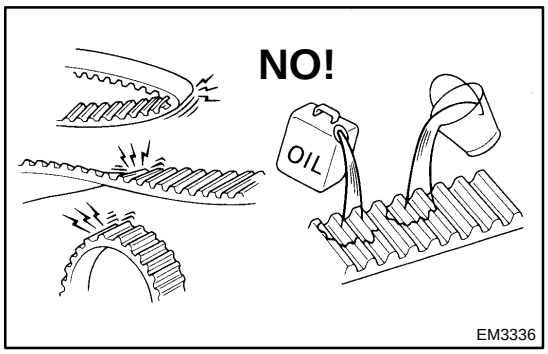
(b) Using SST, remove the crankshaft timing pulley.

SST 09950–50012 (09951–05010, 09952–05010, 09953–05010, 09953–05020, 09954–05010)

NOTICE:

Do not scratch the sensor part of the crankshaft timing pulley.

EM0ZC–01



INSPECTION

1. INSPECT TIMING BELT

NOTICE:

- **Do not bend, twist or turn the timing belt inside out.**
- **Do not allow the timing belt to come into 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 are 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.

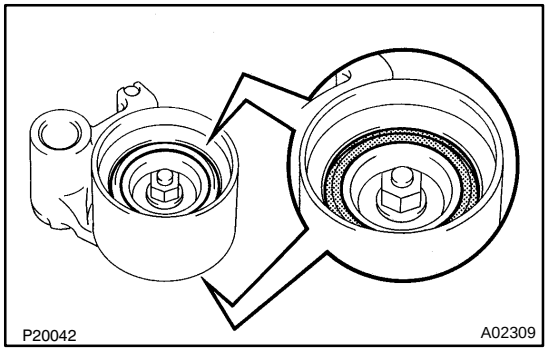
(b) If the belt teeth are cracked or damaged, check to see if either camshaft is locked.

(c) If there is noticeable wear or cracks on the belt face, check to see if there are nicks on the side of the idler pulley lock and water pump.

(d) 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 check gasket has been installed correctly and for foreign material on the pulley teeth.

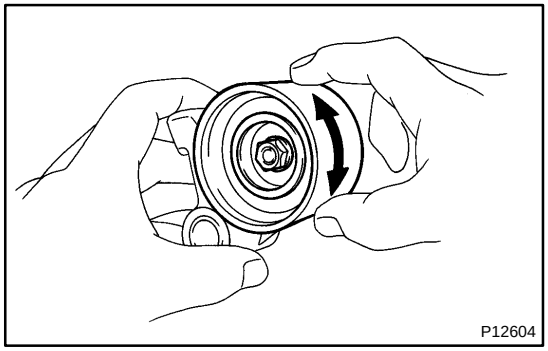
If necessary, replace the timing belt.



2. INSPECT IDLER PULLEYS

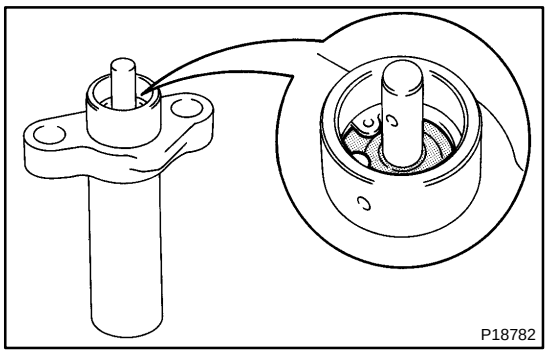
(a) Visually check the seal portion of the idler pulley for oil leakage.

If leakage is found, replace the idler pulley.



(b) Check that the idler pulley turns smoothly.

If necessary, replace the idler pulley.



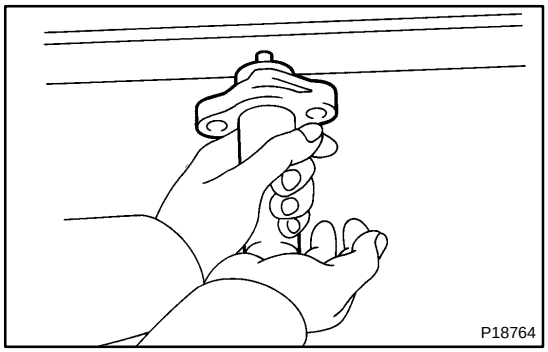
3. INSPECT TIMING BELT TENSIONER

(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.

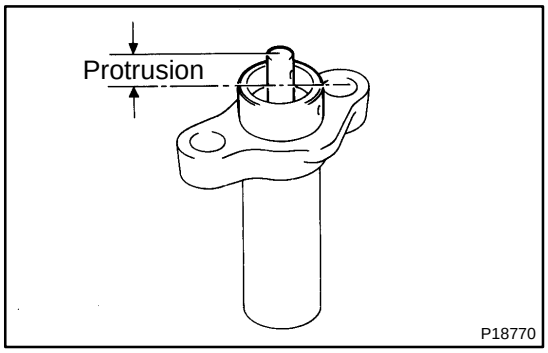


(b) Hold the tensioner with both hands and push the push rod strongly as shown to check that it doesn't move.

If the push rod moves, replace the tensioner.

NOTICE:

Never hold the tensioner push rod facing downward.



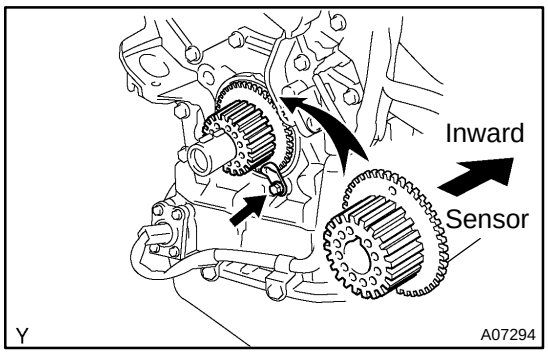
(c) Measure the protrusion of the push rod from the housing end.

Protrusion: 10.0 – 10.8 mm (0.394 – 0.425 in.)

If the protrusion is not as specified, replace the tensioner.

EM0ZD–01

INSTALLATION



1. INSTALL CRANKSHAFT TIMING PULLEY

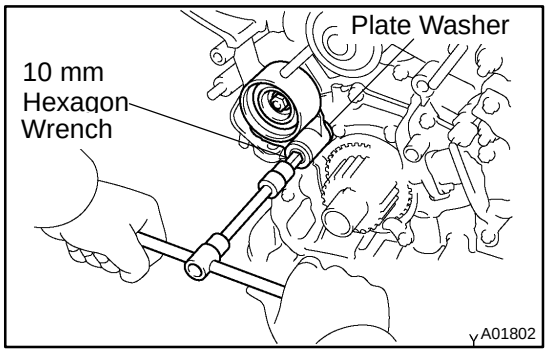
(a) Align the pulley set key with the key groove of the timing pulley, and slide on the timing pulley.

(b) Install the timing pulley, facing the sensor side inward.

NOTICE:

Do not scratch the sensor part of the crankshaft timing pulley.

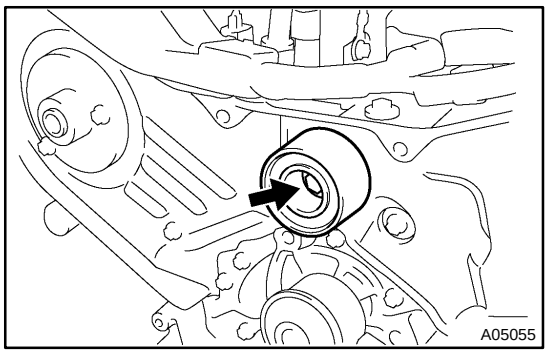
(c) Install the timing belt plate with the bolt.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)



2. INSTALL NO.1 IDLER PULLEY
Adhesive: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(a) Using a 10 mm hexagon wrench, install the plate washer and idler pulley with the pivot bolt.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(b) Check that the pulley bracket moves smoothly.



3. INSTALL NO.2 IDLER PULLEY

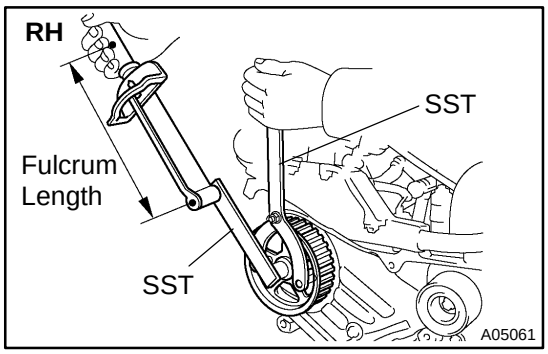
(a) Install the idler pulley with the bolt.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(b) Check that the idler pulley moves smoothly.

4. INSTALL RH CAMSHAFT TIMING PULLEY

(a) Face the flange side of the timing pulley outward.

(b) Align the knock pin on the camshaft with the knock pin groove of the timing pulley, and slide on the timing pulley.



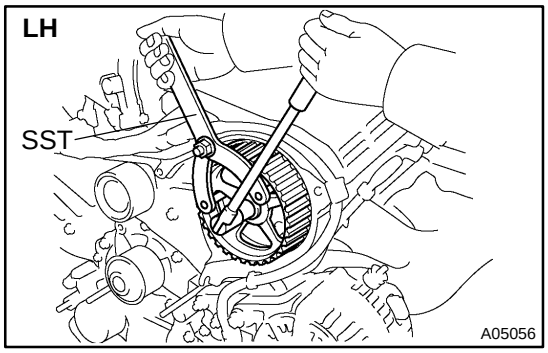
(c) Using SST, install the pulley bolt.
SST 09249–63010, 09960–10010 (09962–01000, 09963–01000)
Torque: 88 N·m (900 kgf·cm, 65 ft·lbf)

HINT:
Use a torque wrench with a fulcrum length of 340 mm (13.39 in.).

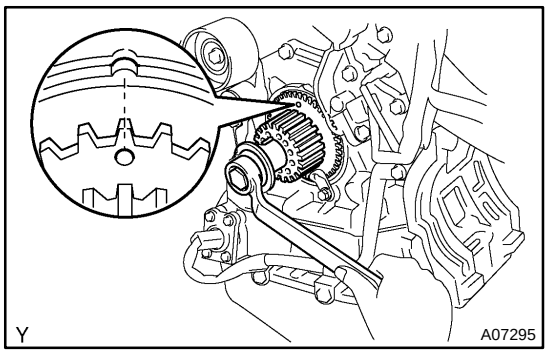
5. INSTALL LH CAMSHAFT TIMING PULLEY

(a) Face the flange side of the timing pulley inward.

(b) Align the knock pin on the camshaft with the knock pin groove of the timing pulley, and slide on the timing pulley.



(c) Using SST, install the pulley bolt.
SST 09960–10010 (09962–01000, 09963–01000)
Torque: 125 N·m (1,300 kgf·cm, 94 ft·lbf)

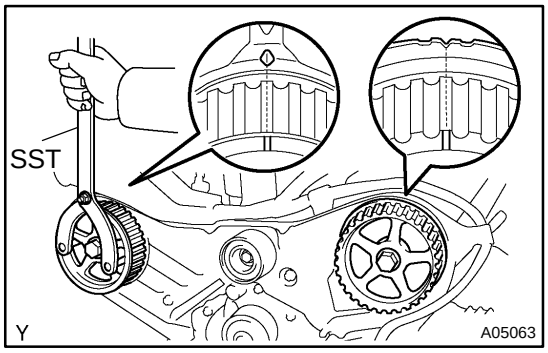


6. SET NO.1 CYLINDER TO TDC/COMPRESSION

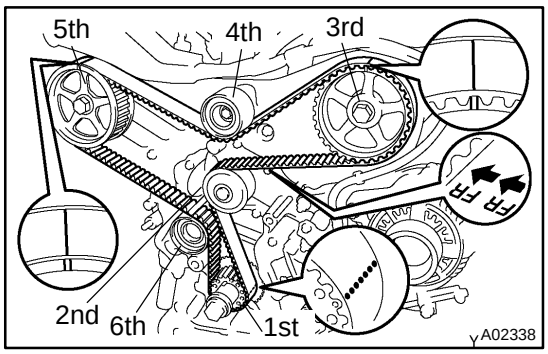
(a) Crankshaft Timing Pulley Position:

(1) Temporarily install the crankshaft pulley bolt to the crankshaft.

(2) Turn the crankshaft, and align the timing marks of the crankshaft timing pulley and oil pump body.



(b) Camshaft Timing Pulley Positions:
Using SST, turn the camshaft pulley, align the timing marks of the timing pulley and No.3 timing belt cover.
SST 09960–10010 (09962–01000, 09963–01000)



7. INSTALL TIMING BELT

NOTICE:

The engine should be cold.

(a) Remove any oil or water on the pulleys, and keep them clean.

NOTICE:

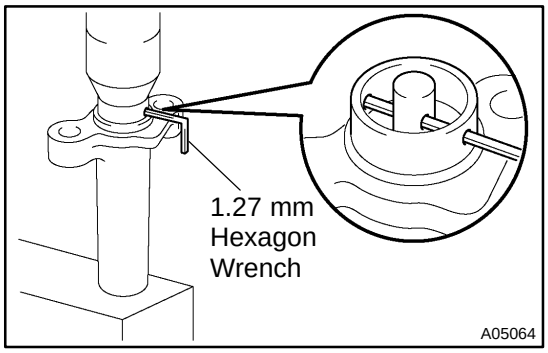
Only wipe the pulleys; do not use any cleansing agent.

(b) Face the front mark on the timing belt forward.

(c) Align the installation mark on the timing belt with the timing mark of the crankshaft timing pulley.

(d) Align the installation marks on the timing belt with the timing marks of the camshaft timing pulleys.

(e) Install the timing belt in this order:
1st: Crankshaft timing pulley
2nd: Water pump pulley
3rd: LH camshaft timing pulley
4th: No.2 idler pulley
5th: RH camshaft timing pulley
6th: No.1 idler pulley

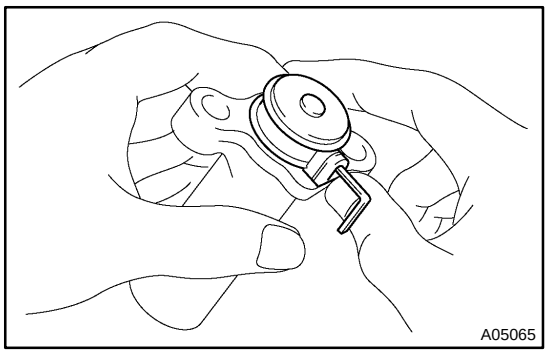


8. SET TIMING BELT TENSIONER

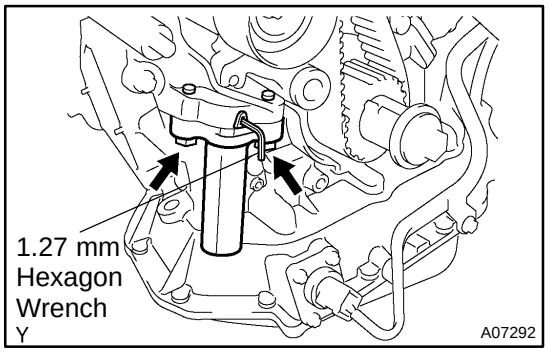
(a) Using a press, slowly press in the push rod using 981 – 9,807 N (100 – 1,000 kgf, 200 – 2,205 lbf) of pressure.

(b) Align the holes of the push rod and housing, pass a 1.27 mm 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 tensioner.

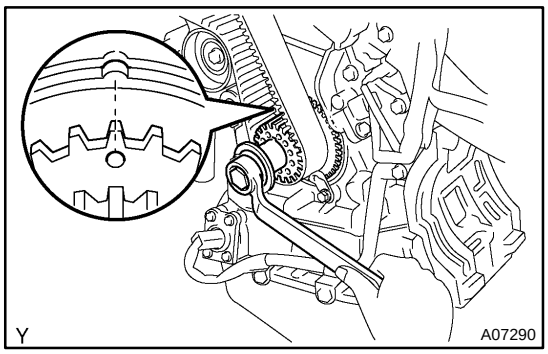


9. INSTALL TIMING BELT TENSIONER

(a) Temporarily install the tensioner with the 2 bolts.

(b) Alternately tighten the 2 bolts.
Torque: 27 N·m (280 kgf·cm, 20 ft·lbf)

(c) Remove the 1.27 mm hexagon wrench from the tensioner.

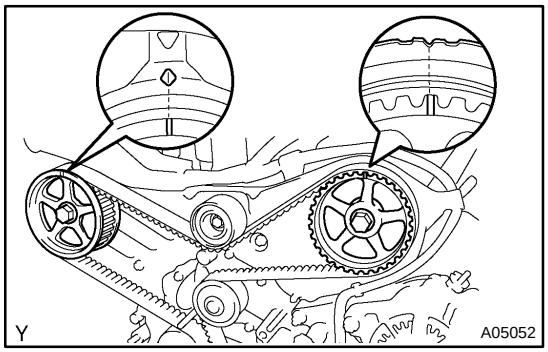


10. CHECK VALVE TIMING

(a) Slowly turn the crankshaft 2 revolutions, and align the timing marks of the crankshaft timing pulley and oil pump body.

NOTICE:

Always turn the crankshaft clockwise.



(b) Check that the timing marks of the RH and LH timing pulleys with the timing marks of the No.3 timing belt cover as shown in the illustration.

If the marks do not align, remove the timing belt and reinstall it.

(c) Remove the crankshaft pulley bolt.

11. INSTALL RH ENGINE MOUNTING BRACKET

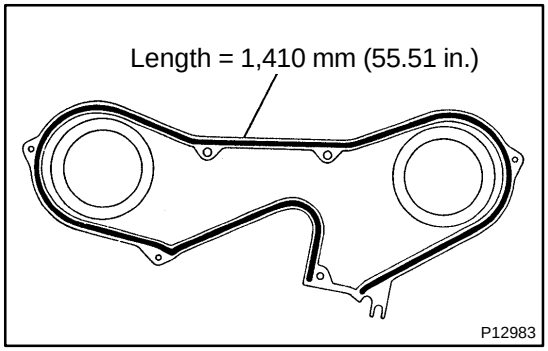
Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

12. INSTALL NO.2 TIMING BELT COVER

(a) Check that the timing belt cover gasket has no cracks or peeling, etc.

If the gasket has cracks or peeling, etc., replace it using these steps:

- Using a screwdriver and gasket scraper, remove all the old gasket material.
- Thoroughly clean all components to remove all the loose material.

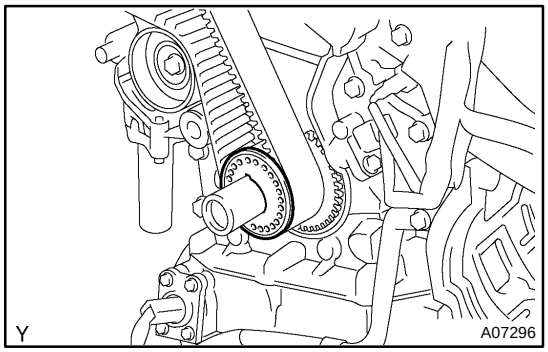


- Remove the backing paper from a new gasket and install the gasket evenly to the part of the timing belt cover shaded black in the illustration.
- After installing the gasket, press down on it so that the adhesive firmly sticks to the timing belt cover.

(b) Install the timing belt cover with the 5 bolts.

Torque: 8.5 N·m (85 kgf·cm, 74 in.·lbf)

(c) Install the engine wire protector clamps to the No.3 timing belt cover.



13. INSTALL TIMING BELT GUIDE

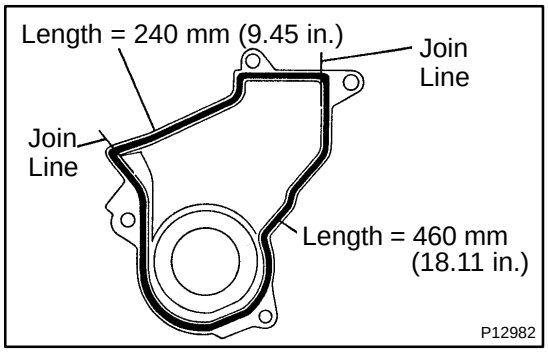
Install the timing belt guide, facing the cup side outward.

14. INSTALL NO.1 TIMING BELT COVER

(a) Check that the timing belt cover gaskets have cracks or peeling, etc.

If the gasket has cracks or peeling, etc., replace it using these steps:

- Using a screwdriver and gasket scraper, remove all the old gasket material.
- Thoroughly clean all components to remove all the loose material.



- Remove the backing paper from a new gasket and install the gasket evenly to the part of the timing belt cover shaded black in the illustration.

NOTICE:

When joining 2 gaskets, do not leave a gap between them. Cut off any excess gasket.

- After installing the gasket, press down on it so that the adhesive firmly sticks to the timing belt cover.

(b) Install the timing belt cover with the 4 bolts.

Torque: 8.5 N·m (85 kgf·cm, 74 in.·lbf)

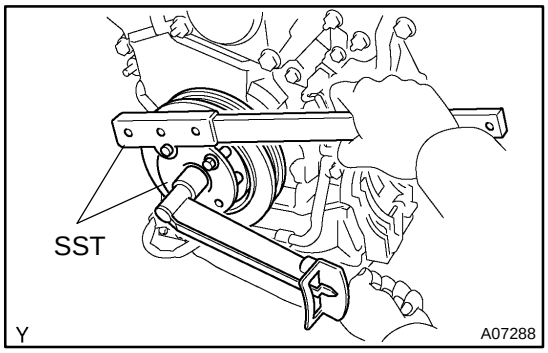
15. INSTALL CRANKSHAFT PULLEY

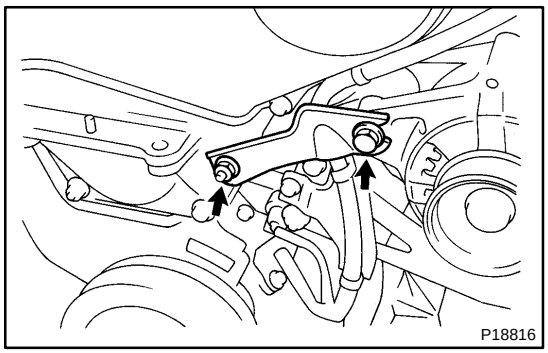
(a) Align the pulley set key with the key groove of the pulley, and slide on the pulley.

(b) Using SST, install the pulley bolt.

SST 09213–54015 (91651–60855), 09330–00021

Torque: 215 N·m (2,200 kgf·cm, 159 ft·lbf)





16. INSTALL NO.2 GENERATOR BRACKET

Install the generator bracket with the pivot bolt and nut. Do not tighten the bolt yet.

Torque: (Nut): 28 N·m (290 kgf·cm, 21 ft·lbf)

17. INSTALL NO.2 RH ENGINE MOUNTING BRACKET AND ENGINE MOVING CONTROL ROD

(See page EM–77)

18. CONNECT GROUND STRAP CONNECTORS

19. CONNECT ENGINE COOLANT RESERVOIR HOSE TO WATER OUTLET

20. INSTALL PS PUMP DRIVE BELT

21. INSTALL GENERATOR DRIVE BELT

(See page CH–16)

22. INSTALL RH FENDER APRON SEAL

23. INSTALL RH FRONT WHEEL

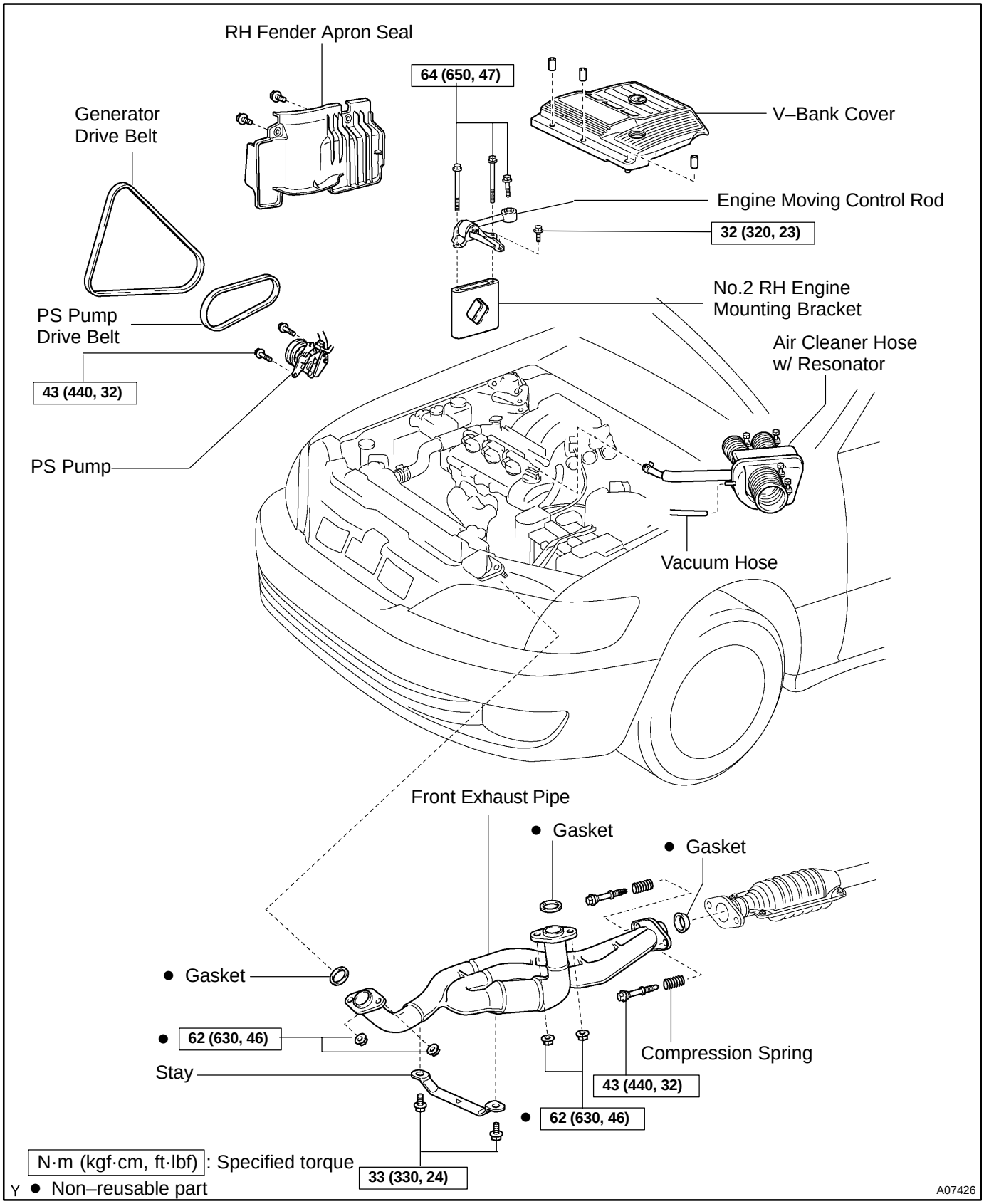
24. VEHICLE ROAD TEST

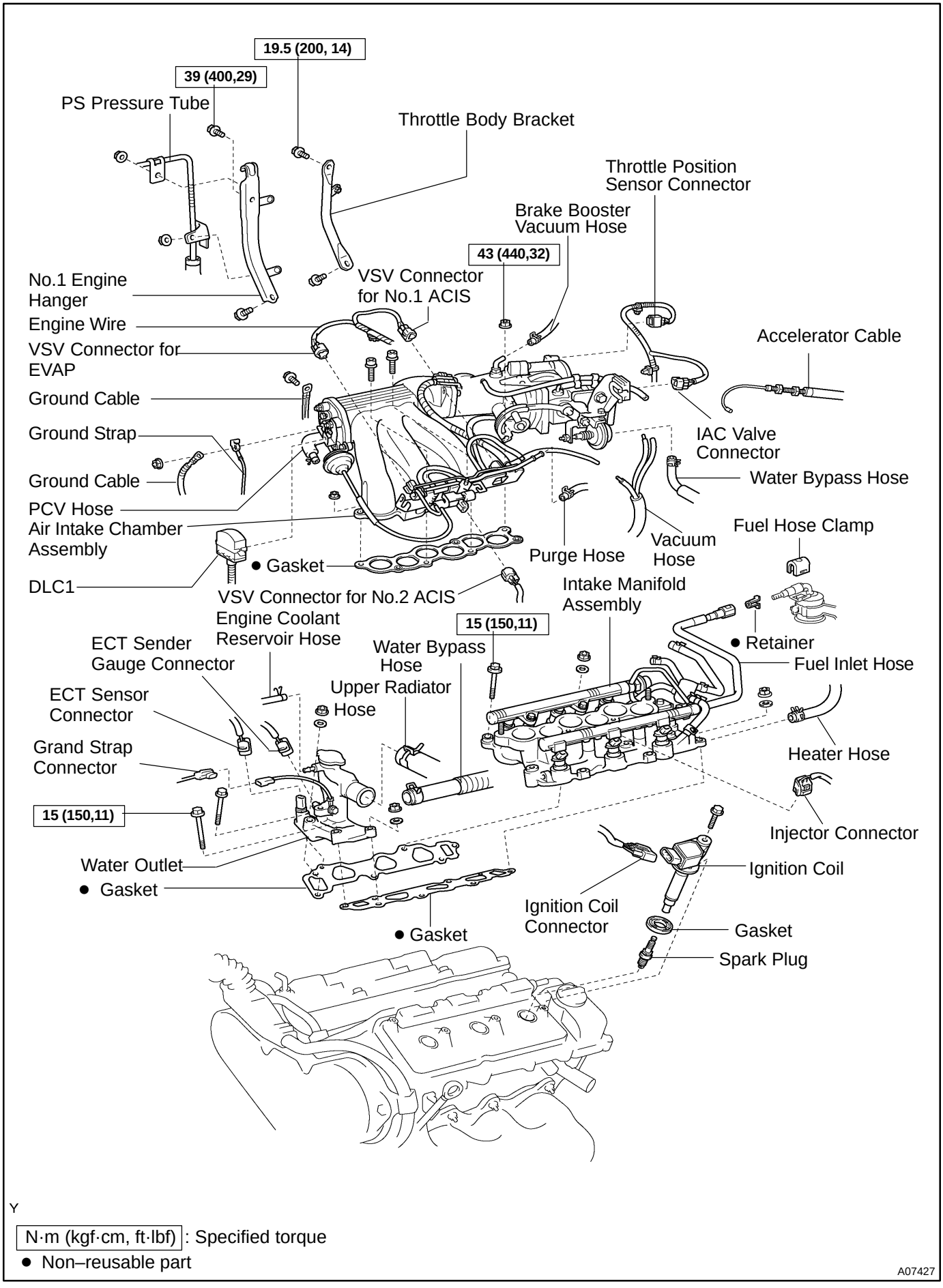
Check for abnormal noise, shock, slippage, correct shift points and smoothly operation.

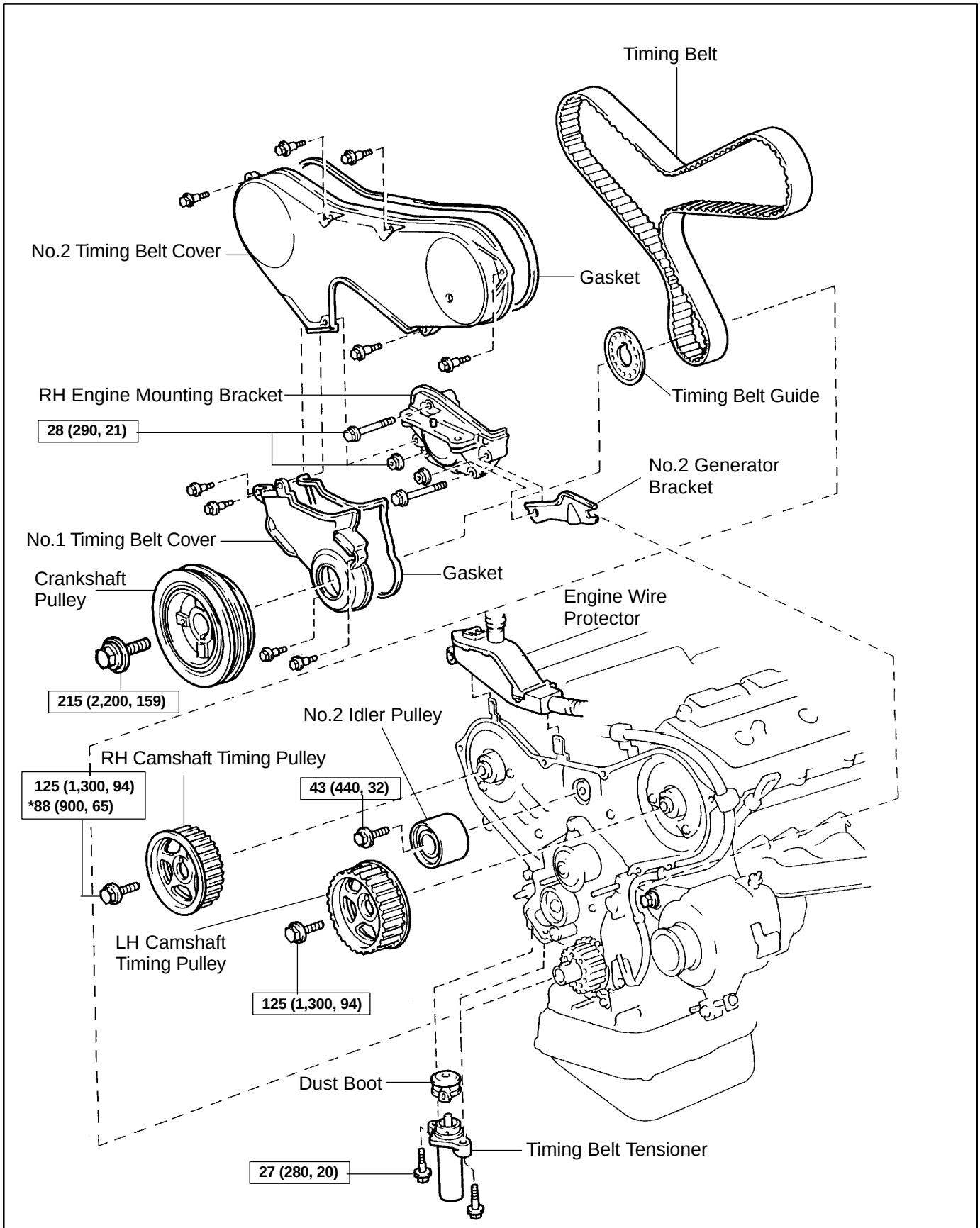
CYLINDER HEAD

COMPONENTS

EM042–02

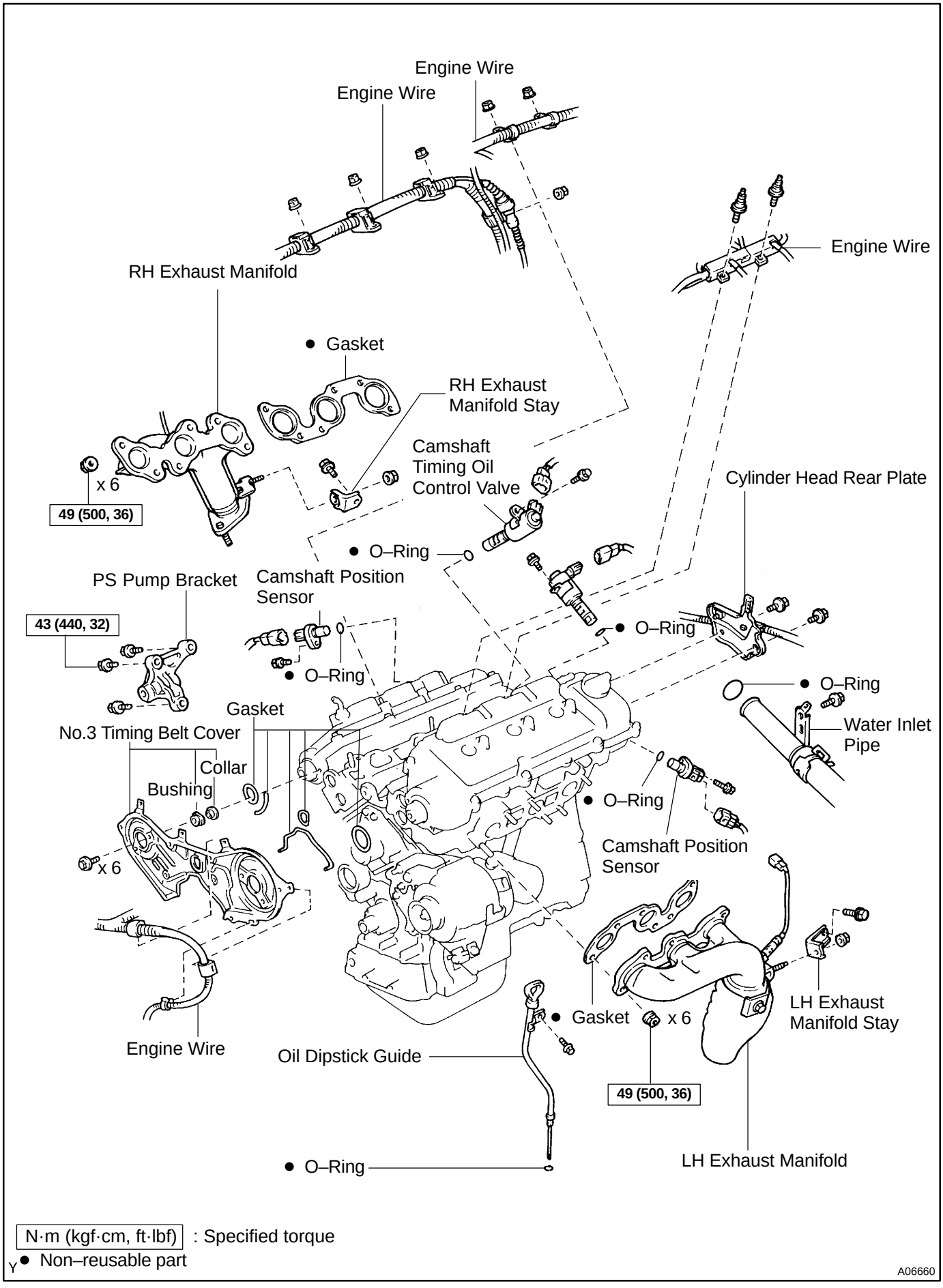



19.5 (200, 14)
39 (400,29)
PS Pressure Tube
Throttle Body Bracket
Throttle Position Sensor Connector
Brake Booster Vacuum Hose
43 (440,32)
No.1 Engine Hanger
VSV Connector for No.1 ACIS
Engine Wire
VSV Connector for EVAP
Accelerator Cable
Ground Cable
Ground Strap
IAC Valve Connector
Ground Cable
Water Bypass Hose
PCV Hose
Air Intake Chamber Assembly
Fuel Hose Clamp
Purge Hose
Vacuum Hose
● Gasket
DLC1
VSV Connector for No.2 ACIS
Intake Manifold Assembly
Engine Coolant Reservoir Hose
15 (150,11)
● Retainer
ECT Sender Gauge Connector
Water Bypass Hose
Fuel Inlet Hose
Upper Radiator Hose
ECT Sensor Connector
Grand Strap Connector
Heater Hose
15 (150,11)
Injector Connector
Water Outlet
Ignition Coil
● Gasket
Ignition Coil Connector
● Gasket
Gasket
Spark Plug
Y
N·m (kgf·cm, ft·lbf) : Specified torque
● Non–reusable part
A07427



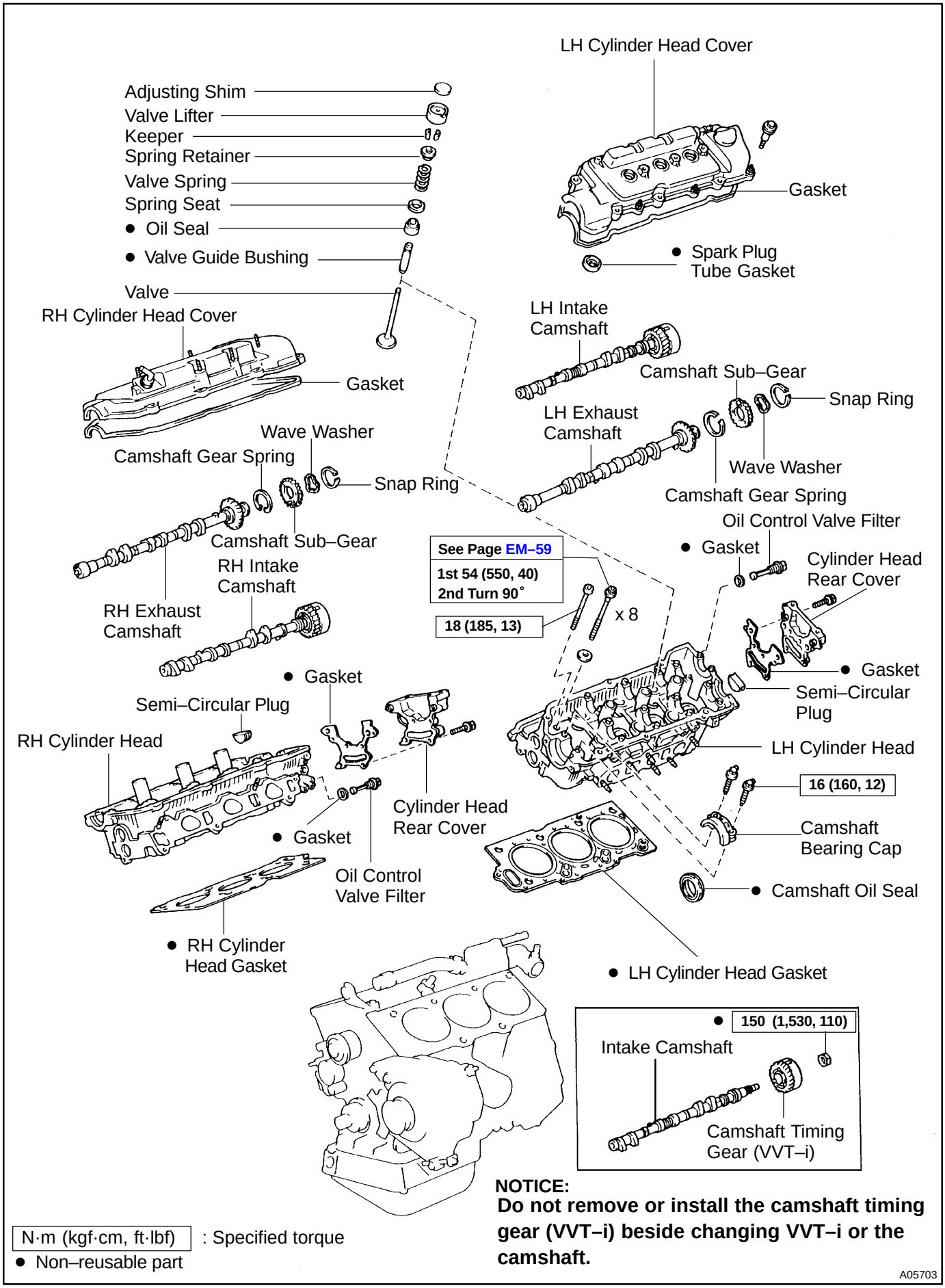
N·m (kgf·cm, ft·lbf) : Specified torque
● Non–reusable part
* For use with SST

A05070



N·m (kgf·cm, ft·lbf) : Specified torque
● Non–reusable part

A06660


LH Cylinder Head Cover
Adjusting Shim
Valve Lifter
Keeper
Spring Retainer
Valve Spring
Spring Seat
● Oil Seal
● Valve Guide Bushing
Valve
Gasket
● Spark Plug Tube Gasket
RH Cylinder Head Cover
Gasket
LH Intake Camshaft
Camshaft Sub–Gear
Snap Ring
LH Exhaust Camshaft
Wave Washer
Camshaft Gear Spring
Wave Washer
Camshaft Gear Spring
Snap Ring
Camshaft Sub–Gear
Oil Control Valve Filter
● Gasket
Cylinder Head Rear Cover
See Page EM–59
1st 54 (550, 40)
2nd Turn 90°
18 (185, 13)
x 8
RH Intake Camshaft
RH Exhaust Camshaft
● Gasket
Semi–Circular Plug
● Gasket
Semi–Circular Plug
RH Cylinder Head
LH Cylinder Head
16 (160, 12)
Cylinder Head Rear Cover
Camshaft Bearing Cap
● Gasket
Oil Control Valve Filter
● Camshaft Oil Seal
● RH Cylinder Head Gasket
● LH Cylinder Head Gasket
● 150 (1,530, 110)
Intake Camshaft
Camshaft Timing Gear (VVT–i)
N·m (kgf·cm, ft·lbf) : Specified torque
● Non–reusable part
NOTICE:
Do not remove or install the camshaft timing gear (VVT–i) beside changing VVT–i or the camshaft.
A05703

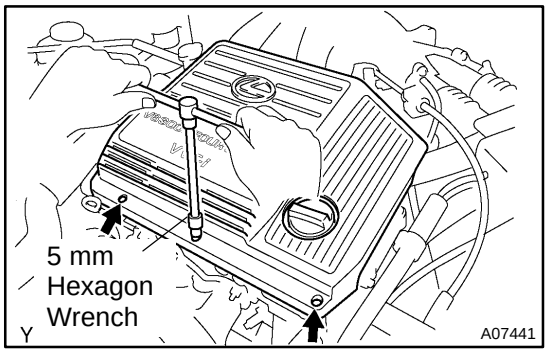
EM0ZE–01

REMOVAL

NOTICE:

Do not remove or install the camshaft timing gear (VVT–i) beside changing VVT–i or the camshaft.

1. **DRAIN ENGINE COOLANT**
2. **REMOVE RH FENDER APRON SEAL**
3. **REMOVE GENERATOR DRIVE BELT (See page CH–6)**
4. **REMOVE PS PUMP (See page SR–20)**
5. **REMOVE FRONT EXHAUST PIPE (See page EM–72)**



6. **REMOVE V–BANK COVER**

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

(c) Remove the V–bank cover.

7. **REMOVE AIR CLEANER CAP AND CASE ASSEMBLY (See page EM–72)**

8. **REMOVE AIR INTAKE CHAMBER ASSEMBLY**

(a) Disconnect the accelerator cable.

(b) Disconnect the throttle position sensor connector.

(c) Disconnect the IAC valve connector.

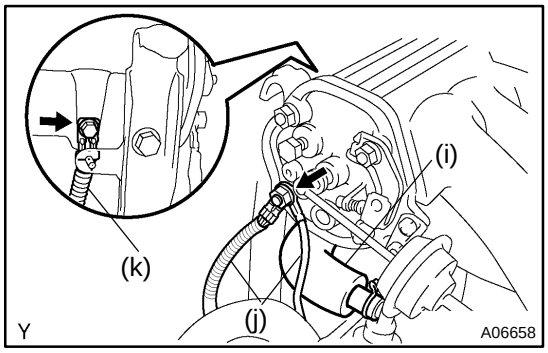
(d) Disconnect the No.1 VSV connector for the ACIS.

(e) Disconnect the No.2 VSV connector for the ACIS.

(f) Disconnect the VSV connector for the EVAP.

(g) Disconnect the DLC1 from the bracket on the intake air control valve.

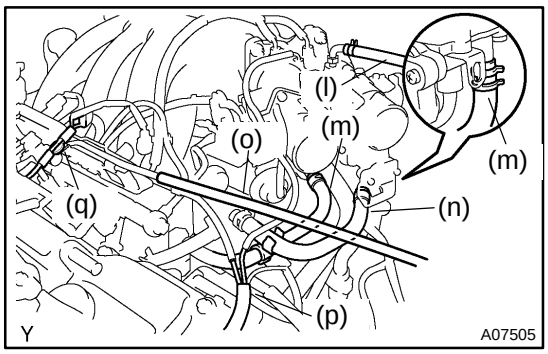
(h) Remove the 2 nuts, and disconnect the PS pressure tube from the No.1 engine hanger.



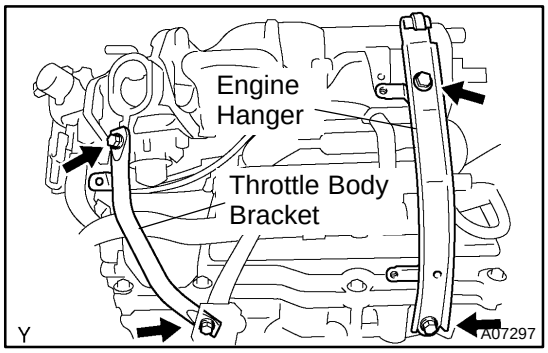
(i) Disconnect the PCV hose from the PCV valve on the RH cylinder head.

(j) Disconnect the ground strap and cable from the intake air control valve for the ACIS.

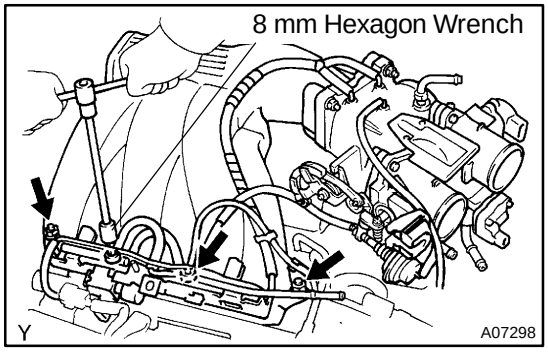
(k) Disconnect the ground cable from the air intake chamber.



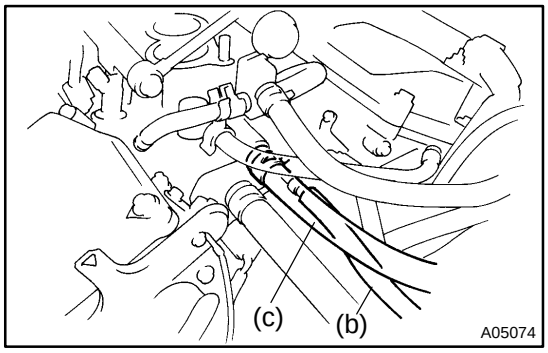
(l) Disconnect the brake booster vacuum hose from the throttle body.
(m) Disconnect the 2 water bypass hoses from the throttle body.
(n) Disconnect the air assist hose from the throttle body.
(o) Disconnect the purge hose from the pipe on the emission control valve set.
(p) Disconnect the 2 vacuum hoses from the vacuum tank for the ACIS.
(q) Disconnect the engine wire clamp from the emission control valve set.



(r) Remove the 2 bolts and No.1 engine hanger.
(s) Remove the 2 bolts and throttle body bracket.



(t) Using an 8 mm hexagon wrench, remove the 2 bolts, 2 nuts, the air intake chamber assembly and gasket.



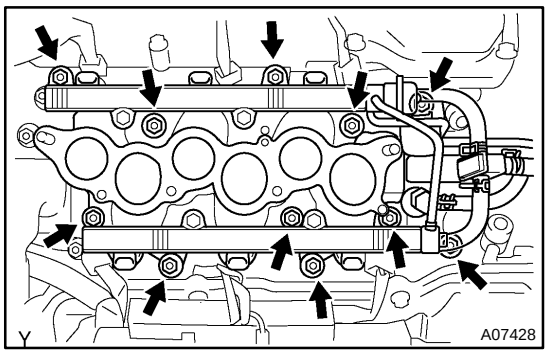
9. REMOVE INTAKE MANIFOLD ASSEMBLY

(a) Disconnect the 6 injector connectors.
(b) Disconnect the fuel inlet hose from the fuel filter.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.
(See page SF–1)

(c) Disconnect the heater hose from the intake manifold.



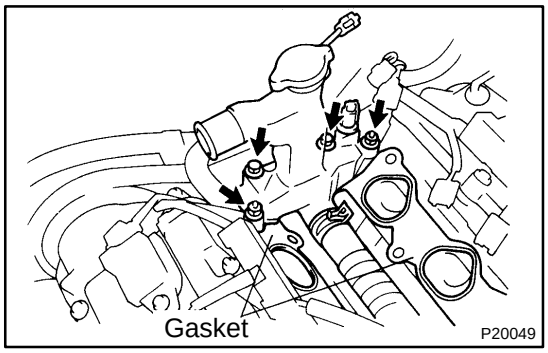
(d) Remove the 9 bolts, 2 nuts, 2 plate washers, the intake manifold, delivery pipes and injectors assembly.

NOTICE:

- **Be careful not to drop the injectors when removing the delivery pipes.**
- **Pay attention to put any hung load on the injector to and from the side direction.**

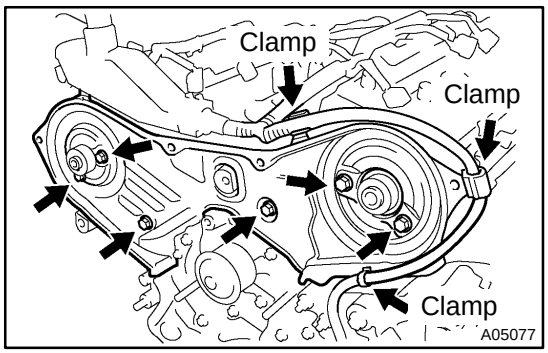
10. REMOVE WATER OUTLET

(a) Disconnect the ECT sender gauge connector.
(b) Disconnect the ECT sensor connector.
(c) Disconnect the ground strap connector.
(d) Disconnect the upper radiator hose.
(e) Disconnect the engine coolant reservoir hose.



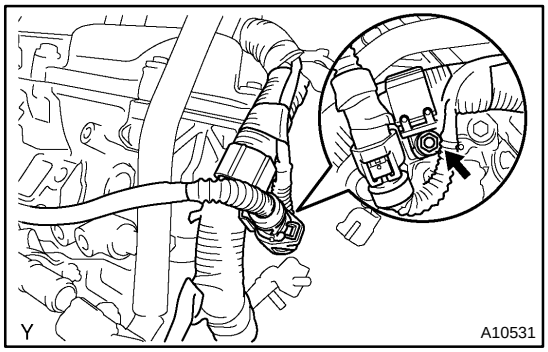
(f) Remove the 2 bolts, 2 nuts and 2 plate washers.
(g) Disconnect the water bypass hose, and remove the water outlet.
(h) Remove the 2 gaskets.

11. REMOVE IGNITION COILS
12. REMOVE SPARK PLUGS
13. REMOVE TIMING BELT (See page EM–15)
14. REMOVE CAMSHAFT TIMING PULLEYS (See page EM–15)
15. REMOVE NO.2 IDLER PULLEY (See page EM–15)
16. REMOVE NO.3 TIMING BELT COVER



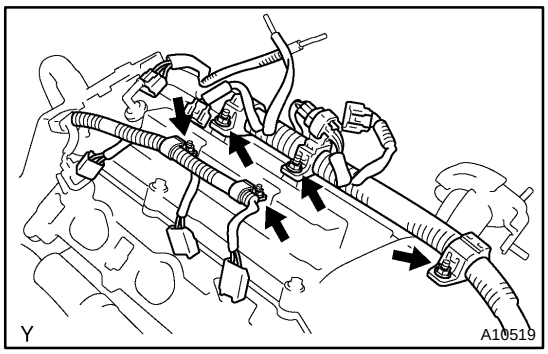
(a) Disconnect the 3 engine wire clamps from the timing belt cover.
(b) Remove the 6 bolts and timing belt cover.

17. REMOVE CAMSHAFT POSITION SENSORS
18. REMOVE CAMSHAFT TIMING OIL CONTROL VALVES



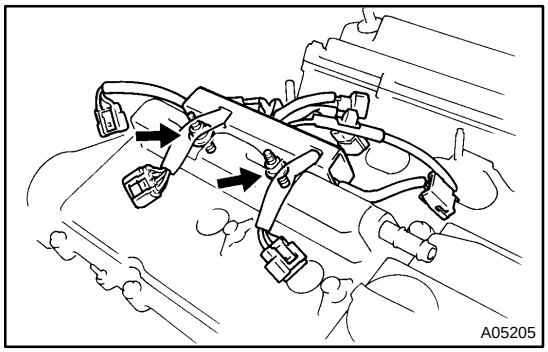
19. DISCONNECT ENGINE WIRE PROTECTOR FROM REAR SIDE

Remove the nut, and disconnect the engine wire protector from the RH cylinder head.



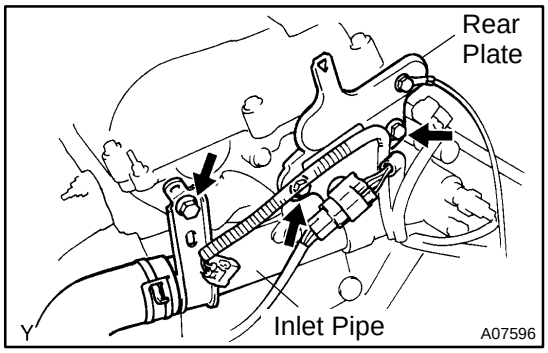
20. DISCONNECT ENGINE WIRE AND PROTECTOR FROM RH SIDE

Remove the 5 nuts, and disconnect the engine wire and protector from the RH cylinder head cover.



21. DISCONNECT ENGINE WIRE PROTECTOR FROM LH SIDE

Remove the 2 bolts, and disconnect the engine wire protector from the LH cylinder head cover.



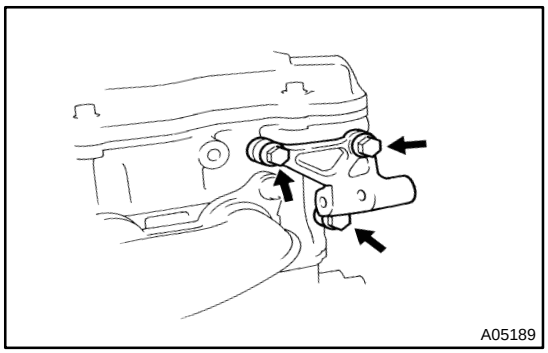
22. DISCONNECT CYLINDER HEAD REAR PLATE FROM LH CYLINDER HEAD

Remove the 2 bolts, and disconnect the rear plate.

23. DISCONNECT WATER INLET PIPE FROM LH CYLINDER HEAD AND WATER INLET

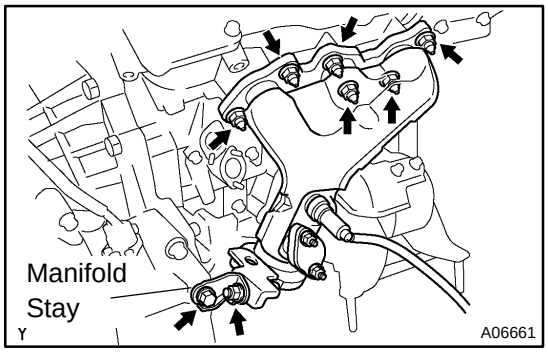
(a) Remove the bolt, and disconnect the inlet pipe from the water inlet.

(b) Remove the O–ring from the inlet pipe.



24. REMOVE PS PUMP BRACKET

Remove the 3 bolts and pump bracket.

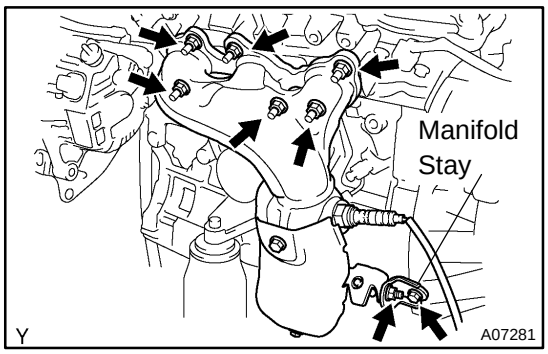


25. REMOVE RH EXHAUST MANIFOLD

(a) Disconnect the A/F sensor connector.

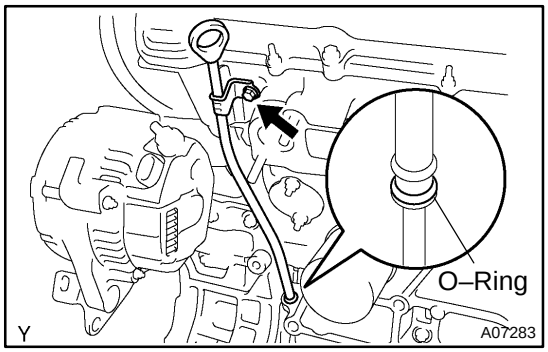
(b) Remove the bolt, nut and exhaust manifold stay.

(c) Remove the 6 nuts, exhaust manifold and gasket.



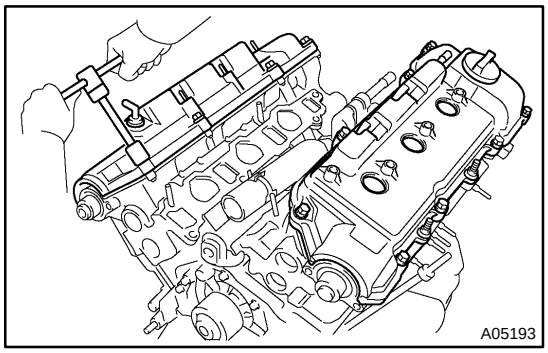
26. REMOVE LH EXHAUST MANIFOLD

(a) Disconnect the A/F sensor connector.
(b) Remove the bolt, nut and exhaust manifold stay.
(c) Remove the 6 nuts, exhaust manifold and gasket.



27. REMOVE OIL DIPSTICK AND GUIDE

(a) Remove the bolt holding the dipstick guide 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.



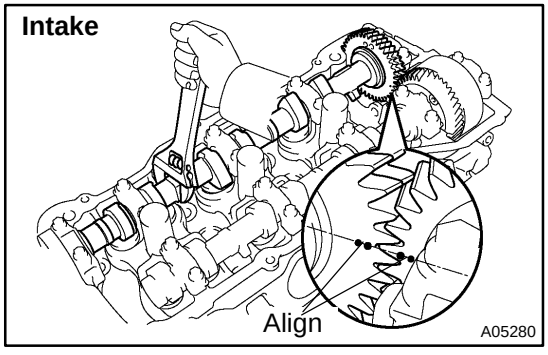
28. REMOVE CYLINDER HEAD COVERS

Remove the 9 bolts, cylinder head cover and gasket. Remove the 2 cylinder head covers.

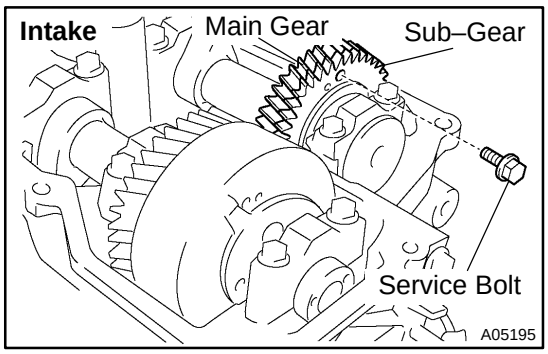
29. REMOVE CAMSHAFTS OF RH CYLINDER HEAD

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept leveled while it is being installed. If the camshaft is not kept leveled, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Remove the intake camshaft.
    (1) Align the timing marks (2 dot marks) of the camshaft drive and driven gears by turning the camshaft with a wrench.

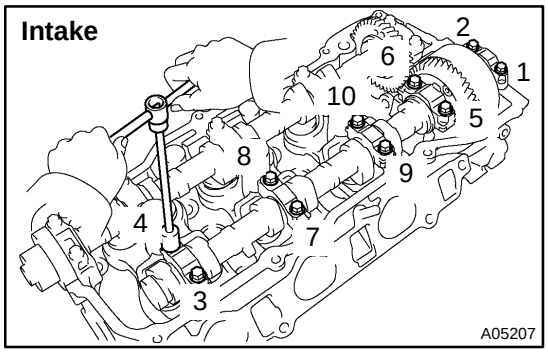


(2) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.

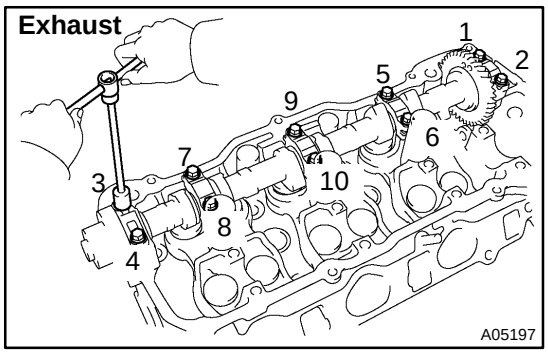
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm (0.63 – 0.79 in.)

HINT:
When removing the camshaft, mark certain that the torsional spring force of the sub–gear has been eliminated by the above operation.



(3) Uniformly loosen and remove the 10 bearing cap bolts in several passes and in the sequence shown.
(4) Remove the 5 bearing caps and intake camshaft.

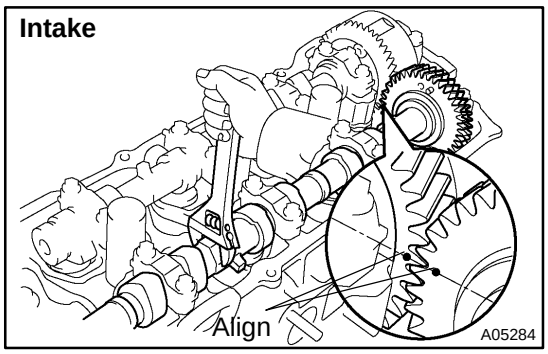


(b) Remove the exhaust camshaft.
(1) Uniformly loosen and remove the 10 bearing cap bolts in several passes and in the sequence shown.
(2) Remove the 5 bearing caps, oil seal and exhaust camshaft.

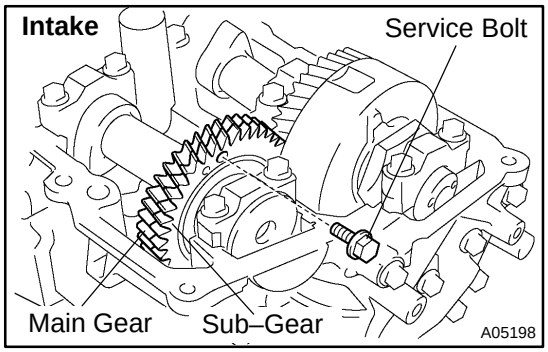
30. REMOVE CAMSHAFTS OF LH CYLINDER HEAD

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept leveled while it is being installed. If the camshaft is not kept leveled, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Remove the intake camshaft.
(1) Align the timing marks (1 dot mark) of the camshaft drive and driven gears by turning the camshaft with a wrench.

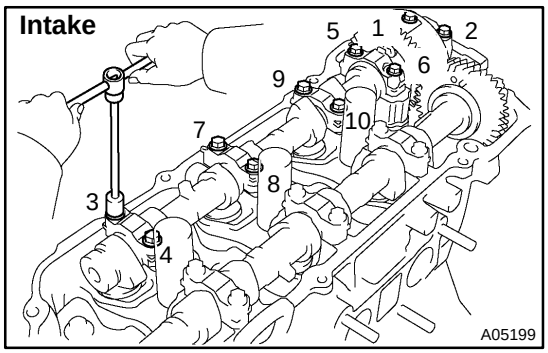


(2) Secure the exhaust camshaft sub–gear to the main gear with a service bolt.

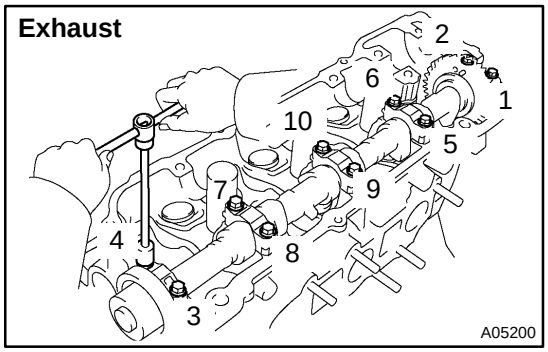
Recommended service bolt:

Thread diameter	6 mm
Thread pitch	1.0 mm
Bolt length	16 – 20 mm (0.63 – 0.79 in.)

HINT:
When removing the camshaft, make sure that the torsional spring force of the sub–gear has been eliminated by the above operation.

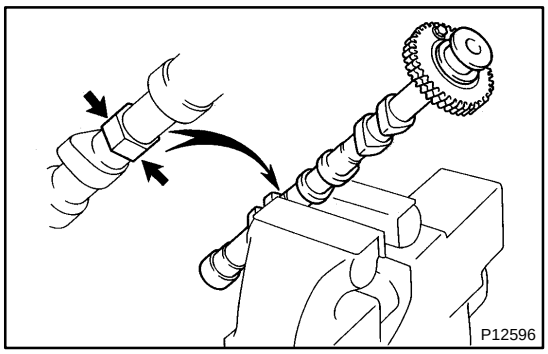


(b) Uniformly loosen and remove the 10 bearing cap bolts in several passes and in the sequence shown.
(c) Remove the 5 bearing caps and intake camshaft.



(d) Remove the exhaust camshaft.
(1) Uniformly loosen and remove the 10 bearing cap bolts in several passes and in the sequence shown.
(2) Remove the 5 bearing caps, oil seal and exhaust camshaft.

HINT:
- Arrange the camshafts in the correct order.
- Arrange the bearing caps in the correct order.

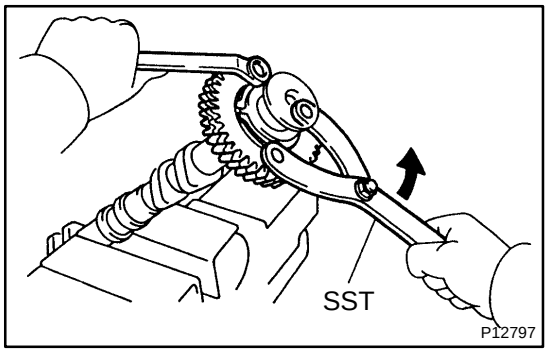


31. DISASSEMBLE EXHAUST CAMSHAFTS

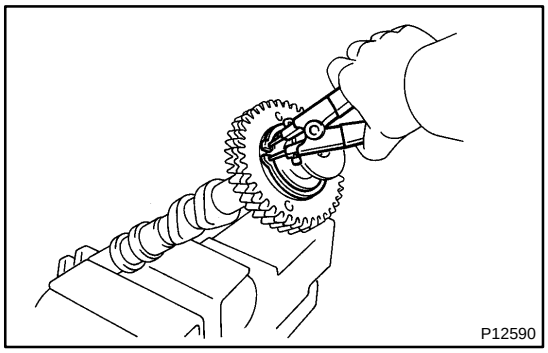
(a) Mount the hexagonal wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



(b) Using SST, turn the sub–gear counterclockwise, and remove the service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

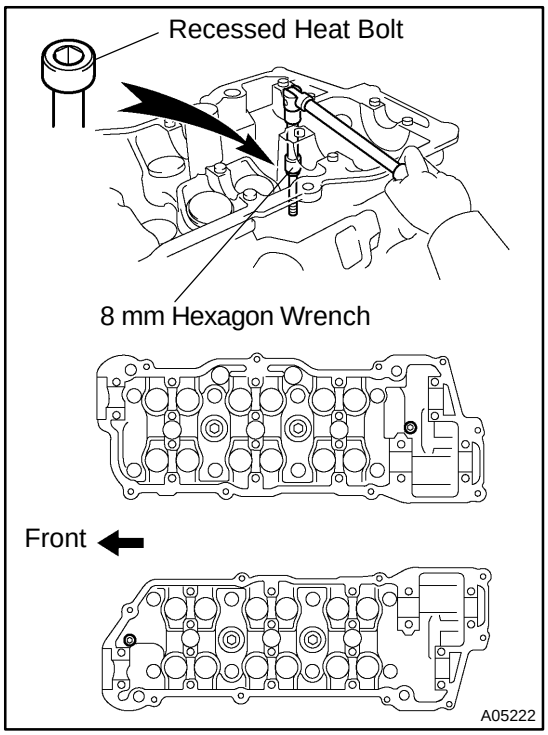


(c) Using snap ring pliers, remove the snap ring.

(d) Remove the wave washer, camshaft sub–gear, and camshaft gear spring.

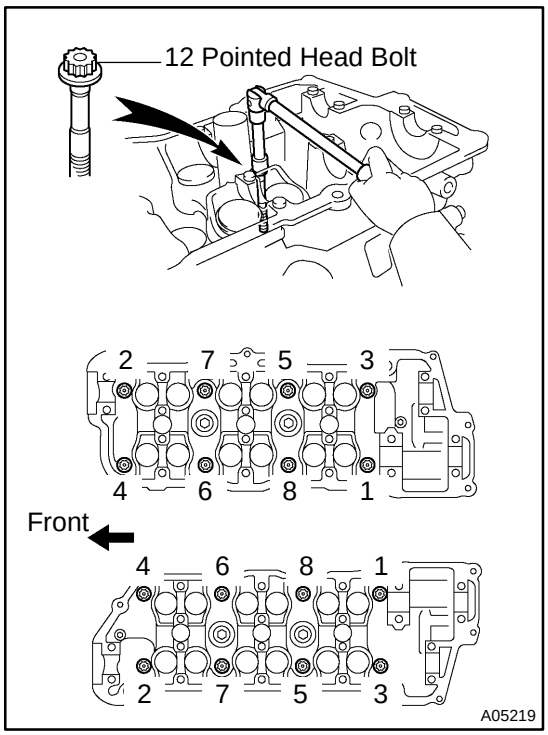
HINT:

Arrange the camshaft sub–gears and gear springs (RH and LH side).



32. REMOVE CYLINDER HEADS

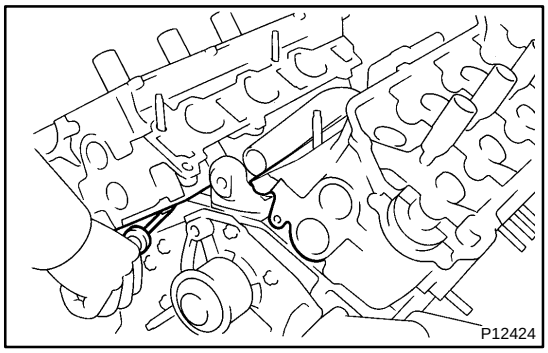
(a) Using an 8 mm hexagon wrench, remove the cylinder head (recessed head) bolt on each cylinder head, then repeat for the other side, as shown.



(b) Uniformly loosen and remove the 8 cylinder head (12 pointed head) bolts on each cylinder head in several passes and in the sequence shown, then repeat for the other side, as shown. Remove the 16 cylinder head bolts and plate washers.

NOTICE:

Head warpage or cracking could result from removing bolts in an incorrect order.



(c) Lift the cylinder head from the dowels on the cylinder block and place the 2 cylinder heads on wooden blocks on a bench.

HINT:

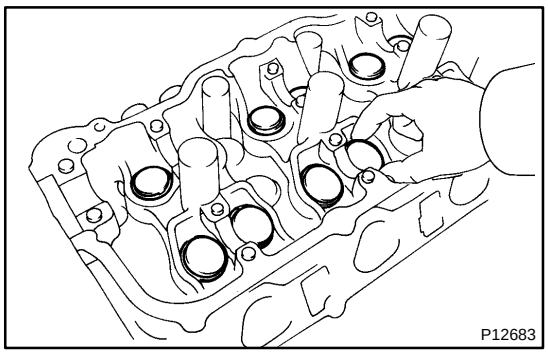
If the cylinder head is difficult to lift off, pry between the cylinder head and cylinder block with a screwdriver.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

EM0ZF–01

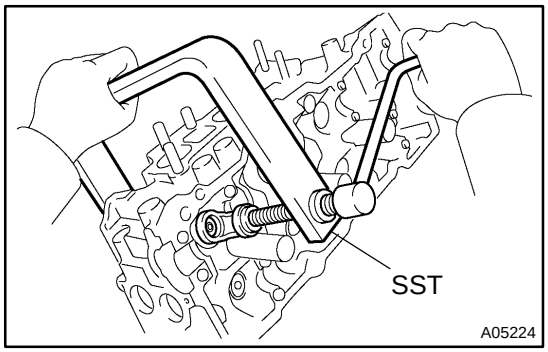
DISASSEMBLY



1. REMOVE VALVE LIFTERS AND SHIMS

HINT:

Arrange the valve lifters and shims in the correct order.

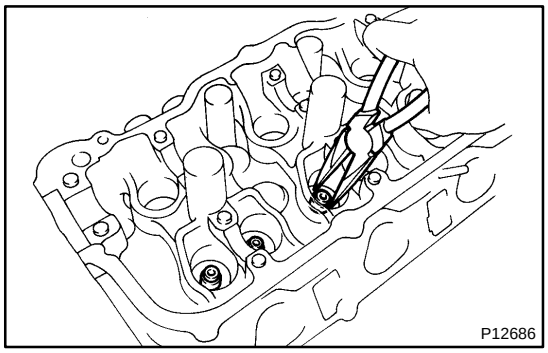


2. REMOVE VALVES

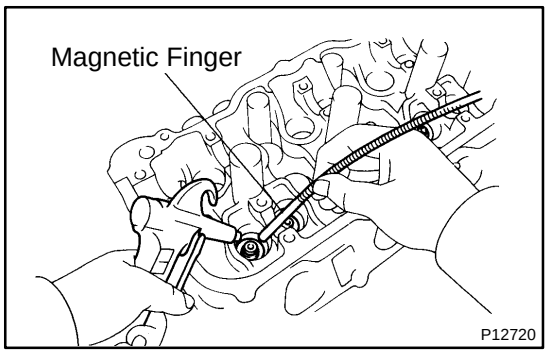
(a) Using SST, compress the valve spring and remove the 2 keepers.

SST 09202–70020 (09202–00010)

(b) Remove the spring retainer, valve spring and valve.



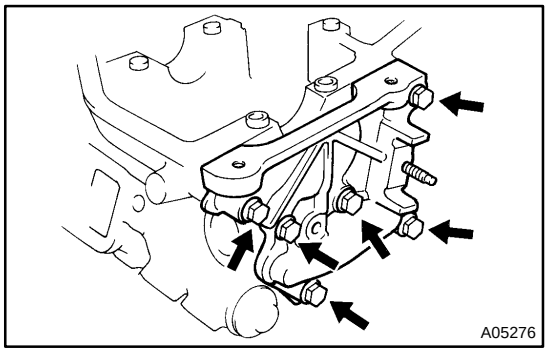
(c) Using needle–nose pliers, remove the oil seal.



(d) Using compressed air and a magnetic finger, remove the spring seat by blowing air.

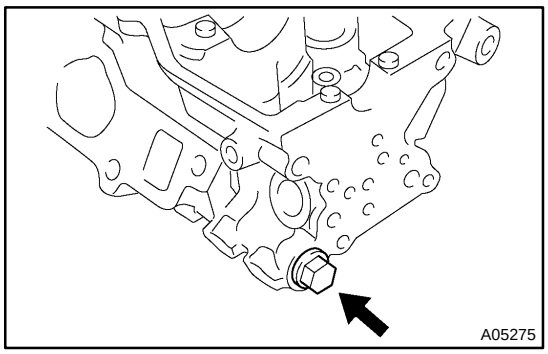
HINT:

Arrange the valves, valve springs, spring seats and spring retainers in the correct order.



3. REMOVE CYLINDER HEAD REAR COVER

Remove the 6 bolts, rear cover and gasket.

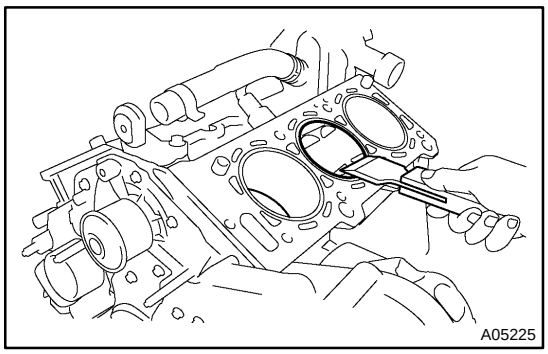


4. REMOVE OIL CONTROL VALVE FILTER

Remove the plug, gasket and valve filter.

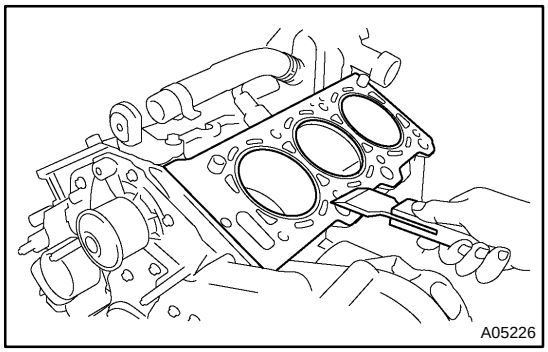
EM0ZG–01

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.

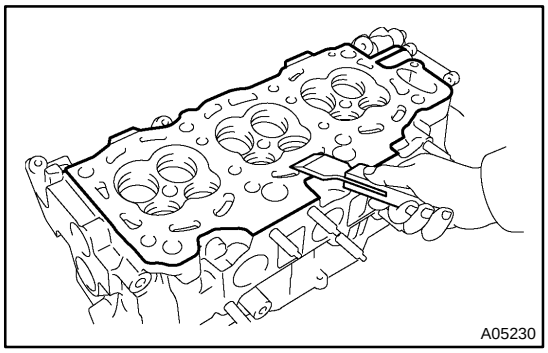


(b) Using a gasket scraper, remove all the gasket material from the cylinder block surface.

(c) Using compressed air, blow carbon and oil from the bolt holes.

CAUTION:

Protect your eyes when using high pressure compressed air.

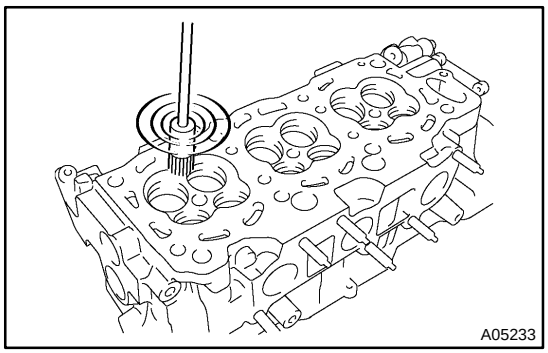


2. REMOVE GASKET MATERIAL

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.

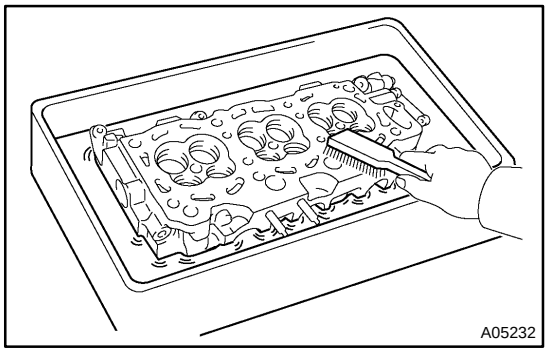


3. CLEAN COMBUSTION CHAMBERS

Using a wire brush, remove all the carbon from the combustion chambers.

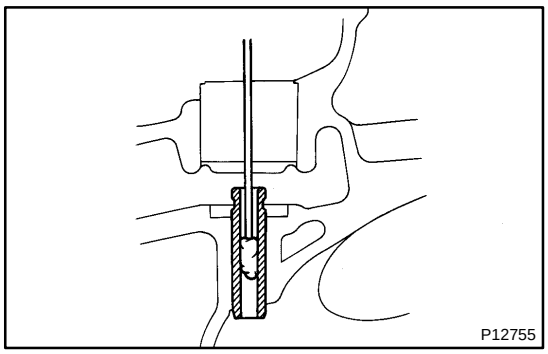
NOTICE:

Be careful not to scratch the cylinder block contact surface.



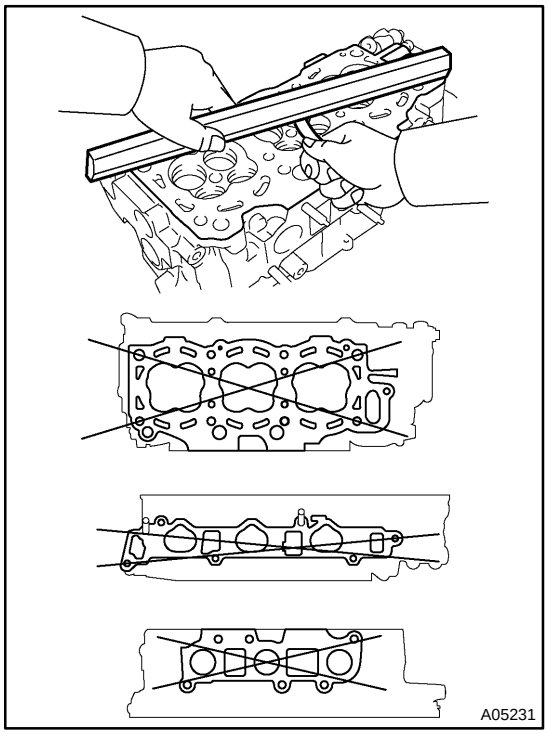
4. CLEAN CYLINDER HEADS

Using a soft brush and solvent, thoroughly clean the cylinder head.



5. CLEAN VALVE GUIDE BUSHINGS

Using a valve guide bushing brush and solvent, clean all the guide bushings.

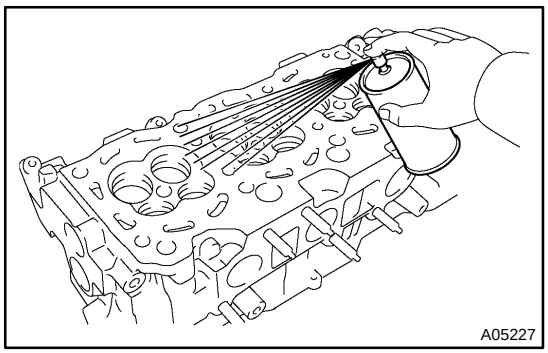


6. INSPECT FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surfaces contacting the cylinder block and the manifolds for warpage.

Maximum warpage: 0.10 mm (0.0039 in.)

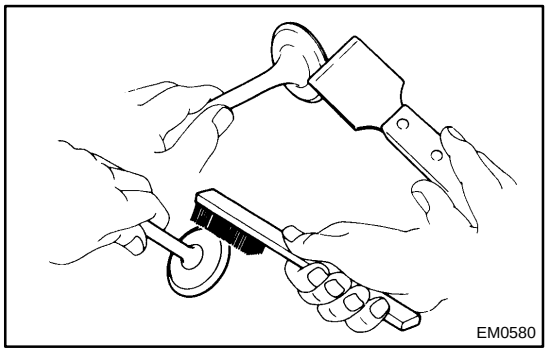
If warpage is greater than maximum, replace the cylinder head.



7. INSPECT FOR CRACKS

Using a dye penetrant, check the combustion chamber, intake ports, exhaust ports and cylinder block surface for cracks.

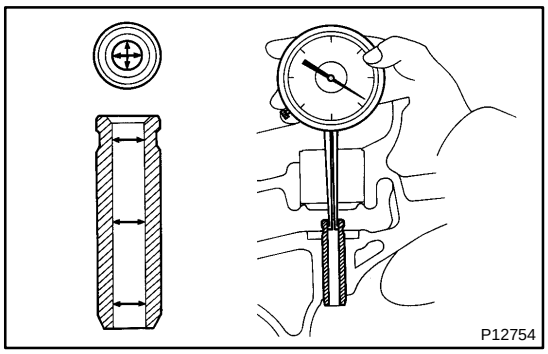
If cracked, replace the cylinder head.



8. CLEAN VALVES

(a) Using a gasket scraper, chip off any carbon from the valve head.

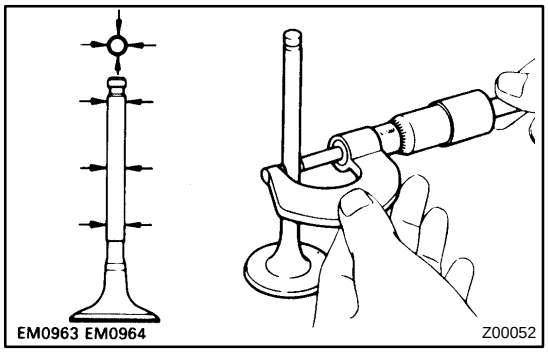
(b) Using a wire brush, thoroughly clean the valve.



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 guide bushing inside diameter measurement.

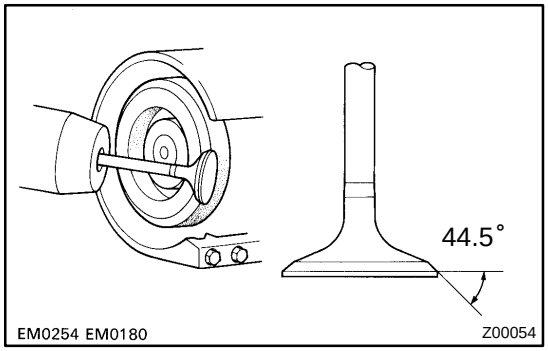
Standard oil clearance:

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 maximum, replace the valve and guide bushing.

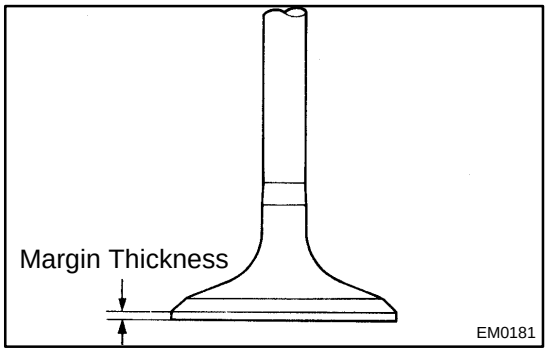


10. INSPECT AND GRIND VALVES

(a) Grind the valve enough to remove pits and carbon.

(b) Check that the valve is ground to the correct valve face angle.

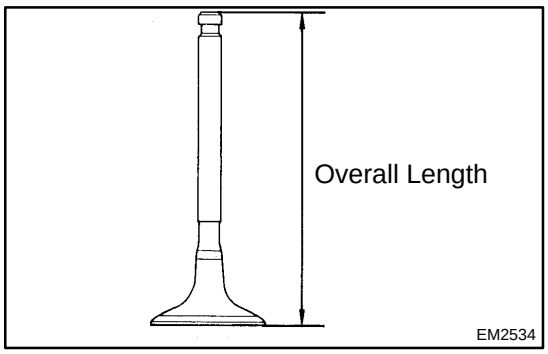
Valve face angle: 44.5°



(c) Check the valve head margin thickness.

Standard margin thickness: 1.0 mm (0.039 in.)
Minimum margin thickness: 0.5 mm (0.020 in.)

If the margin thickness is less than minimum, replace the valve.



(d) Check the valve overall length.

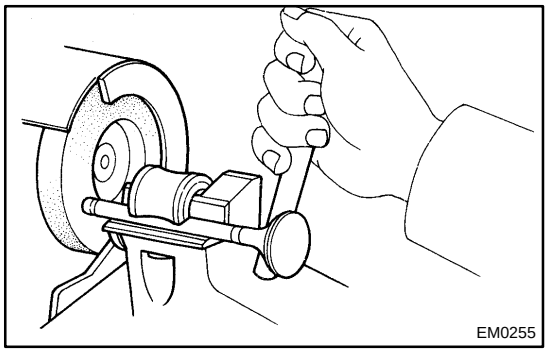
Standard overall length:

Intake	95.45 mm (3.5779 in.)
Exhaust	95.40 mm (3.7559 in.)

Minimum overall length:

Intake	94.95 mm (3.7382 in.)
Exhaust	94.90 mm (3.7362 in.)

If the overall length is less than minimum, replace the valve.

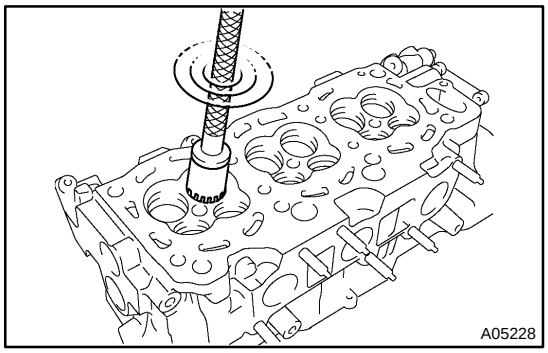


(e) Check the surface of the valve stem tip for wear.

If the valve stem tip is worn, resurface the tip with a grinder or replace the valve.

NOTICE:

Do not grind off more than minimum.

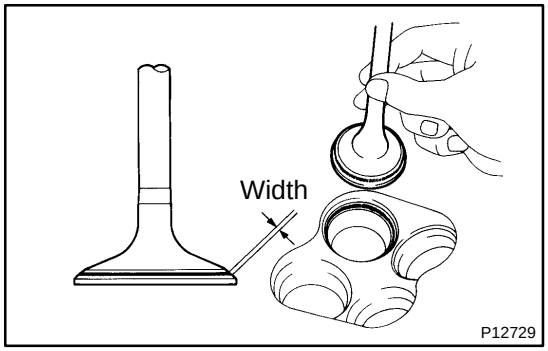


11. INSPECT AND CLEAN VALVE SEATS

(a) Using a 45˚ carbide cutter, resurface the valve seats. Remove only enough metal to clean the seats.

(b) Check the valve seating position.

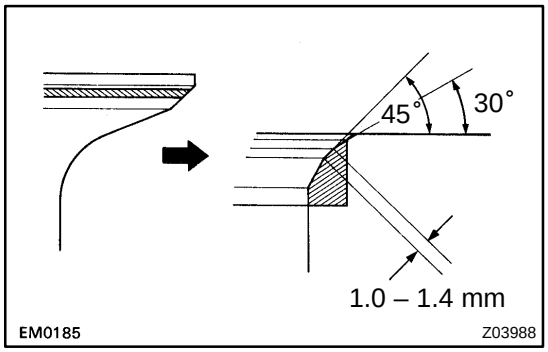
Apply a light coat of prussian blue (or white lead) to the valve face. Lightly press the valve against the seat. Do not rotate valve.



(c) Check the valve face and seat for the following:

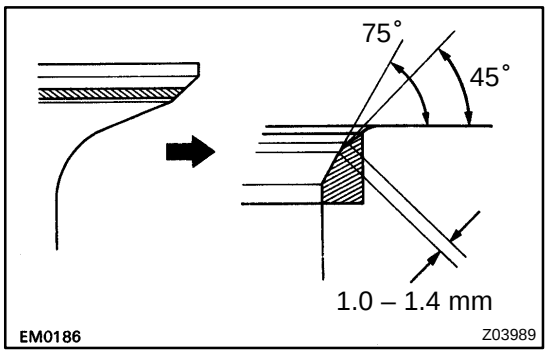
- If blue appears 360˚ around the face, the valve is concentric. If not, replace the valve.
- If blue appears 360˚ around the valve seat, the guide and face are concentric. If not, resurface the seat.
- Check that the seat contact is in the middle of the valve face with the following width:

1.0 – 1.4 mm (0.039 – 0.055 in.)

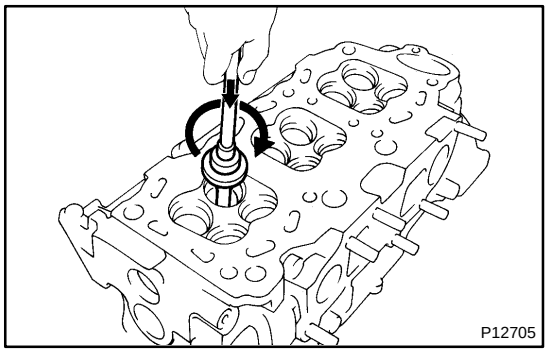


If not, correct the valve seats as follows:

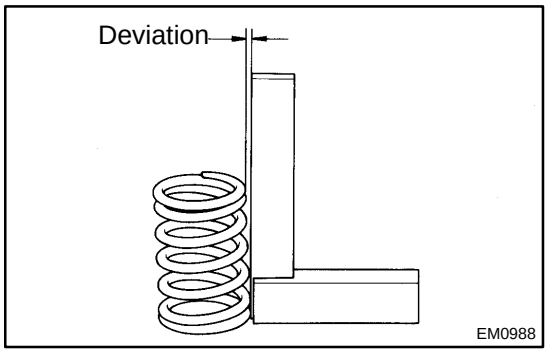
(1) If the seating is too high on the valve face, use 30˚ and 45˚ cutters to correct the seat.



(2) If the seating is too low on the valve face, use 75° 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.

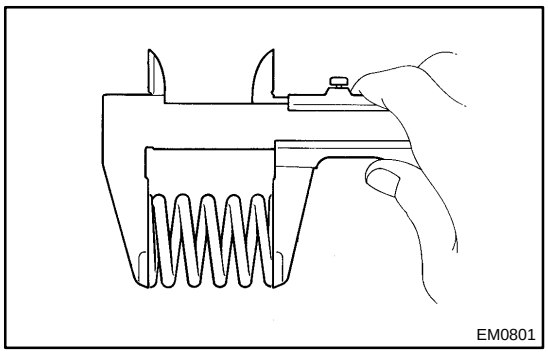


12. INSPECT VALVE SPRINGS

(a) Using a steel square, measure the deviation of the valve spring.

Maximum deviation: 2.0 mm (0.079 in.)

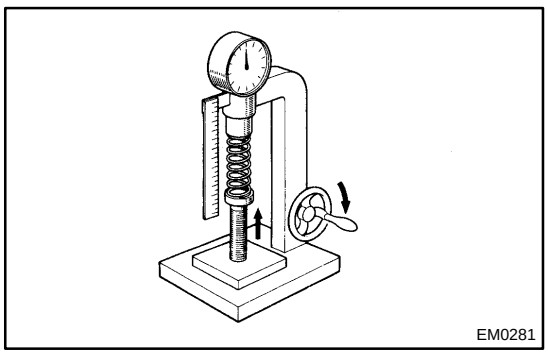
If the deviation is greater than maximum, replace the valve spring.



(b) Using vernier calipers, measure the free length of the valve spring.

Free length: 45.50 mm (1.7913 in.)

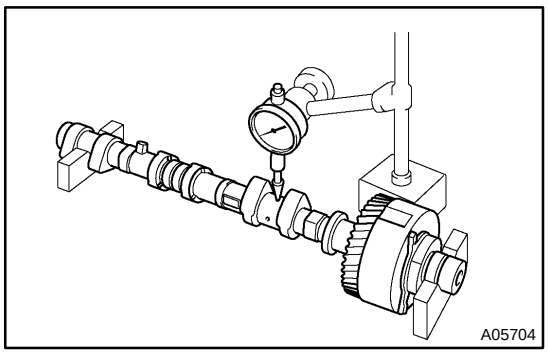
If the free length is not as specified, replace the valve spring.



(c) Using a spring tester, measure the tension of the valve spring at the specified installed length.

Installed tension:
186 – 206 N (19.0 – 21.0 kgf, 41.9 – 46.3 lbf)
at 33.8 mm (1.331 in.)

If the installed tension is not as specified, replace the valve spring.



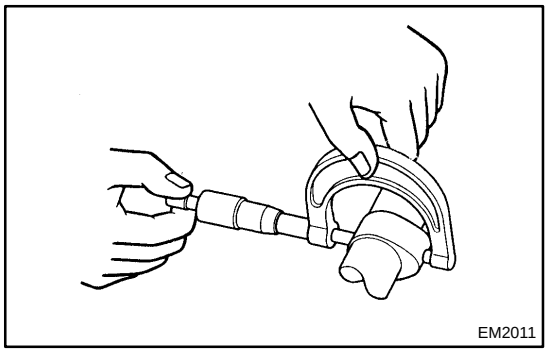
13. INSPECT CAMSHAFT FOR RUNOUT

(a) Place the camshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout: 0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the camshaft.



14. INSPECT CAM LOBES

Using a micrometer, measure the cam lobe height.

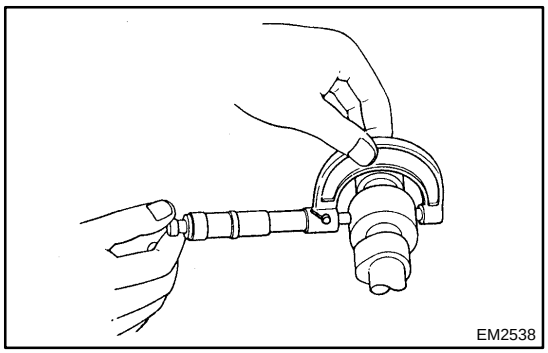
Standard cam lobe height:

Intake	42.932 – 43.032 mm (1.6902 – 1.6942 in.)
Exhaust	42.764 – 42.864 mm (1.6836 – 1.6876 in.)

Minimum cam lobe height:

Intake	42.78 mm (1.6842 in.)
Exhaust	42.61 mm (1.6776 in.)

If the cam lobe height is less than minimum, replace the camshaft.



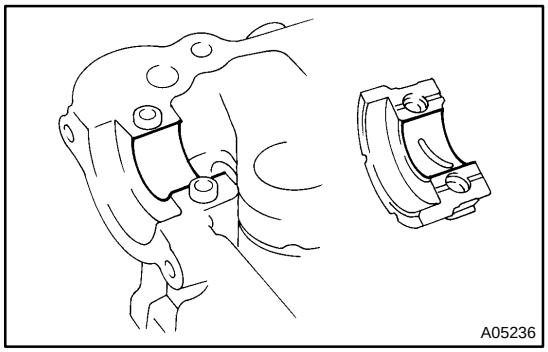
15. INSPECT CAMSHAFT JOURNALS

Using a micrometer, measure the journal diameter.

Journal diameter:

26.959 – 26.975 mm (1.0613 – 1.0620 in.)

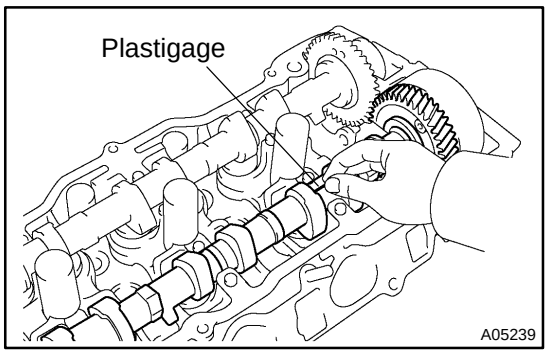
If the journal diameter is not as specified, check the oil clearance.



16. 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.

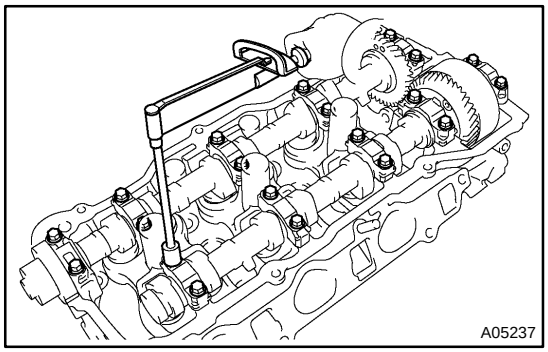


17. INSPECT CAMSHAFT JOURNAL OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the cylinder head.

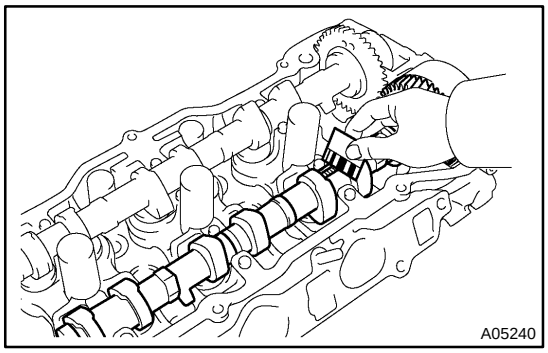
(c) Lay a strip of Plastigage across each of the camshaft journal.



(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.
Standard oil clearance:

Intake	0.035 – 0.072 mm (0.0014 – 0.0028 in.)
Exhaust	0.025 – 0.062 mm (0.0010 – 0.0024 in.)

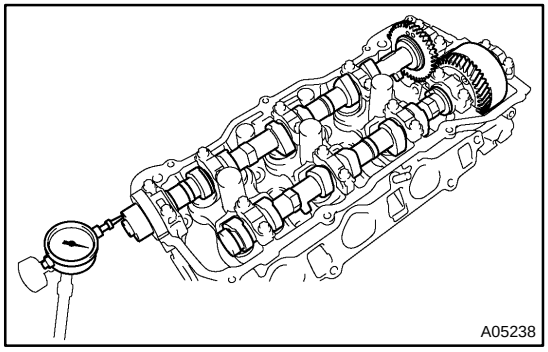
Maximum oil clearance:

Intake	0.10 mm (0.0039 in.)
Exhaust	0.09 mm (0.0035 in.)

If the oil clearance is greater than 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.



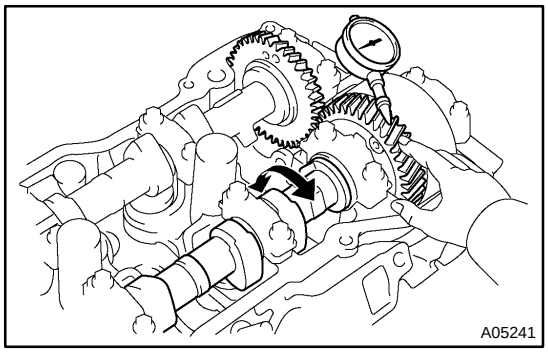
18. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts. (See page EM–59)

(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.
Standard thrust clearance:
0.040 – 0.090 mm (0.0016 – 0.0035 in.)
Maximum thrust clearance: 0.12 mm (0.0047 in.)

If the thrust clearance is greater than maximum, replace the camshaft. If necessary, replace the bearing caps and cylinder head as a set.

(c) Remove the camshafts.



19. INSPECT CAMSHAFT GEAR BACKLASH

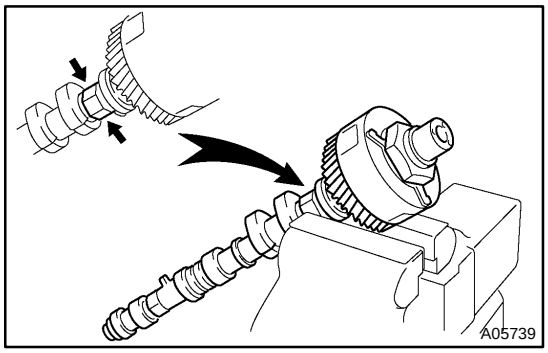
(a) Install the camshafts without installing the exhaust cam sub–gear. (See page EM–59)

(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.)

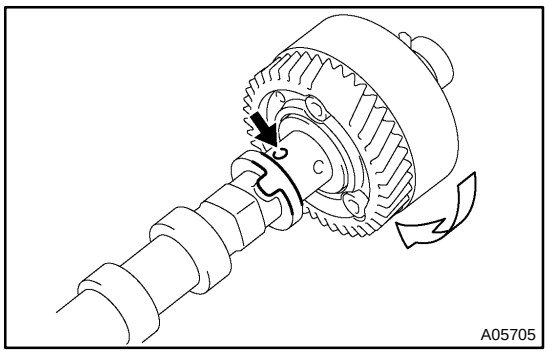
If the backlash is greater then maximum, replace the camshafts.

(c) Remove the camshafts.



20. INSPECT CAMSHAFT TIMING GEAR (VVT–i)

(a) Mount the hexagon wrench head portion of the camshaft in a vise.



(b) Check that VVT–i will not turn.

(c) Cover the port except the port on the advance angle side (nearest to the convex portion) shown in the illustration with the vinyl tape.

(d) Using the air gun, apply about 100 kPa (1 kgf/cm^3, 14 psi) of air pressure to the port on the advance side shown in the illustration.

NOTICE:

When the oil is splashed, wipe it off with a shop lug and the likes.

HINT:

Perform this in order to release the lock pin for the maximum delay angle locking.

Standard: Must turn

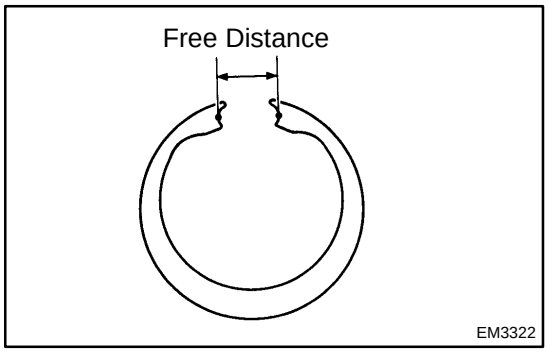
HINT:

Depending on the air pressure, VVT–i will turn to the advance angle side without applying force by hand. Also, under the condition that the pressure can be hardly applied because of the air leakage from the port, there may be the case that the lock pin could be hardly released.

(e) Under the condition of (d), turn VVT–i to the advance angle side (the white arrow marked direction in the illustration) with your hand.

(f) Except the position where the lock pin meets at the maximum delay angle, let VVT–i turn back and forth and check the movable range and that there is no disturbance.
Standard: Movable smoothly in the range about 30˚

(g) Turn VVT–i with your hand and lock it at the maximum delay angle position.

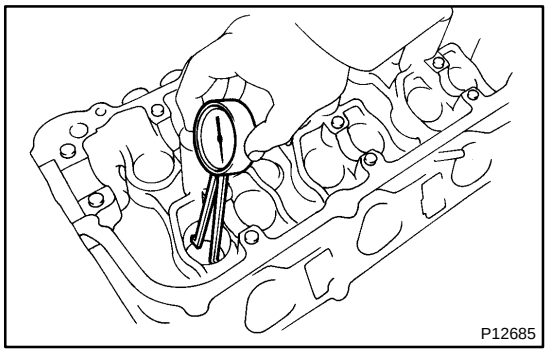


21. INSPECT CAMSHAFT GEAR SPRING

Using vernier calipers, measure the free distance between the spring ends.

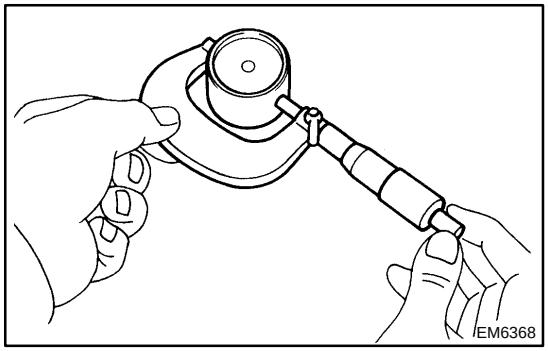
Free distance: 18.2 – 18.8 mm (0.712 – 0.740 in.)

If the free distance is not as specified, replace the gear spring.



22. 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 – 31.018 mm (1.2205 – 1.2212 in.)



(b) Using a micrometer, measure the lifter diameter.
Lifter diameter:
30.966 – 30.976 mm (1.2191 – 1.2195 in.)

(c) Subtract the lifter diameter measurement from the lifter bore diameter measurement.
Standard oil clearance:
0.024 – 0.050 mm (0.0009 – 0.0020 in.)
Maximum oil clearance: 0.07 mm (0.0028 in.)

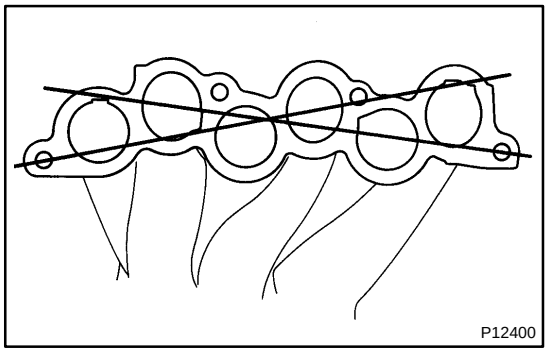
If the oil clearance is greater than maximum, replace the lifter. If necessary, replace the cylinder head.

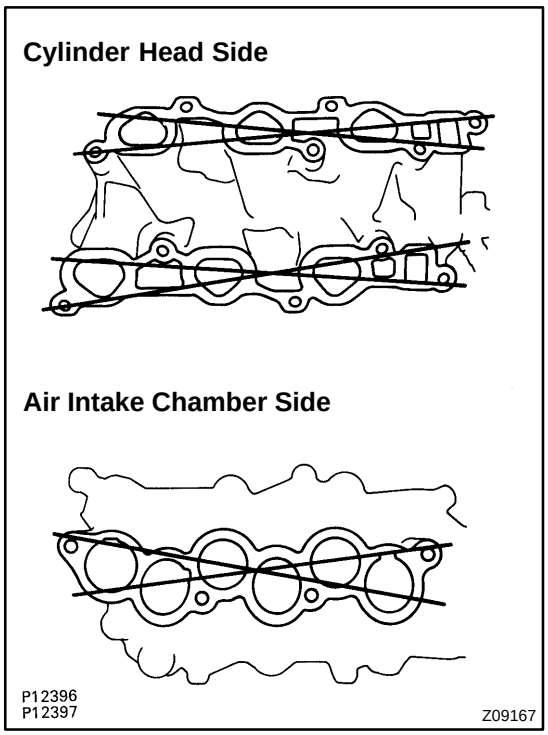
23. INSPECT AIR INTAKE CHAMBER

Using a precision straight edge and feeler gauge, measure the surface contacting the intake manifold for warpage.

Maximum warpage: 0.10 mm (0.0039 in.)

If warpage is greater than maximum, replace the chamber.





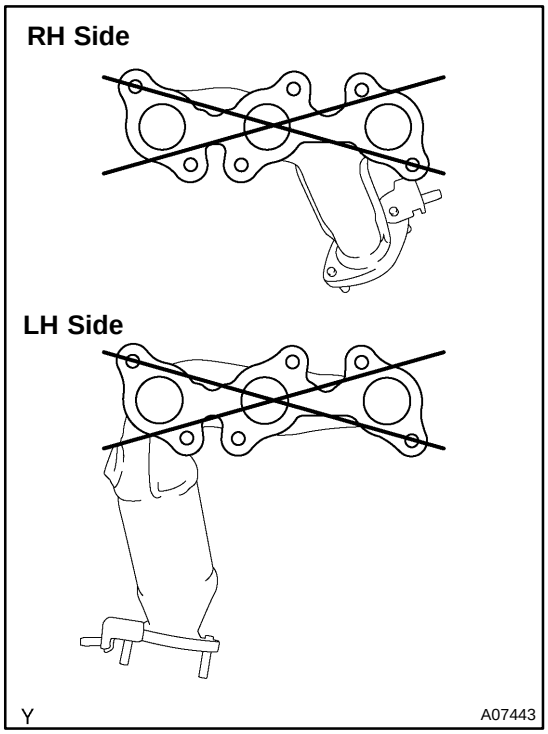
24. INSPECT INTAKE MANIFOLD

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head and air intake chamber for warpage.

Maximum warpage:

Air intake chamber side	0.15 mm (0.0059 in.)
Cylinder head side	0.08 mm (0.0031 in.)

If warpage is greater than maximum, replace the manifold.

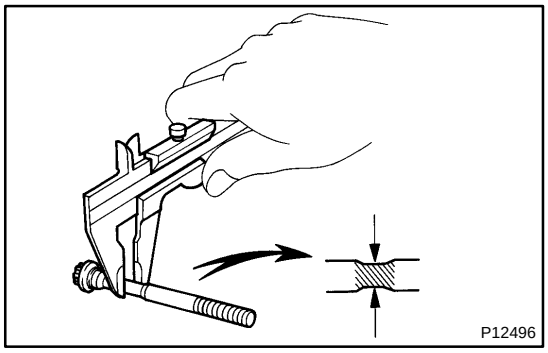


25. INSPECT EXHAUST MANIFOLDS

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head for warpage.

Maximum warpage: 0.50 mm (0.0196 in.)

If warpage is greater than maximum, replace the manifold.



26. INSPECT 12 POINTED HEAD CYLINDER HEAD BOLTS

Using vernier calipers, measure the tension portion diameter of the bolt.

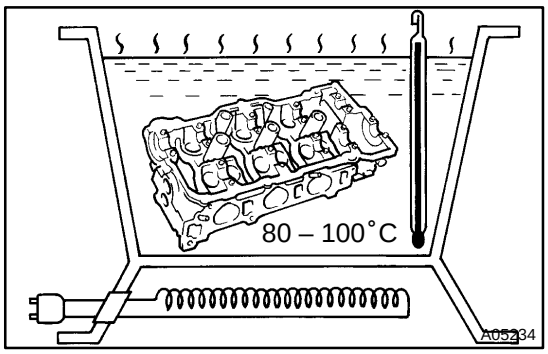
Standard outside diameter:
8.95 – 9.05 mm (0.3524 – 0.3563 in.)
Minimum outside diameter: 8.75 mm (0.3445 in.)

If the diameter is less than minimum, replace the bolt.

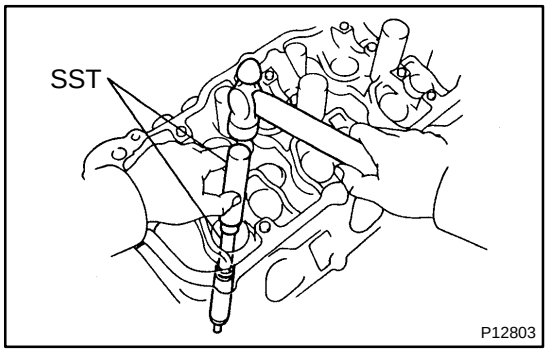
EM0ZH–01

REPLACEMENT

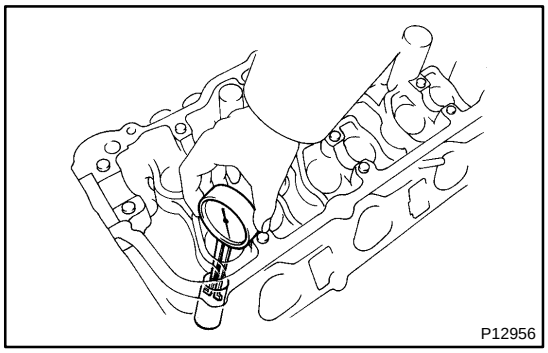
1. REPLACE VALVE GUIDE BUSHINGS



(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 09201–01055, 09950–70010 (09951–07100)



(c) Using a caliper gauge, measure the bushing bore diameter of the cylinder head.

Both intake and exhaust

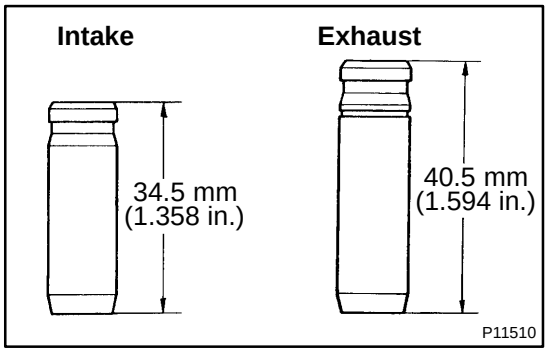
Bushing bore diameter mm (in.)	Bushing size
10.295 – 10.313 (0.4053 – 0.4060)	Use STD
10.345 – 10.363 (0.4073 – 0.4080)	Use O/S 0.05

(d) Select a new guide bushing (STD or O/S 0.05).

If the bushing bore diameter of the cylinder head is greater than 10.313 mm (0.4060 in.), machine the bushing bore to the following dimension:

10.345 – 10.363 mm (0.4073 – 0.4080 in.)

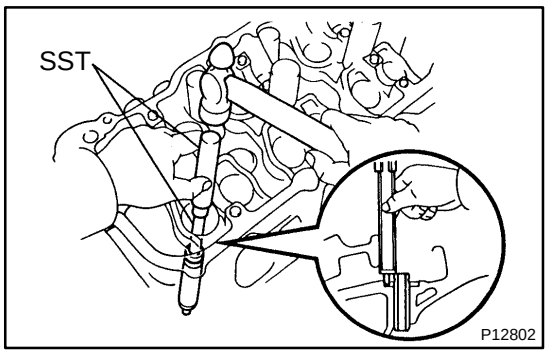
If the bushing bore diameter of the cylinder head is greater than 10.363 mm (0.4080 in.), replace the cylinder head.



HINT:

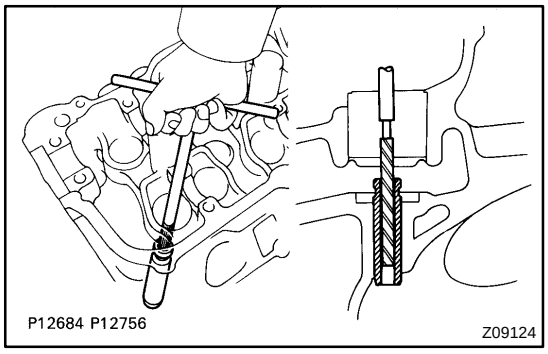
Different bushings are used for the intake and exhaust.

(e) Gradually heat the cylinder head to 80 – 100˚C (176 – 212˚F).

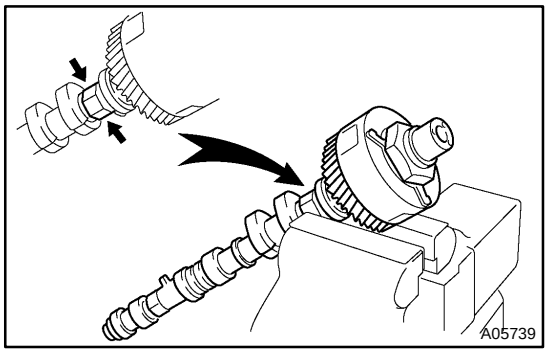


(f) Using SST and a hammer, tap in a new guide bushing to the specified protrusion height.
SST 09201–01055, 09950–70010 (09951–07100)
Protrusion height:

Intake	11.1 – 11.3 mm (0.437 – 0.453 in.)
Exhaust	8.9 – 9.3 mm – (0.350 – 0.366 in.)



(g) Using a sharp 5.5 mm reamer, ream the guide bushing to obtain the standard specified clearance (See page EM–42) between the guide bushing and valve stem.



2. REPLACE CAMSHAFT TIMING GEAR (VVT–i)

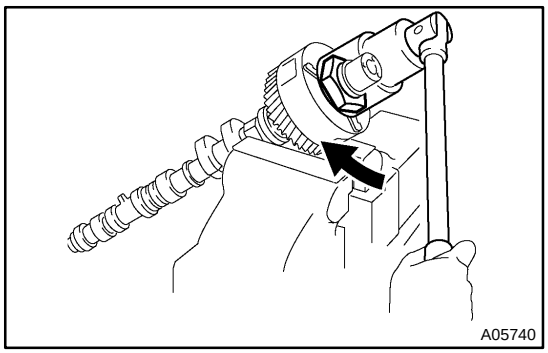
NOTICE:

Do not remove or install the camshaft timing gear (VVT–i) beside changing VVT–i or the camshaft.

(a) Mount the hexagon wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.



(b) Using a 46 mm socket wrench, remove the lock nut by turning it clockwise.

NOTICE:

- **Remove it under the condition that the lock pin is operated and lock at the maximum delay angle position.**
- **The lock nut have LH threads.**
- **Never use any tool other than the socket wrench, otherwise that may result in deforming the cam angle rotor portion.**

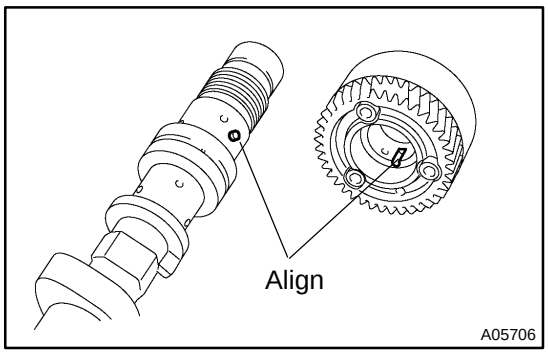
(c) Remove the camshaft VVT–i.

HINT:

In case of having difficulty to remove VVT–i, apply a slight hitting using a plastic–faced hammer and then remove it.

NOTICE:

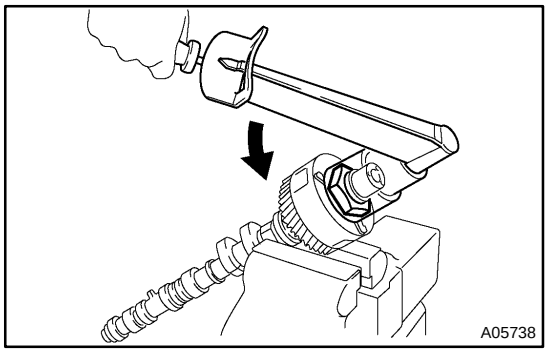
Never remove the 3 bolts on the gear.



(d) Align the knock pin and knock pin groove and install VVT–i on the camshaft.

NOTICE:

Install it under the condition that the lock pin is operated and lock at the maximum delay angle position.



(e) Apply the engine oil on the nut, the placing surface of VVT–i and the screw portion.

HINT:

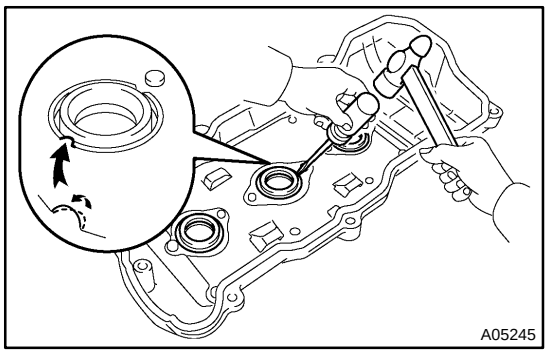
Be sure to apply the oil, otherwise the prescribed torque cannot be obtained.

(f) Using a 46 mm socket wrench, install and torque a new lock nut by turning it counterclockwise.

Torque: 150 N·m (1,530 kgf·cm, 110 ft·lbf)

NOTICE:

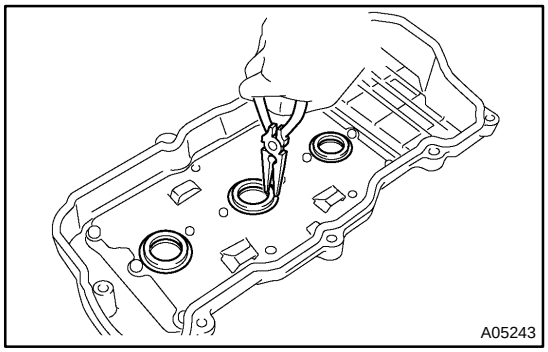
- **Must change the nuts to the new ones when to change VVT–i.**
- **The lock nut have LH threads.**
- **Never use any tool other than the socket wrench, otherwise that may result in deforming the cam angle rotor portion.**



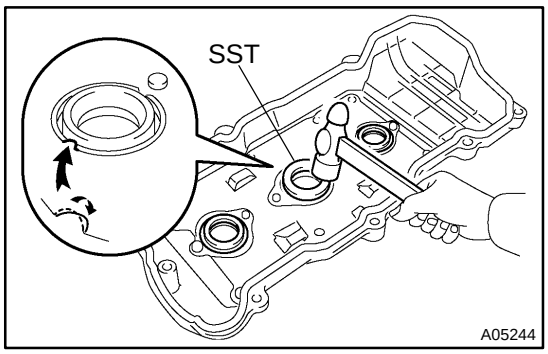
3. REPLACE SPARK PLUG TUBE GASKETS

(a) Bend up the tab on the ventilation baffle plate which prevents the gasket from the slipping out.

(b) Using a screwdriver and hammer, tap out the gasket.



(c) Using needle–nose pliers, pry out the gasket.



(d) 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 09608–03071

(e) Apply a light coat of MP grease to the gasket lip.

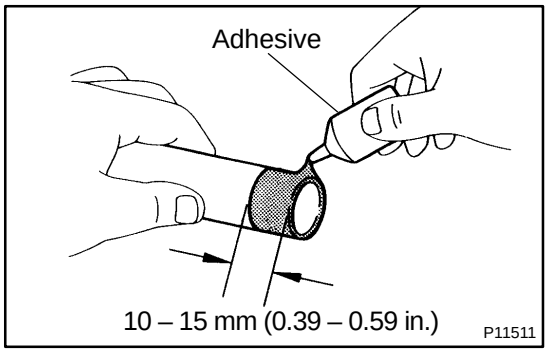
(f) Return the ventilation plate tab to its original position.

EM0ZI–01

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.

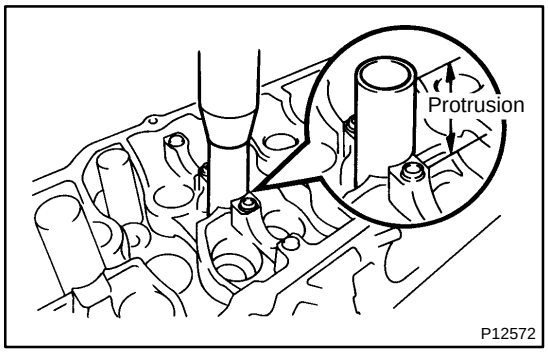


1. INSTALL SPARK PLUG TUBES

HINT:

When using a new cylinder head, spark plug tubes must be installed.

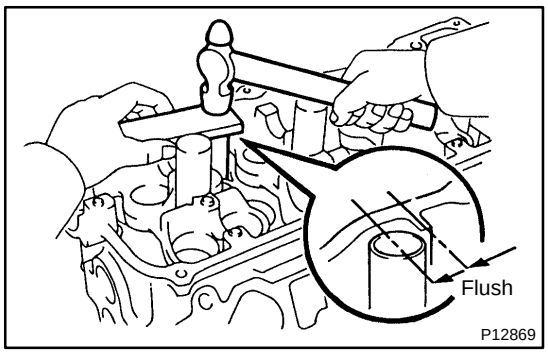
(a) Apply adhesive to the end of the spark plug tube.
Adhesive: Part No. 08833–00070, THREE BOND 1324 or equivalent



(b) Using a press, press in a new spark plug tube until there is 42.4 – 43.4 mm (1.669 – 1.709 in.) protruding from the camshaft bearing cap installation surface of the cylinder head.

NOTICE:

Avoid pressing a new spark plug tube in too far by measuring the amount of the protrusion while pressing.



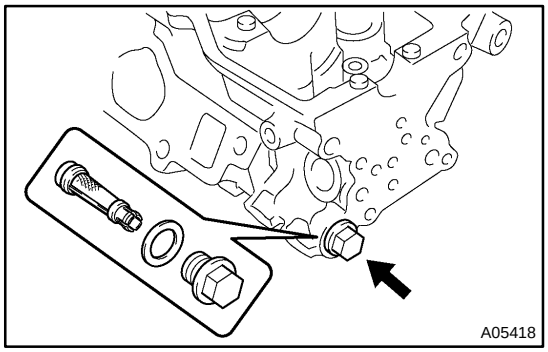
2. INSTALL PCV PIPES

HINT:

When using a new cylinder head, PCV pipe must be installed.
Using a wooden block and hammer, tap in a new PCV pipe until its top side is flush with the cylinder head edge.

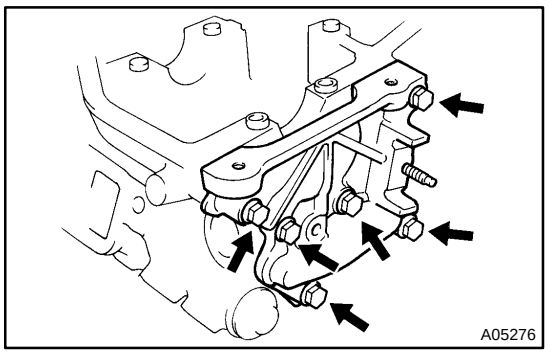
NOTICE:

Be careful not to damage the cylinder head edge.



3. INSTALL OIL CONTROL VALVE FILTER

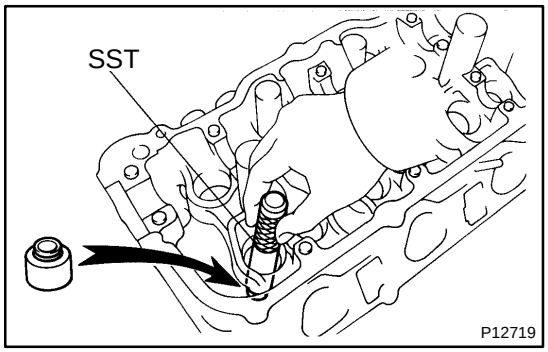
(a) Assemble the valve filter and plug.
(b) Install the plug with new gasket.
Torque: 45 N·m (460 kgf·cm, 33 ft·lbf)



4. INSTALL CYLINDER HEAD REAR COVER

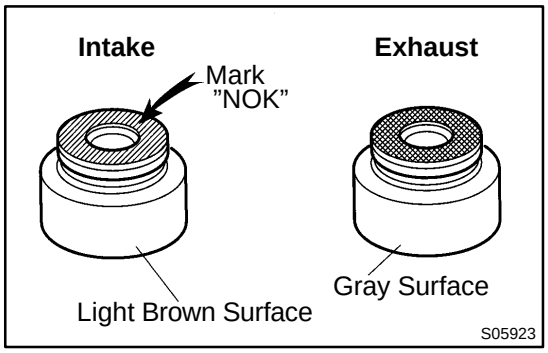
Install the rear cover and gasket with the 6 bolts.

Torque: 10 N·m (100 kgf·cm, 7.3 ft·lbf)



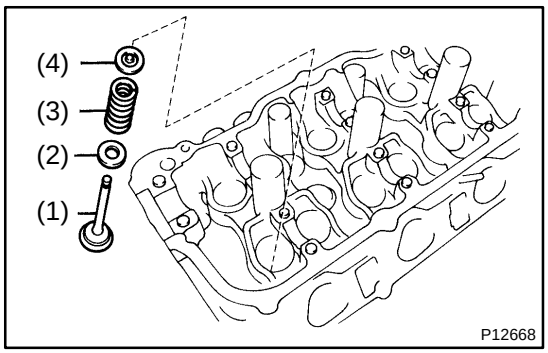
5. INSTALL VALVES

(a) Using SST, push in a new oil seal.
SST 09201–41020

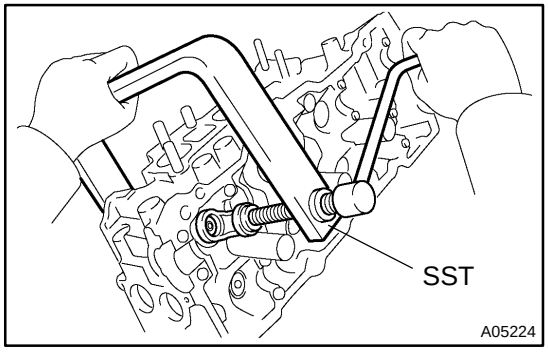


HINT:
The intake valve oil seal is light brown and the exhaust valve oil seal is gray.

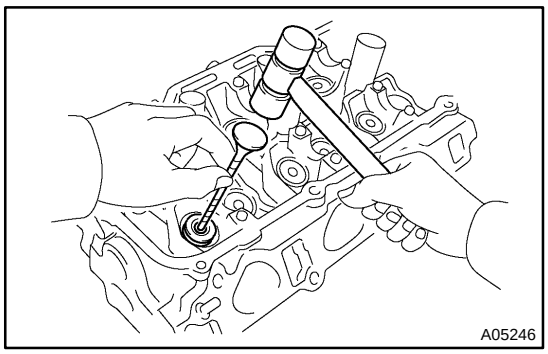
NOTICE:
Pay much attention when assembling the oil seal for intake and exhaust. Assembling the wrong one may cause a failure.



(b) Install the valve (1), spring seat (2), valve spring (3) and spring retainer (4).



(c) Using SST, compress the valve spring and place the 2 keepers around the valve stem.
SST 09202–70020 (09202–00010)



(d) Using a plastic–faced hammer and the valve stem (not in use) tip wound with vinyl tape, lightly tap the valve stem tip to assure proper fit.

NOTICE:

Be careful not do damage the valve stem tip.

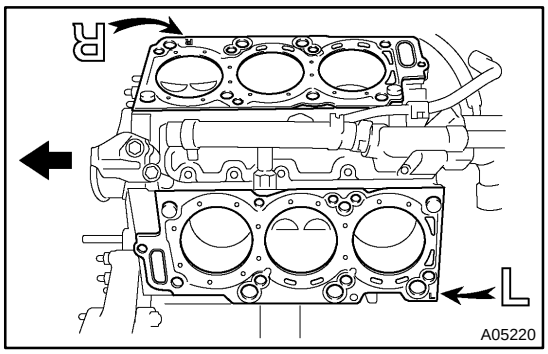
6. INSTALL VALVE LIFTERS AND SHIMS

(a) Install the valve lifter and shim.

(b) Check that the valve lifter rotates smoothly by hand.

EM0ZJ–01

INSTALLATION



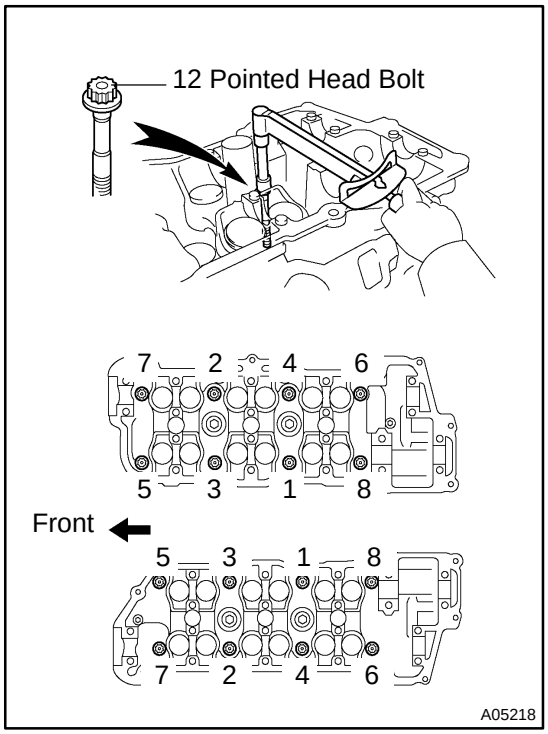
1. PLACE CYLINDER HEAD ON CYLINDER BLOCK

(a) Place 2 new cylinder head gaskets in position on the cylinder block.

NOTICE:

Be careful of the installation direction.

(b) Place the 2 cylinder heads in position on the cylinder head gaskets.



2. INSTALL 12 POINTED HEAD CYLINDER HEAD BOLTS

HINT:

- The cylinder head bolts are tightened in 2 progressive steps (steps (c) and (e)).
- If any bolt is broken or deformed, replace it.

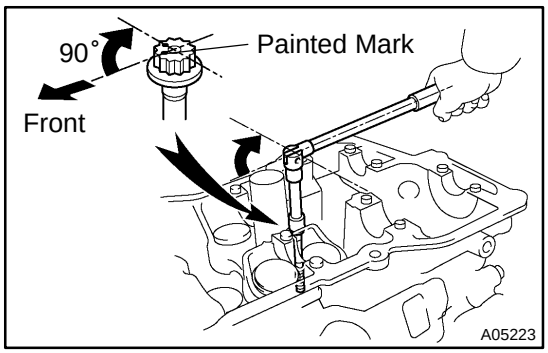
(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Install the plate washer to the cylinder head bolt.

(c) Install and uniformly tighten the cylinder head bolts on each cylinder head in several passes and in the sequence shown, then repeat for the other side, as shown.

Torque: 54 N·m (550 kgf·cm, 40 ft·lbf)

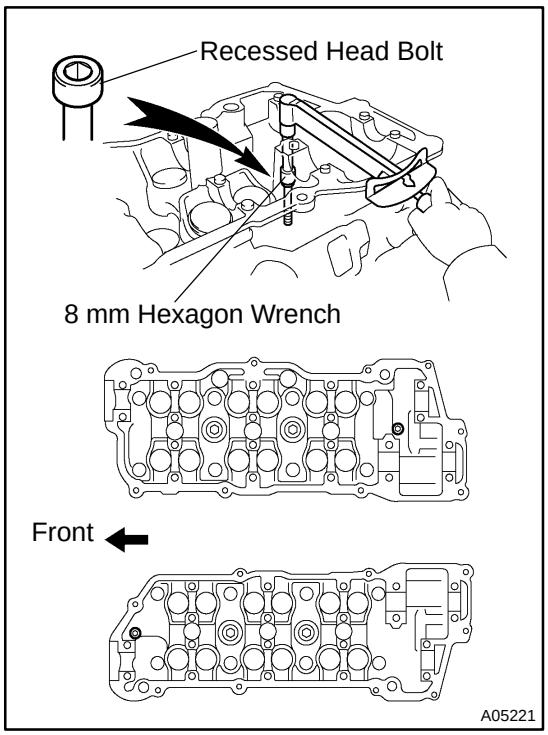
If any of the cylinder head bolts does not meet the torque specification, replace the cylinder head bolt.



(d) Mark the front of the cylinder head bolt head with paint.

(e) Retighten the cylinder head bolts by 90° in the numerical order shown.

(f) Check that the painted mark is now at a 90° angle to the front.

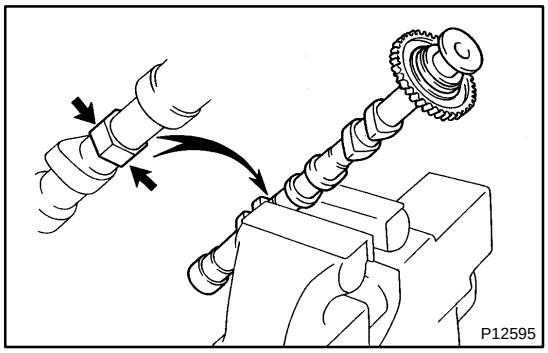


3. INSTALL RECESSED HEAD CYLINDER HEAD BOLTS

(a) Apply a light coat of engine oil on the threads and under the heads of the cylinder head bolts.

(b) Using an 8 mm hexagon wrench, install the cylinder head bolt on each cylinder head, then repeat for the other side, as shown.

Torque: 18.5 N·m (185 kgf·cm, 13 ft·lbf)

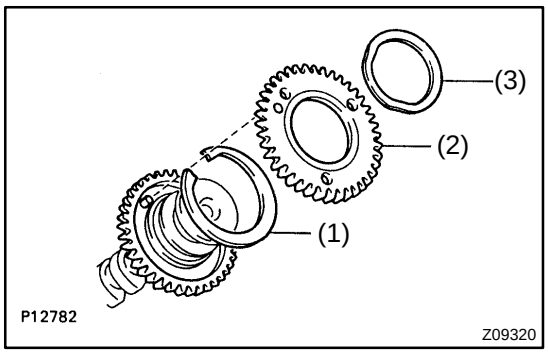


4. ASSEMBLE EXHAUST CAMSHAFTS

(a) Mount the hexagonal wrench head portion of the camshaft in a vise.

NOTICE:

Be careful not to damage the camshaft.

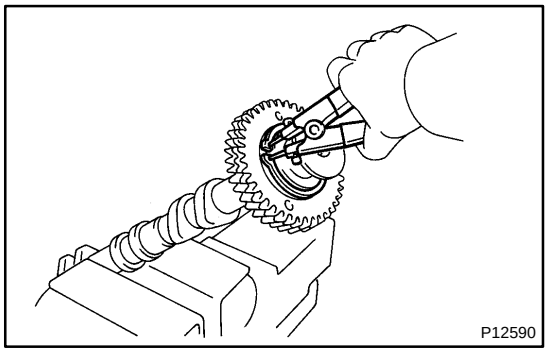


(b) Install the camshaft gear spring (1) and camshaft sub–gear (2).

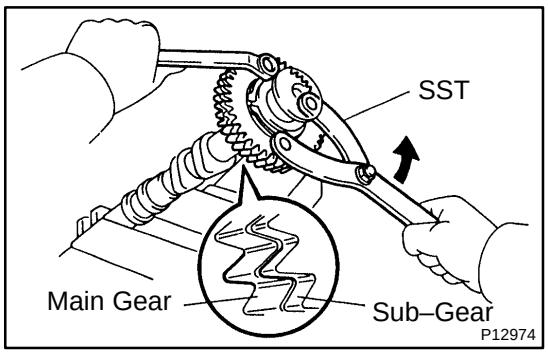
HINT:

Attach the pins on the gears to the gear spring ends.

(c) Install the wave washer (3).



(d) Using snap ring pliers, install the snap ring.



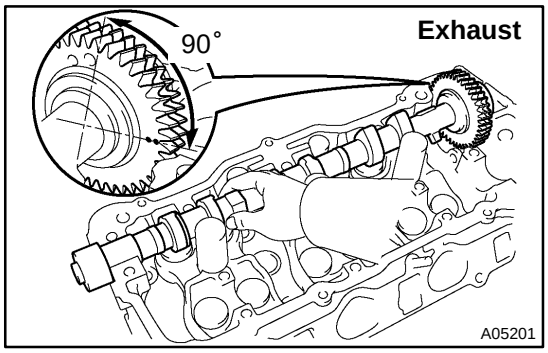
(e) Using SST, align the holes of the camshaft main gear and sub–gear by turning camshaft sub–gear counterclockwise, and temporarily install a service bolt.
SST 09960–10010 (09962–01000, 09963–00500)

(f) Align the gear teeth of the main gear and sub–gear, and tighten the service bolt.

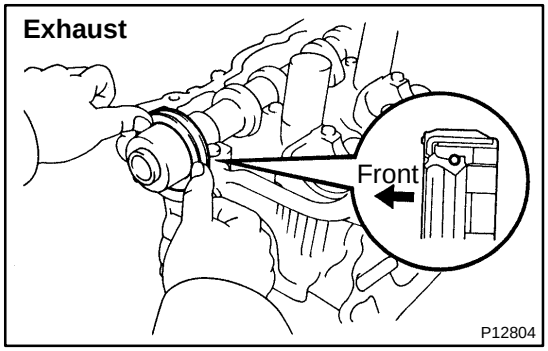
5. INSTALL CAMSHAFTS OF RH CYLINDER HEAD

NOTICE:

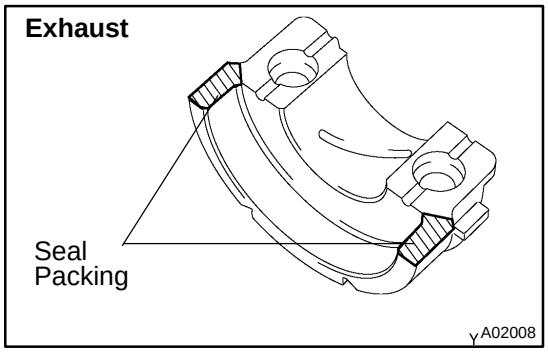
Since the thrust clearance of the camshaft is small, the camshaft must be kept leveled while it is being installed. If the camshaft is not kept leveled, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.



(a) Install the exhaust camshaft.
(1) Apply new engine oil to the thrust portion and journal of the camshaft.
(2) Place the exhaust camshaft at 90˚ angle of timing mark (2 dot marks) on the cylinder head.
(3) Apply MP grease to a new oil seal lip.

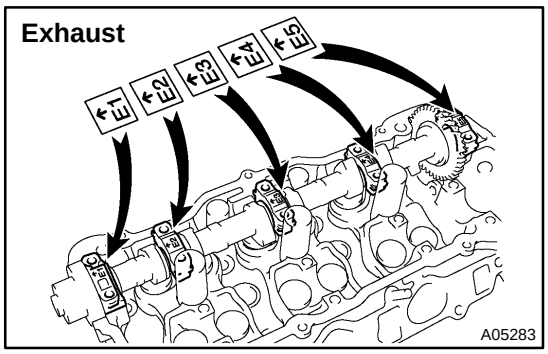


(4) Install the oil seal to the camshaft.

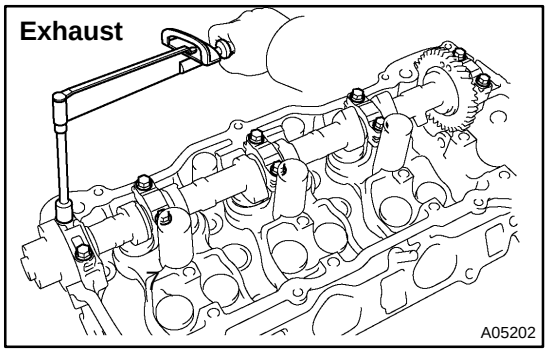


(5) Remove any old packing (FIPG) material.
(6) Apply seal packing to the No.1 bearing cap as shown.

Seal packing: Part No. 08826–00080 or equivalent



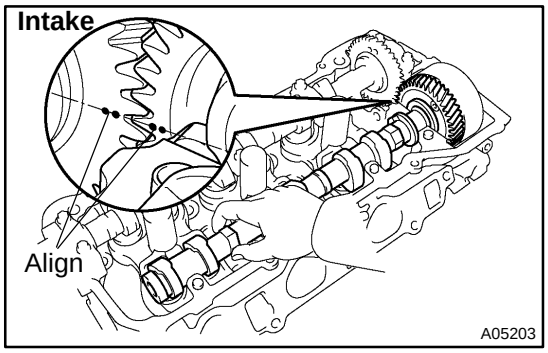
(b) Install the 5 bearing caps in their proper locations.



(c) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(d) Install and uniformly tighten the 10 bearing cap bolts in several passes and in the sequence shown.

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

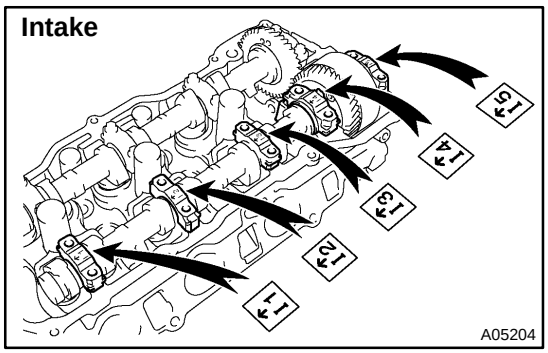


(e) Install the Intake camshaft.

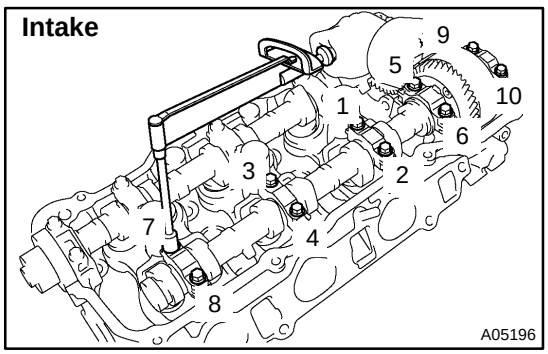
(1) Apply new engine oil to the thrust portion and journal of the camshaft.

(2) Align the timing marks (2 dot marks) of the camshaft drive and driven gears.

(3) Place the intake camshaft on the cylinder head.



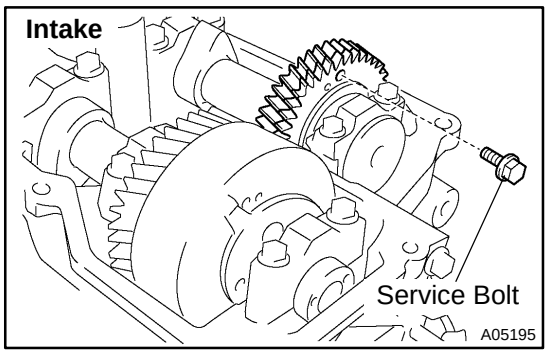
(4) Install the 5 bearing caps in their proper locations.



(5) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.

(6) Install and uniformly tighten the 10 bearing cap bolts in several passes and in the sequence shown.

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

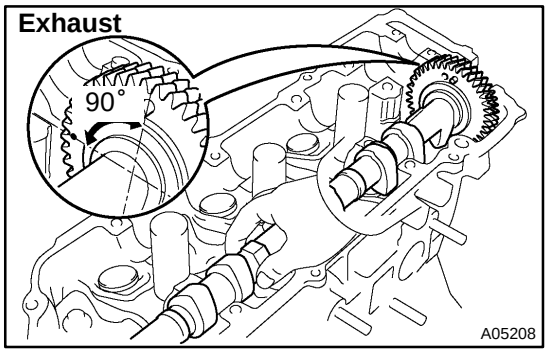


(7) Remove the service bolt.

6. INSTALL CAMSHAFTS OF LH CYLINDER HEAD

NOTICE:

Since the thrust clearance of the camshaft is small, the camshaft must be kept leveled while it is being installed. If the camshaft is not kept leveled, the portion of the cylinder head receiving the shaft thrust may crack or be damaged, causing the camshaft to seize or break. To avoid this, the following steps should be carried out.

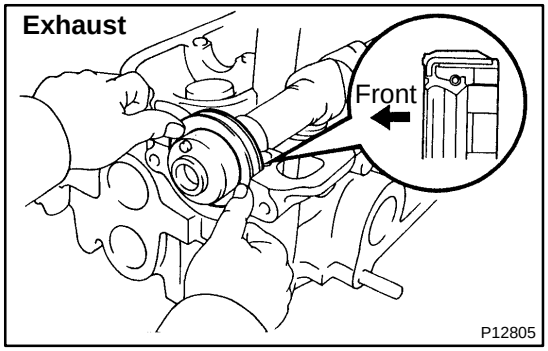


(a) Install the exhaust camshaft.

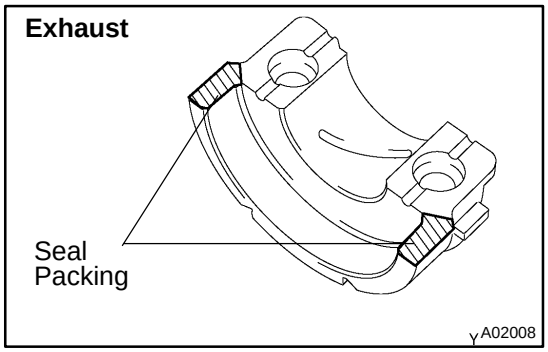
(1) Apply new engine oil to the thrust portion and journal of the camshaft.

(2) Place the exhaust camshaft at 90° angle of timing mark (1 dot mark) on the cylinder head.

(3) Apply MP grease to a new oil seal lip.



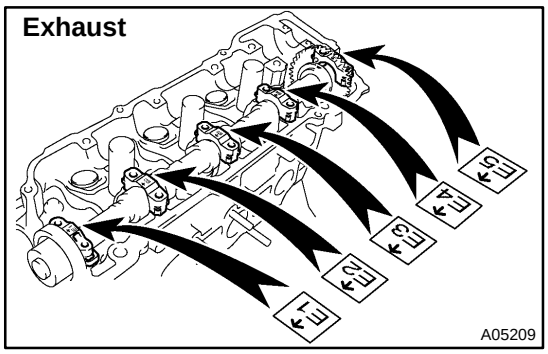
(4) Install the oil seal to the camshaft.



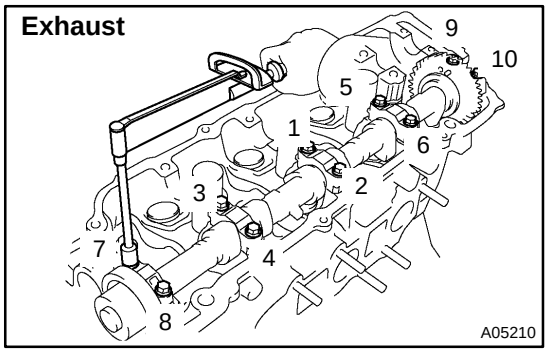
(5) Remove any old packing (FIPG) material.

(6) Apply seal packing to the No.1 bearing cap as shown.

Seal packing: Part No. 08826–00080 or equivalent

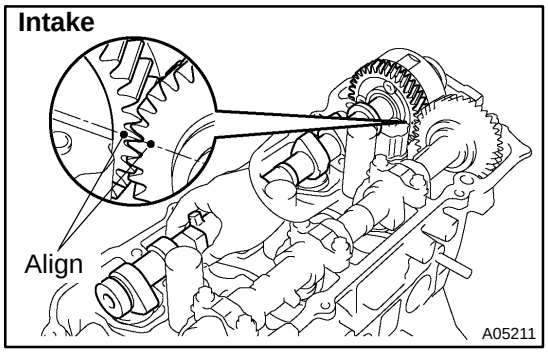


(7) Install the 5 bearing caps in their proper locations.

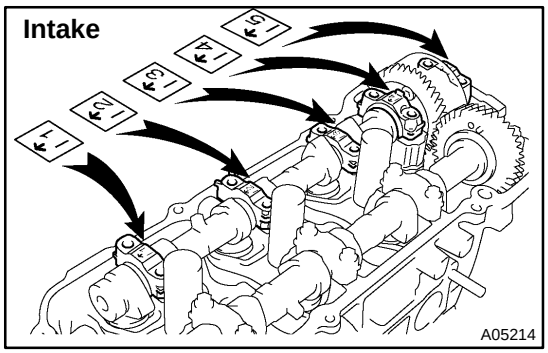


(8) Apply a light coat of engine oil on the threads and under the heads of the bearing cap bolts.
(9) Install and uniformly tighten the 10 bearing cap bolts in several passes and in the sequence shown.

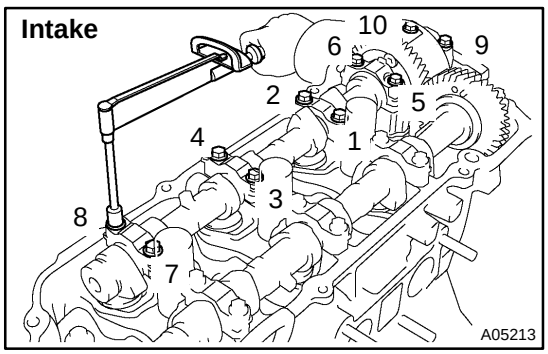
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



(b) Install the intake camshaft.
(1) Apply new engine oil to the thrust portion and journal of the camshaft.
(2) Align the timing marks (1 dot mark) of the camshaft drive and driven gears.
(3) Place the intake camshaft on the cylinder head.

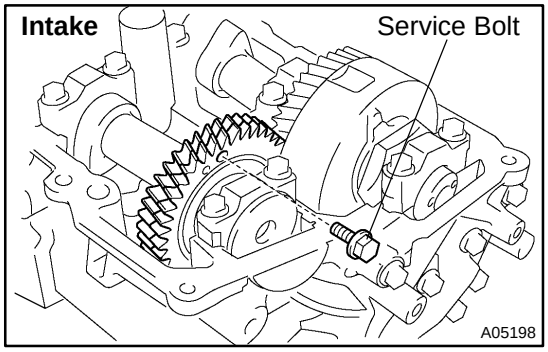


(4) Install the 5 bearing caps in their proper locations.



(5) Apply a light coat of engine oil on the threads and under the heads of bearing cap bolts.
(6) Install and uniformly tighten the 10 bearing cap bolts in several passes and in the sequence shown.

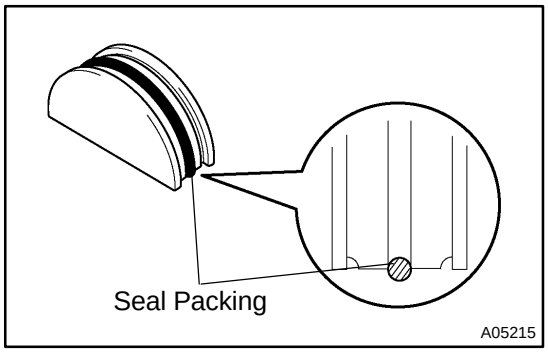
Torque: 16 N·m (160 kgf·cm, 12 ft·lbf)



(7) Remove the service bolt.

7. CHECK AND ADJUST VALVE CLEARANCE
(See page EM–4)

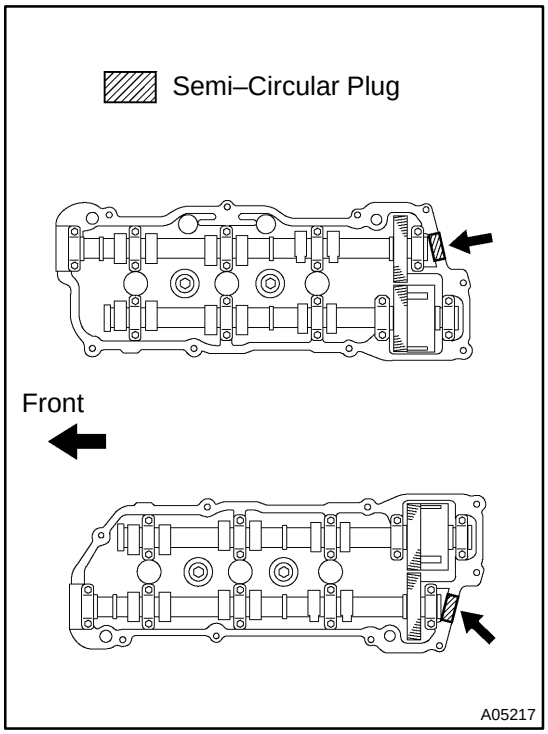
Turn the camshaft and position the cam lobe upward, and check and adjust the valve clearance.



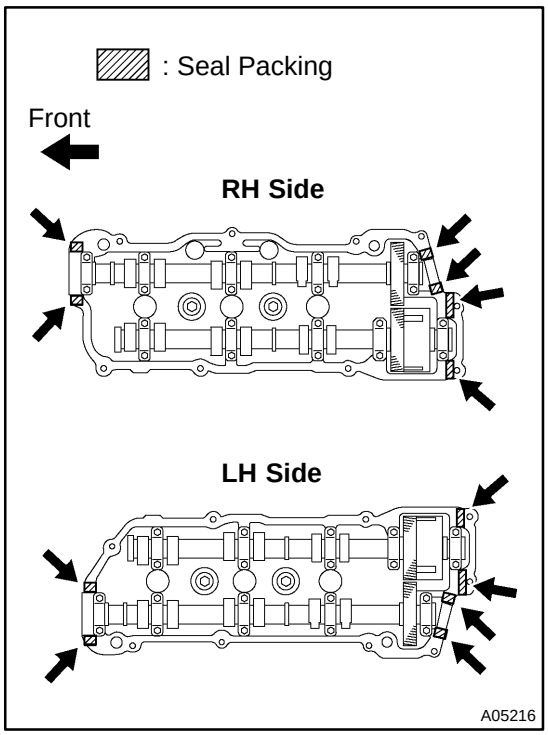
8. INSTALL SEMI–CIRCULAR PLUGS

(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 2 semi–circular plugs to the cylinder heads.



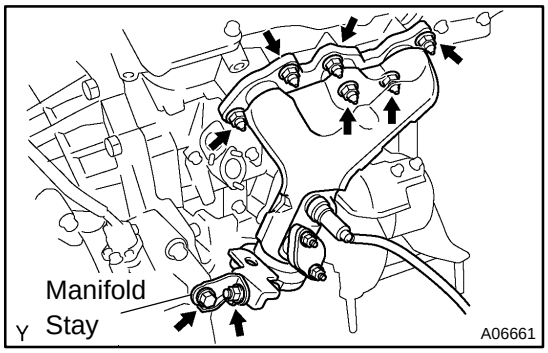
9. INSTALL CYLINDER HEAD COVERS

(a) Apply seal packing to the cylinder heads as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent

(b) Install the gasket to the cylinder head cover.

(c) Install the cylinder head cover with the 9 bolts. Uniformly tighten the bolts in several passes. Install the 2 cylinder head covers.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

10. INSTALL PS PUMP BRACKET
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

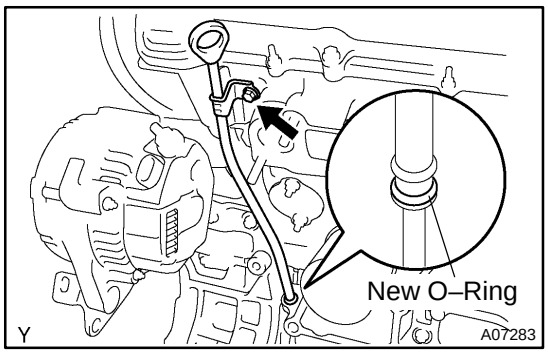


11. INSTALL RH EXHAUST MANIFOLD

(a) Install a new gasket and the exhaust manifold with the 6 nuts. Uniformly tighten the nuts in several passes.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install the exhaust manifold stay with the bolt and nut. Alternately tighten the bolt and nut.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(c) Connect the A/F sensor connector.



12. INSTALL OIL DIPSTICK AND GUIDE

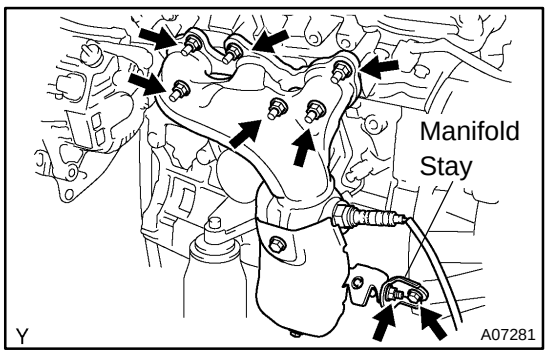
(a) Install a new O–ring to the dipstick guide.

(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: 8 N·m (80 kgf·cm, 69 in.·lbf)

(e) Install the dipstick.

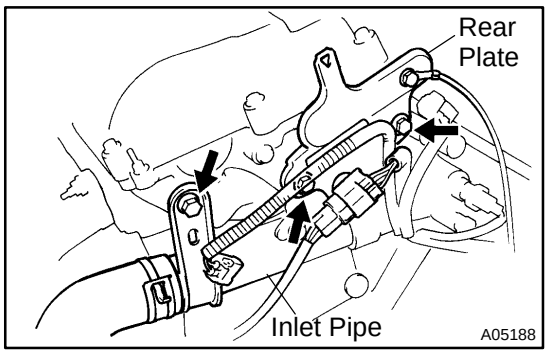


13. INSTALL LH EXHAUST MANIFOLD

(a) Install a new gasket and the exhaust manifold with the 6 nuts. Uniformly tighten the nuts in several passes.
Torque: 49 N·m (500 kgf·cm, 36 ft·lbf)

(b) Install the exhaust manifold stay with the bolt and nut. Alternately tighten the bolt and nut.
Torque: 34 N·m (350 kgf·cm, 25 ft·lbf)

(c) Connect the A/F sensor connector.



14. INSTALL WATER INLET PIPE

(a) Install a new O–ring to the water inlet pipe.

(b) Apply soapy water to the O–ring.

(c) Connect the water inlet pipe to the water inlet.

(d) Install the bolt holding the water inlet pipe to the cylinder head.

Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

15. INSTALL CYLINDER HEAD REAR PLATE

Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

16. INSTALL ENGINE WIRE PROTECTOR

17. INSTALL CAMSHAFT TIMING OIL CONTROL VALVES

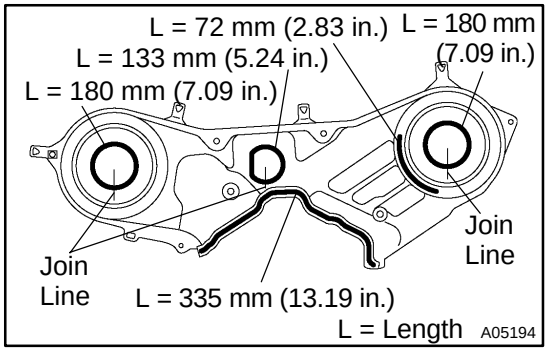
18. INSTALL CAMSHAFT POSITION SENSORS

19. INSTALL NO.3 TIMING BELT COVER

(a) Check that the timing belt cover gaskets have no cracks or peeling, etc.

If the gaskets have cracks or peeling etc., replace them using these steps:

- Using a screwdriver and gasket scraper, remove all the old gasket material.
- Thoroughly clean all components to remove all the loose material.



- Remove the backing paper from a new gasket and install the gasket evenly to the part of the timing belt cover shaded black in the illustration.

NOTICE:

When joining 2 gaskets, do not leave a gap between them. Cut off any excess gasket.

- After installing the gasket, press down on it so that the adhesive firmly sticks to the timing belt cover.

(b) Install the timing belt cover with the 6 bolts.

Torque: 8.5 N·m (85 kgf·cm, 74 in.·lbf)

(c) Install the 3 engine wire clamps to the timing belt cover.

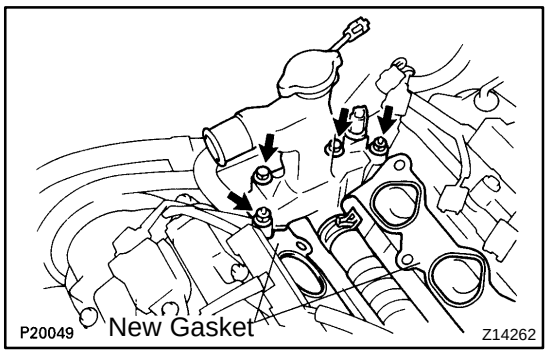
20. INSTALL NO.2 IDLER PULLEY (See page EM–21)

21. INSTALL CAMSHAFT TIMING PULLEYS (See page EM–21)

22. INSTALL TIMING BELT (See page EM–21)

23. INSTALL SPARK PLUGS

24. INSTALL IGNITION COILS



25. INSTALL WATER OUTLET

(a) Install 2 new gaskets.

(b) Connect the water outlet to the bypass hose.

(c) Install the water outlet with the 2 bolts, 2 nuts and 2 plate washers. Alternately tighten the bolts and nuts.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

NOTICE:

Do not scratch the seal surface of the water outlet with the stud bolt.

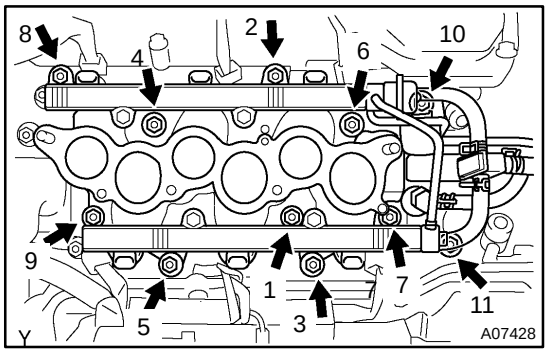
(d) Connect the ECT sender gauge connector.

(e) Connect the ECT sensor connector.

(f) Connect the ground strap connector.

(g) Connect the upper radiator hose.

(h) Connect the engine coolant reservoir hose.



26. INSTALL INTAKE MANIFOLD ASSEMBLY

(a) Install the intake manifold, delivery pipe and injectors assembly with the 9 bolts, 2 plate washers and 2 nuts. Uniformly tighten the bolts and nuts in several passes and in the sequence shown.

Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)

(b) Connect the fuel inlet hose to the fuel filter.

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precaution.

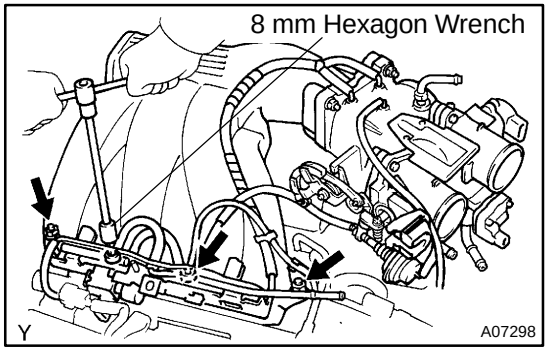
(See page SF–1)

(c) Connect the heater hose to the intake manifold.

27. RETIGHTEN WATER OUTLET MOUNTING BOLTS AND NUTS

Tighten the 2 bolts and 2 nuts.

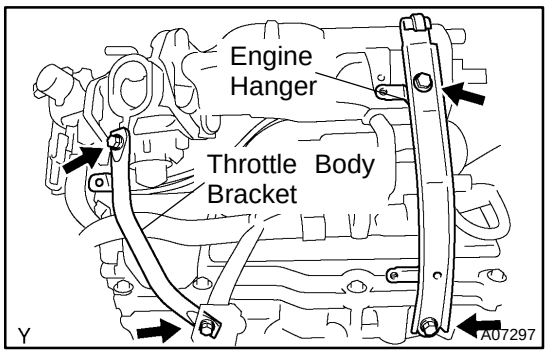
Torque: 15 N·m (150 kgf·cm, 11 ft·lbf)



28. INSTALL AIR INTAKE CHAMBER ASSEMBLY

(a) Using an 8 mm hexagon wrench, install a new gasket and the air intake chamber assembly with the 2 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.

Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)



(b) Install the No.1 engine hanger with the 2 bolts.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)
(c) Install the throttle body bracket with the 2 bolts.
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)
(d) Connect the PCV hose to the PCV valve on the RH cylinder head.
(e) Connect the ground strap and cable to the intake air control valve for the ACIS.
(f) Connect the ground cable and strap with the nut.
Torque: 14.5 N·m (145 kgf·cm, 10 ft·lbf)
(g) Connect the ground cable to the air intake chamber.
(h) Connect the brake booster vacuum hose to the throttle body.
(i) Connect the 2 water bypass hoses to the throttle body.
(j) Connect the air assist hose to the throttle body.
(k) Connect the purge hose to the emission control valve set.
(l) Connect the 2 vacuum hoses to the vacuum tank for ACIS.
(m) Connect the engine wire clamp to the emission control valve set.
(n) Install the PS pressure tube with the 2 nuts.
(o) Connect the throttle position sensor connector.
(p) Connect the IAC valve connector.
(q) Connect the No.1 VSV connector for the ACIS.
(r) Connect the No.2 VSV connector for the ACIS.
(s) Connect the VSV connecter for the EVAP.
(t) Connect the DLC1 to the bracket on the intake air control valve.
(u) Connect the accelerator cable.

29. INSTALL AIR FILTER AND AIR CLEANER CAP ASSEMBLY

30. INSTALL V–BANK COVER

(a) Using a 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.
(b) Press down the V–bank cover fastener.

31. INSTALL FRONT EXHAUST PIPE
(See page EM–77)

32. INSTALL PS PUMP (See page SR–27)

33. INSTALL GENERATOR DRIVE BELT
(See page CH–16)

34. FILL WITH ENGINE COOLANT

35. START ENGINE AND CHECK FOR LEAKS

36. VEHICLE ROAD TEST

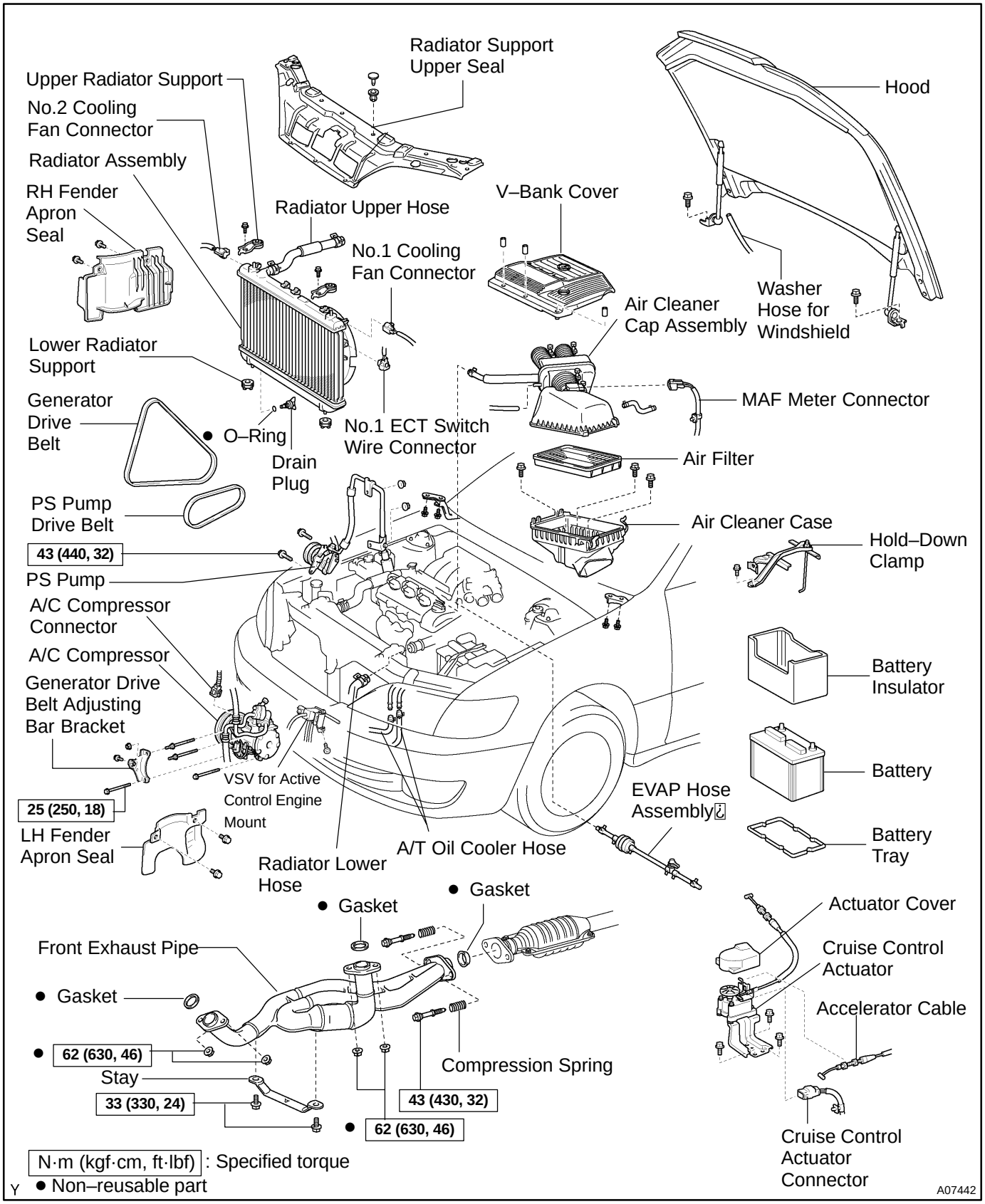
Check for abnormal noise, shock, slippage, correct shift points and smoothly operation.

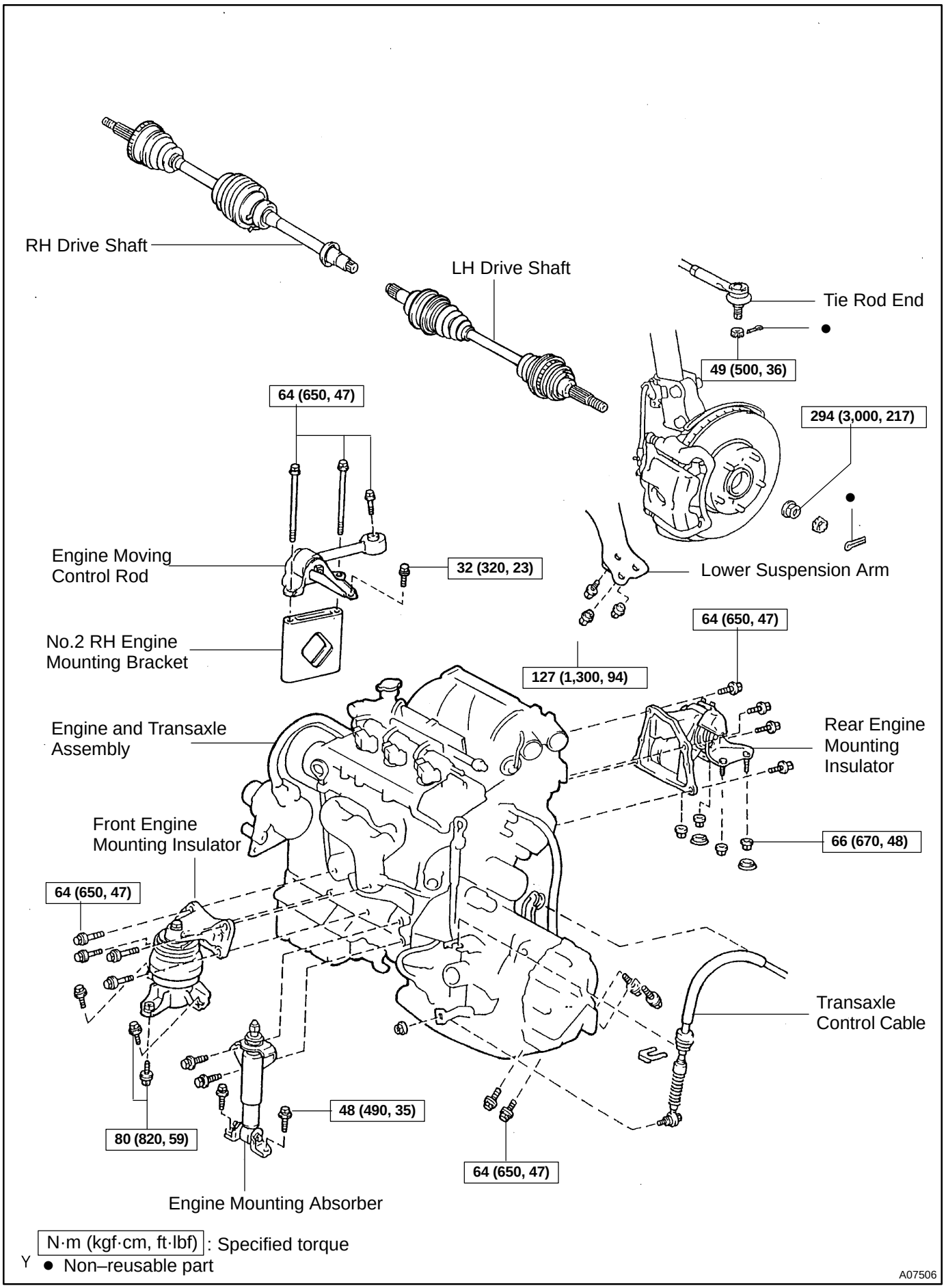
37. RECHECK ENGINE COOLANT LEVEL

ENGINE UNIT

COMPONENTS

EM0ZK–01

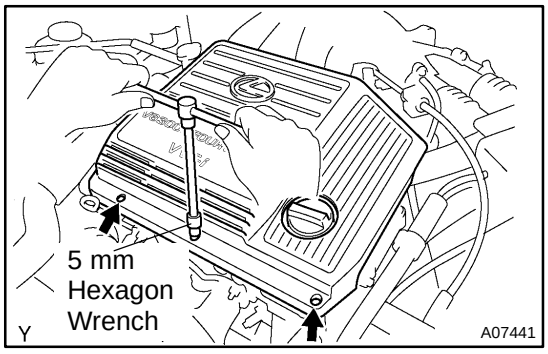



RH Drive Shaft
LH Drive Shaft
Tie Rod End
49 (500, 36)
64 (650, 47)
294 (3,000, 217)
Engine Moving Control Rod
32 (320, 23)
Lower Suspension Arm
No.2 RH Engine Mounting Bracket
64 (650, 47)
127 (1,300, 94)
Engine and Transaxle Assembly
Rear Engine Mounting Insulator
Front Engine Mounting Insulator
66 (670, 48)
64 (650, 47)
Transaxle Control Cable
48 (490, 35)
80 (820, 59)
64 (650, 47)
Engine Mounting Absorber
N·m (kgf·cm, ft·lbf): Specified torque
● Non–reusable part
A07506

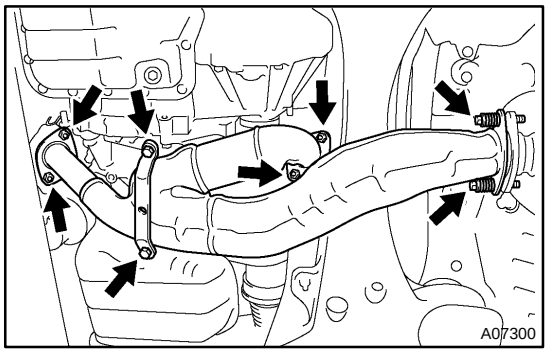
EM0ZL–01

REMOVAL

1. REMOVE BATTERY AND TRAY
2. REMOVE HOOD
3. REMOVE ENGINE FENDER APRON SEALS
4. DRAIN ENGINE COOLANT
5. DRAIN ENGINE OIL



6. REMOVE V–BANK COVER
(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.
(b) Loosen the V–bank cover fastener counterclockwise.
(c) Remove the V–bank cover.
7. DISCONNECT ACCELERATOR CABLE
8. REMOVE AIR CLEANER CAP ASSEMBLY AND AIR CLEANER CASE
9. REMOVE CRUISE CONTROL ACTUATOR
10. REMOVE RADIATOR (See page CO–18)



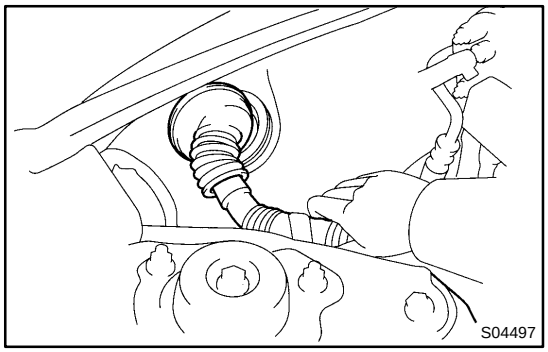
11. REMOVE FRONT EXHAUST PIPE
(a) Remove the 2 bolts holding the support stay to the support bracket.
(b) Remove the 2 bolts and 2 compression springs holding the front exhaust pipe to the center exhaust pipe.
(c) Remove the 4 nuts holding the front exhaust pipe to the exhaust manifolds.
(d) Remove the front exhaust pipe and 3 gaskets.
12. DISCONNECT CONNECTORS, CABLE, CLAMPS AND HOSES
(a) Disconnect the noise filter connector on the LH fender apron.
(b) Disconnect the generator wire and connector.
(c) Disconnect the starter wire and connector.
(d) Remove the bolt and disconnect the ground strap from the LH fender apron.
(e) Disconnect the 2 ground strap connectors from the RH fender apron.
(f) Disconnect the ground cable from the battery body bracket.
(g) Disconnect the engine wire protector clamp from the battery body bracket.
(h) Disconnect the engine wire clamp from the bracket on the RH fender apron.
(i) Disconnect the brake booster vacuum hose from the throttle body.
(j) Disconnect the engine coolant reservoir hose from the water outlet.
(k) Disconnect the heater hose from the intake manifold.
(l) Disconnect the heater hose from the water inlet housing.

(m) Disconnect the fuel inlet hose from the fuel filter.

CAUTION:
Perform disconnecting operation of the fuel tube connector (quick type) after observing the precautions (See page SF–1).

(n) Disconnect the EVAP hose assembly from the pipe on the emission control valve set.

(o) Disconnect the 2 vacuum hoses from the vacuum tank for the ACIS.



13. DISCONNECT ENGINE WIRE FROM CABIN

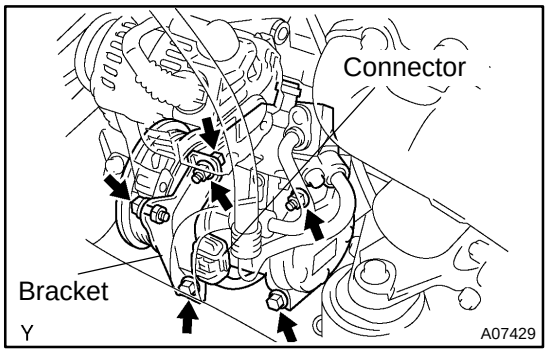
(a) Remove the No.2 instrument lower panel.

(b) Disconnect the 3 ECM connectors.

(c) Disconnect the 3 cowl wire connectors from the connectors on the bracket.

(d) Disconnect the grommet from the cowl panel, and pull out the engine wire.

14. REMOVE DRIVE SHAFTS (See page SA–16)



15. DISCONNECT A/C COMPRESSOR FROM ENGINE

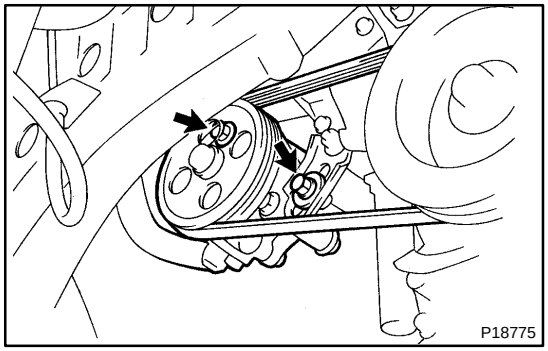
(a) Disconnect the A/C compressor connector.

(b) Remove the drive belt.

(c) Remove the 2 bolts, nut and drive belt adjusting bar bracket.

(d) Remove the 3 bolts and disconnect the A/C compressor from the engine.

16. DISCONNECT TRANSAXLE CONTROL CABLE FROM TRANSAXLE

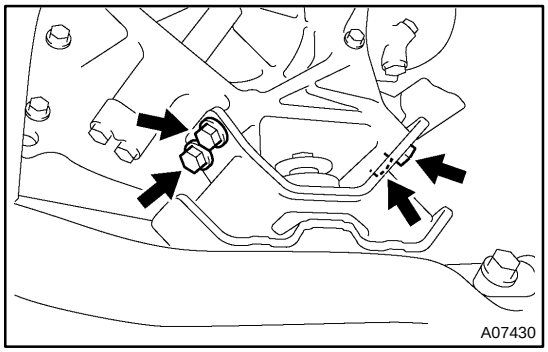


17. DISCONNECT PS PUMP FROM ENGINE

(a) Remove the 2 nuts, and disconnect the PS pressure tube from the No.1 engine hanger.

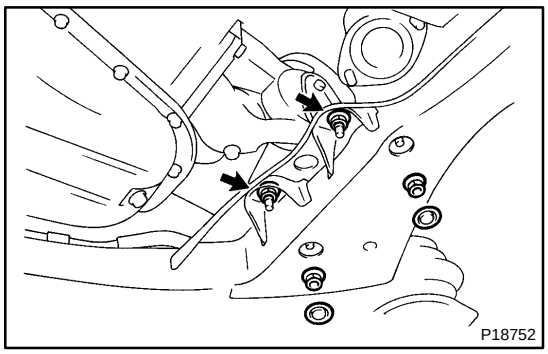
(b) Loosen the 2 bolts, and remove the drive belt.

(c) Remove the 2 bolts, and disconnect the PS pump from the engine.



18. DISCONNECT TRANSAXLE FROM LH ENGINE MOUNTING INSULATOR

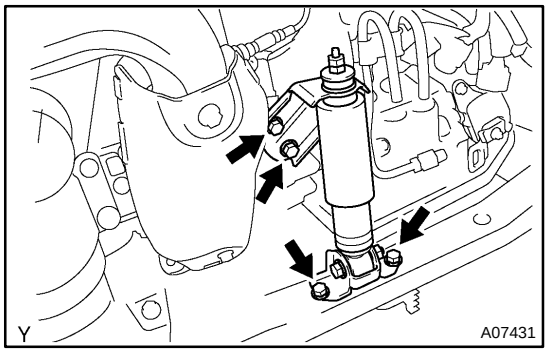
Remove the 4 bolts holding the transaxle to the mounting insulator.



19. DISCONNECT REAR ENGINE MOUNTING BRACKET FROM FRONT FRAME

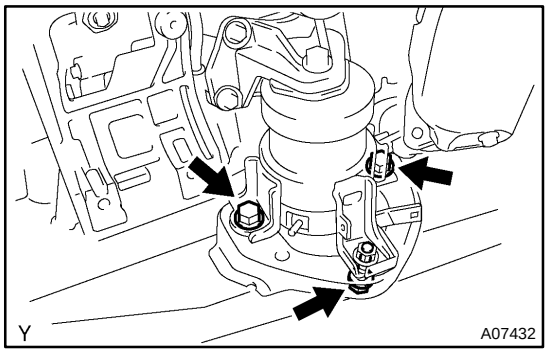
(a) Remove the 2 hole plugs.

(b) Remove the 4 nuts holding the front frame to the mounting bracket.



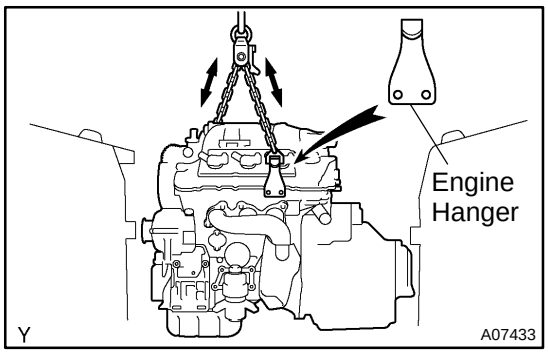
20. REMOVE ENGINE MOUNTING ABSORBER

Remove the 4 bolts and mounting absorber.



21. DISCONNECT FRONT ENGINE MOUNTING INSULATOR FROM FRONT FRAME

Remove the 3 bolts holding the mounting insulator to the front frame.



22. ATTACH ENGINE SLING DEVICE TO ENGINE HANGERS

(a) Install the No.2 engine hanger in the correct direction.

Part No.:

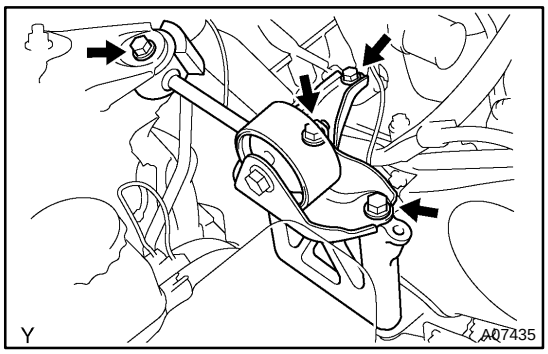
No.2 engine hanger	12282–20020
Bolt	91621–60822

Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

(b) Attach the sling device to the engine hangers.

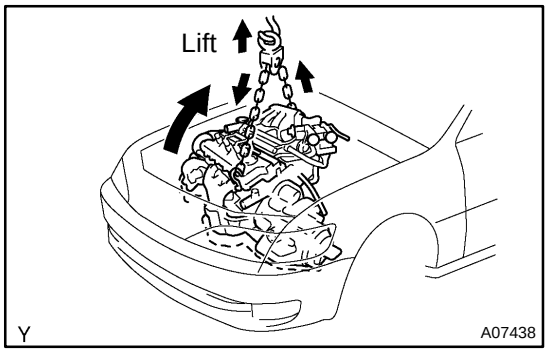
CAUTION:

Do not attempt to hang the engine by hooking the chain to any other part.



23. REMOVE ENGINE MOVING CONTROL ROD AND NO.2 RH ENGINE MOUNTING BRACKET

Remove the 4 bolts, control rod and mounting bracket.



24. REMOVE ENGINE AND TRANSAXLE ASSEMBLY FROM VEHICLE

(a) Lift the engine out of the vehicle slowly and carefully.

NOTICE:

- **Be careful not to hit the PNP switch.**
- **Make sure the engine is clear of all wiring, hoses and cables.**

(b) Place the engine and transaxle assembly onto the stand.

25. REMOVE FRONT ENGINE MOUNTING INSULATOR FROM ENGINE

Remove the 4 bolts and mounting insulator.

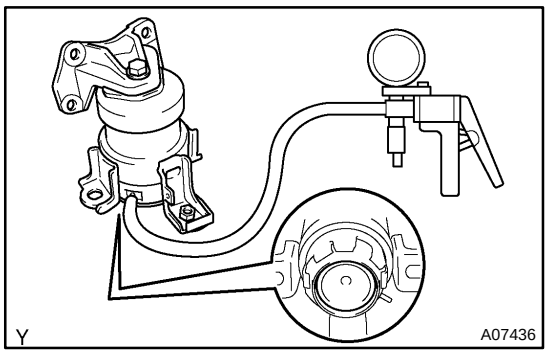
26. REMOVE REAR ENGINE MOUNTING INSULATOR AND BRACKET ASSEMBLY FROM ENGINE

Remove the 4 bolts, the mounting insulator and bracket assembly.

27. SEPARATE ENGINE AND TRANSAXLE

EM0M5–02

INSPECTION



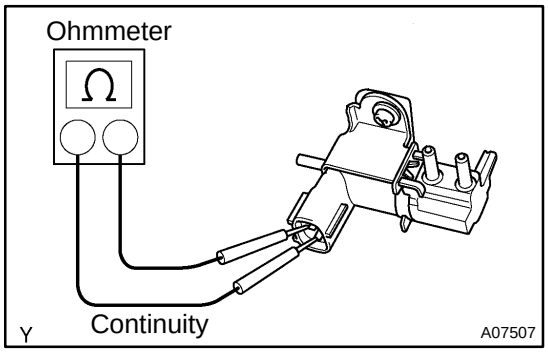
1. INSPECT FRONT ENGINE MOUNTING INSULATOR

(a) Using a MITYVAC (Hand–Held Vacuum Pump), apply vacuum of 80 kPa (600 mmHg, 25 in.Hg) and allow it to stand for 1 minute.

(b) Check that there is no change in the needle movement.

(c) Check that there is no fluid leakage caused by a break of a lower diaphragm.

If the operation is not as specified, replace the insulator.



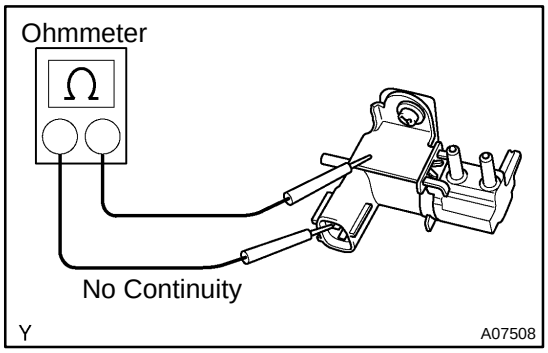
2. INSPECT VSV FOR ACTIVE CONTROL ENGINE MOUNT

(a) Inspect the VSV for open circuit.

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 19 – 21 Ω at 20˚C (68˚F)

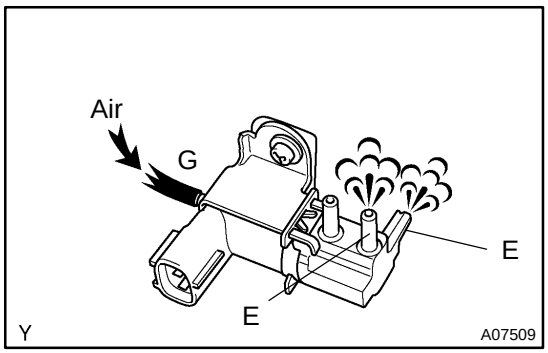
If there is no continuity, replace the VSV.



(b) Inspect the VSV for ground.

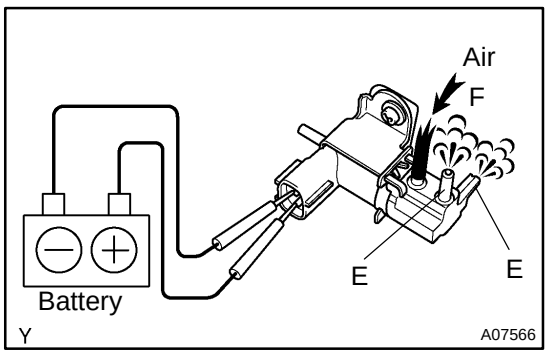
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



(c) Inspect the VSV operation.

(1) Check that air flows from port G to port E.



(2) Apply battery positive voltage across the terminals.

(3) Check that air flows from port F to port E.

If operation is not as specified, replace the VSV.

3. INSPECT VACUUM TANK

(See page SF–56)

EM0ZM–01

INSTALLATION

1. ASSEMBLE ENGINE AND TRANSAXLE

2. INSTALL REAR ENGINE MOUNTING INSULATOR

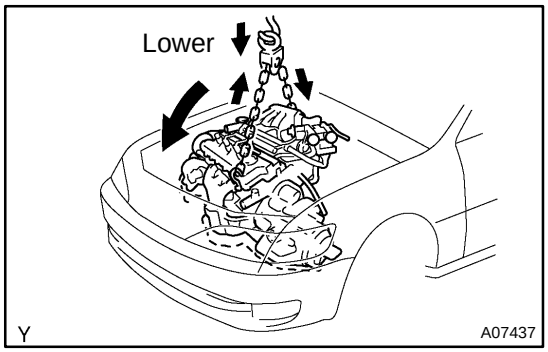
Install the mounting insulator with the 4 bolts.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

3. INSTALL FRONT ENGINE MOUNTING INSULATOR

Install the mounting insulator with the 4 bolts.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)



4. INSTALL ENGINE AND TRANSAXLE ASSEMBLY IN VEHICLE

(a) Attach the engine sling device to the engine hangers.

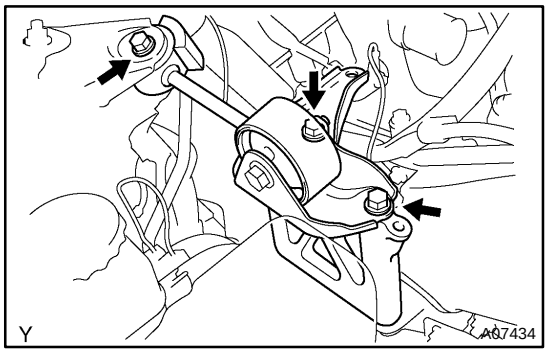
(b) Lower the engine into the engine compartment.

Tilt the transaxle downward, lower the engine and clear the LH mounting.

NOTICE:

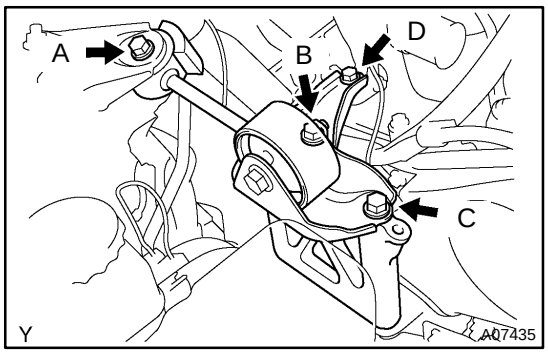
Be careful not to hit the park/neutral position switch.

(c) Keep the engine level, and align RH and LH mountings with the body bracket.



5. INSTALL NO.2 RH ENGINE MOUNTING BRACKET AND ENGINE MOVING CONTROL ROD

(a) Temporarily install the No.2 RH engine mounting bracket and engine moving control rod with the 3 bolts.



(b) Tighten the bolt (A).

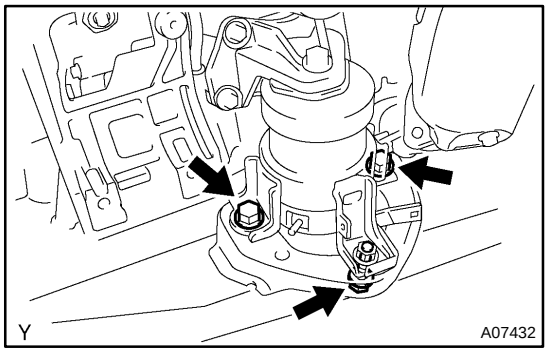
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

(c) Tighten the other 3 bolts (B, C and D).

Torque:

64 N·m (650 kgf·cm, 47 ft·lbf) for bolt B and C

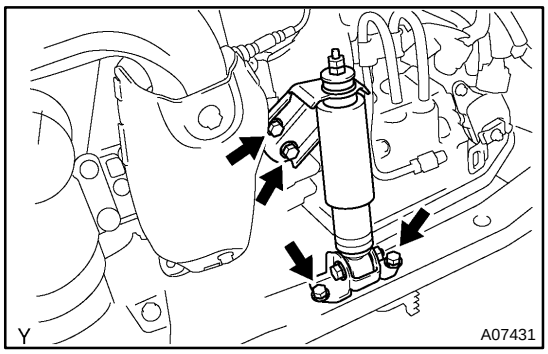
32 N·m (320 kgf·cm, 23 ft·lbf) for bolt D



6. CONNECT FRONT ENGINE MOUNTING INSULATOR

Connect the mounting insulator with the 3 bolts.

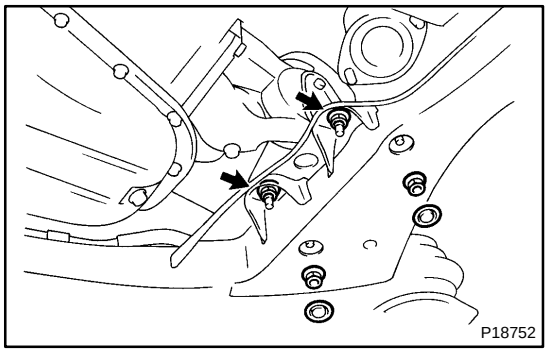
Torque: 80 N·m (820 kgf·cm, 59 ft·lbf)



7. INSTALL ENGINE MOUNTING ABSORBER

Install the engine mounting absorber with the 4 bolts.

Torque: 48 N·m (490 kgf·cm, 35 ft·lbf)

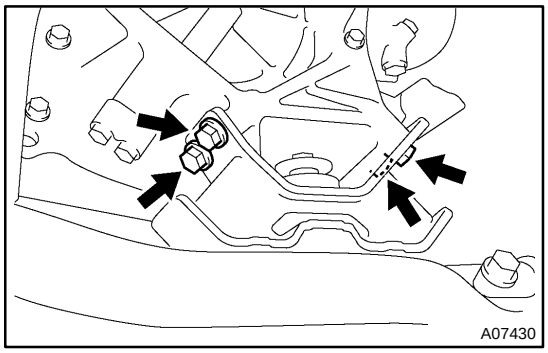


8. CONNECT REAR ENGINE MOUNTING INSULATOR

(a) Connect the mounting insulator with the 4 nuts.

Torque: 66 N·m (670 kgf·cm, 48 ft·lbf)

(b) Install the 2 hole plugs.



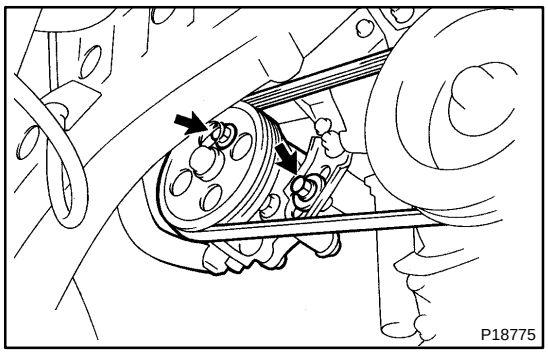
9. CONNECT LH ENGINE MOUNTING INSULATOR

Connect the mounting insulator with the 4 bolts.

Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)

10. REMOVE ENGINE SLING DEVICE

11. CONNECT TRANSAXLE CONTROL CABLE TO TRANSAXLE



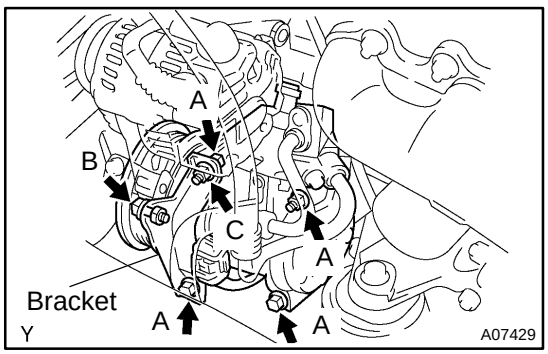
12. INSTALL PS PUMP

(a) Install the PS pump with the 2 bolts.

Torque: 43 N·m (440 kgf·cm, 31 ft·lbf)

(b) Install the drive belt.

(c) Connect the PS pressure tube with the 2 nuts.



13. INSTALL A/C COMPRESSOR

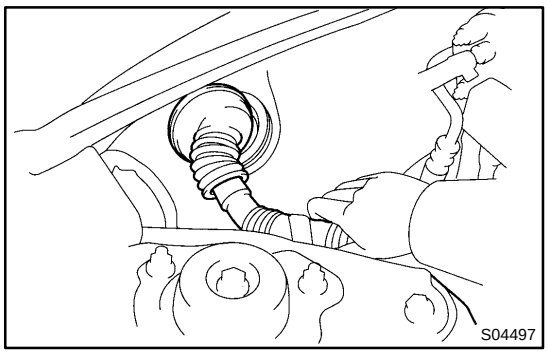
(a) Install the A/C compressor and drive belt adjusting bar bracket with the 5 bolts and nut.

Torque:
25 N·m (250 kgf·cm, 18 ft·lbf) for bolt A
18 N·m (185 kgf·cm, 13 ft·lbf) for bolt B
25 N·m (250 kgf·cm, 18 ft·lbf) for nut C

(b) Install the drive belt.

(c) Connect the A/C compressor connector.

14. INSTALL DRIVE SHAFTS (See page SA–23)



15. CONNECT ENGINE WIRE TO CABIN

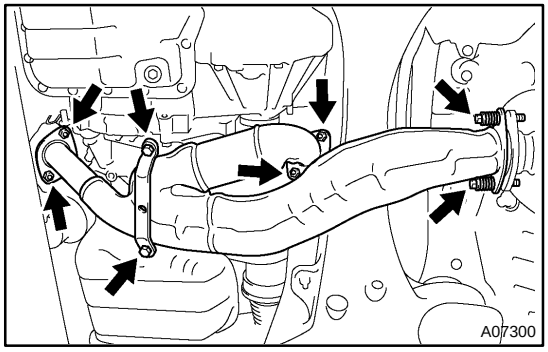
(a) Push in the engine wire through the cowl panel. Install the grommet.
(b) Connect the 3 engine ECM connectors.
(c) Connect the 3 cowl wire connectors to the connectors on the bracket.
(d) Install the No.2 instrument lower panel.

16. CONNECT CONNECTORS, CABLE, CLAMPS AND HOSES

(a) Connect the noise filter connector on the LH fender apron.
(b) Connect the generator connector and wire.
(c) Connect the starter connector and wire.
(d) Connect the 2 ground strap connectors to the RH fender apron
(e) Connect the strap connector to the LH fender apron with the bolt.
(f) Connect the ground cable to the battery body bracket.
(g) Connect the engine wire protector clamp to the battery body bracket.
(h) Connect the engine wire clamp to the bracket on the RH fender apron.
(i) Connect the brake booster vacuum hose to the throttle body.
(j) Connect the engine coolant reservoir hose to the water outlet.
(k) Connect the heater hose to the intake manifold.
(l) Connect the heater hose to the water inlet housing.
(m) Connect the fuel inlet hose to the fuel filter.

CAUTION:
Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.
(See page SF–1)

(n) Connect the EVAP hose assembly to the pipe on the emission control valve set.
(o) Connect the 2 vacuum hoses to the vacuum tank for the ACIS.



17. INSTALL FRONT EXHAUST PIPE

(a) Temporarily install 3 new gaskets and the front exhaust pipe with the 2 bolts, 2 compression springs and 4 nuts.
(b) Tighten the 4 nuts holding the exhaust manifolds to the front exhaust pipe.
Torque: 62 N·m (630 kgf·cm, 46 ft·lbf)
(c) Tighten the 2 bolts and 2 compression springs holding the front exhaust pipe to the center exhaust pipe.
Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)

(d) Install the support stay with the 2 bolts.
Torque: 33 N·m (330 kgf·cm, 24 ft·lbf)

18. INSTALL RADIATOR (See page CO–24)

19. INSTALL CRUISE CONTROL ACTUATOR

20. INSTALL AIR CLEANER CAP ASSEMBLY AND AIR CLEANER CASE

21. CONNECT ACCELERATOR CABLE

22. INSTALL V–BANK COVER

(a) Using a 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

(b) Press down the V–bank cover fastener.

23. INSTALL ENGINE FENDER APRON SEALS

24. INSTALL BATTERY TRAY AND BATTERY

25. INSTALL HOOD

26. FILL ENGINE WITH OIL

27. FILL WITH ENGINE COOLANT

28. START ENGINE AND CHECK FOR LEAKS

29. PERFORM ROAD TEST

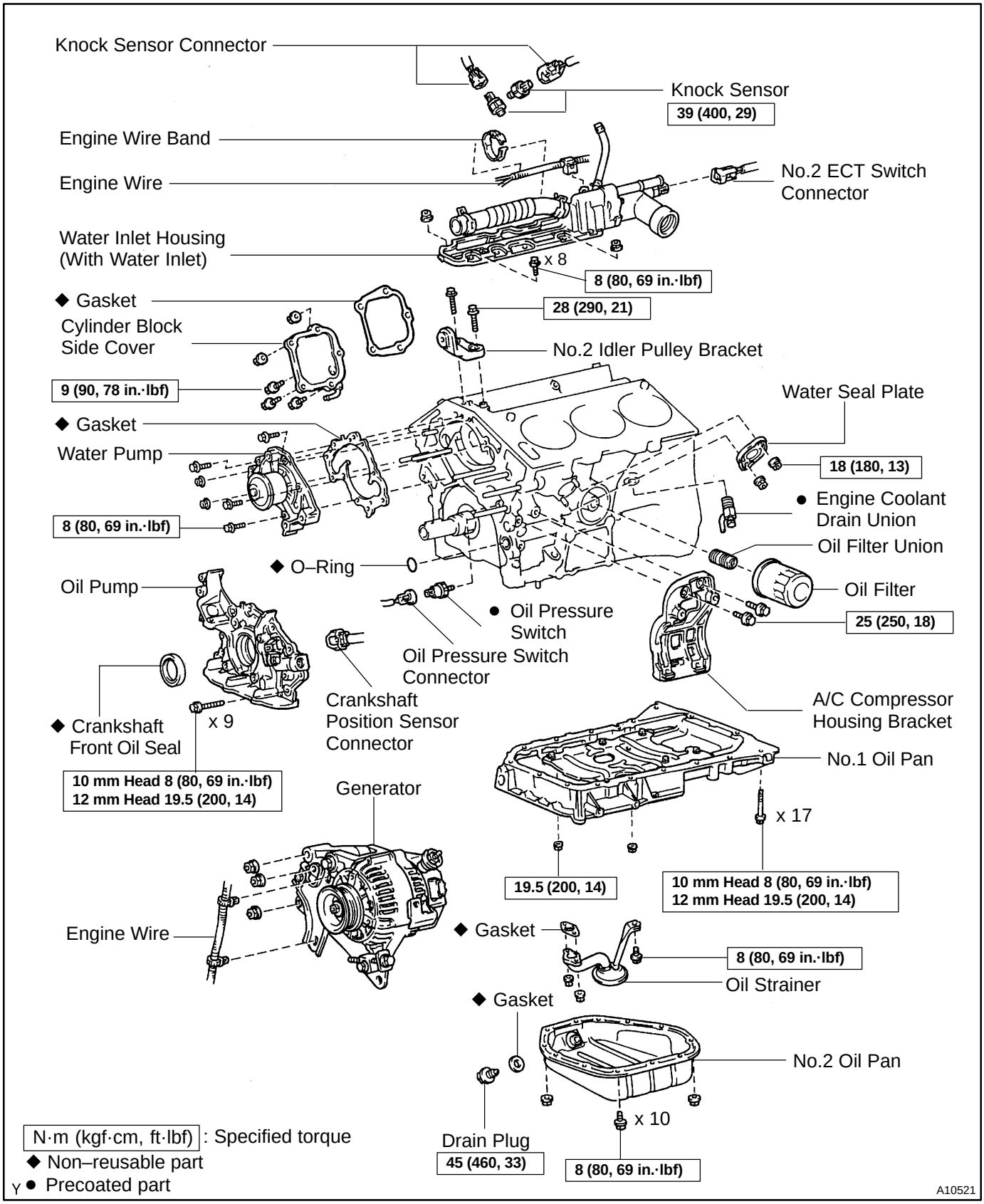
Check for abnormal noise, shock, slippage, correct shift points and smooth operation.

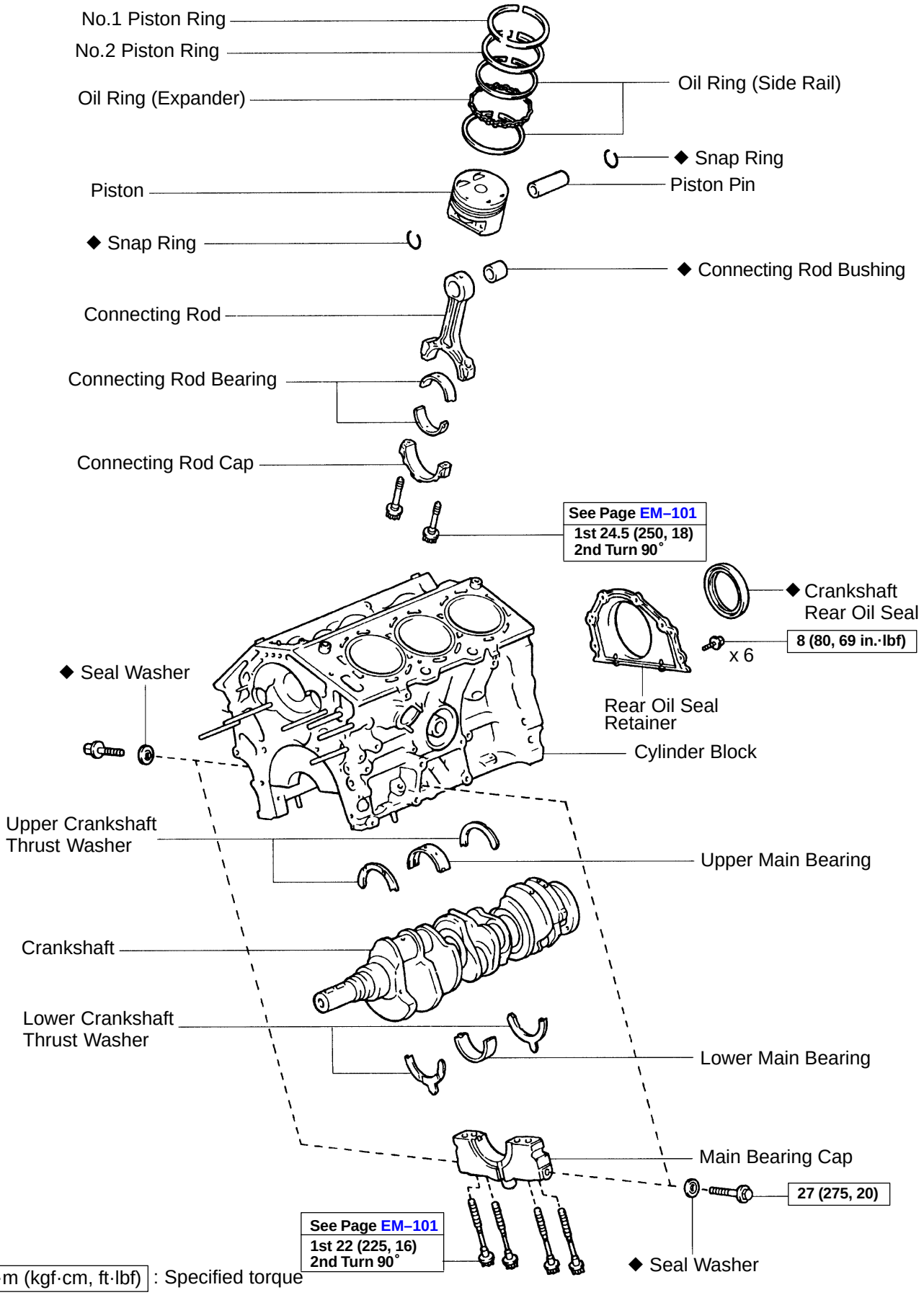
30. RECHECK ENGINE COOLANT AND OIL LEVELS

CYLINDER BLOCK

COMPONENTS

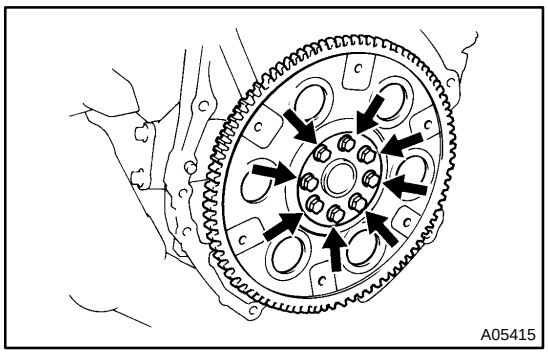
EM04B–02




No.1 Piston Ring
No.2 Piston Ring
Oil Ring (Expander)
Oil Ring (Side Rail)
◆ Snap Ring
Piston
Piston Pin
◆ Snap Ring
◆ Connecting Rod Bushing
Connecting Rod
Connecting Rod Bearing
Connecting Rod Cap
See Page EM–101
1st 24.5 (250, 18)
2nd Turn 90°
◆ Crankshaft Rear Oil Seal
8 (80, 69 in.·lbf)
x 6
◆ Seal Washer
Rear Oil Seal Retainer
Cylinder Block
Upper Crankshaft Thrust Washer
Upper Main Bearing
Crankshaft
Lower Crankshaft Thrust Washer
Lower Main Bearing
Main Bearing Cap
27 (275, 20)
See Page EM–101
1st 22 (225, 16)
2nd Turn 90°
◆ Seal Washer
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
Z18551

EM0ZN–01

DISASSEMBLY



1. REMOVE DRIVE PLATE

Remove the 8 bolts, rear plate, drive plate and front spacer.

2. INSTALL ENGINE TO ENGINE STAND FOR DISASSEMBLY

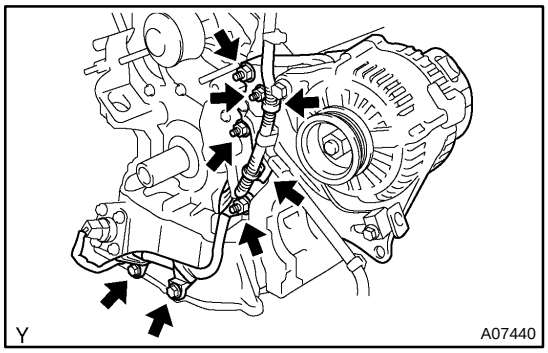
3. REMOVE TIMING BELT AND PULLEYS (See page EM–15)

4. REMOVE CYLINDER HEAD (See page EM–31)

5. DISCONNECT CRANKSHAFT POSITION SENSOR CONNECTOR

6. DISCONNECT OIL PRESSURE SWITCH CONNECTOR

7. DISCONNECT OIL LEVEL SENSOR CONNECTOR



8. REMOVE ENGINE WIRE

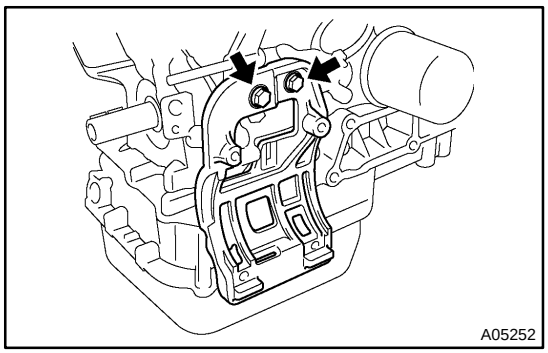
(a) Disconnect the 2 wire clamps from the wire brackets.

(b) Remove the 2 bolts and nut, and disconnect the engine wire.

9. REMOVE GENERATOR, ADJUSTING BAR AND BRACKET ASSEMBLY

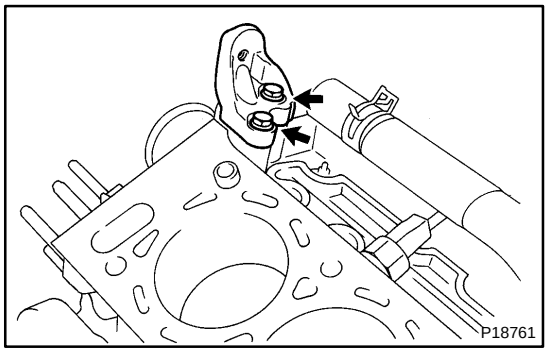
Remove the 3 nuts, the generator, adjusting bar and bracket assembly.

10. REMOVE OIL PRESSURE SWITCH (See page LU–1)



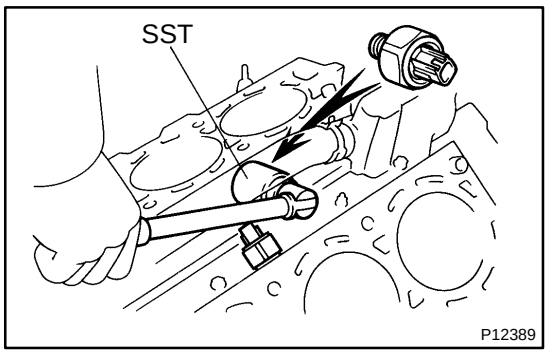
11. REMOVE A/C COMPRESSOR HOUSING BRACKET

Remove the 2 bolts and compressor housing bracket.



12. REMOVE NO.2 IDLER PULLEY BRACKET

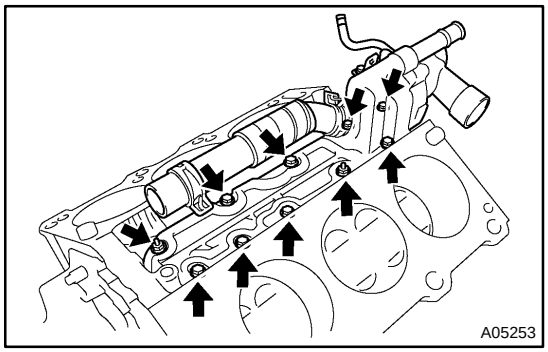
Remove the 2 bolts and idler pulley bracket.



13. REMOVE KNOCK SENSORS

(a) Disconnect the 2 knock sensor connectors.

(b) Using SST, remove the 2 knock sensors.
SST 09816–30010



14. REMOVE WATER INLET HOUSING

(a) Remove the engine wire band.

(b) Disconnect the engine wire clamp from the bracket.

(c) Remove the 8 bolts, 2 nuts and water inlet housing.

15. REMOVE WATER PUMP (See page CO–6)

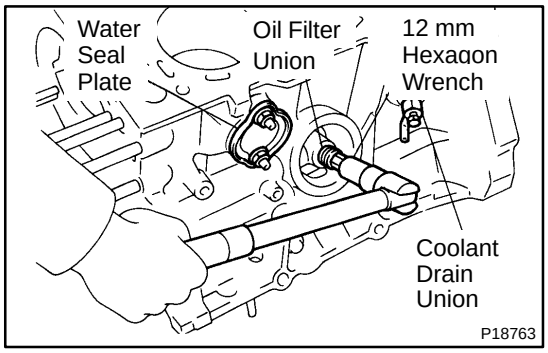
16. REMOVE NO.2 OIL PAN (See page LU–9)

17. REMOVE OIL STRAINER (See page LU–3)

18. REMOVE NO.1 OIL PAN (See page LU–3)

19. REMOVE OIL PUMP (See page LU–9)

20. REMOVE OIL FILTER (See page LU–3)



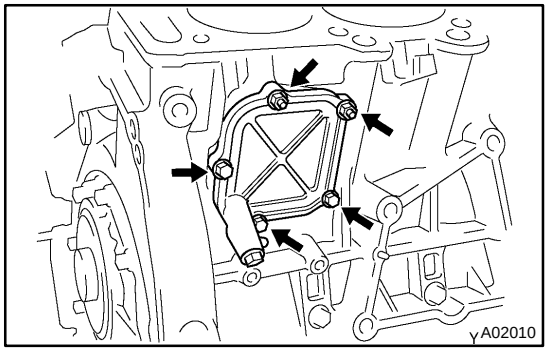
21. REMOVE OIL FILTER UNION

Using a 12 mm hexagon wrench, remove the oil filter union.

22. REMOVE WATER SEAL PLATE

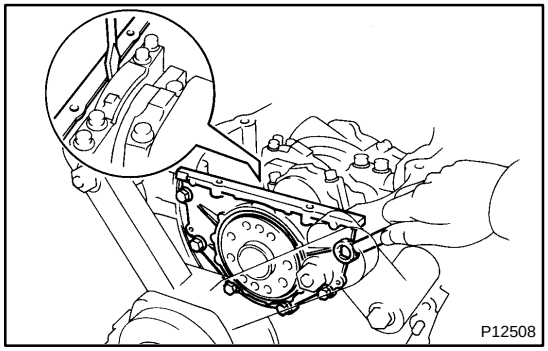
Remove the 2 nuts and seal plate.

23. REMOVE ENGINE COOLANT DRAIN UNION



24. REMOVE CYLINDER BLOCK SIDE COVER

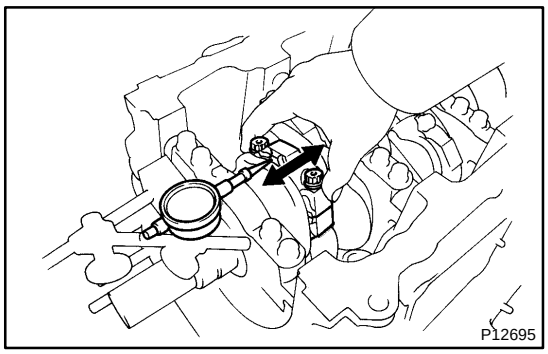
Remove the 3 bolts, 2 nuts, cylinder block side cover and gasket.



25. REMOVE REAR OIL SEAL RETAINER

(a) Remove the 6 bolts.

(b) Using a screwdriver, remove the oil seal retainer by prying the portions between the oil seal retainer and main bearing cap.



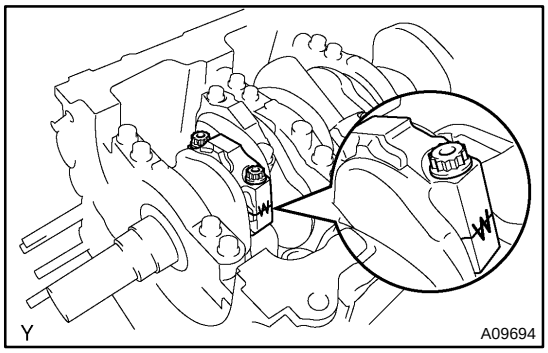
26. CHECK CONNECTING ROD THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while moving the connecting rod back and forth.

Standard thrust clearance:
0.15 – 0.30 mm (0.0059 – 0.0118 in.)
Maximum thrust clearance: 0.35 mm (0.0138 in.)

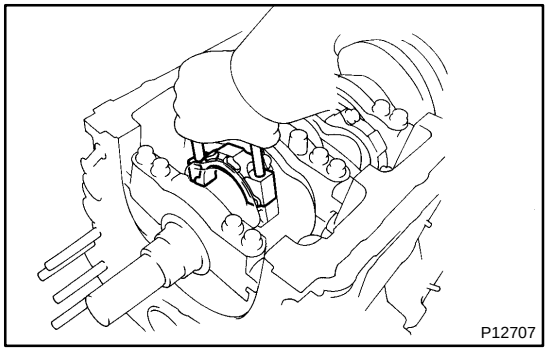
If the thrust clearance is greater than maximum, replace the connecting rod assembly(s). If necessary, replace the crankshaft.

Connecting rod thickness:
20.80 – 20.85 mm (0.8189 – 0.8209 in.)



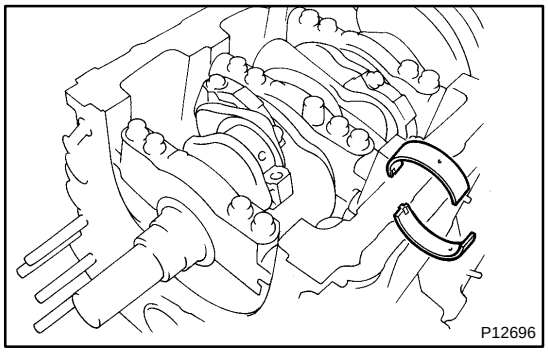
27. REMOVE CONNECTING ROD CAPS AND CHECK OIL CLEARANCE

(a) Check the matchmarks on the connecting rod and cap are aligned to ensure correct reassembly.
(b) Remove the 2 connecting rod cap bolts.



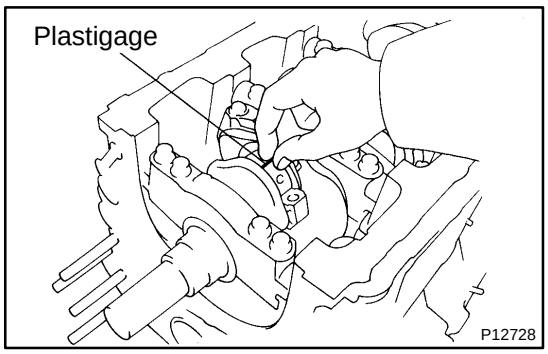
(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

HINT:
Keep the lower bearing inserted with the connecting rod cap.

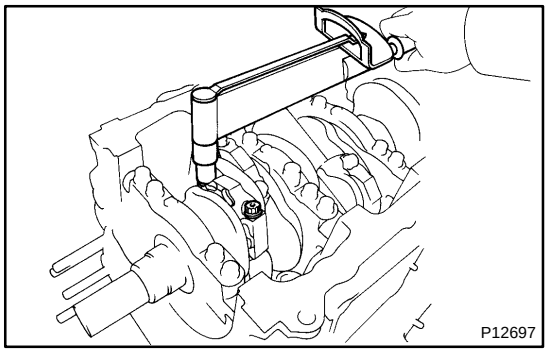


(d) Clean the crank pin and bearing.
(e) Check the crank pin and bearing for pitting and scratches.

If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(f) Lay a strip of Plastigage across the crank pin.

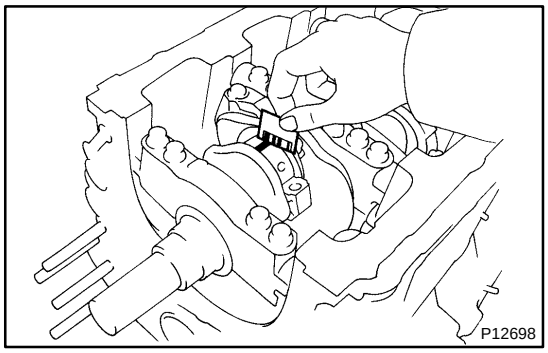


(g) Install the connecting rod cap with the 2 bolts (See page EM–101).

Torque:
1st: 24.5 N·m (250 kgf·cm, 18 ft·lbf)
2nd: Turn extra 90°

NOTICE:
Do not turn the crankshaft.

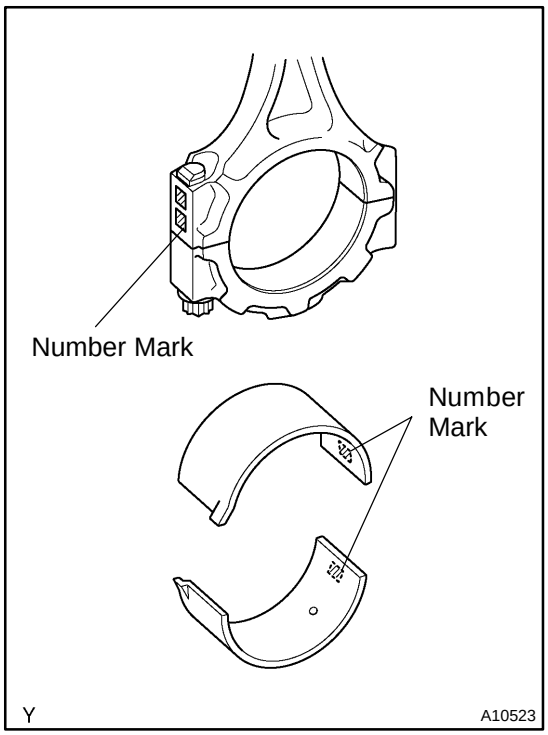
(h) Remove the 2 bolts, connecting rod cap and lower bearing (See steps (b) and (c)).



(i) Measure the Plastigage at its widest point.

Standard oil clearance:
0.038 – 0.064 mm (0.0015 – 0.0025 in.)
Maximum oil clearance: 0.08 mm (0.0031 in.)

If the oil clearance is greater than maximum, replace the bearings. If necessary, grind or replace the crankshaft.

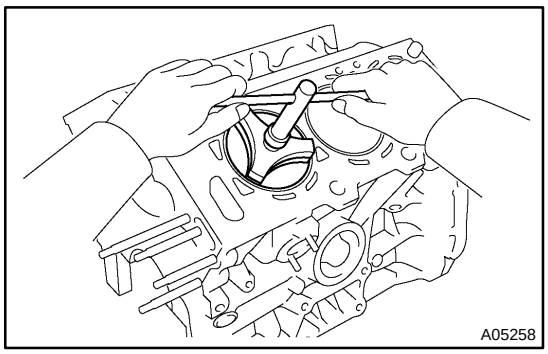


HINT:
If replacing a bearing, replace it with one having the same number as marked on the connecting rod. There are 4 sizes of standard bearings, marked ”1”, ”2”, ”3” and ”4” accordingly.

Reference:
Standard bearing center wall thickness:

Mark	mm (in.)
”1”	1.484 – 1.487 (0.0584 – 0.0585)
”2”	1.487 – 1.490 (0.0585 – 0.0587)
”3”	1.490 – 1.493 (0.0587 – 0.0588)
”4”	1.493 – 1.496 (0.0588 – 0.0589)

(j) Completely remove the Plastigage.



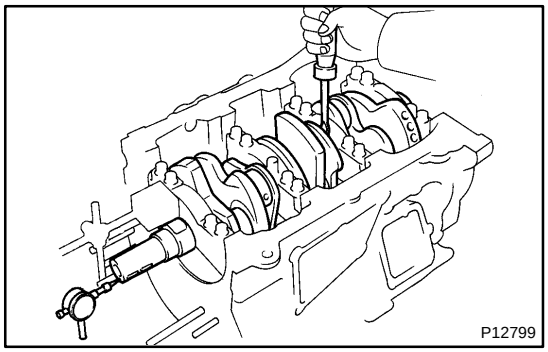
28. REMOVE PISTON AND CONNECTING ROD ASSEMBLIES

(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, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.



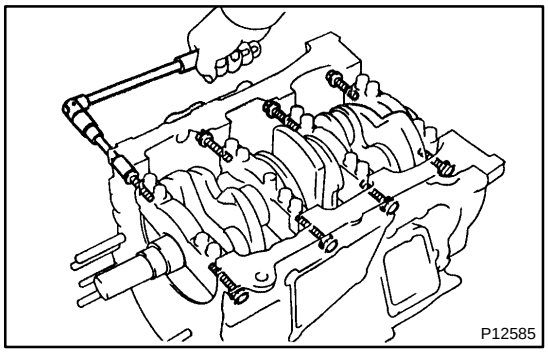
29. CHECK CRANKSHAFT THRUST CLEARANCE

Using a dial indicator, measure the thrust clearance while prying the crankshaft back and forth with a screwdriver.

Standard thrust clearance:
0.04 – 0.24 mm (0.0016 – 0.0095 in.)
Maximum thrust clearance: 0.30 mm (0.0118 in.)

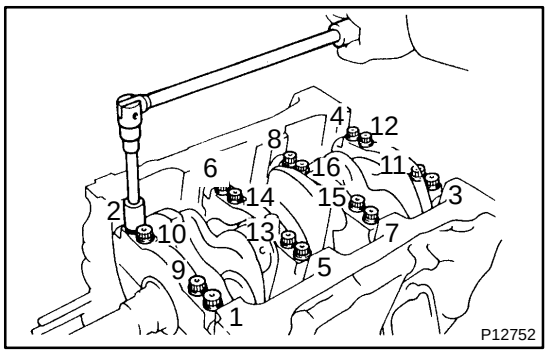
If the thrust clearance is greater than maximum, replace the thrust washers as a set.

Thrust washer thickness:
1.930 – 1.980 mm (0.0760 – 0.0780 in.)

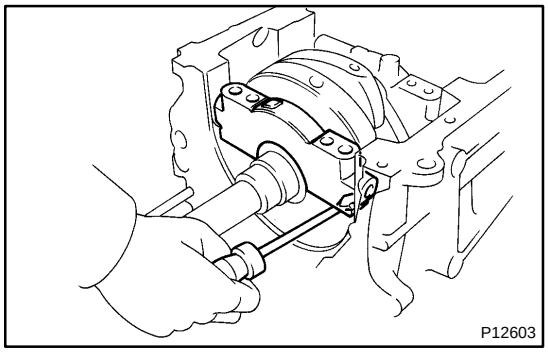


30. REMOVE MAIN BEARING CAPS AND CHECK OIL CLEARANCE

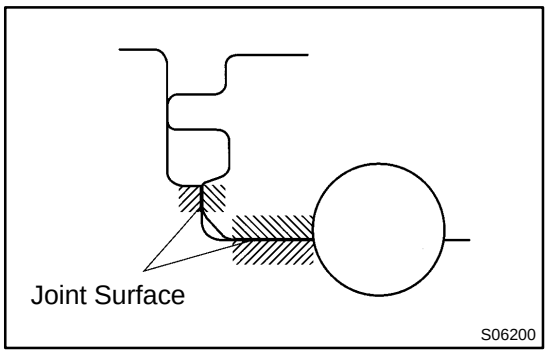
(a) Uniformly loosen and remove the 8 main bearing cap bolts and seal washers in the several passes and in the sequence shown.



(b) Uniformly loosen and remove the 16 main bearing cap bolts in several passes and in the sequence shown.



(c) Using a screwdriver, pry out main bearing caps. Remove the 4 main bearing caps, lower bearings and (No.2 main bearing cap only) 2 lower thrust washers.

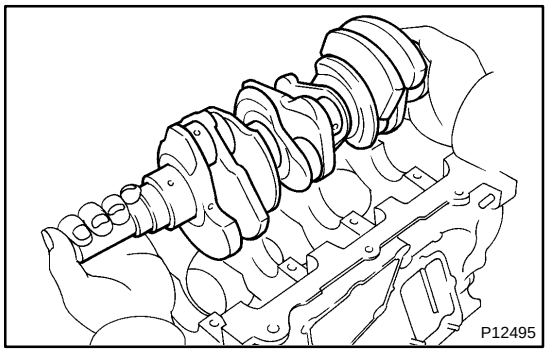


NOTICE:

Pull up the main bearing cap little by little to the right and the left by turns and pay attention not to damage the joint surface of the cylinder block and the main bearing cap.

HINT:

- Keep the lower bearing and main bearing cap together.
- Arrange the main bearing caps and lower thrust washers in correct order.



(d) Lift out the crankshaft.

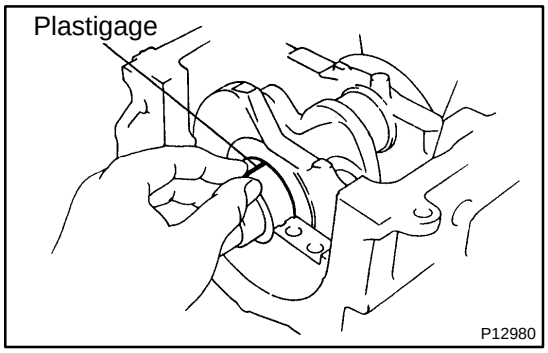
HINT:

Keep the upper bearings together with the cylinder block.

(e) Clean each main journal and bearing.

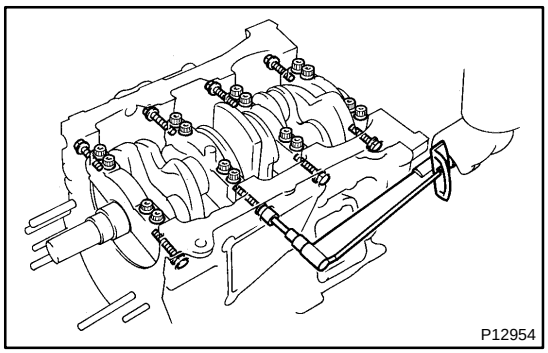
(f) Check each main journal and bearing for pitting and scratches.

If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



(g) Place the crankshaft on the cylinder block.

(h) Lay a strip of Plastigage across each journal.



(i) Install the 4 main bearing caps (See page EM–101).

Torque:

12 pointed head bolts:

1st: 22 N·m (225 kgf·cm, 16 ft·lbf)

2nd: Turn extra 90°

Hexagon head bolts:

27 N·m (275 kgf·cm, 20 ft·lbf)

NOTICE:

Do not turn the crankshaft.

(j) Remove the main bearing caps. (See steps (a) to (c))

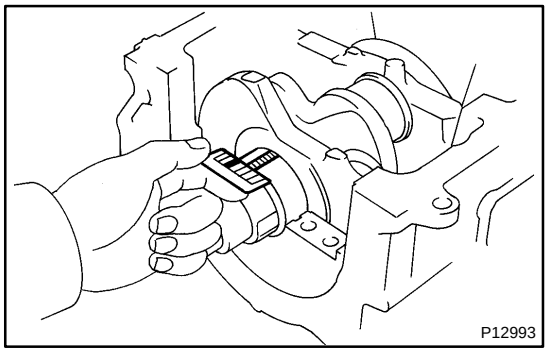
(k) Measure the Plastigage at its widest point.

Standard oil clearance:

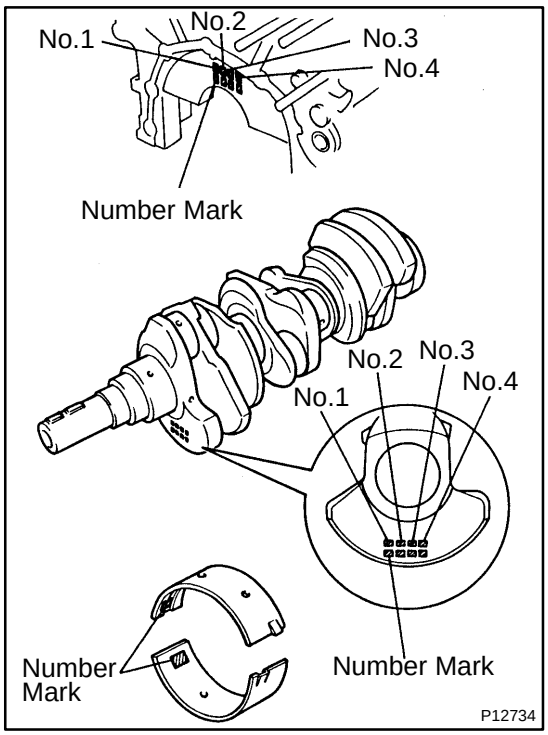
No.1 and No.4 journals	0.014 – 0.034 mm (0.0006 – 0.0013 in.)
No.2 and No.3 journals	0.026 – 0.046 mm (0.0010 – 0.0018 in.)

Maximum clearance:

No.1 and No.4 journals	0.05 mm (0.0020 in.)
No.2 and No.3 journals	0.06 mm (0.0024 in.)



If the oil clearance is greater than maximum, replace the bearings. If necessary, replace the crankshaft.



HINT:
If using a bearing, replace it with one having the same number. If the number of the bearing cannot be determined, select the correct bearing by adding together the numbers imprinted on the cylinder block and crankshaft, then refer to the table below for the appropriate bearing number. The No.1 and No.4 journal bearings have 5 standard bearing sizes, marked ”3”, ”4”, ”5”, ”6” and ”7” accordingly. The No.2 and No.3 journal bearings have 5 standard bearing sizes, marked ”1”, ”2”, ”3”, ”4” and ”5” accordingly.

No.1 and No.4 journal bearings

	Total number				” ”: Number mark
Cylinder block (A) + Crankshaft (B)	0 – 5	6 – 11	12 – 17	18 – 23	24 – 28
Use bearing	”3”	”4”	”5”	”6”	”7”

EXAMPLE: Cylinder block ”06” (A)
+ Crankshaft ”08” (B)
= Total number 14 (Use bearing ”5”)

No.1 and No.4 journal standard bearings selection chart

Crankshaft number mark	Cylinder block number mark																
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
00	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5
01	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5
02	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5	6
03	3	3	3	4	4	4	4	4	4	5	5	5	5	5	5	6	6
04	3	3	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6
05	3	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6
06	4	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6
07	4	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6
08	4	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	7
09	4	4	4	5	5	5	5	5	5	6	6	6	6	6	6	7	7
10	4	4	5	5	5	5	5	5	6	6	6	6	6	6	7	7	7
11	4	5	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7
12	5	5	5	5	5	5	6	6	6	6	6	6	7	7	7	7	7

EXAMPLE: Cylinder block ”06”, Crankshaft ”08”
= Use bearing ”5”

No.2 and No.3 journal bearings

	Total number				” ”: Number mark
Cylinder block (A) + Crankshaft (B)	0 – 5	6 – 11	12 – 17	18 – 23	24 – 28
Use bearing	”1”	”2”	”3”	”4”	”5”

EXAMPLE: Cylinder block ”06” (A)
+ Crankshaft ”08” (B)
= Total number 14 (Use bearing ”3”)

No.2 and No.3 journal standard bearings selection chart

Crankshaft number mark	Cylinder block number mark																
	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16
00	1	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3
01	1	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3
02	1	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4
03	1	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4
04	1	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4
05	1	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4
06	2	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4
07	2	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4
08	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5
09	2	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5
10	2	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5
11	2	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5
12	3	3	3	3	3	3	4	4	4	4	4	4	5	5	5	5	5

EXAMPLE: Cylinder block ”06”, Crankshaft ”08”
= Use bearing ”3”

Reference

Item	Mark	mm (in.)
Cylinder block main journal bore diameter (A)	”00”	66.000 (2.5984)
	”01”	66.001 (2.5985)
	”02”	66.002 (2.5985)
	”03”	66.003 (2.5985)
	”04”	66.004 (2.5986)
	”05”	66.005 (2.5986)
	”06”	66.006 (2.5987)
	”07”	66.007 (2.5987)
	”08”	66.008 (2.5987)
	”09”	66.009 (2.5988)
	”10”	66.010 (2.5988)
	”11”	66.011 (2.5989)
	”12”	66.012 (2.5989)
	”13”	66.013 (2.5989)
	”14”	66.014 (2.5990)
	”15”	66.015 (2.5990)
	”16”	66.016 (2.5990)
Crankshaft main journal diameter (B)	”00”	61.000 (2.4016)
	”01”	60.999 (2.4015)
	”02”	60.998 (2.4015)
	”03”	60.997 (2.4015)
	”04”	60.996 (2.4014)
	”05”	60.995 (2.4014)
	”06”	60.994 (2.4013)
	”07”	60.993 (2.4012)
	”08”	60.992 (2.4012)
	”09”	60.991 (2.4012)
	”10”	60.990 (2.4012)
	”11”	60.989 (2.4011)
	”12”	60.988 (2.4011)
Standard bearing center wall thickness	”1”	2.486 – 2.489 (0.0979 – 0.0980)
	”2”	2.489 – 2.492 (0.0980 – 0.0981)
	”3”	2.492 – 2.495 (0.0981 – 0.0982)
	”4”	2.495 – 2.498 (0.0982 – 0.0983)
	”5”	2.498 – 2.501 (0.0983 – 0.0985)
	”6”	2.501 – 2.504 (0.0985 – 0.0986)
	”7”	2.504 – 2.507 (0.0986 – 0.0987)

(l) Completely remove the Plastigage.

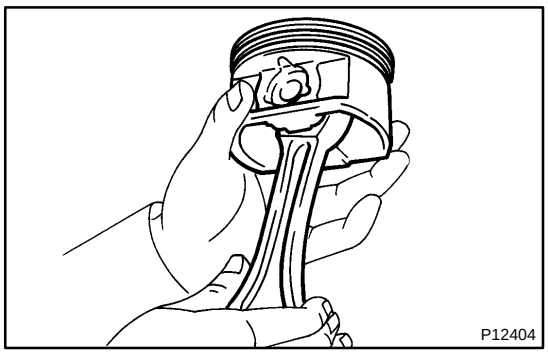
31. REMOVE CRANKSHAFT

(a) Lift out the crankshaft.

(b) Remove the 4 upper main bearings and 2 upper thrust washers from the cylinder block.

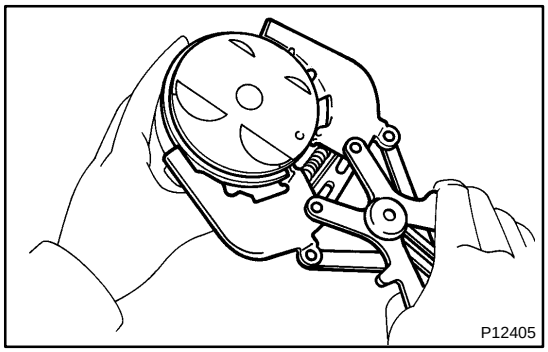
HINT:

Arrange the main bearing caps, bearings and thrust washers in the correct order.



32. CHECK FIT BETWEEN PISTON AND PISTON PIN

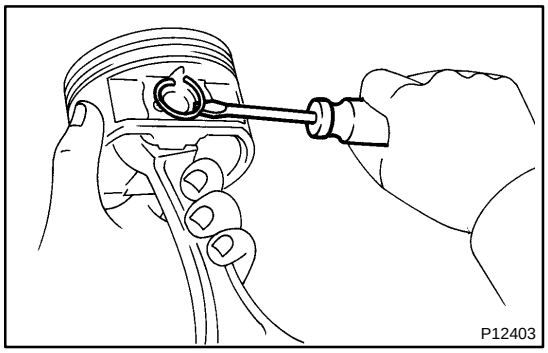
Try to move the piston back and forth on the piston pin.
If any movement is felt, replace the piston and pin as a set.



33. REMOVE PISTON RINGS

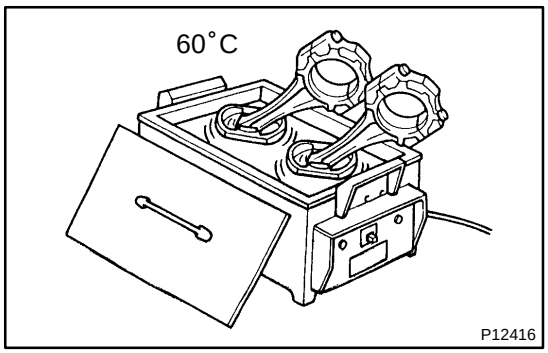
(a) Using a piston ring expander, remove the 2 compression rings.
(b) Remove the 2 side rails and oil ring by hand.

HINT:
Arrange the piston rings in the correct order only.

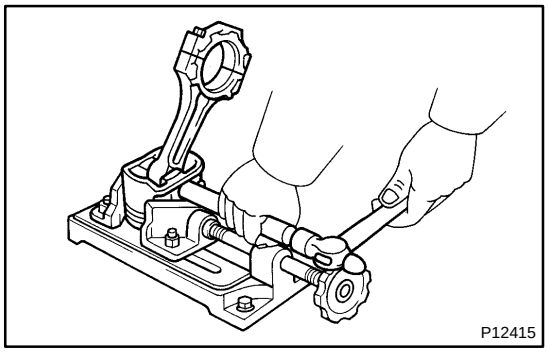


34. DISCONNECT CONNECTING ROD FROM PISTON

(a) Using a small screwdriver, pry out the 2 snap rings.



(b) Gradually heat the piston to approx. 60˚C (140˚F).

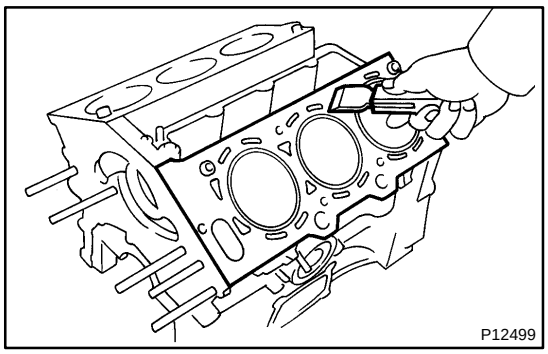


(c) Using a plastic–faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

HINT:

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

EM0ZO–01


P12499

INSPECTION

1. REMOVE GASKET MATERIAL

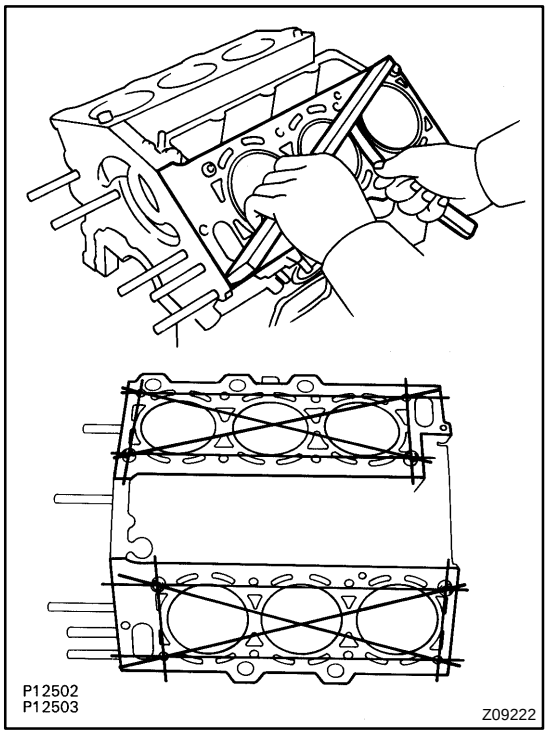
Using a gasket scraper, remove all the gasket material from the top surface of the cylinder block.

2. CLEAN CYLINDER BLOCK

Using a soft brush and solvent, thoroughly clean the cylinder block.

NOTICE:

If the cylinder is washed at high temperatures, the cylinder liner sticks out beyond the cylinder block, so always wash the cylinder block at a temperature of 45˚C (113˚F) or less.

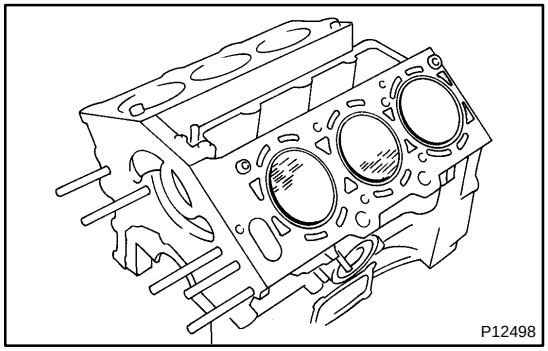


3. INSPECT TOP SURFACE OF CYLINDER BLOCK FOR FLATNESS

Using a precision straight edge and feeler gauge, measure the surface contacting the cylinder head gasket for warpage.

Maximum warpage: 0.07 mm (0.0028 in.)

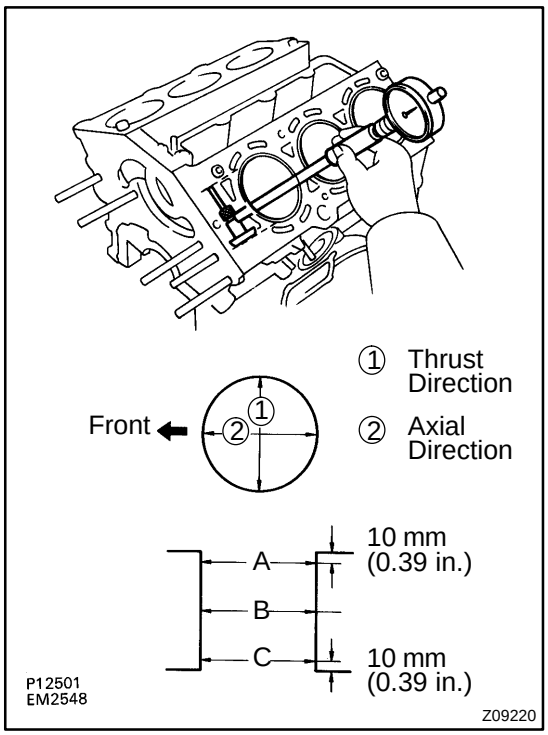
If warpage is greater than maximum, replace the cylinder block.


P12498

4. INSPECT CYLINDER FOR VERTICAL SCRATCHES

Visually check the cylinder for vertical scratches.

If deep scratches are present, replace the cylinder block.

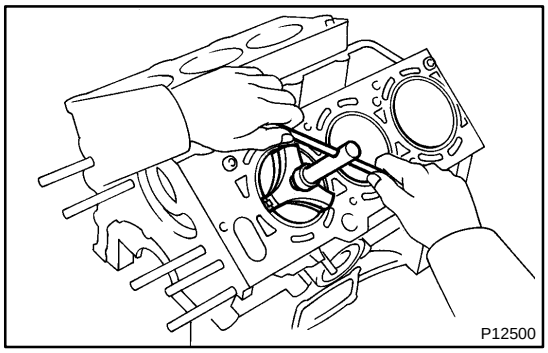


5. INSPECT CYLINDER BORE DIAMETER

Using a cylinder gauge, measure the cylinder bore diameter at positions A, B and C in the thrust and axial directions.

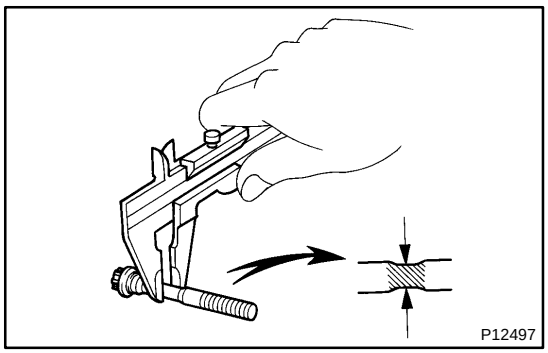
Standard diameter:
87.500 – 87.512 mm (3.4449 – 3.4453 in.)
Maximum diameter: 87.52 mm (3.4457 in.)

If the diameter is greater than maximum, replace the cylinder block.



6. REMOVE CYLINDER RIDGE

If the wear is less than 0.2 mm (0.008 in.), using a ridge reamer, grind the top of the cylinder.

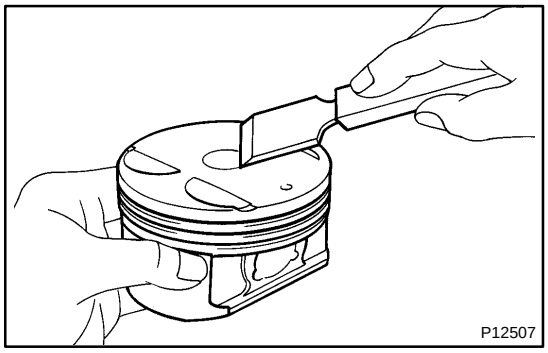


7. INSPECT 12 POINTED HEAD MAIN BEARING CAP BOLTS

Using vernier calipers, measure the tension portion diameter of the bolt.

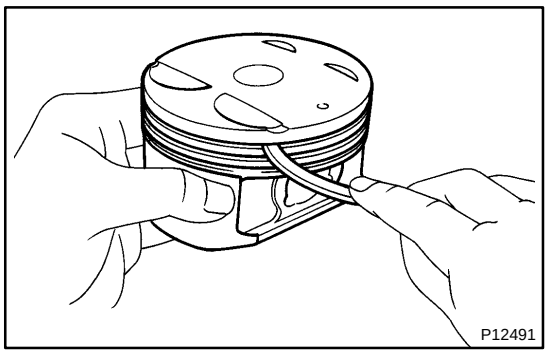
Standard diameter:
7.500 – 7.600 mm (0.2953 – 0.2992 in.)
Minimum diameter: 7.20 mm (0.2835 in.)

If the diameter is less than minimum, replace the bolt.

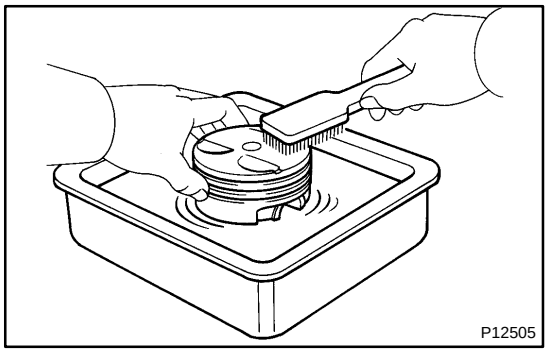


8. CLEAN PISTON

(a) Using a gasket scraper, remove the carbon from the piston top.



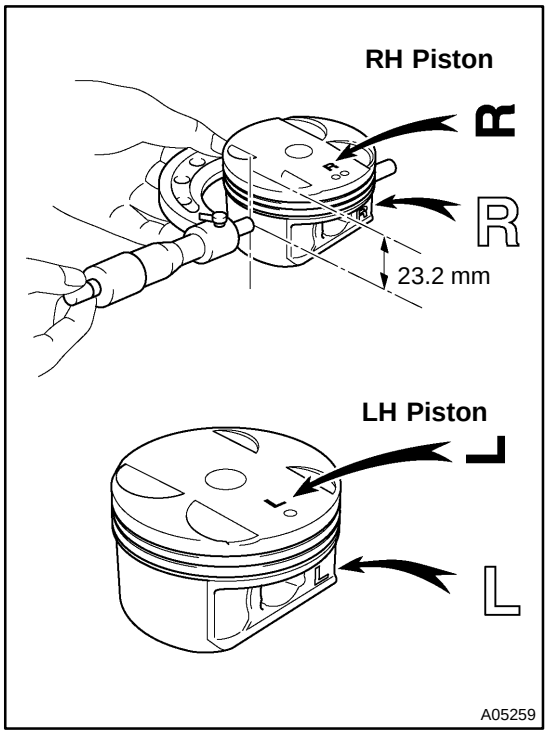
(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.



(c) Using solvent and a brush, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.



9. INSPECT PISTON OIL CLEARANCE

(a) Using a micrometer, measure the piston diameter at right angles to the piston pin center line, 23.2 mm (0.913 in.) from the piston head.

Piston diameter:

87.406 – 87.416 mm (3.4412 – 3.4416 in.)

(b) Measure the cylinder bore diameter in the thrust directions (See step 5.).

(c) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

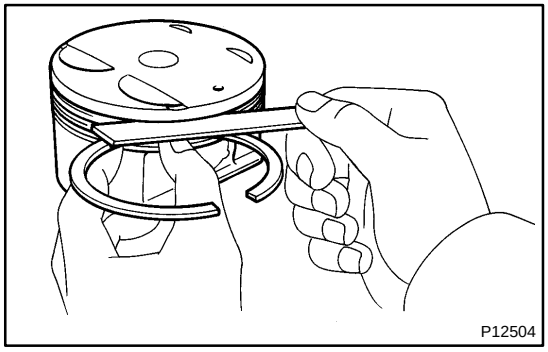
0.084 – 0.106 mm (0.0033 – 0.0042 in.)

Maximum oil clearance: 0.13 mm (0.0051 in.)

If the oil clearance is greater than maximum, replace all the 6 pistons. If necessary, replace the cylinder block.

HINT:

The shape of the piston varies for the RH and LH banks. The RH piston is marked with ”R”, the LH piston with ”L”.



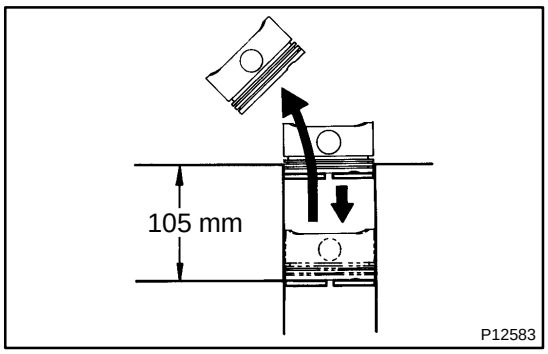
10. INSPECT PISTON RING GROOVE CLEARANCE

Using a feeler gauge, measure the clearance between new piston right and the wall of the ring groove.

Ring groove clearance:

No.1	0.020 – 0.070 mm (0.0008 – 0.0028 in.)
No.2	0.020 – 0.060 mm (0.0008 – 0.0024 in.)

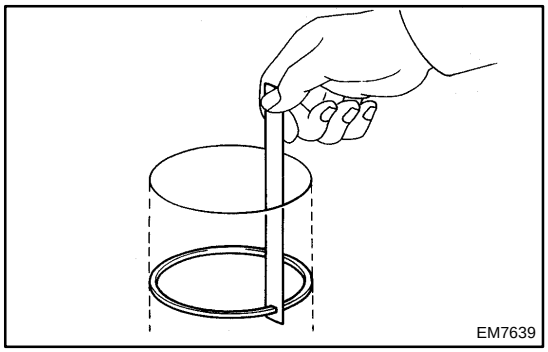
If the clearance is not as specified, replace the piston.



11. INSPECT PISTON RING END GAP

(a) Insert the piston ring into the cylinder bore.

(b) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 105 mm (4.13 in.) from the top of the cylinder block.



(c) Using a feeler gauge, measure the end gap.

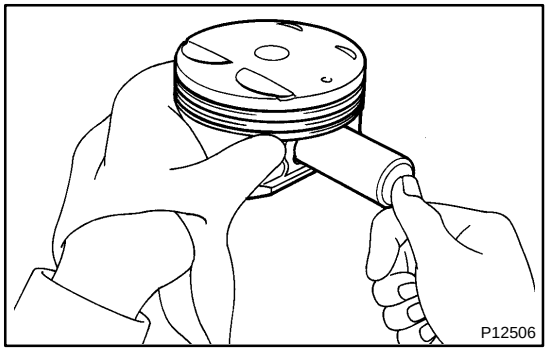
Standard end gap:

No.1	0.25 – 0.35 mm (0.0098 – 0.0138 in.)
No.2	0.35 – 0.45 mm (0.0138 – 0.0177 in.)
Oil (Side rail)	0.15 – 0.40 mm (0.0059 – 0.0157 in.)

Maximum end gap:

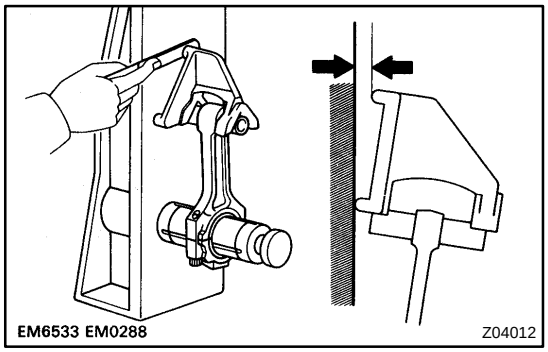
No.1	0.95 mm (0.0374 in.)
No.2	1.05 mm (0.0413 in.)
Oil (Side rail)	1.00 mm (0.0394 in.)

If the end gap is greater than maximum, replace the piston ring.
If the end gap is greater than maximum, even with a new piston ring, replace the cylinder block.



12. INSPECT 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.



13. INSPECT CONNECTING ROD ALIGNMENT

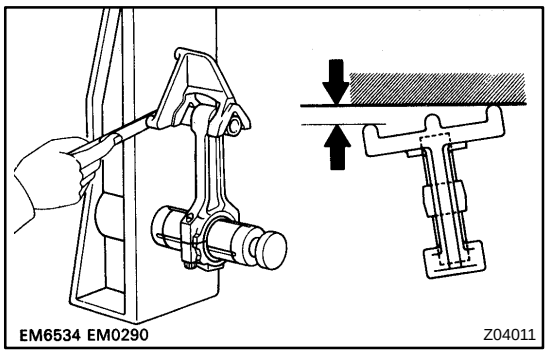
Using a rod aligner and feeler gauge, check the connecting rod alignment.

- Check for out–of–alignment.

Maximum out–of–alignment:

0.05 mm (0.0020 in.) per 100 mm (3.94 in.)

If bend is greater than maximum, replace the connecting rod assembly.

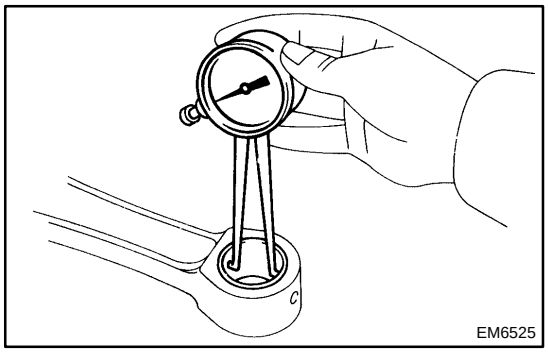


- Check for twist

Maximum twist:

0.15 mm (0.0059 in.) per 100 mm (3.94 in.)

If twist is greater than maximum, replace the connecting rod assembly.

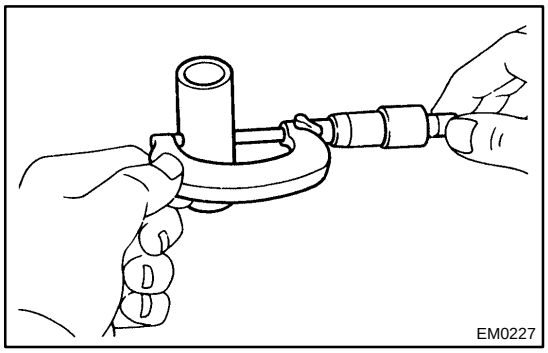


14. INSPECT PISTON PIN OIL CLEARANCE

(a) 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.)



(b) Using a micrometer, measure the piston pin diameter.

Piston pin diameter:

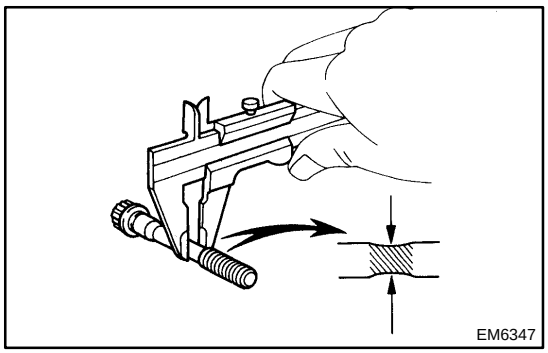
21.997 – 22.006 mm (0.8660 – 0.8664 in.)

(c) Subtract the piston pin diameter measurement from the bushing inside diameter measurement.

Standard oil clearance:

0.005 – 0.011 mm (0.0002 – 0.0004 in.)

Maximum oil clearance: 0.05 mm (0.0020 in.)



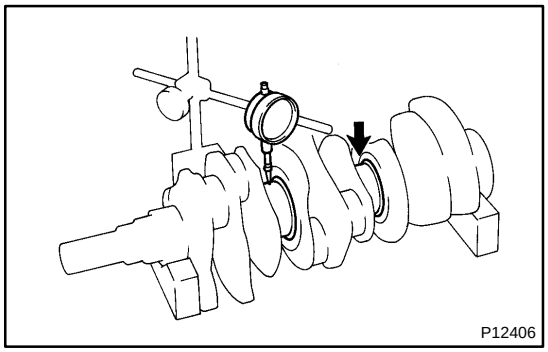
15. INSPECT CONNECTING ROD BOLTS

Using vernier calipers, measure the tension portion diameter of the bolt.

Standard diameter: 7.2 – 7.3 mm (0.284 – 0.287 in.)

Minimum diameter: 7.0 mm (0.276 in.)

If the diameter is less than minimum, replace the bolt.



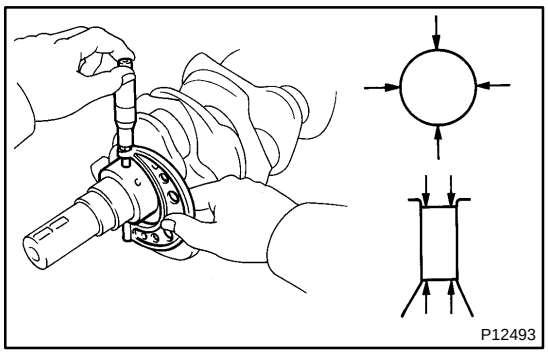
16. INSPECT CRANKSHAFT FOR CIRCLE RUNOUT

(a) Place the crankshaft on V–blocks.

(b) Using a dial indicator, measure the circle runout, as shown in the illustration.

Maximum circle runout: 0.06 mm (0.0024 in.)

If the circle runout is greater than maximum, replace the crankshaft.



17. INSPECT MAIN JOURNALS AND CRANK PINS

(a) Using a micrometer, measure the diameter of each main journal and crank pin.

Main journal diameter:
60.988 – 61.000 mm (2.4011 – 2.4016 in.)
Crank pin diameter:
52.992 – 53.000 mm (2.0862 – 2.0866 in.)

If the diameter is not as specified, check the oil clearance (See page EM–83).

If necessary, replace the crankshaft.

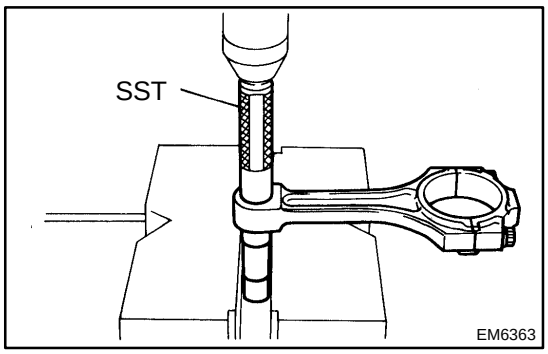
(b) Check each main journal and crank pin for taper and out–of–round as shown.

Maximum taper and out–of–round:
0.02 mm (0.0008 in.)

If the taper and out–of–round is greater than maximum, replace the crankshaft.

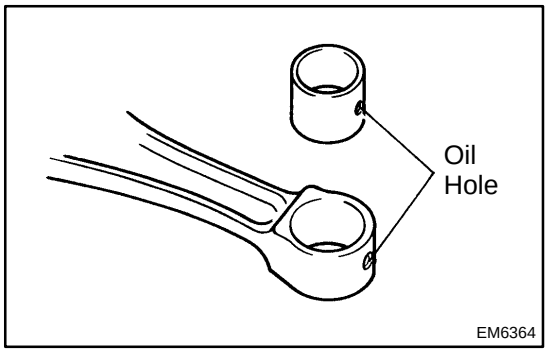
EM0ZP–01

REPLACEMENT



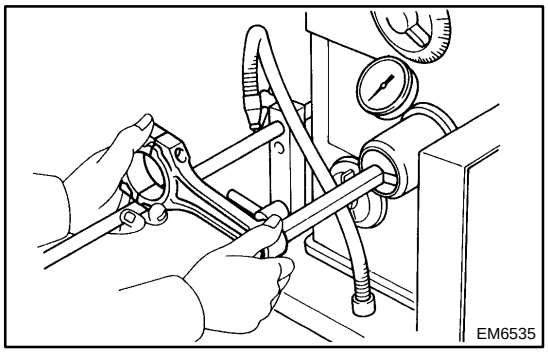
1. REPLACE CONNECTING ROD BUSHING

(a) Using SST and a press, press out the bushing.
SST 09222–30010

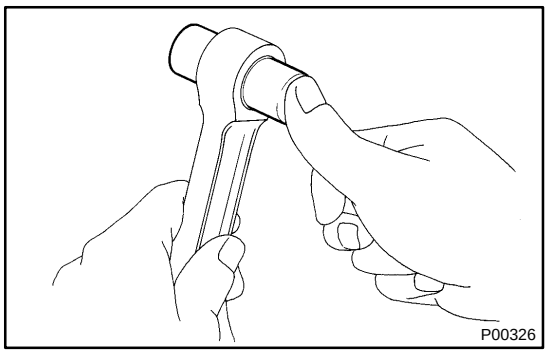


(b) Align the oil holes of a new bushing and the connecting rod.

(c) Using SST and a press, press in the bushing.
SST 09222–30010

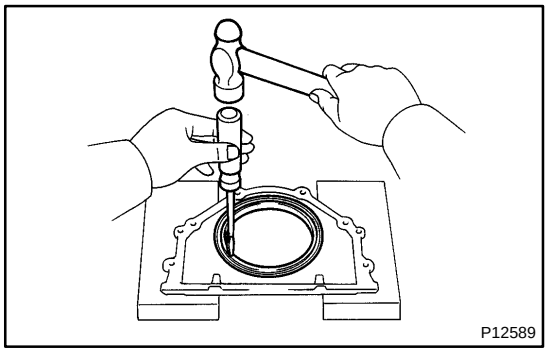


(d) Using a pin hole grinder, hone the bushing to obtain the standard specified clearance (See page EM–93) between the bushing and piston pin.



(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.

2. REPLACE CRANKSHAFT FRONT OIL SEAL
(See page LU–14)

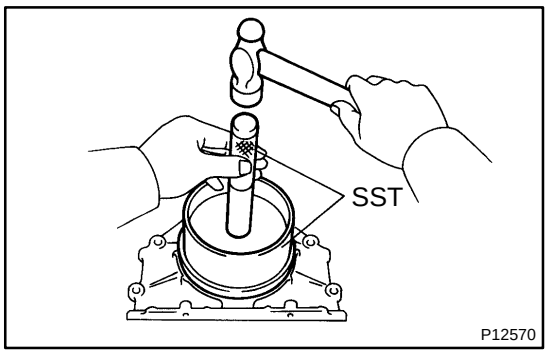


3. REPLACE CRANKSHAFT REAR OIL SEAL

HINT:
There are 2 methods ((a) and (b)) to replace the oil seal which are as follows:

(a) If the rear oil seal retainer is removed from the cylinder block.

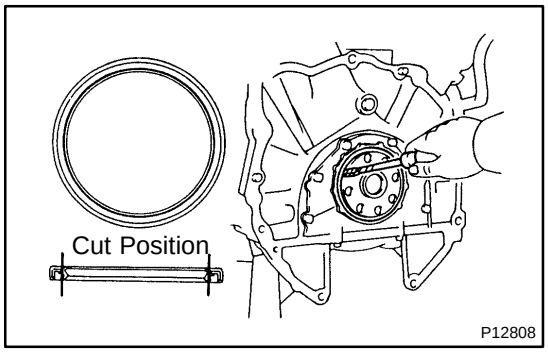
(1) Using a screwdriver and hammer, tap out the oil seal.



(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 09223–15030, 09950–70010 (09951–07100)

(3) Apply MP grease to the oil seal lip.



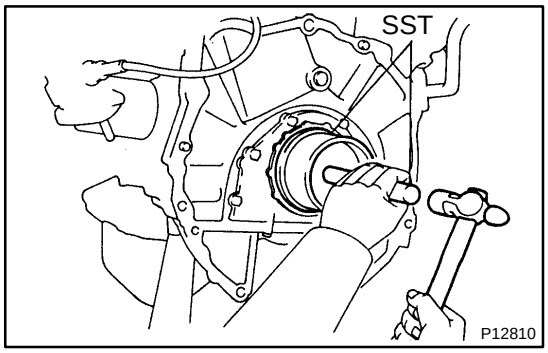
(b) If the rear oil seal retainer is installed to the cylinder block.

(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 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.

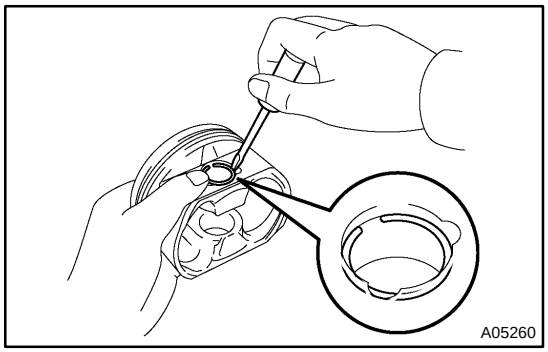
SST 09223–15030, 09950–70010 (09951–07100)

EM0ZQ–01

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.

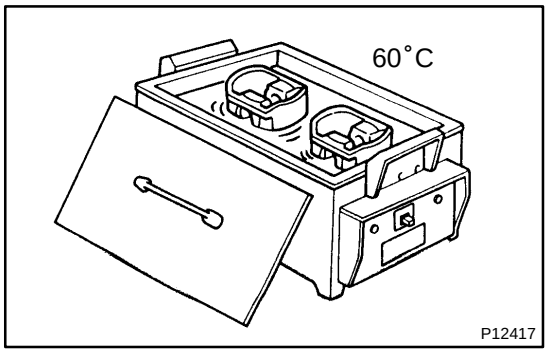


1. ASSEMBLE PISTON AND CONNECTING ROD

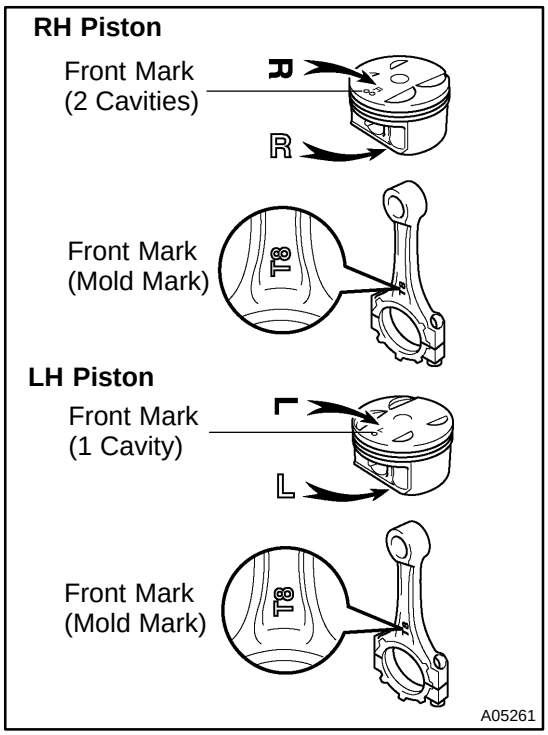
(a) Using a small screwdriver, install a new snap ring at one end of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



(b) Gradually heat the piston to about 60˚C (140˚F).



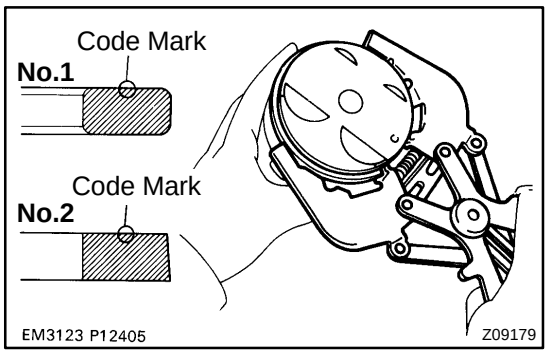
(c) Coat the piston pin with engine oil.

(d) Align the front marks of the piston and connecting rod, and push in the piston pin with your thumb.

(e) Using a small screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Be sure that end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



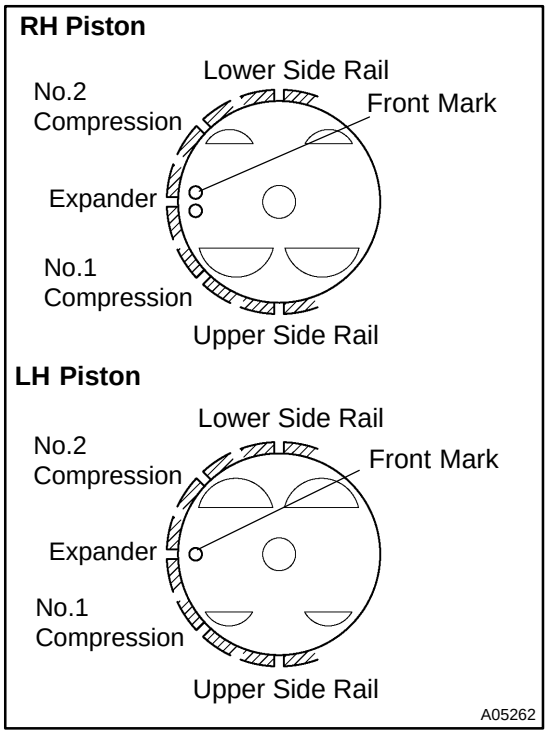
2. INSTALL PISTON RINGS

(a) Install the oil ring expander and 2 side rails by hand.

(b) Using a piston ring expander, install the 2 compression rings with the code mark facing upward.

Code mark:

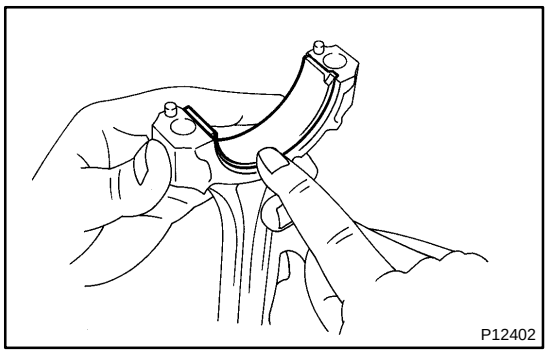
No.1	1R or T
No.2	2R or 2T



(c) Position the piston rings so that the ring ends are as shown.

NOTICE:

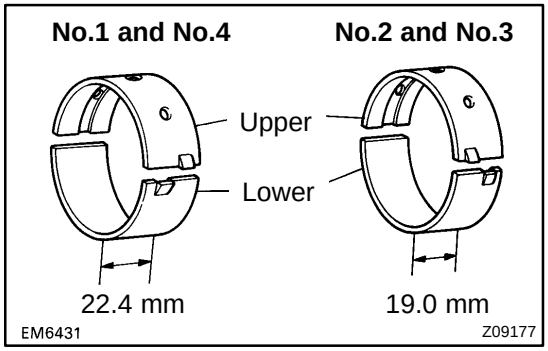
Do not align the ring ends.



3. INSTALL CONNECTING ROD BEARINGS

(a) Align the bearing claw with the groove of the connecting rod or connecting cap.

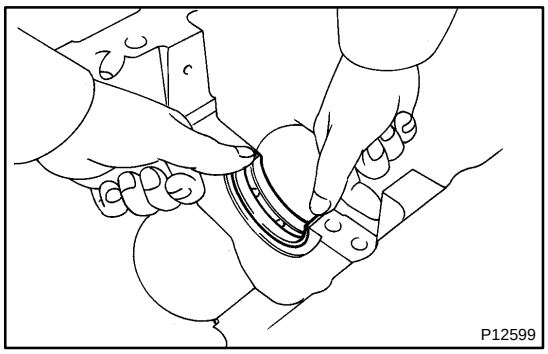
(b) Install the bearings in the connecting rod and connecting rod cap.



4. INSTALL MAIN BEARINGS

HINT:

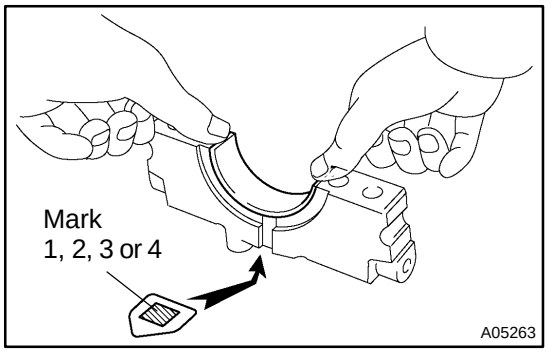
- Main bearings come in widths of 19.0 mm (0.748 in.) and 22.4 mm (0.882 in.). Install the 22.4 mm (0.882 in.) bearings in the No.1 and No.4 cylinder block journal positions with the main bearing cap. Install the 19.0 mm (0.748 in.) bearings in the No.2 and No.3 positions.
- Upper bearings have an oil groove and oil holes; lower bearings do not.



(a) Align the bearing claw with the claw groove of the cylinder block, and push in the 4 upper bearings.

NOTICE:

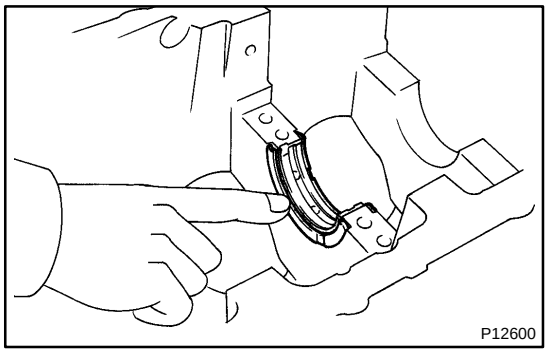
Install the bearing with the oil hole in the cylinder block.



(b) Align the bearing claw with the claw groove of the main bearing cap, and push in the 4 lower bearings.

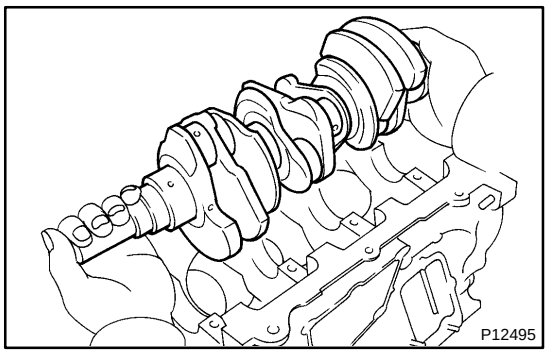
HINT:

A number is marked on each main bearing cap to indicate the installation position.

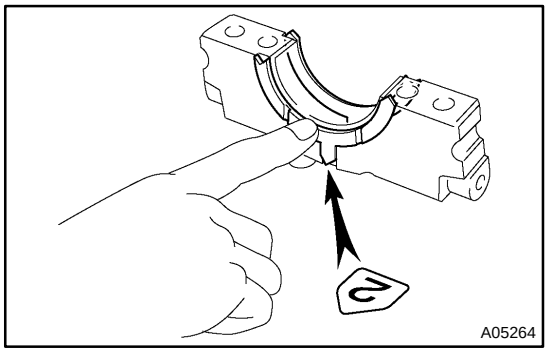


5. INSTALL UPPER THRUST WASHERS

Install the 2 thrust washers under the No.2 journal position of the cylinder block with the oil grooves facing outward.

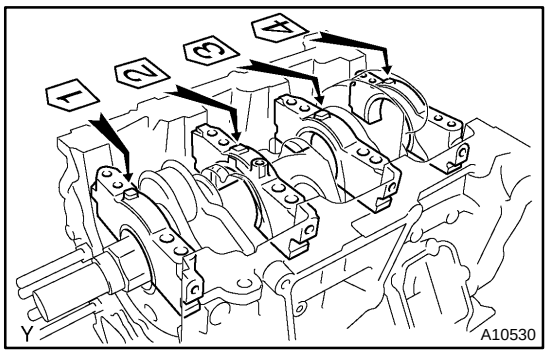


6. PLACE CRANKSHAFT ON CYLINDER BLOCK

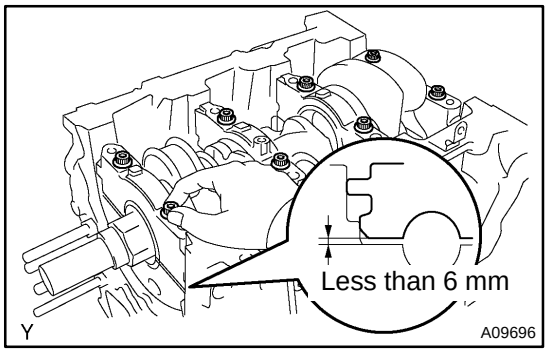


7. PLACE MAIN BEARING CAPS AND LOWER THRUST WASHERS ON CYLINDER BLOCK

(a) Install the 2 thrust washers on the No.2 bearing cap with the grooves facing outward.



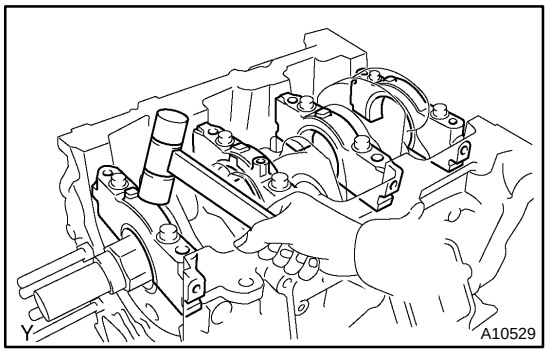
(b) Temporarily place the 4 main bearing caps level and let them in their proper locations.



(c) Apply a light coat of engine oil on the threads and under the main bearing cap bolts for the 12 pointed head.

(d) Temporarily install the 8 main bearing cap bolts to the inside positions.

(e) Insert the main bearing cap with your hand until the clearance between the main bearing cap and the cylinder block will become less than 6 mm (0.23 in.) by making the 2 internal main bearing cap bolts as a guide.

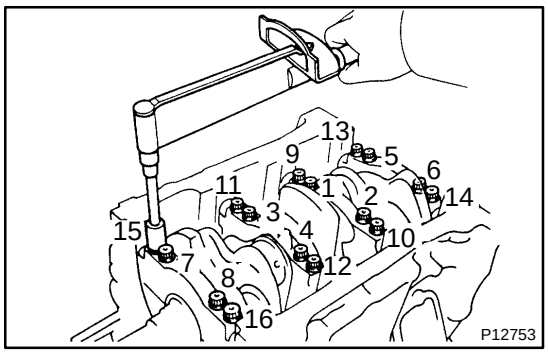


(f) Using a plastic–faced hammer, lightly tap the bearing cap to ensure a proper fit.

8. INSTALL 12 POINTED HEAD MAIN BEARING CAP BOLTS

HINT:

- The main bearing cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any of the main bearing cap bolts is broken or deformed, replace it.

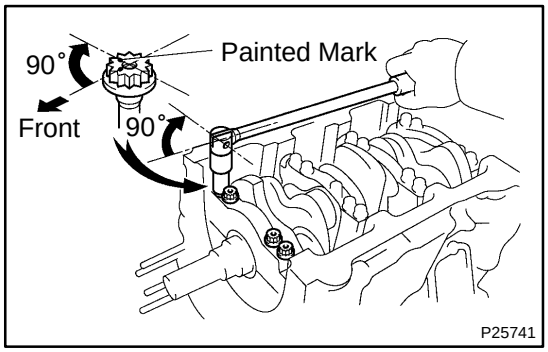


(a) Apply a light coat of engine oil on the threads and under the main bearing cap bolts.

(b) Install and uniformly tighten the 16 main bearing cap bolts in several passes and in the sequence shown.

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

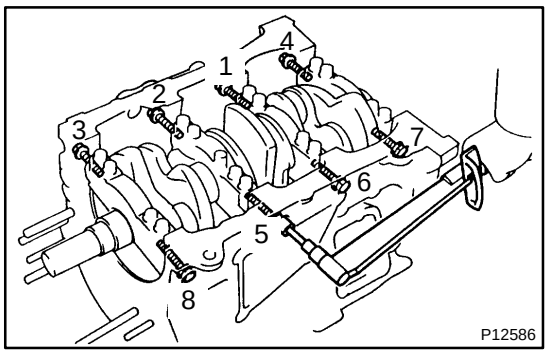
If any of the main bearing cap bolts does not meet the torque specification, replace the main bearing cap bolt.



(c) Mark the front of the main bearing cap bolts 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.



9. INSTALL HEXAGON HEAD MAIN BEARING CAP BOLTS

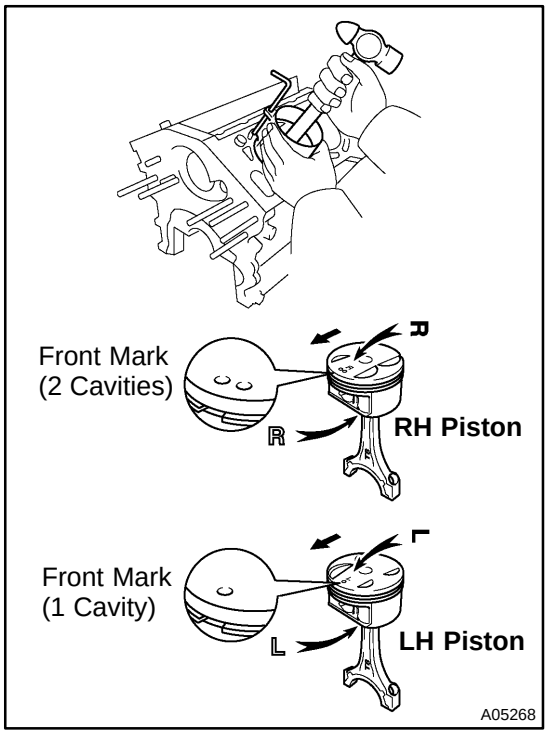
(a) Install a new seal washer to the main bearing cap bolt.

(b) Install and uniformly tighten the 8 main bearing cap bolts in several passes and in the sequence shown.

Torque: 27 N·m (275 kgf·cm, 20 ft·lbf)

10. CHECK CRANKSHAFT THRUST CLEARANCE

(See page EM–83)

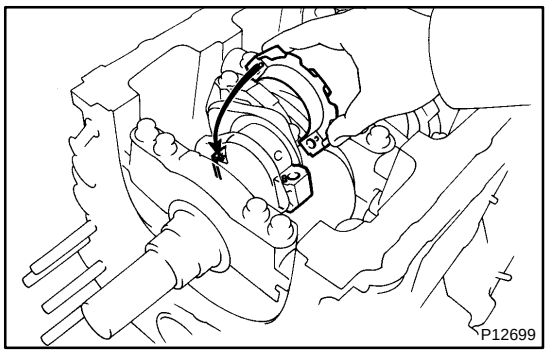


11. INSTALL PISTON AND CONNECTING ROD ASSEMBLES

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.

HINT:

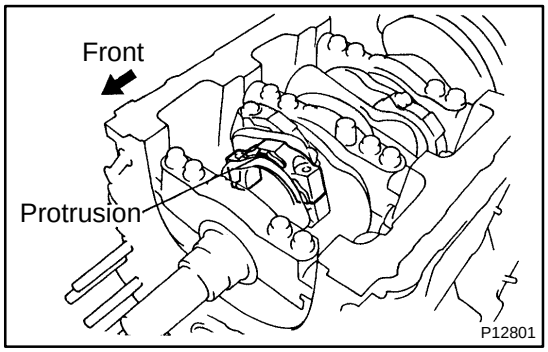
The shape of the piston varies for the RH and LH banks. The RH piston is marked with ”R”, the LH piston with ”L”.



12. PLACE CONNECTING ROD CAP ON CONNECTING ROD

(a) Match the numbered connecting rod cap with the connecting rod.

(b) Align the pin dowels of the connecting rod cap with the pins of the connecting rod, and install the connecting rod.

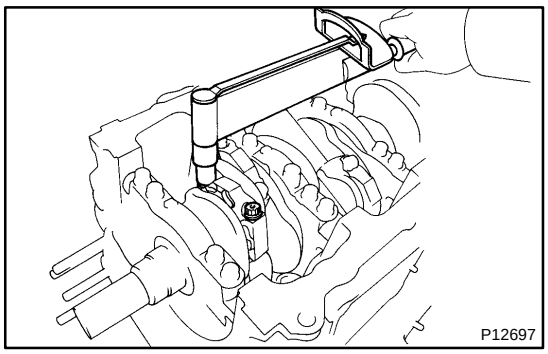


(c) Check that the protrusion of the connecting rod cap is facing in the correct direction.

13. INSTALL CONNECTING ROD CAP BOLTS

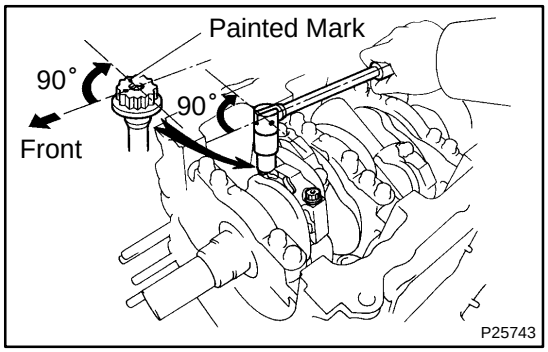
HINT:

- The connecting rod cap bolts are tightened in 2 progressive steps (steps (b) and (d)).
- If any 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 in several passes.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

If any of the connecting rod cap bolts does not meet the torque specification, replace the connecting rod cap bolts.

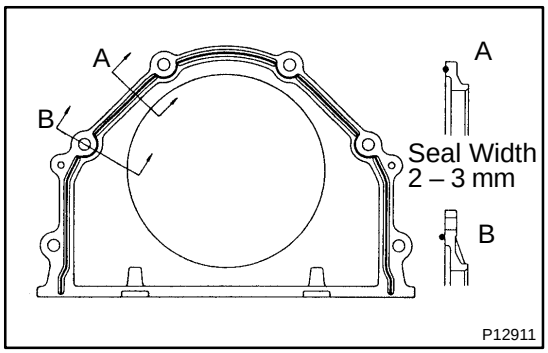


(c) Mark the front of the connecting cap bolts with paint.
(d) Retighten the cap bolts by 90° as shown.
(e) Check that the painted mark is now at a 90° angle to the front.
(f) Check that the crankshaft turns smoothly.

14. CHECK CONNECTING ROD THRUST CLEARANCE (See page EM–83)

15. 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 cylinder block.
- Using a razor blade and gasket scraper, remove all the oil packing (FIPG) material from the gasket surfaces and sealing grooves.
- Thoroughly clean all components to remove all the loose material.
- Using a non–residue solvent, clean both sealing surfaces.

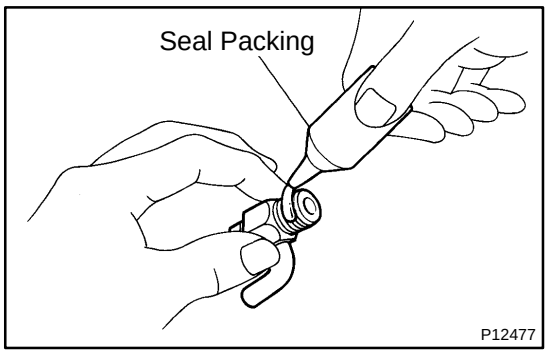


(b) Apply seal packing to the oil seal retainer as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent
- Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the oil seal retainer with the 6 bolts Uniformly tighten the bolt in several passes and in the sequence shown.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

16. INSTALL CYLINDER BLOCK SIDE COVER

Install a new gasket and the cylinder block side cover with the 3 bolts and 2 nuts.
Torque: 9 N·m (90 kgf·cm, 78 in.·lbf)



17. INSTALL ENGINE COOLANT DRAIN UNION

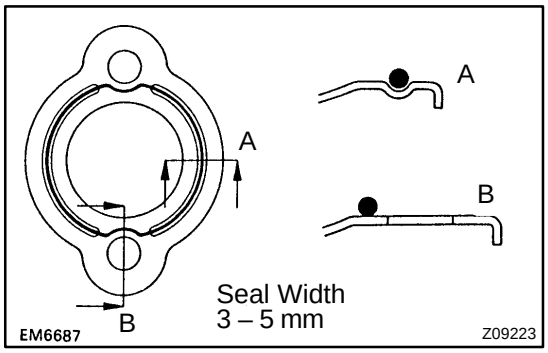
(a) Apply seal packing to 2 or 3 threads.
Seal packing: Part No. 08826–00100 or equivalent

(b) Install the drain union.
Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

HINT:
After applying the specified torque, rotate the drain union clockwise until its drain port is facing downward.

18. INSTALL WATER SEAL PLATE

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the seal plate 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 seal plate as shown in the illustration.
Seal packing: Part No. 08826–00100 or equivalent
- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.
- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.

(c) Install the seal plate with the 2 nuts.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

19. INSTALL OIL FILTER UNION
Torque: 30 N·m (310 kgf·cm, 22 ft·lbf)

20. INSTALL OIL FILTER (See page LU–3)

21. INSTALL OIL PUMP (See page LU–16)

22. INSTALL NO.1 OIL PAN (See page LU–16)

23. INSTALL OIL STRAINER (See page LU–16)

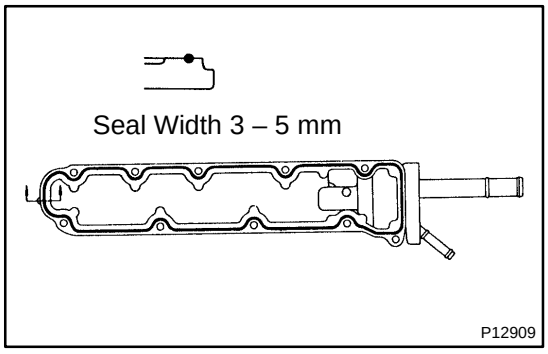
24. INSTALL NO.2 OIL PAN (See page LU–16)

25. INSTALL WATER PUMP (See page CO–8)

26. INSTALL WATER INLET HOUSING

(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 cylinder block.
- Using a razor blade and gasket scraper, remove all the old packing (FIPG) material from the gasket surfaces and sealing grooves.
- 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 water inlet housing as shown in the illustration.

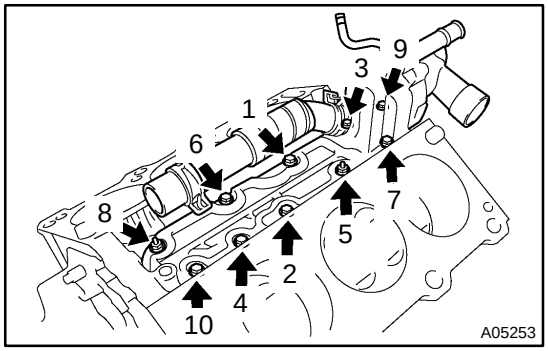
Seal packing: Part No. 08826–00100 or equivalent

- Install a nozzle that has been cut to a 3 – 5 mm (0.12 – 0.20 in.) opening.

HINT:

Avoid applying an excessive amount to the surface.

- Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- Immediately remove nozzle from the tube and reinstall cap.



(c) Install the water inlet housing with the 8 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes and in the sequence shown.

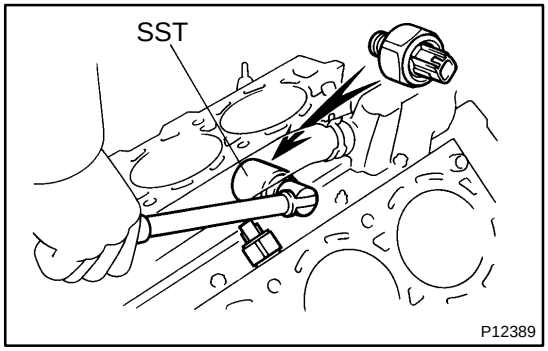
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

(d) Connect the No.2 ECT switch connector.

(e) Connect the engine wire clamp to the water inlet.

(f) Install the engine wire band.

(g) Install the engine wire clamp.



27. INSTALL KNOCK SENSORS

(a) Using SST, install the 2 knock sensors.

SST 09816–30010

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Connect the 2 knock sensor connectors.

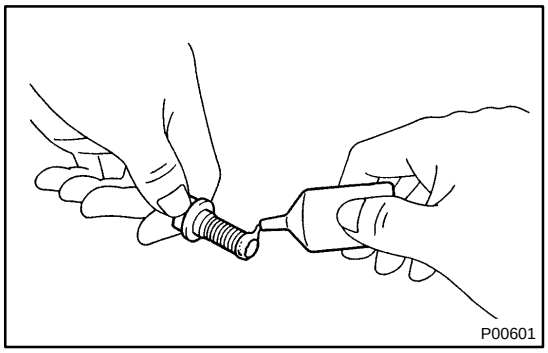
28. INSTALL NO.2 IDLER PULLEY BRACKET

Torque: 28 N·m (290 kgf·cm, 21 ft·lbf)

29. INSTALL A/C COMPRESSOR HOUSING BRACKET

Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

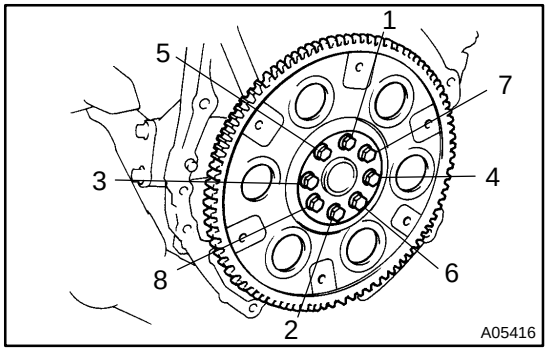
30. **INSTALL OIL PRESSURE SWITCH (See page LU–1)**
31. **INSTALL GENERATOR, BRACKET AND ADJUSTING BAR ASSEMBLY**
    Torque: 43 N·m (440 kgf·cm, 32 ft·lbf)
32. **INSTALL ENGINE WIRE**
33. **CONNECT OIL LEVEL SENSOR CONNECTOR**
34. **CONNECT OIL PRESSURE SWITCH CONNECTOR**
35. **CONNECT CRANKSHAFT POSITION SWITCH CONNECTOR**
36. **INSTALL CYLINDER HEAD (See page EM–59)**
37. **INSTALL TIMING PULLEYS AND BELT (See page EM–21)**
38. **REMOVE ENGINE STAND**



39. **INSTALL DRIVE PLATE**

(a) Apply adhesive to 2 or 3 threads of the bolt end.
Adhesive: Part No. 08833–00070, THREE BOND 1324 or equivalent

(b) Install the front spacer, drive plate and rear plate on the crankshaft.

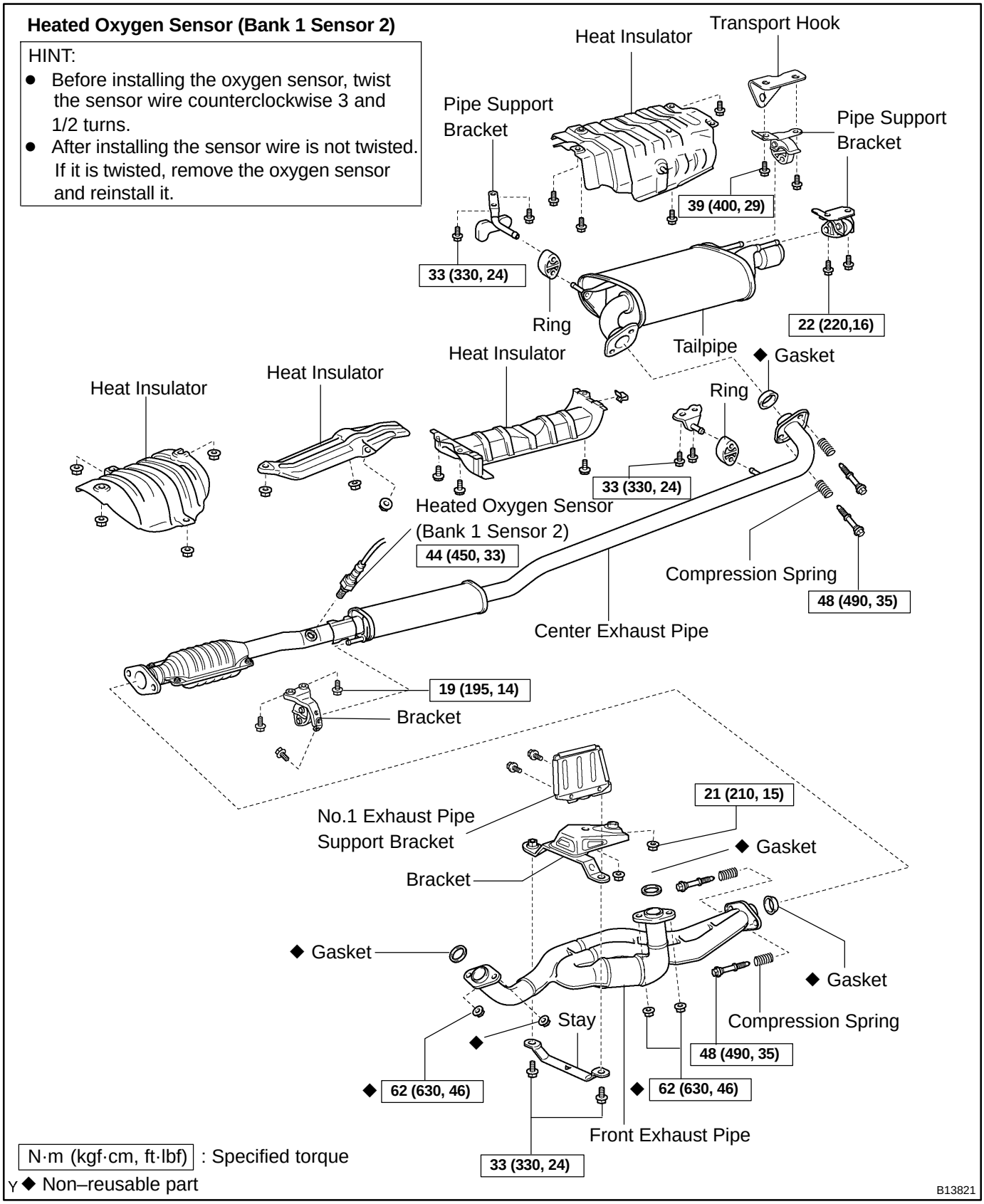


(c) Install and uniformly tighten the 8 bolts in several passes and in the sequence shown.
Torque: 83 N·m (850 kgf·cm, 61 ft·lbf)

EXHAUST SYSTEM

EM0ZR–05

COMPONENTS



IGNITION SYSTEM

IG0DL–01

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 SPARK TEST

Check that the spark occurs.

(1) Remove the ignition coils (with igniters). (See page IG–5)
(2) Remove the spark plugs.
(3) Install the spark plug to the ignition coil, and connect the ignition coil connector.
(4) Ground the spark plug.
(5) See 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:

SPARK TEST

↓ NO

CHECK CONNECTIONS OF IGNITION COIL (WITH IGNITER) CONNECTORS → BAD → Connect securely.

↓ OK

CHANGE IT TO NORMAL IGNITION COIL (WITH IGNITER) AND PERFORM SPARK TEST AGAIN → OK → Replace ignition coil (with igniter).

↓ NO

CHECK POWER SUPPLY TO IGNITION COILS (WITH IGNITER)
1. Turn ignition switch to ON.
2. Check that there is battery positive voltage at ignition coil positive (+) terminal.

→ BAD → Check wiring between ignition switch to ignition coils (with igniters).

↓ OK

CHECK RESISTANCE OF SENSORS (See steps 4 and 5)

Resistance:	**Cold**	**Hot**
Camshaft position sensor	**835 – 1,400 Ω**	**1,060 – 1,645 Ω**
Crankshaft position sensor	**1,630 – 2,740 Ω**	**2,065 – 3,225 Ω**

→ BAD → Replace camshaft position sensor. Replace crankshaft position sensor.

↓ OK

CHECK IGT SIGNAL FROM ECM (See page DI–121) → BAD → Check wiring between ECM and ignition coils (with igniters), and then try another ECM.

↓ OK

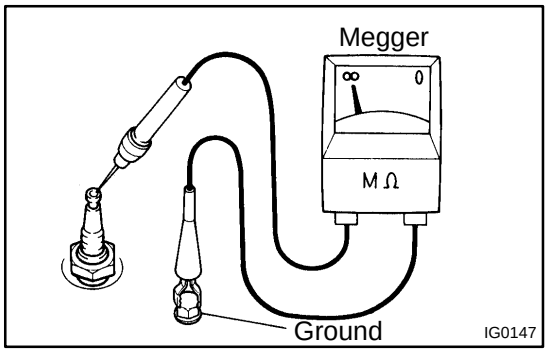
TRY ANOTHER IGNITION COIL (WITH IGNITER)

2. INSPECT SPARK PLUGS

NOTICE:

- **Never use a wire brush for cleaning.**
- **Never attempt to adjust the electrode gap on a used spark plug.**
- **Spark plugs should be replaced every 144,000 km (90,000 miles).**

(a) Remove the 6 ignition coils (with igniers).
(See page IG–5)



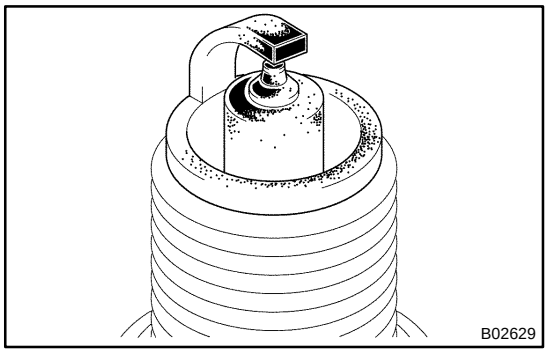
(b) Inspect the electrode.
- Using a megger (insulation resistance meter), measure the insulation resistance.

Standard correct insulation resistance:
10 MΩ or more

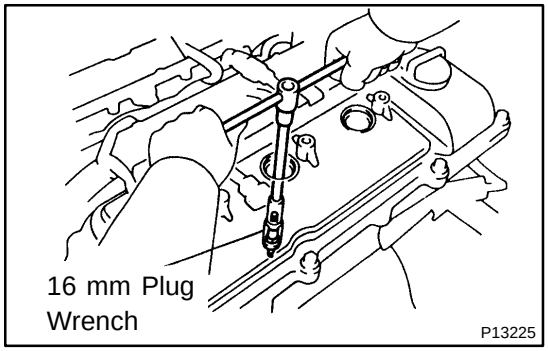
If the resistance is less than specified, proceed to step (d).

HINT:

If a megger is not available, these 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))



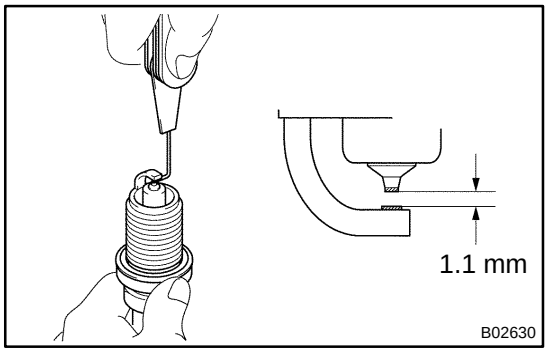
(c) Using a 16 mm plug wrench, remove the 6 spark plugs.

(d) Visually 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) Inspect the electrode gaps.

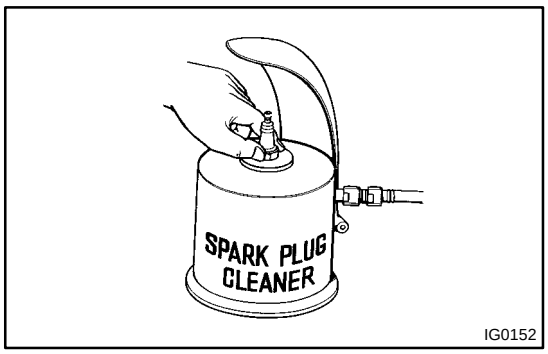
Maximum electrode gap for used spark plug:
1.3 mm (0.051 in.)

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 the 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

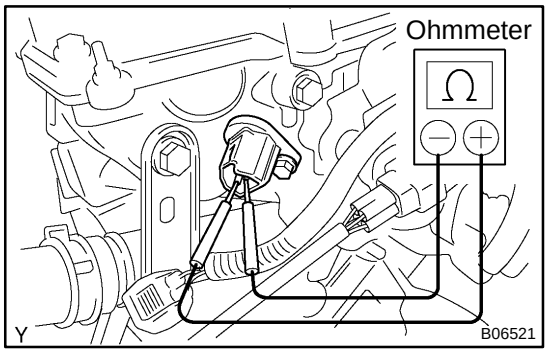
HINT:

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 6 spark plugs.
Torque: 18 N·m (180 kgf·cm, 13 ft·lbf)

(h) Reinstall the 6 ignition coil (See page IG–5).

3. INSPECT IGNITION COILS (WITH IGNITERS)
(See step 1.)



4. INSPECT CAMSHAFT POSITION SENSORS

(a) Remove the V–bank cover.

(b) Remove the air cleaner hose w/ resonator.

(c) Disconnect the sensor connectors.

(d) Using an ohmmeter, measure the resistance between terminals.

Resistance:

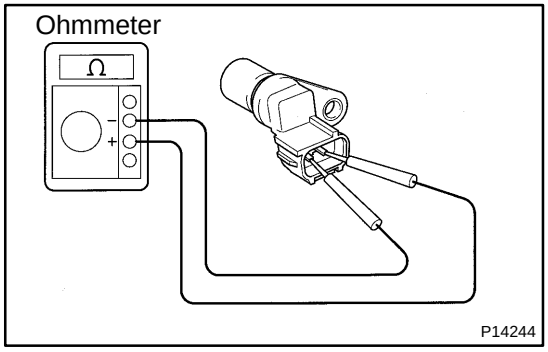
Cold	835 – 1,400 Ω
Hot	1,060 – 1,645 Ω

If the resistance is not as specified, replace the sensor.

(e) Reconnect the sensor connectors.

(f) Reinstall the air cleaner hose w/ resonator.

(g) Reinstall the V–bank cover.



5. INSPECT CRANKSHAFT POSITION SENSOR

(a) Remove the sensor (See page IG–9).

(b) Using an ohmmeter, measure the resistance between the terminals.

Resistance:

Cold	1,630 – 2,740 Ω
Hot	2,065 – 3,225 Ω

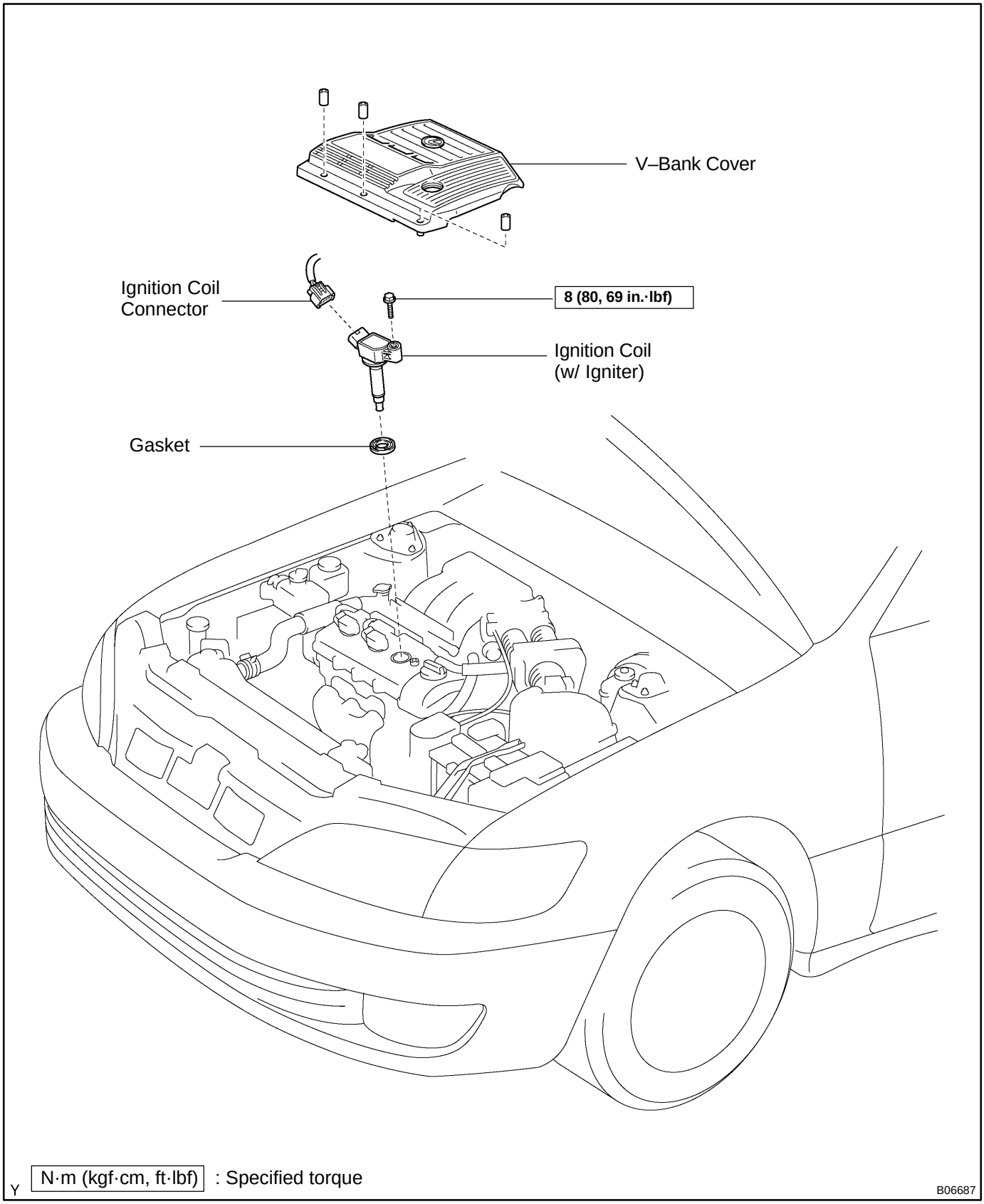
If the resistance is not as specified, replace the sensor.

(c) Reinstall the sensor (See page IG–9).

IGNITION COIL

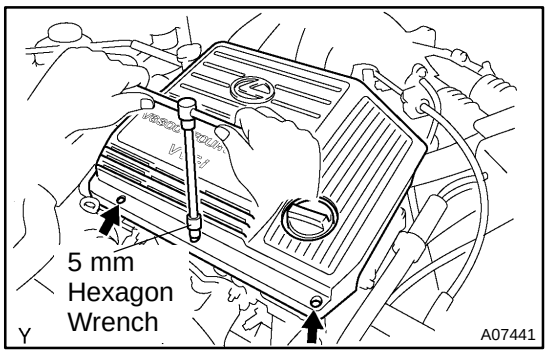
COMPONENTS

IG09O–02



IG0DM–01

REPLACEMENT



1. REMOVE V–BANK COVER

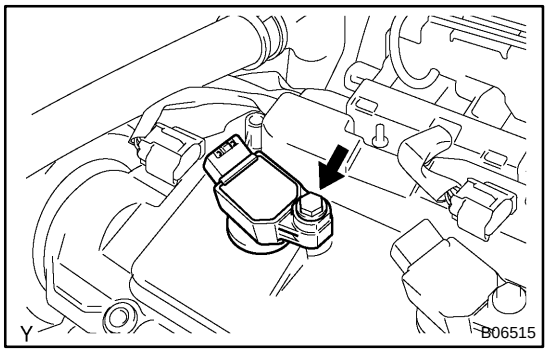
(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

(c) Remove the V–bank cover.

2. REMOVE IGNITION COILS

(a) Disconnect the 6 ignition coil connectors.



(b) Remove the bolt, and pull out the ignition coil. Remove the 6 ignition coils.

3. REINSTALL NEW IGNITION COILS

(a) Connect a new ignition coil to the spark plug, and attach the ignition coil to the cylinder head cover, and install the bolt. Install the 6 ignition coils.

Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

(b) Connect the 6 ignition coil connectors.

4. REINSTALL V–BANK COVER

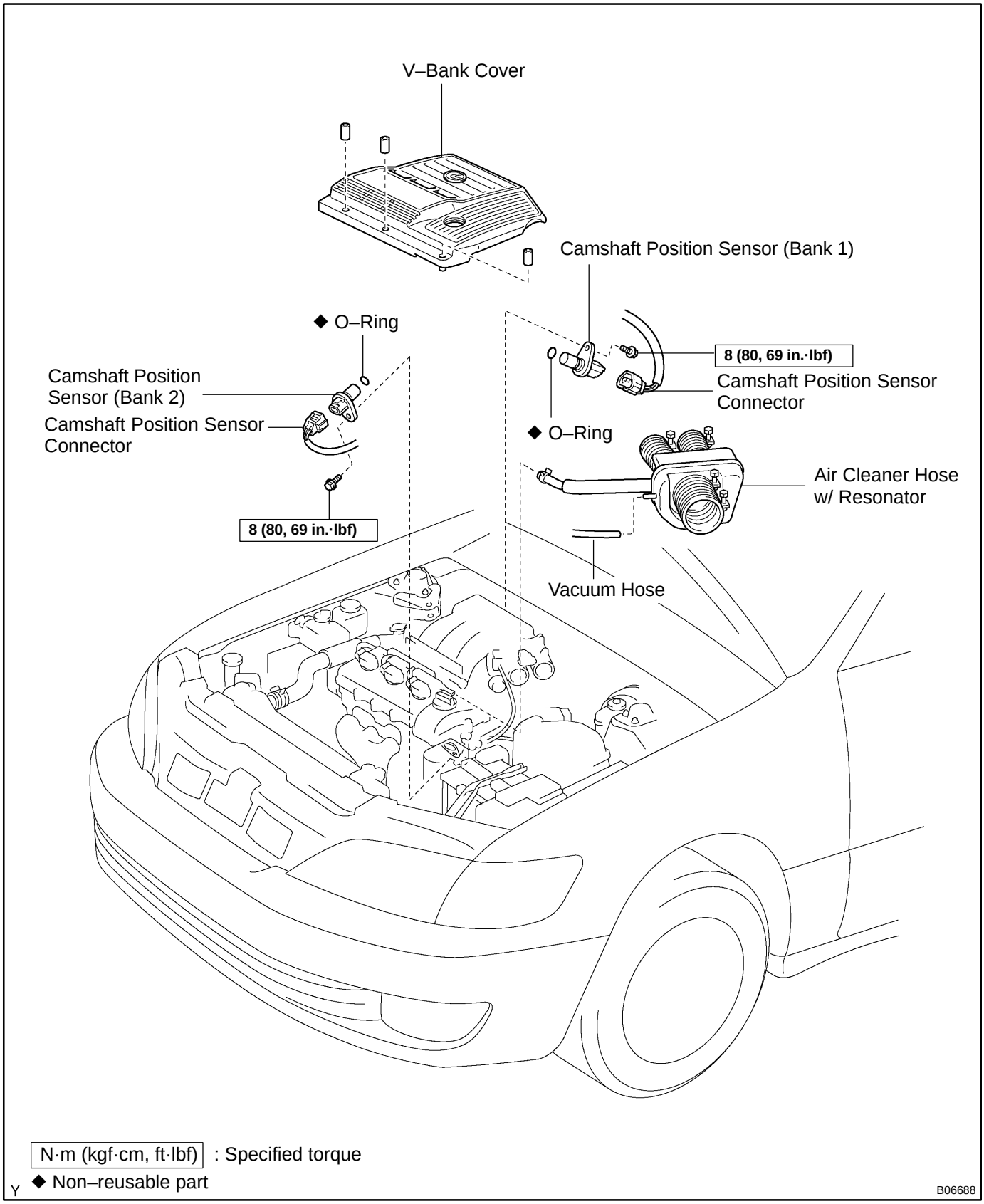
(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

(b) Press down the V–bank cover fastener.

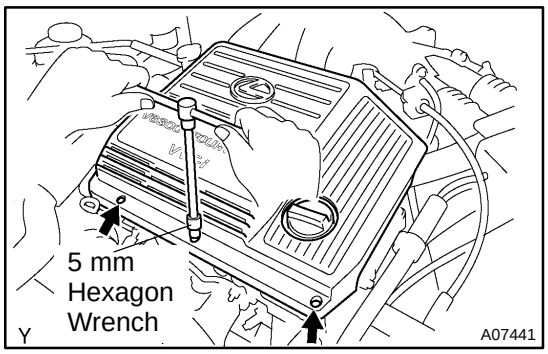
CAMSHAFT POSITION SENSOR

IG09Q–02

COMPONENTS



IG0DN–01



REPLACEMENT

1. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

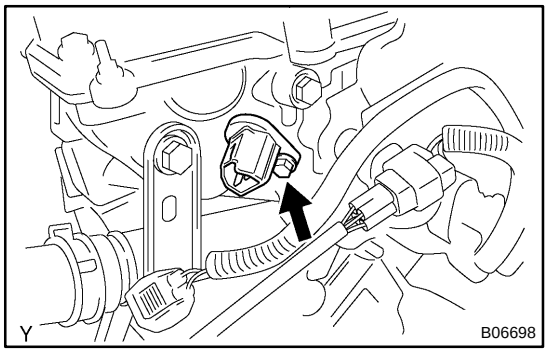
(b) Loosen the V–bank cover fastener counterclockwise.

(c) Remove the V–bank cover.

2. REMOVE AIR CLEANER HOSE WITH RESONATOR

3. REMOVE CAMSHAFT POSITION SENSORS

(a) Disconnect the 2 camshaft popsition sensor connectors.



(b) Remove the bolt and camshaft position sensor. Remove the 2 camshaft position sensors.

(c) Remove the O–rings from the camshaft position sensors.

4. REINSTALL NEW CAMSHAFT POSITION SENSORS

(a) Install new O–rings to new camshaft position sensors.

(b) Install the camshaft position sensor with the bolt. Install the 2 camshaft position sensors.

Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

(c) Connect the 2 camshaft popsition sensor connectors.

5. REINSTALL AIR CLEANER HOSE WITH RESONATOR

6. REINSTALL V–BANK COVER

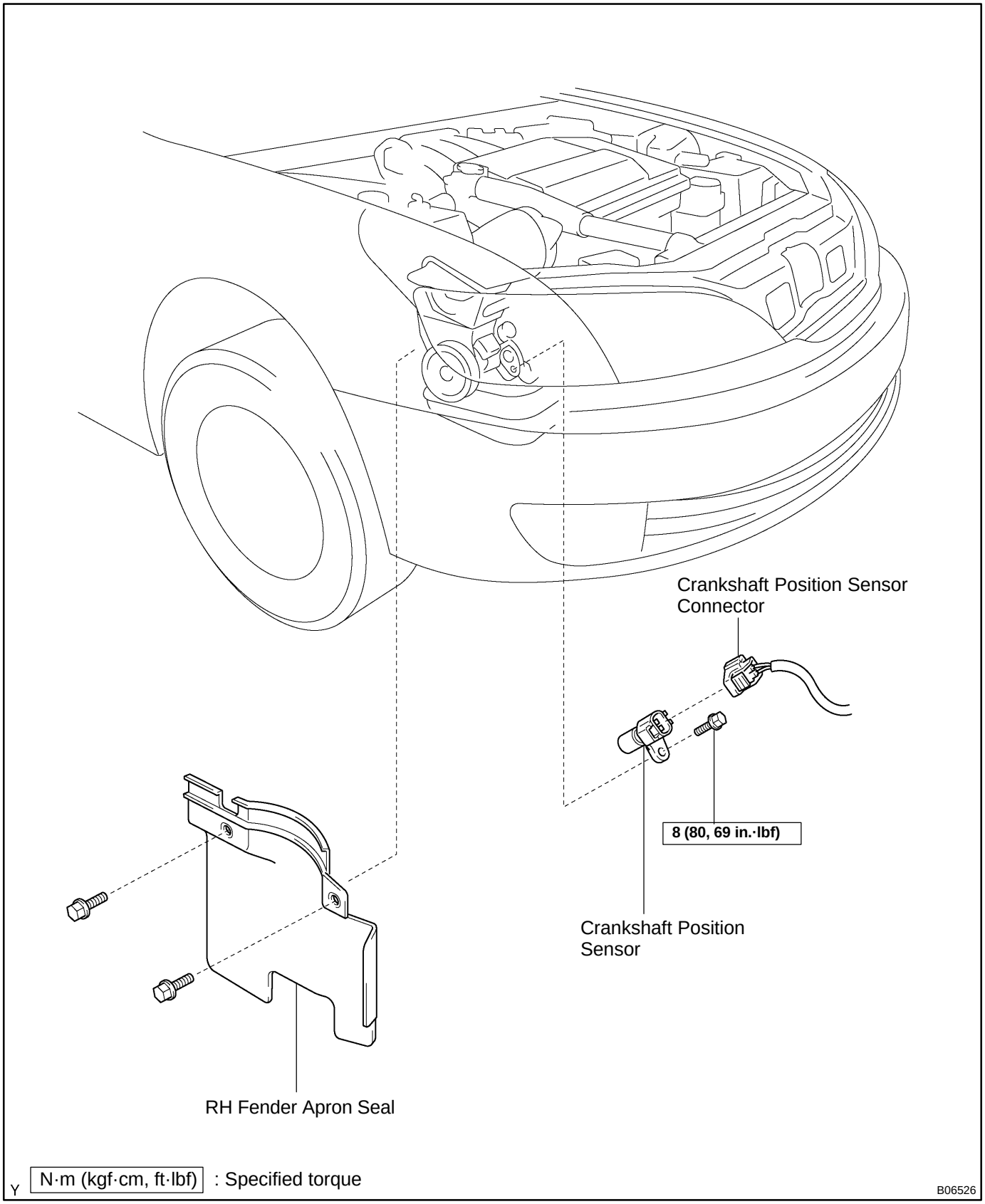
(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

(b) Press down the V–bank cover fastener.

CRANKSHAFT POSITION SENSOR

IG067–02

COMPONENTS



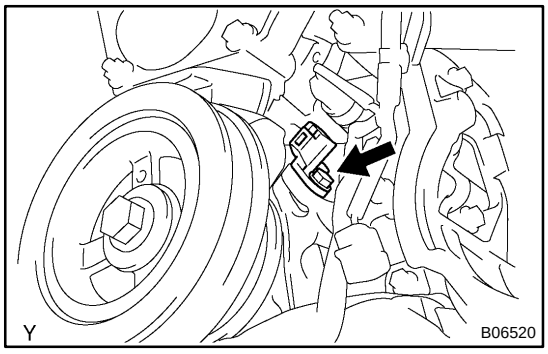
IG068–02

REPLACEMENT

1. REMOVE RH FENDER APRON SEAL

2. REMOVE CRANKSHAFT POSITION SENSOR

(a) Disconnect the crankshaft position sensor connector.



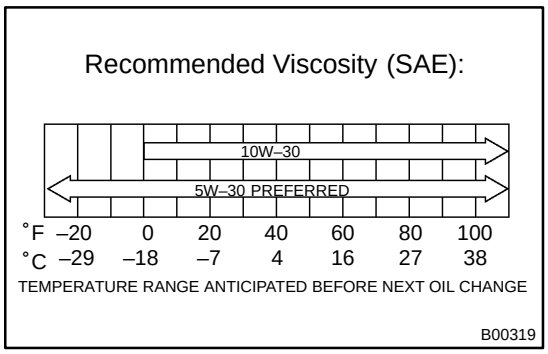
(b) Remove the bolt and crankshaft position sensor.

3. REINSTALL NEW CRANKSHAFT POSITION SENSOR

(a) Install a new crankshaft position sensor with the bolt.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

(b) Connect the crankshaft position sensor connector.

4. REINSTALL RH FENDER APRON SEAL



OIL AND FILTER

INSPECTION

LU0G0–01

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 SJ, Energy–Conserving or ILSAC multi-grade engine oil.

SAE 5W – 30 is the best choice for your vehicle, for good fuel economy, and good starting in cold weather.

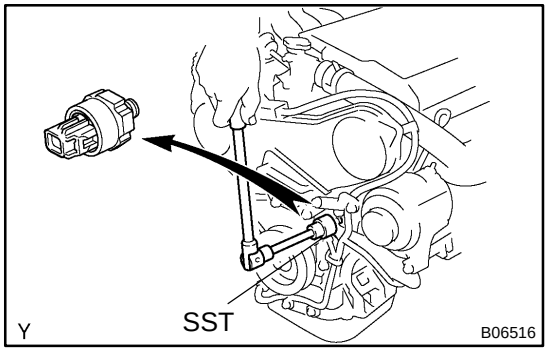
2. CHECK ENGINE OIL LEVEL

After warm up the engine and then 5 minutes after the engine stop, oil level should be between the low level and full level marks on the dipstick.

If low, check for leakage and add oil up to the full level mark.

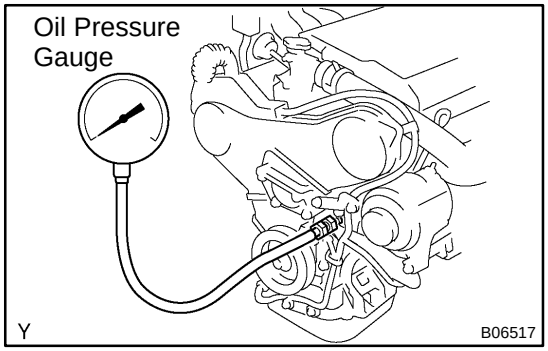
NOTICE:

Do not fill with engine oil above the full level mark.



3. REMOVE OIL PRESSURE SWITCH, AND INSTALL OIL PRESSURE GAUGE

(a) Using SST, remove the oil pressure switch.
SST 09816–30010



(b) Install the oil pressure gauge.

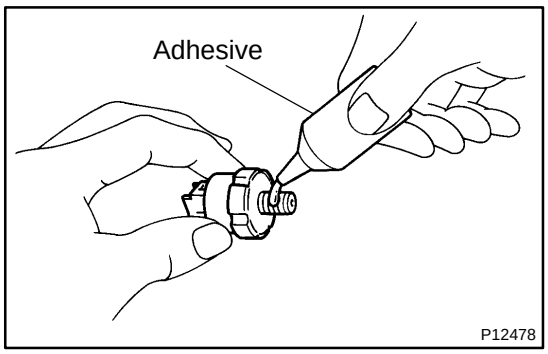
4. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.

5. CHECK OIL PRESSURE

Oil pressure:

At idle	29 kPa (0.3 kgf/cm^2, 4.3 psi) or more
At 3,000 rpm	294 – 539 kPa (3.0 – 5.5 kgf/cm^2, 43 – 78 psi)



6. REMOVE OIL PRESSURE GAUGE AND REINSTALL OIL PRESSURE SWITCH

(a) Remove the oil pressure gauge.

(b) Apply adhesive to 2 or 3 threads of the oil pressure switch.
Adhesive: Part No. 08833–00080, THREE BOND 1344, LOCTITE 242 or equivalent

(c) Using SST, install the oil pressure switch.
SST 09816–30010
Torque: 13 N·m (130 kgf·cm, 9 ft·lbf)

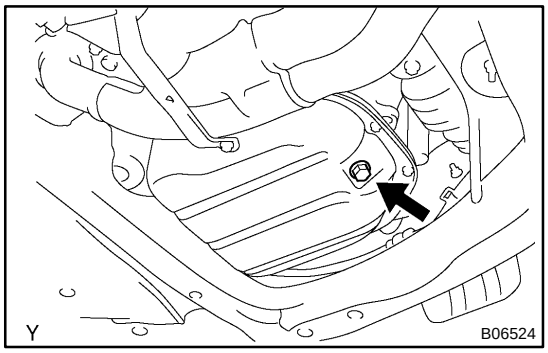
7. START ENGINE AND CHECK FOR LEAKS

LU01Q–02

REPLACEMENT

CAUTION:

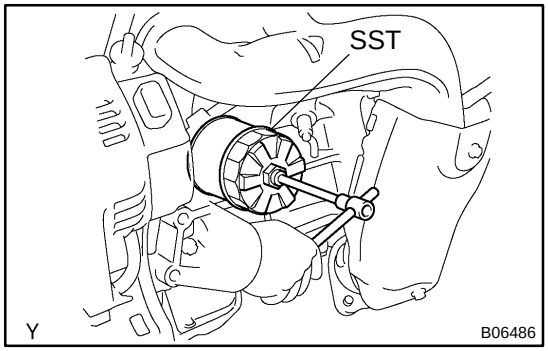
- ★ **Prolonged and repeated contact with mineral oil will result in the removal of natural fats from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.**
- ★ **Exercise caution in order to minimize the length and frequency of contact of your skin to used oil. Wear protective clothing and gloves. Wash your skin thoroughly 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 filter must be disposed of only at designated disposal sites.**



1. DRAIN ENGINE OIL

(a) Remove the oil filler cap.

(b) Remove the oil drain plug, and drain the oil into a container.

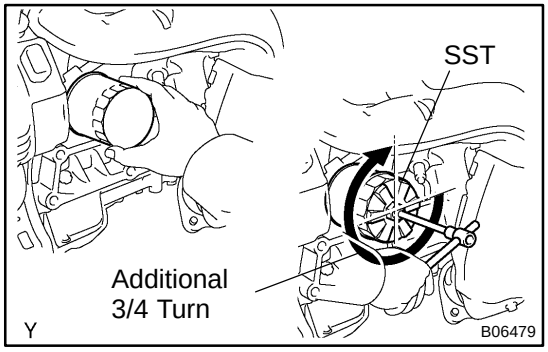


2. REPLACE OIL FILTER

(a) Using SST, remove the oil filter.
SST 09228–07501

(b) Check and clean the oil filter installation surface.

(c) Apply clean engine oil to the gasket of a new oil filter.



(d) Lightly screw the oil filter into place, and tighten it until the gasket contacts the seat.

(e) Using SST, tighten it an additional 3/4 turn.
SST 09228–07501

3. REFILL WITH ENGINE OIL

(a) Clean and install the oil drain plug with a new gasket.
Torque: 45 N·m (460 kgf·cm, 33 ft·lbf)

(b) Fill with fresh engine oil.
Capacity:

Drain and refill	w/ Oilfilter change	4.7 liters (5.0 US qts, 4.1 lmp. qts)
	w/o Oilfilter change	4.5 liters (4.8 US qts, 4.0 lmp. qts)
Dry fill		5.2 liters (5.5 US qts, 4.6 lmp. qts)

(c) Install the oil filler cap.

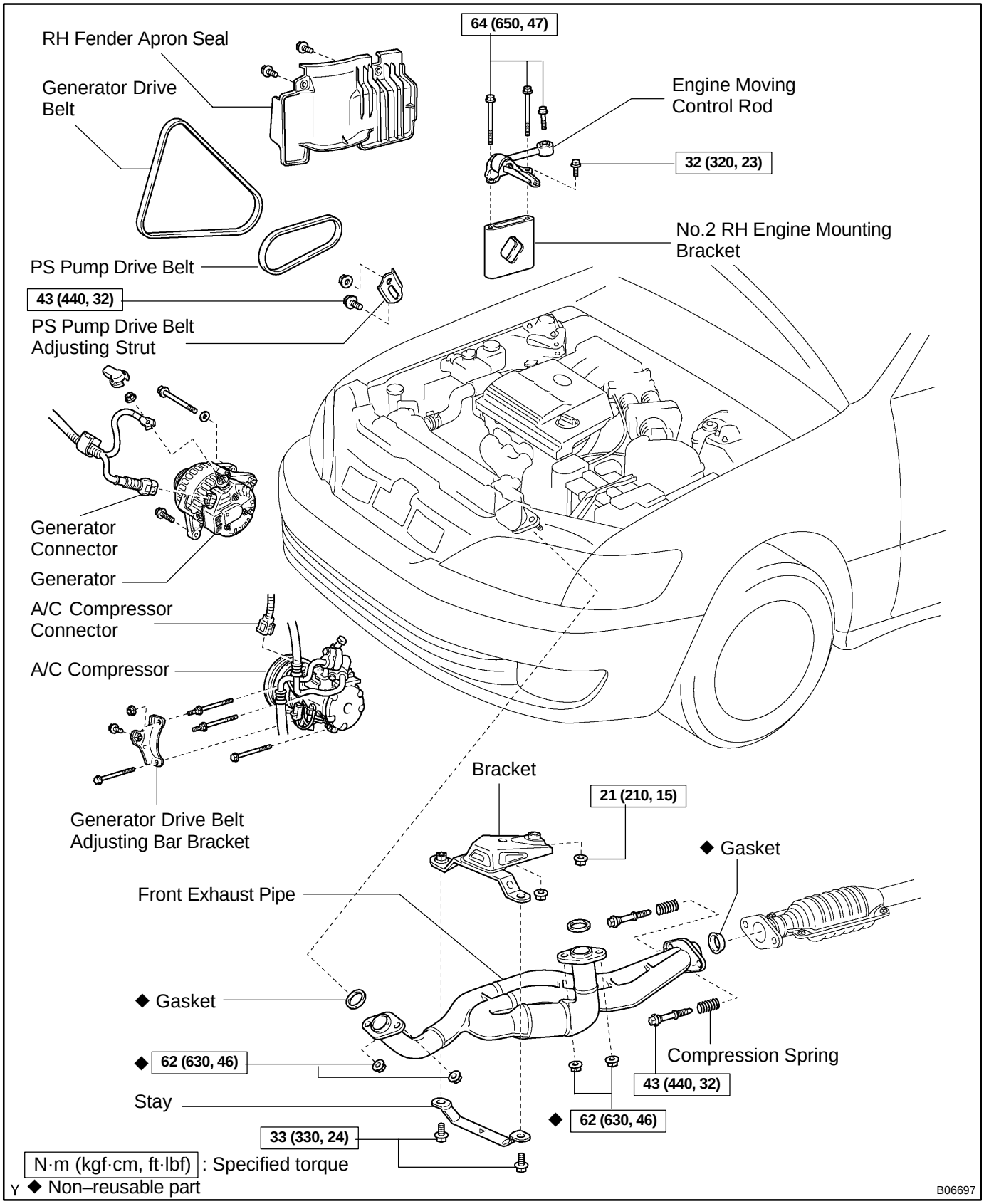
4. START ENGINE AND CHECK FOR OIL LEAKS

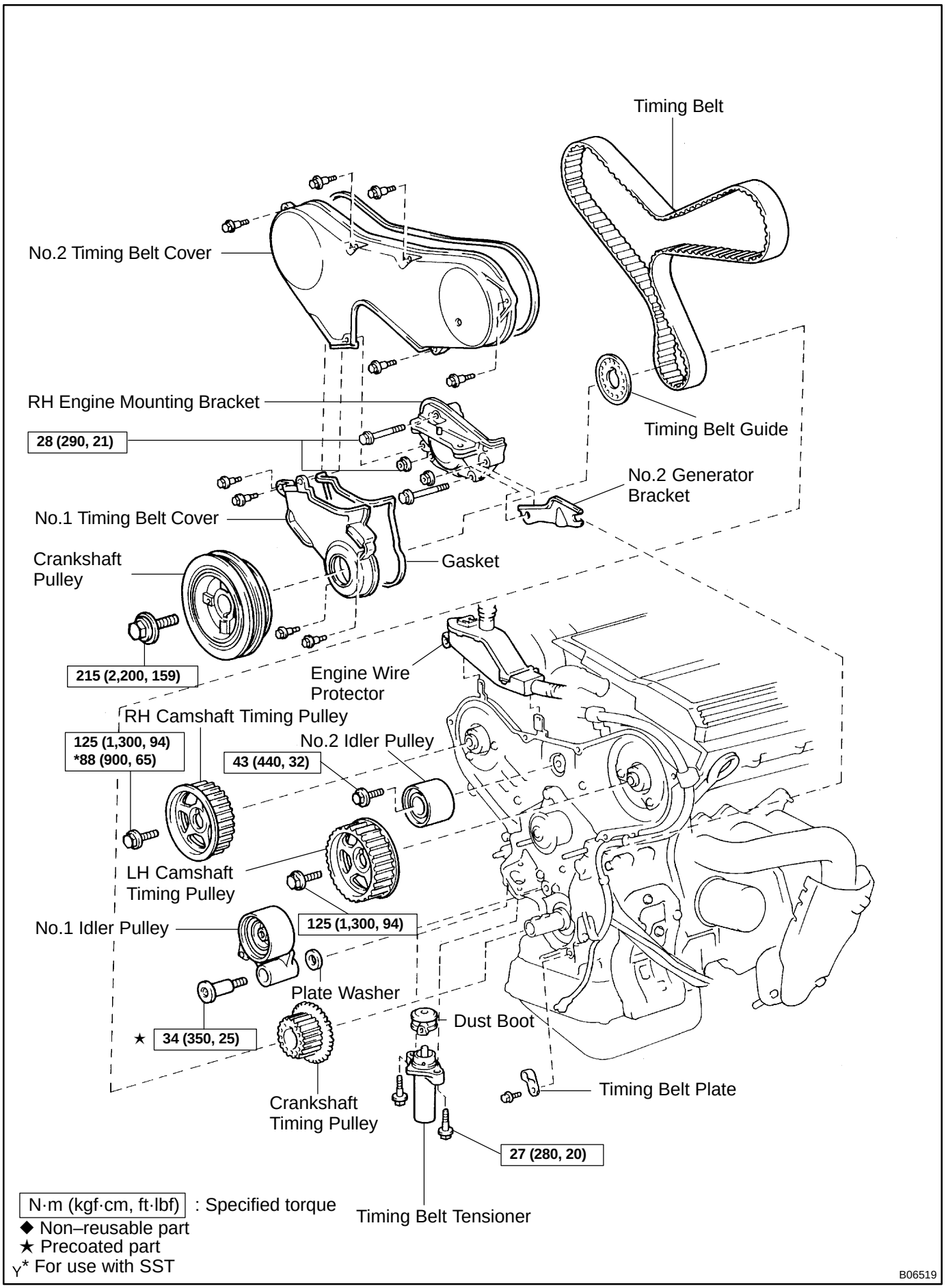
5. RECHECK ENGINE OIL LEVEL

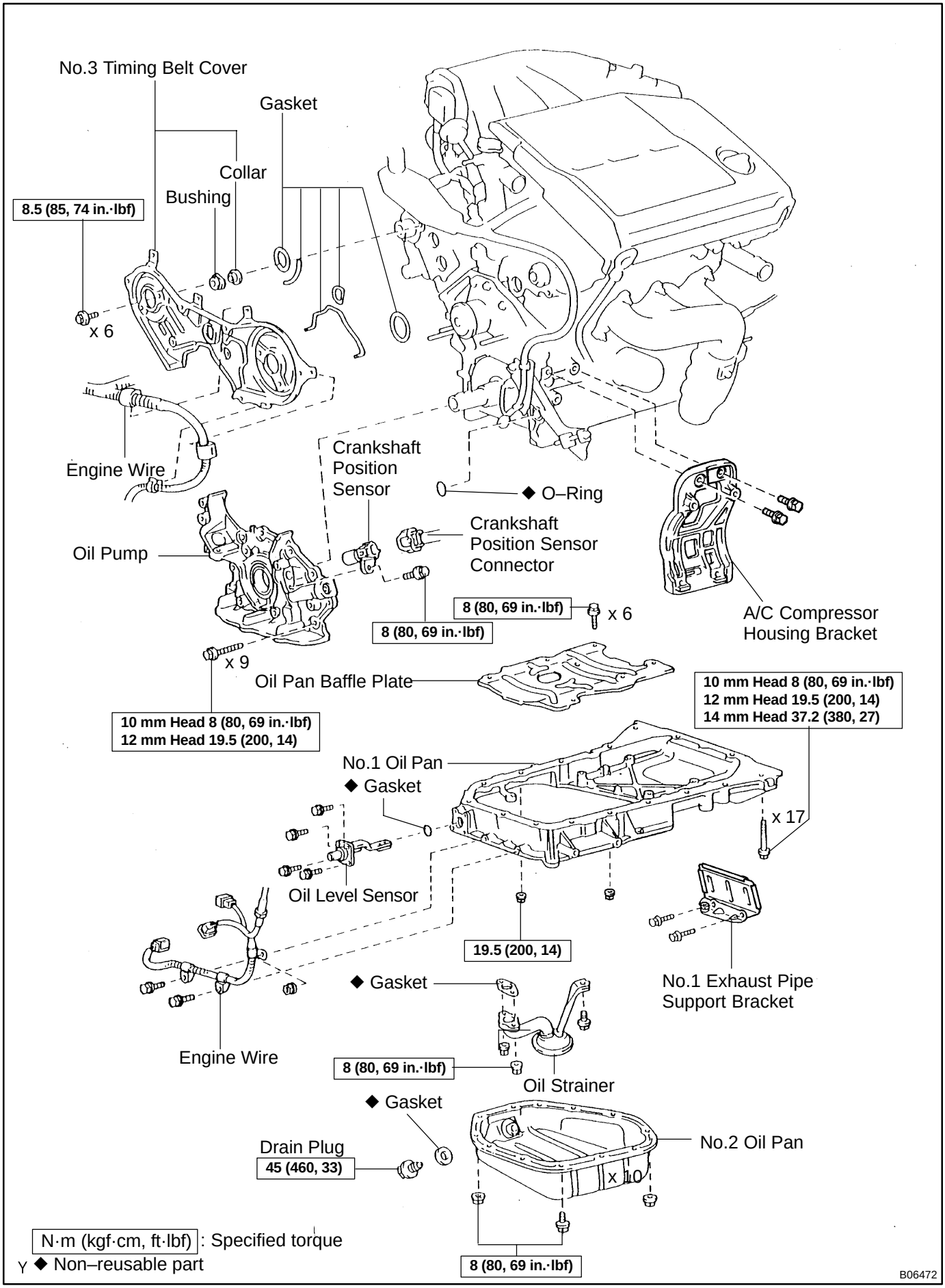
OIL PUMP

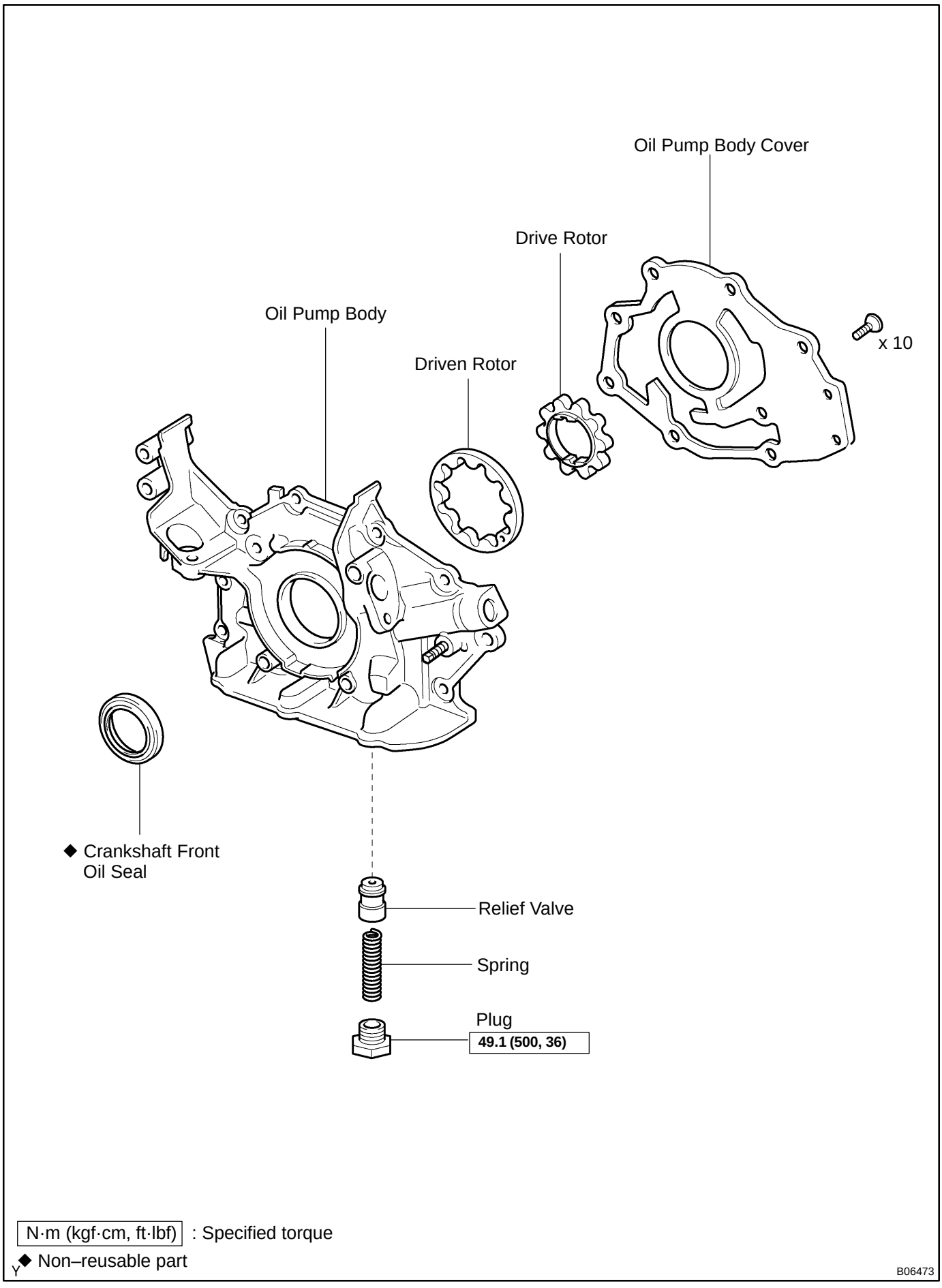
COMPONENTS

LU01R–02




Timing Belt
No.2 Timing Belt Cover
RH Engine Mounting Bracket
28 (290, 21)
Timing Belt Guide
No.2 Generator Bracket
No.1 Timing Belt Cover
Gasket
Crankshaft Pulley
215 (2,200, 159)
Engine Wire Protector
RH Camshaft Timing Pulley
125 (1,300, 94)
*88 (900, 65)
No.2 Idler Pulley
43 (440, 32)
LH Camshaft Timing Pulley
No.1 Idler Pulley
125 (1,300, 94)
Plate Washer
★ 34 (350, 25)
Dust Boot
Timing Belt Plate
Crankshaft Timing Pulley
27 (280, 20)
Timing Belt Tensioner
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
★ Precoated part
Y* For use with SST
B06519


No.3 Timing Belt Cover
Gasket
Collar
Bushing
8.5 (85, 74 in.·lbf)
x 6
Engine Wire
Crankshaft Position Sensor
◆ O–Ring
Crankshaft Position Sensor Connector
Oil Pump
8 (80, 69 in.·lbf)
x 6
8 (80, 69 in.·lbf)
A/C Compressor Housing Bracket
x 9
Oil Pan Baffle Plate
10 mm Head 8 (80, 69 in.·lbf)
12 mm Head 19.5 (200, 14)
10 mm Head 8 (80, 69 in.·lbf)
12 mm Head 19.5 (200, 14)
14 mm Head 37.2 (380, 27)
No.1 Oil Pan
◆ Gasket
x 17
Oil Level Sensor
19.5 (200, 14)
No.1 Exhaust Pipe Support Bracket
◆ Gasket
Engine Wire
8 (80, 69 in.·lbf)
Oil Strainer
◆ Gasket
Drain Plug
45 (460, 33)
No.2 Oil Pan
x 10
8 (80, 69 in.·lbf)
N·m (kgf·cm, ft·lbf): Specified torque
◆ Non–reusable part
B06472


Oil Pump Body Cover
Drive Rotor
Oil Pump Body
Driven Rotor
x 10
◆ Crankshaft Front Oil Seal
Relief Valve
Spring
Plug
49.1 (500, 36)
N·m (kgf·cm, ft·lbf) : Specified torque
◆ Non–reusable part
B06473

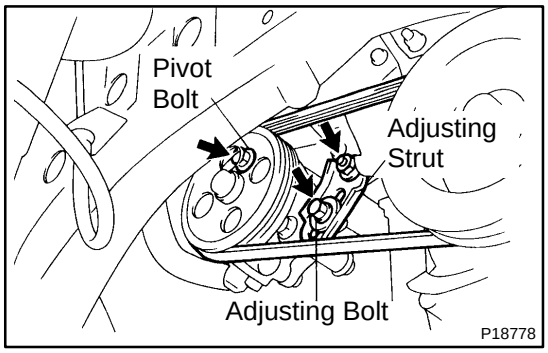
LU0G1–01

REMOVAL

HINT:

When repairing the oil pump, the oil pan and strainer should be removed and cleaned.

1. **DRAIN ENGINE OIL**
2. **REMOVE RH FRONT WHEEL**
3. **REMOVE RH FENDER APRON SEAL**
4. **REMOVE FRONT EXHAUST PIPE (See page EM–72)**
5. **REMOVE GENERATOR FROM ENGINE (See page CH–6)**
6. **REMOVE A/C COMPRESSOR FROM ENGINE (See page EM–72)**

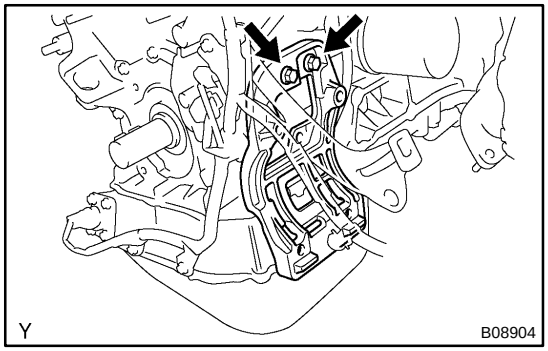


7. **REMOVE PS PUMP DRIVE BELT AND ADJUSTING STRUT**

(a) Loosen the pivot and adjusting bolts, and remove the drive belt.

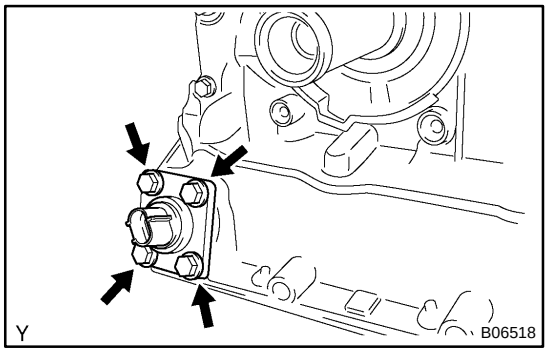
(b) Remove the bolt, nut and adjusting strut.

8. **REMOVE TIMING BELT (See page EM–15)**
9. **REMOVE TIMING PULLEYS (See page EM–15)**
10. **REMOVE NO.3 TIMING BELT COVER (See page EM–31)**



11. **REMOVE A/C COMPRESSOR HOUSING BRACKET**

Remove the 2 bolts and housing bracket.



12. **REMOVE OIL LEVEL SENSOR**

(a) Disconnect the level sensor connector.

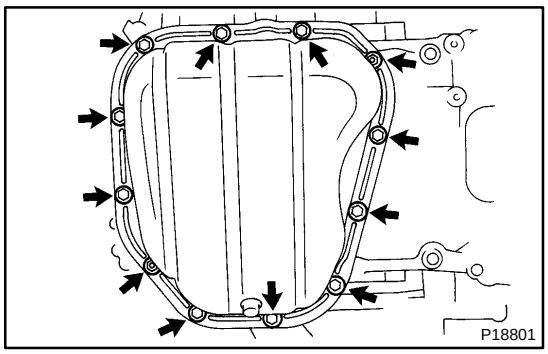
(b) Remove the 2 bolts and nut, and disconnect the engine wire.

(c) Remove the 4 bolts and oil level sensor.

(d) Remove the gasket from the level sensor.

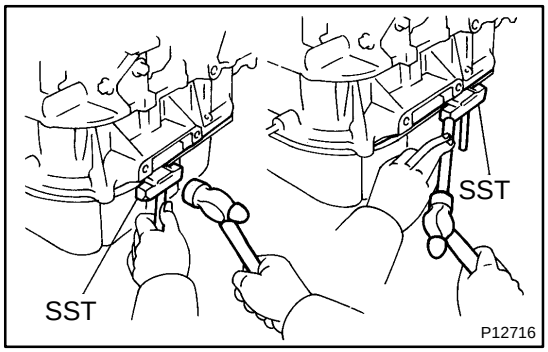
NOTICE:

Be careful not to drop the oil level sensor when removing it.



13. REMOVE NO.2 OIL PAN

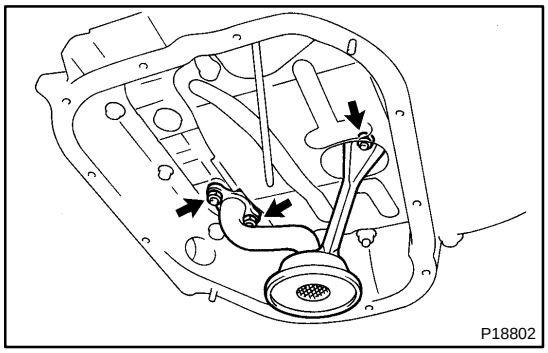
(a) Remove the 10 bolts and 2 nuts.



(b) Insert the blade of SST between the No.1 and No.2 oil pans, and cut off applied sealer and remove the No.1 oil pan.
SST 09032–00100

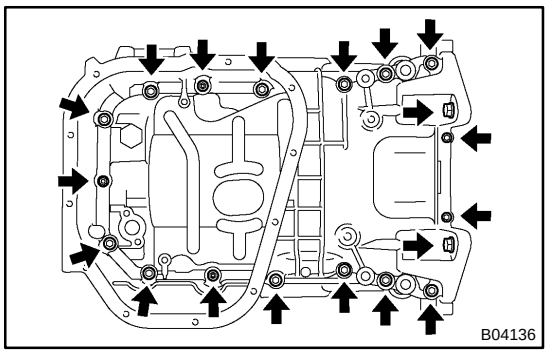
NOTICE:

- ★ **Be careful not to the 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.**



14. REMOVE OIL STRAINER

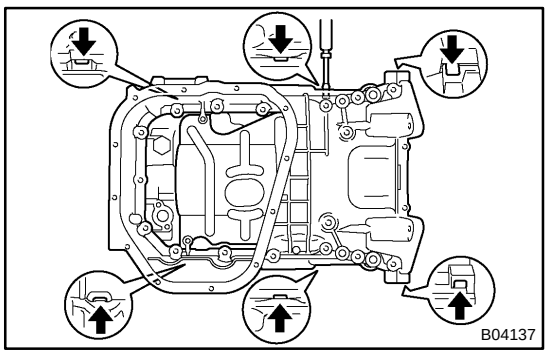
Remove the bolt, 2 nuts, oil strainer and gasket.



15. REMOVE NO.1 OIL PAN

(a) Remove the 2 bolts and No.1 exhaust pipe support bracket.

(b) Remove the 17 bolts and 2 nuts.



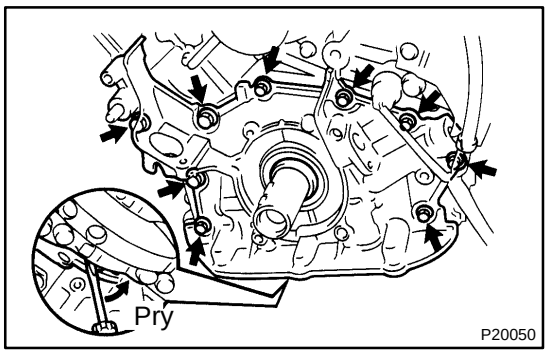
(c) Using a screwdriver, remove the oil pan by prying the portions between the cylinder block and oil pan.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and oil pan.

16. REMOVE BAFFLE PLATE FROM NO.1 OIL PAN

17. REMOVE CRANKSHAFT POSITION SENSOR



18. REMOVE OIL PUMP

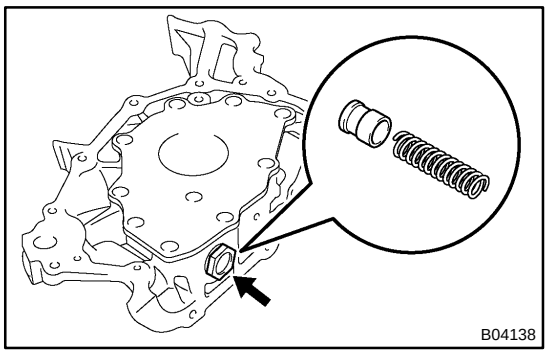
(a) Remove the 9 bolts.

(b) Remove the oil pump by prying a screwdriver between the oil pump and main bearing cap.

(c) Remove the O–ring.

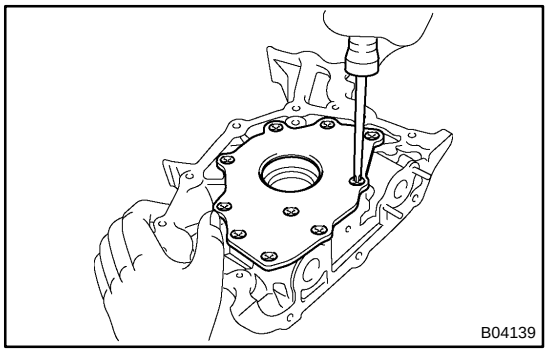
LU01T–02

DISASSEMBLY



1. REMOVE RELIEF VALVE

Remove the plug, spring and relief valve.

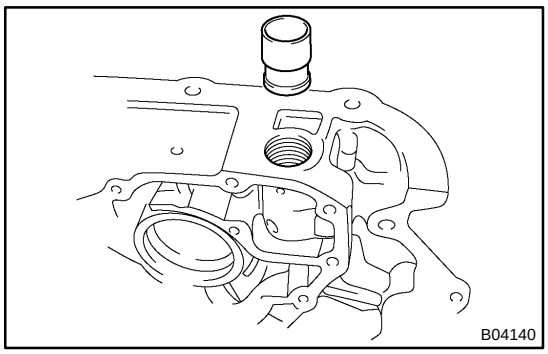


2. REMOVE DRIVE AND DRIVEN ROTORS

Remove the 10 screws, pump body cover, drive and driven rotors.

LU01U–02

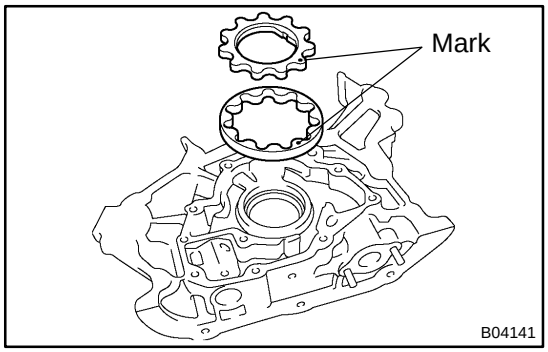
INSPECTION



1. INSPECT RELIEF VALVE

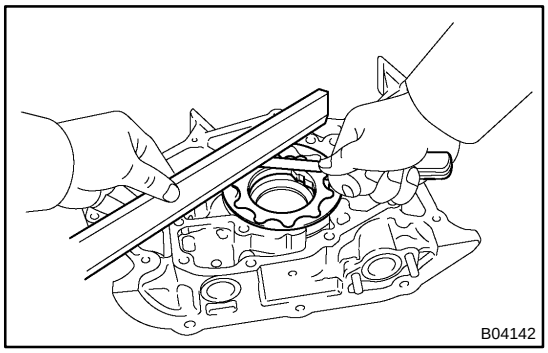
Coat the valve with engine oil and check that it falls smoothly into the valve hole by its own weight.

If it does not, replace the relief valve. If necessary, replace the oil pump assembly.



2. PLACE DRIVE AND DRIVEN ROTORS INTO OIL PUMP BODY

Place the drive and driven rotors into the oil pump body with the mark facing upward.

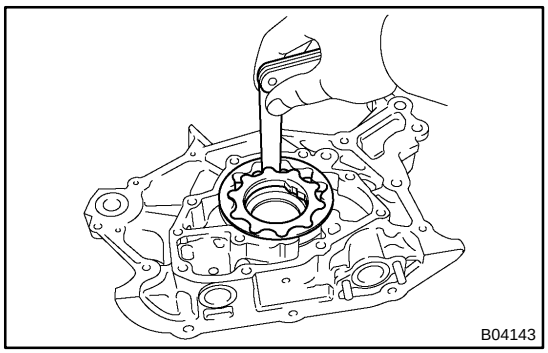


3. INSPECT ROTOR SIDE CLEARANCE

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.

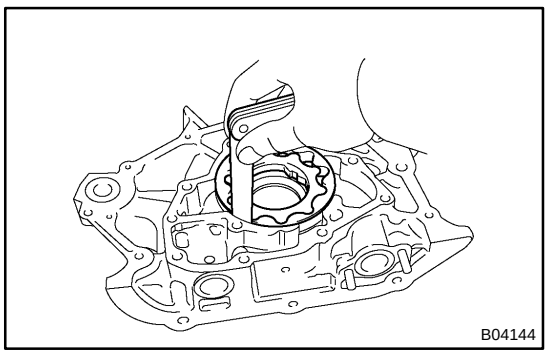


4. INSPECT ROTOR TIP CLEARANCE

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.



5. INSPECT ROTOR BODY CLEARANCE

Using a feeler gauge, measure the clearance between the driven rotor and body.

Standard body clearance:
0.250 – 0.325 mm (0.0098 – 0.0128 in.)
Maximum body clearance: 0.40 mm (0.0157 in.)

If the body clearance is greater than maximum, replace the rotors as a set. If necessary, replace the oil pump assembly.

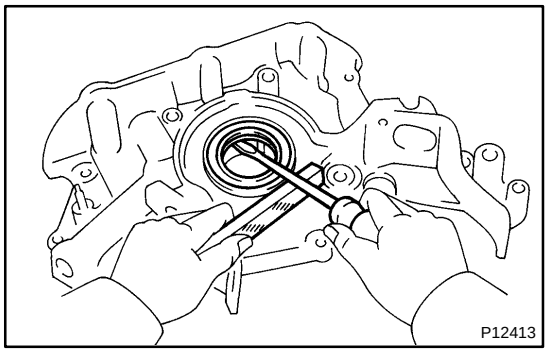
LU01V–02

REPLACEMENT

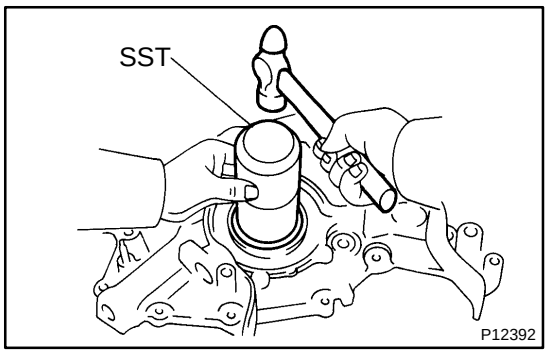
REPLACE CRANKSHAFT FRONT OIL SEAL

HINT:

There are 2 methods ((a) and (b)) to replace the oil seal which are as follows:



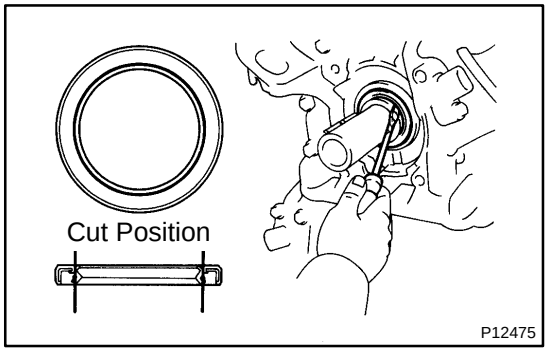
(a) If the oil pump is removed from the cylinder block.
  (1) Using a screwdriver, pry out the oil seal.



  (2) Using SST and a hammer, tap in a new oil seal until its surface is flush with the oil pump body edge.

SST 09223–00010

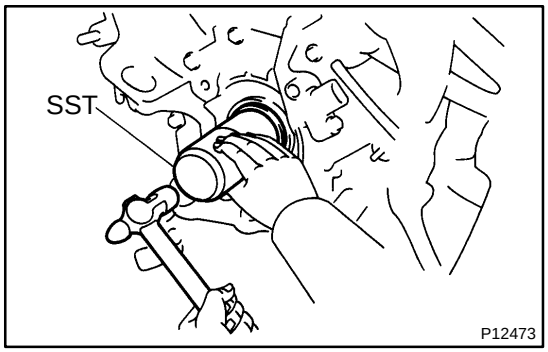
  (3) Apply MP grease to the oil seal lip.



(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:

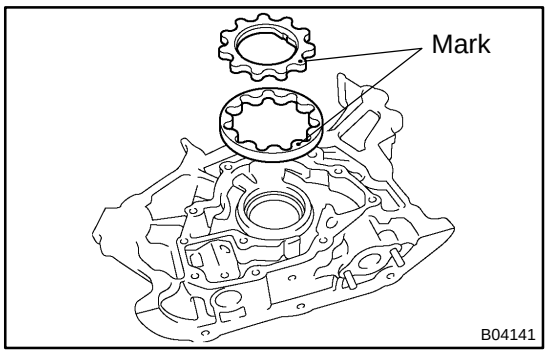
Be careful not to damage the crankshaft. Tape the screwdriver tip.



  (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 09223–00010

LU01W–02



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.

2. INSTALL RELIEF VALVE

Insert the relief valve and spring into the pump body hole, and install the plug.

Torque: 49.1 N·m (500 kgf·cm, 36 ft·lbf)

LU0G2–01

INSTALLATION

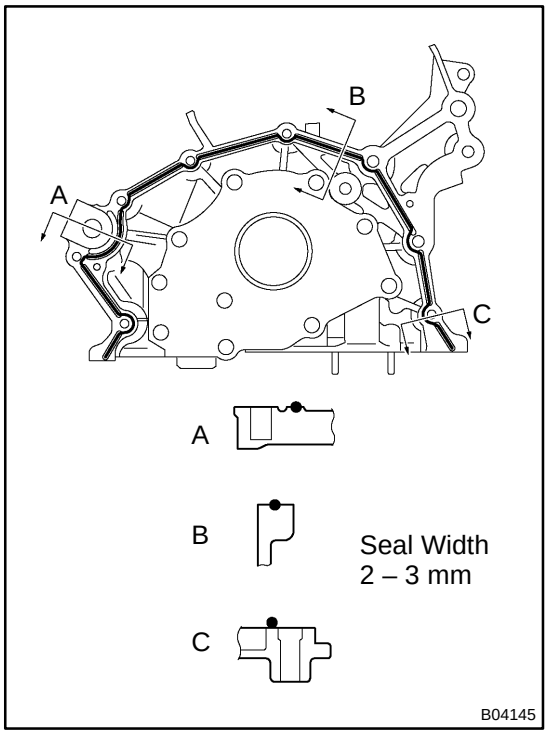
1. INSTALL OIL PUMP

(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 grooves.

★ 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

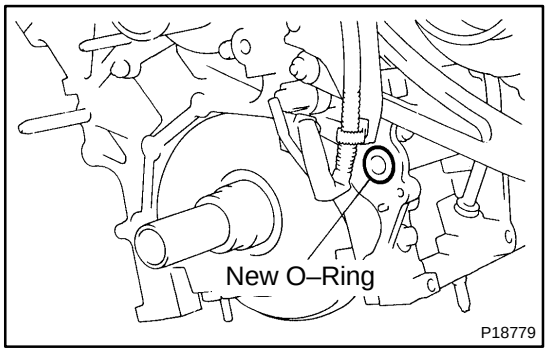
★ Install a nozzle that has been cut to a 2 – 3 mm (0.08 – 0.12 in.) opening.

HINT:

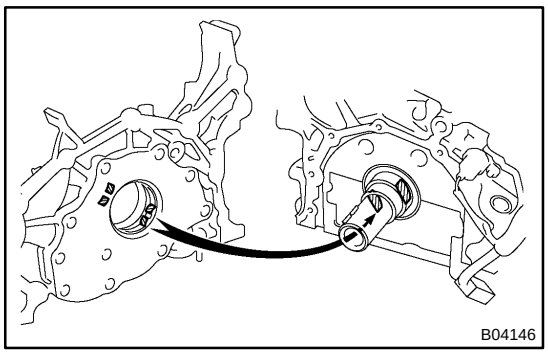
Avoid applying an excessive amount to the surface.

★ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.

★ Immediately remove nozzle from the tube and reinstall cap.



(c) Place a new O–ring on 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.

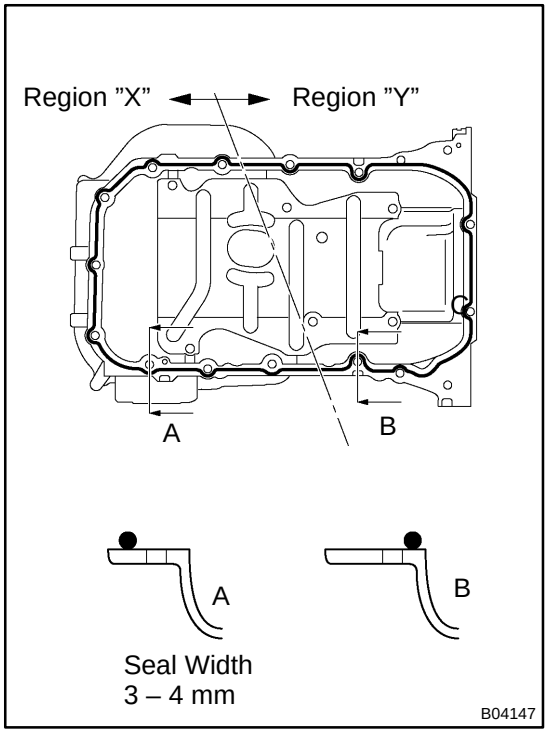
(e) Install the oil pump with the 9 bolts. Uniformly tighten the bolts in several passes.
Torque:
10 mm head: 8 N·m (80 kgf·cm, 69 in.·lbf)
12 mm head: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

2. INSTALL CRANKSHAFT POSITION SENSOR
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

3. INSTALL BAFFLE PLATE TO NO.1 OIL PAN
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

4. 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 oil pan, 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 grooves.
- ★ 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 pan as shown in the illustration.
Seal packing: Part No. 08826–00080 or equivalent
Region ”X” is at the outer side of the bolt hole.
Region ”Y” is at the inner side of the bolt hole.
- ★ Install a nozzle that has been cut to a 3 – 4 mm (0.12 – 0.16 in.) opening.

HINT:
Avoid applying an excessive amount to the surface.
- ★ Parts must be assembled within 3 minutes of application. Otherwise the material must be removed and reapplied.
- ★ Immediately remove nozzle from the tube and reinstall cap.

(c) Install the oil pan with the 17 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque:
10 mm head: 8 N·m (80 kgf·cm, 69 in.·lbf)
12 mm head: 19.5 N·m (200 kgf·cm, 14 ft·lbf)
14 mm head: 37.2 N·m (380 kgf·cm, 27 ft·lbf)

(d) Install the No.1 exhaust pipe support bracket with the 2 bolts.
Torque: 7.8 N·m (80 kgf·cm, 69 in.·lbf)

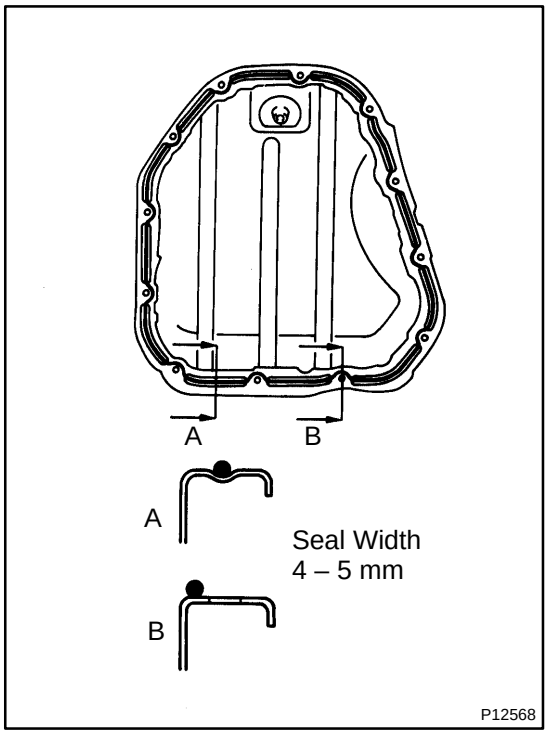
5. INSTALL OIL STRAINER

Install a new gasket and the oil strainer with the bolt and 2 nuts.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)

6. INSTALL NO.2 OIL PAN

(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surface 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 grooves.
★ Thoroughly clean all components to remove all the loose material.
★ Using a non–residue solvent, clean both sealing surfaces.

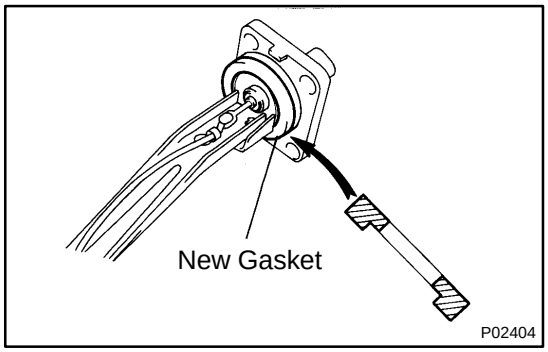
NOTICE:
Do not use a solvent which will affect the painted surfaces.



(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 4 – 5 mm (0.16 – 0.20 in.) opening.

HINT:
Avoid applying an excessive amount to the surface.
★ Parts must be assembled within 3 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 10 bolts and 2 nuts. Uniformly tighten the bolts and nuts in several passes.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)



7. INSTALL OIL LEVEL SENSOR

(a) Install a new gasket to the level sensor.
(b) Install the level sensor with the 4 bolts.
Torque: 8 N·m (80 kgf·cm, 69 in.·lbf)
(c) Connect the engine wire with the 2 bolts and nut.
(d) Connect the level sensor connector.

8. INSTALL A/C COMPRESSOR HOUSING BRACKET
Torque: 25 N·m (250 kgf·cm, 18 ft·lbf)

9. INSTALL NO.3 TIMING BELT COVER
(See page EM–59)

10. INSTALL TIMING PULLEYS (See page EM–21)
11. INSTALL TIMING BELT (See page EM–21)
12. INSTALL ADJUSTING STRUT AND PS PUMP DRIVE BELT
(a) Temporarily install the adjusting strut with the bolt and nut.
(b) Install the drive belt with the pivot and adjusting bolts.
Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)
(c) Tighten the nut.
Torque: 43.1 N·m (440 kgf·cm, 32 ft·lbf)
13. INSTALL A/C COMPRESSOR (See page EM–77)
14. INSTALL GENERATOR (See page CH–2)
15. INSTALL RH FENDER APRON SEAL
16. INSTALL FRONT EXHAUST PIPE (See page EM–77)
17. INSTALL RH FRONT WHEEL
18. FILL ENGINE WITH OIL
19. START ENGINE AND CHECK FOR LEAKS
20. RECHECK ENGINE OIL LEVEL

SFI SYSTEM

SF05M–04

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 FUEL SYSTEM

3. KEEP GASOLINE AWAY FROM RUBBER OR LEATHER PARTS

4. MAINTENANCE PRECAUTIONS

(a) In event of engine misfire, these precautions should be taken.
  (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) Precautions when handling the oxygen sensor.
  (1) Do not allow the oxygen sensor to drop or hit against an object.
  (2) Do not allow the sensor to come into contact with water.

5. IF VEHICLE IS EQUIPPED WITH A 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 run out of tune.

(b) Disconnection, looseness or cracks in the parts of the air induction system between the throttle body and cylinder head will allow air suction and cause the engine to run out of tune.

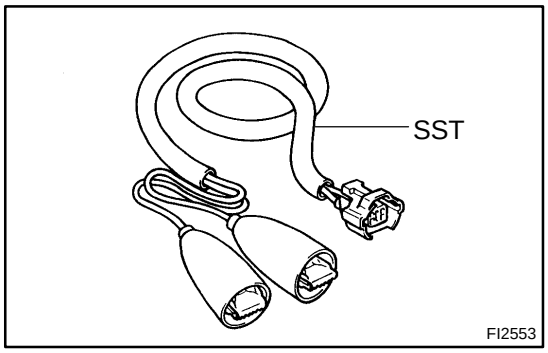
7. ELECTRONIC CONTROL SYSTEM

(a) Before removing SFI wiring connectors, terminals, etc., first disconnect the power by either turning the ignition switch to LOCK or disconnecting the negative (–) terminal cable from the battery.

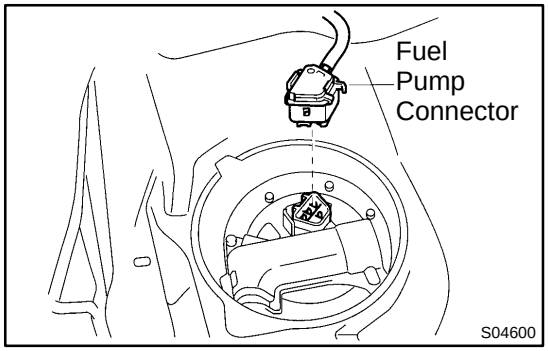
HINT:

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 permit parts to receive a severe impact during removal or installation. Handle all SFI parts carefully, especially the ECM.
(d) Be careful during 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 during rainy weather, take care to prevent entry of water. Also, when washing the engine compartment, prevent water from getting on the SFI parts and wiring connectors.
(g) Parts should be replaced as an assembly.
(h) Care should be taken when pulling out and inserting wiring connectors.
  (1) Release the lock and pull out the connector, pulling on the connectors.
  (2) Fully insert the connector and check that it is locked.

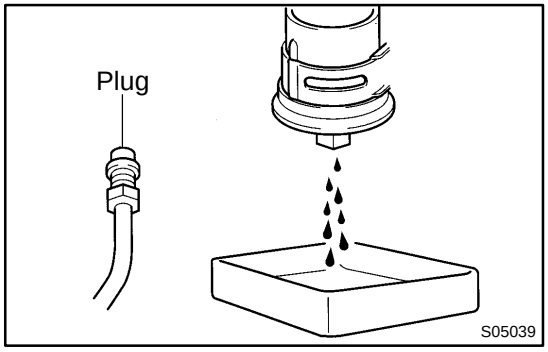


(i) Use SST for inspection or test of the injector or its wiring connector.
SST 09842–30070

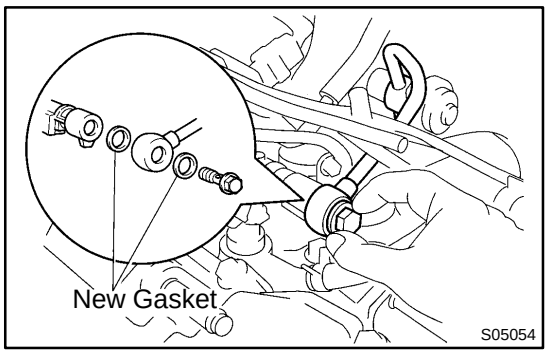


8. FUEL SYSTEM

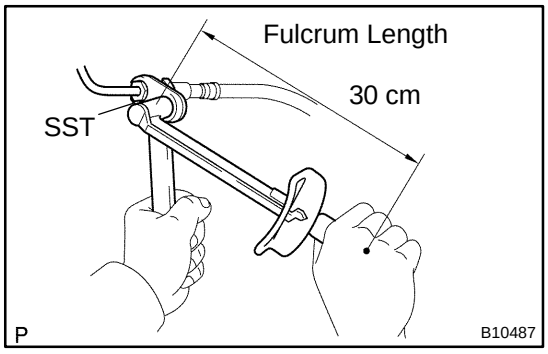
(a) When disconnecting the high fuel pressure line, a large amount of gasoline will spill out, so observe these procedures:
  (1) Disconnect the fuel pump connector.
  (2) Start the engine. After the engine has stopped on its own, turn the ignition switch to LOCK.



  (3) Put a container under the connection.
  (4) Slowly loosen the connection.
  (5) Disconnect the connection.
  (6) Plug the connection with a rubber plug.



(b) When connecting the union bolt on the high pressure pipe union, observe these procedures:
(1) Always use 2 new gaskets.
(2) Tighten the union bolt by hand.
(3) Tighten the union bolt to the specified torque.
Torque: 32.5 N·m (330 kgf·cm, 24 ft·lbf)

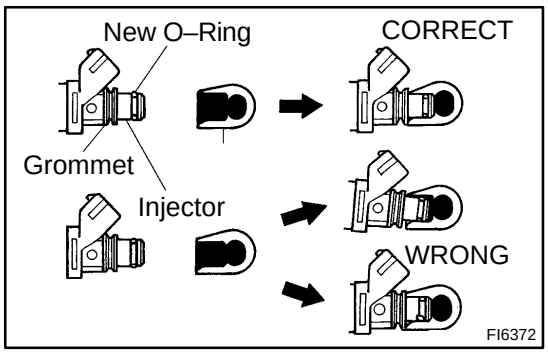


(c) When connecting the flare nut on the high pressure pipe union, observe these procedures:
(1) Apply a light coat of engine oil to the flare nut, and tighten the flare nut by hand.
(2) Using SST, tighten the flare nut to specified torque.
SST 09023–38400

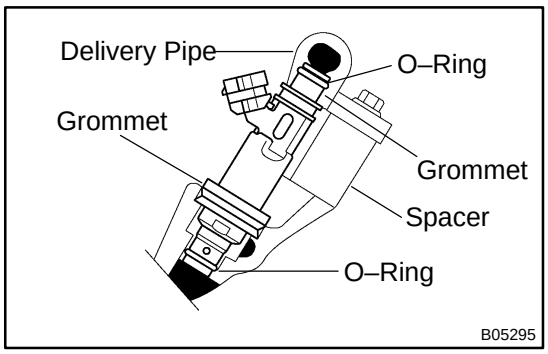
NOTICE:
Do not rotate the fuel pipe, when tightening the flare nut.

Torque: 24 N·m (245 kgf·cm, 18 ft·lbf) for using SST

HINT:
Use a torque wrench with a fulcrum length of 30 cm (11.81 in.).

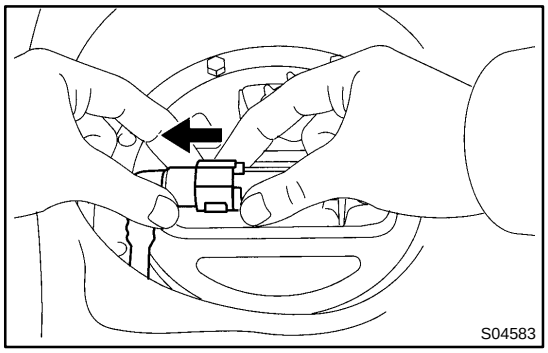


(d) Observe these precautions when removing and installing the injectors.
(1) Never reuse the O–ring.
(2) When placing a new O–ring on the injector, take care not to damage it in any way.
(3) Coat a new O–ring with spindle oil or gasoline before installing–never use engine, gear or brake oil.

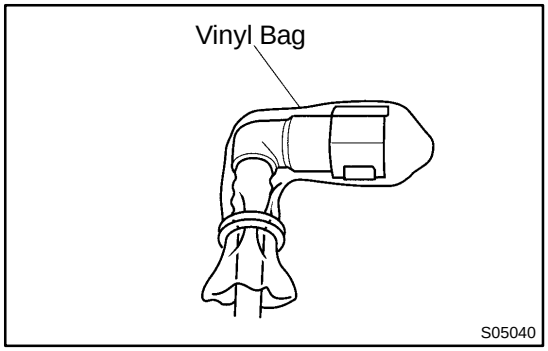


(e) Install the injector to the delivery pipe and intake manifold, as shown in the illustration.
Before installing the injector, must apply spindle oil or gasoline on the place where a delivery pipe or an intake manifold touches an O–ring of the injector.

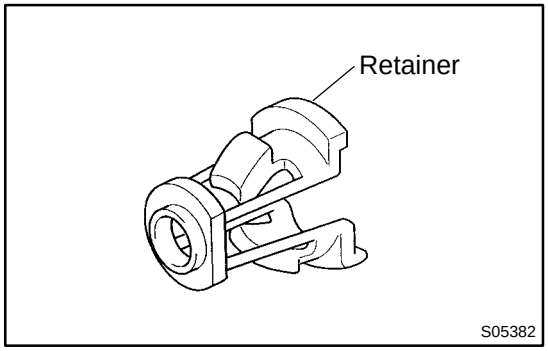
(f) Observe these precautions when disconnecting the fuel tube connector (quick type).
(1) Check if there is any dirt like mud on the pipe and around the connector before disconnecting them and clean the dirt away.
(2) Be sure to disconnect with hands.



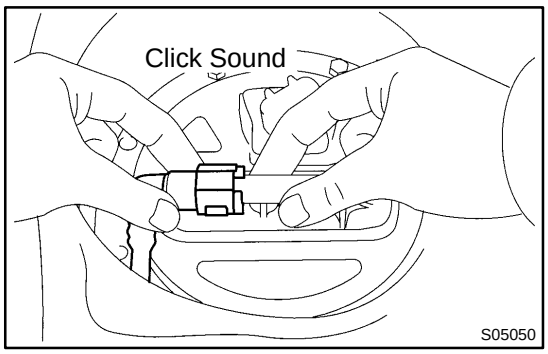
(3) When the connector and the pipe are stuck, pinch the retainer between the hands, push and pull the connector to free to disconnect and pull it out. Do not use any tool at this time.
(4) Inspect if there is any dirt or the likes on the seal surface of the disconnected pipe and clean it away.



(5) Prevent the disconnected pipe and connector from damaging and mixing foreign objects by covering them with a vinyl bag.

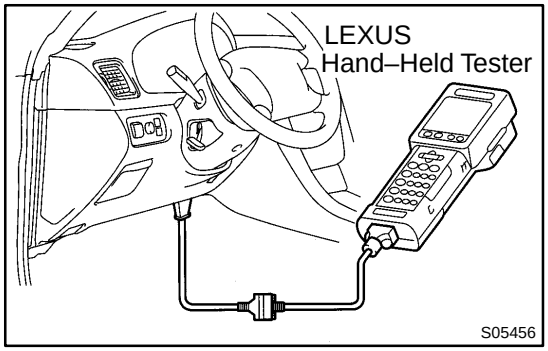


(g) Observe these precautions when connecting the fuel tube connector (quick type).
(1) Do not reuse the retainer removed from the pipe.
(2) Must use hands without using tools when to remove the retainer from the pipe.
(3) Check if there is any damage or foreign objects on the connected part of the pipe.



(4) Match the axis of the connector with axis of the pipe, and push in the connector until the retainer makes a ”click” sound. In case that the connections is tight, apply little amount of new engine oil on the tip of the pipe.
(5) After having finished the connection, check if the pipe and the connector are securely connected by pulling them.
(6) Check if there is any fuel leakage.

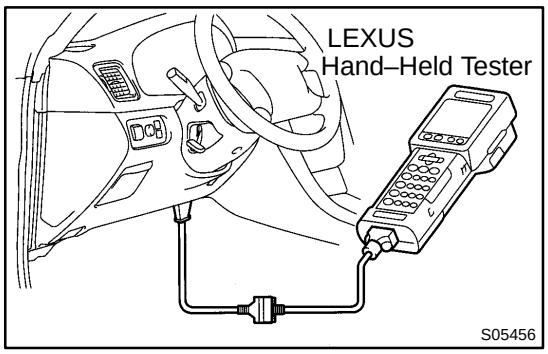
(h) Observe these precautions when handling nylon tube.
(1) Pay attention not to turn the connected part of the nylon tube and the quick connector with force when connecting them.
(2) Pay attention not to kink the nylon tube.
(3) Do not remove the EPDM protector on the outside of the nylon tube.
(4) Must not close the piping with the nylon tube by bending it.



(i) Check that there are no fuel leaks after doing maintenance anywhere on the fuel system.
(1) Connect the LEXUS hand–held tester to the DLC3.
(2) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

NOTICE:
Do not start the engine.

(3) Select the active test mode on the LEXUS hand–held tester.
(4) Please refer to the LEXUS hand–held tester operator’s manual for further details.
(5) If you have no LEXUS hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector (See page SF–6).
(6) Check that there are no leaks from any part of the fuel system.
(7) Turn the ignition switch to LOCK.
(8) Disconnect the LEXUS hand–held tester from the DLC3.



FUEL PUMP

SF05N–03

ON–VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION

(a) Connect the LEXUS hand–held tester to the DLC3.

(b) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

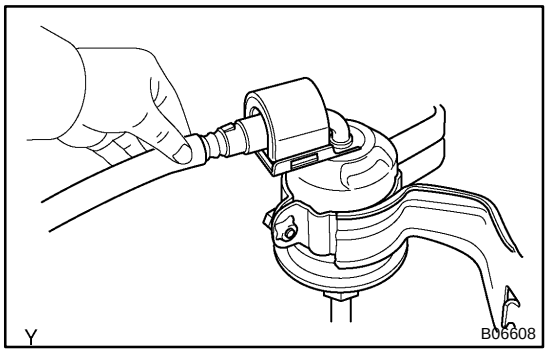
NOTICE:

Do not start the engine.

(c) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

(d) Please refer to the LEXUS hand–held tester operator's manual for further details.

(e) If you have no LEXUS hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector. (See step 7.)



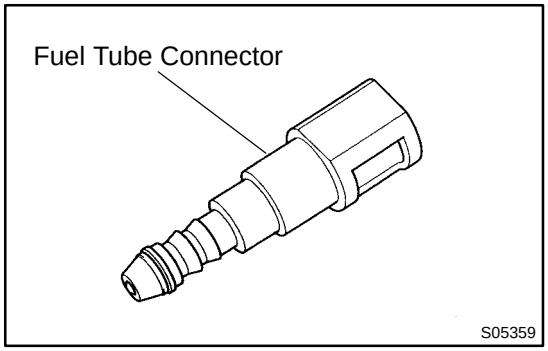
(f) Check that there is pressure in the fuel inlet hose from the fuel filter.

HINT:

If there is fuel pressure, you will hear the sound of fuel flowing. If there is no pressure, check the fusible link, fuses, EFI main relay, fuel pump, ECM and wiring connections.

(g) Turn the ignition switch OFF.

(h) Disconnect the LEXUS hand–held tester from the DLC3.

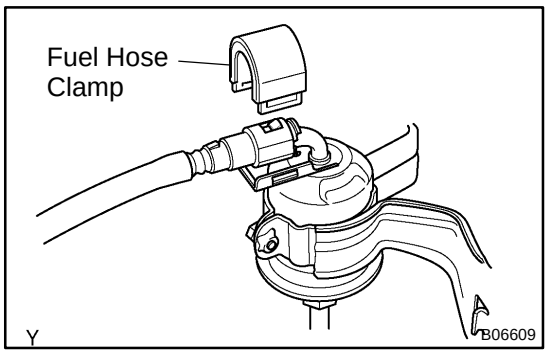


2. CHECK FUEL PRESSURE

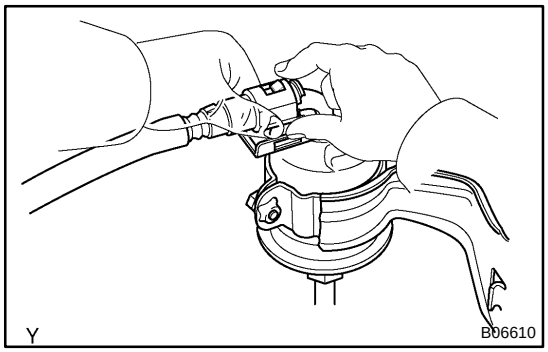
(a) Check the battery positive voltage is above 12 V.

(b) Disconnect the negative (–) terminal cable from the battery.

(c) Purchase the new No.1 fuel pipe and take out the fuel tube connector from its pipe.
Part No. 23801–20060



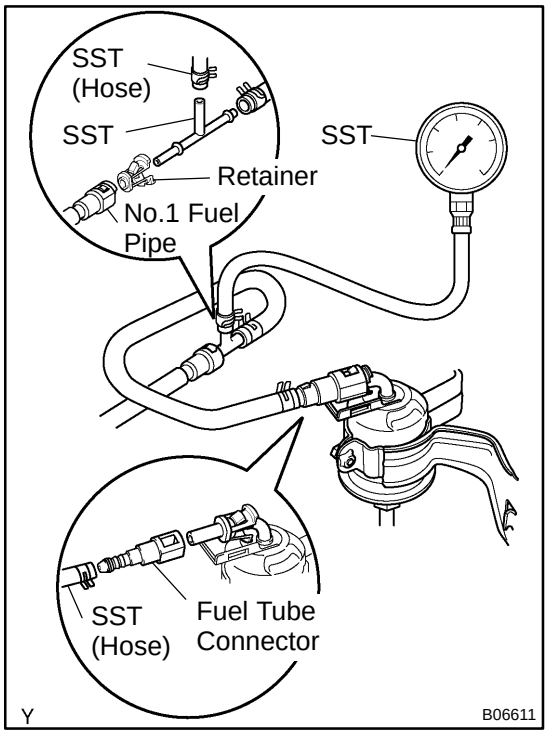
(d) Remove the fuel hose clamp.



(e) Disconnect the No.1 fuel pipe (fuel tube connector) from the fuel filter outlet.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after observing the precautions (See page SF–1).**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.**



(f) Install SST (pressure gauge) as shown in the illustration by using SST and fuel tube connector.
SST 09268–41047, 09268–41250, 09268–45012

(g) Wipe off any splattered gasoline.

(h) Reconnect the negative (–) terminal cable to the battery.

(i) Connect the LEXUS hand held tester to the DLC3.
(See step 1. check fuel pump operation (a) to (e))

(j) Measure the fuel pressure.
Fuel pressure:
301 – 347 kPa (3.1 – 3.5 kgf/cm^2, 44 – 50 psi)

If pressure is high, replace the fuel pressure regulator.
If pressure is low, check the fuel hoses, fuel hose connections, fuel pump, fuel filter and fuel pressure regulator.

(k) Disconnect the LEXUS hand–held tester from the DLC3.

(l) Start the engine.

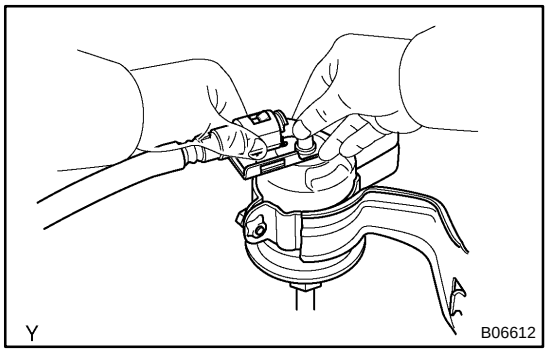
(m) Measure the fuel pressure at idle.
Fuel pressure:
301 – 347 kPa (3.1 – 3.5 kgf/cm^2, 44 – 50 psi)

(n) Stop the engine.

(o) Check that the fuel pressure remains as specified for 5 minutes after the engine has stopped.
Fuel pressure:
147 kPa (1.5 kgf/cm^2, 21 psi) or more

If pressure is not as specified, check the fuel pump, pressure regulator and/or injectors.

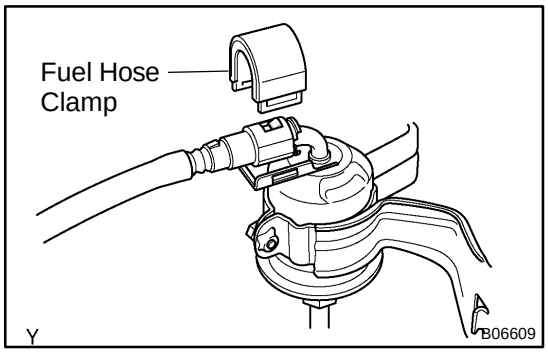
(p) After checking fuel pressure, disconnect the negative (–) terminal cable from the battery and carefully remove the SST and fuel tube connector to prevent gasoline from splashing.
SST 09268–41047, 09268–41250, 09268–45012



(q) Reconnect the No.1 fuel pipe (fuel tube connector).

CAUTION:

Perform connecting operations of the fuel tube connector (quick type) after observing the precautions (See page SF–1).



(r) Surely install the fuel hose clamp to the fuel filter with ”click” sound.

(s) After installing the clamp, check that the clamp is fixed by pulling up the clamp.

(t) Reconnect the negative (–) terminal cable to the battery.

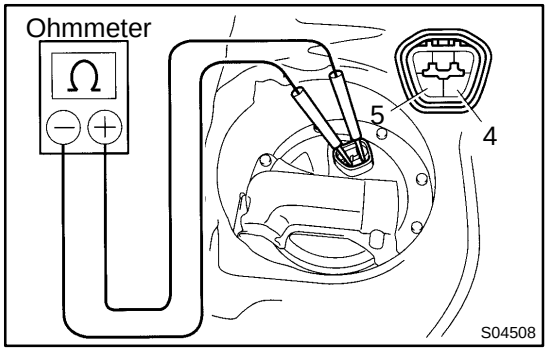
(u) Check for fuel leaks.

3. REMOVE REAR SEAT CUSHION

4. REMOVE FLOOR SERVICE HOLE COVER

5. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

6. INSPECT FUEL PUMP RESISTANCE

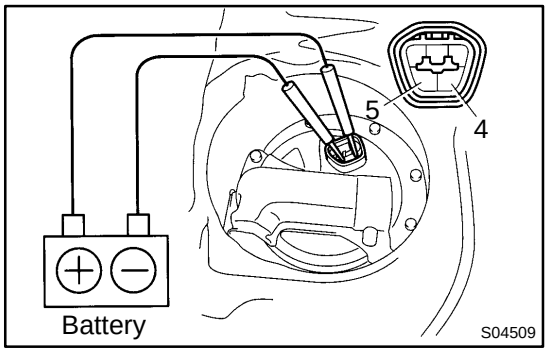


Using an ohmmeter, measure the resistance between terminals 4 and 5.

Resistance: 0.2 – 3.0 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the fuel pump.

7. INSPECT FUEL PUMP OPERATION



Connect the positive (+) lead from the battery to terminal 4 of the connector, and the negative (–) lead to terminal 5. Check that the fuel pump operates.

NOTICE:

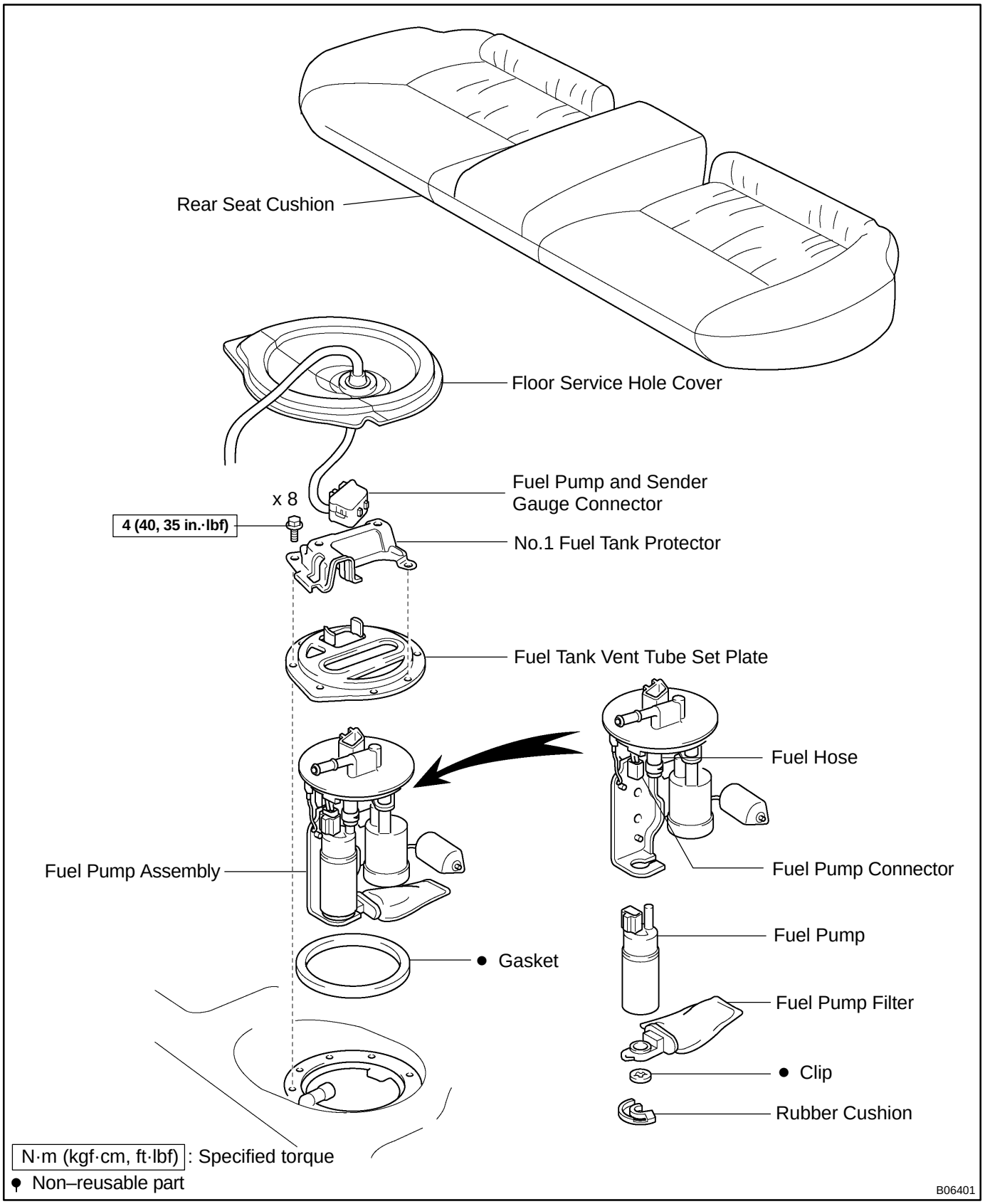
- **These tests must be done quickly (within 10 seconds) to prevent the coil burning out.**
- **Keep the fuel pump as far away from the battery as possible.**
- **Always do the switching at the battery side.**

If operation is not as specified, replace the fuel pump or lead wire.

8. **RECONNECT FUEL PUMP & SENDER GAUGE CONNECTOR**
9. **REINSTALL FLOOR SERVICE HOLE COVER**
10. **REINSTALL REAR SEAT CUSHION**

SF05O–03

COMPONENTS



SF05P–03

REMOVAL

CAUTION:

Do not smoke or work near an open flame when working on the fuel pump.

1. REMOVE REAR SEAT CUSHION

2. REMOVE FLOOR SERVICE HOLE COVER

(a) Take out the floor carpet.

(b) Remove the service hole cover.

HINT:

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

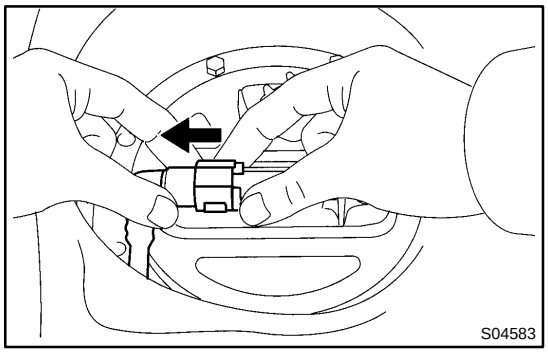
Check for fuel leakage.

3. DISCONNECT FUEL PUMP & SENDER GAUGE CONNECTOR

4. REMOVE NO.1 FUEL TANK PROTECTOR

Remove the 2 bolts and No.1 fuel tank protector.

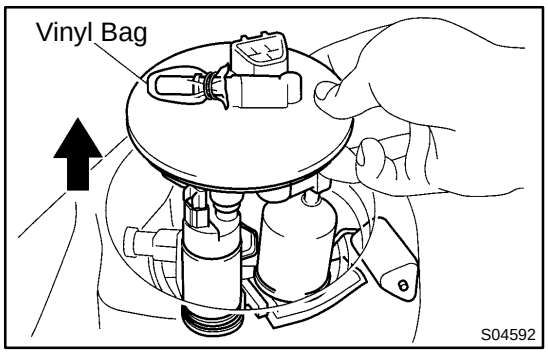
Torque: 4 N·m (40 kgf·cm, 35 in.·lbf)



5. DISCONNECT FUEL TUBE (FUEL TUBE CONNECTOR)

CAUTION:

- **Perform disconnecting and connecting operations of the fuel tube connector (quick type) after observing the precautions.**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the vehicle compartment.**



6. REMOVE FUEL PUMP ASSEMBLY FROM FUEL TANK

(a) Remove the 6 bolts and fuel tank vent tube set plate.
Torque: 4 N·m (40 kgf·cm, 35 in.·lbf)

(b) Pull out the fuel pump assembly.

(c) Remove the gasket from the pump assembly.

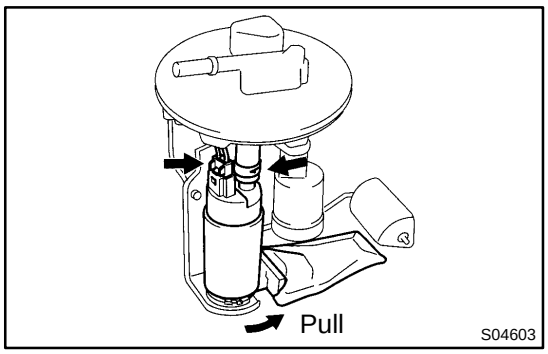
NOTICE:

- **Do not damage the fuel pump filter.**
- **Be careful that the arm of the sender gauge should not bent.**

HINT:

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

Install a new gasket to the pump assembly.



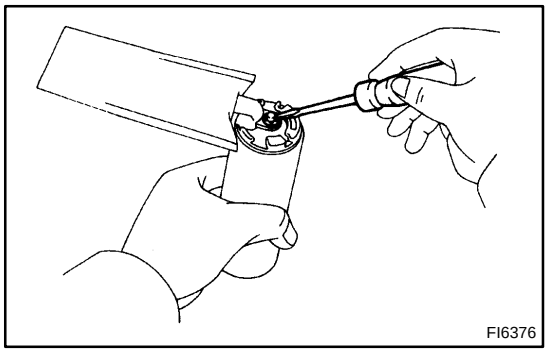
7. DISCONNECT FUEL PUMP CONNECTOR

8. REMOVE FUEL PUMP FROM FUEL PUMP BRACKET

(a) Pull off 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.

HINT:

At the time of installation, please refer to the following items.
Install the pump filter with a new clip.

SF05Q–01

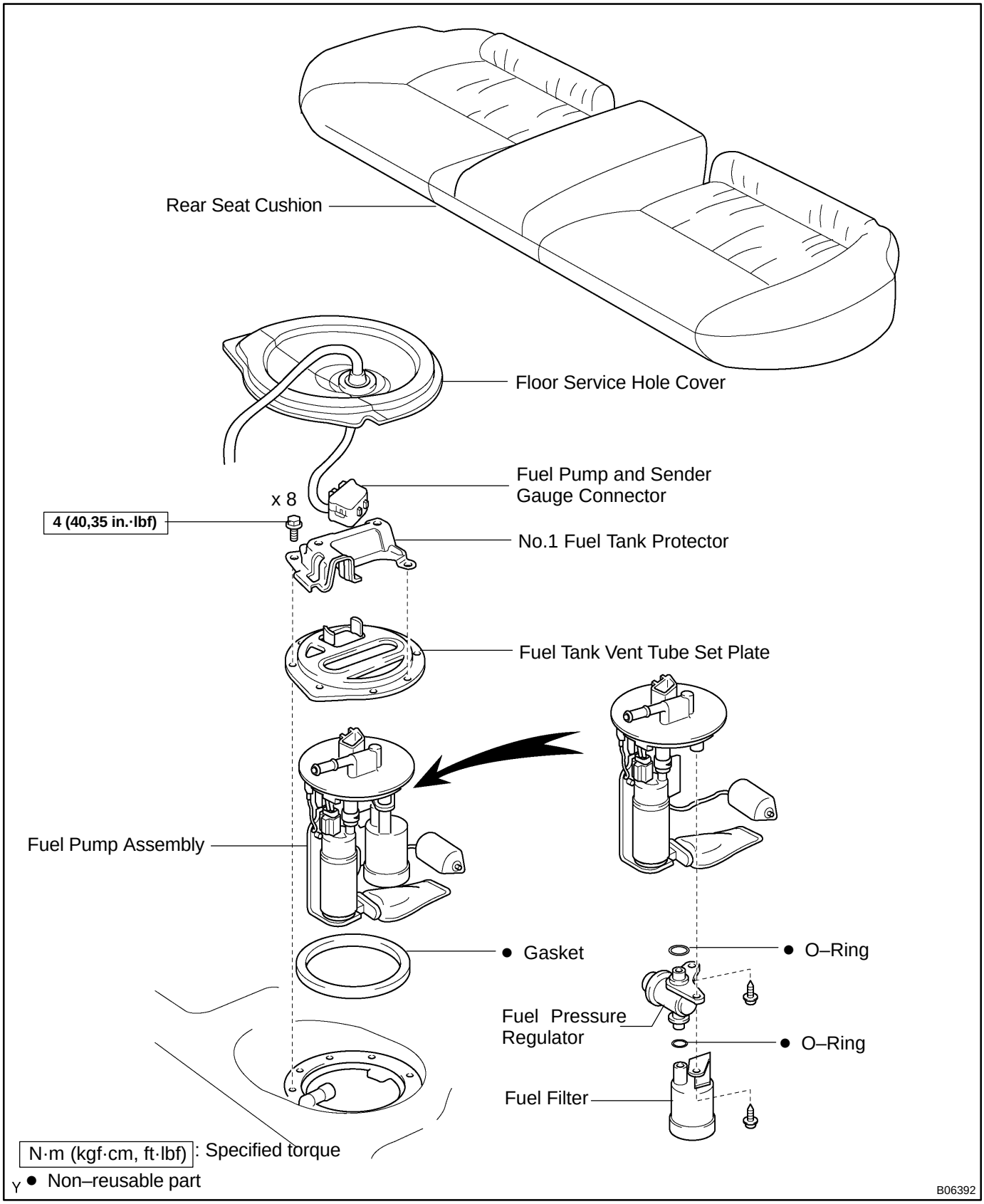
INSTALLATION

Installation is in the reverse order of removal (See page SF–11).

FUEL PRESSURE REGULATOR

SF05R–03

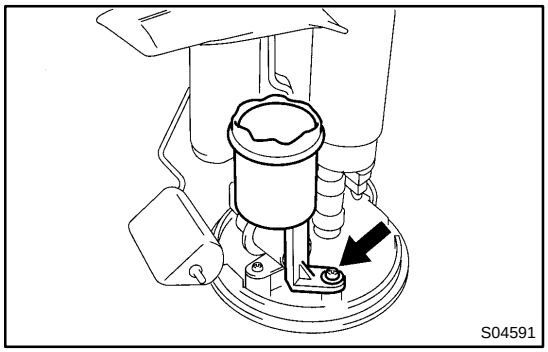
COMPONENTS



SF05S–02

REMOVAL

1. REMOVE FUEL PUMP ASSEMBLY FROM FUEL TANK
(See page SF–11)



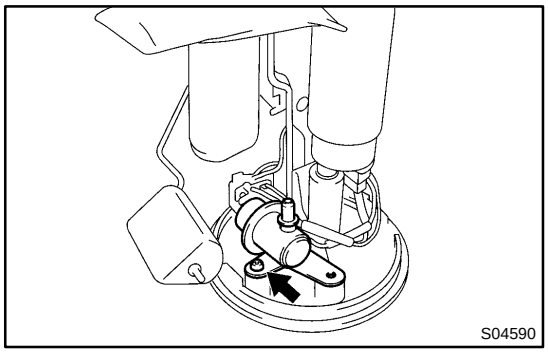
2. REMOVE FUEL FILTER

(a) Remove the screw, and pull out the fuel filter.
Torque: 2.0 N·m (20 kgf·cm, 17 in.·lbf)

(b) Remove the O–ring from the fuel filter.

HINT:

At the time of installation, please refer to the following items.
Apply a light coat of gasoline to a new O–ring, and install it to the fuel filter.



3. REMOVE FUEL PRESSURE REGULATOR

(a) Remove the screw, and pull out the pressure regulator.
Torque: 2.0 N·m (20 kgf·cm, 17 in.·lbf)

(b) Remove the O–ring from the pressure regulator.

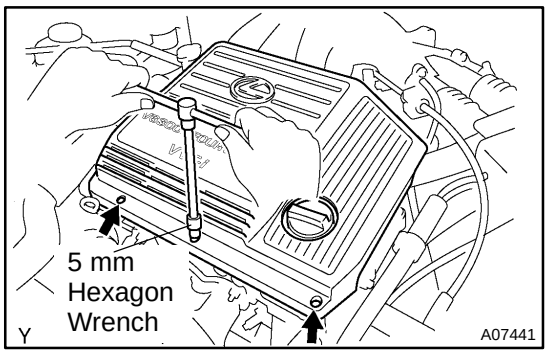
HINT:

At the time of installation, please refer to the following items.
Apply a light coat of gasoline to a new O–ring, and install it to the pressure regulator.

SF05T–01

INSTALLATION

Installation is in the reverse order of removal (See page SF–15).



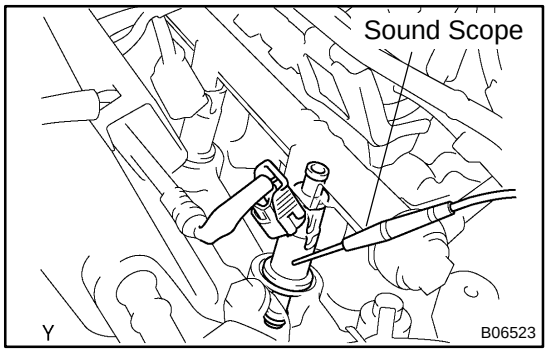
INJECTOR

SF072–03

ON–VEHICLE INSPECTION

1. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.
(b) Loosen the V–bank cover fastener counterclockwise.
(c) Remove the V–bank cover.

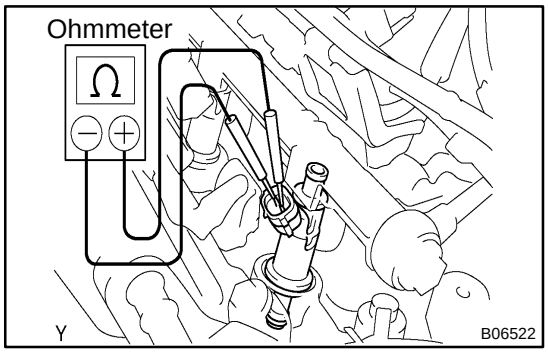


2. INSPECT INJECTOR OPERATION

Check operation sound from each injector.

(1) With the engine running or cranking, use a sound scope to check that there is normal operating noise in proportion to engine speed.
(2) If you have no sound scope, you can check the injector operating vibration with your finger.

If no sound or unusual sound is heard, check the wiring connector, injector or injection signal from the ECM.



3. INSPECT INJECTOR RESISTANCE

(a) Disconnect the injector connector.
(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.

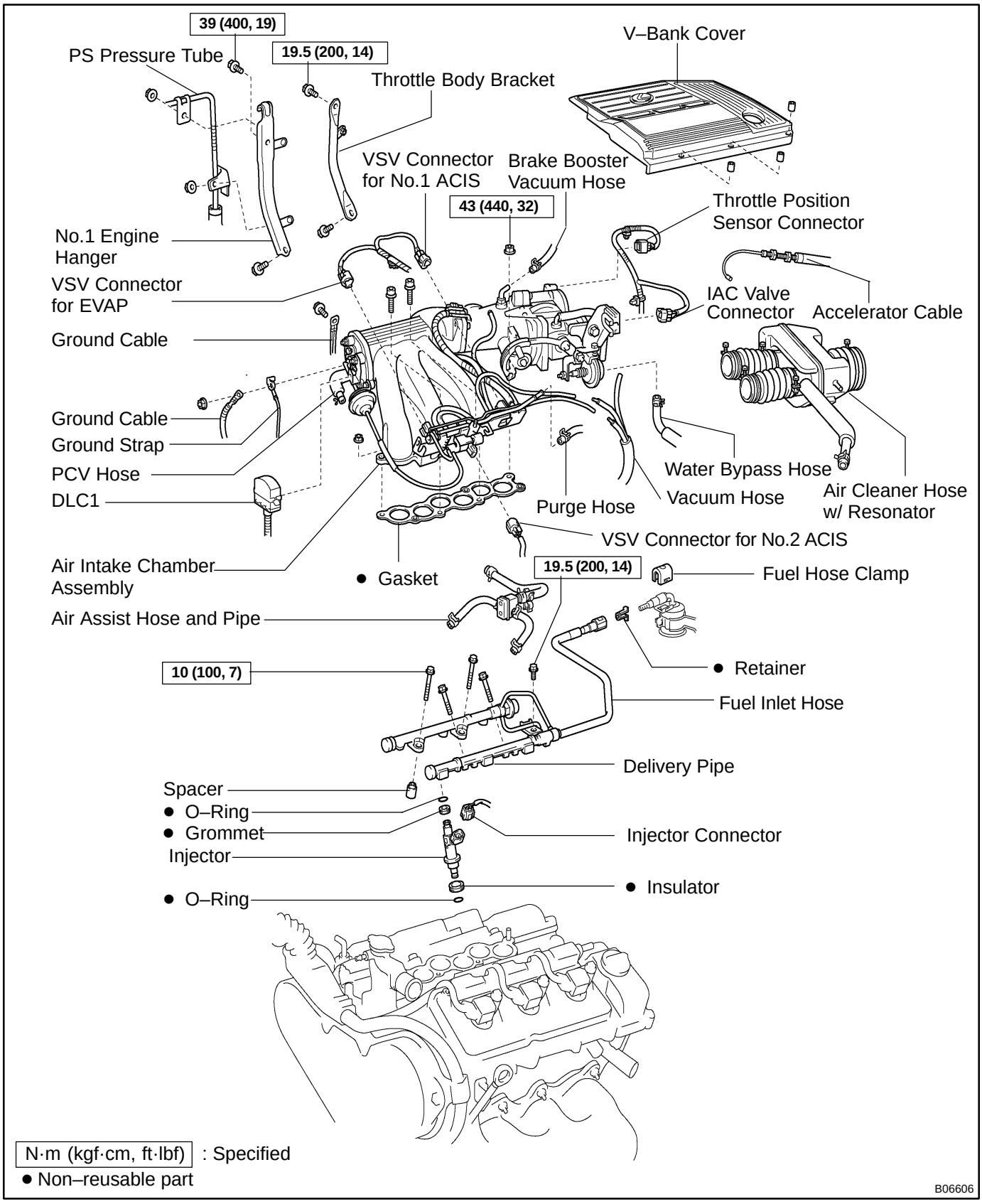
(c) Reconnect the injector connector.

4. REINSTALL V–BANK COVER

(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.
(b) Press down the V–bank cover fastener.

SF073–03

COMPONENTS



SF0ZR–01

REMOVAL

1. REMOVE V–BANK COVER

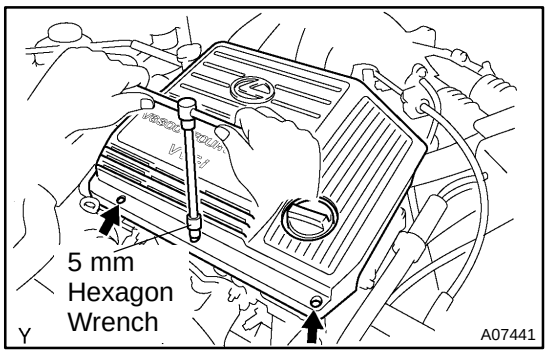
(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

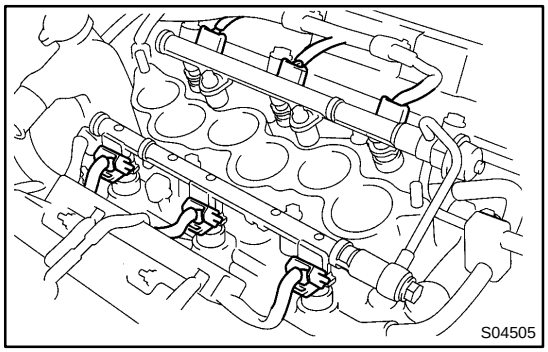
(c) Remove the V–bank cover.

2. REMOVE AIR CLEANER HOSE WITH RESONATOR

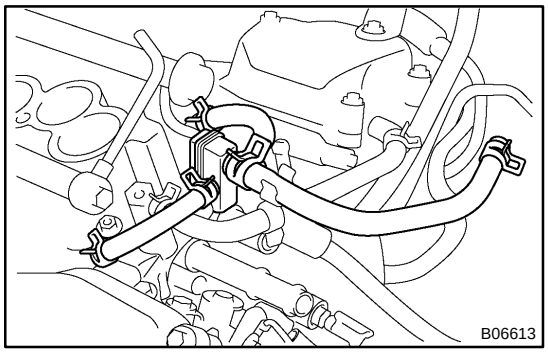
3. REMOVE AIR INTAKE CHAMBER ASSEMBLY (See page EM–31)



4. DISCONNECT INJECTOR CONNECTORS

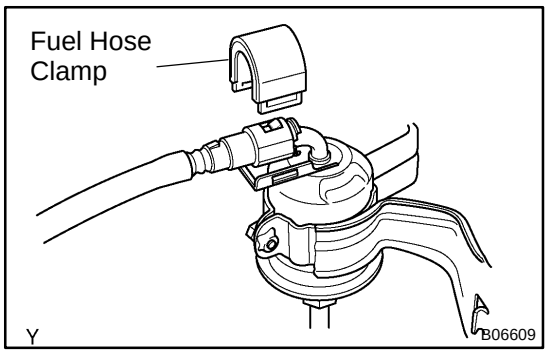


5. REMOVE AIR ASSIST HOSES AND PIPE



6. DISCONNECT NO.1 FUEL PIPE

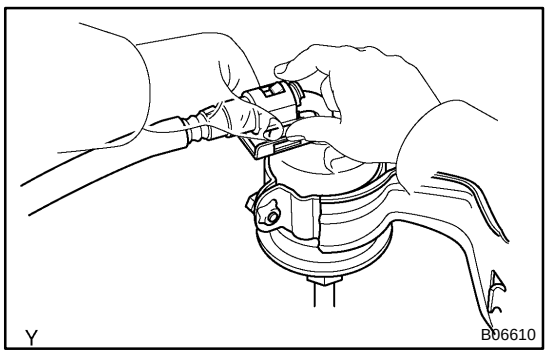
(a) Remove the fuel hose clamp.

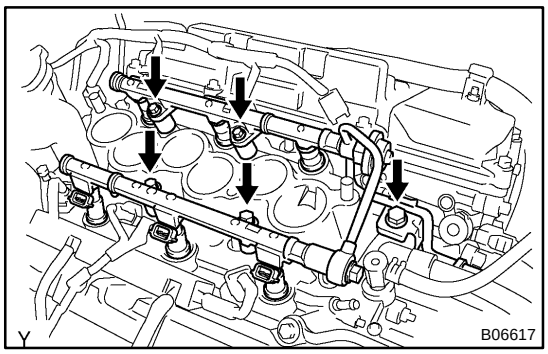


(b) Disconnect the No.1 fuel pipe (fuel tube connector) from the fuel filter outlet.

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after observing the precautions. (See page SF–1)**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.**





7. REMOVE DELIVERY PIPES AND INJECTORS

NOTICE:

- **Be careful not to drop the injectors when removing the delivery pipes.**
- **Pay attention to put any hung load on the injector to and from the side direction.**

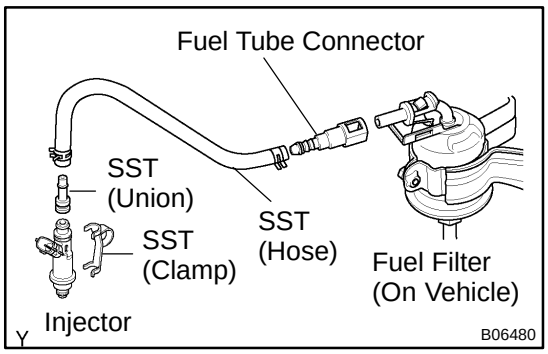
(a) Remove the 5 bolts and delivery pipes together with the 6 injectors and No.1 fuel pipe.

(b) Remove the 4 spacers from the intake manifold.

(c) Pull out the 6 injectors from the delivery pipes.

(d) Remove the 2 O–rings and 2 grommets from each injector.

SF075–03

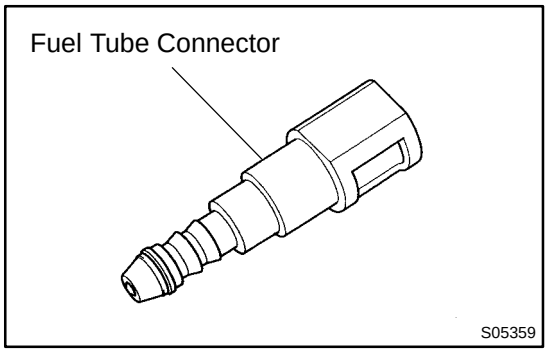


INSPECTION

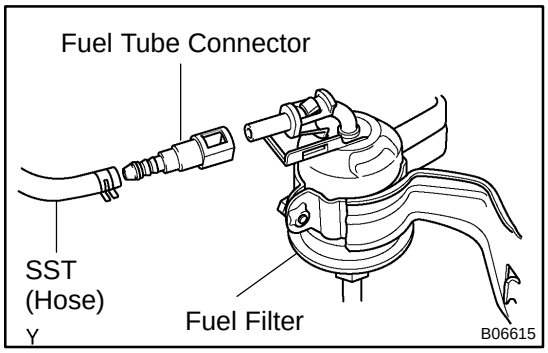
1. INSPECT INJECTOR INJECTION

CAUTION:

Keep injector clear of sparks during the test.



(a) Purchase the new No.1 fuel pipe and take out the fuel tube connector from its pipe.
Part No. 23801–20060



(b) Connect SST (hose) and fuel tube connector to the fuel filter outlet.
SST 09268–41047

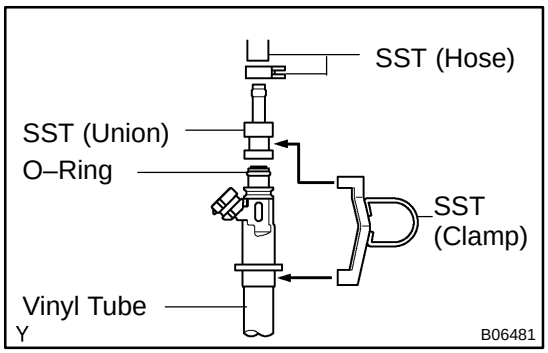
CAUTION:

Preform connecting operations of the fuel tube connector (quick type) after observing the precautions.

(See page SF–1)

HINT:

Use the vehicle fuel filter.



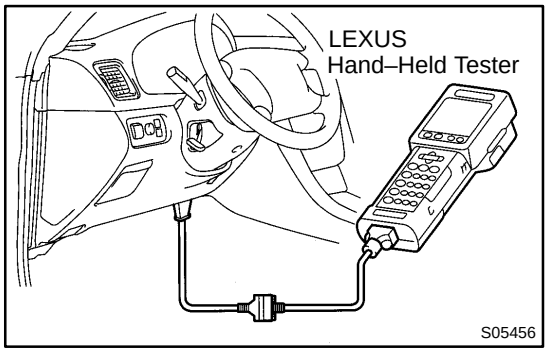
(c) Install the grommet and O–Ring to the injector.

(d) Connect SST (union and hose) to the injector, and hold the injector and union with SST (clamp).
SST 09268–41047

(e) Put the injector into a graduated cylinder.

HINT:

Install a suitable vinyl hose onto the injector to prevent gasoline from splashing out.



(f) Connect the LEXUS hand–held tester to the DLC3.

(g) Turn the ignition switch ON and push the LEXUS hand–held tester main switch ON.

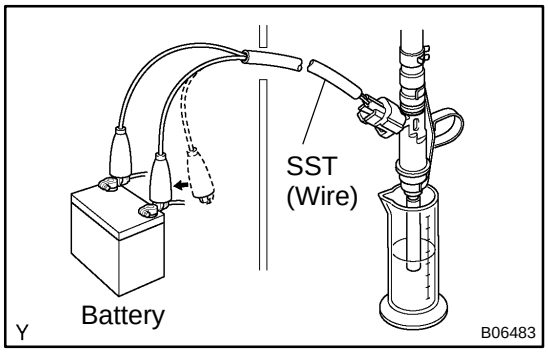
NOTICE:

Do not start the engine.

(h) Select the ACTIVE TEST mode on the LEXUS hand–held tester.

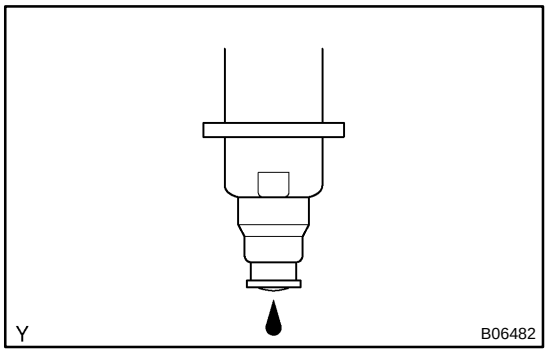
(i) Please refer to the LEXUS hand–held tester operator's manual for further details.

(j) If you have no LEXUS hand–held tester, connect the positive (+) and negative (–) leads from the battery to the fuel pump connector. (See page SF–6)



(k) Connect SST (wire) to the injector and battery for 15 seconds, and measure the injection volume with a graduated cylinder. Test each injector 2 or 3 times.
SST 09842–30070
Volume:
60 – 73 cm^3 (3.4 – 4.5 cu in.) per 15 sec.
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 test 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 the SST and fuel tube connector.
SST 09268–41047, 09842–30070

CAUTION:

- **Perform disconnecting operations of the fuel tube connector (quick type) after observing the precautions. (See page SF–1)**
- **As there is retained pressure in the fuel pipe line, prevent it from splashing inside the engine compartment.**

(e) Disconnect the LEXUS hand–held tester from the DLC3.

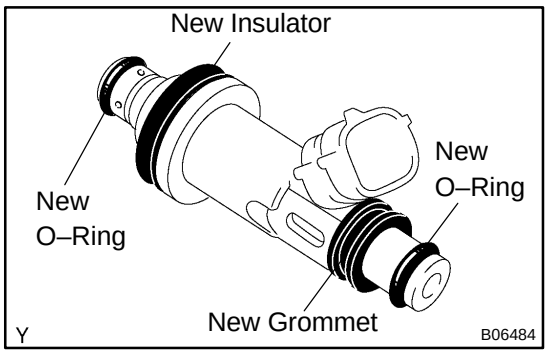
SF076–03

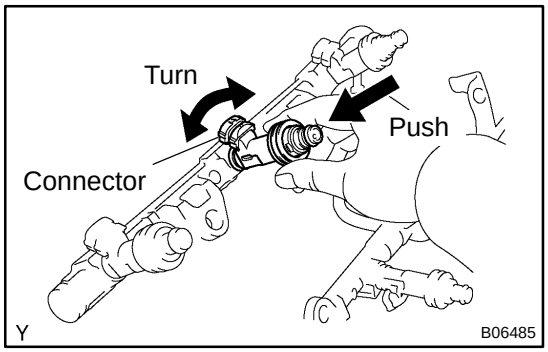
INSTALLATION

1. INSTALL INJECTORS AND DELIVERY PIPES

(a) Install new insulator and grommet to each injector.

(b) Apply a light coat of spindle oil or gasoline to 2 new O–rings and install them to each injector.

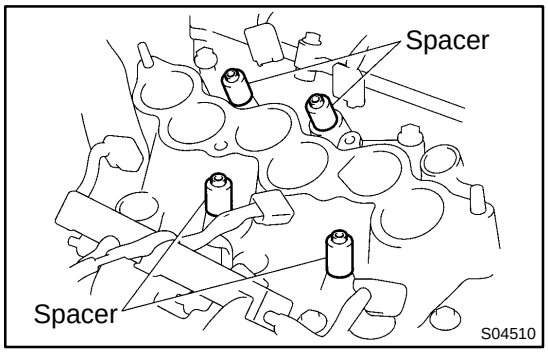




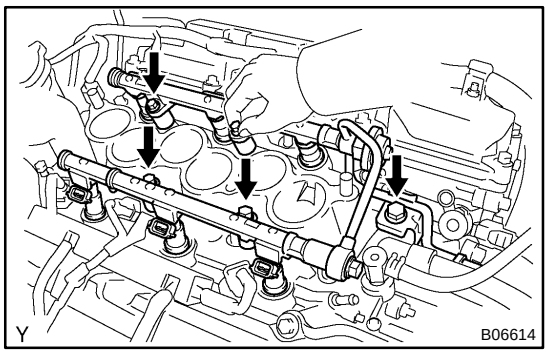
(c) Apply a light coat of spindle oil or gasoline on the place where a delivery pipe touches an O–ring of the injector.

(d) While turning the injector clockwise and counterclockwise, push it to the delivery pipes. Install the 6 injectors.

(e) Position the injector connector outward.



(f) Place the 4 spacers in position on the intake manifold.

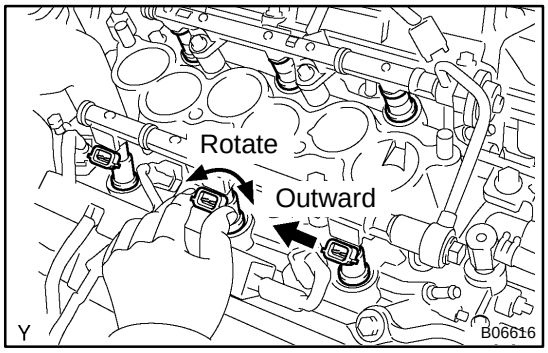


(g) Apply a light coat of spindle oil or gasoline on the place where a intake manifold touches an O–ring of the injector.

(h) Place the delivery pipes and fuel pipe together with the 6 injectors in position on the intake manifold.

(i) Temporarily install the 4 bolts holding the delivery pipes to the intake manifold.

(j) Temporarily install the bolt holding the No.1 fuel pipe to the intake manifold.

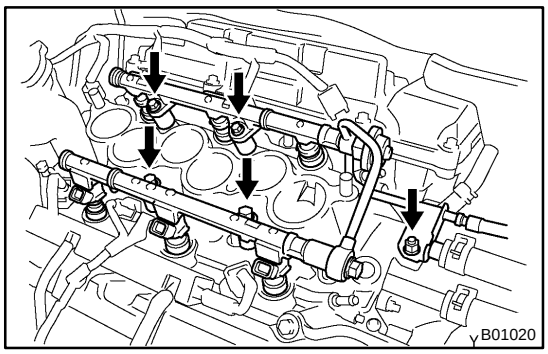


(k) Check that the injectors rotate smoothly.

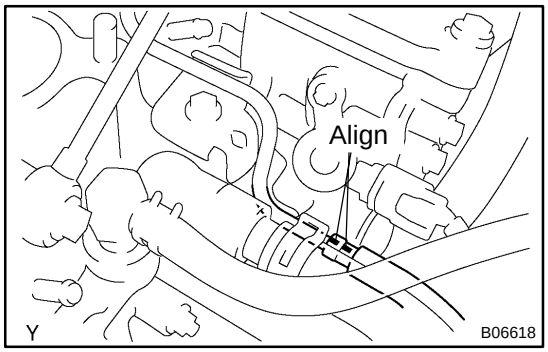
HINT:

If injectors do not rotate smoothly, the probable cause is incorrect installation of O–rings. Replace the O–rings.

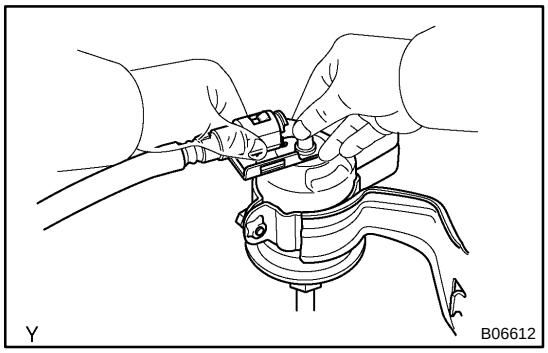
(l) Position the injector connector outward.



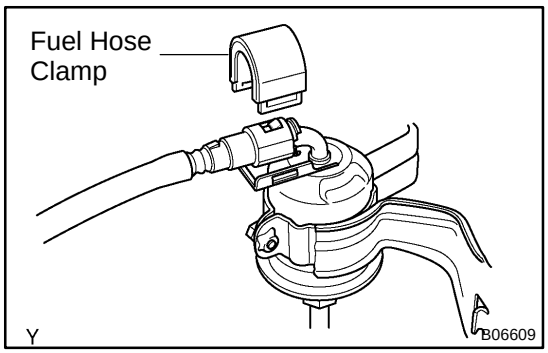
(m) Tighten the 4 bolts holding the delivery pipes to the intake manifold.
Torque: 10 N·m (100 kgf·cm, 7 ft·lbf)
(n) Tighten the bolt holding the No.1 fuel pipe to the intake manifold.
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)



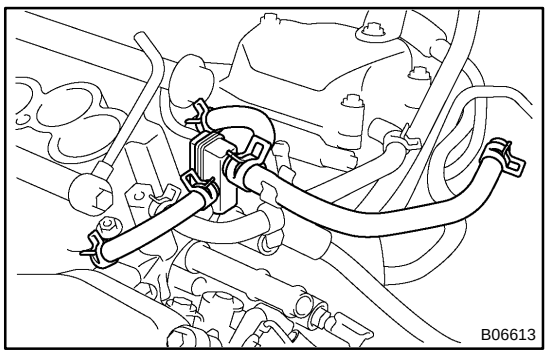
2. CONNECT NO.1 FUEL PIPE
(a) Align the alignment marks (white paint) on the No.1 fuel pipe.



(b) Connect the No.1 fuel pipe (fuel tube connector) to the fuel filter.
CAUTION:
Perform connecting operations of the fuel tube connector (quick type) after observing the precautions.



(c) Surely install the fuel hose clamp to the fuel filter with "click" sound.
(d) After installing the clamp, check that the clamp is fixed by pulling up the clamp.



3. INSTALL AIR ASSIST HOSES AND PIPE
4. CONNECT INJECTOR CONNECTORS
5. INSTALL AIR INTAKE CHAMBER ASSEMBLY
(See page EM–59)
6. INSTALL AIR CLEANER HOSE WITH RESONATOR
7. INSTALL V–BANK COVER
(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.
(b) Press down the V–bank cover fastener.
8. CHECK FOR FUEL LEAKS

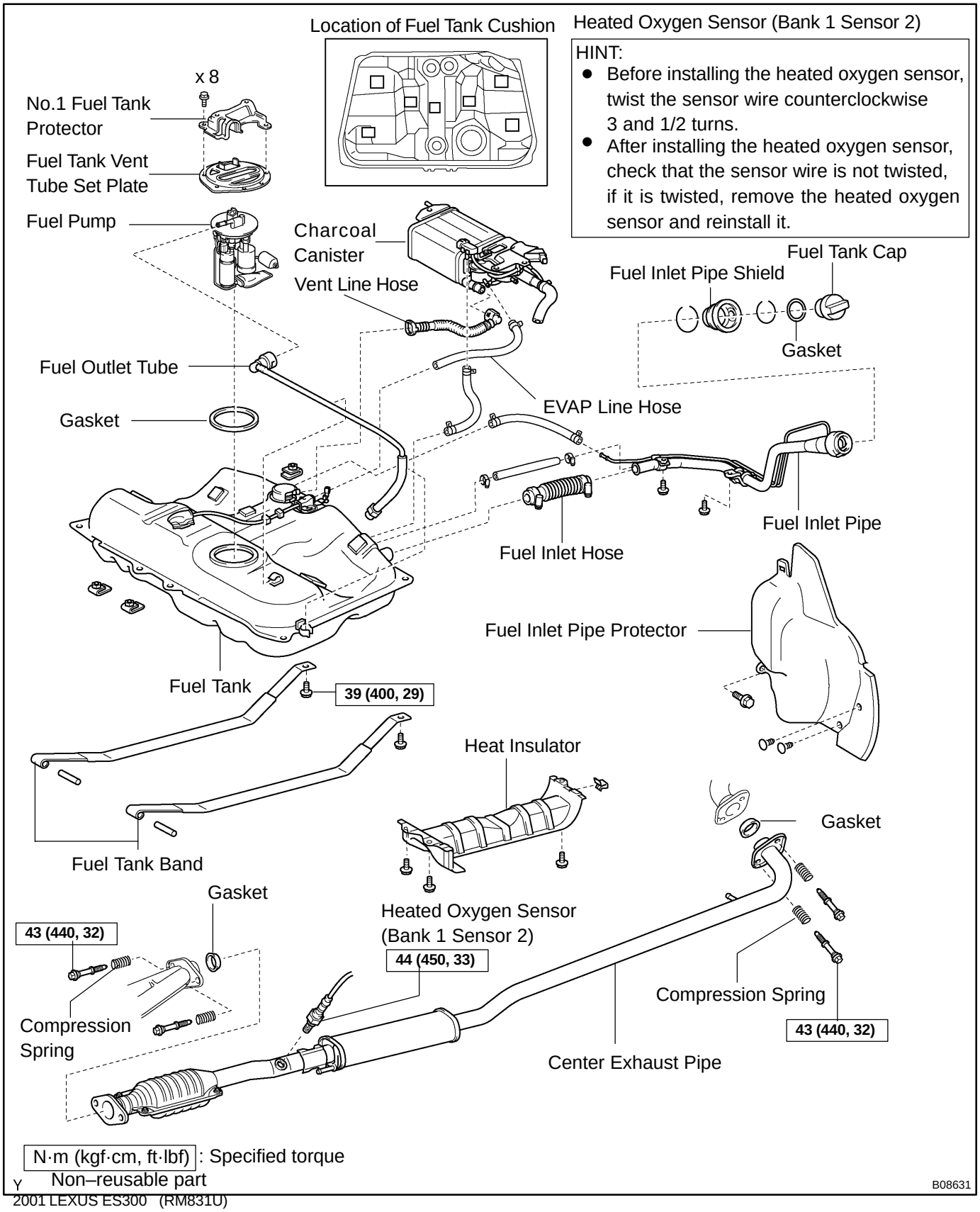
FUEL TANK AND LINE

SF05V–03

COMPONENTS

CAUTION:

Always use new gaskets when replacing the fuel tank or component parts.
Apply the proper torque to all parts tightened.



SF05W–03

INSPECTION

INSPECT FUEL TANK AND LINE

(a) Check the fuel lines for cracks or leakage, and all connections for deformation.

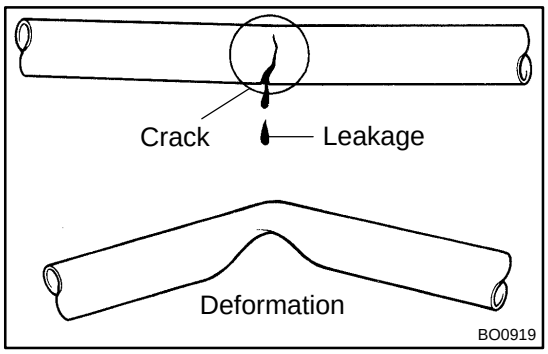
(b) Check the fuel tank vapor vent system hoses and connections for looseness, sharp bends or damage.

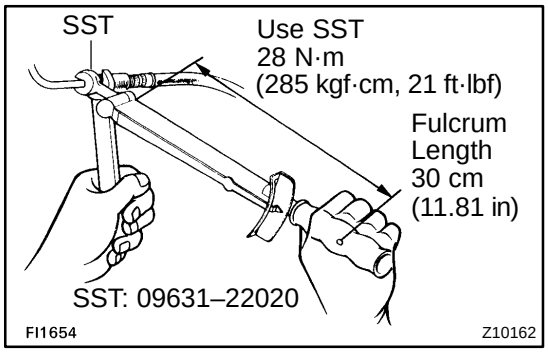
(c) Check the fuel tank for deformation, cracks, fuel leakage or tank band looseness.

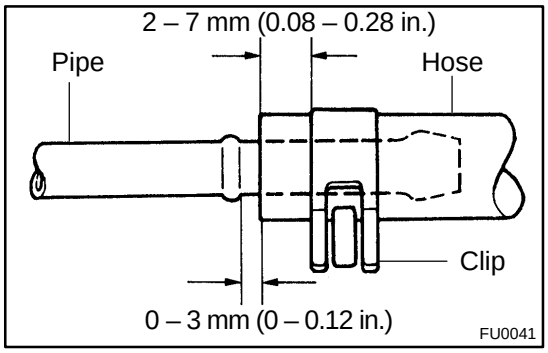
(d) Check the filler neck for damage or fuel leakage.

(e) Hose and pipe connections are as shown in the illustration.

If a problem is found, repair or replace the parts as necessary.



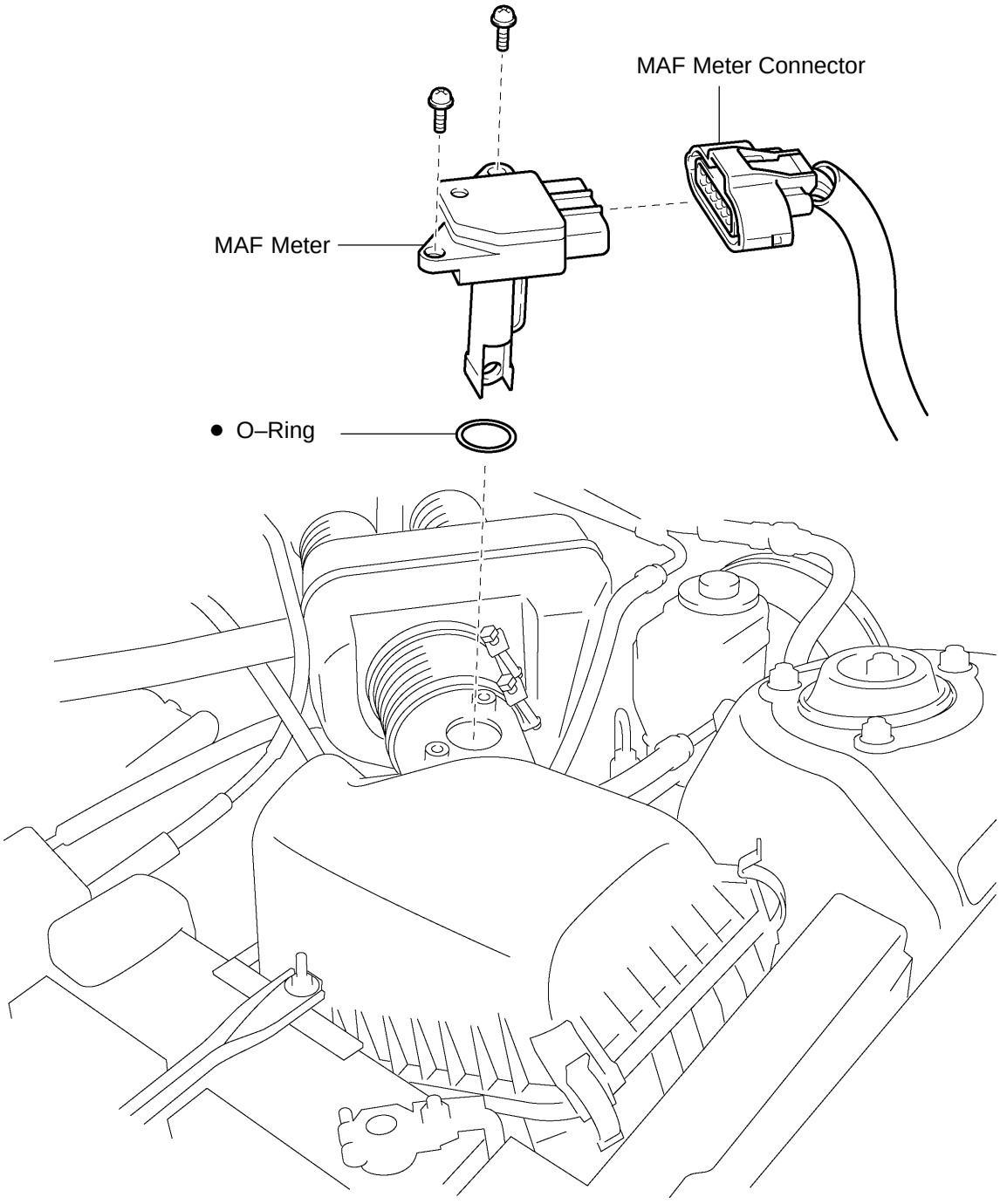




MASS AIR FLOW (MAF) METER

SF05X–03

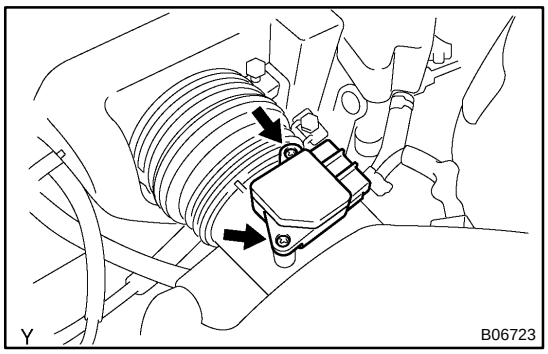
COMPONENTS



Y ● Non–reusable part

B06673

SF05Y–03



REMOVAL

REMOVE MAF METER

(a) Disconnect the MAF meter connector.

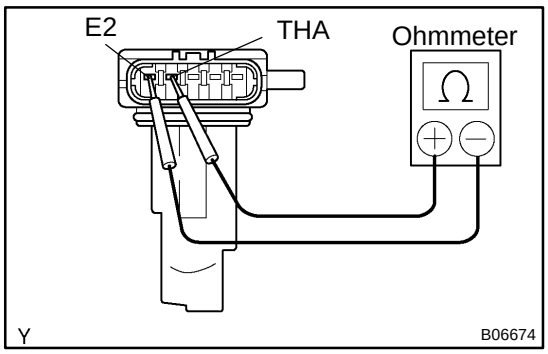
(b) Remove the 2 screws, MAF meter and O–ring.

HINT:

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

Install a new O–ring to the MAF meter.

SF05Z–03



INSPECTION

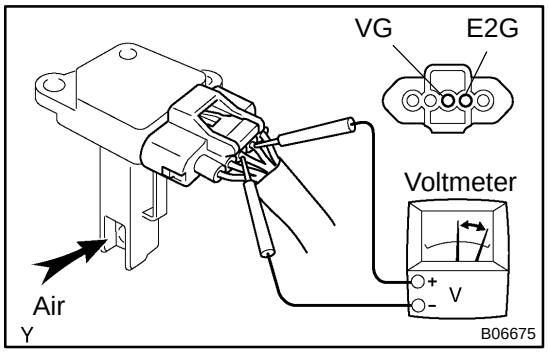
1. INSPECT MAF METER RESISTANCE

Using an ohmmeter, measure the resistance between terminals THA and E2.

Resistance:

Terminals	Resistance	Temperature
THA – E2	13.6 – 18.4 kΩ	–20˚C (–4˚F)
THA – E2	2.21 – 2.69 kΩ	20˚C (68˚F)
THA – E2	0.49 – 0.67 kΩ	60˚C (140˚F)

If the resistance is not as specified, replace the MAF meter.



2. INSPECT MAF METER OPERATION

(a) Connect the MAF meter connector.
(b) Turn the ignition switch ON.
(c) Using a voltmeter, connect the positive (+) tester probe to terminal VG, and negative (–) tester probe to terminal E2G.
(d) Blow air into the MAF meter, and check that the voltage fluctuates.

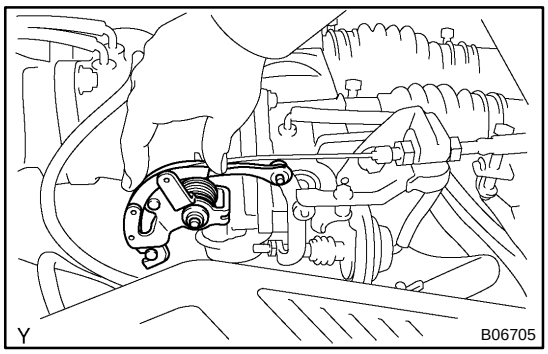
If operation is not as specified, replace the MAF meter.

(e) Turn the ignition switch LOCK.
(f) Disconnect the MAF meter connector.

SF060–01

INSTALLATION

Installation is in the reverse order of removal (See page SF–28).



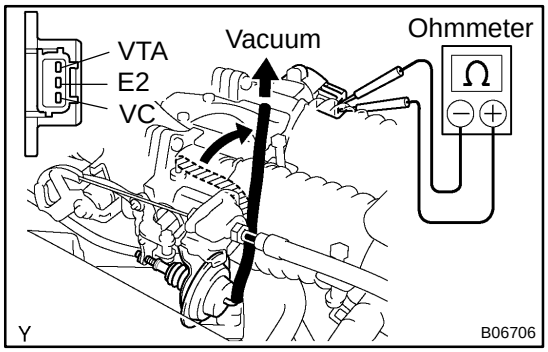
THROTTLE BODY

SF061–02

ON–VEHICLE INSPECTION

1. INSPECT THROTTLE BODY

Check that the throttle linkage moves smoothly.



2. INSPECT THROTTLE POSITION SENSOR

(a) Disconnect the sensor connector.

(b) Disconnect the vacuum hose from the throttle body.

(c) Apply vacuum to the throttle opener.

(d) Using an ohmmeter, measure the resistance between each terminal.

Resistance:

Throttle valve condition	Between terminals	Resistance
Fully closed	VTA – E2	0.2 – 6.3 kΩ
Fully open	VTA – E2	2.0 – 10.2 kΩ
–	VC – E2	2.5 – 5.9 kΩ

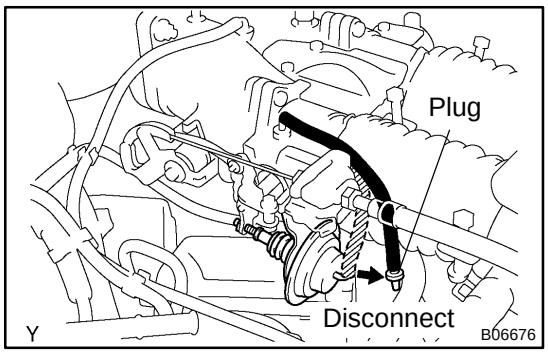
(e) Reconnect the vacuum hose to the throttle body.

3. INSPECT THROTTLE OPENER

(a) Allow the engine to warm up to normal operating temperature.

(b) Check idle speed.

Idle speed: 700 ± 50 rpm



(c) Disconnect the vacuum hose from the throttle opener, and plug the hose end.

(d) Check the throttle opener setting speed.

Throttle opener setting speed: 1,100 – 1,700 rpm

If the throttle opener setting is not as specified, replace the throttle body.

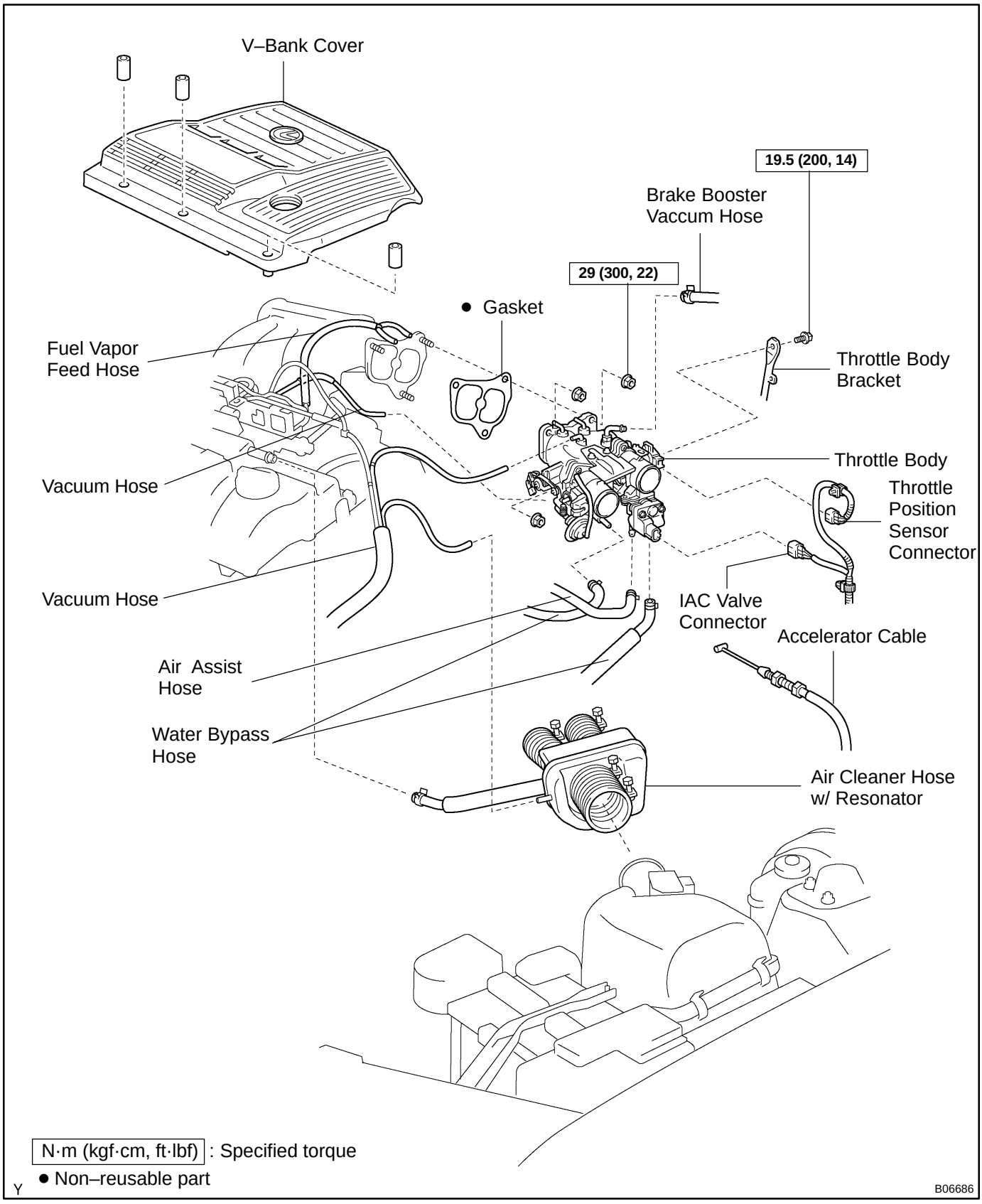
(e) Stop the engine.

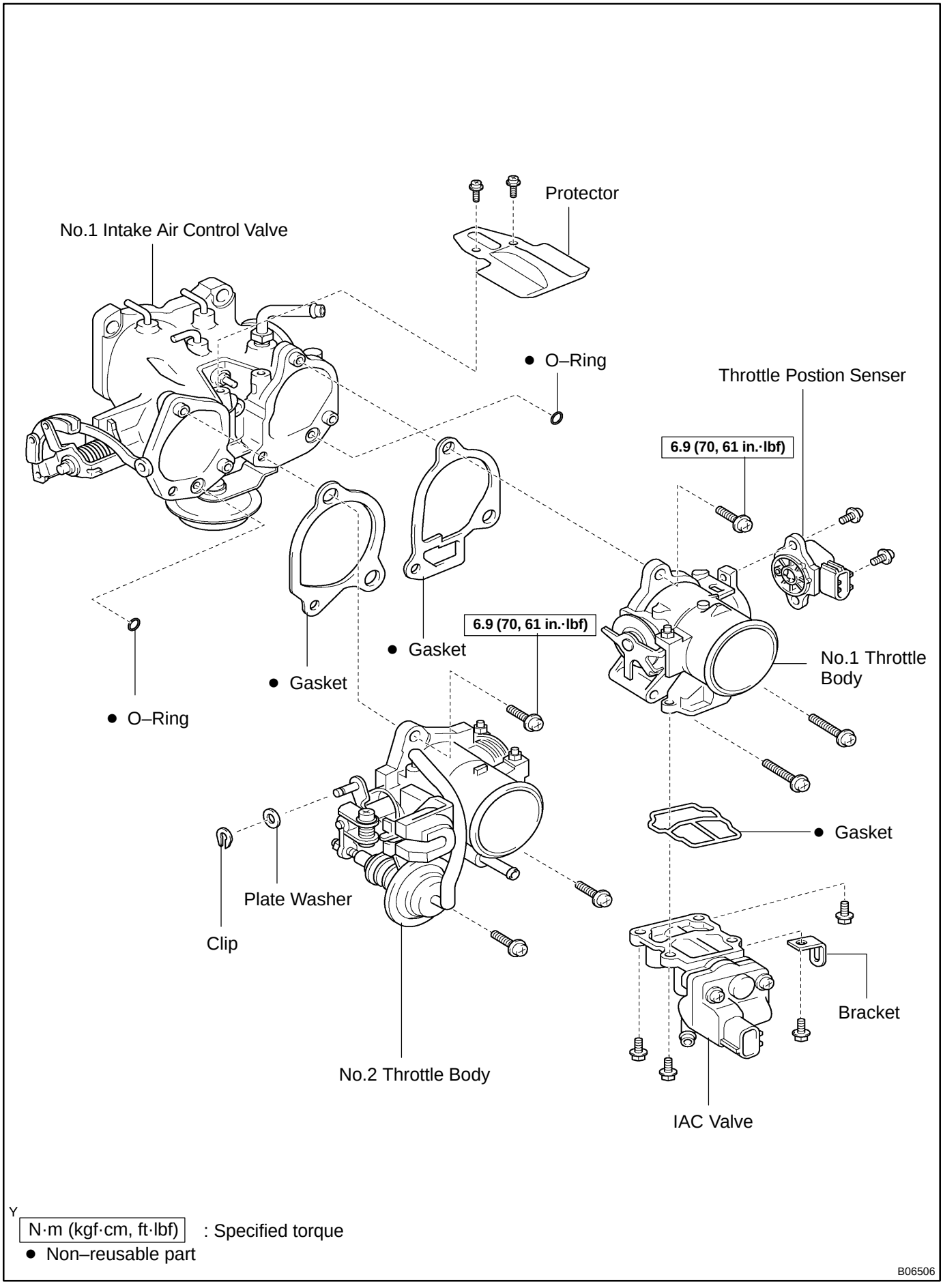
(f) Reconnect the vacuum hose to the throttle opener.

(g) Start the engine and check that the idle speed returns to the correct speed.

SF0ZS–01

COMPONENTS

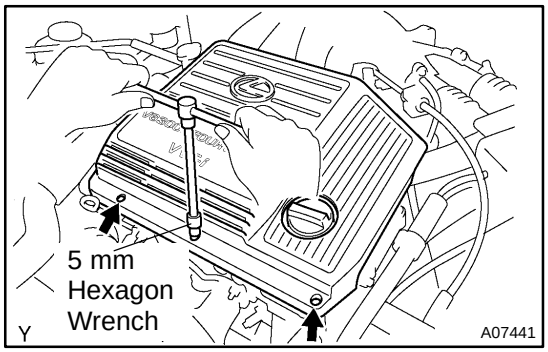



Protector
No.1 Intake Air Control Valve
● O–Ring
Throttle Postion Senser
6.9 (70, 61 in.·lbf)
● Gasket
6.9 (70, 61 in.·lbf)
No.1 Throttle Body
● Gasket
● O–Ring
● Gasket
Plate Washer
Clip
No.2 Throttle Body
Bracket
IAC Valve
Y
N·m (kgf·cm, ft·lbf) : Specified torque
● Non–reusable part
B06506

SF0ZT–01

REMOVAL

1. DRAIN ENGINE COOLANT



2. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

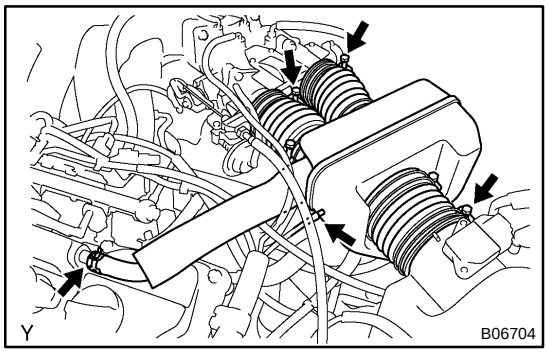
(b) Loosen the V–bank cover fastener counterclockwise.

HINT:

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

Press down the V–bank cover fastener.

(c) Remove the V–bank cover.



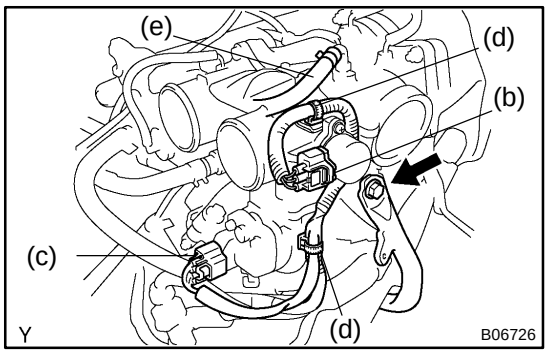
3. REMOVE AIR CLEANER HOSE WITH RESONATOR

(a) Disconnect the PCV hose.

(b) Disconnect the vacuum hose (from the VSV for the active engine control mount).

(c) Loosen the 3 hose clamps, and remove the air cleaner hose with the resonator.

4. DISCONNECT ACCELERATOR CABLE



5. REMOVE THROTTLE BODY

(a) Remove the bolt holding the throttle body to the throttle body bracket.

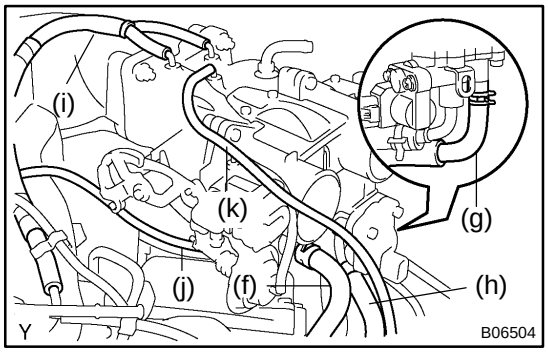
Torque: 19.5 N·m (200 kgf·cm, 14 ft·lbf)

(b) Disconnect the throttle position sensor connector.

(c) Disconnect the IAC valve connector.

(d) Disconnect the 2 wire clamps.

(e) Disconnect the brake booster vacuum hose.



(f) Disconnect the water bypass hose (from the intake manifold).

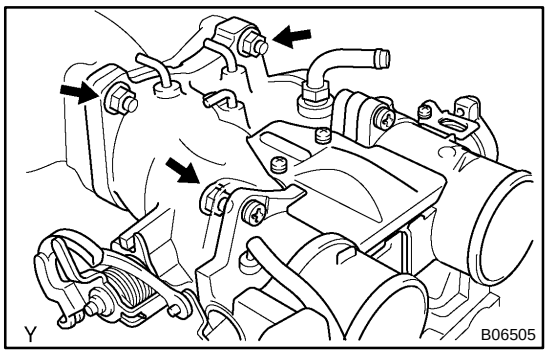
(g) Disconnect the water bypass hose (from the water inlet housing).

(h) Disconnect the air assist hose.

(i) Disconnect the fuel vapor feed hose (from the emission control valve set).

(j) Disconnect the vacuum hose (from the No.1 ACIS VSV).

(k) Disconnect the vacuum hose (from the vacuum tank for the ACIS).



(l) Remove the 3 nuts, throttle body and gasket.

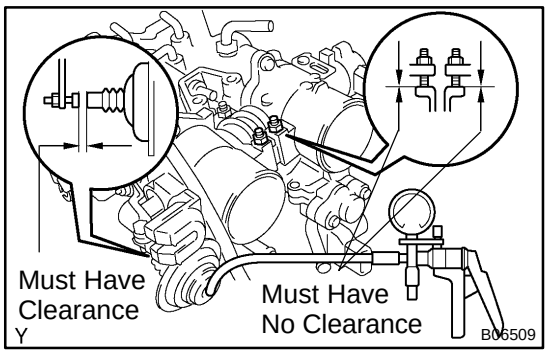
HINT:

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

Place a new gasket on the air intake chamber.

Torque: 29 N·m (300 kgf·cm, 22 ft·lbf)

SF0ZU–01



INSPECTION

NOTICE:

In case of changing, removing or installing the throttle body or IAC valve, must do this.

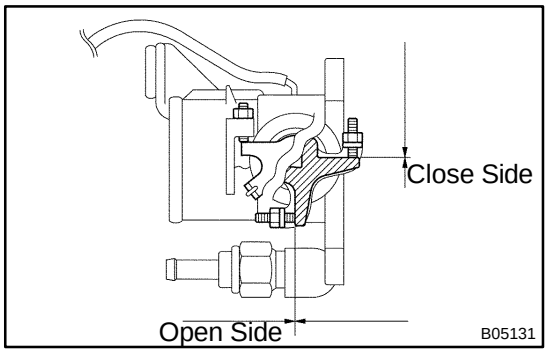
1. INSPECT THROTTLE BODY

(a) Check that there is no clearance between each throttle stop screw and the throttle lever when applying the vacuum (53.3 kPa (400 mmHg, 15.7 in.Hg)) to the throttle opener using a MITYVAC (Hand–Held Vacuum Pump).

Standard: Must have no clearance

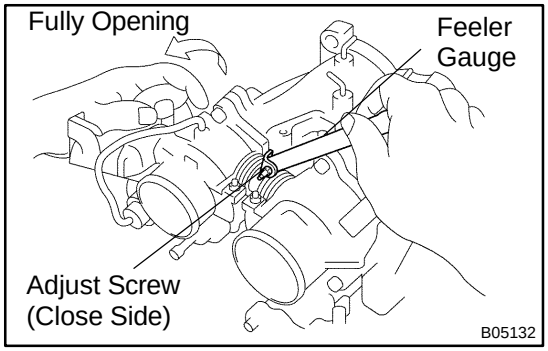
NOTICE:

As the throttle stop screw is precisely adjusted, so do not adjust it.



(b) Under the condition of (1), check visually that there is a clearance between each adjust screw and the throttle lever on No.1 side.

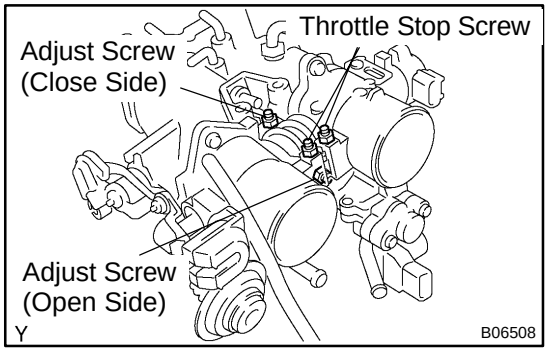
Adjust screw	Reference value
Close side	About 0.13 mm (0.0051 in.)
Open side	About 0.22 mm (0.0087 in.)



(c) Measure the clearance between the adjust screw on the close side when fully opening the throttle lever on No.2 side by hand and the throttle lever on No.1 side with a feeler gauge.

Standard value: 0.25 – 0.45 mm (0.0098 – 0.0177 in.)

In case of being out of standard value, perform the adjustment of step 2.



2. ADUST THROTTLE BODY (BALANCE)

NOTICE:

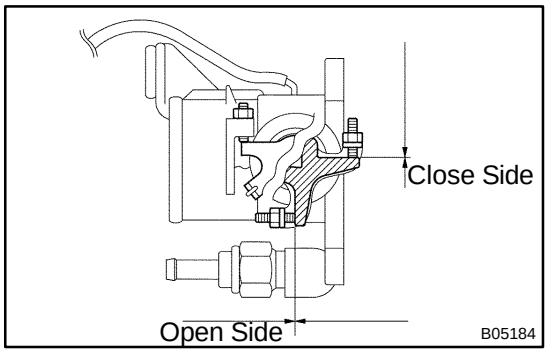
Do not adjust the throttle stop screw and throttle opener.

(a) Beforehand checking.
Recheck 1 – (a).

(b) Adjustment of the adjust screw on the open side.
(1) Using a 2 mm hexagon wrench, loosen the lock nut and screw, make clearance between the screw tip and the throttle lever on No.1 side.
(2) Turn the screw to the screw torque direction gradually, and stop it at the position where to touch the lever at the very moment.

NOTICE:

If turning it too much to the torque direction, the No.1 lever goes off from the throttle stop screw causing the adjustment failure.



(3) Turn it back from the position where it touches the lever to the screw loosing direction.

Standard: Turn it back by rotating 1/4

(4) Tighten the lock nut.

(c) Adjustment of the adjust screw on the close side.
(1) Loosen the lock nut and screw, and make clearance between the screw tip and the throttle lever on No.1 side.
(2) Turn the screw to the screw torque direction gradually, and stop it at the position where to touch the lever at the very moment.

NOTICE:

If turning it too much to the torque direction, the No.2 lever goes off from the throttle stop screw causing the adjustment failure.

(3) Turn it back from the position where it touches the lever to the screw loosing direction.

Standard: Turn it back by rotating 1/2 – 3/4

(4) Tighten the lock nut.

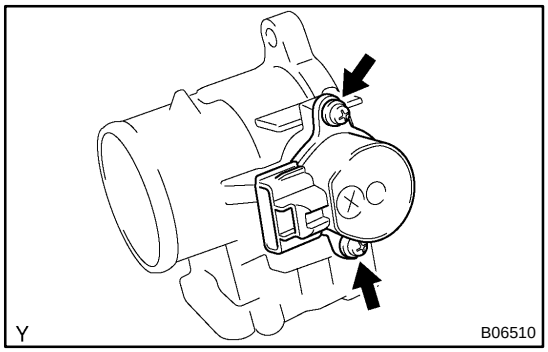
(d) Completion checking.
Check 1 – (c).

SF0ZV–01

REPLACEMENT

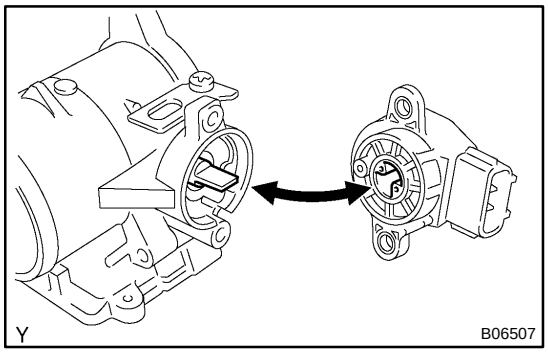
NOTICE:

- **Do not give a shock to the throttle position senor.**
- **Do not disassemble or adjust the throttle opener.**

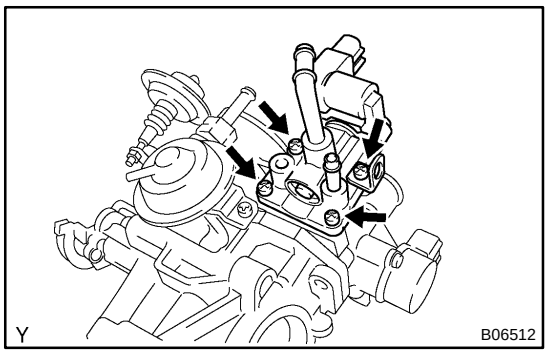


1. REPLACE THROTTLE POTION SENSOR

(a) Remove the 2 screws and throttle position sensor.

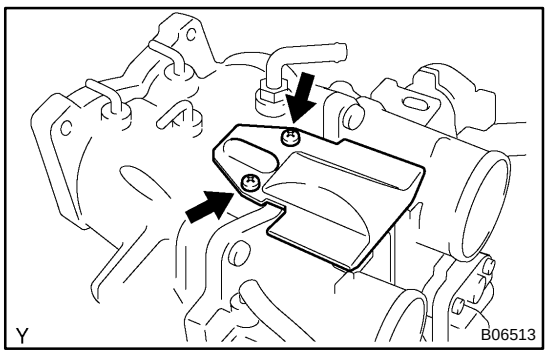


(b) Reinstall a new throttle position sensor.
  (1) Check that the throttle valve is fully close.
  (2) Insert the sensor to the throttle body with it turned counterclockwise by 30° to 60° against the fully–close valve position.
  (3) By turning the sensor clockwise, tighten the 2 screws.



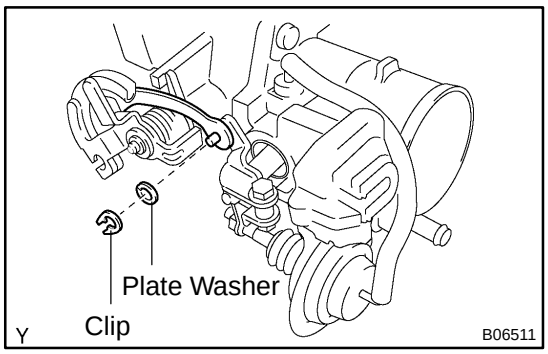
2. REPLACE IAC VALVE

(a) Remove the 4 screws, bracket, IAC valve and gasket.
(b) Place a new gasket on the No.1 throttle body.
(c) Reinstall a new IAC valve with the 4 screws and bracket.

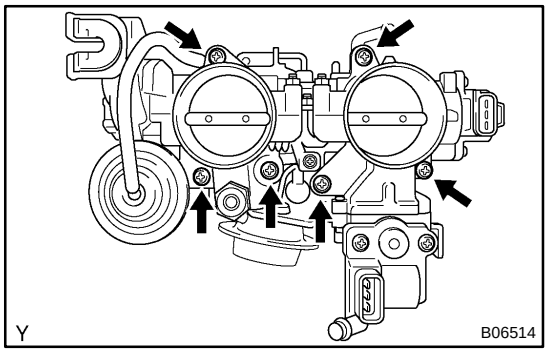


3. REPLACE THROTTLE BODIES

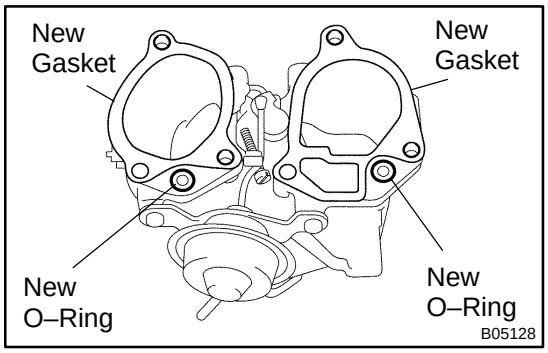
(a) Remove the 2 screws and protector.



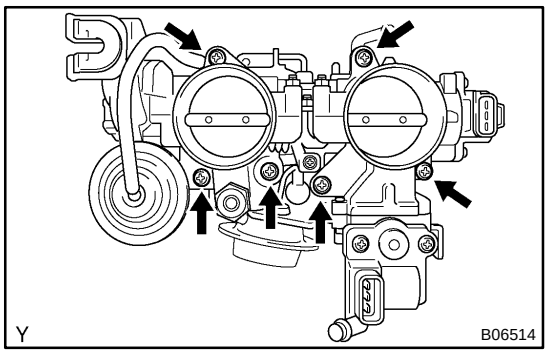
(b) Remove the clip and plate washer, and disconnect the accelarator link.



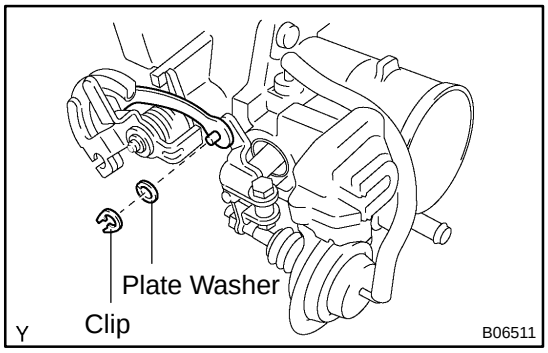
(c) Remove the 6 screws, No.1 throttle body, No.2 throttle body and 2 gaskets from the No.1 intake air control valve.



(d) Place 2 new gaskets and 2 new O–rings as shown in the illustration.



(e) Reinstall a new No.1 throttle body and No.2 throttle body with the 6 screws.
Torque: 69 N·m (70 kgf·cm, 61 in.·lbf)



(f) Reconnect the accelerator link with the plate washer and clip.

(g) Reinstall the protector with the 2 screws.

SF065–02

INSTALLATION

Installation is in the reverse order of removal (See page SF–34).

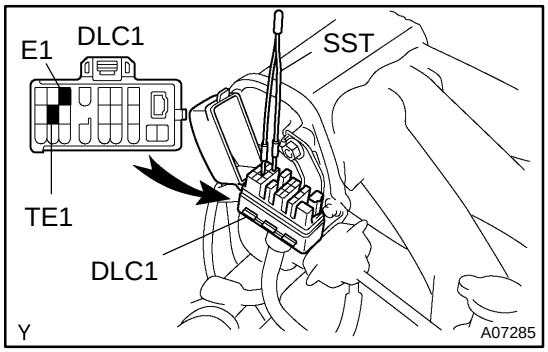
IDLE AIR CONTROL (IAC) VALVE

SF0ZW–01

ON–VEHICLE INSPECTION

1. INSPECT IAC VALVE OPERATION

(a) Initial conditions:
- Engine at normal operating temperature
- Idle speed checked correctly
- Transmission in neutral position
- A/C switch OFF



(b) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020

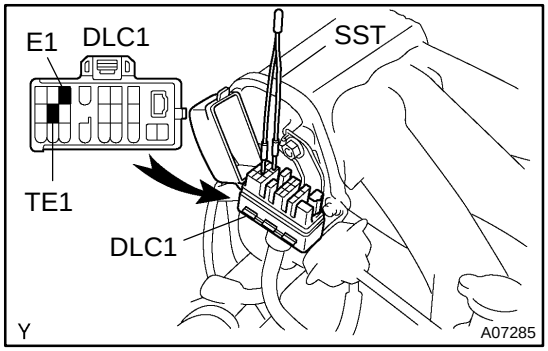
(c) After engine speed is kept at approx. 1,000 rpm for 5 seconds, check that it returns to idle speed.

If the engine speed operation is not as specified, check the IAC valve, wiring and ECM.

(d) Remove the SST from the DLC1.
SST 09843–18020

2. INSPECT AIR ASSIST SYSTEM

(a) Initial conditions:
- Engine at normal operating temperature
- Idle speed checked correctly
- Transmission in neutral position
- A/C switch OFF

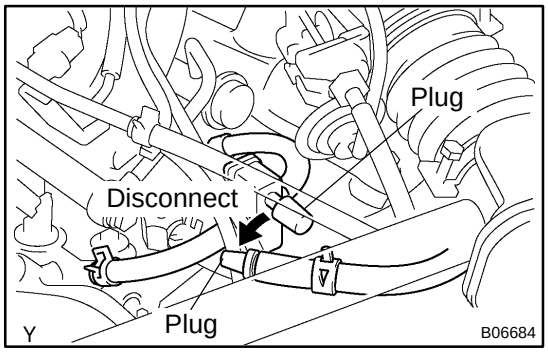


(b) Using SST, connect terminals TE1 and E1 of the DLC1.
SST 09843–18020

(c) After engine speed is kept at 900 – 1,300 rpm for 10 seconds, check that it returns to idle speed.

(d) Stop the engine.

(e) Remove the V–bank cover.



(f) Disconnect the air assist hose from the air pipe, and block off the IAC valve exit and the entry to the pipe.

(g) Start the engine and check that the idle speed reaches 500 rpm or below (the engine may stall).

If the idle does not reach 500 rpm or below, check for a leak between the air assist hoses, pipe and injectors.

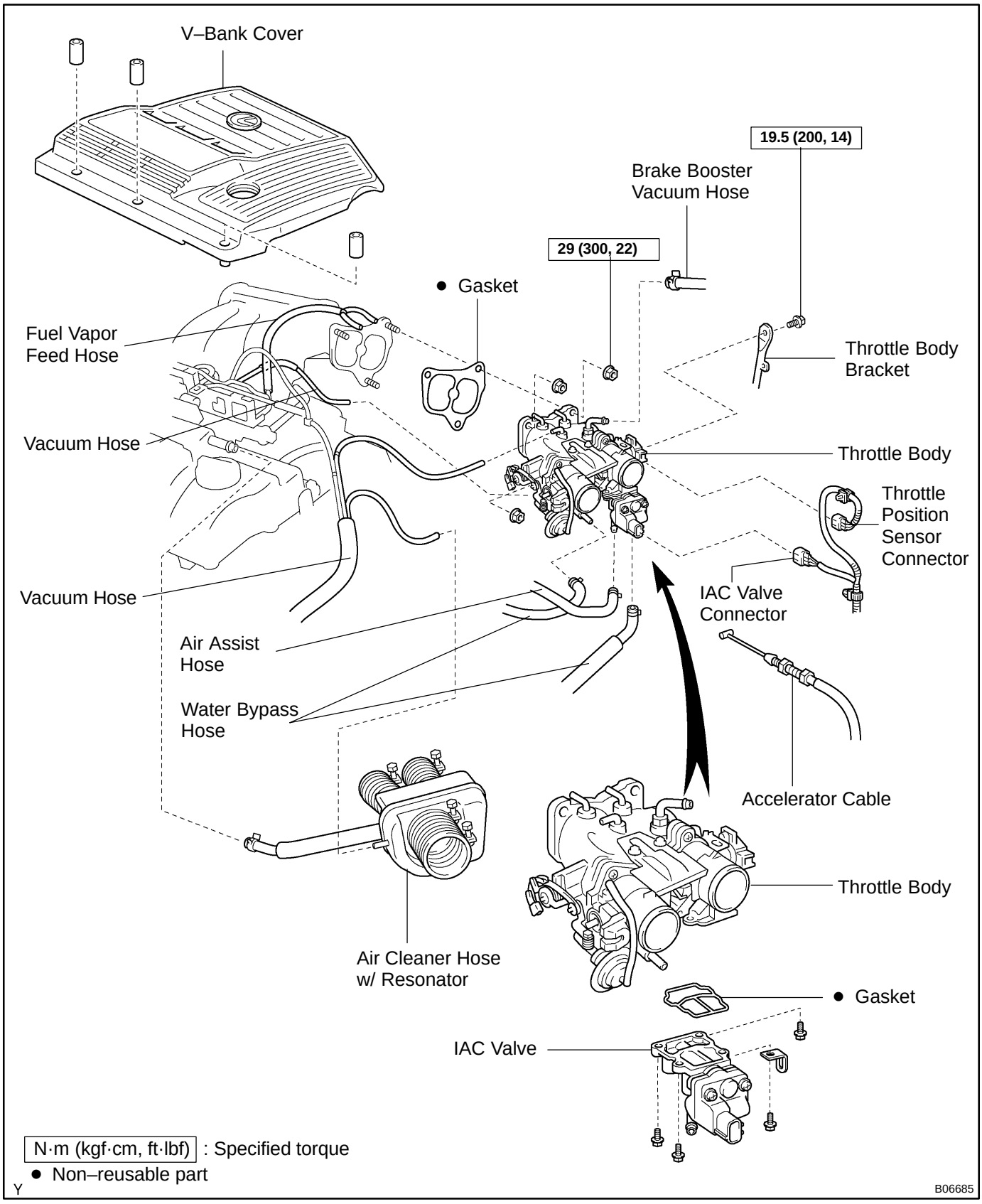
(h) Remove the SST from the DLC1.
SST 09843–18020

(i) Reconnect the air assist hose to the air pipe.

(j) Reinstall the V–bank cover.

SF067–03

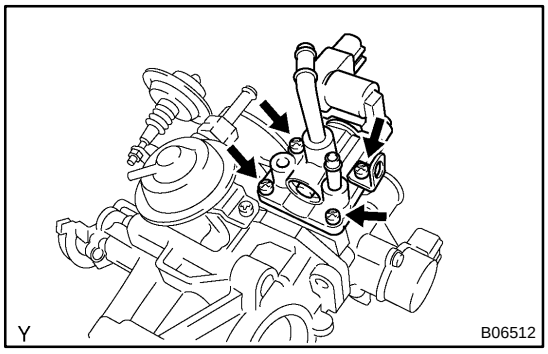
COMPONENTS



SF068–03

REMOVAL

1. REMOVE THROTTLE BODY (See page SF–34)



2. REMOVE IAC VALVE

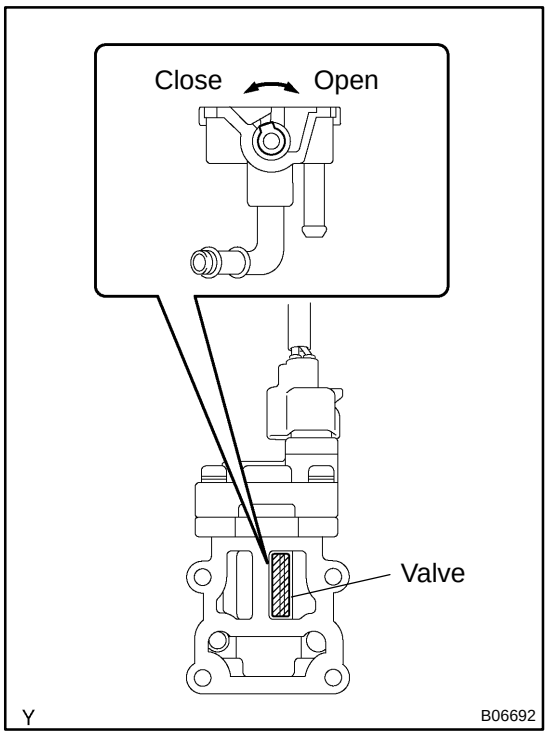
Remove the 4 screws, bracket, IAC valve and gasket.

HINT:

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

Place a new gasket on the throttle body.

SF0ZX–01



INSPECTION

INSPECT IAC VALVE OPERATION

(a) Check that the IAC valve is halfly opened.
(b) Connect the IAC valve connector to the IAC valve.
(c) Turn the ignition switch ON.
(d) Check that the IAC valve moves in 0.5 seconds by order of fully close, fully open and halfly open.

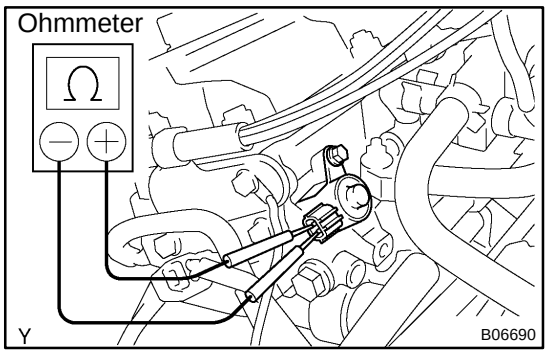
If operation is not as specified, replace the IAC valve.

(e) Turn the ignition switch OFF.
(f) Disconnect the IAC valve connector from the IAC valve.

SF06A–01

INSTALLATION

Installation is in the reverse order of removal (See page SF–43).



CAMSHAFT TIMING OIL CONTROL VALVE

SF0SL–03

ON–VEHICLE INSPECTION

INSPECT OIL CONTROL VALVE RESISTANCE

(a) Remove the V–bank cover.
(b) Disconnect the oil control valve connector.
(c) Using an ohmmeter, measure the resistance between the terminals.

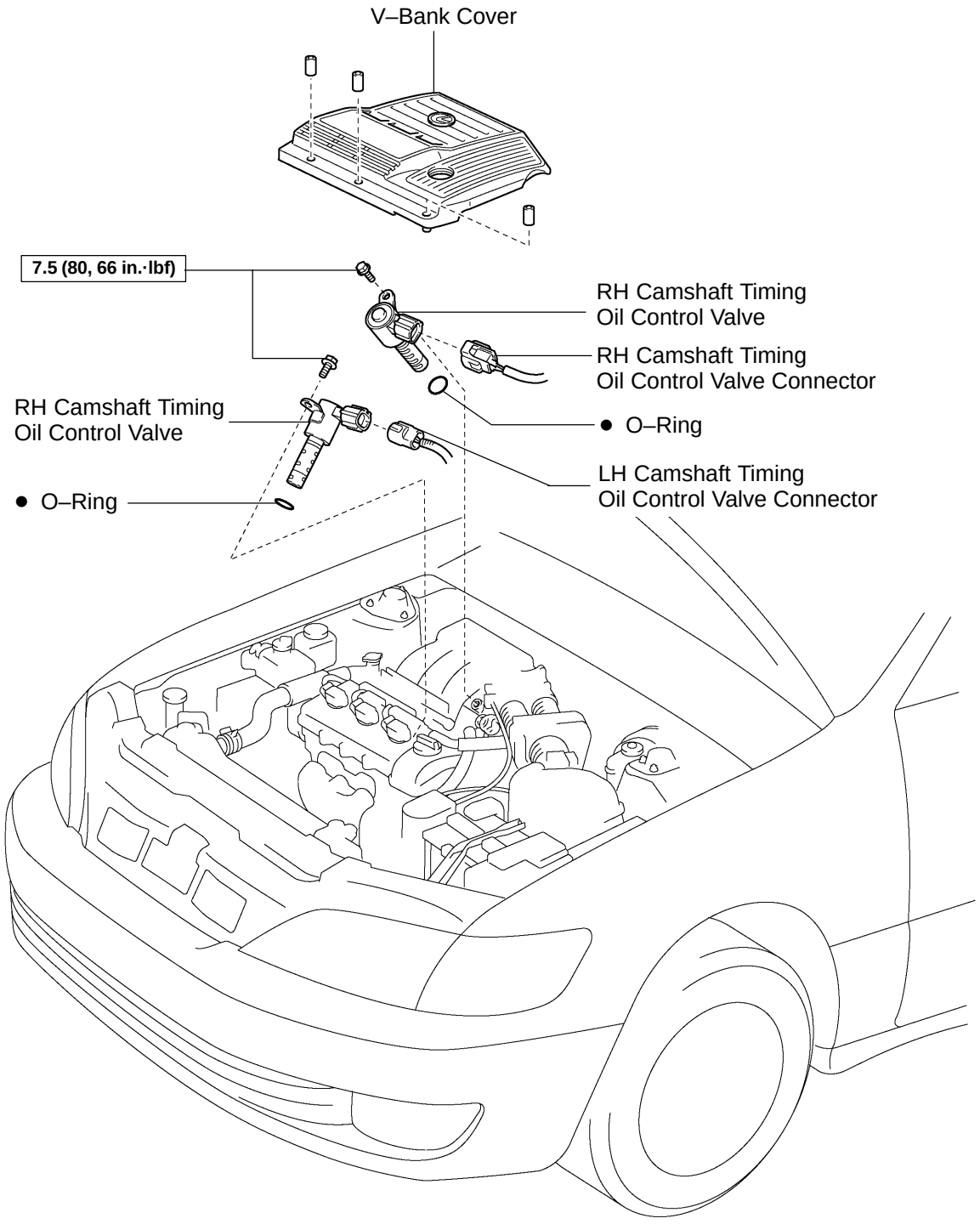
Resistance: 6.9 – 7.9 Ω at 20˚C (68˚F)

If the resistance is not as specified, replace the valve.

(d) Reconnect the oil control valve connector.
(e) Reinstall the V–bank cover.

SF0SM–03

COMPONENTS



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

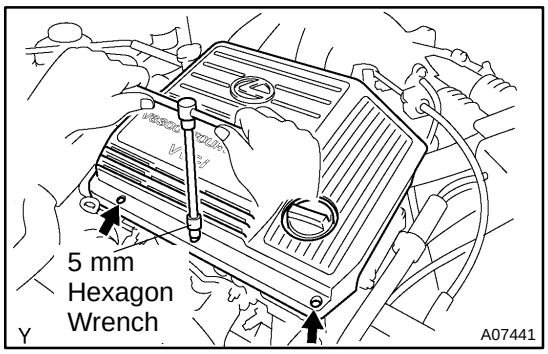
● Non–reusable part

Y

B06689

SF0ZY–01

REMOVAL



1. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

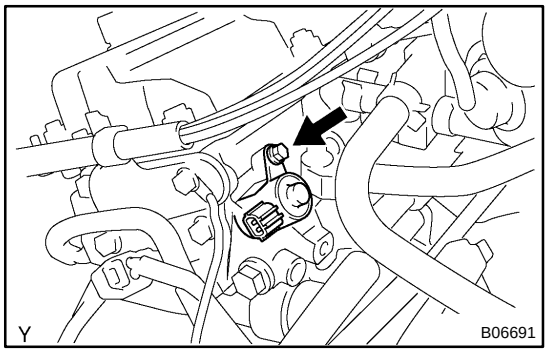
(b) Loosen the V–bank cover fastener counterclockwise.

HINT:

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

Press down the V–bank cover fastener.

(c) Remove the V–bank cover.



2. REMOVE CAMSHAFT TIMING OIL CONTROL VALVES

(a) Disconnect the 2 camshaft oil control valve connectors.

(b) Remove the bolt, camshaft oil control valve and O–ring. Remove the 2 camshaft oil control valves.

Torque: 7.5 N·m (80 kgf·cm, 66 in.·lbf)

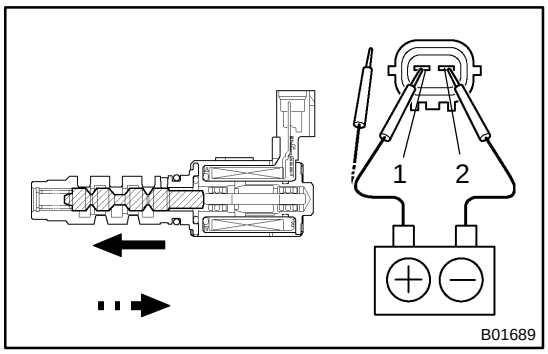
(c) Remove the O–ring from the each camshaft oil control valve.

HINT:

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

Use a new O–ring.

SF0SO–03



INSPECTION

INSPECT CAMSHAFT OIL CONTROL VALVE OPERATION

Connect the positive (+) lead from the battery to terminal 1 and negative (–) lead to terminal 2, and check the movement of the valve.

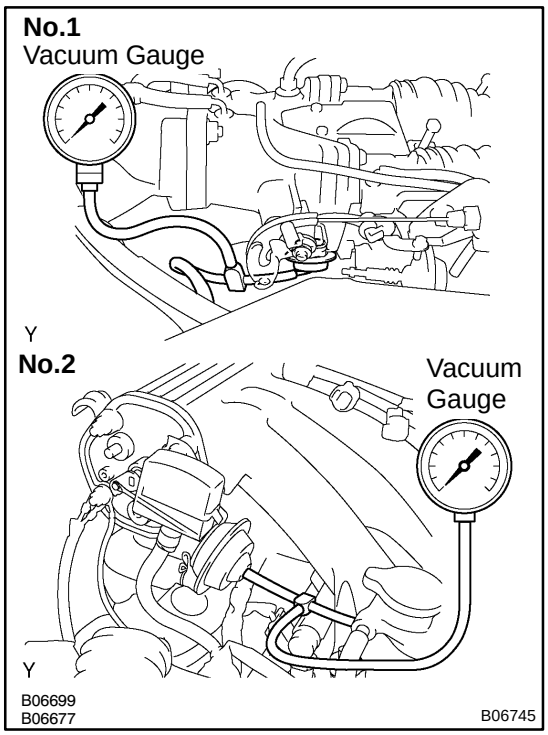
Battery positive voltage is applied	Valve moves in ← direction
Battery positive voltage is cut off	Valve moves in ⇢ direction

If operation is not as specified, replace the valve.

SF0SP–03

INSTALLATION

Installation is in the reverse order of removal. (See page SF–48)



ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

SF06B–03

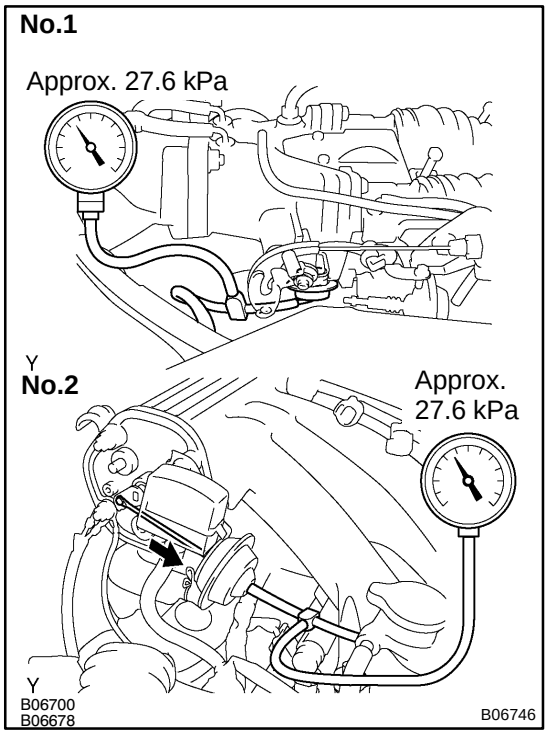
ON–VEHICLE INSPECTION

INSPECT INTAKE AIR CONTROL VALVE

(a) Using a 3–way connector, connect vacuum gauge to the actuator hose.

(b) Start the engine.

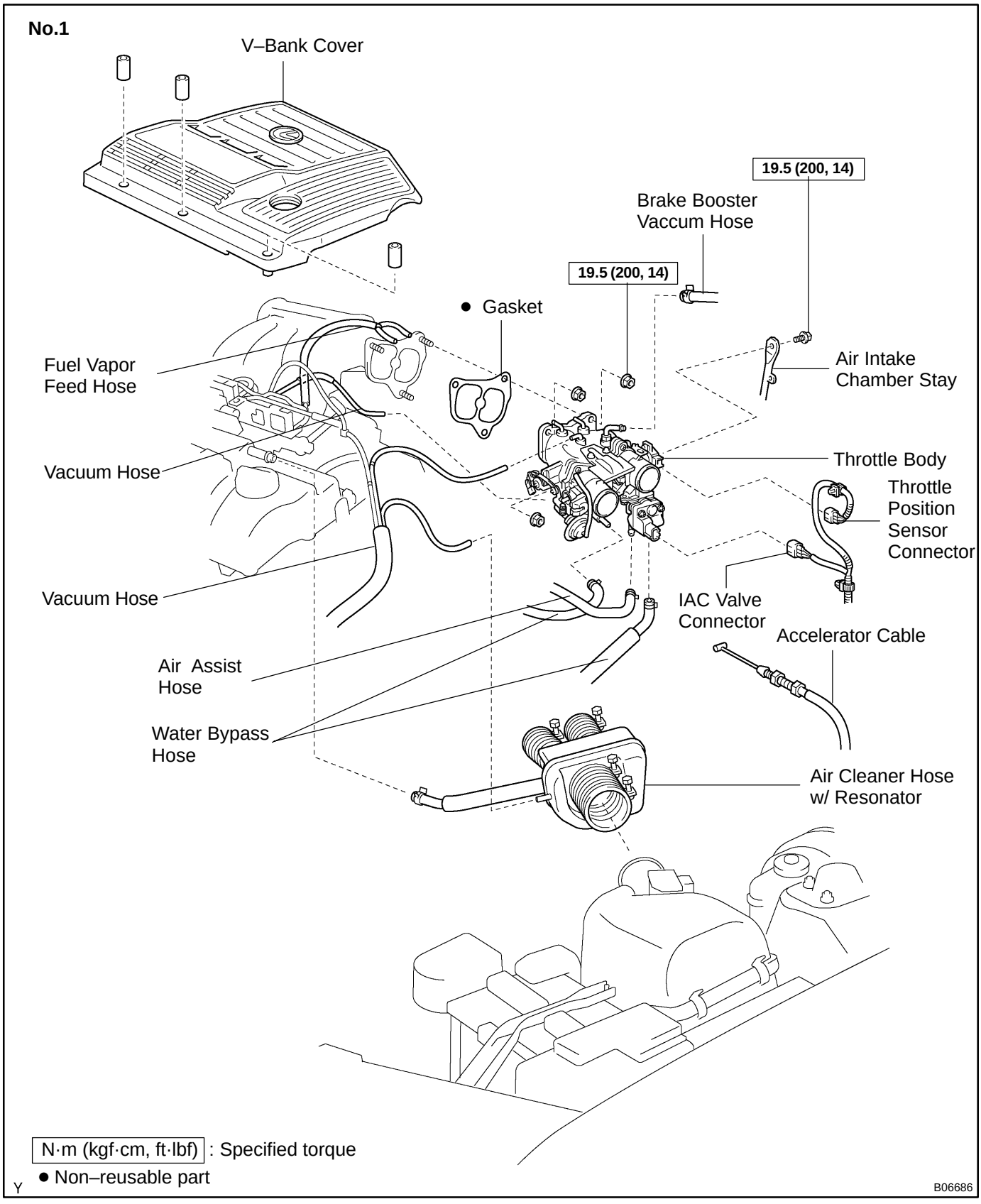
(c) While the engine is idling, check that the vacuum gauge needle does not move.



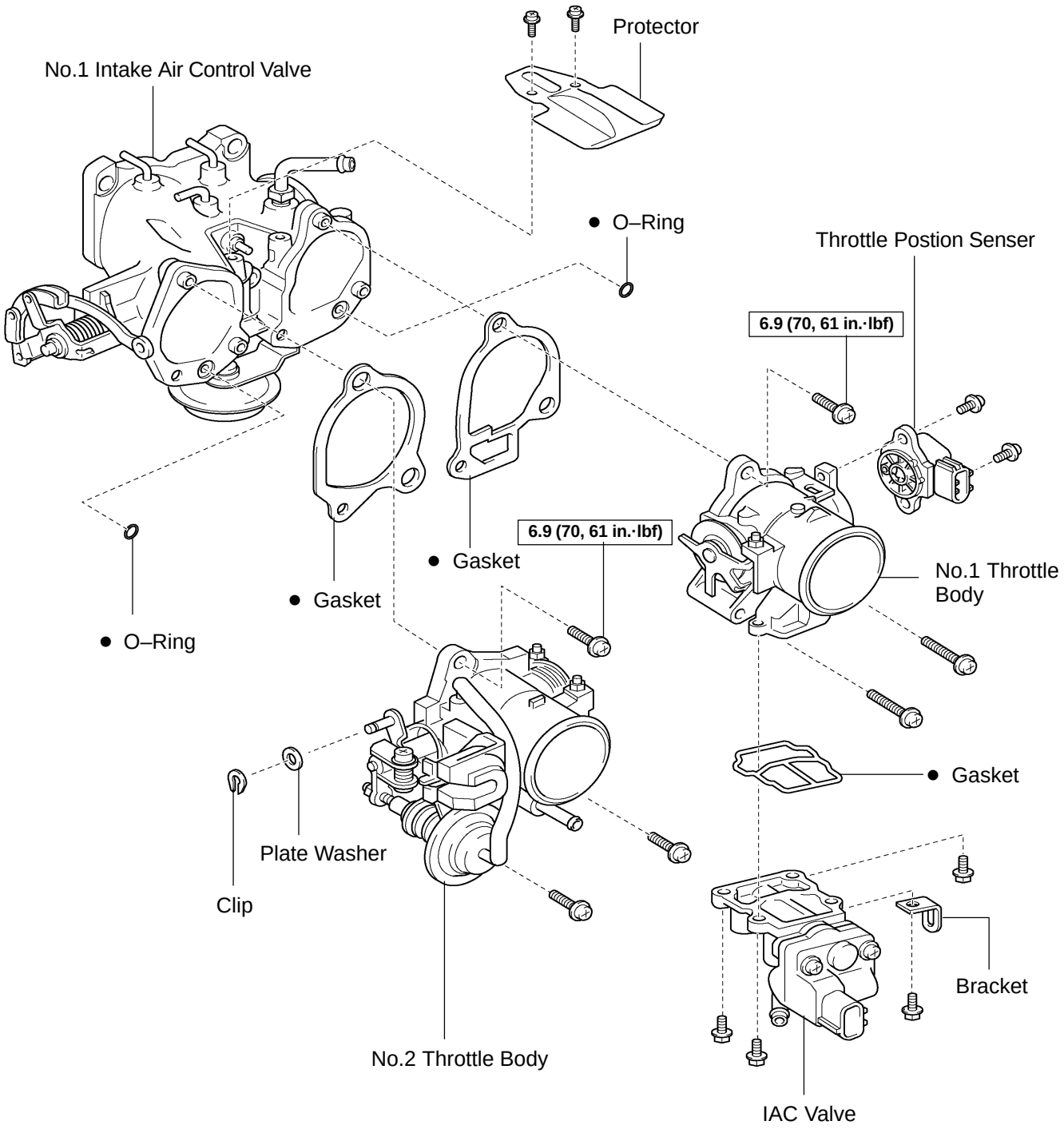
(d) Rapidly depress the accelerator pedal to fully open position and check that the vacuum gauge needle momentarily fluctuates up to approx. 26.7 kPa (200 mmHg, 7.9 in.Hg). (The actuator rod is pulled out.)

SF0ZZ–01

COMPONENTS



No.1



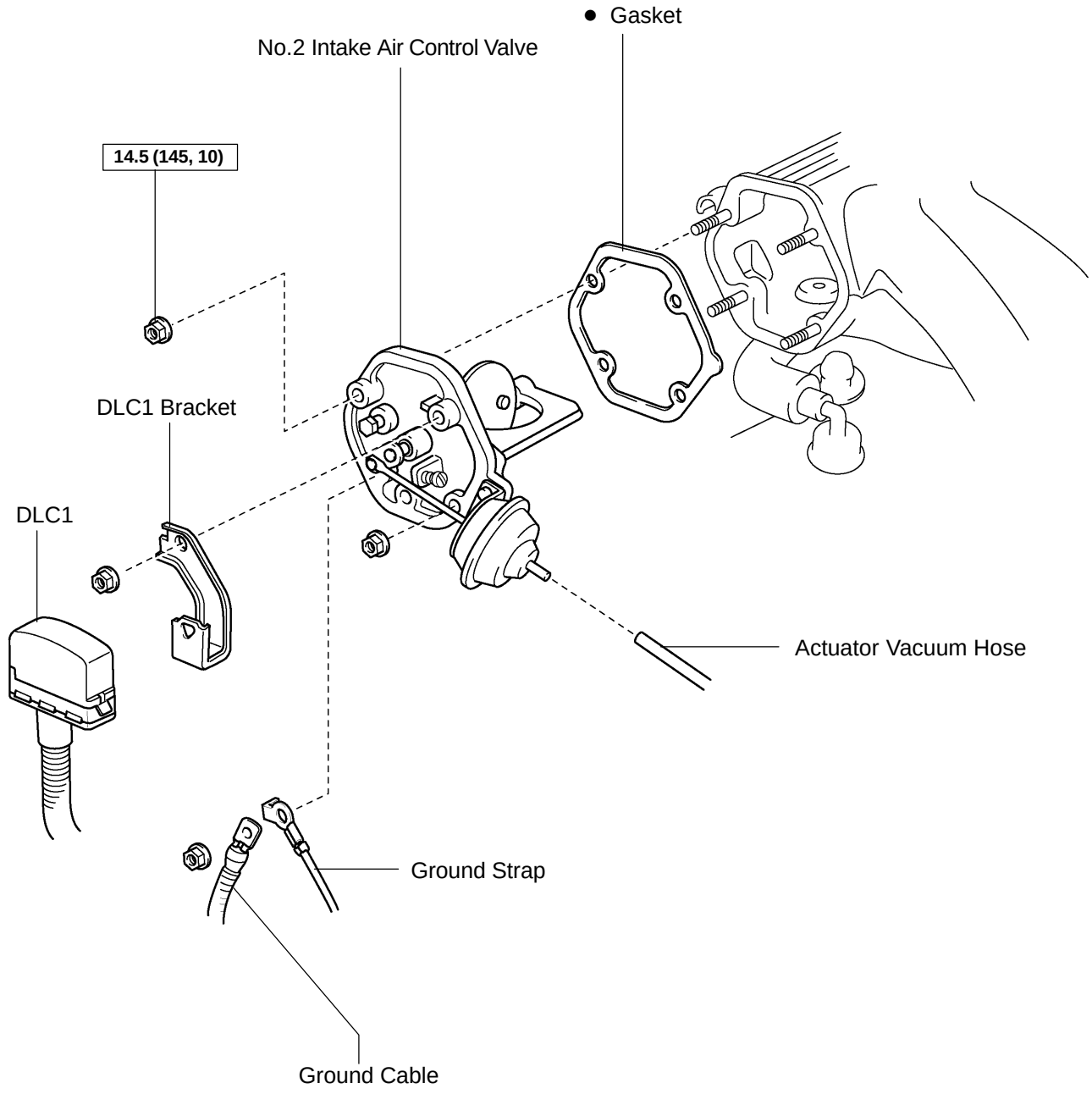
Y

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

● Non–reusable part

B06506

No.2



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

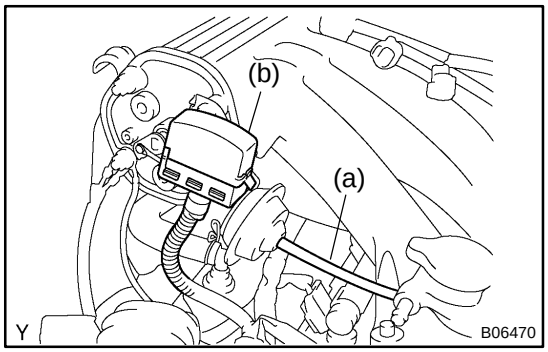
Y ● Non–reusable part

B06500

SF06D–02

REMOVAL

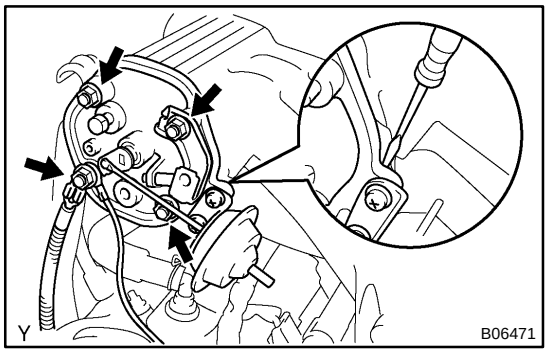
1. REMOVE NO.1 INTAKE AIR CONROL VALVE (See pages SF–34 and SF–38)



2. REMOVE NO.2 INTAKE AIR CONTROL VALVE

(a) Disconnect the actuator vacuum hose.

(b) Disconnect the DLC1 from the DLC1 bracket.



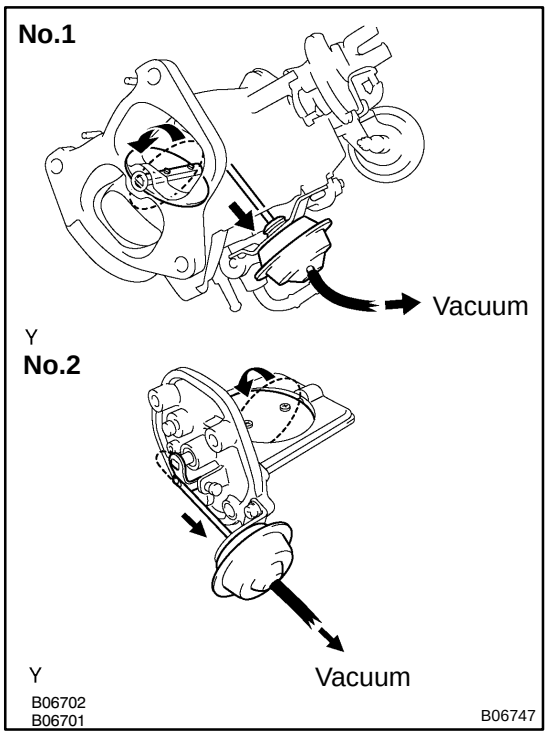
(c) Remove the intake air control valve.

(1) Remove the 4 nuts and DLC1 bracket, and disconnect the ground strap and cable.

(2) Remove the intake air control valve by prying a screwdriver between the intake air control valve and air intake chamber.

(3) Remove the gasket.

SF06E–03



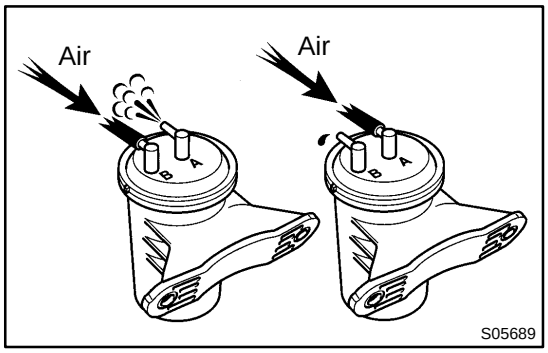
INSPECTION

1. INSPECT INTAKE AIR CONTROL VALVE

(a) With 26.7 kPa (200 mmHg, 7.9 in.Hg) of vacuum applied to the actuator, check that the actuator rod moves.

(b) One minute after applying the vacuum in (a), check that the actuator rod does not return.

If the operation is not as specified, replace the intake air control valve.

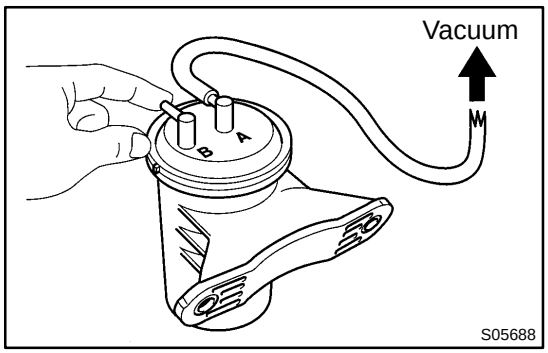


2. INSPECT VACUUM TANK

LOCATION: The LH side member under the battery tray.

(a) Check that air flows from port B to port A.

(b) Check that air does not flow from port A to port B.



(c) Plug port B with your finger, and apply 26.7 kPa (200 mmHg, 7.9 in.Hg) of vacuum to port A, and check that there is no change is vacuum after one minute.

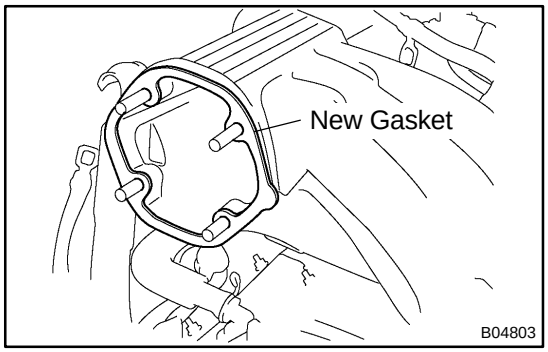
If the operation is not as specified, replace the vacuum tank.

3. INSPECT VSV (See page SF–65)

SF06F–03

INSTALLATION

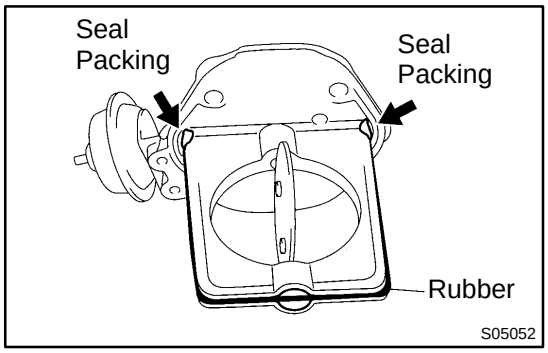
1. INSTALL NO.1 INTAKE AIR CONTROL VALVE
(See pages SF–38 and SF–40)



2. INSTALL NO.2 INTAKE AIR CONTROL VALVE

(a) Install the No.2 intake air control valve.

(1) Install a new gasket to the air intake chamber.



(2) Apply a light coat of engine oil to the rubber portions.

(3) Apply seal packing to the positions of the intake air control valve shown in the illustration.

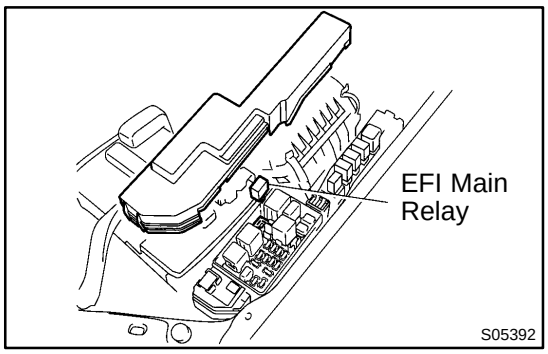
Seal packing: Part No. 08826–00080 or equivalent

(4) Install the intake air control valve, DLC1 bracket, ground strap and cable with the 4 nuts.

Torque: 14.5 N·m (145 kgf·cm, 10 ft·lbf)

(b) Connect the DLC1.

(c) Connect the actuator vacuum hose.



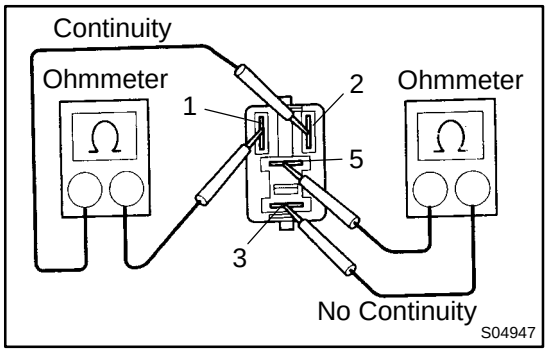
EFI MAIN RELAY

SF06G–07

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE EFI MAIN RELAY (Marking: EFI)



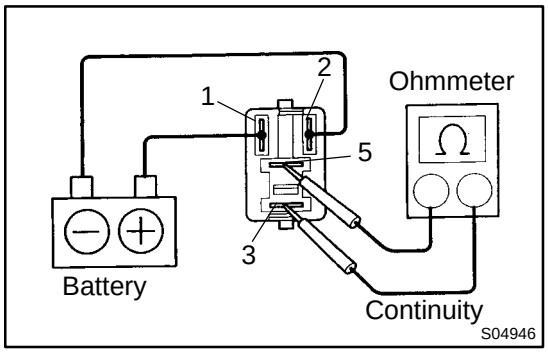
3. INSPECT EFI MAIN RELAY CONTINUITY

(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.



4. INSPECT EFI MAIN RELAY OPERATION

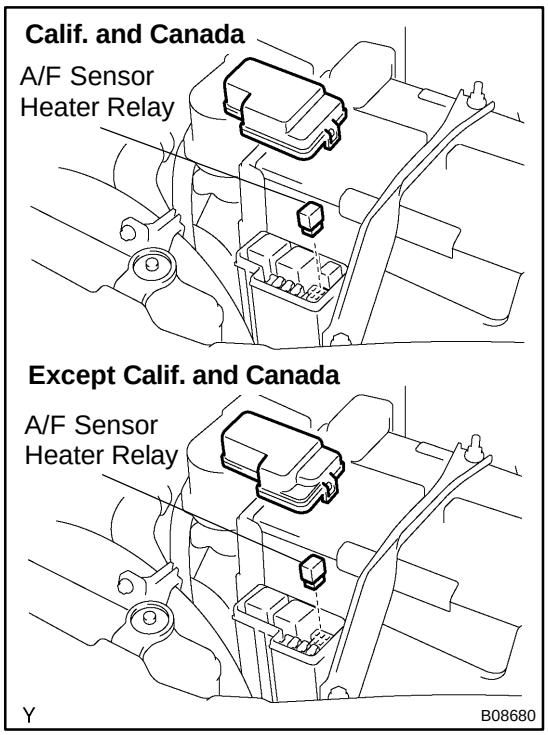
(a) Apply battery voltage across terminals 1 and 2.

(b) Using an ohmmeter, check that there is continuity between terminals 3 and 5.

If there is no continuity, replace the relay.

5. REINSTALL EFI MAIN RELAY

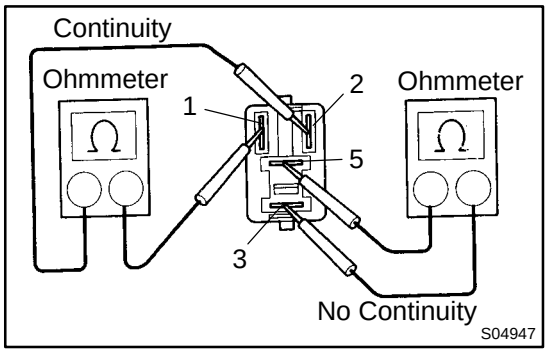
6. REINSTALL RELAY BOX COVER



A/F SENSOR HEATER RELAY INSPECTION

SF14I–01

1. **REMOVE RELAY BOX COVER**
2. **REMOVE A/F SENSOR HEATER RELAY (Marking: A/F HTR)**



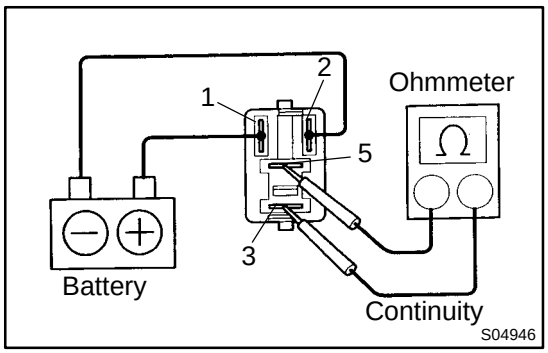
3. **INSPECT A/F SENSOR HEATER RELAY CONTINUITY**

(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.



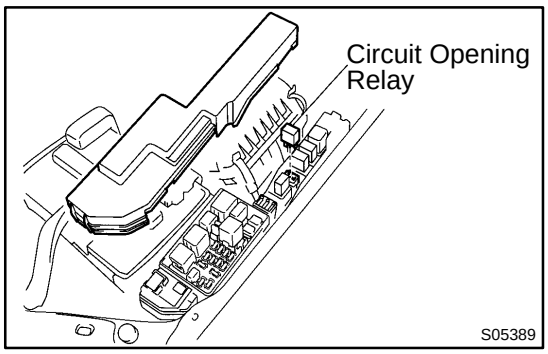
4. **INSPECT A/F SENSOR HEATER RELAY OPERATION**

(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.

5. **REINSTALL A/F SENSOR HEATER RELAY**
6. **REINSTALL RELAY BOX COVER**



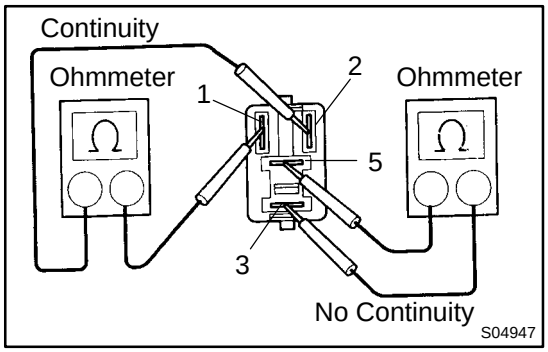
CIRCUIT OPENING RELAY

SF06H–05

INSPECTION

1. REMOVE RELAY BOX COVER

2. REMOVE CIRCUIT OPENING RELAY (Marking: CIR OPN)



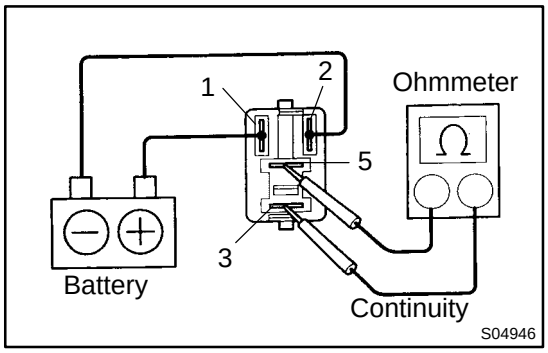
3. INSPECT CIRCUIT OPENING RELAY CONTINUITY

(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.



4. INSPECT CIRCUIT OPENING 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.

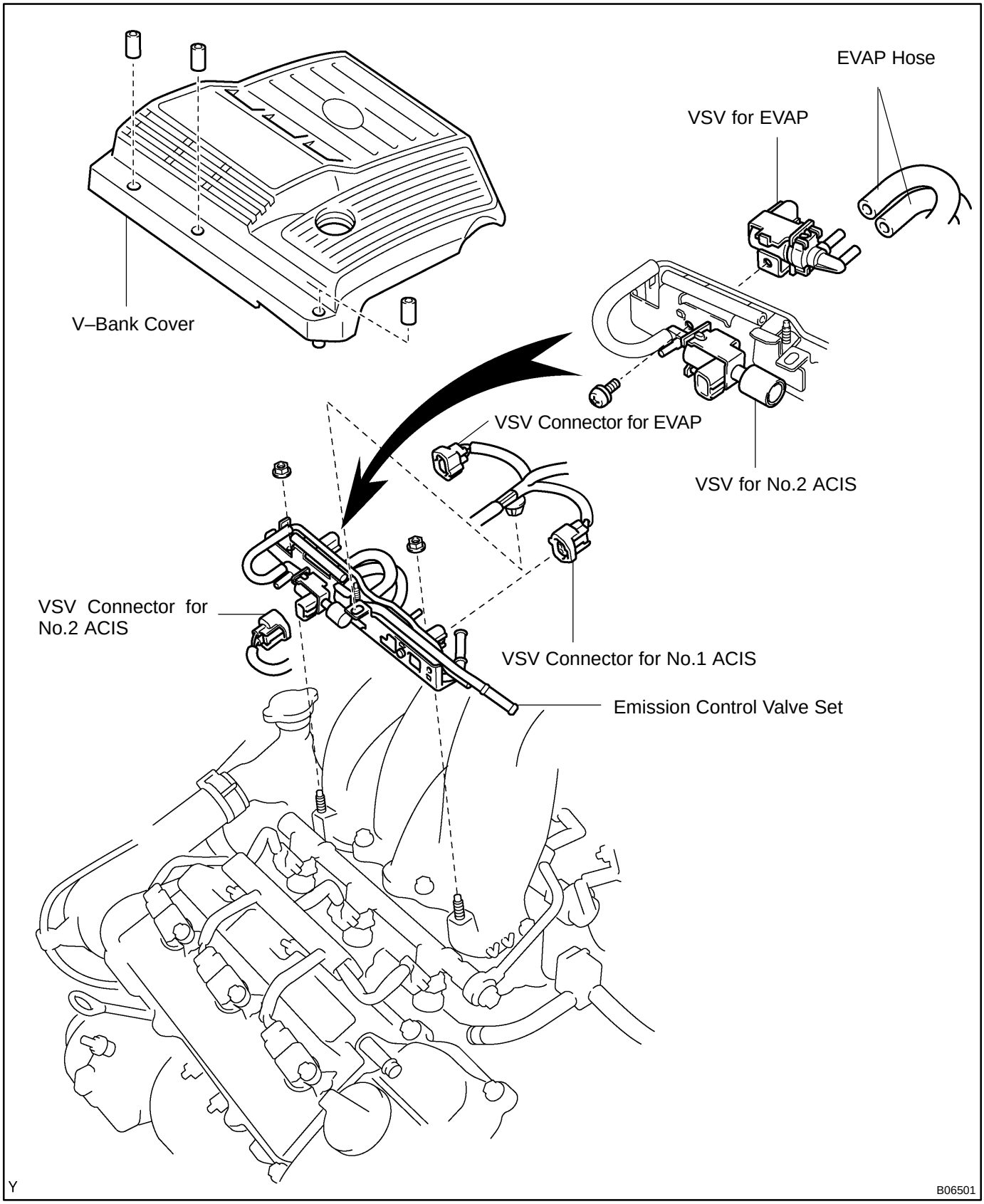
5. REINSTALL CIRCUIT OPENING RELAY

6. REINSTALL RELAY BOX COVER

VSV FOR EVAPORATIVE EMISSION (EVAP)

COMPONENTS

SF06K–02



SF06L–03

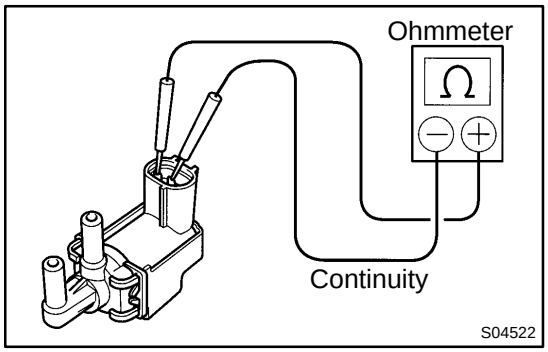
INSPECTION

1. REMOVE V–BANK COVER AND EMISSION CONTROL VALVE SET

2. REMOVE VSV

(a) Disconnect the 2 EVAP hoses from the VSV.

(b) Remove the screw and VSV.

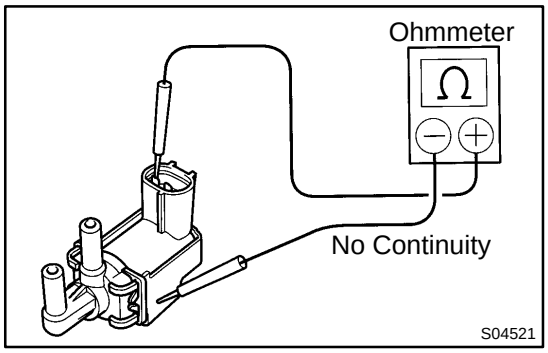


3. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

Resistance: 27 – 33 Ω at 20˚C (68˚F)

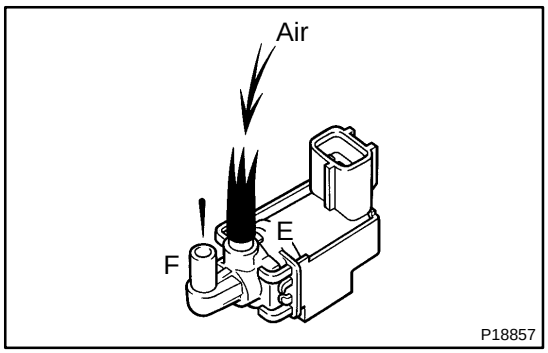
If there is no continuity, replace the VSV.



4. INSPECT VSV FOR GROUND

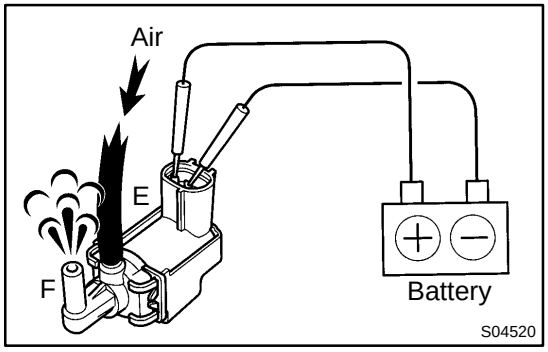
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



5. INSPECT VSV OPERATION

(a) Check that air flows with difficulty from port E to port F.



(b) Apply battery voltage across the terminals.

(c) Check that air flows from port E to port F.

If operation is not as specified, replace the VSV.

6. REINSTALL VSV

(a) Install the VSV with the screw.

(b) Connect the 2 EVAP hoses to the VSV.

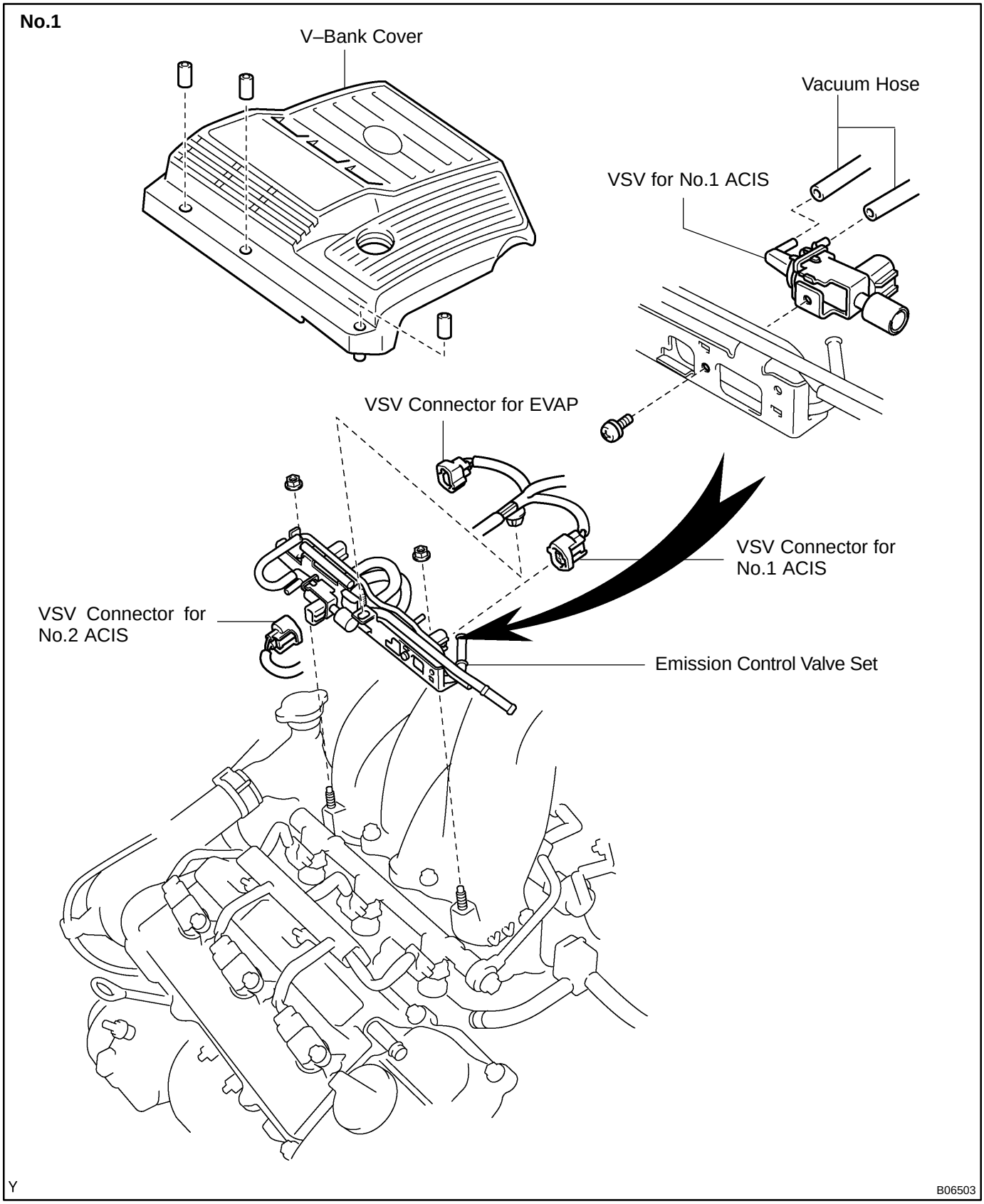
7. REINSTALL EMISSION CONTROL VALVE SET

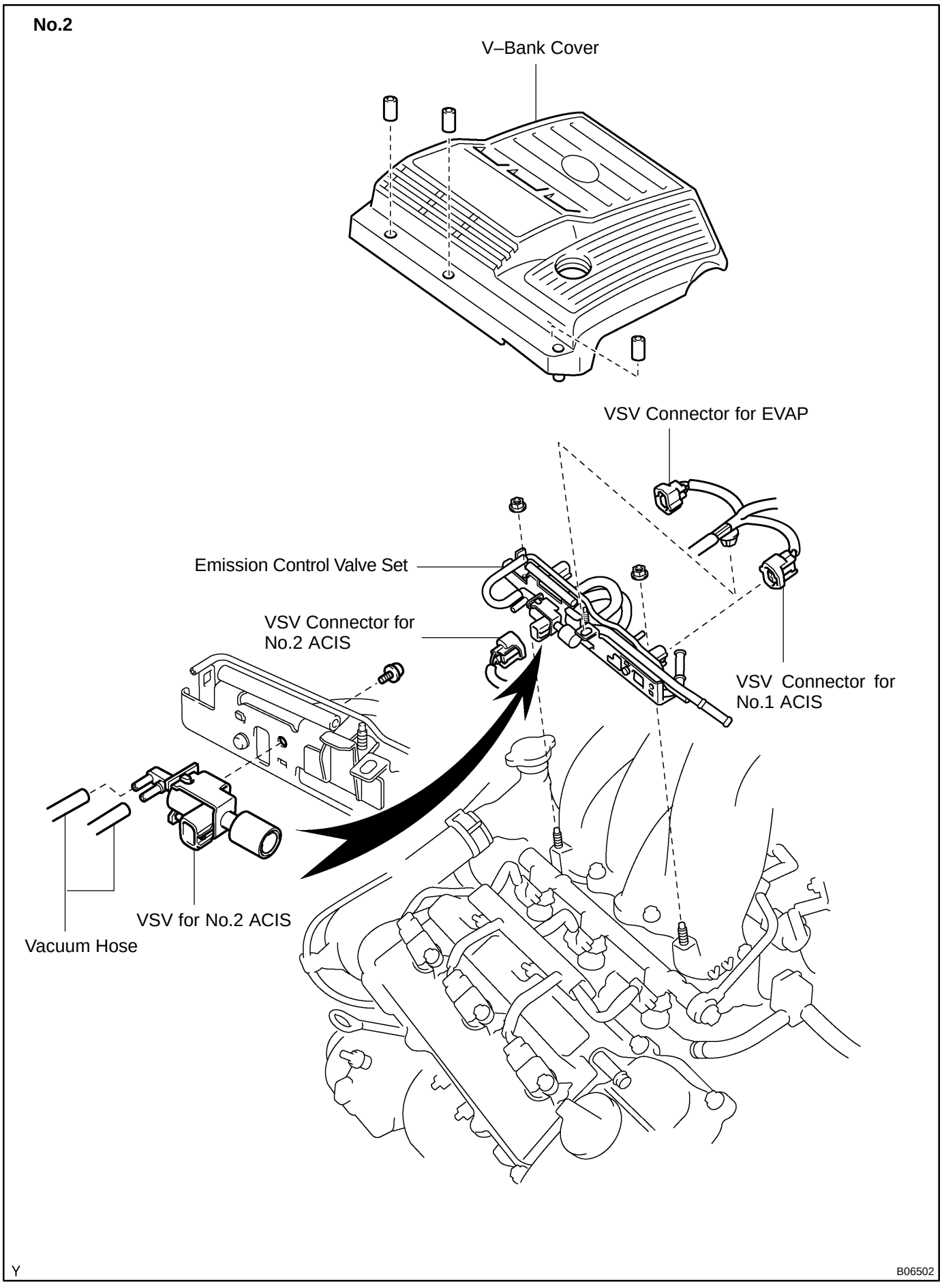
8. REINSTALL V–BANK COVER

VSV FOR ACOUSTIC CONTROL INDUCTION SYSTEM (ACIS)

SF100–01

COMPONENTS




No.2
V–Bank Cover
VSV Connector for EVAP
Emission Control Valve Set
VSV Connector for No.2 ACIS
VSV Connector for No.1 ACIS
VSV for No.2 ACIS
Vacuum Hose
Y
B06502

SF06N–03

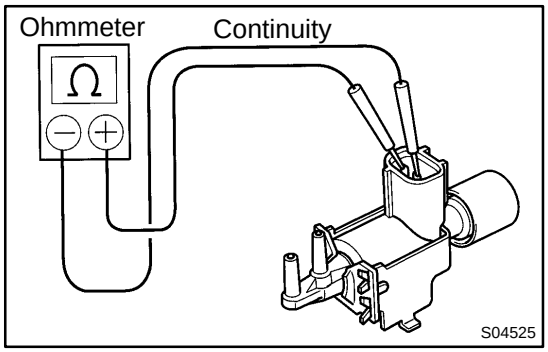
INSPECTION

1. REMOVE V–BANK COVER, AND EMISSION CONTROL VALVE SET

2. REMOVE VSV

(a) Disconnect the 2 vacuum hoses from the VSV.

(b) Remove the screw and VSV.

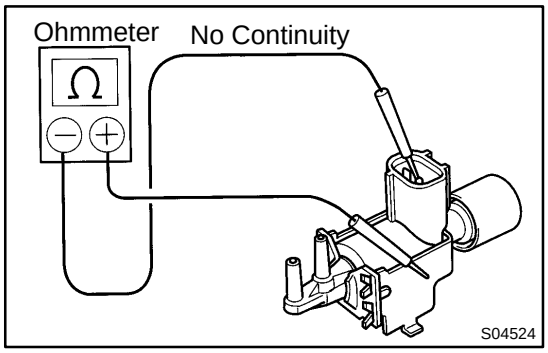


3. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between each terminals.

Resistance: 33 – 39 Ω at 20˚C (68˚F)

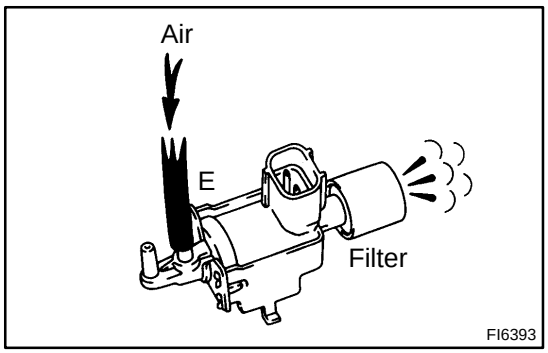
If there is no continuity, replace the VSV.



4. INSPECT VSV FOR GROUND

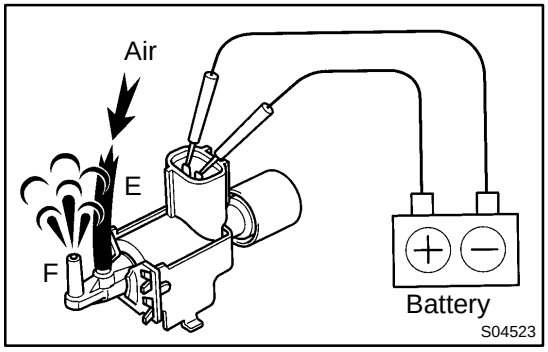
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



5. INSPECT VSV OPERATION

(a) Check that air flows from port E to the filter.



(b) Apply battery voltage across the terminals.

(c) Check that air flows from port E to port F.

If operation is not as specified, replace the VSV.

6. REINSTALL VSV

(a) Install the VSV with the screw.

(b) Connect the 2 vacuum to the VSV.

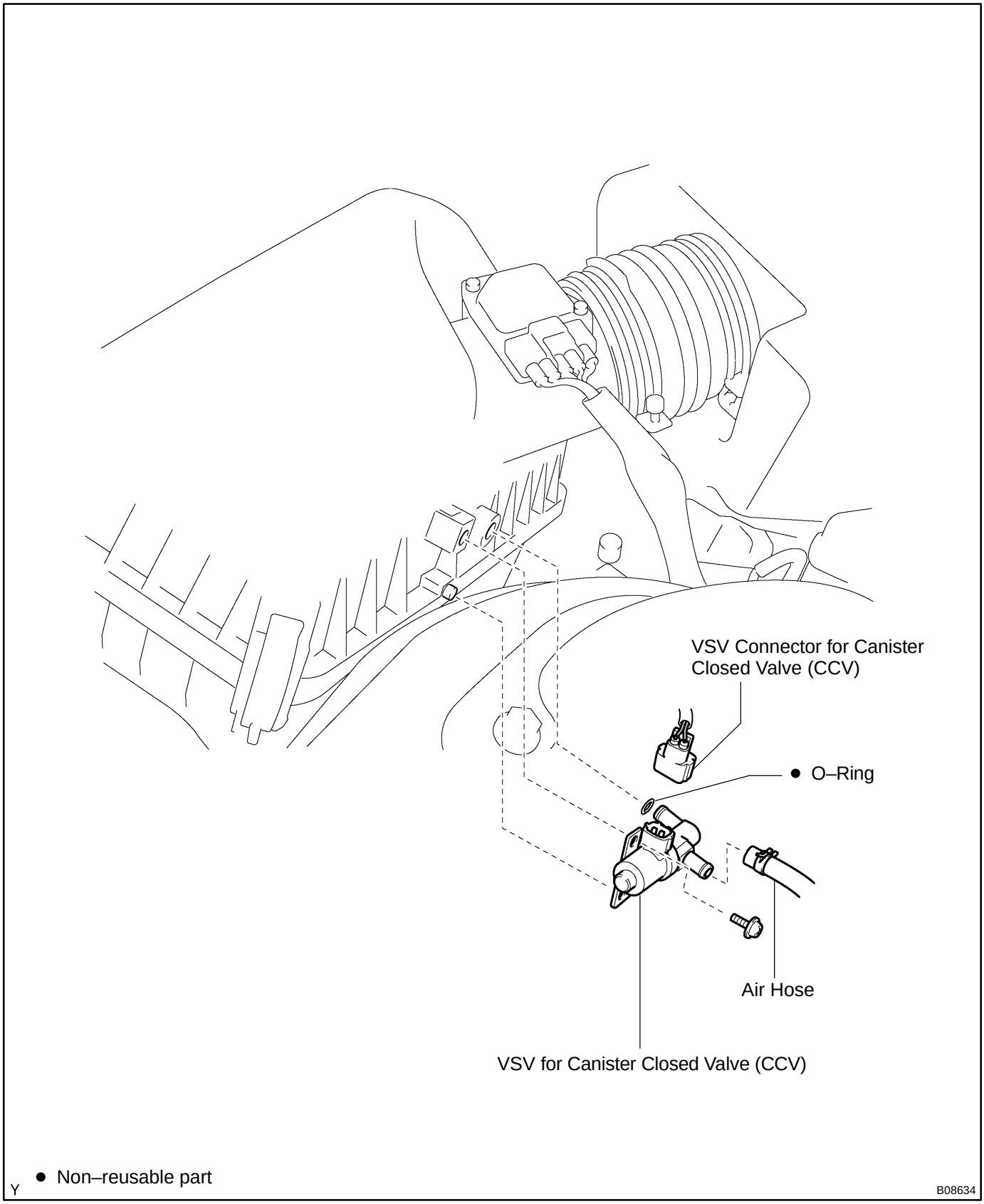
7. REINSTALL EMISSION CONTROL VALVE SET

8. REINSTALL V–BANK COVER

VSV FOR CANISTER CLOSED VALVE (CCV)

SF14E–01

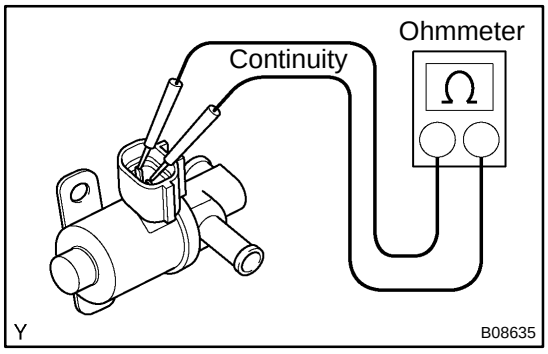
COMPONENTS



SF14F–01

INSPECTION

1. REMOVE VSV



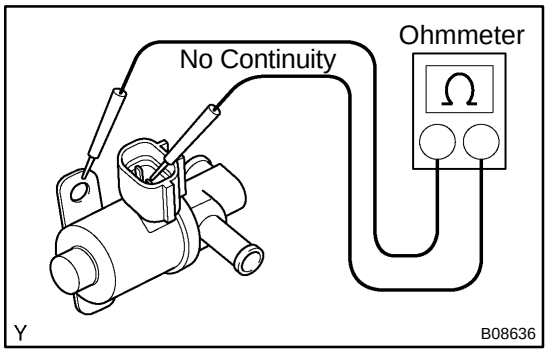
2. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

Resistance:

At 20˚C (68˚F)	25 – 30 Ω
At 120˚C (248˚F)	33 – 42 Ω

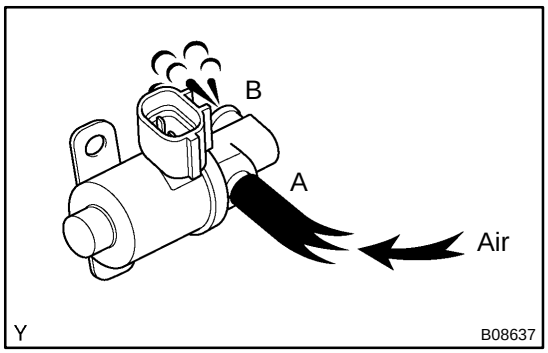
If there is no continuity, replace the VSV.



3. INSPECT VSV FOR GROUND

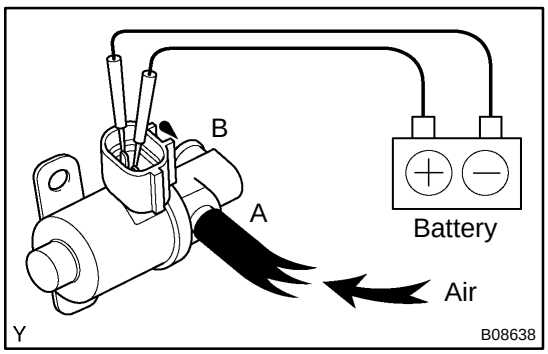
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



4. INSPECT VSV OPERATION

(a) Check that air flows from ports A to B.



(b) Apply battery positive voltage across the terminals.

(c) Check that air does not flow from ports A to B.

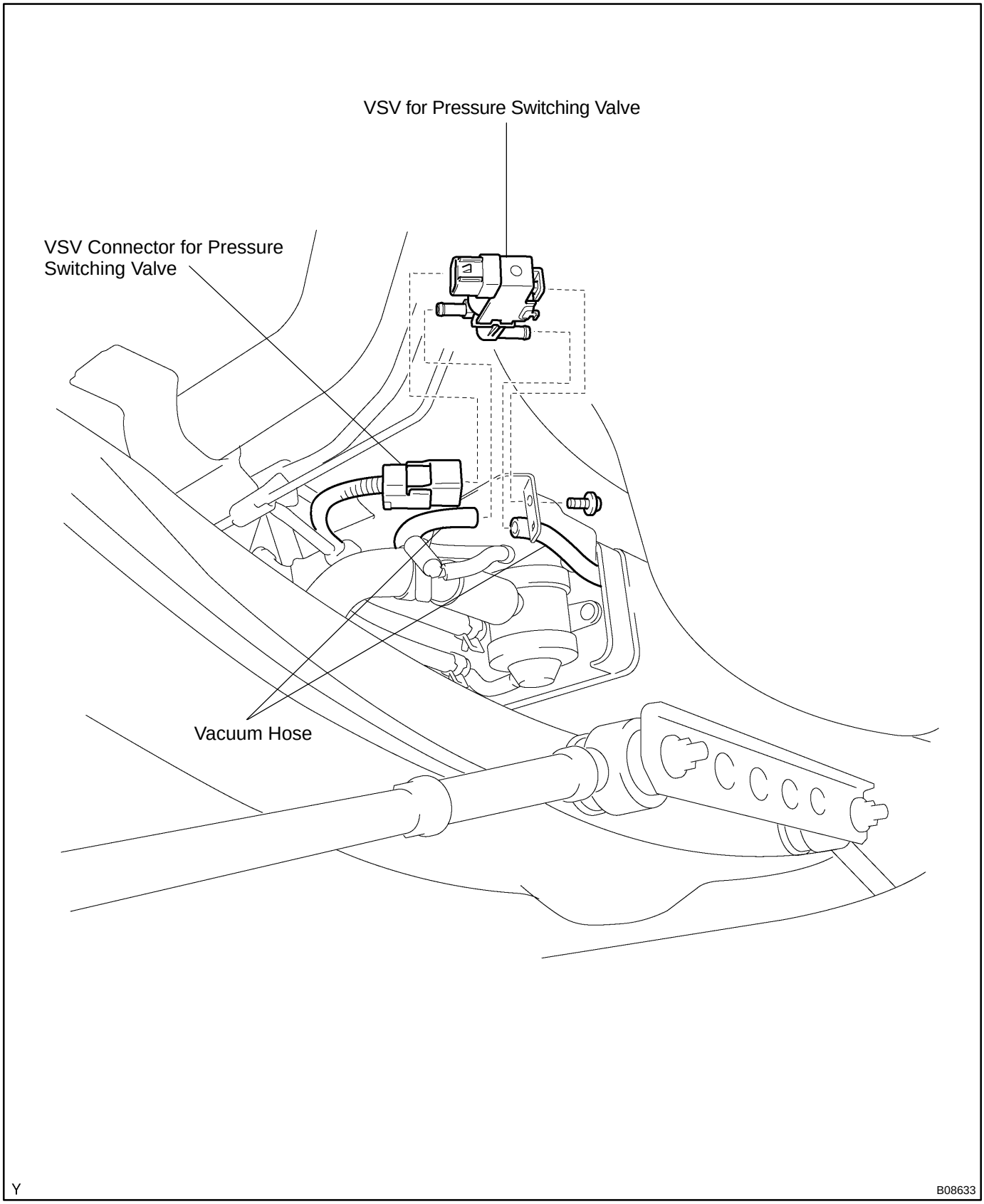
If operation is not as specified, replace the VSV.

5. REINSTALL VSV

VSV FOR PRESSURE SWITCHING VALVE

SF14G–01

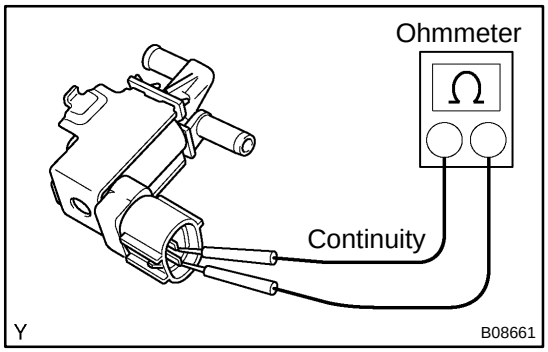
COMPONENTS



SF14H–01

INSPECTION

1. REMOVE VSV



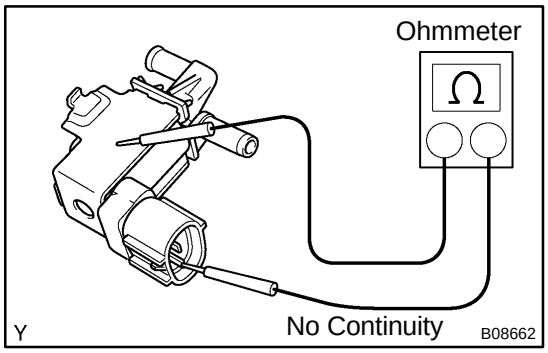
2. INSPECT VSV FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the terminals.

Resistance:

At 20˚C (68˚F)	37 – 44 Ω
At 120˚C (248˚F)	51 – 62 Ω

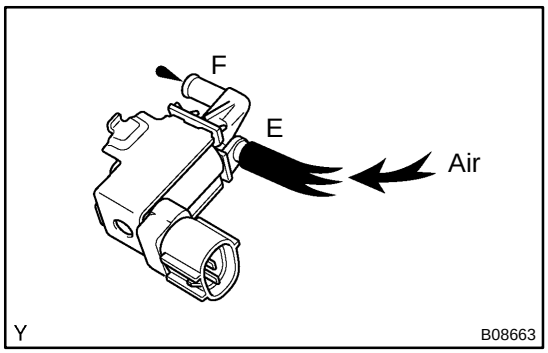
If there is no continuity, replace the VSV.



3. INSPECT VSV FOR GROUND

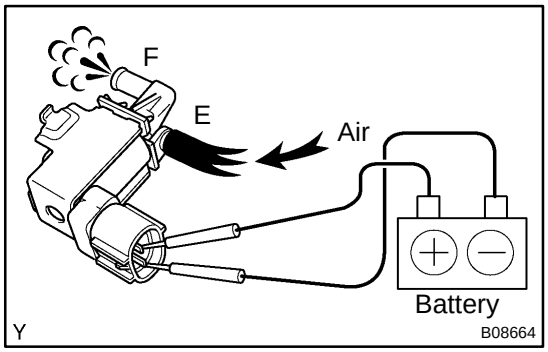
Using an ohmmeter, check that there is no continuity between each terminal and the body.

If there is continuity, replace the VSV.



4. INSPECT VSV OPERATION

(a) Check that air does not flow from ports E to F.



(b) Apply battery positive voltage across the terminals.

(c) Check that air flows from ports E to F.

If operation is not as specified, replace the VSV.

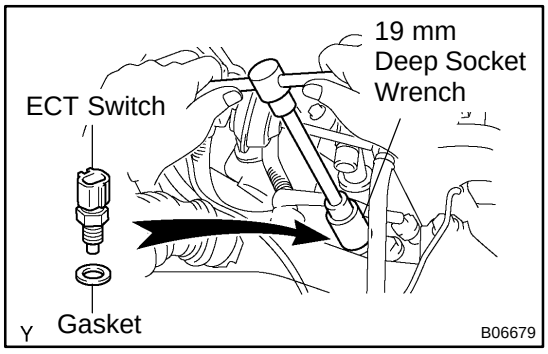
5. REINSTALL VSV

ENGINE COOLANT TEMPERATURE (ECT) SENSOR

SF06Q–03

INSPECTION

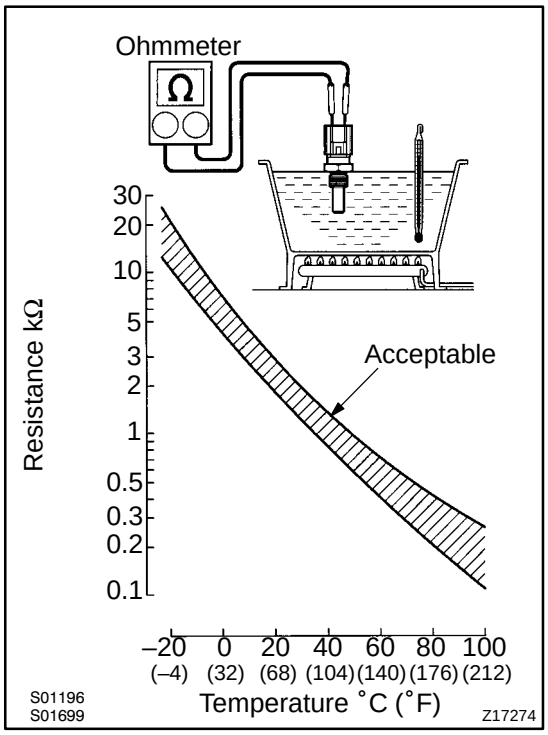
1. DRAIN ENGINE COOLANT



2. REMOVE ECT SENSOR

(a) Disconnect the ECT sensor connector.

(b) Using a 19 mm deep socket wrench, remove the ECT sensor and gasket.



3. 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.

4. REINSTALL ECT SENSOR

(a) Install a new gasket to the ECT sensor.

(b) Using a 19 mm deep socket, install the ECT sensor.

Torque: 20 N·m (200 kgf·cm, 14 ft·lbf)

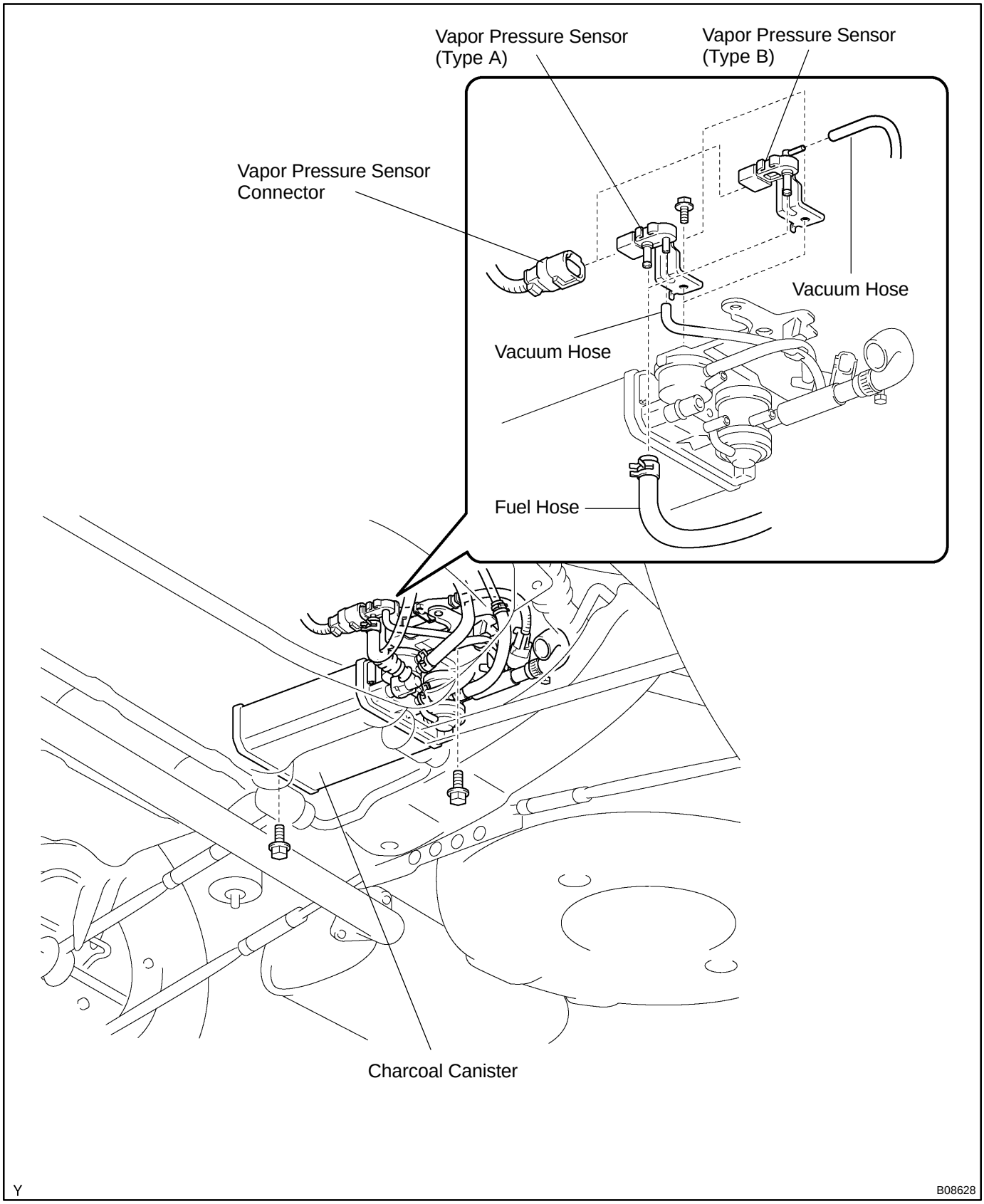
(c) Connect the ECT sensor connector.

5. REFILL WITH ENGINE COOLANT

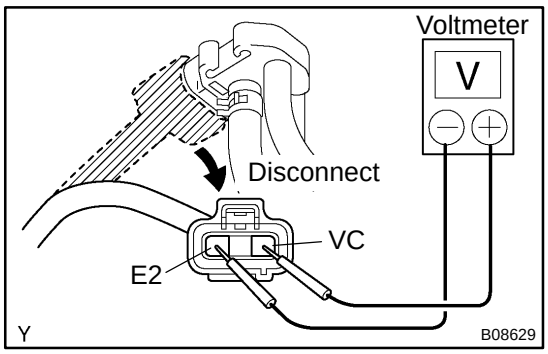
VAPOR PRESSURE SENSOR

COMPONENTS

SF101–02



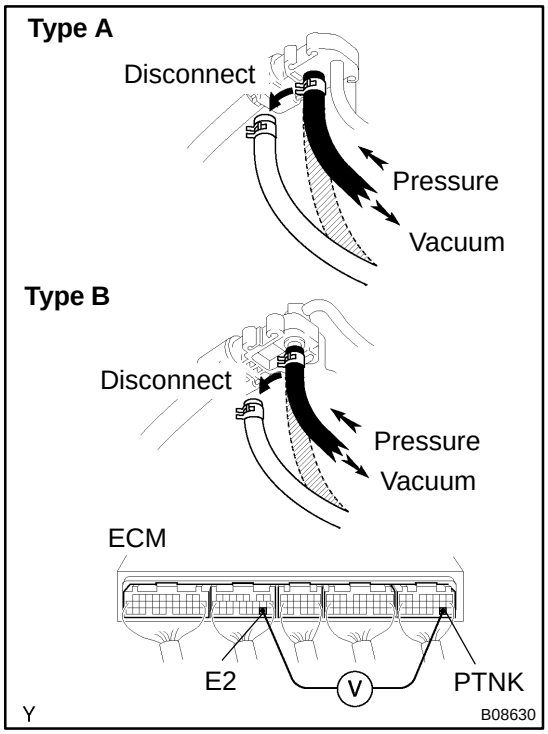
SF06R–03



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 terminals VC and E2 of the wiring harness side.
Voltage: 4.5 – 5.5 V
(d) Turn the ignition switch OFF.
(e) Reconnect the vapor pressure sensor connector.



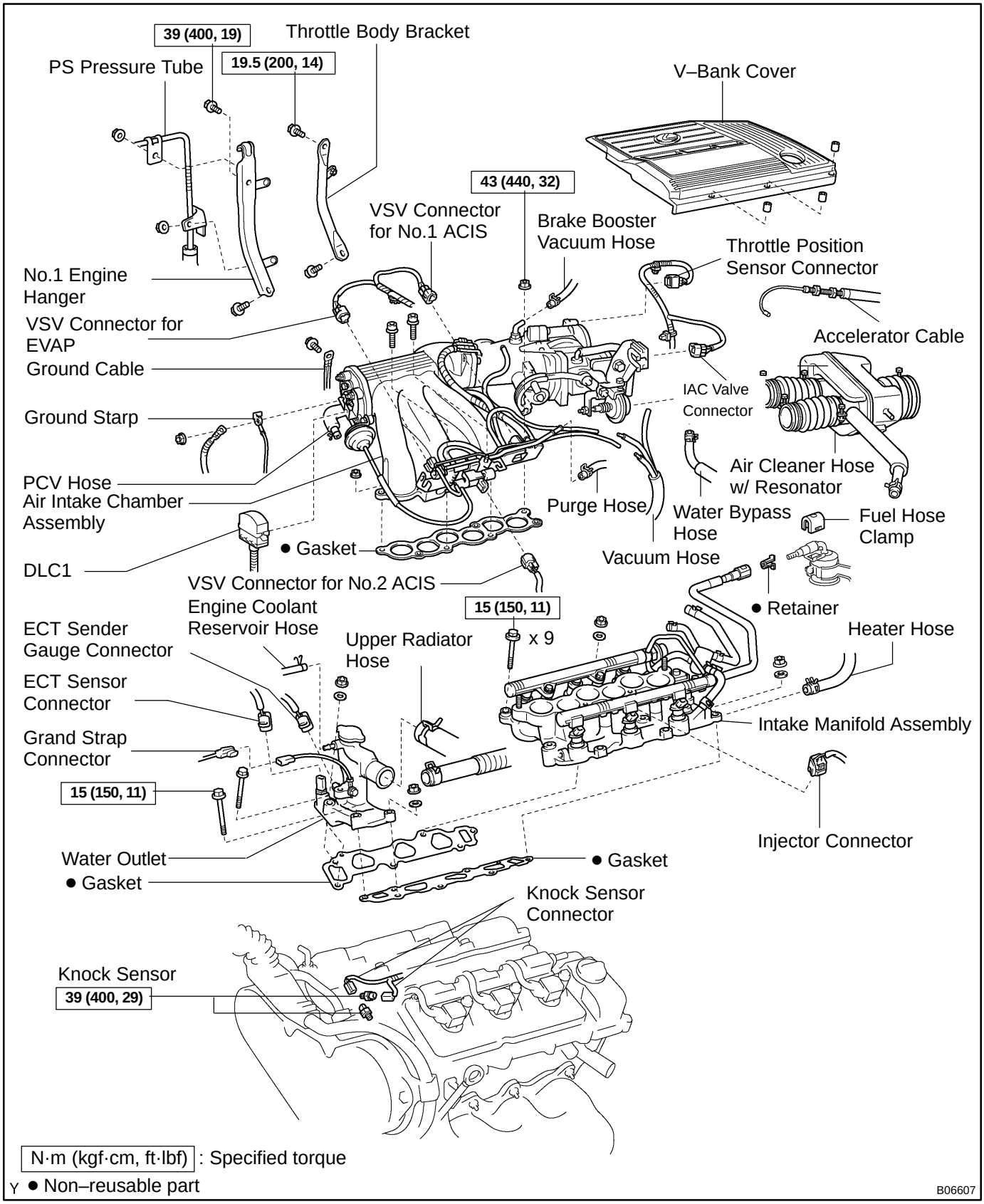
2. INSPECT POWER OUTPUT OF VAPOR PRESSURE SENSOR

(a) Turn the ignition switch ON.
(b) Disconnect the fuel hose from the vapor pressure sensor.
(c) Connect a voltmeter to terminals PTNK and E2 of the ECM, and measure the output voltage under the following conditions:
(1) Apply vacuum (2.0 kPa (15 mmHg, 0.59 in.Hg)) to the vapor pressure sensor.
Voltage: 1.3 – 2.1 V
(2) Release the vacuum from the vapor pressure sensor.
Voltage: 3.0 – 3.6 V
(3) Apply pressure (1.5 kPa (15 gf/cm^2, 0.22 psi)) to the vapor pressure sensor.
Voltage: 4.2 – 4.8 V
(d) Turn the ignition switch OFF.
(e) Reconnect the fuel hose to the vapor pressure sensor.

KNOCK SENSOR

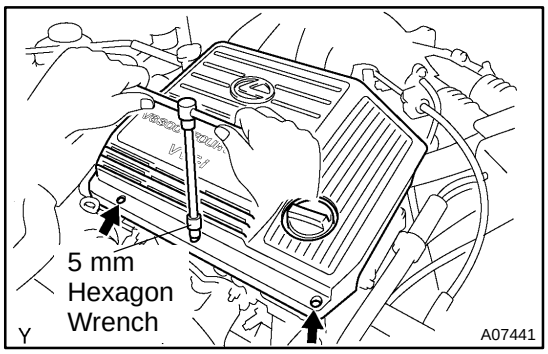
COMPONENTS

SF06S–02



SF102–01

INSPECTION



1. REMOVE V–BANK COVER

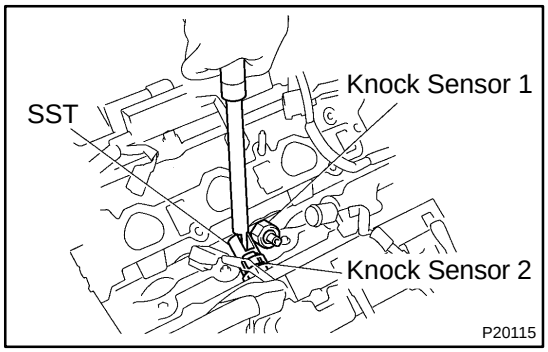
(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.

(b) Loosen the V–bank cover fastener counterclockwise.

(c) Remove the V–bank cover.

2. REMOVE AIR CLEANER HOSE WITH RESONATOR

3. REMOVE INTAKE MANIFOLD ASSEMBLY AND WATER OUTLET (See page EM–31)

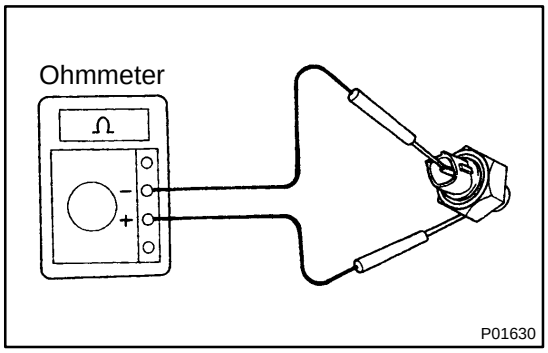


4. REMOVE KNOCK SENSORS

(a) Disconnect the knock sensor connector.

(b) Using SST, remove the knock sensor.

SST 09817–16011



5. INSPECT KNOCK SENSORS

Using an ohmmeter, check that there is no continuity between the terminal and body.

If there is continuity, replace the sensor.

6. REINSTALL KNOCK SENSORS

(a) Using SST, install the knock sensor.

SST 09817–16011

Torque: 39 N·m (400 kgf·cm, 29 ft·lbf)

(b) Connect the knock sensor connector.

7. REINSTALL WATER OUTLET AND INTAKE MANIFOLD ASSEMBLY (See page EM–59)

8. REINSTALL AIR CLEANER HOSE WITH RESONATOR

9. REINSTALL V–BANK COVER

(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.

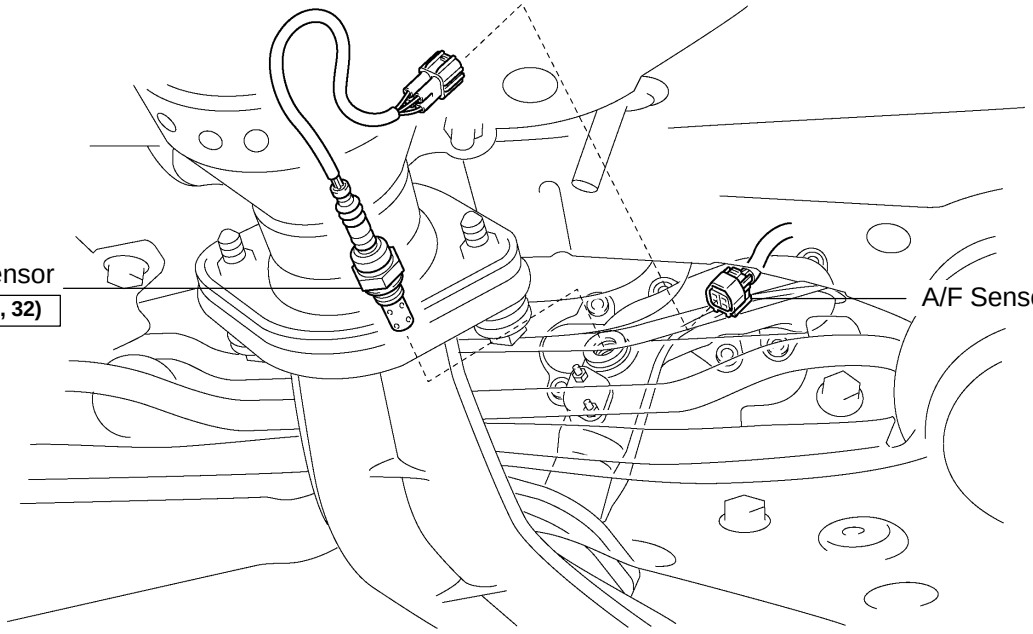
(b) Press down the V–bank cover fastener.

AIR–FUEL RATIO (A/F) SENSOR

SF103–01

COMPONENTS

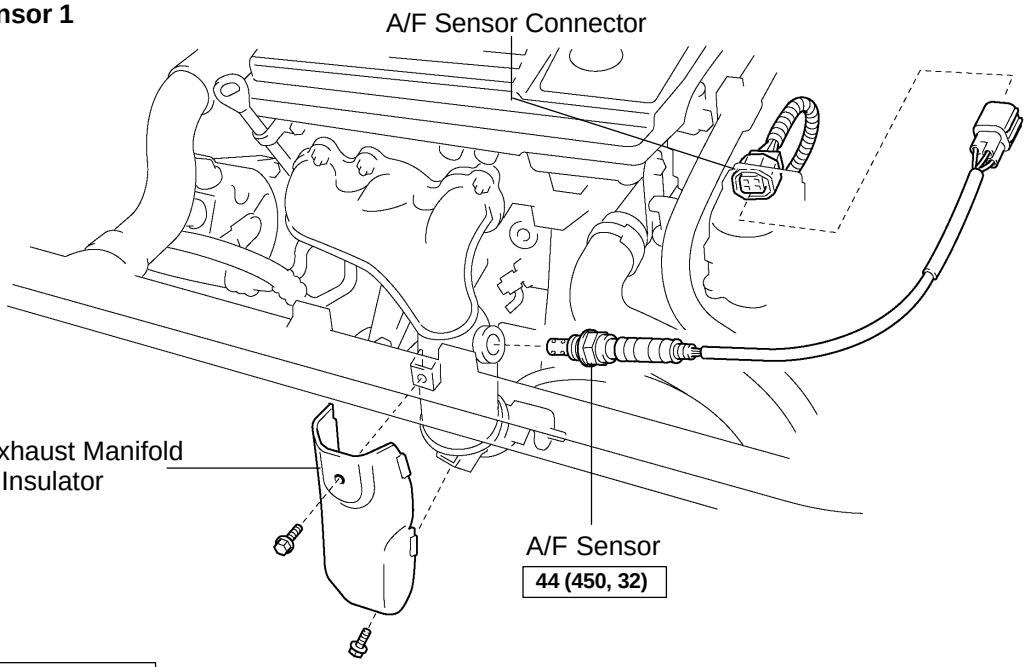
Bank 1 Sensor 1



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

B06683

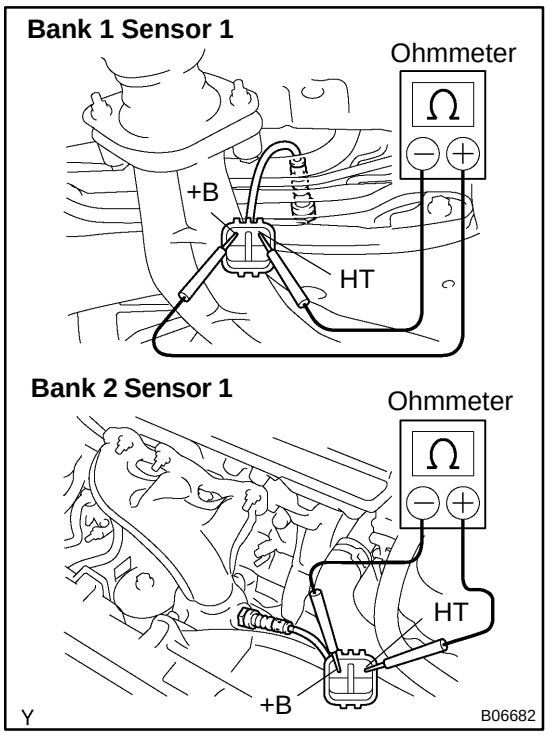
Bank 2 Sensor 1



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

B06681

SF104–01



INSPECTION

INSPECT HEATER RESISTANCE OF A/F SENSORS (Bank 1 sensor 1, Bank 2 Sensor 1)

(a) Disconnect the A/F sensor connector.

(b) Using an ohmmeter measure the resistance between terminals +B and HT.

Resistance:

At 20˚C (68˚F)	0.8 – 1.4 Ω
At 800˚C (1,472˚F)	1.8 – 3.2 Ω

If the resistance is not as specified, replace the sensor.

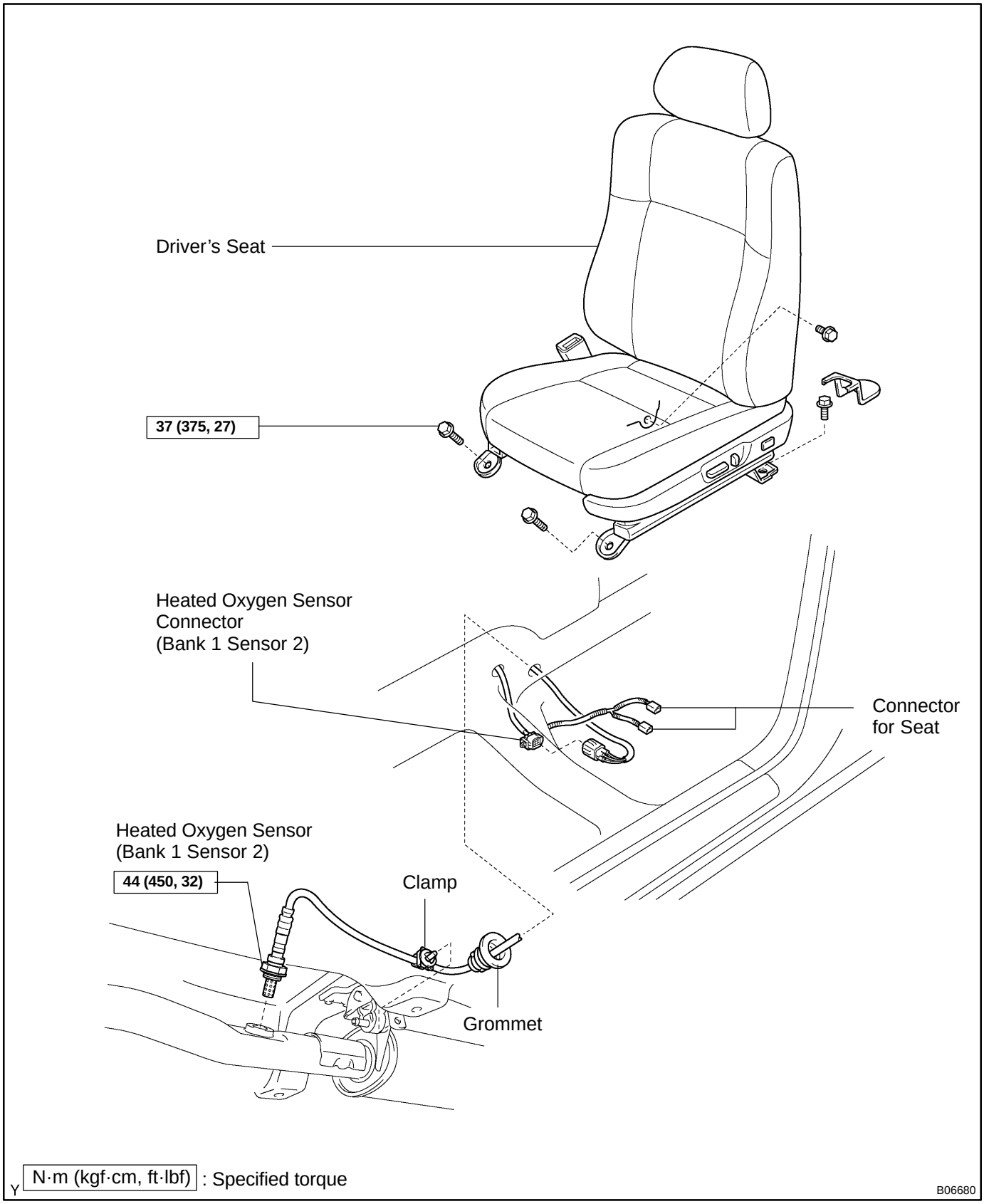
Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

(c) Reconnect the A/F sensor connector.

HEATED OXYGEN SENSOR

COMPONENTS

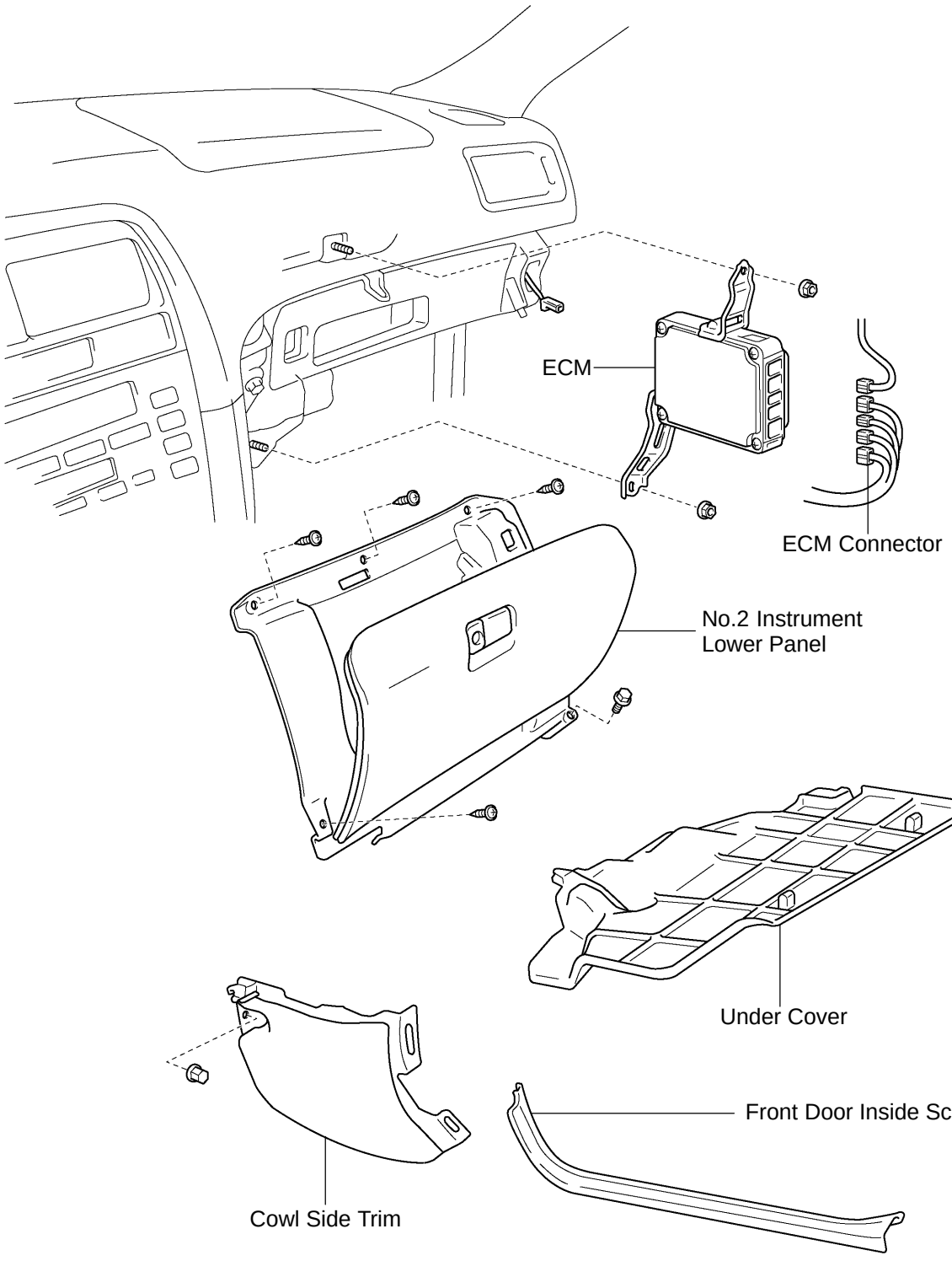
SF105–01



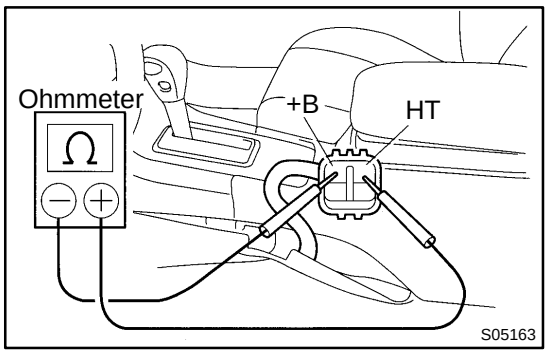
ENGINE CONTROL MODULE (ECM)

SF06Z–03

COMPONENTS



SF106–01



INSPECTION

INSPECT HEATER RESISTANCE OF HEATED OXYGEN SENSOR (Bank 1 Sensor 2)

(a) Remove the driver's seat.

(b) Disconnect the oxygen sensor connector.

(c) Using an ohmmeter, measure the resistance between the terminals +B and HT.

Resistance:

At 20˚C (68˚F)	11 – 16 Ω
At 800˚C (1,472˚F)	23 – 32 Ω

If the resistance is not as specified, replace the sensor.

Torque: 44 N·m (450 kgf·cm, 32 ft·lbf)

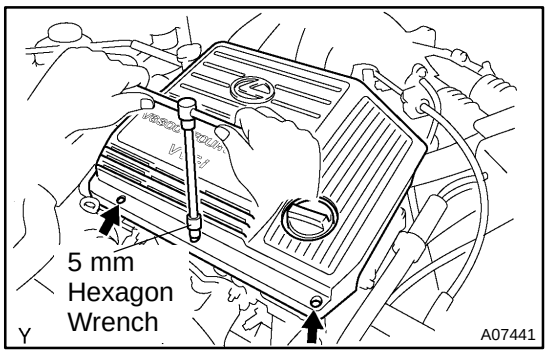
(d) Reconnect the oxygen sensor connector.

(e) Reinstall the driver's seat.

SF070–01

INSPECTION

1. REMOVE ECM
2. INSPECT ECM (See page DI–20)
3. REINSTALL ECM



FUEL CUT RPM

SF071–03

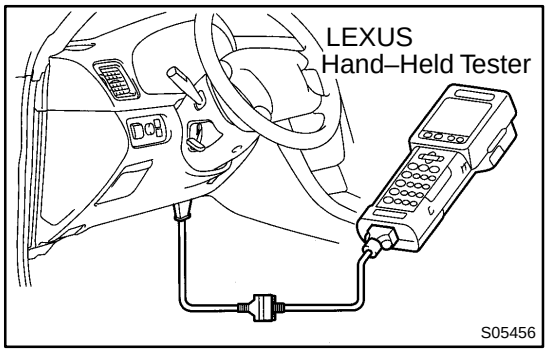
INSPECTION

1. REMOVE V–BANK COVER

(a) Using a 5 mm hexagon wrench, remove the 3 cap nuts.
(b) Loosen the V–bank cover fastener counterclockwise.
(c) Remove the V–bank cover.

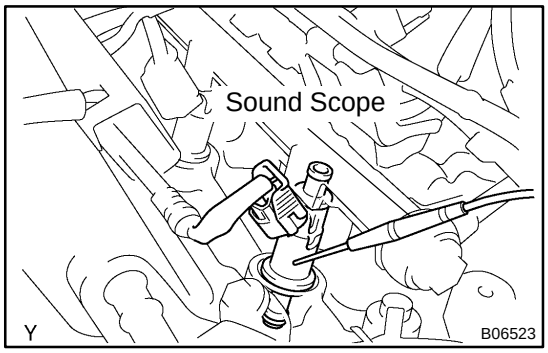
2. WARM UP ENGINE

Allow the engine to warm up to normal operating temperature.



3. CONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL

(a) Connect the LEXUS hand–held tester or OBDII scan tool to the DLC3.
(b) Please refer to the LEXUS hand–held tester or OBDII scan tool operator's manual for further details.



4. INSPECT FUEL CUT OFF PRM

(a) Increase the engine speed to at least 3,500 rpm.
(b) Use a sound scope to check for injector operating noise.
(c) Check that when the throttle lever is released, injector operation noise stops momentarily and then resumes.

HINT:

Measure with the A/C OFF.

Fuel return rpm: 1,200 rpm

5. DISCONNECT LEXUS HAND–HELD TESTER OR OBDII SCAN TOOL

6. REINSTALL V–BANK COVER

(a) Using 5 mm hexagon wrench, install the V–bank cover with the 3 cap nuts.
(b) Press down the V–bank cover fastener.

STARTING SYSTEM

ST017–01

ON–VEHICLE INSPECTION

NOTICE:

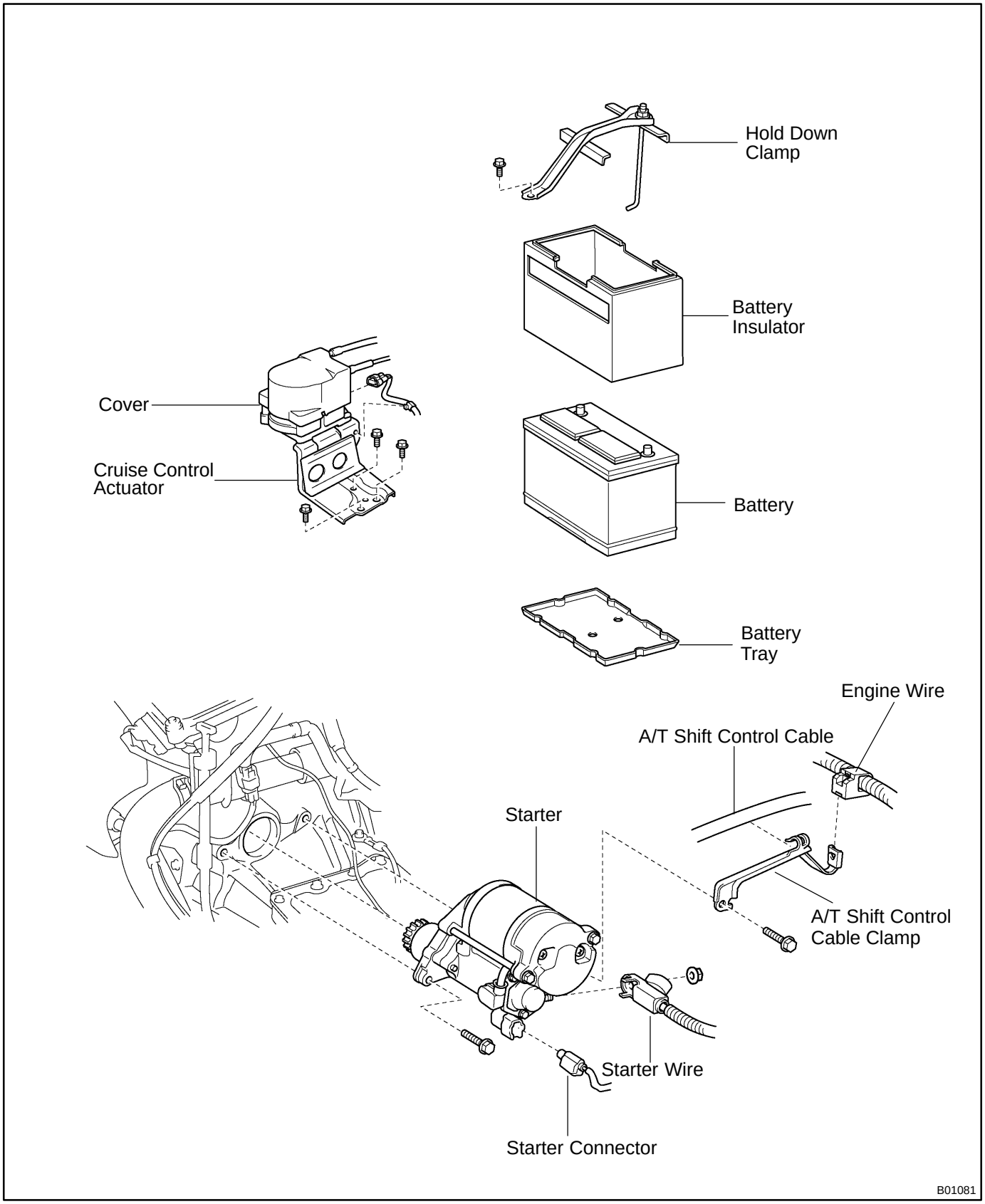
Before changing the starter, check the following items again:

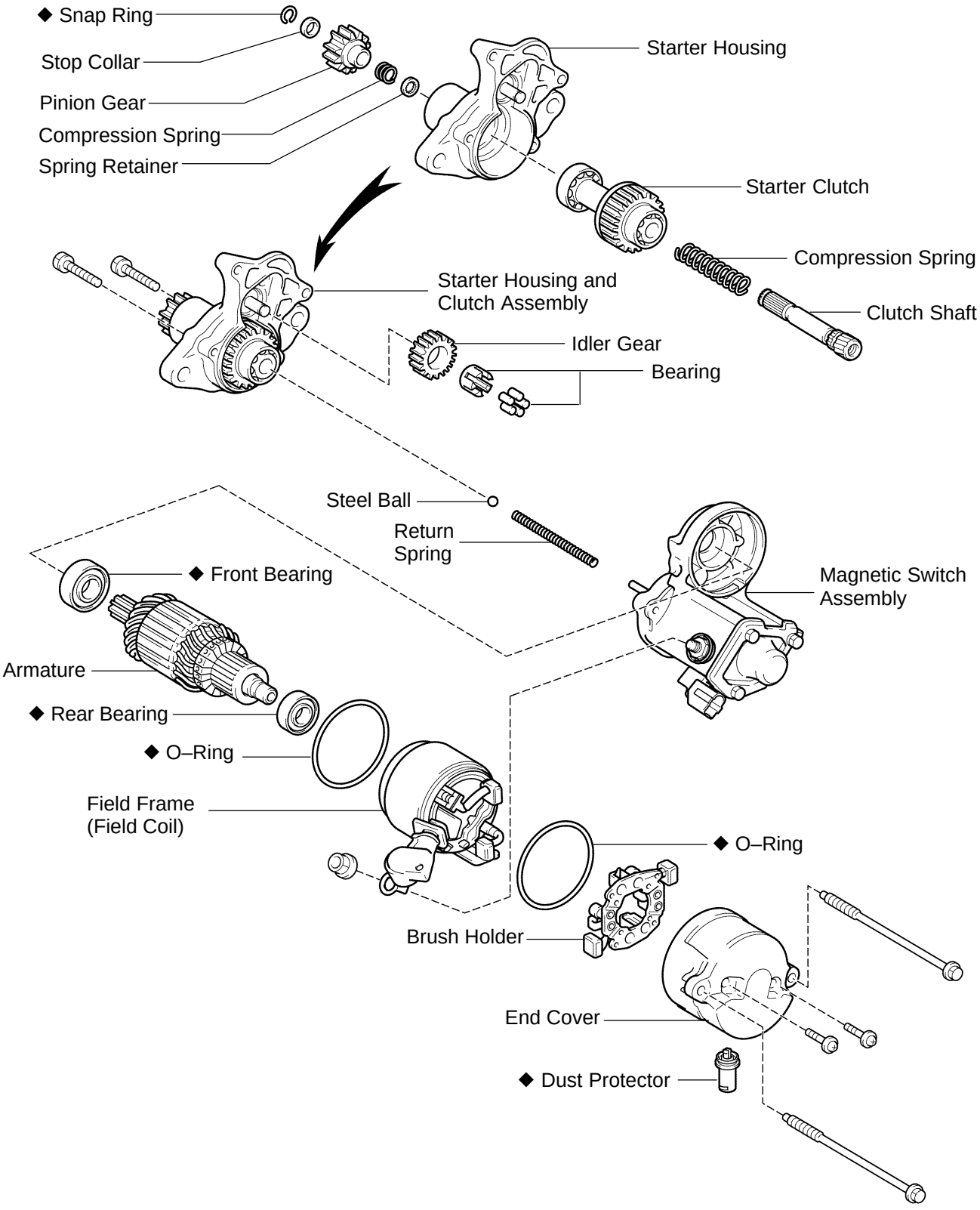
- **Connector connection**
- **Accessory installation, e.g.: theft deterrent system**

STARTER

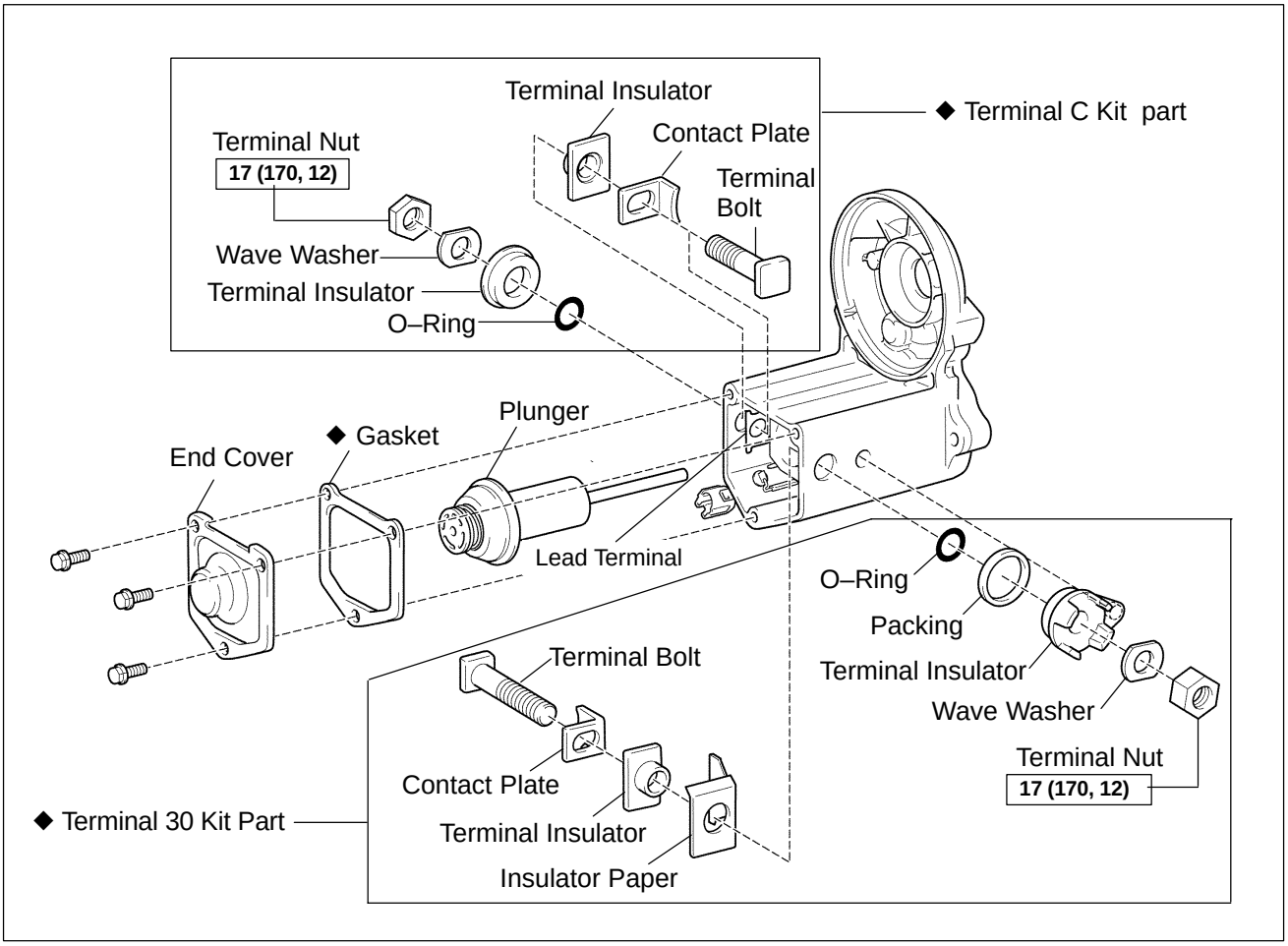
COMPONENTS

ST018–01




◆ Snap Ring
Stop Collar
Pinion Gear
Compression Spring
Spring Retainer
Starter Housing
Starter Clutch
Compression Spring
Clutch Shaft
Starter Housing and Clutch Assembly
Idler Gear
Bearing
Steel Ball
Return Spring
◆ Front Bearing
Magnetic Switch Assembly
Armature
◆ Rear Bearing
◆ O–Ring
Field Frame (Field Coil)
◆ O–Ring
Brush Holder
End Cover
◆ Dust Protector
◆ Non–reusable part
B01154

Magnetic Switch Assembly



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

◆ Non–reusable part

B01155

ST019–01

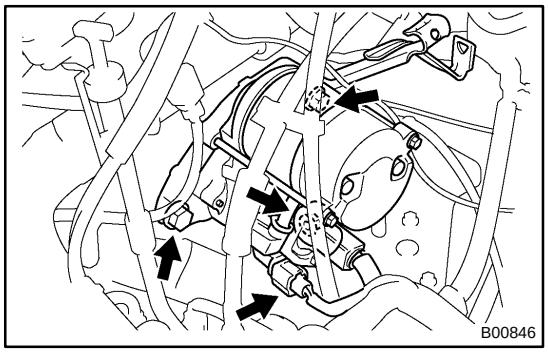
REMOVAL

1. REMOVE BATTERY AND TRAY

2. (w/ CRUISE CONTROL SYSTEM)
REMOVE CRUISE CONTROL ACTUATOR

(a) Disconnect the actuator connector and clamp.

(b) Remove the 3 bolts, and disconnect the actuator with the bracket.



3. REMOVE STARTER

(a) Disconnect the A/T shift control cable.

(b) Disconnect the engine wire.

(c) Disconnect the starter connector.

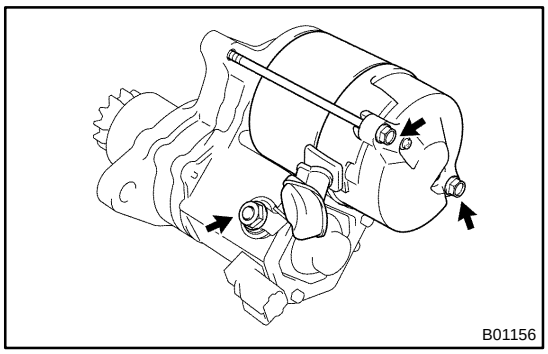
(d) Remove the nut, and disconnect the starter wire.

(e) Remove the 2 bolts, A/T shift control cable clamp and starter.

Torque: 37 N·m (380 kgf·cm, 27 ft·lbf)

ST01A–01

DISASSEMBLY

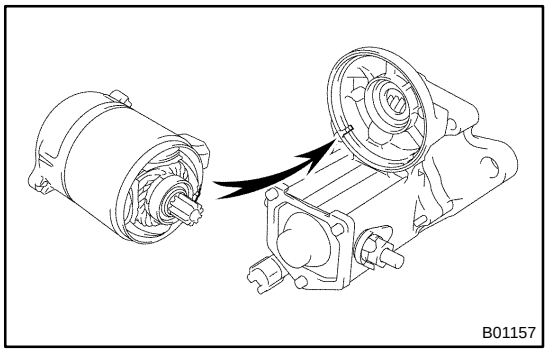


1. REMOVE DUST PROTECTOR

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: 5.9 N·m (60 kgf·cm, 52 in.·lbf)



(c) Pull out the field frame together with the armature.

HINT:

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

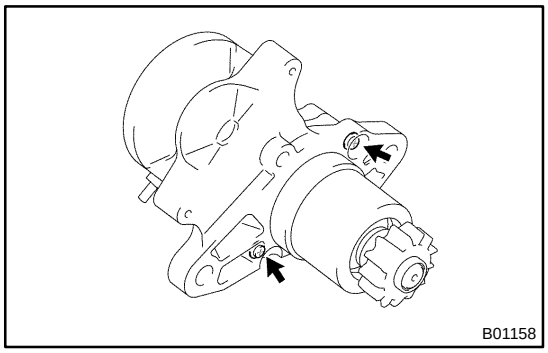
Align the protrusion of the field frame with the groove of the magnetic switch.

(d) Remove the O–ring from the field frame.

HINT:

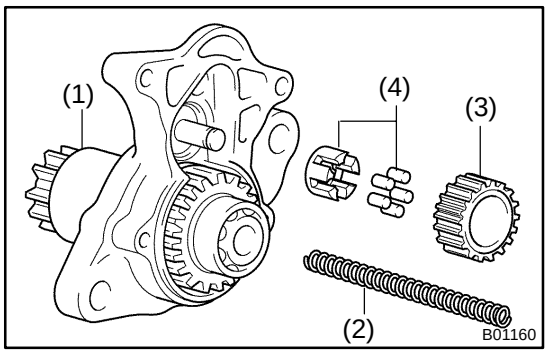
At the time assembly, please refer to the following items.

Use a new O–ring.

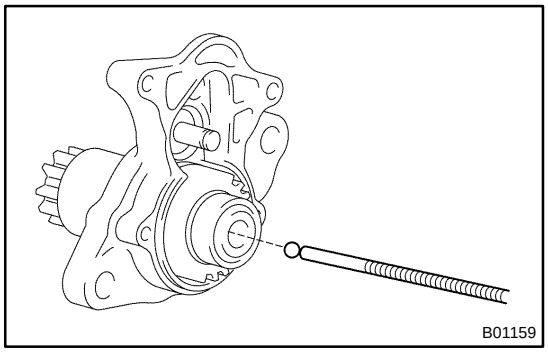


3. REMOVE STARTER HOUSING, CLUTCH ASSEMBLY AND GEAR

(a) Remove the 2 screws.
Torque: 5.9 N·m (60 kgf·cm, 52 in.·lbf)

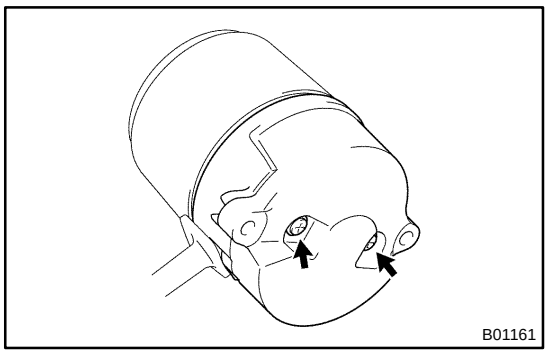


(b) Remove these parts from the magnetic switch:
(1) Starter housing and clutch assembly
(2) Return spring
(3) Idler gear
(4) Bearing



4. REMOVE STEEL BALL

Using a magnetic finger, remove the steel ball from the clutch shaft hole.



5. REMOVE BRUSH HOLDER

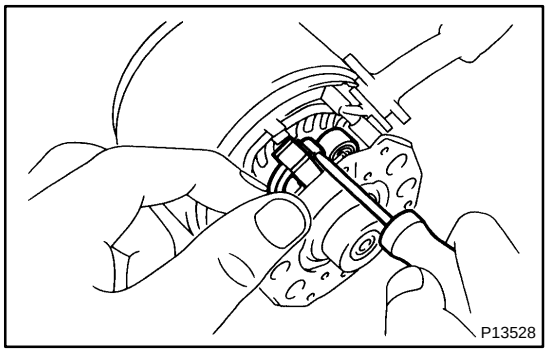
(a) Remove the 2 screws and end cover from the field frame.
Torque: 1.5 N·m (15 kgf·cm, 13 in.·lbf)

(b) Remove the O–ring from the field frame.

HINT:

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

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:

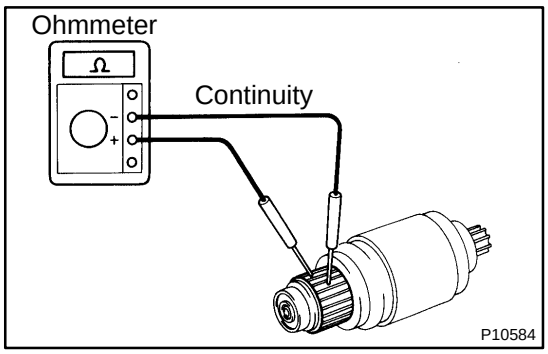
At the time of assembly, please refer to the following item.

Check that the positive (+) lead wires are not grounded.

6. REMOVE ARMATURE FROM FIELD FRAME

ST01B–01

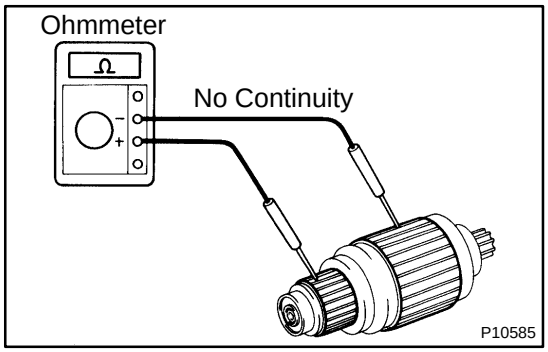
INSPECTION



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.



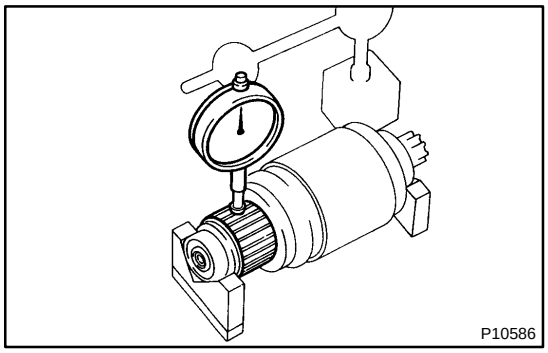
2. INSPECT COMMUTATOR FOR GROUND

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 SURFACES

If the surface is dirty or burnt, correct it with sandpaper (No.400) or on a lathe.



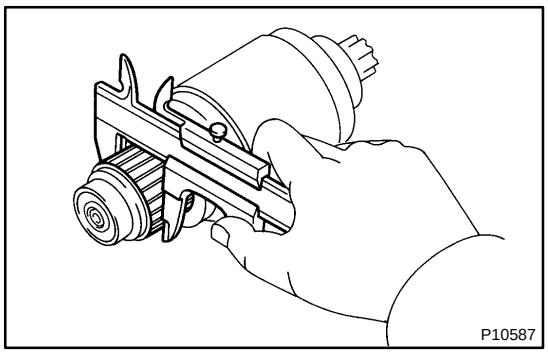
4. INSPECT COMMUTATOR CIRCLE RUNOUT

(a) Place the commutator on V–blocks.

(b) Using a dial gauge, measure 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.



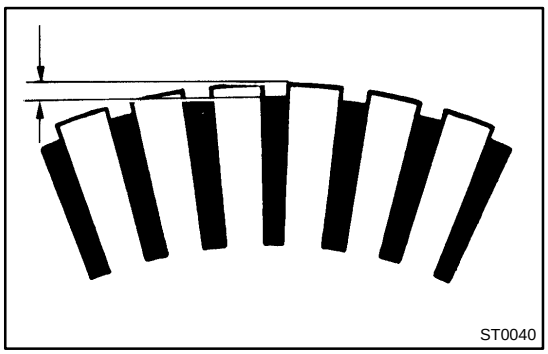
5. INSPECT COMMUTATOR DIAMETER

Using a vernier caliper, measure the commutator diameter.

Standard diameter: 30.0 mm (1.181 in.)

Minimum diameter: 29.0 mm (1.142 in.)

If the diameter is less than minimum, replace the armature.



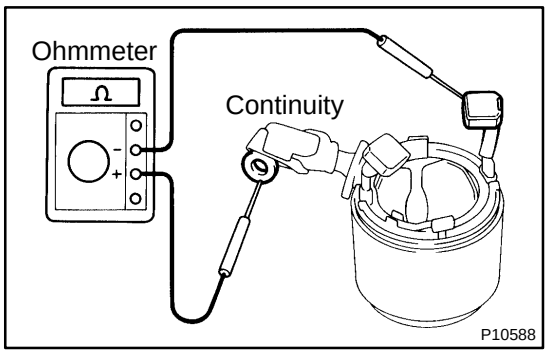
6. INSPECT UNDERCUT DEPTH

Check that the undercut depth is clean and free of foreign materials. Smooth out the edge.

Standard undercut depth: 0.6 mm (0.024 in.)

Minimum undercut depth: 0.2 mm (0.008 in.)

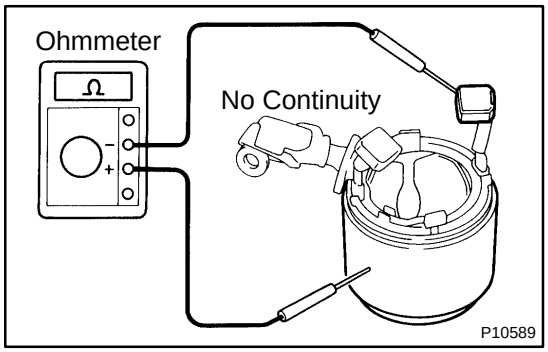
If the undercut depth is less than minimum, correct it with a hacksaw blade.



7. INSPECT FIELD COIL FOR OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between the lead wire and field coil brush lead.

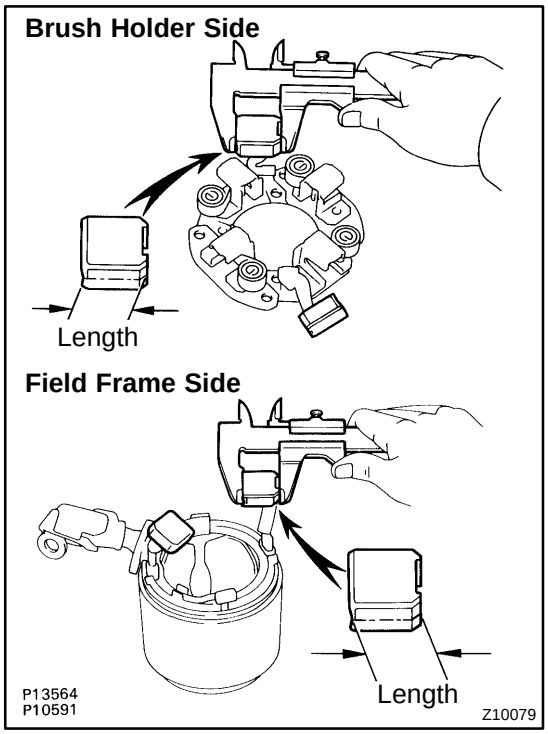
If there is no continuity, replace the field frame.



8. INSPECT FIELD COIL FOR GROUND

Using an ohmmeter, check that there is no continuity between the field coil end and field frame.

If there is continuity, repair or replace the field frame.



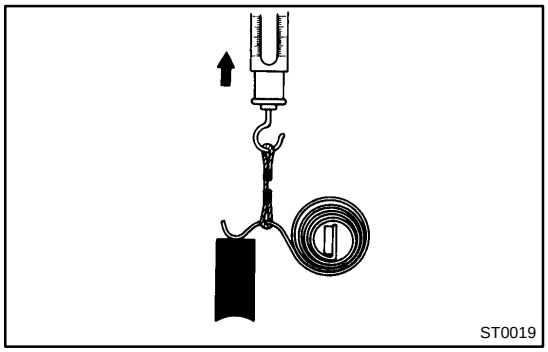
9. INSPECT BRUSH LENGTH

Using a vernier caliper, measure the brush length.

Standard length: 15.5 mm (0.610 in.)

Minimum length: 10.0 mm (0.394 in.)

If the length is less than minimum, replace the brush holder and field frame.



10. INSPECT BRUSH SPRING LOAD

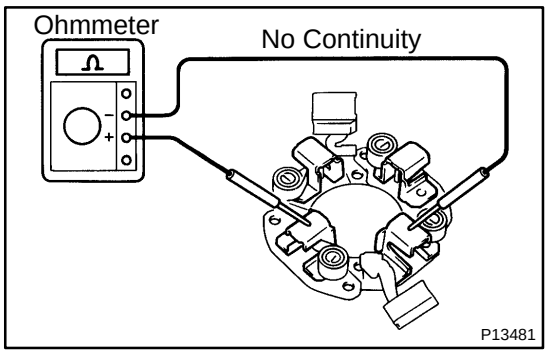
Take the pull scale reading the instant the brush spring separates from the brush.

Standard spring installed load:

17.6 – 23.5 N (1.8 – 2.4 kgf, 3.9 – 5.3 lbf)

Minimum spring installed load: 11.8 N (1.2 kgf, 2.6 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.

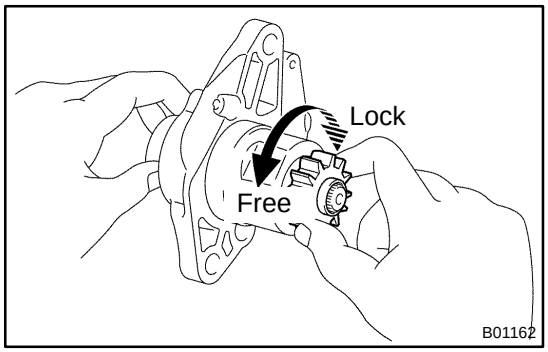
If there is continuity, repair or replace the brush holder.

12. INSPECT GEAR TEETH

Check the gear teeth on the pinion gear, idler gear and clutch assembly for wear or damage.

If damaged, replace the gear or clutch assembly.

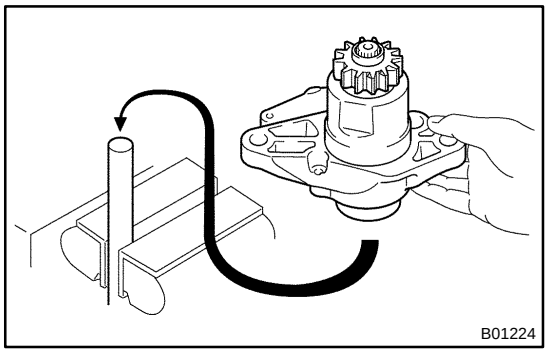
If damaged, also check the drive plate ring gear for wear or damage.



13. INSPECT CLUTCH

Hold the starter clutch and rotate the pinion gear counterclockwise, and check that it turns freely. Try to rotate the pinion gear clockwise and check that it locks.

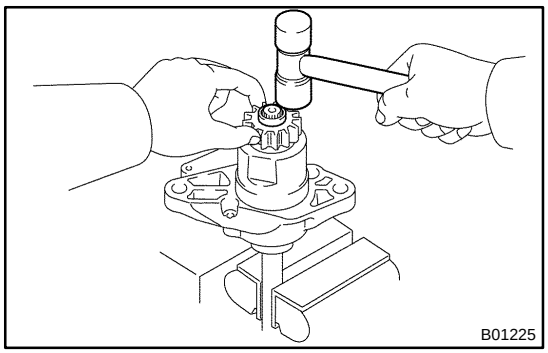
If necessary, replace the clutch assembly.



14. IF NECESSARY, REPLACE CLUTCH ASSEMBLY

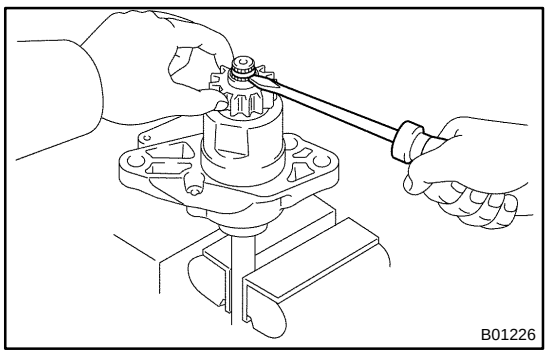
(a) Disassembe the starter housing and clutch assembly.

(1) Mount a brass bar in a vise, and install the starter housing and clutch assembly to the brass bar.

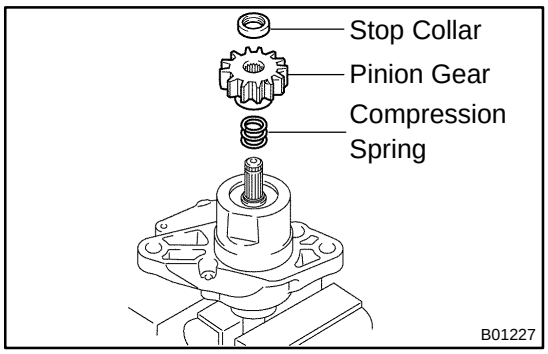


(2) Push down the pinion gear.

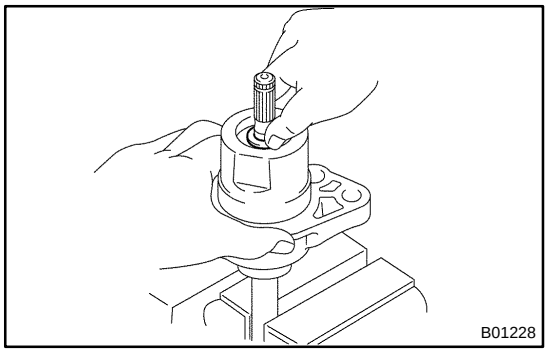
(3) Using a plastic–faced hammer, tap down the stop collar.



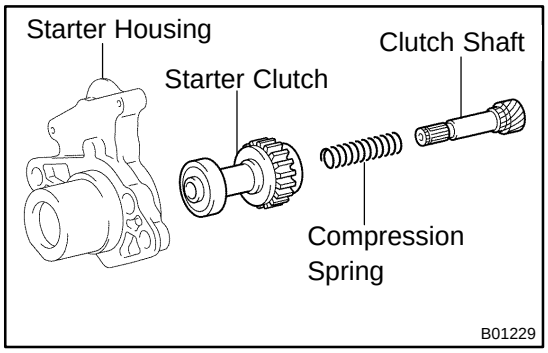
(4) Using a screwdriver, pry out the snap ring.



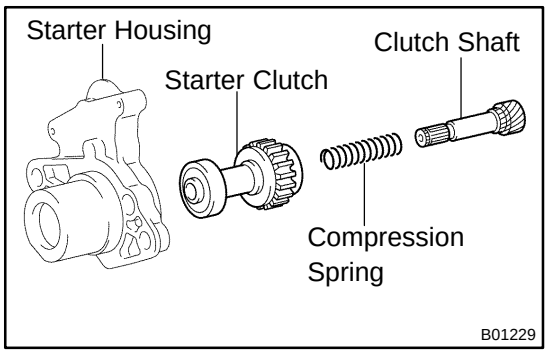
(5) Remove these parts:
- Stop collar
- Pinion gear
- Compression spring



(6) Push down the starter housing, and remove the spring retainer.

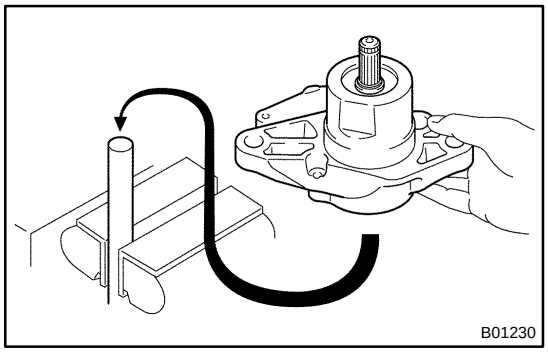


(7) Disassemble these parts:
- Starter housing
- Starter clutch
- Compression spring
- Clutch shaft

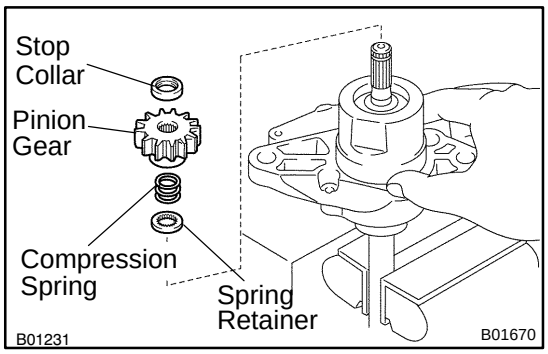


(b) Assemble the starter housing and clutch assembly.

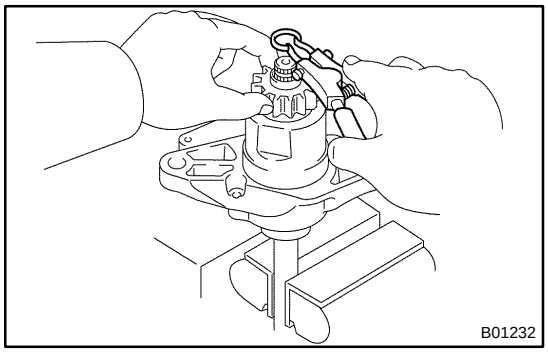
(1) Assemble these parts:
- Starter housing
- Starter clutch
- Compression spring
- Clutch shaft



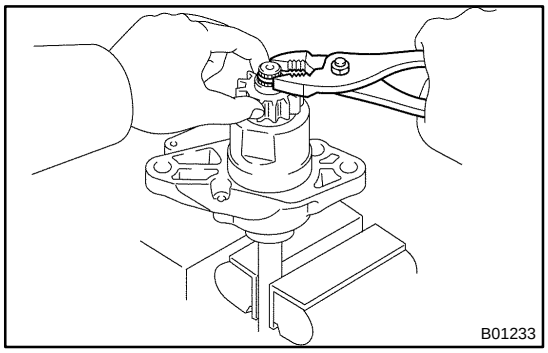
(2) Mount a brass bar in a vise, install the starter housing and clutch assembly to the brass bar.



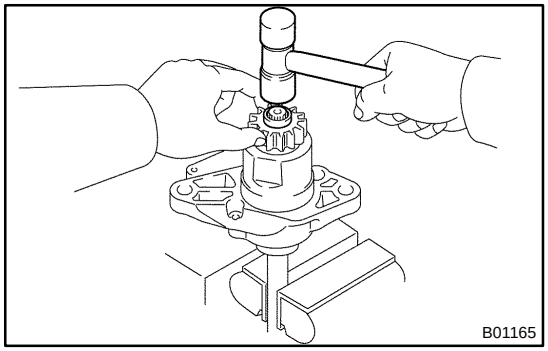
(3) Push down the starter housing, and install these parts:
- Spring retainer
- Compression spring
- Pinion gear
- Stop collar



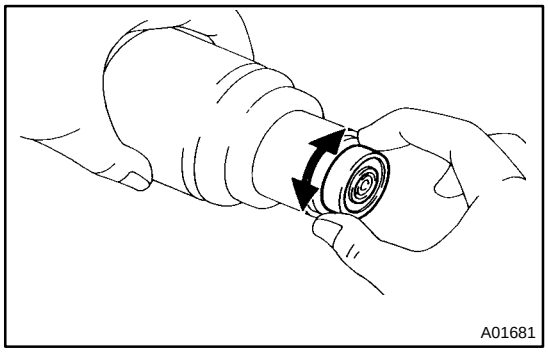
(4) Push down the pinion gear.
(5) Using snap ring pliers, install a new snap ring.



(6) Using pliers, compress the snap ring.
(7) Check that the snap ring fits correctly.

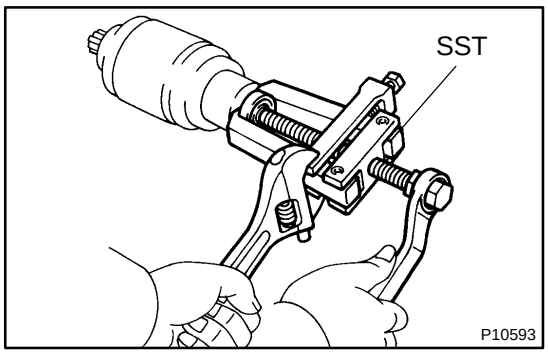


(8) Remove the starter housing and clutch assembly from the brass bar.
(9) Using a plastic–faced hammer, tap the clutch shaft and install the stop collar onto the snap ring.



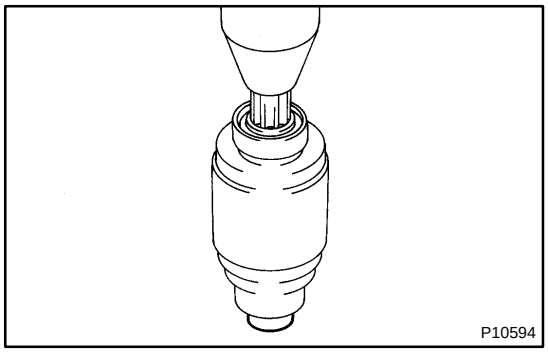
15. INSPECT REAR BEARING

Turn each bearing by hand while applying inward force.
If resistance is felt or the bearing sticks, replace the bearing.

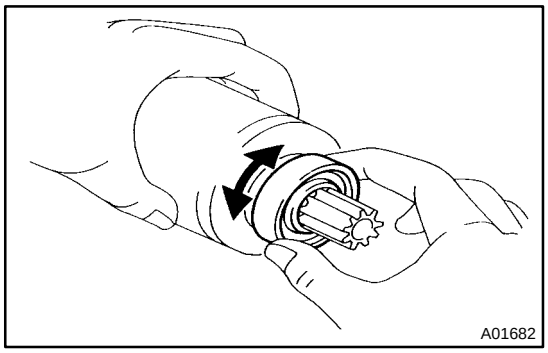


16. IF NECESSARY, REPLACE REAR BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

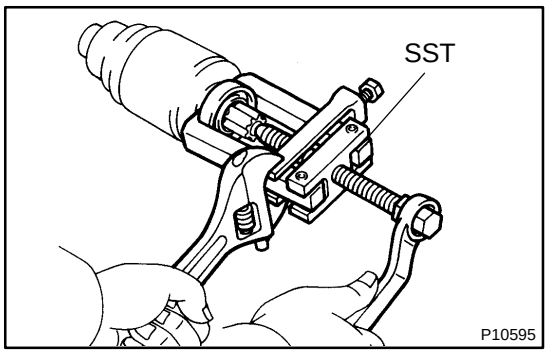


(b) Using a press, press in a new bearing.



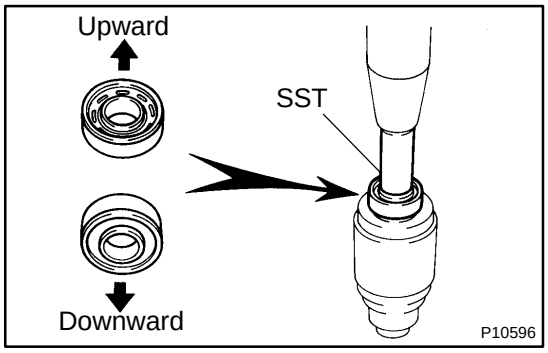
17. INSPECT FRONT BEARING

Turn each bearing by hand while applying inward force.
If resistance is felt or the bearing sticks, replace the bearing.



18. IF NECESSARY, REPLACE FRONT BEARING

(a) Using SST, remove the bearing.
SST 09286–46011

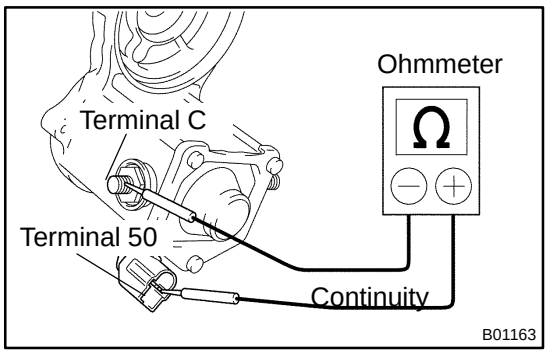


(b) Using SST and a press, press in a new bearing.

NOTICE:

Be careful of the bearing installation direction.

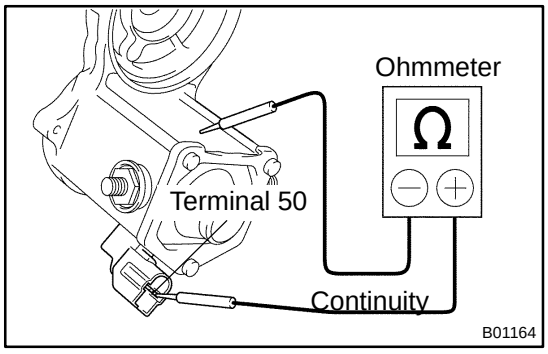
SST 09820–00030



19. INSPECT MAGNETIC SWITCH PULL–IN COIL OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between terminals 50 and C.

If there is no continuity, check and replace the magnetic switch.



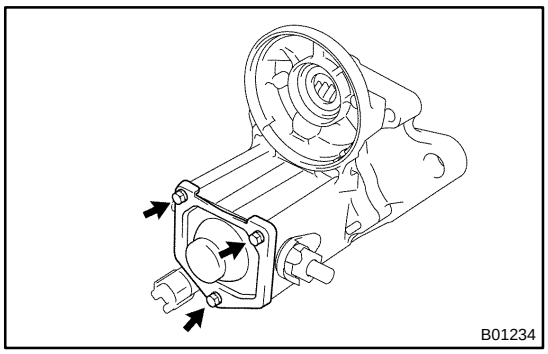
20. INSPECT MAGNETIC SWITCH HOLD–IN COIL OPEN CIRCUIT

Using an ohmmeter, check that there is continuity between terminal 50 and the switch body.

If there is no continuity, replace the magnetic switch.

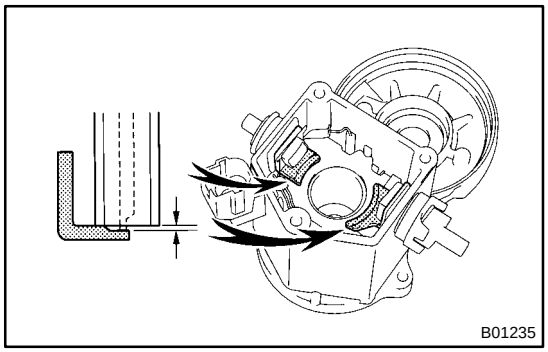
ST01C–01

REPLACEMENT



1. REMOVE MAGNETIC SWITCH END COVER

Remove the 3 bolts, end cover, gasket and plunger.

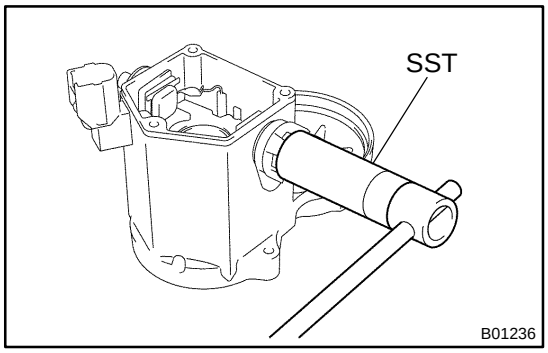


2. INSPECT CONTACT PLATE FOR WEAR

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.

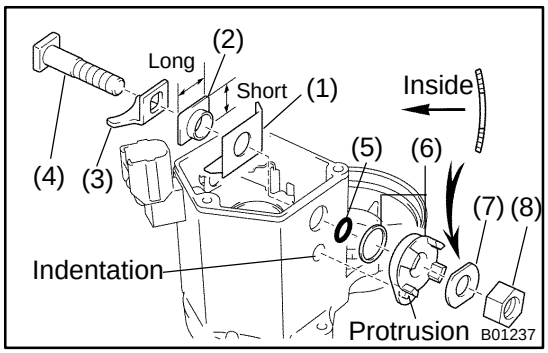


3. REMOVE TERMINAL KIT PARTS

(a) Using SST, loosen the terminal nuts.
SST 09810–38140

(b) Terminal C:
Remove the terminal nut, wave washer, terminal insulator (outside), O–ring, terminal bolt, contact plate and terminal insulator (inside).

(c) Terminal 30:
Remove the terminal nut, wave washer, terminal insulator (outside), packing, O–ring, terminal bolt, contact plate, terminal insulator (inside) and insulation paper.



4. REINSTALL TERMINAL KIT PARTS

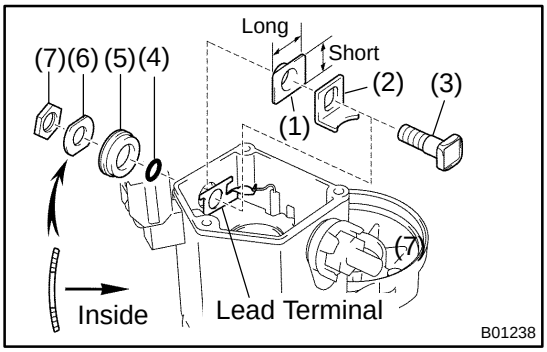
(a) Terminal 30:
Install these new parts:
(1) Insulation paper
(2) Terminal insulator (inside)
(3) Contact plate
(4) Terminal bolt
(5) O–ring
(6) Packing and terminal insulator (outside):
Install the packing to the terminal insulator, and install them.

HINT:
Match the protrusion of the insulator with the indentation of the housing.

(7) Wave washer
(8) Terminal nut

NOTICE:

Be careful to install the terminal insulators (inside) and wave washers in the correct direction.

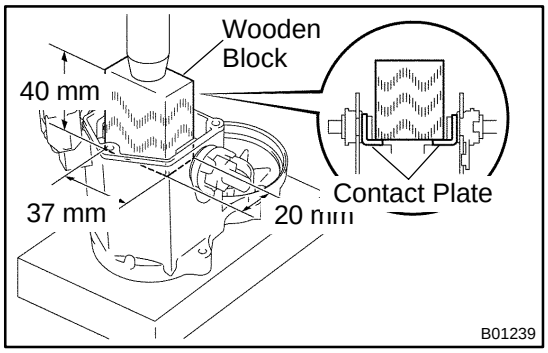


(b) Terminal C:
Install these new parts:
(1) Terminal insulator (inside)
(2) Contact plate
(3) Terminal bolt
(4) O–ring
(5) Terminal insulator (outside)
(6) Wave washer
(7) Terminal nut

NOTICE:

Be careful to install the terminal insulators (inside) and wave washers in the correct direction.

(c) Temporarily tighten the terminal nuts.



5. TIGHTEN TERMINAL NUT

(a) 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.**

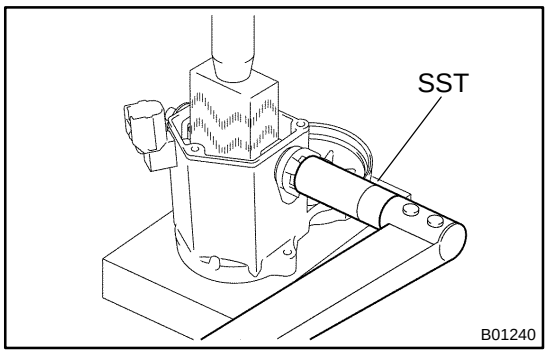
Gauge pressure:

$$(\text{kgf/cm}^2) = \frac{100\ \text{kgf}}{\left(\frac{\text{Ram diameter (cm)}}{2}\right)^2 \times 3.14\ (\pi)}$$

$$(\text{psi}) = \frac{221\ \text{lbf}}{\left(\frac{\text{Ram diameter (in.)}}{2}\right)^2 \times 3.14\ (\pi)}$$

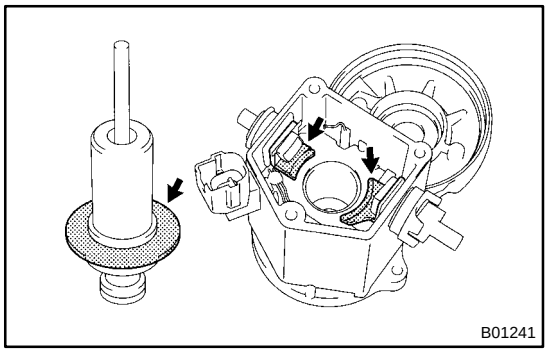
(kpa) = (kgf/cm^2) x 98.1
(kpa) = (psi) x 6.9

- **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.**



(b) Using SST, tighten the nuts to the specified torque.
SST 09810–38140
Torque: 17 N·m (170 kgf·cm, 12 ft·lbf)

NOTICE:
If the nut is over tightened, it may cause cracks on the inside of the insulator.



6. CLEAN CONTACT SURFACES OF CONTACT PLATE AND PLUNGER

Clean the contact surfaces of the remaining contact plate and plunger with a dry shop rag.

7. REINSTALL MAGNETIC SWITCH END COVER

Install the plunger, new gasket, end cover with 3 bolts.
Torque: 2.5 N·m (26 kgf·cm, 23 in.·lbf)

ST01D–01

REASSEMBLY

Reassembly is in the reverse order of disassembly (See page ST–6).

HINT:

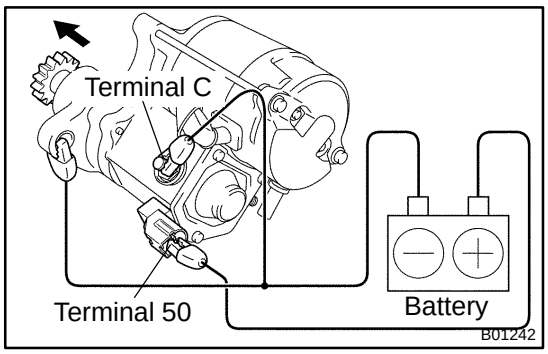
Use high–temperature grease to lubricate the bearings, springs, steel ball and gears when assembling the starter.

ST01E–01

TEST

NOTICE:

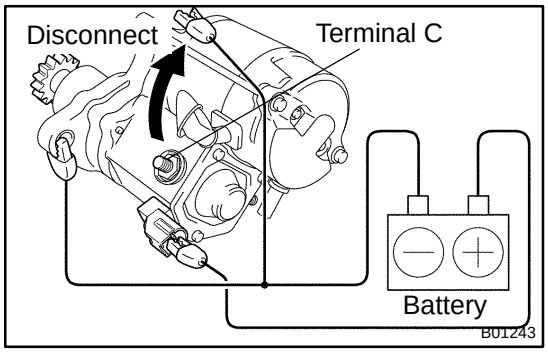
These tests must be done within 3 to 5 seconds to avoid burning out the coil.



1. DO PULL–IN TEST

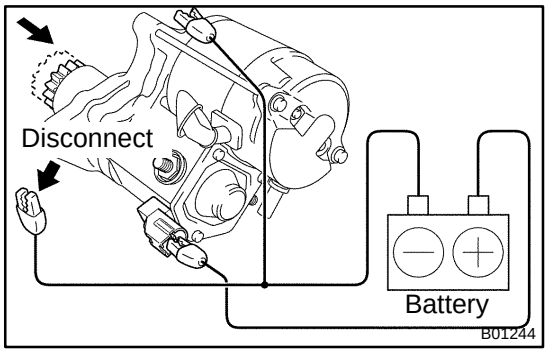
(a) Disconnect the field coil lead wire from terminal C.

(b) Connect the battery to the magnetic switch as shown. Check that the clutch pinion gear moves outward.



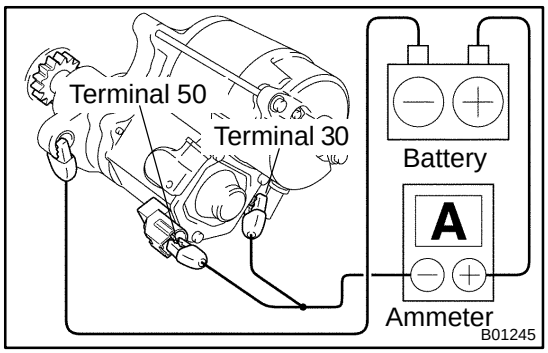
2. DO HOLD–IN TEST

With battery connected as above with the clutch 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 switch body. Check that the clutch 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 reads the specified current.

Specified current: 90 A or less at 11.5 V

ST01F–01

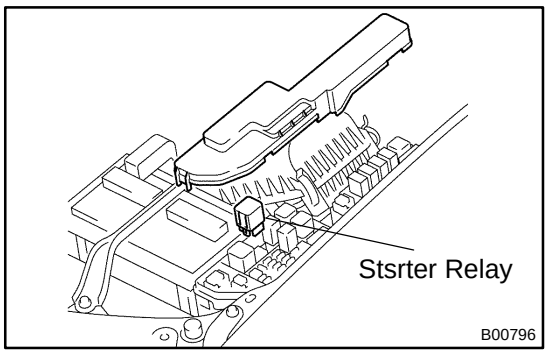
INSTALLATION

Installation is in the reverse order of removal (See page ST–5).

ST01F–01

INSTALLATION

Installation is in the reverse order of removal (See page ST–5).



STARTER RELAY

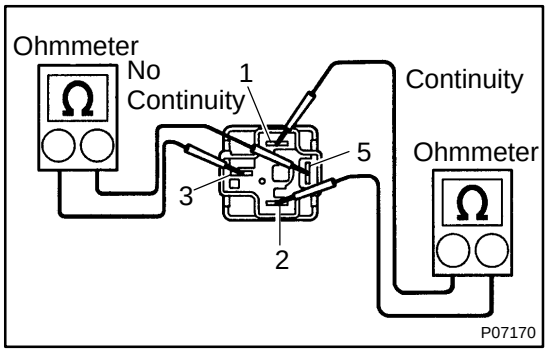
ST01G–01

INSPECTION

1. REMOVE STARTER RELAY (Marking: ”ST”)

LOCATION: In the engine compartment relay box.

Remove the relay box cover and starter relay.



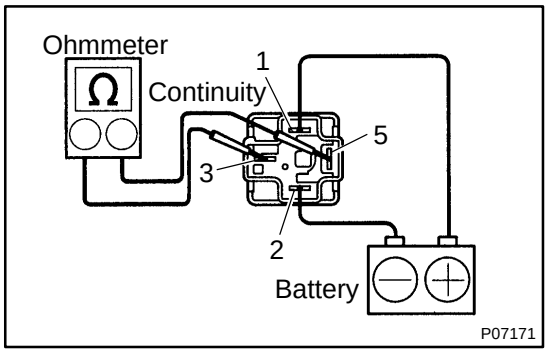
2. INSPECT STARTER RELAY CONTINUITY

(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 STARTER RELAY OPERATION

(a) Apply battery positive 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